Zimmer
MedizinSysteme

Instructions for use

SonoSys*Touch*

EN

SonoSys*Touch*

Digital colour Doppler
Ultrasound imaging system

INSTRUCTIONS FOR USE

Declaration

1. This manual contains some warnings and notes to raise awareness of potential dangers. The user should pay particular attention to dangers that are mentioned in this manual. Zimmer MedizinSysteme cannot be held liable for errors or omissions in this manual.

2. This system should only be operated by, or under the guidance of, a qualified physician.

3. Zimmer MedizinSysteme assumes no liability for data loss due to operational mistakes or operation in abnormal conditions.

4. The doctor assumes responsibility for the diagnostic procedure. Zimmer MedizinSysteme assumes no liability for this.

5. After purchasing this system, the user shall bear full responsibility for the maintenance and management of the system.

6. Zimmer MedizinSysteme shall assume no liability for the safety, reliability and performance of the system in the event that any of the following occurs:

   1) Loss or damage caused by not adhering to the operating instructions or due to improper handling of the system.

   2) Loss or damage caused by force majeure, such as fire, earthquakes, floods or lightning.

   3) Loss or damage resulting from operating conditions that do not conform to the requirements of the system, such as insufficient power supply, incorrect installation or environmental conditions that do not meet the requirements of the national standards for electrical equipment.

   4) Loss or damage caused by using the system in a location other than the one it was purchased for.

5) Assembly of the system where it has been upgraded, readjusted, improved or maintained by operators who are not recognised by Zimmer MedizinSysteme.

6) Loss or damage as a result of the system not being purchased from Zimmer MedizinSysteme or an agent authorised by Zimmer MedizinSysteme.

7. The company is responsible for the accuracy and completeness of these operating instructions. The instructions for use are part of the product.

8. The company reserves the final right to interpret these operating instructions.

9. These instructions for use are valid as of April 2019.

Maintenance instructions

1. Zimmer MedizinSysteme shall provide free maintenance during the warranty period if malfunctions occur during normal operation despite compliance with the operating instructions.

2. No free maintenance will be provided if any of the following conditions apply:

   1） The warranty period has expired.

   2） There is a failure caused by improper usage (such as incorrect power supply voltage, fire, human error, an accident etc.).

   3） Disassembly and maintenance have been carried out by operators who are not from Zimmer MedizinSysteme.

   4） There is damage to the system caused by disassembly that was not approved by Zimmer MedizinSysteme. In this situation, Zimmer MedizinSysteme has the right to refuse maintenance.

3. Zimmer MedizinSysteme will charge for the maintenance service if the system's warranty period has expired.

Contact information for

Zimmer MedizinSysteme customer service

Address: Zimmer MedizinSysteme GmbH

Junkersstr. 9

89231 Neu-Ulm

Tel.: 0731 – 9761 -0

Email: info@zimmer.de

CE 0123

The product bears the CE marking in accordance with the European Medical Devices Directive 93/42 EEC.

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Preliminary remark

In order to use this system correctly and safely and to ensure it has a long life, the user should have an accurate understanding of its functions, operations and instructions, as well as its maintenance. Please read the information contained in this manual carefully before using the system.

This system has been designed and manufactured so that it can be used safely for operators and patients. However, to guarantee safety and reliability, please pay attention to the following information:

a) This system belongs to protection class I, in accordance with IEC 60601-1:2005. Please follow the safety requirements described in Chapter 1 when operating this system. It contains applied parts of type BF and CF.

b) Do not try to remodel the system. If necessary, contact our agent or request assistance from us directly.

c) If any abnormality occurs during operation, turn off the power supply immediately and contact our agent or request assistance from us directly.

d) Connect the device's power cable to an earthed socket with a ground impedance of 0.1 Ω or less.

e) Additional equipment connected to the electrical medical equipment must comply with the applicable IEC or ISO standards (e.g. IEC60950 for data processing equipment). Furthermore, all configurations must comply with the requirements for electrical medical systems (see IEC 60601-1-1 or clause 16 of IEC60601-1 3). Anyone who connects additional equipment to electrical medical equipment is configuring a medical system and is therefore responsible for the system complying with the requirements for electrical medical systems. Please note that local laws take priority over the aforementioned requirements. If in doubt, consult your local specialist dealer or the technical service department.

f) The system does not provide special protective functions or safeguards for use with high-frequency equipment. Users should proceed cautiously with such applications.

g) In the USA, U.S. Federal Law restricts this device to sale by or on the order of a physician.

h) Pay special attention to **Warnings** or **Notes** in the operating instructions. Please

read this manual carefully and exercise caution when working.

【Warning】: Signals potential danger, in order to avoid serious injury or death.

【Note】: Signals potential danger, in order to avoid milder or moderate injury or material damage.

i) This manual does not contain any clinical examination techniques. The user must therefore adopt the correct examination techniques, based on his/her expertise, professional training and clinical experience.

j) These operating instructions may differ slightly from your equipment due to the version of the system software and the configuration of options and accessories. The actual system that you purchase is what counts.

k) If the administrator of this system changes, these operating instructions should be transferred to the new administrator so that he/she can manage this system correctly and avoid damage or loss due to operational errors.

Revised in October 2015

Chapter 1

Scope of Application and Safety Precautions

1.1 Scope of application

The system is a general-purpose diagnostic ultrasound imaging system designed exclusively for use in a wide variety of extracorporeal body-imaging procedures for humans. A general-purpose system supports various transducers and related application software packages, allowing for the collection, display and analysis of ultrasound information. Usages include, e.g., general-purpose cardiac imaging, OB/GYN, breast, prostate, vascular, Doppler and colour Doppler, depending on the particular operating system, the specific software packages and the compatible ultrasound transducers.

ECG mode offers 3-lead ECG signals for cardiac examinations. This mode is intended for acquiring and displaying 3-lead ECG signals only. ECG is used as a tool for synchronised display and storage of cardiac recordings.

【Note】: The system is not intended for foetal Doppler applications.

1.2 Operating conditions

a) This system should be operated under the following ambient conditions, so as to ensure its safe and correct operation:

- Ambient temperature: 0°C to 40°C
- Relative humidity: 30% to 85%;
- Atmospheric pressure: 700 hPa to 1,060 hPa.

⚠ **【Note】: If operation takes place outside the above-specified ranges, it cannot be guaranteed that any correct ultrasonic images will be produced.**

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b) Strong sources of radiated emissions or electromagnetic waves from radio & TV stations, for instance, may cause the system to function incorrectly or cause interference to occur in the display. The system must be kept away from such sources of emissions or electromagnetic waves.

c) Do not operate this system while other devices with motor or silex switches are operating in the same power phase. Otherwise, the power cables will cause interference to the system.

d) Keep the system dry and avoid strong fluctuations in temperature when repositioning the device. Otherwise there is a risk of a short circuiting due to condensation or water drops.

e) Using this system in a confined space may result in a high internal temperature. Therefore, please ensure that it is located in a well-ventilated room.

f) Medical electrical equipment requires the undertaking of special precautions regarding electromagnetic compatibility (EMC), and such devices must be installed in accordance with the EMC information contained in the accompanying documents.

g) Portable and mobile RF communications equipment (mobile phones, radio telephones, radios...) can affect medical electrical equipment.

1.3 Electricity requirements

Never use this system if the power supply does not meet the following requirements. Otherwise the system could get damaged.

a) Voltage: Single phase, 100 to 240V ~, tolerance ± 10 %, 50 Hz/60 Hz ± 1 Hz; 230 ± 23V ~ for EU countries, 50 Hz ± 1 Hz;

b) Connecting the equipotential bonding terminal: Use an earthed power socket. Before connecting to the power supply, connect the additional potential equalisation conductor to the equipotential bonding terminal on another earthed system or an additional earthed device;

c) Before inserting the power plug into the socket, you must connect the equipotential wire. Before unplugging the wire, you must unplug the plug from the socket to avoid electric shock;

d) The removable multi-jack socket provided with the system can only be used to supply power for the system equipment. The connection of electric devices that are not part of the system and the removable multi-jack socket may result in danger;

e) If the non-medical electrical equipment that is provided as part of the system needs to be supplied via a portable multiple socket with an isolating transformer, then direct connection of this non-medical electrical equipment to the wall socket can result in dangers;

f) Do not try to branch off any additional multiple sockets or wires from the removable multi-jack socket of the system devices or from the system devices themselves;

g) Any accessories or equipment which are not listed in this manual should not be connected to this system, as doing so may result in danger;

h) When the system configured as per this manual is in use, all power supply plugs of the devices must be connected to the same special portable multiple socket. If the portable multiple socket is powered by a special power supply device, this power supply device must comply with the requirements of standard IEC60601-1:2005. When the multiple socket is in use, the electric safety performance of the system ("system" refers to the ultrasound and imaging system only and not to the whole system consisting of the ultrasound imaging system and other peripheral devices) must comply with standard IEC 60601-1:2005. Should you have any queries, please consult your distributor or member of service personnel;

i) Do not place the removable multi-jack socket on the ground, as doing so may result in danger;

j) The maximum load capacity of the removable multi-jack socket may not be less than the total load of all devices that the system consists of, or this could result in danger.

【Note】: In regions where the mains supply is not stable, it is recommended to use the power supply from a stabiliser with an output power of 500VA, so as to avoid damage to the system due to mains voltage fluctuations.

1.4 Main features

a) Materials group: IIIb

b) Pollution class: 2

c) Mains transient voltage over voltage category: Class II

1.5 Safety

This system has been designed and manufactured in compliance with the international standard IEC 60601-1:2005. This system has undergone biological tests in accordance with the relevant requirements of ISO 10993, and these tests prove that this system does not cause any potential cytotoxicity, skin allergies or stimulation.

To operate the system correctly and safely, please follow the instructions below:

a) This system is not explosion-proof. Do not operate it in an inflammable or highly explosive environment (e.g. in the presence of anaesthetic gas, oxygen or hydrogen);

b) This system is not waterproof. Never allow water or other liquids to drip onto the system;

c) This unit needs a protective earthing system. The system's power cable must be connected to an earthed socket. If the system is powered by a power supply without earthing, its equipotential bonding terminal must be connected to the equipotential terminal of another earthed system or an additional earthed device. Do not use the system without an earth terminal;

d) Ultrasound safety:

- The ALARA (As Low As Reasonably Achievable) principle should be observed. Patients should always be exposed to the lowest practical transmit power levels for the shortest possible time.
- Stop the system or hold the probe away from the patient when no scanning is being performed.
- When examining the patient, avoid the probe being used on one part of the body for a long time.
- If clinical indications are required, the operator of the system must be fully familiar with the acoustic power output or have access to the relevant heat index. When switching on the device, entering a new patient ID or switching from a non-foetal to a foetal application, please check the display of the acoustic power output and MI.
- The probe should not be used for a trans-vaginal exam when noticeable heat is given off from the probe itself when it is exposed to the air. When examining an embryo or foetus, take special care to ensure that the acoustic output and exposure period are as low as possible.

【Warning】: To avoid the risk of an electric shock, this equipment must only be connected to a main supply with a protective conductor.

1.6 Warnings and notes

【Warning】:

a) While operating the system, please follow the methods and procedures described in this manual.

b) Users should be aware of latex-sensitivity issues and have at their disposal protective sheaths that are not made out of latex.

c) During examination, the system operator should not touch any metal parts of any electronic device in the vicinity at the same time as touching the patient.

d) With the exception of the USB port, do not unplug the system or any other peripheral device (e.g. a printer) before the system has been turned off. Otherwise, the system may get damaged or an electric shock may occur.

e) The system is not intended for use with a defibrillator.

f) The APPLIED PART may not come into direct contact with the PATIENT'S heart.

g) The system is not suitable for use with contrast agents.

h) When multiple devices are connected with one another, this could result in accumulative leakage current and dangers.

i) Before cleaning the system, be sure to unplug the power cable. If any failure occurs in the system, the patient may be at risk of an electric shock.

j) Live components, such as signal input or output ports of the system or any other device, must under no circumstances come into direct contact with the patient. If any failure happens in this system or in another device, the patient may be at risk of an electric shock.

k) The user must not open the system housing or the panel by themselves, as this may cause a short circuit or an electric shock.

【Note】:

a) Always turn off the system and protect it with a dust-proof cover whenever the system is not in use.

b) The system should be operated in a clean environment. Avoid operating the system in locations where it is exposed to direct sunlight, major temperature fluctuations, large quantities of dust, or in close proximity to a heat source or in high humidity. Do not place any objects on top of the main unit.

c) Avoid exposure to strong vibrations. Otherwise, the system components may get damaged.

d) Before connecting or disconnecting the probe(s), first ensure that the main unit is in the standby mode. It is always better, however, to disconnect the main unit from the power supply.

e) Freeze the image as a still image whenever no examination is being performed.

f) In order to ensure safety, only ultrasound coupling gel that is compliant with the applicable standards may be applied.

g) If during the examination, images are interfered with by AC noise (humming) through the patient, apply a shield sheet between the body and the bed, as shown in Fig. 1-1, and connect the sheet to the equipotential bonding terminal of the main unit. The humming interference noise can be eliminated.

h) Turn the system off correctly, Otherwise there is a risk of system data loss or system failure.

i) The system must not be turned off while printing, saving, or retrieving data. Otherwise, these procedures may not be performed correctly and file information may be lost.

j) Improper shutting down may result in corruption of hard disk data or in system failures.

k) It is prohibited to let external forces act on the control panel (such as leaning on it with the body). Otherwise the system could get damaged.

l) Excessive bending or twisting of the system's cables may result in system failure or in the system being unable to function continuously. Ensure that the system is not rolled over the cable, so as to avoid damage.

m) Ensure that important data, such as clinical records and so on, are stored on an external storage medium so as to avoid accidental loss.

n) When positioning the system, please ensure that its power port (where the power supply cable is connected) is accessible so that the cable can be easily plugged in. The power supply can then be cut off immediately in emergencies.

o) The mains plug or device plug is intended to be used as an isolation device for the mains supply. Please always ensure that the mains plug or device plug is easy to operate.

p) Ensure that only the special components supplied by Zimmer MedizinSysteme are used for the repair or replacement of system components.

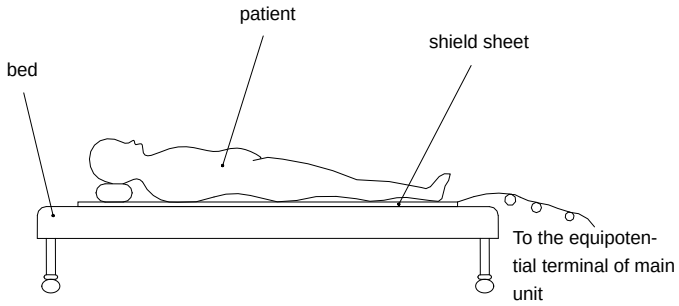


Fig.1-1 Laying a shield sheet to eliminate the hum (AC noise) interference

【Note】: The shield sheet is usually made of metal (iron or copper), placed under the patient and connected to an equipotential bonding terminal. An equipotential plane is formed under the patient bed, which serves as a shield against electromagnetic interference and decreases EMI impact on ultrasound images and clinical diagnosis. Subject to the specific environment of the patient and the diagnostic needs, only in rare cases – when abnormal interferences occur that may affect the diagnostic result from the image – is it suggested to use a metal sheet to improve the diagnosis. However, for conventional use of the system, this metal sheet is not required. It is only a suggestion for improvement and not necessary.

1.7 Classification

a) Protection against electric shock

The system belongs to General Systems, Protection Class I, Applied Part Type BF and CF.

b) Protection against ingress of water

The system belongs to Class IPX0, the probe head to Class IPX7, and the probe cable to IPX4.

c) EMC performance

The system belongs to Group 1, Class A in accordance with CISPR 11.

1.8 ALARA

The guiding principle for the use of diagnostic ultrasound is defined by the “as low as reasonably achievable” (ALARA) principle. In any case, users can minimise the biological effects of the ultrasound, if they keep the ultrasound exposure as low as possible while obtaining diagnostic images.

Understanding the characteristics of the imaging mode being used allows the sonographer to apply the ALARA principle with informed judgement. Additionally, the probe frequency, the system setup values, the scanning techniques, and the sonographer's own experience help him/her to act in accordance with the ALARA principle.

There are several system controls that the operator can use to adjust the image quality and limit the acoustic intensity. These controls are related to the techniques that an operator might use to implement ALARA. These controls can be divided into three categories: direct controls, indirect controls, and receiver controls.

Direct controls

Application selection and output intensity controls directly affect acoustic intensity. Application selection refers to your selection of a clinical option and an optimised preset. There are different ranges of allowable intensity or output based on your selection. Selection of the correct range for the acoustic intensity of the application is one of the first steps to take in any examination. For example, peripheral vascular intensity levels are not recommended for foetal examinations. Some systems automatically select the appropriate range for a particular application, while others require manual selection. Ultimately, it is the user who bears the responsibility for correct clinical use. The Zimmer MedizinSysteme system provides both automatic or default and manual or user-selectable settings.

Output also has direct impact on acoustic intensity. Once the application has been set, the output control can be used to increase or decrease the output intensity. The output control allows you to select intensity levels that are less than the established maximum. Prudent use dictates that you select the lowest output intensity that is consistent with good image quality.

Indirect controls

These indirect controls have an indirect effect on the acoustic intensity. These controls affect the imaging mode, the pulse repetition frequency, the depth focus and probe selection.

The imaging mode selected determines the properties of the ultrasound beam. B mode is a scanning mode, and the Doppler is a stationary or non-scanning mode. A stationary ultrasonic beam concentrates energy in a single location. A moving or scanning ultrasonic beam disperses the energy over an area, and the beam is only concentrated for a fraction of the time of a non-scanning mode.

Pulse repetition frequency or rate refers to the number of ultrasonic bursts of energy over a specific period of time. The higher the pulse repetition frequency, the more pulses of energy emitted in a given time period. Several control elements affect the pulse repetition frequency: focal depth, depth, sample volume depth, colour sensitivity, number of focal zones and sector width.

The focus of the ultrasonic beam affects the image resolution. Maintaining or increasing the resolution at a different focus requires the variation of output over the focal zone. This variation of output is a function of system optimisation. Different examinations require different focal depths. Setting the focus to the correct depth improves the resolution of the structure under examination.

The pulse length is the time period for which the ultrasonic burst is turned on. The longer the pulse, the greater the temporary average intensity value. The greater the temporary average intensity, the greater the likelihood of temperature increase and cavitation. Pulse length, recording duration or pulse duration is the output pulse duration of a pulsed Doppler. Increasing the Doppler sample volume increases the pulse length.

The transducer selected indirectly affects the intensity. Tissue attenuation changes with the frequency. The higher the transducer operating frequency, the greater the attenuation of the ultrasonic energy. A higher transducer operating frequency requires more output intensity to scan at a deeper depth. To scan deeper at the same output intensity, a lower transducer frequency is required. Using more gain and output beyond a certain point without corresponding increases in image quality can mean that a lower frequency transducer is needed.

Receiver controls

Receiver controls are used by the operator to improve image quality. These controls have no effect on acoustic output. Receiver controls affect only how the ultrasound echo is received. These controls include GAIN, TGC, Dynamic Range, and image processing. The important thing to remember, in relation to output, is that the receiver controls should be optimised before the output is increased. For example, one should optimise GAIN to improve image quality before increasing acoustic power.

An example of the application of ALARA

An ultrasound examination of a patient’s liver begins with selecting the appropriate transducer frequency. After selecting the transducer, which is based on the patient's anatomy, adjustments to the output power should be made to ensure that the lowest possible setting is used to acquire an image. After the image has been captured, adjust the focus of the transducer and then increase the receiver gain to get a uniform representation of the tissue. If an adequate image can be captured with the gain, a

decrease in the output should be made. Only after making these adjustments should you increase output to the next level.

Having captured the B display of the liver, colour can be used to pinpoint the blood flow. As with the B image display, the gain of the image processing controls must be optimised before increasing output.

Once the blood flow has been pinpointed, use the Doppler controls to position the sample volume over the vessel. Before increasing output, adjust velocity range or scale and the Doppler gain to obtain an optimal Doppler trace. You should only increase output if maximum Doppler gain does not create an acceptable image.

In summary: Choose the right transducer frequency for the task. Start with a low output level. Optimise the image with focus, receiver gain and other image control units. If the image is unsuitable for diagnosis at this point, increase the output.

Control effects

As various system controls are adjusted, the acoustic output values may change. This becomes most apparent when the PWR settings are changed. However, other system controls also affect screen output values. The following controls affect output:

- PWR
- ANGLE
- WIDTH
- PRF (and therefore the frame rate)
- FOCAL POINTS
- C-WIDTH (colour box width)
- C-SPAN (colour box span)
- SPECTRUM RANGE
- SVL (sample volume length)
- Zoom
- Depth
- Sample volume depth
- Transducer

Chapter 2

Design, Principle and Technical specifications

2.1 Design and operating principle

2.1.1 System design

The system consists of a main unit, a monitor, probes and peripheral devices. The main unit includes a probe interface board, a T/R module board, digital signal processing, a computer, a control panel (console) and a power supply unit. See Fig. 2-1. Up to 4 probes can be connected to this system at the same time. The probes can be switched using the circuitry of the probe interface board, and the user can select the required probe via the control panel.

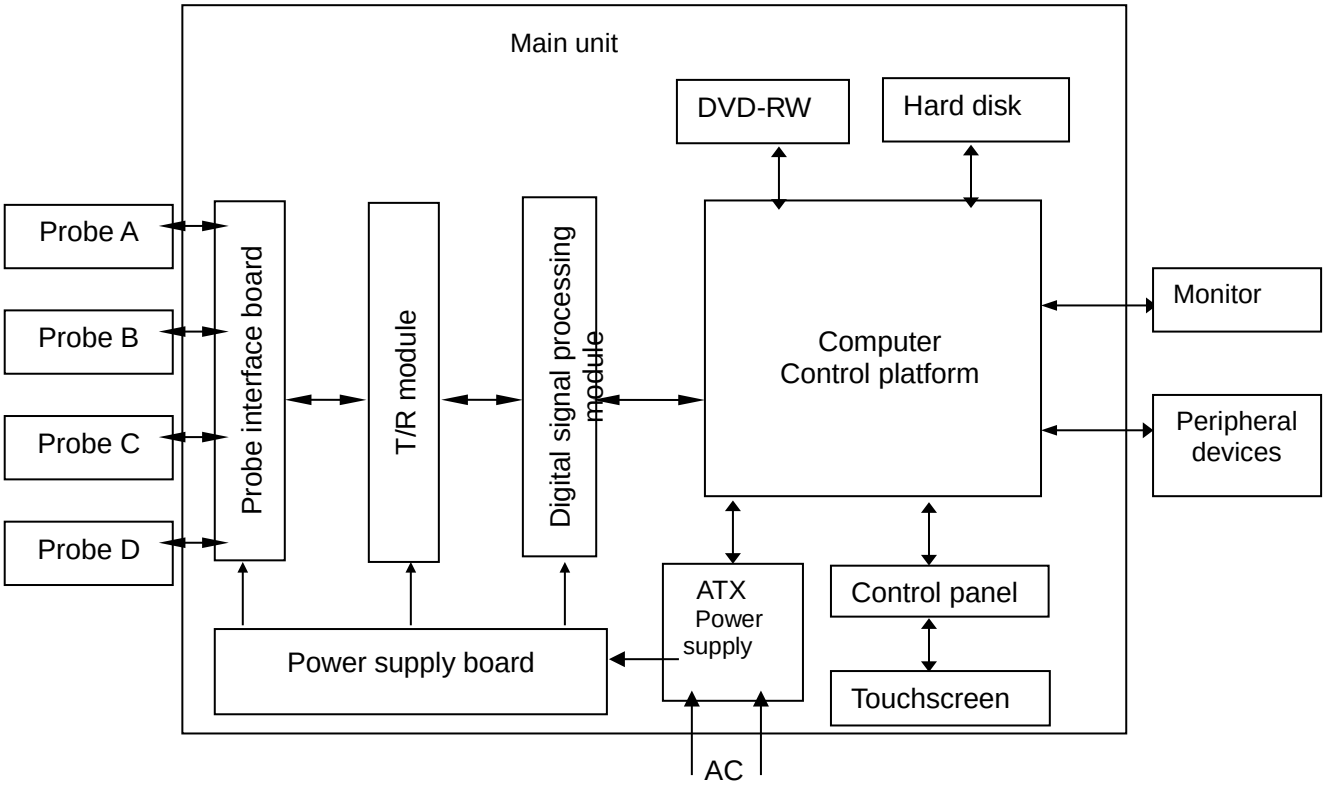


Fig. 2-1 Composition of the main unit – Block diagram

2.1.2 Operating principle

The Digital Signal Processing Module on the one hand transmits digital image signals to the control platform, and on the other hand receives control information from the control platform and generates the corresponding control data to control the front end.

The system works as follows:

Based on control actions from the control panel, the control platform generates commands and parameter data automatically. The Digital Signal Processing Module receives commands and control parameters from the control platform and distributes these to each functional module.

The real-time controller on the Digital Signal Processing Module generates live scan control signals and controls transmission of the front-end T/R controller. And the front-end T/R controller is in charge of the T/R control of the ultrasound according to the requirements of synchronised scan control signals from the system.

The beam-forming module on the Digital Signal Processing Module receives amplified echo signals from the Probe Interface Board and performs digital beam forming, then sends beam data to the subsequent processing module. As a key technique, digital signal processing plays an important role in ultrasound systems. This technology ensures that data is transmitted and converted with high accuracy. Further processing provides better images that support correct diagnosis from the doctors. Data information such as image data processed by digital signals is sent to the control platform via data channels on the interface board for further processing and image display.

Every time ultrasound is transmitted, the excitation high-voltage from the T/R Module generates and sends a set of excitation pulses to the currently active probe. One element group in the transducer gets excited, and the ultrasound is transmitted. Sound waves propagate through the tissue and are reflected by it, and the ultrasound returned to the probe is received by the same element group and then sent to the preamplifier on the T/R Module for pre-amplification, depth gain compensation and programmable gain amplification. After this process, signals are sent to the Digital Signal Processing Module.

The power required by the system is provided by the power module.

Depending on which buttons the user pushes, relevant information is sent to the control panel/control platform. The platform automatically generates control commands and parameters and sends these to the modules involved.

The control platform is the managerial centre of the whole system, which receives operation commands from the control panel and controls the entire system based on the current system status. Other functions that the control platform fulfils include measurement and calculation, screen display and video processing, management of patient data and images, as well as controlling storage, printing and communication.

2.2 Technical specifications

Below is a list of the technical specifications for the hardware and software of the system. Hardware and/or software marked with “option” or a *1) mark are additional options and may not be available for your current system configuration.

Notes *1): Dependent on the scope of the order

*2): Subject to change

2.2.1 Scope of delivery

ItemNo. *2)	Number	Description	
8060	1	SonoSys Touch b/w	
10103053	1	USB stick 3.0	
10102353	1	SonoSys Touch instructions for use	
118	1	Power cable 3m long	
8061	1	Linear probe L8LC (50mm, 5.0-12.0MHz) 192 elements	*1)
8062	1	Convex probe C3LC (R60, 2.0–5.0 MHz) 128 elements	*1)
8064	1	Phased array probe P3FC (1.7/4.0MHz)	*1)
8060-01	1	Licence colour CFM, PW	*1)
8060-02	1	Licence CW	*1)

2.2.2 Accessories

ItemNo. *2)	Number	Description
54207110	1	Recording paper for Mitsubishi P93 E video printer (Roll 110mm / 21m Sonido/Sonido 2/ SonoSys (Pro))
10103053	1	USB stick 3.0
10102353	1	SonoSys Touch instructions for use
118	1	Power cable 3m long
8054	1	Warmer for ultrasonic contact gel
8055	1	Phased array probe P5FC (4.0/7.0 MHz)
8056	1	Microconvex probe C6LC (4.5-7.5 MHz)
8061	1	Linear probe L8LC (50mm, 5.0-12.0MHz) 192 elements
8062	1	Convex probe C3LC (R60, 2.0–5.0 MHz) 128 elements
8063	1	Linear probe L10LC (38mm, 7.0-14.0MHz) 128 elements
8064	1	Phased array probe P3FC (1.7/4.0MHz)
8065	1	Convex probe C3LC (R60, 2.0–5.0 MHz) 192 elements
8057	1	Endocavity probe V6LC
8057	1	Pencil Array TR5 – 14 5.0 MHz
8059	1	Linear probe L10LC (28,8mm, 10.0-18.0MHz)

【Note】: Please refer to the packing list for the specific accessory.

2.2.3 Options

ItemNo. *2)	Number	Description
8117	1	P93 E b/w video printer Mitsubishi or Sony
8060-01	1	Licence colour CFM, PW

8060-02	1	Licence CW
8060-03	1	Panascope licence
8060-05	1	Elastography licence
8060-06	1	ECG licence
8060-07	1	Vector Space Flow (VS Flow) licence
8060-08	1	DICOM 3.0 licence
-	1	Ultracloud licence
-	1	SonoAir licence (Wifi Module, Ultrasound to iPhone/iPad) Customers also need to download the app for iPad and iPhone from the Apple Store for approx. €19.00.

2.2.4 Imaging modes

a) B, 2B, 4B modes

b) B/M mode, M mode

c) B-mode control (linear probes)

d) Tissue harmonic imaging (THI)

e) Colour flow map (CFM)

f) Colour power angio (CPA)

g) Colour control

h) B/C split screen

i) Directional power Doppler

j) Pulsed wave Doppler (PWD)

k) Pulsed wave Doppler control

l) Trapezoidal/extended sector imaging

m) Elastographic imaging

n) Anatomical M mode

o) Panoscope

p) XBeam

q) Continuous wave Doppler(CW):

r) Tissue Doppler imaging (TDI)

s) 4D Pro imaging

t) Macro fidelity (MFI)

u) ECG mode

v) Vector space flow (VS Flow)

w) 3D imaging

2.2.5 Image parameter settings

a) B mode: Gain, TGC (time gain control), Transmit focusing, Dynamic range, Persistence, Map, Clarity, Sector size, Acoustic power, Wide sector, Zoom, Chroma

b) M mode: Sweep speed, sampling line, chroma, map

c) Colour flow map/colour power angio/ tissue Doppler imaging (CFM/CPA/TDI): colour gain, colour persistence, colour frequency, colour priority, colour enhancement, colour change, PRF, map, baseline, wall filter, colour box size

d) Pulsed wave Doppler (PW): Doppler gain, Doppler frequency, wall filter, angle correction, PRF, baseline, chroma, smoothness, map, audio volume

e) Continuous wave Doppler (CW): Doppler gain, Doppler frequency, wall filter, angle correction, chroma, smoothness, map, velocity scale

2.2.6 Measurement, analysis and calculation functions

a) General measurement:

1) 2D: distance, area, circumference, volume

2) M mode: distance, time, slope (velocity)

3) Doppler: acceleration, mean velocity, real-time spectrum analysis

b) Special analysis and calculation: analysis, calculation and report for abdomen, obstetrics, gynaecology, near-surface organs, urology, orthopaedics, cardiology and peripheral vessels.

2.2.7 File management – Patient images

a) Patients' data, images and CINE files can be stored on HDD, COMBO and USB storage.

b) Supported by video printer and USB printer

c) DICOM 3.0 archiving *

d) SonoAir *

2.2.8 Power supply

a) Voltage: 100 to 240 V ~ (230 ± 23 V ~ for EU countries)

b) Current frequency: 50 Hz ± 1 Hz or 60 Hz ± 1 Hz

c) Input power: 500 VA

2.2.9 Gap

The gaps for the system comply with the standard ISO 13852, and there is no special requirement for a trapping zone for the operator, the patient or other persons.

2.2.10 Procedure

Interference-free operation

2.3 Dimensions and weight

a) Dimensions (L x W x H): 580 mm × 815 mm × 1,480 mm

b) Weight (including LCD): approx. 60kg

Chapter 3

Introduction to the Components

3.1 System appearance

Fig.3-1 System appearance

【Tip】: Due to the different configurations, the cosmetic appearance of the system shown in this illustration may differ slightly from the system you have acquired. The actual system is what counts.

3.2 Introduction to the system components

3.2.1 Probe console

The probe console is on the right of the system. As shown in Fig. 3-2, the probe console includes 4 connection options, which allow the user to connect up to 4 probes to the system at the same time. Every port is fitted with a locking switch, for fixing the probe. For more details about connecting the probes, see ***4.1.1*** *Connecting components*.

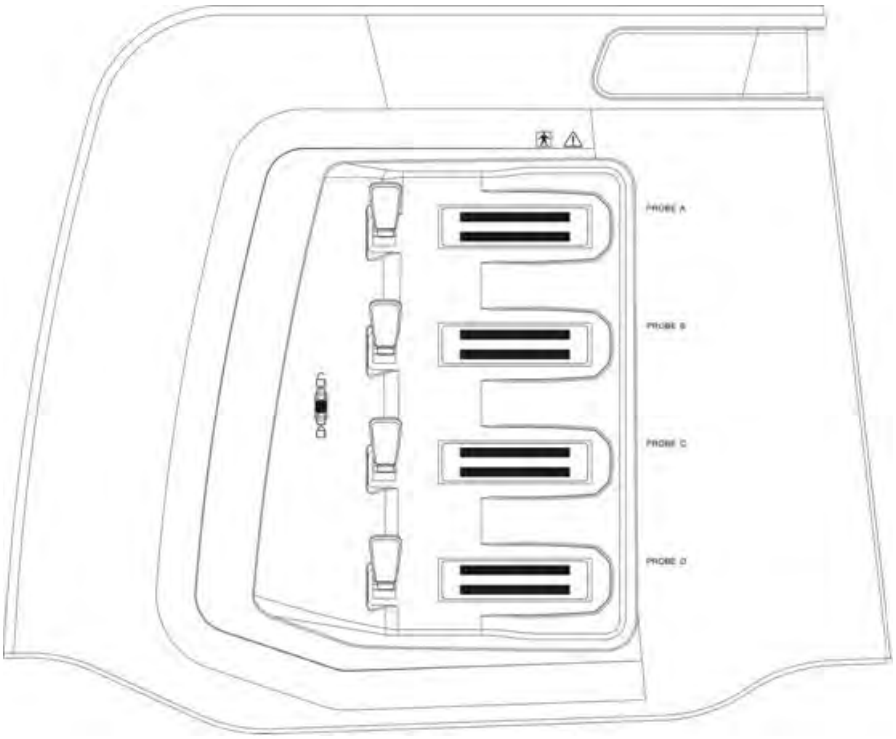


Fig.3-2 Graphical representation of the probe console

3.2.2 Probe (applied parts)

3.2.2.1 External structure of the probe

A display point is located on top of the probe housing. The immersion part is located beneath the display point. The colour of the display point relates to the probe's centre frequency: orange for 3.5 MHz, green for 5.0MHz and purple for 8.0 MHz.

See Fig. 3-3 for the outside structure of the configurable convex and linear array probes.

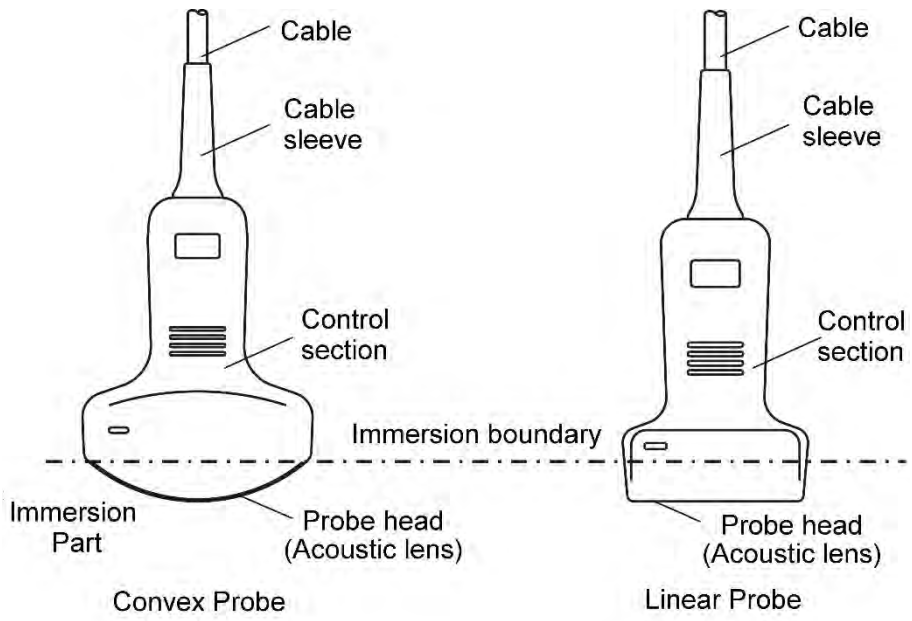


Fig.3-3 Probe structure

3.2.2.2 Probe application

a) The probe can be damaged by even a slight impact. Take care during operation to avoid shocks or collisions against hard objects.

b) Ensure that the main unit is in standby mode while connecting or disconnecting the probe.

c) Be very careful not to scratch the surface of the probe's head (acoustic lens) during operation;

d) Use a sponge or a soft cloth soaked with water to clean the probe after the examination. DO NOT use alcohol or cloths containing alcohol or an organic solvent (such as a thinner) to clean the probe. For detailed information about the cleaning and disinfection of the probe, please refer to section ***4.4.12***;

e) 2002: Any endocavity probes, when in use, should be covered with a probe cover that is compliant with ISO 4074.

Biological warning concerning the probe covers: If the covers used for endocavity probes are condoms, they should be non-lubricated and non-medicated. Practitioners should be aware that condoms are less prone to leakage than commercial probe covers and have a six-fold enhanced AQL (acceptable quality level) when compared to standard examination gloves. Their AQL equals that of surgical gloves. Users should be aware of latex-sensitivity issues and have at their disposal protective sheaths that are not made out of latex. Ensure that NO chemical substances (e.g. lubricants) come into contact with the silica keypad of the control panel, so as to prevent the silica keypad from swelling.

f) All the endocavity probes must have sterile protective covers without heat source when they are in use. When applying the endocavity probe, do not activate the probe (i.e., put the main unit into still-image mode) when it is in vitro of patients. Otherwise, it may cause harmful interference to other devices.

g) The probe cannot be immersed into water over the water immersion boundary, as shown in Fig. 3-3. The watertightness category of the probe is IPX7. Accidental immersion of the probe in water over the immersion boundary may cause malfunctions or problems. Should such problems occur, please contact our service personnel immediately.

h) The protection category for the probe cable is IPX4 (protected against splashing water). If the probe cable is exposed due to scratches or cracks in the coating, please contact our service personnel immediately and avoid electric shock;

i) It is prohibited to scan eyes with the probe.

j) Do not use probes produced by other companies as they may cause damage to the system and the probe. In extreme cases, fire and other accidents can occur.

3.2.3 Monitor front panel

The front panel of the monitor is shown in Fig. 3-4. The menu buttons are on the right side of the screen.

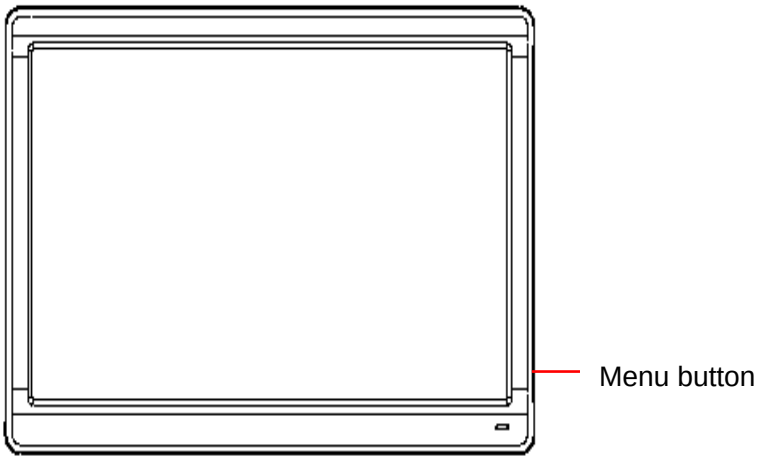


Fig.3-4 Monitor front panel

⏻–Turns the monitor on or off. If the monitor is on but no display signal is being received, this button will be orange. When the monitor is on and the display signal is being received (which means the system is activated), this button will be green.

MENU: For bringing up the main setup menu and selecting the desired item.

◀—For shifting the cursor and selecting the desired item.

▶— For shifting the cursor and selecting the desired item.

EXIT: For exiting the current menu and returning to the previous menu.

3.2.4 Control panel

3.2.4.1 Adjusting the position of the control panel

1) Lifting the control panel

Hold the handle on the left side of the control panel tightly inward and then slightly lift it up to lift the control panel, or press it down to lower the control panel. When the control panel is at an appropriate height, release the handle and the elevation mechanism will lock automatically. See Fig. 3-5.

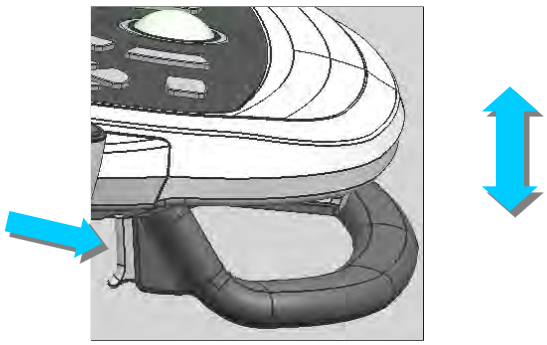


Fig.3-5 Lifting up the control panel

2) Swivelling the control panel

Hold the handle on the left side of the control panel tightly inwards to swivel the control panel to the left or right and into a suitable position. When the control panel has been swivelled into a suitable position, release the handle, and the swivel mechanism will lock automatically. See Fig. 3-6.

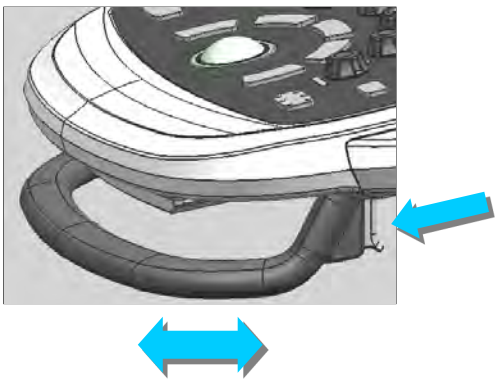


Fig.3-6 Swivelling the control panel

3.2.4.2 Control panel layout

The control panel is made up of a trackball, keys/buttons, knobs, toggle switches and a touchscreen, and it controls various functions of the system, such as probe selection, changing the imaging mode, and adjusting the TGC, depth and other parameters. See Fig. 3-7 for the control panel layout and Table 3-1 for the functions of the control units.

Fig.3-7 Control panel

Table 3-1 List of control unit functions

No.	Control unit	Type	Description of function
1		Button	Power switch: On the top left of the control panel, for turning the system on/off. When the system operates properly, the power switch indicator will be green.
2		Knob	There are 5 knobs controlling different elements on the touchscreen. Their functions are for different operations and imaging modes. Touch the desired item on the touchscreen. The selected element can be adjusted by turning the knob directly below it.
3	B	Button + Knob	• **B mode**: Press the centre of the button to activate B single mode. • **B mode**: Turn the knob to adjust the B and M gain.
4	M	Button	**M mode**: Toggle button for switching from/to B/M mode and M mode.
5	CFM	Button + Knob	• **CFM**: Press the centre of the button to activate colour flow mapping. • **CFM**: Rotate the knob to adjust the colour flow mapping gain or colour power angio gain.
6	TDI	Button	**TDI**: Tissue Doppler imaging mode selection button for switching to TDI mode when using a probe that supports the TDI function.
7	PW	Button + Knob	• **PW**: Press the centre of the button to activate pulsed wave Doppler mode. • **PW**: Rotate the knob to adjust the pulsed wave Doppler gain.
8	CW	Button	**CW:** Continuous wave Doppler (CW) selection button. For calling up CW mode.

9	Depth	Knob	**Depth**: For adjusting the display depth of the image.
10	Value	Knob	**Value:** For changing the value or status of the selected item in different menus; for rotating the probe mark when displaying pictograms; for adjusting the magnification factors when in zoom state.
11	Report	Button	**Report**: For calling up the patient report user interface.
12	ID	Button	**ID**: For calling up the ***New Patient Info*** editing user interface. Creating a new patient and entering the patient data. Creating a new examination or reviewing and changing patient information.
13	Smarchive	Button	**Smarchive**: For calling up the ***Archive Management*** user interface and evaluating patient data (including patient information, reports, media files, etc.) for exporting, printing, or sending.
14	P5	Button	**P5**: The function of hotkeys can be defined for user-friendly operation. See 5.2.3.1 for the user-defined method.
15	4D	Button	**4D**: For displaying the 3D/4D ROI (region of interest) box and then subsequently activating the ROI's 3D or 4D Pro mode. **【Note】: The 4D mode is only available when the volume probe is being used.**
16	Elas	Button	**Elas:** For activating the elastography imaging mode. **【Note】: This is an optional feature.**

17	Exam	Button	**Exam:** For selecting the desired probe and examination type. The optional probe and examination type are displayed on the screen.
18	P1 P4 P2 P3	Button	**P1/P2/P3/P4**: Hotkeys can be defined for user-friendly operation. See 5.2.3.1 for the user-defined method.
19		Button	**ULTRACLOUD:** The most important features are: upload and download of user parameters; upload and download of user data; remote maintenance; automatic generation of a QR code for accessing the server and retrieving personal data.
20	Esc	Button	**Esc**: For exiting the current mode or operation state, e.g. for exit CFM/spectral Doppler imaging/4D imaging to go to B mode, to exit a dialogue window, to exit measurements and calculations. When a cursor is displayed, this button can be used to hide the cursor.
21	Calc	Button	**Calc**: For calling up special measurement software according to the probe and examination type.
22	T-Ball	Button	**T-Ball**: For toggling the trackball control target when the ROI box is displayed; for changing the measuring point during measurement and calculation.
23	Dis or P6	Button	**P6 / Dis**: By default, this is a distance measurement key. The function of the hotkeys can be user-defined for user-friendly operation. See ***5.2.3.1*** for the user-defined method.

24		Button	**Set**: For selecting items or parameters; for activating formal modes (such as B/M, PW and 4D) from various preliminary modes; for displaying the trackball cursor in non-preliminary modes; for confirming the start point and end point of measurements. This function is similar to the left mouse button.
25		Slider controls	**TGC**: 8 slider controls at the top-right corner of the control panel, for adjusting the gain at various display depths.
26		Button	**Save**: For saving images or film files. **【Note】: The storage location and format can be set up in Store Setup.**
27		Button	**Freeze**: For switching between Still-image and Live state.
28	Touchscreen	Touchscreen	For displaying the touchscreen menu. The menu varies with the different operations and imaging modes.
29	Trackball	/	• For selecting certain items in the menu or in the control window; • For changing the position of focus; • For moving the image's zoom-box; • For moving the cursor in the annotation state. • For selecting specific still images from a film loop; • For moving the measurement point in measurement state.

3.2.4.3 Touchscreen

Use any of the sensor keys on the touchscreen to activate a system function, such as Panoramic, 2B mode, 4B mode, text annotation, Harmonics or Zoom, and to change the parameters of the imaging modes. The knobs below the touchscreen controlling the corresponding options on the touchscreen.

The menus on the touchscreen are mode- or state-dependant. The touchscreen display in live B mode is shown in Fig. 3-8. The functions of the sensor keys are listed in Table 3-2.

Fig.3-8

Table 3-2 List of sensor key functions on the touchscreen

No.	Sensor key	Description of function
1	**B**	If parameters for another mode are displayed on the touchscreen, tap this key to display items for B mode.
2	**Preset**	For switch examination type. Tap this key, and the touchscreen will display the examination types for the current probe. Tap on one examination type to activate it.
3	**Auto-Fit**	For smart optimisation that adjusts the image to its optimal state.

4	**XBeam**	For turning XBeam mode on/off.
5	**Guide**	For turning the biopsy guide line display on/off.
6	**Panoscope**	For activating Panoscope mode.
7	**Setup**	For bringing up the main SETUP menu and carrying out system, function and measurement settings and system updates, etc..
8	**Text**	For turning text/annotation state on/off. Use the keyboard to input characters or add a preset annotation on the touchscreen to the image area. See ***7.2*** for further details.
9	**Body mark**	For calling up the body markers selection screen. Tap this key, and the body marker will be displayed on the touchscreen. Tap on a specific body marker to add the marker to the image area.
10	**Clear (delete)**	For deleting all annotations, measurement and calculation results.
11		For displaying the arrow and cursors. ● In non-preliminary modes, press this button once to display the arrow. Press again to display the cursor. You can repeat this action. ● In preliminary mode, press the button the first time to display the cursor, and the second time to display the arrow.
12	**Printing**	For printing images when a printer is connected; can be set up for other functions. **【Note】: Perform the setup in *Setup – Print Key Setup*. See 5.2.4 for further details.**

13	**Disk**	For bringing up the ***Store Setup*** screen and specifying the format and location of file storage. See ***9.2*** for further details.
14		For switching to 2B mode.
15		For switching to 4B mode.
16	**Zoom**	For turning zoom state on/off and rotating the **Value** knob to change the zoom factor.
17	**CPA**	For turning colour power angio imaging state on/off.
18	**Save cine**	For quick-saving film files. The files will automatically be stored under the standard files (generally in E:\\PatInfo).
19	**Parameter settings elements**	• For displaying the adjustable parameters in the current mode. Tap on one parameter and rotate the knob directly underneath the touchscreen to adjust the parameter value. • Tap on ***Harmonic*** to activate the THI function if the probe being used supports the THI function. • Multiple pages will be displayed if there are too many parameters to fit. Tap on the upper/lower arrow on the right of the parameter area to turn to the page.

3.2.4.4 Keyboard

The system comes with a standard PC keyboard (see fig.3-9), which is located under the control panel. The keyboard can be ejected by pushing it inward as indicated until a rattling sound is heard. Then you can pull it out.

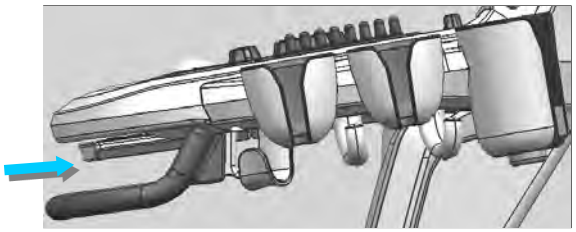


Fig.Fig.3-9(a) Pushing the keyboard inward

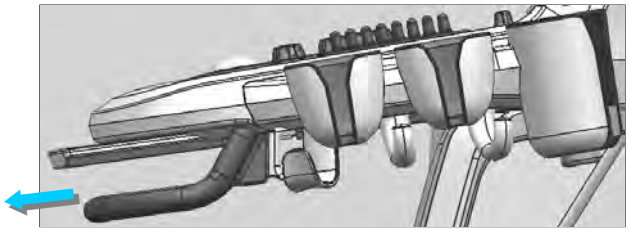


Fig.3-9 (b) Pulling the keyboard out

Fig.3-9 Graphical illustration of the extendable keyboard

The keyboard is shown in Fig. 3-10. See Table 3-3 for a description of the functions of the special function keys.

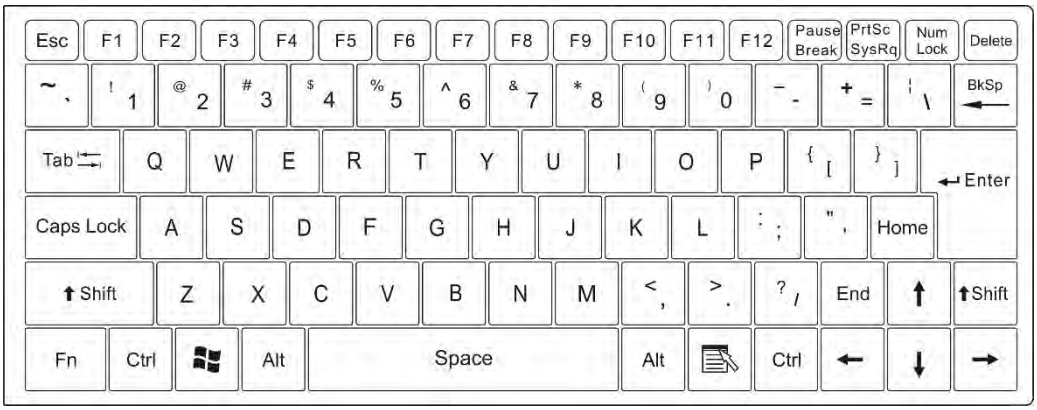


Fig.3-10 Keyboard

Table 3-3 Description of the functions of the special function keys

No.	Button	Description of function
1	**Enter**	This key is for moving the cursor to the start of the next line of text or input field.
2	**Tab**	On the ***New Patient Info*** screen and in the ***Archive Management*** screen, press **Tab** on the keyboard, and the cursor will move from one input field to the next input field. When *Auto Trace* is being used, press **Tab** on the keyboard to switch the trace type.
3	**Caps lock**	This key is used for switching between uppercase and lowercase letters when inputting text.
4	**Ctrl**	Press **Ctrl** + cursor position + **Set** to select multiple files.

No.	Button	Description of function
5	**BkSp (Backspace)**	This key is for deleting the single character in front of the delete cursor before entering text. This key is for deleting the trace dot by dot when performing ***Trace Measurement***.
6	**Delete**	For deleting one single character where the cursor is for inputting text.
7	**Q/W/E/R**	When the puncture line function is activated, **Q** and **W** can be used to adjust the position of the puncture line. **E** and **R** can be used to adjust the angle of the puncture line.
8	**Y**	If the biopsy guide line is turned on, this key can be used to toggle between single or dual biopsy lines.
9	**G**	If the biopsy guide line is turned on, this key can be used to toggle between the display styles for the biopsy guide line.
10	**F**	In non-4D mode, non-input state and non-recording state, and without opening any screen, this key can be used to display full-screen.

3.2.5 Storage tray

The storage tray below the front side of the control panel is for keeping small items such as a pen, a notebook or a manual. If it needs to be cleaned, first lift the front of the tray and then pull it out as shown in the instructions in Fig. 3-11.

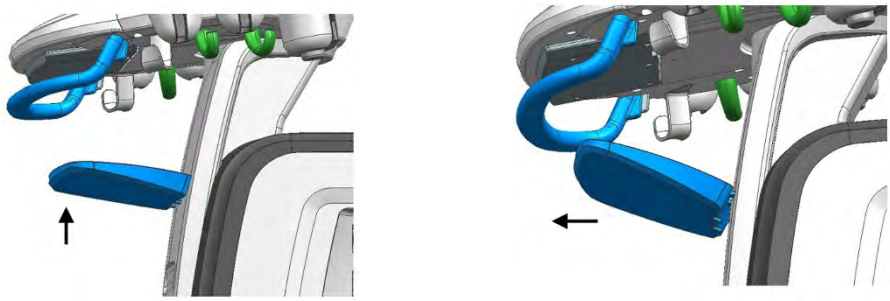


Fig.3-11 How to pull the tray out

3.2.6 Wheel brake

There is a wheel brake on each of the 4 wheels of the system Press the front part of the wheel brake downwards, as shown in Fig. 3-12. The wheel will be locked and the system can be moved to another location. Press the back part of the wheel brake downwards to release it. The system can now be moved. See 4.5 for precautions when moving the system.

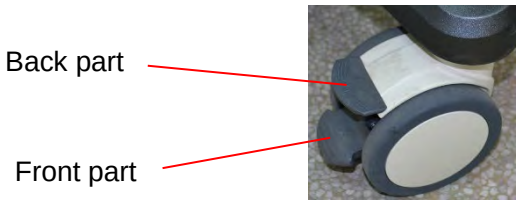


Fig.3-12

⚠ **【Note】: Do not move the system by force if one of the wheels is jammed. Otherwise the wheel might get damaged.**

3.2.7 Back

The back of the system consists of two parts: The terminal strip (see Fig. 3-13), and the service panel (see Fig. 3-14.). The terminal strip consists of ports for connecting peripheral devices to the system. The service panel contains the main switch, the fuse holder, the mains power socket and the equipotential bonding terminal.

3.2.7.1 Diagram of the interface console

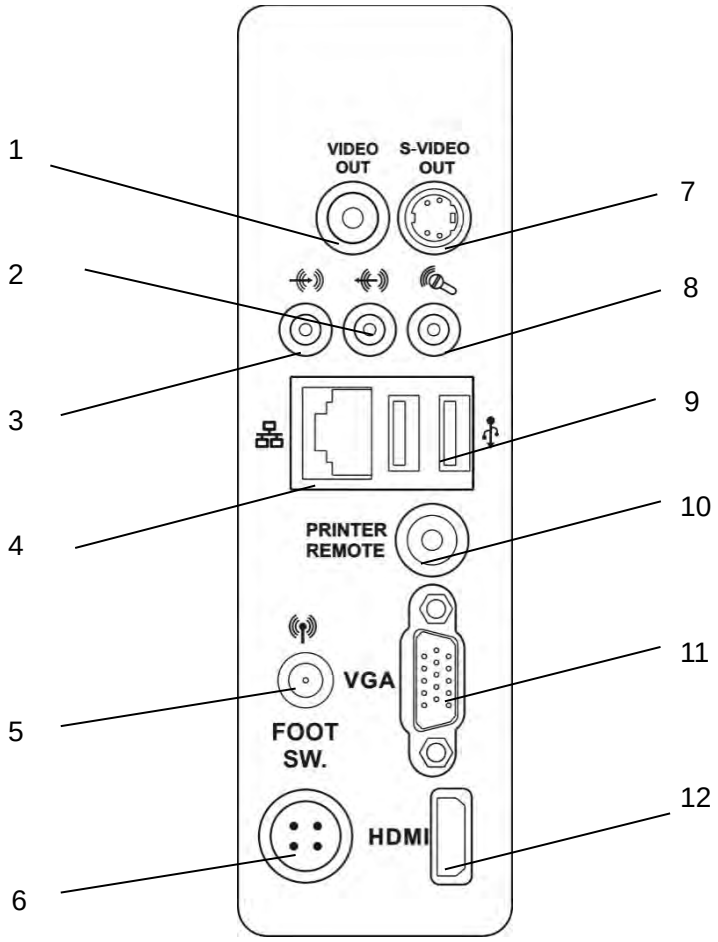


Fig.3-13 Interface console

1—Video-out port

2—Audio-out port

3—Audio-in port

4—Network port

5—WLAN antenna port

6—Foot switch port

7—S-video-out port

8—MIC port

9—USB port

10—Printer port

11—VGA port

11 – High definition multimedia interface

3.2.7.2 Power supply circuit diagram

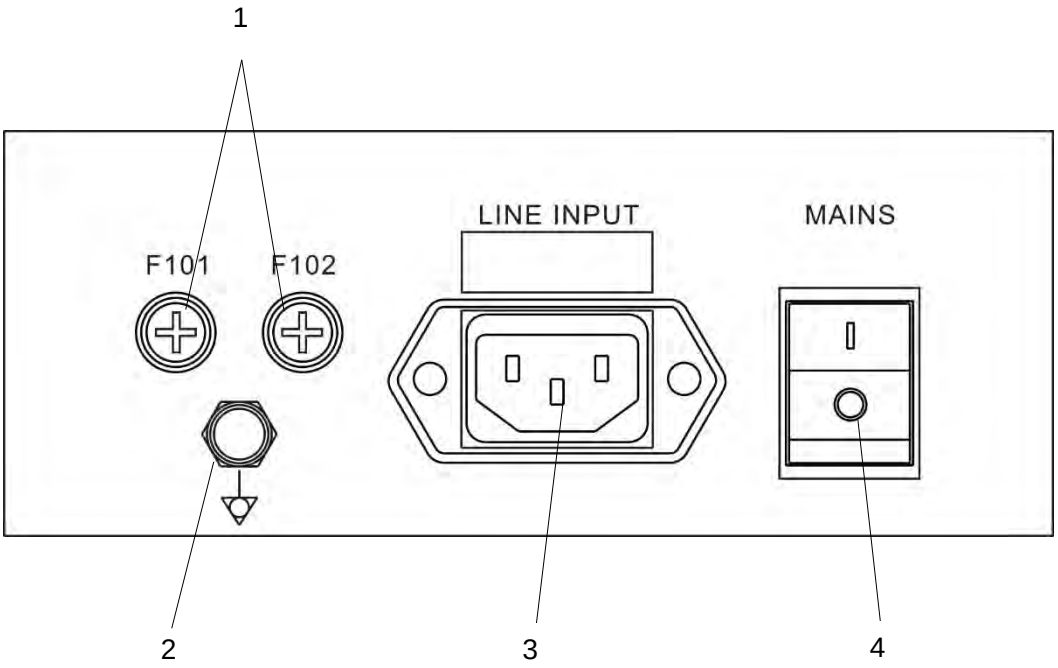


Fig.3-14 Power supply circuit diagram

1—Fuse holder (2 pcs)
2—Equipotential bonding terminal
3—Power-in mains connection
4—Main power switch

【Note】: F101 and F102 are fuse holders for the current input. Please read section *4.4.9 Testing consumables* concerning fuse types.

【Note 1】: In the case of a sudden power outage, which may cause system program failures, data loss, or system instability, it is recommended to configure the system with an uninterrupted power supply (UPS) having the power of above 1000 VA.

【Note 2】: The OPERATOR may not touch the part in question and the PATIENT simultaneously. Part in question refers to sections *3.2.7.1 and 3.2.7.2*.

【Note 3】: The main power switch is used to electrically isolate the circuits from the MAINS SUPPLY at all poles simultaneously.

3.2.7.3 Peripheral devices or components to which the system can be connected

The system can be connected to peripheral devices or components via the terminal strip, the back panel of the power supply, or the USB ports. The connected peripheral devices or components are shown as Table 3-4.

Table 3-4 Peripheral devices or components

1- Network port: For connecting to a router or another PC.	2- VGA Port: For a monitor with a VGA signal input.
3- S-video port: For a monitor or video printer with an S-video signal input.	4- Video port: For a monitor or video printer with a video signal input.
5- Remote printer port: For a video printer.	6- Foot switch port: For the foot switch.
7- Power socket: For the system's power cable.	8- USB port: For a USB hard disk or another device with a USB port.

Chapter 4

Getting Started

4.1 System installation

4.1.1 Connecting components

In addition to the devices installed in the system, the ultrasound imaging system can support many external devices, e.g. monitor, probe and printer. See Table 4-1 for the detailed list of accessories, detachable parts and materials for the system.

【Note】: Any device that was not purchased at Zimmer MedizinSysteme and not installed by a Zimmer MedizinSysteme representative is not covered by the Zimmer MedizinSysteme service agreement warranty. Zimmer MedizinSysteme does not carry out any repairs for such devices.

Table 4-1 A list of the accessories, detachable parts, and materials

Accessories	Power cable, potential equalisation conductor, S-video cable, printer control cable
Detachable parts	Monitor, probe holder

4.1.1.1 Installing the main unit

【Warning】: The main unit must be installed by Zimmer MedizinSysteme service personnel.

a) After removing the packaging, remove the key cover from the lower arm, as shown in Fig. 4-1.

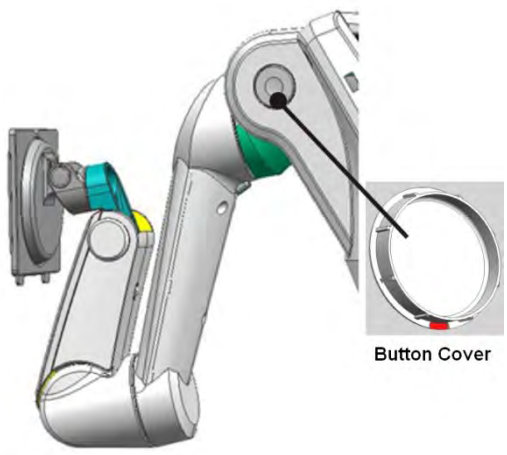


Fig.4-1 Removing the key cover

b) Hold up the arm. Hold down the backward button to move the arm. Then release the backward button and lift the arm up slightly until a click sound is heard. It means the arm is installed in place. See Fig. 4-2.

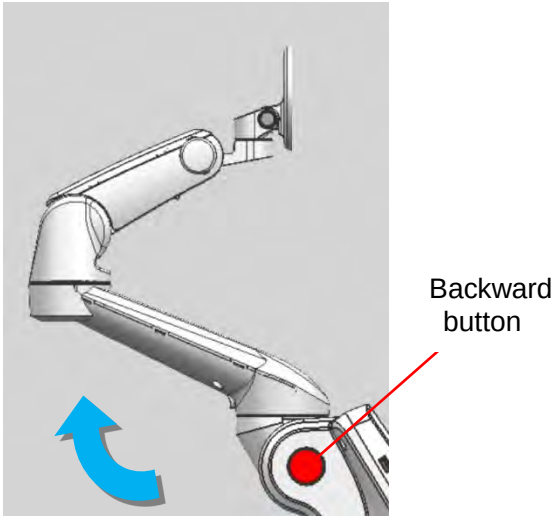


Fig.4-2 Lifting up the arm

⚠ **【Note】: When the arm installation is finished, first install the monitor, and then adjust the arm height.**

a) As shown in Fig. 4-3, connect the two slots on the back of the LCD with the two convex corners on the top of the support arm. Use the corners to support the LCD and press the key in Fig. 4-4 to fix the LCD.

Fig.4-3 Mounting the LCD monitor

Fig.4-4 Fixing the LCD monitor

b) Connect the DVI port and the power supply cable with the LCD, as shown in Fig. 4-5. The connecting screws on the DVI port must be secured, so as to avoid a loose connection and any impact on the display. Use a clip lock to fix the connecting cable.

Fig.4-5 Connecting the LCD cable

c) After the monitor installation is complete, lightly press down and hold the upper arm. Then push the lever below the upper arm to the end and release the arm lock. Now you can change the height of the upper and lower arms.

⚠ **【Note 1】: When arm installation is completed, first install the monitor, and then release the arm lock. Otherwise the arm may jump to the maximum height due to spring force imbalance.**

⚠ **【Note 2】: When the arm lock is released, press the arm down using force, so that the spring force lifts the arm slowly and the arm does not bounce back and injure the operator.**

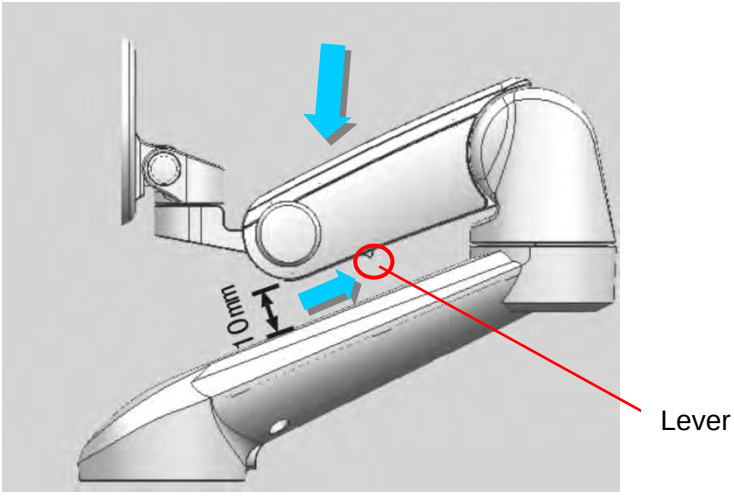


Fig.4-6 Releasing the arm lock

⚠ **【Caution】: Please follow the above steps for installation. Otherwise, there can be adverse consequences if these steps and instructions are ignored.**

d) After completing the above installation, press the button under the arm (see Fig. 4-7), and turn the entire lower arm to the left or right, as shown in Fig. 4-8.

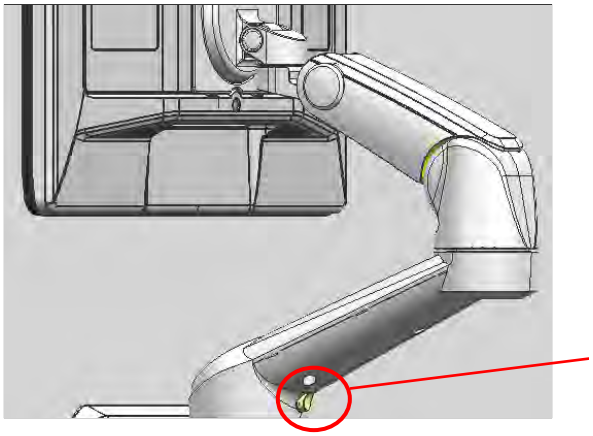


Fig.4-7

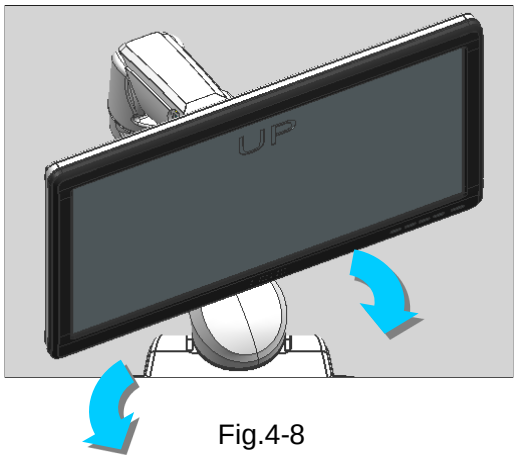


Fig.4-8

4.1.1.2 Connecting/disconnecting a probe

a) **Connecting a probe:** Insert the probe connector into the probe socket on the main unit (**please note the direction in which the plug is connected. The probe cable is located on the front of the system as shown in Fig.4-9)**. Ensure the connection is secured, and then slide the locking switch in front of the probe socket downwards to lock the probe in the locking position.

⚠ **【Note】: During operation, ensure the probe connector is firmly seated and properly connected before shifting the locking switch. If you feel strong resistance when shifting the locking switch, abandon the operation. Double check whether the probe connector is properly inserted in the system port and whether the connection is properly established before shifting the locking switch again. Otherwise the system could get damaged.**

Fig.4-9 Connecting a probe

b) **Disconnecting a probe:** Slide the locking switch up into the unlock position to release the fastener. Then you can pull the probe plug out of the socket.

4.1.1.3 WLAN antenna port and antenna

The system has a built-in WLAN device. The WLAN antenna connector is located on the panel on the back of the system (see ***Section 3.4.7.1*** for the exact position of the WLAN antenna connection).

To use the SonoAir feature (**Note: This feature is an optional feature that cannot be used if not activated**), please connect the configured WLAN antenna to the port. The antenna interface is spiral in shape and must be able to be turned.

For wireless transmission, connect to an image end device, such as a workstation, iPad or iPhone, or connect to a DICOM server via a wireless network (WLAN).

4.1.1.4 Network connection (see Chapter 5 for settings)

Connect the network connecting cable to the RJ-45 network port on the main unit to establish a connection between the main unit and other computers. For example, connecting to a device like a workstation or DICOM server.

The network port is on the connector panel on the back of the system (see Section ***3.2.7.1*** for the exact position of the network port).

4.1.1.5 Printer installation

a) Video printer (option): Connect the BNC port of the BNC/RCA cable with the VIDEO-IN port on the video printer, and connect the RCA port of the BNC/RCA cable with the VIDEO-OUT port on the main unit (if the video device has an S-signal terminal, connect its S-VIDEO-IN port with the S-VIDEO-OUT port on the main unit using an S-terminal cable), and then connect the printer's REMOTE port with the PRINTER REMOTE port on the main unit using a printer control cable.

b) Printer with USB port: Connect the USB printer to the USB port on the main unit using a standard USB connecting cable. After the system is initialised, tap on ***Set up*** on the touchscreen and choose ***Function Setup*** and then ***Printer Setup*** to activate the screen for setting up printers and fax machines. Follow the operating instructions for the printer to install the printer driver. After installation, the USB port for the printer can be used.

⚠ **【Note】: Please connect the printer before turning on the system.**

4.1.1.6 Connecting the foot switch (option)

Connect the foot switch to the FOOT SW. socket on the control panel for power supply (see ***Section 3.2.7.1*** for the exact position of the foot switch connection).

4.1.1.7 Connecting the gel warmer (option)

Place the gel warmer in the coupling gel heating device on the system. Connect it properly and turn on the heating function to warm up the coupling gel. The connection steps are as follows:

1) Assemble the cup and the gel warmer so that the heater's cable fits into the slot of the cup. See Fig. 4-10.

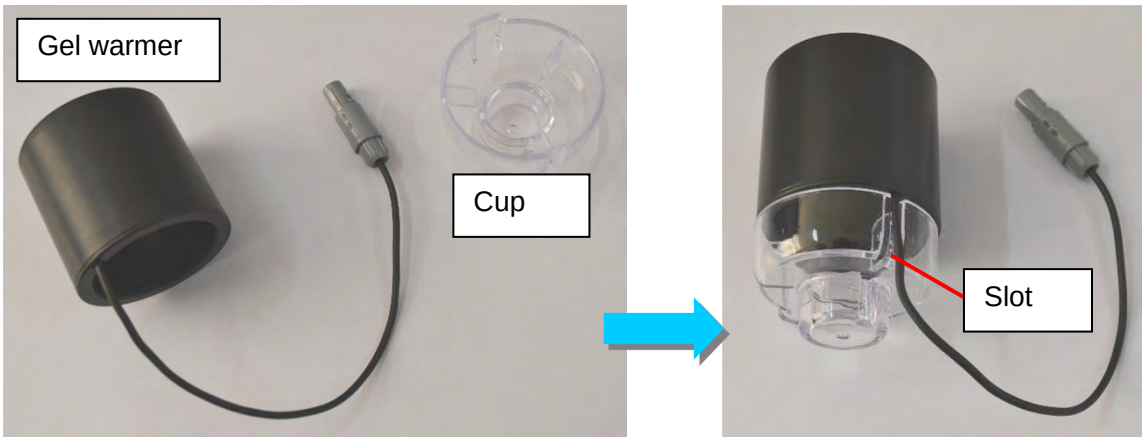


Fig.4-10 Connecting the gel warmer and cup

2) Place both the cup and gel warmer in the coupling gel heater slot on the left side of the system console (see Fig. 3-1 for the position of the coupling gel heater slot). Insert the plug of the cable into the power socket under the console so that the direction label on the power plug points outwards. See Fig. 4-11.

【Note】: The cup and gel warmer must be inserted at the same time. When doing so, hold them tight to avoid accidentally dropping them.

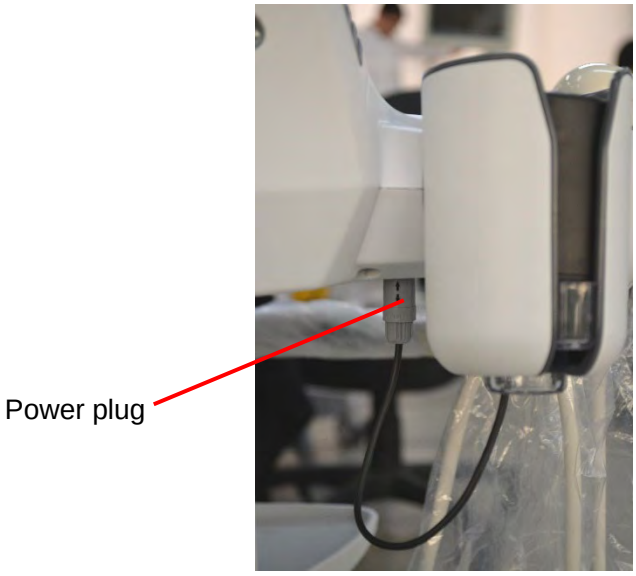


Fig.4-11

3) To remove the power plug, hold it by its rubber section and pull it downwards. See Fig. 4-12.

【Note】: The system may get damaged if these instructions are not followed.

Fig.4-12

Once the connection is established, turn on the heating function in Setup - System Setup, and the heater will warm up. Put the coupling gel in the slot to heat it up. See ***5.2.2*** for more information about the setup.

4.1.1.8 Replacing the fuse

【Warning】: The fuse must be replaced by Zimmer MedizinSysteme service staff.

1) Take the fuse slot out from the fuse holder.

2) Replace the fuse.

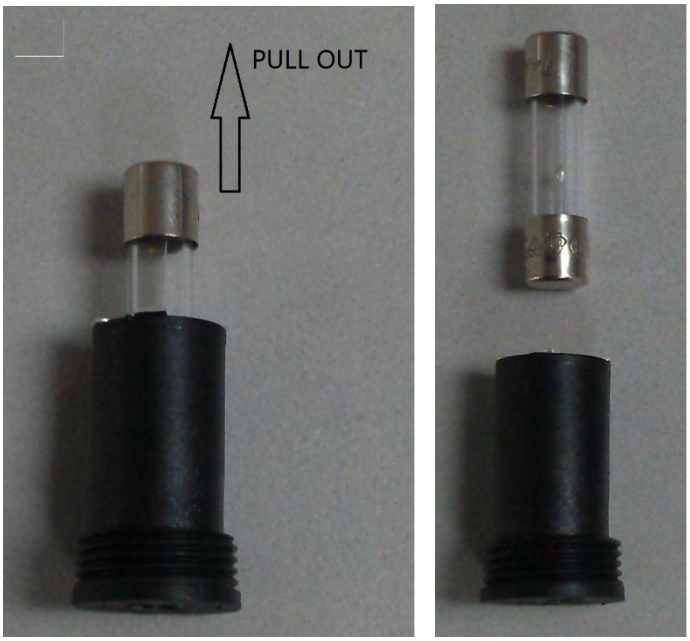


Fig.4-13

3) Place the fuse slot back into the fuse holder.

【Note】: To avoid the risk of electric shock, the plug should be taken out of the socket when the fuse is being replaced.

4.1.2 Power supply cable

a) If the power supply source is not a tripod socket with a ground wire, one end of the enclosed potential equalisation conductor must be connected to the system's potential equalisation terminal, and the other end should be connected to the potential equalisation terminal of an earthed system, or an earthed device that complies with the requirements, so as to ensure that the main unit is reliably earthed.

b) Ensure that the power switch is turned off before connecting the power cable.

4.2 Location of the system

After finishing assembling the system, the system should be placed in a suitable position.

1) Unlock the four-wheel brakes and move the system (see Section ***4.5*** for precautions on moving the system).
2) Move the system to the proper place.
3) Adjust the placement angle so as to avoid bright lights from above or outside.
4) Lock the wheel brakes and fix the system in place.

⚠ **【Note】: Set aside more than 30cm of space at the back of the system and on both sides of the system, otherwise a malfunction could occur due to an increase in the internal temperature of the system.**

4.3 Performing an examination

After completing system installation and review, the user can start to prepare for a patient examination.

4.3.1 Preparation

a) Ultrasound coupling gel: serves as a coupling medium between the probe and the patient's body surface, so as to avoid air between the skin and the probe, which can hinder ultrasound transmission.

b) Tissue paper: for removing ultrasound coupling gel from the patient and the probe.

4.3.2 Starting up the system

Follow the steps below to start up the system:

1) Connect the AC power cable to the power socket on the system's power supply panel;
2) Plug the power cable into the socket;
3) Switch the main power switch on the back of the system to the "|" position, and the indicator will light up;
4) Press the power switch in the upper-left corner of the control panel (see Fig. 3-7 for the exact position of the power switch) and start the system (booting takes about 3 minutes);
5) Press the power switch again to turn the system off.

⚠【Note 1】: If the system behaves abnormally, press and hold down the power switch on the control panel for longer than 8 seconds to force the system to shut down. If the system is not in use for a long time, switch the main power switch to the OFF position ("O" position).

⚠【Note 2】: DO NOT turn off the main switch when starting the system. Use the power switch on the control panel to turn the system off, and then turn the main switch off. Follow the steps in the correct order to turn the system off, otherwise patient data loss and/or hard drive failure could occur.

4.3.3 General steps for the examination:

This section will introduce the general steps to be considered when operating this system to examine patients. These steps include inputting patient data, selecting the probe and examination type, imaging, notes and body markers (pictograms), printing, image review, image storage, measurement and calculation. Users can adjust the examination steps according to the purpose of the examination and set their preference of approach.

General steps for the examination:

a) Inputting patient data: Input patient data into the system to start an examination. Press the **ID** key on the control panel to call up the ***New Patient Info*** page. Input data in the ***NAME*** **and** ***DOB (date of birth)*** data entry fields. Refer to ***7.1*** *Managing patient information* for detailed information.

b) Select the probe and the type of examination: When starting up the system, the system default probe will be in the **PROBE A** socket, and the preset examination type will be used by default. If you need to connect another probe to the probe socket while examining the patient, press the **Exam** button on the control panel or tap ***Preset*** on the touchscreen, and the connected probe and the examination type will be displayed on the touchscreen. Tap to select. For detailed information, please refer to *Section* ***6.2*** *Selecting probes and the examination type*.

c) Imaging: The available image modes can be directly activated via the control panel or the touchscreen. Image parameter settings can be controlled using both the buttons on the control panel and the touchscreen. Please refer to *Chapter 6 Imaging* for detailed information.

d) Annotations and pictograms:

Tap the ***Text*** button on the touchscreen to input text or tap on the annotations displayed on the touchscreen to add them to the images. Annotations are preset in ***ANNOT SETUP*** (see *section **5.2.10** Annotation setup*);

Pictograms can be utilised via the touchscreen using the ***Body Mark*** button. Please refer to Section ***7.2** Notes on image information* for detailed information.

e) Printing: Users can use the printer installed on the system to print images. Please refer to *Section **4.1.1.5** Printer installation* for detailed information. To set the print key, see *Section **5.2.3.3** Printer setup*.

f) Storing images: The user can press **Save** on the control panel to save individual images or film files to memory. The storage location and format can be set in Store Setup. Please see *Section **9.2** Store setup* for detailed information.

g) Reviewing images: During or after the examination, users can click on the image in the image preview area to review it. Or, press the **smarchive** button on the control panel to call up the ***Archive Management*** screen. Then double-click on the desired patient information to review the examination image. Please refer to *Section **9.4** Patient archive* for detailed information.

h) Measurements and calculations: Users can press the **Calc** button on the control panel to open the measurement and calculation menu. Then select Measurement and perform the measurement and calculation with the still images. This system records measurement values to calculate and create patient reports. The results will be entered into reports automatically and simultaneously, so that the user can process the diagnostic report.

i) New patient: After completing an exam, press the **ID** button to open the ***New Patient Info*** page. Click on ***New Pat*** and choose ***Yes*** in the input window to complete the current examination and create a new patient and begin the next examination.

4.3.4 Operators should pay attention to the following:

If, during a longer-lasting examination, the operator does not pay attention to the procedure, this may cause discomfort and impair the efficiency of the examination. The following suggestions are made for the operator to be comfortable and efficient while working:

a) Avoid straining the eyes; if possible, the screen should be positioned so that the image is clearly visible.

b) Choose a chair that supports the lower back and whose height can be adjusted

to fit the height of the table.

c) In order to avoid neck tension, and during complicated examinations, it is recommended to stand until the examination is completed. Adjust the monitor to eye level or slightly below eye level.

d) Bring the patient as close as possible to the person performing the examination to ensure that the exam is comfortable.

e) Place your elbows close to the sides of your body and relax your shoulders in a horizontal position. Use a support cushion or pillow to support your arm or rest your arm on the bed to reduce arm fatigue.

f) Plan your examinations and have breaks between them.

g) Make sure to change the position of your head, neck, body, arms and legs so as to avoid maintaining the same posture for a long time.

【Warning】: Long examinations may cause the hands, fingers, arms, shoulders, eyes, back or other parts of the body to feel uncomfortable. However, if you have continuous or recurring discomfort, pain, numbness, burning, or stiffness, please consult a qualified medical expert. These symptoms may be related to a musculoskeletal disorder (MSD). An MSD can cause pain and may lead to potentially serious damage to the nerves, muscles, tendons, or other body parts.

4.4 System testing and maintenance

The user can do the following to test the system: If an abnormality is detected, please contact Zimmer MedizinSysteme customer service. Our service staff provide detailed advice and take action to resolve any issues that arise.

4.4.1 Testing when the power is on

Check whether the power indicator on the front of the monitor is normal or not.

4.4.2 Testing knobs and buttons

Refer to *section **3.2.4.2** Layout of the control panel*. Check each knob and button to see if it is working normally.

4.4.3 Testing image quality

Refer to *Chapter 6 Imaging*. Adjust the image using the settings buttons on the control panel and observe the image display to see whether it is normal or not.

4.4.4 Testing measurement functionality

Refer to *Chapter 8 Measurements, calculations and reports*. Check various measurement & calculation functions to see whether they are normal or not.

4.4.5 Testing ECG (ECG mode is an optional function)

Inspect the ECG cable for shedding.

Refer to *section **6.13** ECG Mode*. Connect the 3-pin ECG cable, set the ECG using the settings buttons on the control panel, and observe the ECG display to see whether it is normal or not.

【Note】: ECG calibration is not required.

4.4.6 Inspecting the probe and probe cable

Check whether there are any cracks on the section of the probe that gets immersed in water. Inspect the probe cable connector and the probe cable to see whether there is any shedding.

4.4.7 Inspecting the potential equalisation conductor and main power cable

Check both to see if the coating has come off or if there is any shedding. Check the potential equalisation conductor to see if it is connected correctly and safely. Inspect these carefully so as to avoid any unexpected dangers due to any abnormalities with these cables.

【Note】: As the above sections 4.4.5 and 4.4.6 concern safety, always carry out these reviews every time before operating the system. Other items may be reviewed every 6 months.

4.4.8 Regular safety inspection

The following safety inspections should be carried out by an experienced, well-trained, qualified person at least once every 24 months:

- Check whether the equipment and accessories show any damage to their mechanics and functions.
- Check whether the relevant safety labels are clear for identification purposes.
- Inspect the fuses to ensure that they meet the requirements for the rated current and break limit.
- Ensure that all the device's functions work as per their operating instructions.
- Check whether the earthing resistance is equal to or less than 0.1 Ω.

- Check whether the EARTH LEAKAGE CURRENT meets the requirement of IEC 60601-1:2005.
- Check whether the TOUCH CURRENT meets the requirement of IEC 60601-1:2005.
- Check whether the PATIENT LEAKAGE CURRENT meets the requirement of IEC 60601-1:2005.

The leakage current must not exceed the maximum limit. All data is recorded in the system log. If the system does not work properly or fails any of the above tests, it must be repaired.

4.4.9 Testing consumables

As the items listed below are consumables, it is advisable to check them regularly and replenish or replace them in time.

Table 4-2 List of consumables and tips for replenishment or replacement

Object	**When to replenish or replace**
Ultrasonic coupling gel	Running low
Power supply cable and connection cable	Abnormal appearance
Dust cover	Worn or torn
Probe	Abnormal appearance of connector or cable
Fuse	When you run out of replacement fuses, use the fuse specified below: Type: Glazed fuse (slow, low breaking capacity) Size: 5mm x 20mm Rating: T4AL250V

【Note】When the system is shipped from the factory, no coupling gel is included. The user must purchase the required coupling gel that complies with the regulations of the country where the system is installed. It is recommended to use coupling gel that conforms to ISO 10993 requirements.

4.4.10 Testing the LCD arms

To maintain the support of the LCD arm, move the LCD arm at least every 2 months. When you move the arm, raise the LCD monitor on the LCD arm to the highest position. Then lower it to the minimum height and then adjust the LCD monitor to the required, correct operating height. See Fig. 4-14.

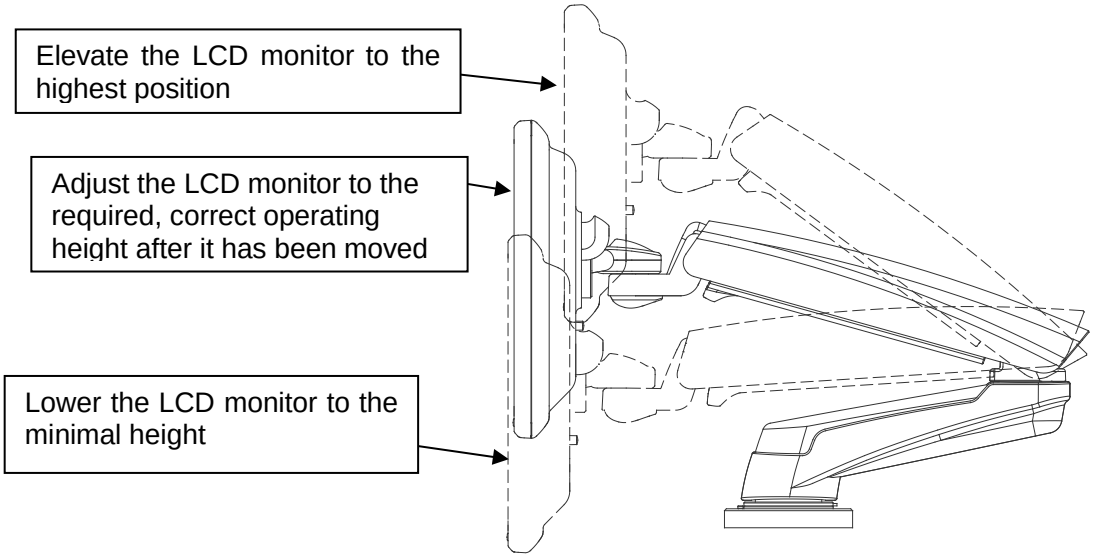


Fig.4-14 Moving the LCD arm

【Note】: Keeping the LCD arm at a fixed height for a long time in order to support the LCD monitor may result in the LCD arm providing decreased support.

4.4.11 Normal essential performance characteristics

◆ The definition of an essential performance characteristic of the system is as follows:

a) Any disturbance to it is not allowed to cause noises on a waveform, artefacts, image distortion or errors in a displayed numerical value that could alter the diagnosis.

b) Any disturbance to it is not allowed to cause an error that involves displaying incorrect numerical values that relate to the diagnosis being made.

c) Any disturbance to it is not allowed to cause an error message in a notification that is related to safety.

d) Any disturbance to it is not allowed to cause unintended or excessive ultrasonic output.

e) Any disturbance to it is not allowed to cause unintended or excessive TRANSDUCER ASSEMBLY surface temperature.

f) Any disturbance to it is not allowed to cause uncontrolled motion of the TRANSDUCER ASSEMBLIES intended for intra-corporeal use.

To ensure the essential performance characteristics, the system must be tested at regular intervals or as required.

For the essential performance characteristics of definitions a), b) and c) above, the user

may test the system with a standard ultrasonic test block every 24 months so as to confirm that the images and displayed numbers for the diagnosis are correct, and do not lead to incorrect diagnoses. Alternatively, the user may request testing and confirmation from Zimmer MedizinSysteme service staff or from a qualified third-party tester.

If the user has any questions about the essential performance characteristics d), e) or f), he can request testing and confirmation every 12 months from a qualified third-party tester.

◆ The definition of an ECG essential performance characteristic is as follows:

a) Following electrostatic discharge, the system must resume normal operation in the previous operating mode within 10 seconds, without loss of any operator settings or stored data, and must continue to perform its intended function and maintain essential performance characteristics.

b) When exposed to electrical fast transients and bursts, the system must continue to perform its intended function as described in the accompanying documents.

c) When exposed to conducted disturbances, the system must continue to perform its intended function as described in the accompanying documents.

d) When the system is to be used in an electrosurgery environment, it must be protected against malfunctions caused by electrosurgery.

If the user has any questions about the essential performance characteristics a), b), c) or d), he can request testing and confirmation every 12 months from a qualified third-party tester.

4.4.12 Cleaning and disinfecting the probes

The probe should be cleaned and disinfected after every use.

Please meet the following requirements for cleaning and disinfecting the probe. Otherwise, the probe may get damaged.

a) The probe should not be cleaned or disinfected with alcohol or cleaning agents that contain alcohol or other organic solvents (e.g. thinners);

b) The part of the probe that is immersed should not exceed the orientation mark on the side of the probe's housing;

c) Do not expose the probe to high steam pressure or ethane oxide;

d) Do not immerse the probe for longer than one hour.

4.4.12.1 Cleaning

a) Clean the probe surface with a soft cloth soaked in water after use;

b) If the probe is dirty, use a soft cloth soaked in a cleaning agent (e.g. neutral soapsuds) to clean it, and then use a soft cloth soaked in water to remove the soapsuds;

c) After cleaning, wipe the probe with a clean, dry cloth.

4.4.12.2 Disinfection

a) The probe should be disinfected with special liquid disinfectant. It is recommended to use glutaraldehyde solution or benzalkonium bromide solution. The disinfectant solution should be formulated and used in accordance with the product instructions from the manufacturer;

b) After disinfection, thoroughly remove the disinfection solution from the probe with sterile water, and then wipe the probe with a soft dry cloth.

【Warning】: A probe cover does not effectively protect the probe against contamination if that probe has been used on a patient at risk of, or suspected to have, Creutzfeldt Jakob disease (CJD). It is possible that the probe may have been severely contaminated. A probe that has been exposed to tissue of the central nervous system tissue of a patient at risk of, or suspected of having, CJD or vCJD (variant Creutzfeldt-Jakob disease) must be destroyed, as it will not be possible to thoroughly decontaminate the probe.

4.4.13 Cleaning the control panel and the exterior housing of the system

The control panel and system exterior require weekly cleaning. Information on cleaning is given below.

a) There must be no water present within the system. Water can damage the circuit.

b) Wipe the system with a soft cloth moistened with water. If necessary, the cloth can be dipped in a small amount of neutral detergent. Once this has been done, use water to remove the detergent.

c) After cleaning, wipe the system with a clean, dry cloth.

【Note】: The trackball on the control panel comes with a dust protector in the form of a rubber ring, which tightly encloses the ball to effectively protect it from dust. This special design effectively prevents dust from accumulating, even after long-term use, without the need to remove the trackball for cleaning.

4.4.14 Cleaning peripheral devices

Peripheral devices (such as printers, foot switch sockets etc.) should be cleaned on a regular basis in line with their use. For the cleaning procedures, please refer to the operating instructions for the individual devices.

4.5 Moving the system

To transport the system safely, please observe the following instructions.

a) Remove all electric cables connected to the rear panel.

b) Put the probe(s) on the probe holder(s).

c) Do not tilt the equipment more than 10 degrees.

d) If a step is higher than 2cm, put something under the casters to make the step height less than 2cm.

e) Before transporting the system, ensure that the keyboard is removed, and that the console and monitor are in the middle. The extended keyboard may be damaged if it collides with another object.

f) Secure the power cable, the potential equalisation conductor and the probe cables tightly, so they do not get caught in the trolley casters.

g) Only move the system when the wheel brakes are unlocked.

h) Do not push the system with excessive force from the side, as the system could fall over.

i) Pay attention to your feet when you move the system to ensure that none of the wheels rolls over them or collides with them.

j) The system must not be parked on an incline.

⚠ **【Note】: Do not forcibly move the system when one of the wheels is locked. Otherwise the wheel might get damaged.**

Chapter 5

System Settings

5.1 System Settings

The settings are used for system set up, for the launch, environment, statuses and parameters of the different modes. Settings are stored in the system memory and are retained in the system, even when it is turned off. This ensures that the system will run the same way every time it boots, according to settings previously made by the user.

The various system features can be customised via the ***SETUP*** menu.

Tap ***Setup*** on the touchscreen to bring up the ***SETUP*** screen, as shown in Fig. 5-1. Move the cursor over any item and press **Set** to bring up the corresponding screen. Move the cursor over ***Exit*** and press **Set**, or directly press **Esc**, to exit the ***SETUP*** screen.

Functions and operation of each setup are explained according to the number denoted on the ***SETUP*** screen.

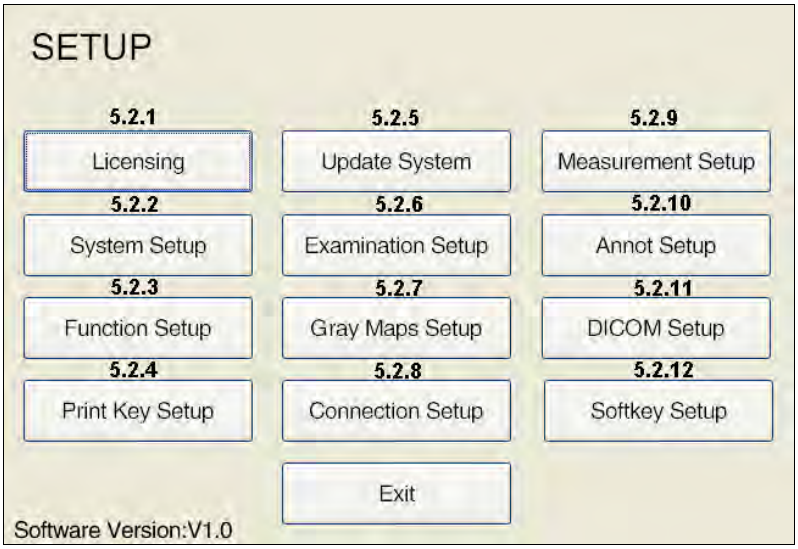


Fig. 5-1 System Settings

Software version “V X.X” will be displayed in the lower-left corner of the ***SETUP*** screen.

5.2 Setup instructions

5.2.1 Licensing

The trial functions have expiration dates built into the software. The activation status, the date of activation and the days used can be called up in the menu. Follow the steps below to activate certain functions (including basic system functions) on the ***Licensing*** screen, as shown in Fig. 5-2. Tap ***Setup*** on the touchscreen to bring up the ***SETUP*** screen. Then click on ***Licensing***, to bring up the ***LICENSING*** screen.

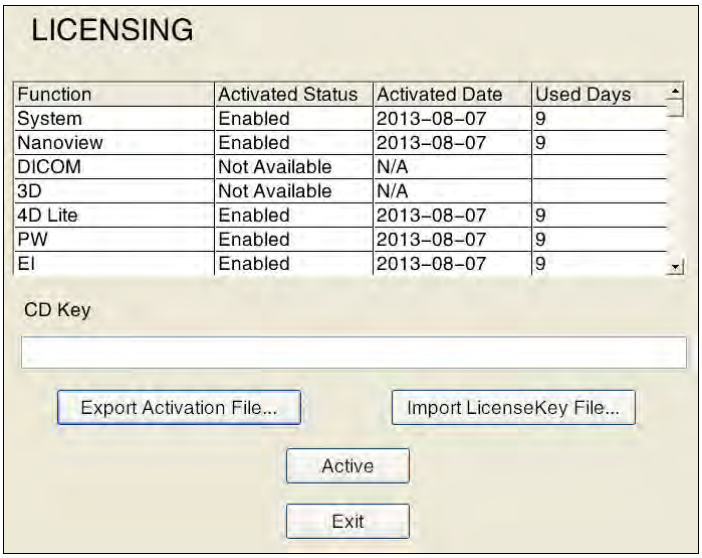


Fig. 5-2 Licencing screen

a) Exporting the activation file: Click ***Export Activation File…*** to bring up the ***Save File*** selection window, and there select the target storage device. A SN.txt file will then be created automatically in the selected master data directory. Click ***Save*** to save the SN.txt file to the target storage device and exit the selection window.

b) Send the ***SN.txt*** file to Zimmer MedizinSysteme, and the ***Licence.txt*** file will be returned to the user.

c) Importing the licence key file: Click on ***Import LicenseKey File...*** . Follow step 1 to open the ***Licence.txt*** file and click on ***Open***. The system then will exit the selection window and create a licence key. Click on ***Active*** on the ***LICENSING***

screen to complete the activation.

【**Note**】**:** Users can also edit the licence key in the CD key editing window and then click ***Active*** to complete the activation.

5.2.2 System Settings

SYSTEM SETUP allows users to change the facility name, the system display properties, the system date/time, and the system language options. The ***SYSTEM SETUP*** screen is shown in Fig. 5-3. Tap ***Set up*** on the touchscreen to bring up the ***SET UP*** screen. Then click ***System Setup*** to bring up the ***SYSTEM SETUP*** screen.

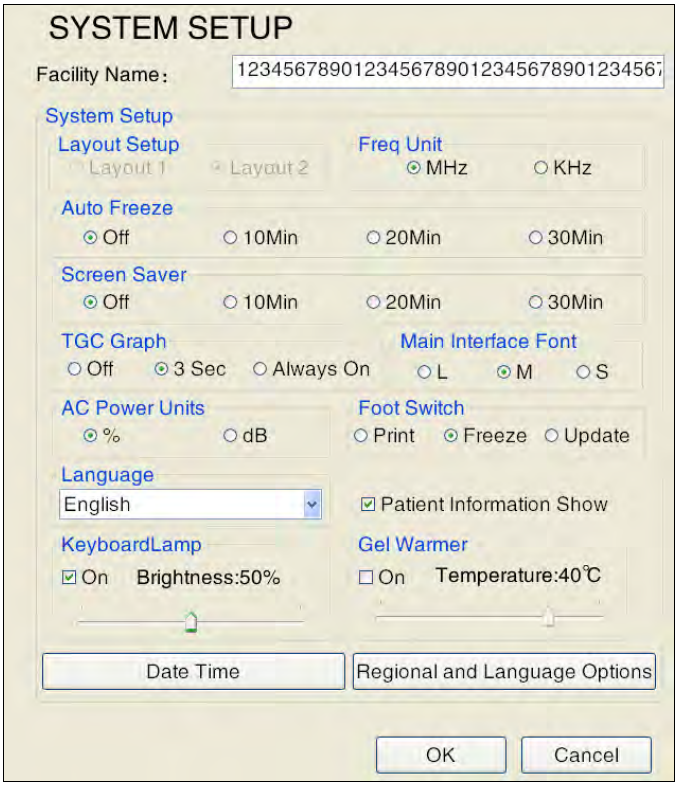


Fig. 5-3 System Settings

a) ***Facility name***: Use the keyboard to input the name of the facility, e.g. Shantou Hospital.

【**Note**】**:** When inputting the text, press **Tab** on the keyboard to switch to another input language (e.g. Russian) (provided the system supports the language).

b) ***Layout setup***: This setting is not supported by the system.

c) ***Freq unit***: For setting the frequency unit. There are two frequency units available: ***MHz*** and ***KHz***.

d) ***Auto freeze, Screen saver***: If no input is made by the user in the system, the system automatically switches to auto freeze and turns on the screen saver. Select ***Off*** to switch off the auto-freeze function and the screensaver. To unfreeze the system and activate the probe/imaging, just press **Freeze** on the control panel.

e) ***TGC graph***: There are three options for the TGC graph display: ***Always On***, ***3 Sec*** and ***Off***. Choose ***Always On*** to constantly display the TGC graph. Use the 8 **TGC** sliders to adjust the TGC graph on the screen in real time. Select ***3 Sec*** and the TGC graph will be displayed during the procedure of adjusting the 8 **TGC** sliders. If the 8 TGC sliders are not used for a period of 3 seconds, the TGC graph will automatically switch off. Select ***Off*** and the TGC graph will not be displayed on the screen.

f) ***Main interface font***: For setting up the font size of the main interface, and information on image control parameters and the setup. Three options are available: ***L, M*** and ***S***.

g) ***AC power units***: There are two AC power supply units available for setting the AC power supply: ***%*** and ***dB***.

h) ***Foot switch***: If a foot switch is connected, the foot switch setting will also be available. There are three options to choose from: ***Print, Freeze*** and ***Update***.

i) ***Language***: For setting the system language. If only one language is available on the system, this element cannot be changed. If the system supports multiple languages, select one from the drop-down menu, click on ***OK***, and all texts on the user interface display will immediately be replaced in the selected language.

j) ***Patient Information Show***: Check the box in front of ***Patient Information Show*** to display the patient information. Otherwise these will not be displayed.

k) ***Key Board Lamp***: Check the box in front of ***On*** under ***Key Board Lamp*** to turn on

the keyboard backlight when working in a poorly lit room. Use the trackball and the **Set** key to drag the slider for the keyboard lamp and change the brightness.

l) Gel Warmer: Check the ***On*** box to turn on coupling gel heating function. Use the trackball and the **Set** key to drag the slider for the temperature setting and change the heating temperature. **(Note: Before setup, place the gel warmer in the system and connect it properly. See *Chapter 4* for the connections.)**

m) ***Date Time***: Set the current date and time in the system-defined format. Click on ***Date Time*** to bring up the ***Date and Time Properties*** settings screen (see Fig.5-4).

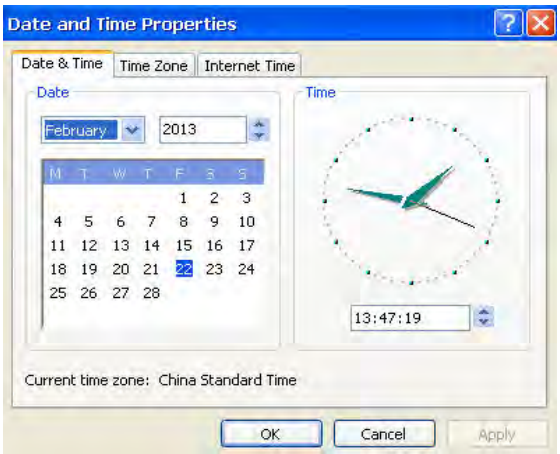


Fig. 5-4 Date and time settings screen

Setting the date: Click on the month drop-down menu, roll the trackball to select and press the **Set** key to confirm the month. Click the up and down arrows on the right side of the year to set the year. Click on the appropriate illustrations on the calendar clock to set the date.

Setting the time: Click on hours, minutes and seconds beneath the clock when the number is shaded blue, and then use the number keys on the keyboard to change the time.

【Note】: On the diagnostics screen, move the cursor onto the date in the upper-right corner of the screen and press the **Set** key to bring up the date/time setting screen. Then set the number according to the method described above.

n) ***Regional and language options***: Formats of date, time and the display of a particular country can be chosen in the ***Regional*** setting. Select the desired

language in the ***Language*** setting. Click on ***Regional and Language Options*** to call up this screen (see Fig. 5-5).

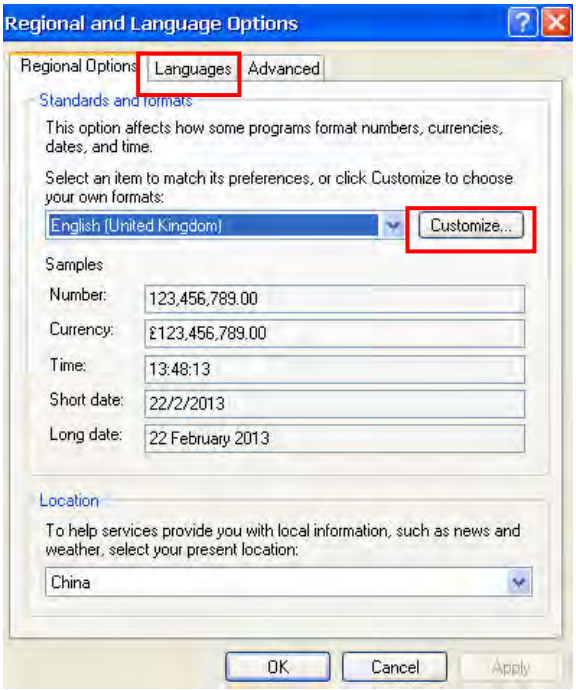


Fig. 5-5 Regional and language options screen

Setting the display format: Select an element on the screen shown in Fig. 5-5, such as ***English (United Kingdom)***, then click on ***Customize*** to bring up the settings screen. Numbers, currency, time, short date and long date can be set as required.

Language setting: Click on ***Language*** to access the language setting screen.

5.2.3 Function setup

With ***FUNCTION SETUP***, users can configure specific system features, including ***Hotkey Setup***, ***SonoAir***, ***Printer Setup***, ***TouchScreen Setup, 4D Setup,*** and ***Video Setup***. Tap ***Setup*** on the touchscreen to bring up the ***SETUP*** screen. Then click on ***Function Setup***, to bring up the ***FUNCTION SETUP*** screen, as shown in Fig. 5-6.

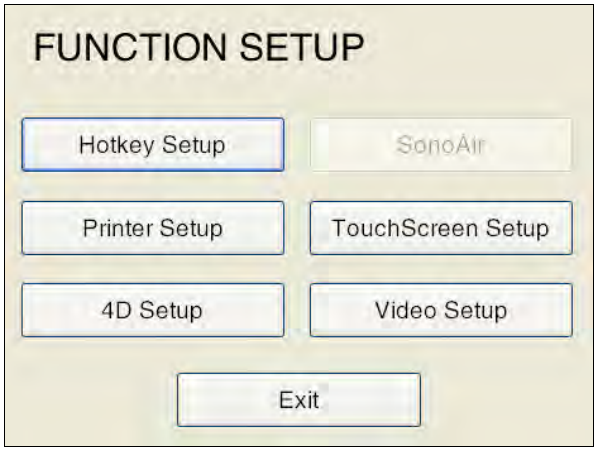


Fig. 5-6 Function setup

5.2.3.1 Hotkey setup

The hotkey setup function allows users to define the functions of the keys **P1** to **P6/Dis** on the control panel. Each key can be defined for any action and configured for different modes. The ***HOTKEY SETUP*** screen is shown in Fig. 5-7.

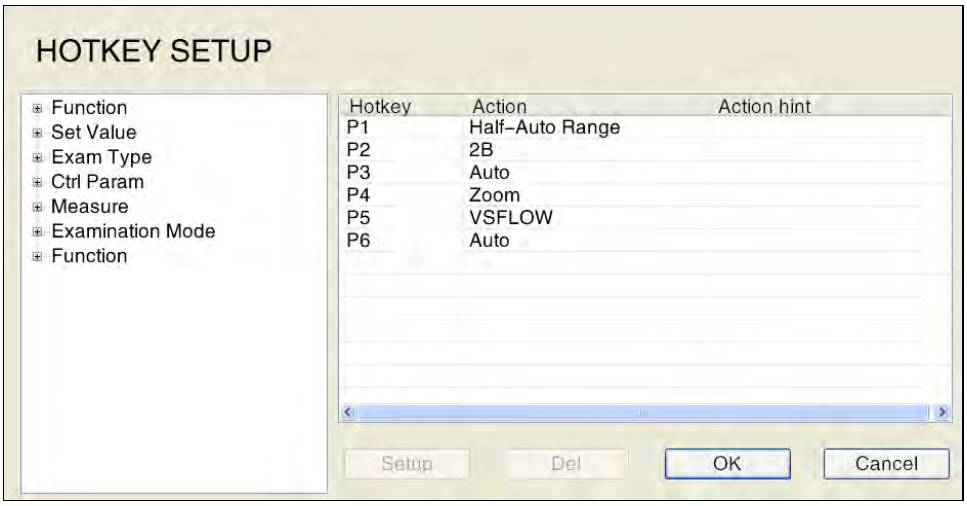


Fig. 5-7 Hotkey setup

【Note】: The default hotkey setup is: P1 for range trace, P2 for 2B mode, P3 for auto, P4 for zoom, P5 for VS-Flow and P6/Dis for distance.

The hotkey setup process is as follows:

1) Select a hotkey: Move the cursor over the desired hotkey and press **Set**. There are 6 hotkeys to choose from: **P1** to **P6/Dis**.

2) Select the action type: For selecting different execution functions for each hotkey. There are three options: ***Function***, ***Set Value, Exam Type, Ctrl Param, Measure, Examination Mode*** and ***Function***. Move the cursor to an action type, double-click **Set** or move the cursor onto "+" in front of the function type. Then press **Set,** to expand the list of the various functions. There are many actions available for selection.

3) Select an action: Move the cursor to an action, and then press **Set** to select. Users can select a function according to their requirements.

4) Setting: After setting the hotkey action, move the cursor over ***Setup*** on the ***HOTKEY SETUP*** screen and press **Set**. The selected action and action type for the hotkey will be automatically displayed in the hotkey table, and the suggested approach will be displayed in the Action Hint table.

   【Note】: To delete the set hotkey, click on the hotkey and on ***Del*** to disable it. Then ***N/A*** **will be displayed under** ***Action***.

5) Confirm setup: After setup, move the cursor over ***OK*** and click on **Set** to confirm the operation and return to the ***FUNCTION SETUP*** screen.

   【Note】: Choose ***Cancel*** to cancel the hotkey setup.

Example 1: Define **P1** as the hotkey for system settings (i.e., you press **P1** to call up the system settings).

How to set: Select the **P1** hotkey on the ***HOTKEY SETUP*** screen → Select ***Function*** → Select ***System Setup*** from the function submenu → Select ***Setup***→ Select ***OK***.

Example 2: Define **P2** as the hotkey for the keyboard lamp (i.e. you press **P2** to turn on the keyboard lamp).

How to set: Select the **P2** hotkey on the ***HOTKEY SETUP*** screen → Select ***Set Value*** → Select ***Keylamp*** from the Keylamp submenu → Select ***On*** → Select ***Setup*** → Select ***OK***.

5.2.3.2 SonoAir

SonoAir enables users to send system video data (i.e. image data) to a work station developed by Zimmer MedizinSysteme via the network connection, which ensures that the work station captures high-quality, complete and undistorted video data.

See Fig. 5-8 ***SonoAir*** screen.

【Note】 : SonoAir is an optional function that is not activated if not purchased. In this case, *SonoAir* is marked grey, and no setup is available.

Fig. 5-8 SonoAir

a) ***On***: For turning the SonoAir network function on/off.

b) ***Image Quality***: Three options are available for setting the image quality: high, mid and low.

c) ***Listen Port***: The write protection is intended for connection to the workstation developed by Zimmer MedizinSysteme.

d) ***Screen Area***: For setting the area for transmitting images.

- ◆ When you select ***Image Area***, only the ultrasound image area can be transmitted.
- ◆ With ***Custom Area***, any area can be set as the transmission area. The ***Left*** and ***Top*** values are for the beginning of the image transmission area (i.e., the top-left point in the transmission area). ***Width*** is for the width of the image

transmission area and ***Height*** is for the height of the image transmission area.

The two setup methods:

1) Select ***Custom Area*** and input the values for ***Left, Top, Width, Height*** (unit: pixel), or click on the up/down arrow to the right of an item to change its value. The green rectangle in the right-hand preview area relates to the transmission area.

2) Use the trackball to move the cursor to the right-hand preview area. Press and hold the **Set** button on the control panel at the start point of the area to be transmitted and use the trackball to move the green rectangle in which the transmission area is located. Now the ***Left, Top, Width, Height*** settings boxes will display the appropriate values.

5.2.3.3 Printer settings

Printers and Faxes allow users to configure printers and faxes connected to the system. Setup options include ***Add a printer***, ***Set printer properties***, ***Share a printer*** and ***View printer tasks***. The setup procedure is the same as that for the Windows screen. The ***Printers and Faxes*** screen is shown in Fig. 5-9.

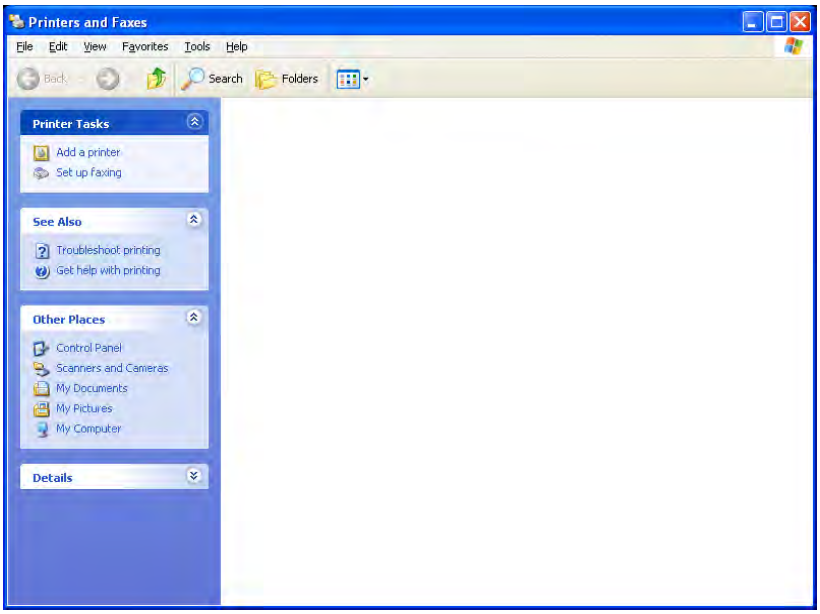


Fig. 5-9 Printers and Faxes

5.2.3.4 Touchscreen settings

TOUCHSCREEN SETUP allows users to change the brightness of images transmitted to peripheral devices to ensure optimum quality. The ***TOUCHSCREEN SETUP*** screen is shown in Fig. 5-10.

Procedure for adjusting the brightness: Press **Set** to activate the cursor. Then use the trackball and press **Set** to shift the slider onto Brightness and make the adjustment.

【Note】: This option can also be used to calibrate the touchscreen. However, the brightness values in this setup are not applicable for the image on the screen or for images stored in the system.

If the touchscreen display is misaligned, use the ***Touchscreen Adjust*** button on the ***TOUCHSCREEN SETUP*** screen to calibrate. Follow the steps below to perform calibration:

Press the ***Touchscreen Adjust*** button and ***Tap the touchscreen to begin calibration*** will be displayed in the middle of the touchscreen.

Tap on the touchscreen, and the prompt ***Tap Calibration Point1*** will appear in the middle of the screen, and a **+** will be seen bottom left. Tap on the **+**, and the prompt ***Tap Calibration Point2*** will appear in the middle of the screen, and a **+** will be seen in the top half. Tap the second **+**, and the prompt ***Tap Calibration Point3*** will appear in the middle of the screen, and a **+** will be seen in the middle on the right. Tap the last **+**, and the touchscreen will display ***Calibration Complete***. The user can now leave the ***SETUP*** screen. Touch the touchscreen again, and the touchscreen will return to its original state.

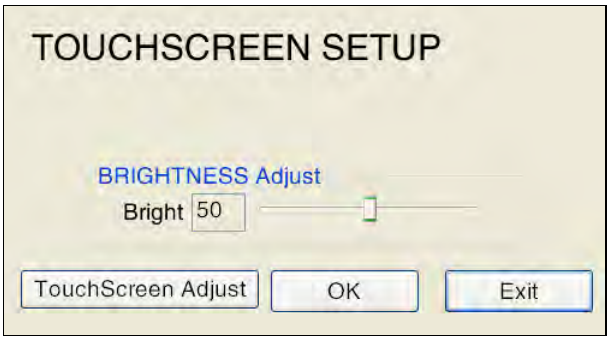


Fig. 5-10 Touchscreen settings

5.2.3.5 4D settings

The 4D setup screen is for the user to set the work mode for the **4D** button.

【Note】: This setting is only available when using a 4D probe.

Abdomen is the default 4D work mode; i.e., when using an abdominal 4D probe, pressing the **4D** button on the control panel will activate 4D mode. Users can reset the work mode according to their requirements.

5.2.3.6 Video setup

Select ***Video Setup*** in ***Setup – Function Setup*** to enter the video setup screen.

The user can apply the corresponding methods for ***VIDEO SETUP*** according to the current display screen. The detailed procedure is described below.

5.2.3.6.1 The first video setup

The VIDEO SETUP screen is shown in Fig. 5-11.

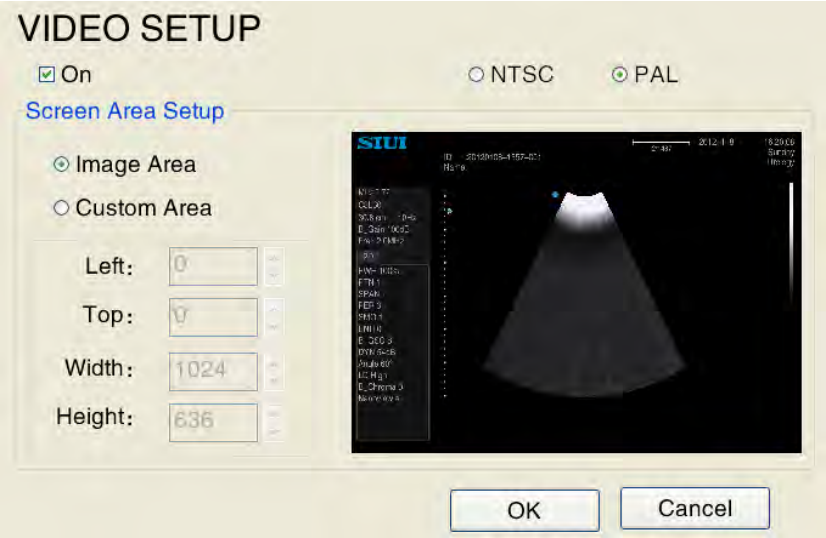


Fig. 5-11 Video setup

a) ***On*** is used to turn the video transmission function on/off.

b) Use the trackball and the **Set** key to select the appropriate format (***NTSC*** or ***PAL***).

【Note】: The setup for the video output format will only take effect after restarting the operating system.

c) ***Screen area setup*** is for setting the area for the transmission of the object.

- When you select ***Image Area***, only the ultrasound image area can be transmitted.
- With ***Custom Area***, any area can be set as the video transmission area. The ***Left*** and ***Top*** values are for the beginning of the video transmission area (i.e., the top-left point in the transmission area).; ***Width*** is for the width of the video transmission area, and ***Height*** is for the height of the video transmission area.

  The two setup methods:

  1) Select ***Custom Area*** and input the values for ***Left, Top, Width, Height*** (unit: pixel), or click on the up/down arrow to the right of an item to change its value. The green rectangle in the right preview area relates to the video transmission area.

  2) Use the trackball to move the cursor to the right-hand preview area. Press and hold the **Set** button on the control panel at the start point of the area to be transmitted and use the trackball to move the green rectangle in which the video transmission area is located. Now the ***Left, Top, Width, Height*** settings boxes will display the appropriate values.

5.2.3.6.2 The second video setup

The VIDEO SETUP screen is shown in Fig. 5-12. Video setup includes Zoom Setup, Video Output Setup and Picture Setup.

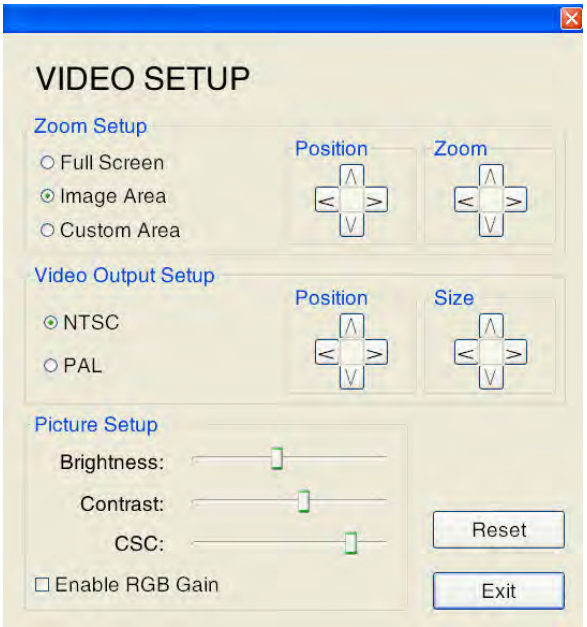


Fig. 5-12 Video setup screen

a) Zoom Setup

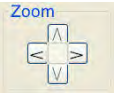
The gain settings allow users to set the size and position of the area of interest. Use the trackball and the **Set** key to select the appropriate position.

◆ ***Full screen***: Video output full-screen area; output content includes image area, parameter area, patient information, and so on.

◆ ***Image area*** (system default setup): Video outputs only image area, and other area information will be hidden.

◆ ***Custom area***: The user can define the video output area and amplify areas of interest. When ***Custom Area*** is selected, ***Position*** and ***Zoom*** can be adjusted.

Use the trackball and the **Set** button to click on the four direction keys of 

and adjust the displayed position. Click on the ***up/down*** arrow of 

to amplify the displayed image lengthwise and click on the ***left and right*** arrow to amplify the displayed image transversely.

【Note】: There are sixteen directional arrows on this interface. Press and hold for a continuous setting and press briefly to set by frequency.

b) Video output setup

Video output setup allows users to set up the displayed position and size of the output screen.

Use the trackball and the **Set** button to select the appropriate format (***NTSC*** or ***PAL***).

【Note】: The setup for the video output format will only take effect after restarting the operating system.

Use the trackball and the **Set** key to click on the four direction keys of 

and adjust the displayed position. Click on the ***up/down*** arrow of 

to amplify the displayed image lengthwise and click on the ***left and right*** arrow to amplify the displayed image transversely.

c) Picture setup

Picture Setup allows users to set up the effect for the output image, including brightness, contrast and saturation. Roll the trackball to move the cursor to the adjustment slider. Press on the **Set** key and roll the trackball to adjust.

Use the trackball and the **Set** key to select ***Enable RGB Gain***, and the screen will light up.

d) Reset

Use the trackball and the **Set** key to click on the ***Reset*** button in the bottom-right corner of the screen, and all the parameters will reset to the factory defaults.

e) Exit

Use the trackball and the **Set** key to click on the ***Exit*** button in the bottom-right corner of the screen and save the current setup and exit the setup screen.

5.2.4 Print key setup

PRINT KEY SETUP allows users to define the ***Print*** key function on the touchscreen. This option is not available for selection if it is not activated. Tap ***Setup*** on the touchscreen to bring up the ***SETUP*** screen. Then click on ***Print Key Setup*** to bring up the ***PRINT KEY SETUP*** screen, as shown in Fig. 5-13.

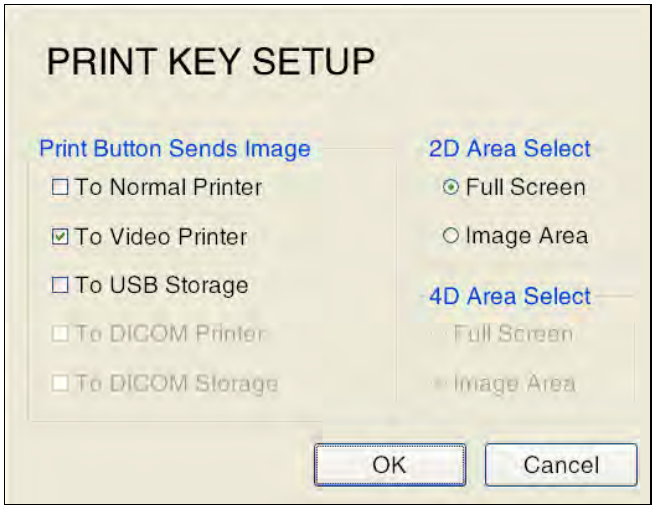


Fig. 5-13 Print key setup

a) ***Print Button Sends image***: There are five options to choose from; namely, ***To Normal Printer***, ***To Video Printer***, ***To USB Storage***, ***To DICOM Printer*** and ***To DICOM Storage*** (The functions ***DICOM Printer*** and ***To DICOM Storage*** are only available if the DICOM option has been purchased and DICOM setup has been configured). Select one of the options and press ***OK*** to exit the setup screen. Tap ***Print*** on the touchscreen again to send the current image to the printer, USB storage, DICOM printer or DICOM storage, according to the setup.

b) ***2D Area Select***: There are two settings options to choose from: ***Full Screen*** and ***Image Area***. Selecting ***full screen***: When in 2D mode, tap ***Print*** on the touchscreen to send the full screen. Selecting the ***image area***: When in 2D mode, tap ***Print*** on the touchscreen to send only the image area.

c) ***4D Area Select***: There are two settings options to choose from: ***Full Screen*** and ***Image Area***. Selecting ***full screen***: When in 3D mode, tap ***Print*** on the touchscreen to send the full screen. Selecting the ***image area***: When in 3D mode, tap ***Print*** on

the touchscreen to send only the image area.

【Note】: The *Full Screen* and *Image Area* settings are for PC printers only.

5.2.5 System upgrade

The system upgrade function is for updating the system software and for special requirements. If this function is required, please contact Zimmer MedizinSysteme. The procedure for updating the system is described below:

After inserting the USB hard disk or CD drive, tap on ***Setup*** on the touchscreen to call up the ***SETUP*** screen. Then click on ***Update System***. The system will automatically search the root directory of the USB hard disk or the CD drive for the update file ***Colour.exe***. As soon as the file is found, the update information will be displayed along with a prompt dialogue box, as shown in Fig. 5-14.

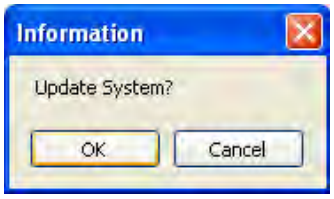


Fig. 5-14 Update prompt

Select ***OK*** to update the system or ***Cancel*** to cancel the update.

If ***Colour.exe*** is not found in the root directory of the USB hard disk or the CD drive, a selection box will appear for the update file. Users must find the directory of the update file, select the update file ***Colour.exe***, and then click on ***Open***, as shown in Fig. 5-15.

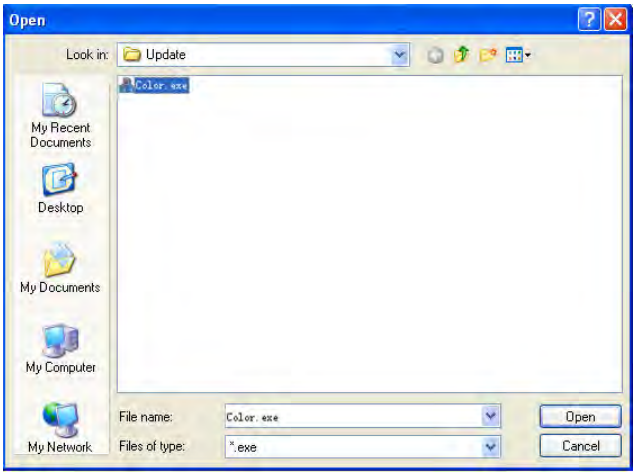


Fig. 5-15 Selection box for the update file

After selecting ***Colour.exe***, a new box will appear to confirm the update, as shown in Fig. 5-15. Select ***OK*** to update the system or ***Cancel*** to cancel the update.

When users open an update software, four options will be displayed on the software installation user interface. Users can choose from among these according to their needs, as shown in Fig. 5-16.

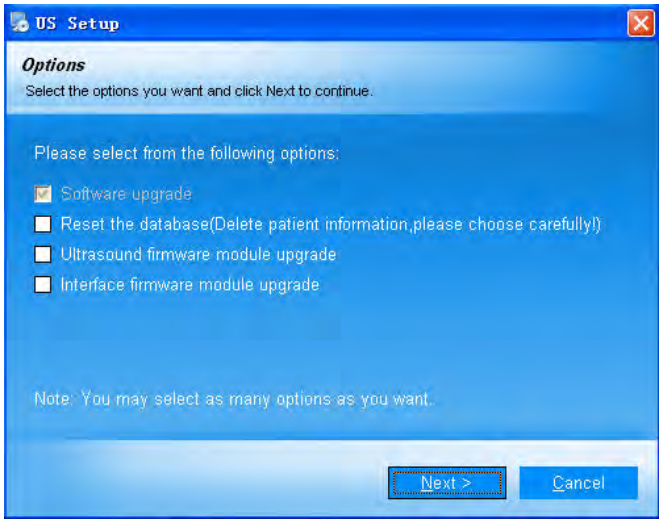


Fig. 5-16 User interface for system installation

a) Software upgrade

This is a routine software upgrade with a default check, and users cannot change this item.

b) Reset the database

If, after the routine software upgrade, prompts for a database error still appear, it is recommended that the user select this item and reinstall this software.

【Note】: Selecting this installation will delete patient information. Please backup the information before installing this item.

c) Ultrasound firmware module upgrade

When this option is selected, the system will request a password during the installation process. If the password is correct, the system will complete the installation and restart. While loading the ultrasound software, the system will automatically update the ultrasound firmware module. The user should follow the on-screen prompts and restart the system. If the password is incorrect, the user

cannot perform this upgrade.

【Note】: This function only works for some system modules.

【Caution】: Updating the ultrasonic firmware module deletes all user settings, including parameter settings and user-defined control modes. Therefore, please select this function with caution.

d) Interface firmware module upgrade

When this option is selected, the system will request a password during the installation process. If the password is correct, the system will complete the installation and restart. When reloading the ultrasound software, the system will automatically update the ultrasound firmware module. The user should subsequently perform a system restart as per the on-screen prompts. If the password is incorrect, the user cannot perform this upgrade.

【Note】: This function only works for some system modules.

【Caution】: Updating the firmware module's user interface deletes all user settings, including parameter settings and user-defined control modes. Therefore, please select this function with caution.

After selecting installation item, press ***Next*** at the bottom right of the user interface to start the installation. Click on ***Cancel*** to cancel the installation. The system will automatically restart.

5.2.6 Examination setup

EXAM SETUP enables users to set up imaging parameters for various examination types and to create new examination types. Tap ***SETUP*** on the touchscreen to bring up the ***SETUP*** screen. Then click on ***Examination Setup*** to bring up the ***EXAM*** screen, as shown in Fig. 5-17. Models of all the connected probes will be displayed on the screen, with all exam types supported by them listed below the corresponding probes. In ***Operation*** there are two options to choose from: ***SaveParam*** and ***DefaultParam***.

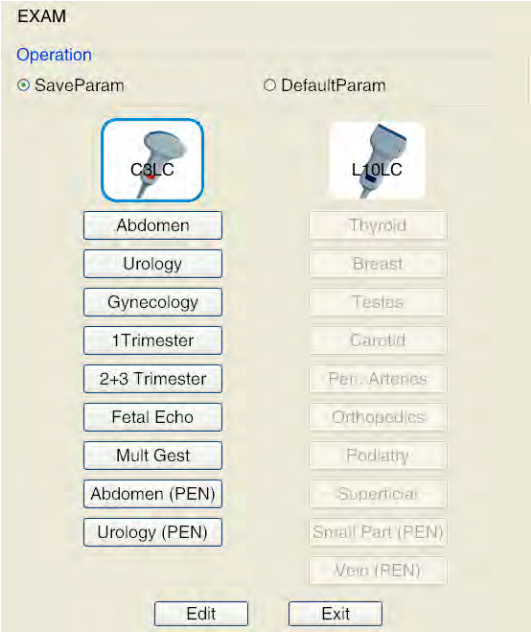


Fig. 5-17 Examination settings

The procedure for ***SaveParam*** is as follows:

1) In any mode, adjust the imaging parameters to the ideal state.

2) Tap ***Setup*** on the touchscreen to bring up the main setup screen. Select ***Examination Setup*** to bring up the ***EXAM*** setup screen.

3) Move the cursor over ***SaveParam*** and click on **Set**.

4) Move the cursor to the button for the examination type for which you would like to save parameters. Press **Set**, and a prompt dialogue box will appear. Use the trackball and **Set** to click on ***Enter*** **and** to save the parameters for the examination type (when the user activates the imaging state of the selected examination type, the stored imaging

parameters are displayed). < Or click on ***Cancel*** to quit the stored parameters (when the user activates the imaging state of the selected examination type, he has to reset the parameters for imaging).

To restore to the default parameters settings, select ***Default Param*** in the ***EXAM*** screen and follow the same operation as for ***SaveParam***.

The user can use the ***Edit*** button on the examination setup screen to create, rename, delete or adjust the examination type, or to import or export all parameters. The procedure is described here:

a) Move the cursor to ***Edit*** and press **Set** to call up the screen for setting the examination, as shown in Fig. 5-18.

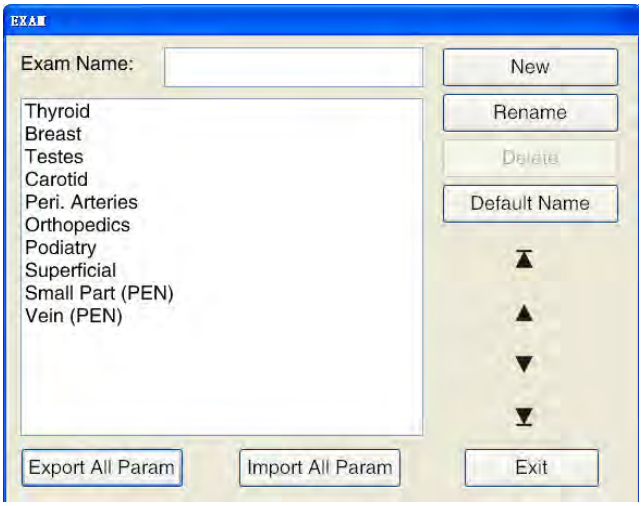


Fig. 5-18 Exam setup screen

b) New: Move the cursor to the input field for the name of the examination, and press **Set** and use the keyboard to enter a new examination type. Then move the cursor to ***New***. Press **Set**, and the new examination type will be created and displayed in the left-hand list.

c) Rename: Move the cursor to the left-hand list, select the examination type to be renamed, and the name will be displayed in the Exam Name input box. Move the cursor to the Exam Name input box. Press **Set**, and then input the change from the keyboard. Move the cursor to ***Rename***. Press **Set** to complete the change.

d) Delete: Move the cursor to the left-hand list, select the examination type to be deleted, and then move the cursor to ***Delete***. Press **Set**, and the system will display a prompt dialogue box. Select ***OK*** to delete the examination type or ***Cancel*** to cancel the process.

e) Adjust Position: Move the cursor to the list on the left, select the examination type, and press one of the 4 arrow marks on the right to change the position of the examination type: for top , for up , for down and for bottom.

f) Export All Param: For exporting all parameters for the examination type, names and new examination types to the specified location. Procedure: Press ***Export All Param*** to call up the input box for saving the file, select the path, and then click on ***Save***.

g) Import All Param: For importing all parameters for the examination type and names into the system. Procedure: Press ***Import All Param*** to call up the input box for saving the file. Select the file and then click on ***Open*** to import parameters.

【Note】: It is not possible to export or import parameters between systems with different modules.

5.2.7 Maps configuration

Tap ***Setup*** on the touchscreen to enter the settings menu. Then click on ***Greyscale Setup*** to bring up the ***MAPS CONFIGURATION*** screen, as shown in Fig. 5-19.

- The screen for editing templates is located on the left-hand side of the ***MAPS CONFIGURATION*** screen;
- In the middle, you will find the currently defined greyscales;
- On the right-hand side of the Maps Configuration screen are the 5 buttons: ***Undo***, ***Restore***, ***Save***, ***Apply*** and ***Exit***;
- ***In*** and ***Out*** at the top of the screen show the coordinates of the cursor on the

template-editing screen (i.e., ***In X*** corresponds to ***out X***);

- There are 8 maps to choose from in ***Map Select***;
- The template types refer to the templates that are applied to the grey curves. Three types are available: ***B***, ***M*** and ***D***. ***B*** is for B-mode images, ***M*** for M-mode images and ***D*** for Doppler images;
- Two template forms are available: ***Curve*** and ***Beeline.***

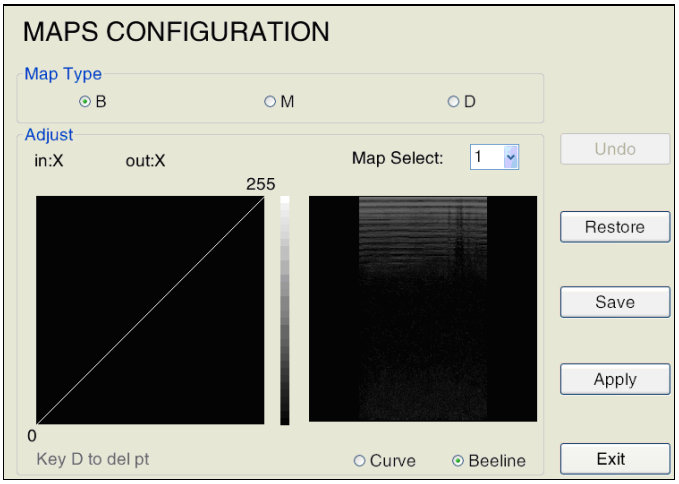


Fig. 5-19 Template configuration screen

a) Drawing the template: The standard graphic consists of a direct line, where the ***In*** value is equal to the ***Out*** value. (i.e., the X and Y coordinates of each point on the direct line are identical.) Use the trackball to move the + cursor. Press **Set** over the target position on the left edit box, and the system will mark a point at that position. Press and hold the **Set** button. Turn the trackball at the same time. You can then drag the marker and draw the template according to the points you have entered. The right-hand box will show the image after setup.

b) Delete: Move the cursor over any of the points you have edited in the input box and then press **D** or **T-Ball** to delete that point.

c) Undo: Move the cursor over the ***Undo*** button on the right side of the screen and press **Set** to cancel the previous operation (including cancelling input and deletion).

d) Restore: Move the cursor to the ***Restore*** button on the right side of the screen and press **Set**. The grey curve will be reset to the default straight line or curve, which means that the input will be equal to the output.

e) Save: When you have finished editing the template, move the cursor over ***Save*** on the right side of the screen and press **Set** to save the custom greyscale map. However, this does not affect the current image.

f) Apply: When you have finished editing the template, move the cursor over ***Apply*** on the right side of the screen and press **Set** to apply the template to the current image. If you start editing another map before ***Apply*** is highlighted, the settings will not be saved.

g) Exit: Move the cursor over ***Exit*** on the right side of the screen. Press **Set** or press **Esc** directly to return to the system menu.

5.2.8 Connection setup

The network connection can be set via ***CONNECTION SETUP***.

The setting options include ***Obtain an IP address automatically*** or inputting the ***IP, mask*** and ***gate***. ***Advance*** opens the connection window. The setup procedure is the same as that for the connection setup in the Windows system.

In addition, ***Computer Name*** can be used to change the computer name. However, the new name will not be applied until the computer restarts.

If the computer has multiple network cards (e.g., an external wireless network card), use the setup to select the desired network card.

Tap ***Setup*** on the touchscreen to bring up the ***SET UP*** screen. Then click ***Connection Setup*** to bring up the ***CONNECTION SETUP*** screen, as shown in Fig. 5-20.

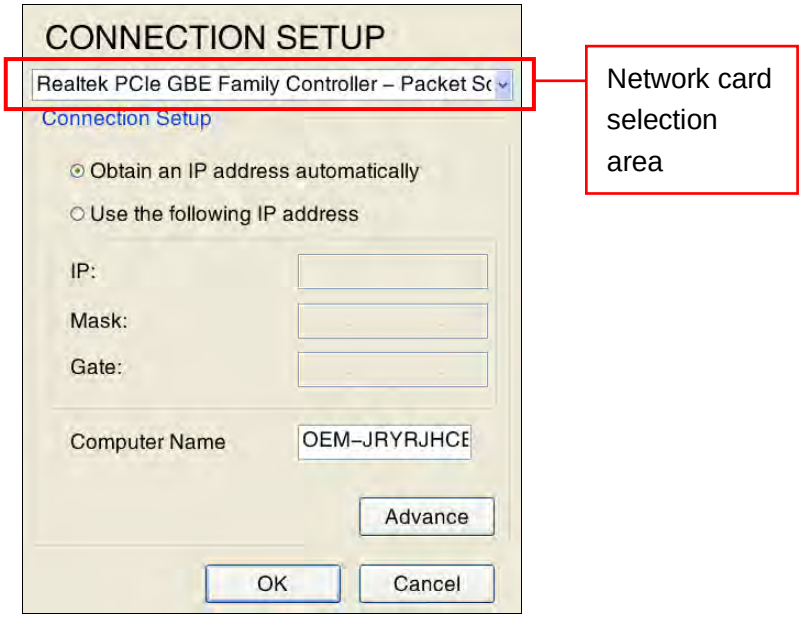


Fig. 5-20 Connection setup

5.2.9 Setting the measurement parameters

MEASUREMENT CONFIGURATION allows users to set measurement units and measurement equations. Tap ***Setup*** on the touchscreen to bring up the ***SETUP*** screen. Then click on ***Measurement Setup*** to call up the ***MEASUREMENT SETUP*** screen, as shown in Fig. 5-21.

a) ***Volume Unit***: For selecting the unit of the corresponding volume measurement. There are five volume units to choose from: ***m³***, ***mm³***, ***ft³***, ***in³*** and ***ml***.

b) ***Distance Unit***: For selecting the unit for measuring the distance (length). There are four units to choose from for measuring the distance: ***cm***, ***mm***, ***ft*** and ***in***.

c) ***Foetus weight unit :*** For selecting the unit for measuring the foetal weight. There are four weight units to choose from: ***g, oz, lb*** and ***kg***.

d) ***Font size of MEAS result :*** For selecting the size of the measurement result. There are three sizes to choose from: ***L***, ***M*** and ***S***.

e) ***Font Bright of MEAS Result :*** For selecting the brightness of the measurement result. There are three sizes to choose from: ***Dark, Mezzo*** and ***Bright***.

f) ***Size of Measurement Cross Cursor***: For selecting the size of the cross cursor

for the transverse measurement. There are three sizes to choose from: ***L***, ***M*** and ***S***.

g) ***Line Type***: For selecting the cursor line type. There are three line types to choose from: ***Dot***, ***Solid*** and ***None***. If ***None*** is selected, no linear cursor will be displayed in the measurements and calculations state.

h) ***Doppler Trace Type***: For selecting the trace type (auto, manual or range trace). Select ***All*** to trace the whole spectrum, ***Down*** to trace the spectrum below the baseline, or ***Up*** to trace the spectrum above the baseline.

i) ***Time Unit***: For selecting the time measurement unit. There are two time units to choose from: ***s*** (seconds) and ***ms*** (milliseconds).

j) ***BSA Function***: For selecting the calculation equation for the body surface. There are two equations to choose from: ***Stevenson*** and ***Grossman***.

k) ***PSAD Coefficient***: For defining the PSAD coefficient.

l) ***Beat Cycle***: For measuring the heart beat in M mode or in Doppler Trace.

m) ***Menu Type:*** For selecting the calc menu display. Select ***Menu*** and press **Calc**, and the CALC menu will be displayed on the monitor. Select ***Touch*** and press **Calc**, and the CALC menu will be displayed on the touchscreen.

Fig. 5-21 Measurement setup

n) ***Advanced setup***

The screen for advanced setup is shown in Fig. 5-22.

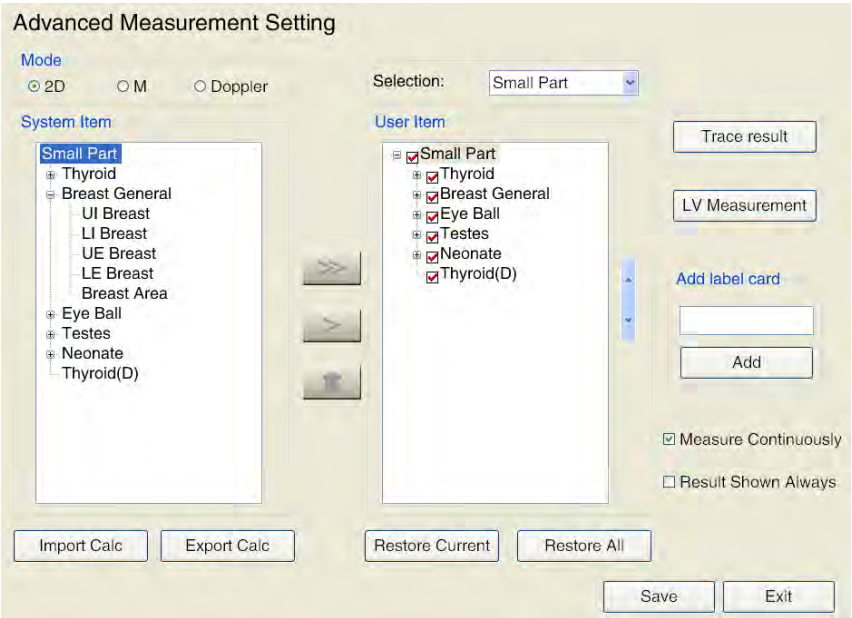


Fig. 5-22 Advanced measurement setup screen

In calculation mode, the 2D, M, and Doppler modes are available for selection. After selecting the ***system item*** and ***user item***, the measurement object will be displayed

according to the mode.

Select the calculation software package from the ***Selection*** drop-down list, and the corresponding measurement object will be displayed in ***System Item*** and ***User Item***.

Users can set up ***User Item*** according to their needs. You can add/hide/delete or rearrange measurement cards or measurement items, create the framework, calculate left-ventricular function objects, etc. Once settings have been made, press the **Calc** button to open the calculation menu. The relevant measurement object will then be displayed according to the user settings.

Each calculation software package can be divided into several measurement cards, and each measurement card includes several measurement items. As shown in Fig. 5-20, small organs contained in the calculation software package, like thyroid, breast, eyeball, etc., are measurement cards, while UI Breast and LI Breast, etc. are measurement items. Click on ⊞ in front of the measurement card to open up the measurement card.

◆ **Adding measurement items**

Each measurement card and each measurement object under ***System Item*** can be added to ***User Item*** at will.

Select one measurement card under ***System Item*** and the target measurement card under ***User Item*** and click on the ≫ key to add all the measurement items on the measurement card to the target measurement card.

When you select one measurement object under ***System Item*** and a target measurement card under ***User Item***, click on the > key to add this measurement object to the target measurement card.

If no object is selected, the keys will remain grey.

◆ Add measurement card

Click on the measurement card (e.g. small parts) under ***User Item*** and input a new measurement card name, as required, via ***Add label card***. Click on ***Add*** to add it to this calculation software package. Add measurement items to the new measurement card in accordance with the ***Add Measurement item*** procedure, as shown in Fig. 5-23.

Fig. 5-23 Add label card

【Note】: If you do not click on the calculation software package with the cursor, the menu button will remain grey.

◆ Hide the measurement card or measurement object

Move the cursor to activate the red "√" in front of an object under ***User item*** and click on the **Set** button to hide this object. As a result, this object will not be displayed in the measurement menu. Press the **Set** button to retrieve this object.

【Note】: If you remove the "√" in front of the measurement card, you will hide the entire measurement card. If you remove the "√" in front of the measurement object, you will hide this measurement object.

◆ Deleting the measurement card or measurement object

Only measurement items or measurement cards that have been added by the user can be deleted. Default measurement items and measurement cards cannot be deleted. Select a new measurement card or new measurement object and then click on the  icon. The measurement card or object will be deleted.

【Note】 : If the selected objects cannot be deleted, the  icon will remain grey.

◆ Rearranging measurement cards/measurement items

Measurement cards/measurement items under ***User Item*** can be moved up/down at will. Select one measurement card/measurement item, move the cursor onto the key on the right side and press the **Set** button to move the measurement card/measurement item up one level. If you have to move the measurement object down, move the cursor onto the button and click on the **Set** button to move the measurement object down one level.

◆ Trace result

If you select ***Trace result***, the user interface will appear, as shown in Fig. 5-22, on which the user can delete objects that do not need to be displayed. Move the cursor over the object to be deleted and press the **Set** key to remove "√". Press the **Set** key again to retrieve it. Click on ***Save***, and this object will not be displayed when the trace measurement is finished or click on ***Cancel*** to cancel the operation and return to the previous menu.

Fig. 5-24 Trace result screen

◆ LV measurement

Choose ***LV Measurement*** to bring up the user interface in Fig. 5-25. Users can select unnecessary objects on this interface. Move the cursor to the object you do not need and press the **Set** key to remove "√". Press the **Set** key again to retrieve it. Click on ***Save***, and this object will not be displayed after finishing the LV function measurement or click on ***Cancel*** to cancel the operation and return to the previous menu.

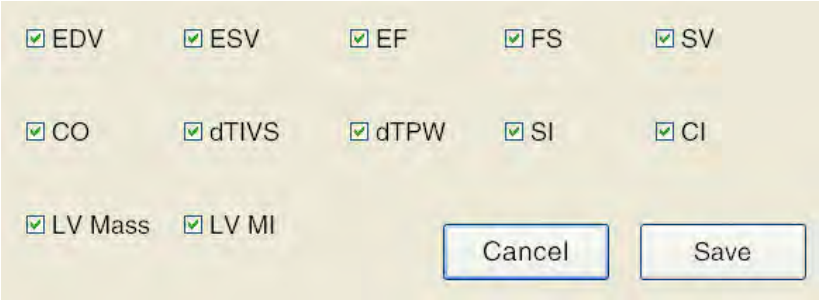


Fig. 5-25 LV measurement screen

◆ **Continuous measurement and constant display of result**

When ***Measure Continuously*** is selected, the system will automatically go to the next measurement object after finishing one measurement object (except when using the routine measurement software and some measurement items with special functions in a specialised measurement software package), until all the measurements are finished.

When ***Result Shown Always*** is selected, the measurement result will be continuously displayed in the bottom right of the screen and will not disappear when the image is displayed as a live image.

◆ **Importing/exporting the calculation software**

Select ***Import Calc***, and a selection box will be displayed. Select the calculation software package that is needed (document name with ".dat" suffix) and click on the ***Open*** key to import the file into the system. Select ***Export Calc*** and select a target folder to save to from the selection box. Modify the name of the folder (if needed) and click on ***Save*** to save the file in the folder.

【Note】: Only the calculation software package from the same system series can be imported into this system.

◆ **Restoring the current calculation package or the entire calculation software.**

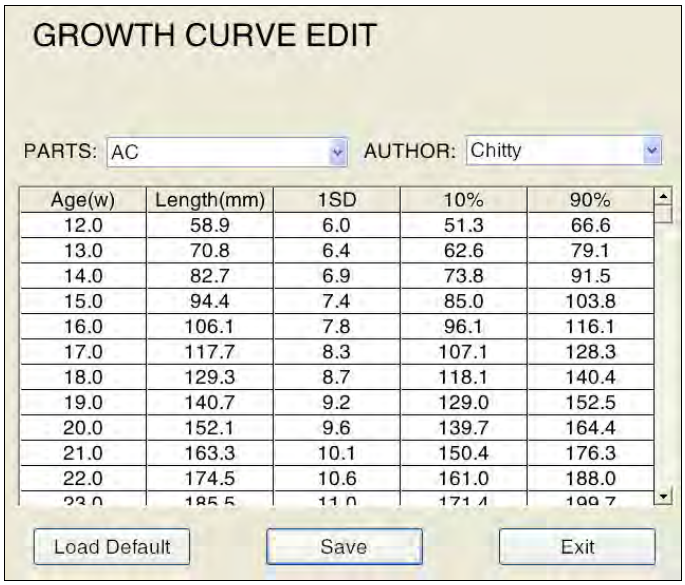
Move the cursor onto ***Restore Current*** or ***Restore All*** and then press the **Set** key to call up a confirmation window. Move the cursor onto ***OK*** and then click on the **Set** key. All the current calculation packages, or the entire calculation software, will be reset to factory defaults, or click ***Cancel*** to cancel the operation and return to the previous menu.

◆ **Saving**

Move the cursor to ***Save*** and press the **Set** key to bring up the ***Save Successfully*** window. Now all user settings will be saved in the system. Move the cursor onto ***OK*** and then click on the **Set** key. Click on the ***Exit*** key to return to the previous menu or click directly on ***Exit*** to return to the previous menu without saving.

o) ***Editing growth curves***

Select the desired parts and the author from the dropdown list above the growth curves table, as shown in Fig 5–26. The content of the table will correspond to the selected growth curve. To change a value, move the cursor over it, press **Set**, and enter the new value via the small keyboard. To restore the default settings, highlight ***Load Default*** and press **Set**. After setup, highlight ***Save*** and press **Set** to save the change, or press ***Exit*** to cancel the change.



Age(w)	Length(mm)	1SD	10%	90%
12.0	58.9	6.0	51.3	66.6
13.0	70.8	6.4	62.6	79.1
14.0	82.7	6.9	73.8	91.5
15.0	94.4	7.4	85.0	103.8
16.0	106.1	7.8	96.1	116.1
17.0	117.7	8.3	107.1	128.3
18.0	129.3	8.7	118.1	140.4
19.0	140.7	9.2	129.0	152.5
20.0	152.1	9.6	139.7	164.4
21.0	163.3	10.1	150.4	176.3
22.0	174.5	10.6	161.0	188.0
23.0	185.5	11.0	171.4	199.7

Fig. 5-26 Editing growth curves

p) ***Editing the estimation of foetal age***

Move the cursor over ***foetal Age Estimating Edit*** and press **Set**. There are two options to choose from: ***table*** and ***equation***.

Choose ***table*** to bring up the screen shown in Fig. 27.7. The procedure is the same as that for ***Growth Curve Edit***. Data in the table can be edited by the user. Click on ***Save***, and the calculation results will change accordingly. Select ***Load Default*** to restore the default system settings. Press **Esc** or select ***Exit*** to return to the submenu for calculation settings.

Length(mm)	Week	Days	Error(D)
100.0	16.0	0.0	6.0
105.0	16.0	3.0	6.0
110.0	16.0	6.0	6.0
115.0	17.0	1.0	6.0
120.0	17.0	4.0	6.0
125.0	18.0	0.0	6.0
130.0	18.0	3.0	6.0
135.0	18.0	6.0	7.0
140.0	19.0	2.0	7.0
145.0	19.0	5.0	7.0
150.0	20.0	1.0	7.0
155.0	20.0	4.0	7.0

Fig. 5-27 Editing the foetal age

Choose ***equation*** to bring up the screen in Fig. 28.5. The default equation is ***BPD foetal Age Equation***, while other options are available in the dropdown list. The values of ***a to e*** and ***coef*** can be changed by the user. If any coefficient value is changed, the corresponding equation values will change accordingly. Then select ***Save*** to display a new calculation result. Select ***Load Default*** to restore the system default settings. Press **Esc** or select ***Exit*** to return to the submenu for calculation settings.

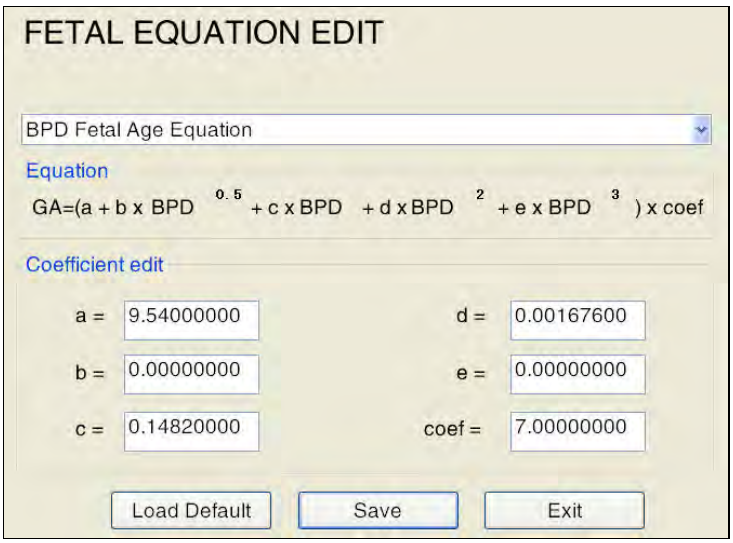


Fig. 5-28 Editing the foetal equation

q) ***Estimating the foetal age***

The screen ***FOETAL AGE ESTIMATING*** is shown in Fig. 5-29. Some foetal age estimates for various examination parts are listed for selection. The ***foetal Age Estimating Table*** is shown in Table 5-1. When a table is selected, the calculation is performed based on the table. When an equation is selected, the calculation is based on the equation.

Click on the arrow on the right side of the object in question. Press the **Set** key to expand the drop-down list. Scroll the trackball to select and click the **Set** button to confirm.

People from different regions have different body characteristics. The default foetal age estimates selected are different. There are seven regions: Southeast Asia, West Asia, Europe, North America, Latin America, North Africa, and general. The user can choose the appropriate option depending on the region. Move the cursor to the ***Region*** drop-down menu, roll the trackball to select a measurement point, and press the **Set** key to select.

When finished, move the cursor to ***Save*** on the bottom of the screen and press the **Set** key to save the setting. Then move the cursor to ***Exit*** and press on the **Set** key to return to the measurement setup screen. If the setting is not saved, it cannot be used.

Click ***Load Default***, and all settings will be restored to the factory settings.

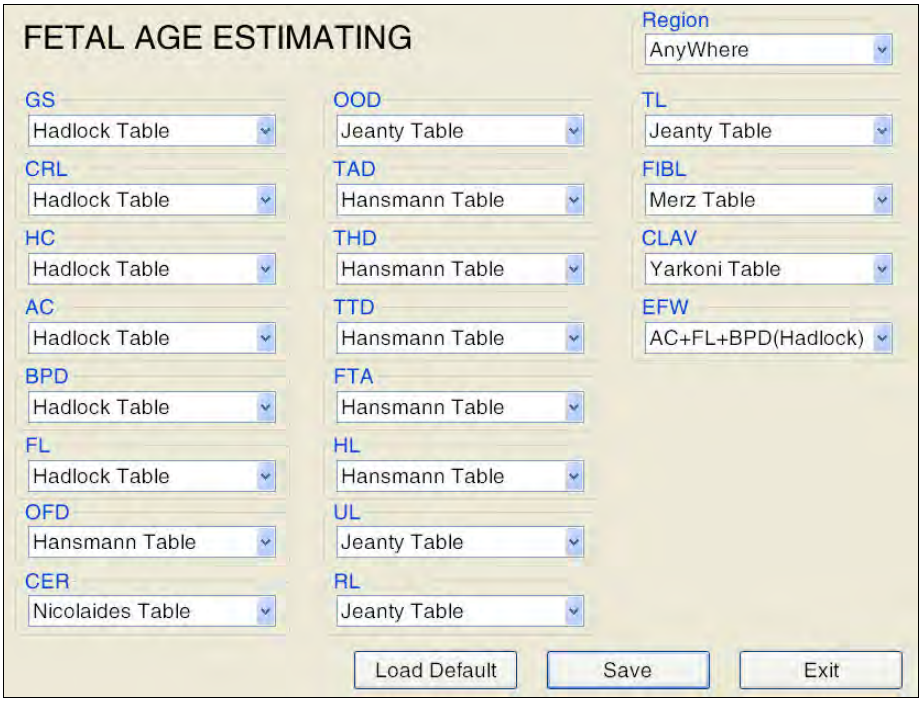


Fig. 5-29 Estimating the foetal age

Table 5-1 Table for estimating foetal age

Menu	Submenu
GS (gestational sac)	Hadlock Equation, Hadlock Table, Hansmann Table, Tokyo Table, South Hospital
CRL (crown-rump length)	Hadlock Equation, Hadlock Table, Hansmann Table, Osaka Table, Tokyo Table, Chitty Table, South Hospital
HC (head circumference)	Hadlock Equation, Hadlock Table, Chitty Table, User-defined Table 1, User-defined Table 2, User-defined Table 3, South Hospital
AC (abdominal circumference)	Hadlock Equation, Hadlock Table, Hansmann Table, Tokyo Table, Chitty Table, User-defined Table 1, User-defined Table 2, User-defined Table 3, South Hospital
BPD (biparietal diameter)	Hadlock Equation, Hadlock Table, Hansmann Table, Osaka Table, Tokyo Table, Chitty Table, User-defined Table 1, User-defined Table 2, User-defined Table 3

FL (femur length)	Hadlock Equation, Hadlock Table, Hansmann Table, Osaka Table, Tokyo Table, Chitty Table, User-defined Table 1, User-defined Table 2, User-defined Table 3
OFD	Hadlock Equation, Hansmann Table, Asum Table, Nicolaides Table
CER	Hadlock Equation, Nicolaides Table, Hill Table
OOD	Hadlock Equation, Hansmann Table, Jeanty Table
TAD	Hadlock Equation, Hansmann Table
THD	Hadlock Equation, Hansmann Table
TTD	Hadlock Equation, Hansmann Table
FTA	Hadlock Equation, Hansmann Table
HL	Hadlock Equation, Hansmann Table, Jeanty Table, Asum Table
UL	Hadlock Equation, Jeanty Table, Merz Table
RL	Hadlock Equation, Jeanty Table, Merz Table
TL	Hadlock Equation, Jeanty Table
FIBL	Hadlock Equation, Merz Table
CLAV	Hadlock Equation, Yarkoni Table
EFW	AC+BPD (Shepard), AC+FL (Hadlock), AC+FL+HC (Hadlock), AC+FL+HC+BPD (Hadlock), AC+FL+BPD (Hadlock), AC (Campbell), BPD+TAD (Hansmann), Tokyo

【Note】: For a description of the abbreviations in the table, please refer to Appendix A.

5.2.10 Annotation setup

ANNOT SETUP enables users to define annotations. Tap ***Setup*** on the touchscreen to call up the ***SETUP*** screen. Then click on ***Annotation Setup*** to call up the ***ANNOT SETUP*** screen, as shown in Fig. 5-30.

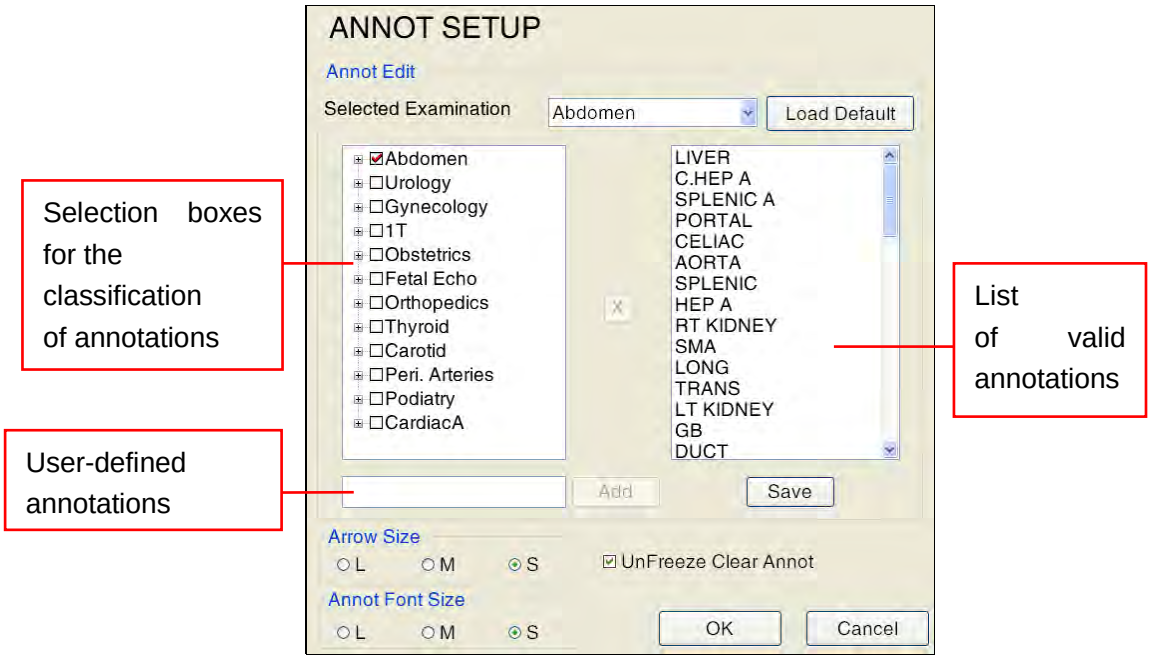


Fig. 5-30 Annotation setup screen

a) Follow the steps below to add/delete predefined annotations:

1) ***Choose the examination type***: Select the desired examination type from the drop-down list ***Selected Examination***.

2) ***Add/delete annotations: There are pre-defined annotations in every selected examination (i.e., all examinations in the selection box for classifying annotations*** have their own, corresponding, pre-defined annotations that can be added or deleted through activation and deactivation).

◆ To add annotations, select the desired examination in the ***selection box for classifying annotations*** by highlighting it, and then press **Set**. The selected annotation will appear in the last line of the ***list of valid annotations***. To add user-defined annotations, input the new annotation manually into the ***User-defined annotations*** box using the small keyboard, and click ***Add***. Then the new annotation will appear in the last line of the ***list of valid annotations***.

◆ To delete annotations, select the annotation to be deleted and click on ☒ to remove it from the ***list of valid annotations*** and deselect it from the ***selection***

box for classifying annotations.

3) Apply: After adding or deleting, select ***Save*** and press **Set**. The settings will then be saved. Then select ***OK*** and press **Set** to return to the main screen.

【Note】: The *Load Default* function will restore the annotations to the default setup.

b) ***Arrow size***: The arrow size can be set using this setting. After setting the arrow size, tap ***Arrow*** on the touchscreen, and the corresponding arrow will be displayed on the screen according to the settings.

c) ***Annot Font Size***: For setting the font size of the annotation. After setting, the annotations, when added, will be displayed in the corresponding size on the screen.

d) ***UnFreeze Clear Annot***: There is a check box at the bottom edge of this user interface. If this box is checked, the image will be displayed as a live image, and all annotations will be removed at the same time. If this box is not checked, the image will be displayed as a still image, and the annotations will be retained. This menu item is activated by default. Move the cursor to the check box and click on the **Set** key to disable this menu item.

5.2.11 DICOM setup (option)

DICOM setup is only available on the main setup screen when the DICOM function has been purchased and activated. Tap ***Set up*** on the touchscreen to bring up the ***SETUP*** screen. Then use the trackball and the **Set** key to click on ***DICOM setup*** and call up the ***DICOM config*** screen.

【Note】 : For instructions on how to use the DICOM feature, see *Appendix H*.

5.2.11.1 Local network configuration

Go to ***DICOM config***. The ***local*** screen will be displayed by default, as shown in Fig. 5-31.

Fig. 5-31 Local screen

Local configuration includes AE and IP ports. Fill in the fields, move the trackball over ***Save***, and press **Set** to save the configuration.

5.2.11.2 DICOM Store server configuration

On the local screen, move the trackball over ***Store*** and press **Set** to call up the ***Store*** screen, as shown in Fig. 5-32.

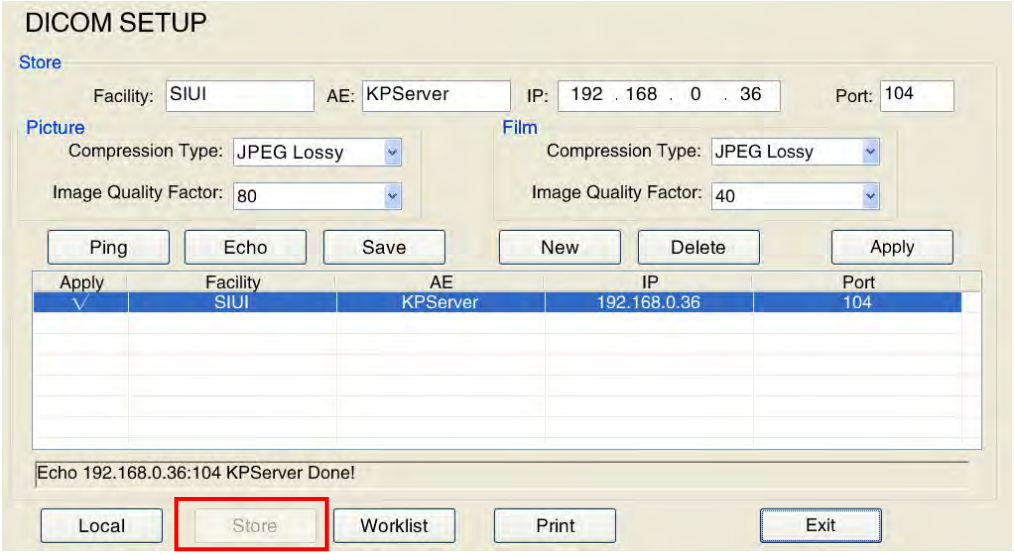


Fig. 5-32 DICOM Store server configuration screen

a) New server

Use the trackball and **Set** to click on ***New***. The content in the Facility, AE, IP, and Port fields will be automatically deleted so that users can enter new information for the DICOM Store server. Move the cursor into the input field and press **Set**. Then input using the keyboard.

- ***Facility:*** For distinguishing between facilities across multiple servers that are connected at different times, especially when mobile devices work between different facilities, users can create multiple DICOM addresses, which can be identified through the facility names in the list.

【Note】: Facility must be completed, and the name cannot be repeated.

【Note】: For the specific setup of AE, IP and Port on the DICOM Store server, please contact your network administrator.

- ***Compression Type and Image Quality Factor:*** For compressing DICOM images or films before transfer. The available file types include ***JPEG Lossless***, ***JPEG Lossy*** and ***uncompressed***. If ***JPEG Lossless*** is selected, the higher value is for better image quality.

【Note】: *Compression Type* should match the DICOM Store server setting. Otherwise, the transfer might fail.

b) Connecting to the server

When a new server is created, use the trackball and Set to click on Echo ***and test whether files can be sent between the local system and the chosen server.***

The connection status will be displayed below the list, “Connecting to XXXX Echo", "Echo succeeds" or "Echo fails".

When connected successfully, click ***Save***, and the server will be displayed in the list.

c) Apply a server

Select a server from the list and use the trackball and **Set** to click on ***Apply*** on the top right of the list and apply the server; a check mark √ will be displayed in the Apply list.

【Note】: If the server is not properly connected, establish the connection according to step b) to make sure the connection is working normally before application.

d) Delete a server

Select the server to be deleted from the list using the trackball. Use the trackball and **Set** to click on ***Delete*** above the list, and the server will be deleted.

5.2.11.3 DICOM Worklist server configuration

Bring up the DICOM configuration. Use the trackball and **Set** to click on ***Worklist*** and call up the ***worklist*** screen, as shown in Fig. 5-33.

On this screen, users can create, connect, apply or delete a DICOM Worklist server. For the detailed procedure, see ***5.2.11.2*** *DICOM Store server configuration*.

If the Worklist server supports MPPS function, check the ***MPPS*** option to achieve MPPS service interactions with the Worklist server. If the Worklist server does not support the MPPS function, the system will not be able to use this function properly.

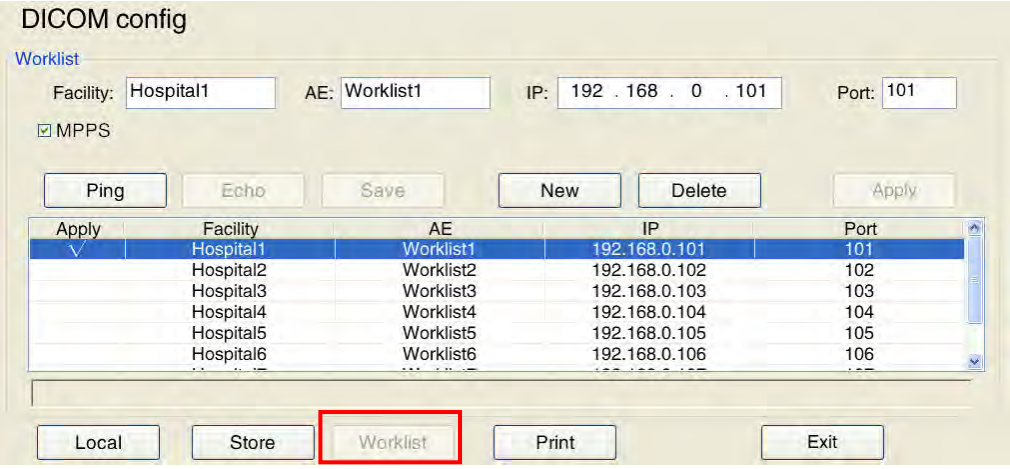


Fig. 5-33 The DICOM Worklist server configuration screen

5.2.11.4 DICOM Print server configuration

Call up DICOM config. Use the trackball and **Set** to click on ***Print***, and call up the ***Print*** screen, as shown in Fig. 5-34.

On this screen, users can create, connect, apply and delete a DICOM Print server. For the detailed procedure, see ***5.2.11.2*** *DICOM Store server configuration*.

- ***Print Copies*** means the number of sheets printed out on one page in good layout.
- ***Colour option***: Printing colour, with ***B/W*** and ***Colour*** to choose from. If ***Colour*** is selected, you can also adjust ***Orientation***. If ***B/W*** is selected, you can also adjust ***Destination, Medium Type, Orientation*** and ***Film Size***.
- ***Destination***: The target of the B/W printing, with ***Processor*** and ***Cassette*** to choose from.
- ***Medium Type***: The medium for the B/W printing, with ***Paper*** and ***Film*** to choose from.
- ***Orientation***: The print format, with ***Portrait*** and ***Landscape*** to choose from.
- ***Film Size***: The film image size for B/W printing, with multiple sizes to choose from.

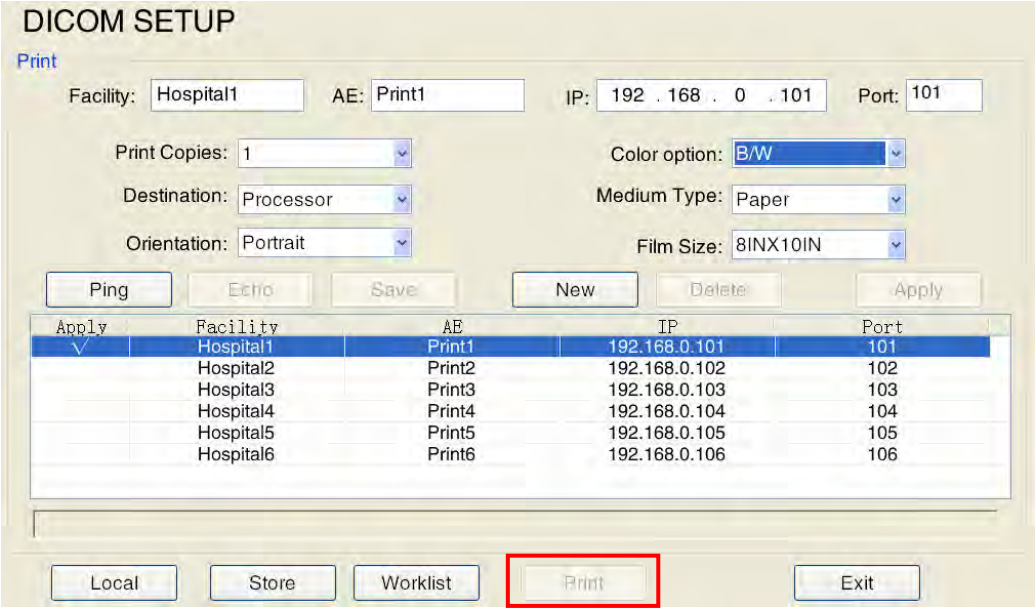


Fig. 5-34 DICOM Print server configuration screen

5.2.12 Softkey setup

A softkey is a parameter control unit on the touchscreen. The user can determine which softkeys are displayed and change the display sequence.

Tap ***Setup*** on the touchscreen to enter the main settings screen. Then click ***Softkey Setup*** to bring up the screen for setting up the softkeys. See Fig. 5-35.

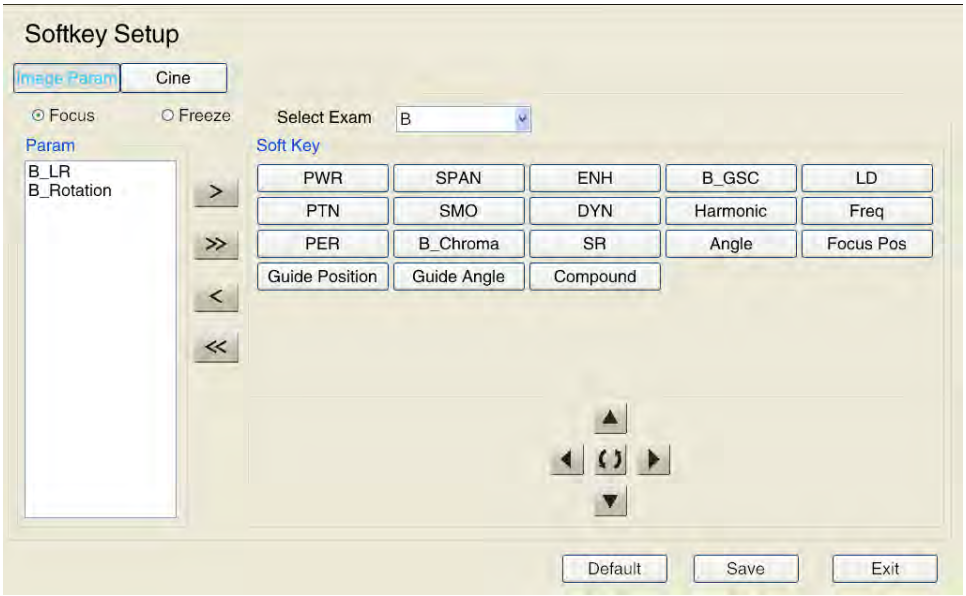


Fig. 5-35 Softkey setup screen (Image param)

The content that can be set up includes:

a) Image parameters displayed for each imaging mode (B, M, CFM, CPA, PW, TDI, CW) in live or still-image state. Here are the setup steps:

1) Use the trackball and the **Set** button to select ***Image Param*** in the top-left corner of the softkey setup screen. When activated, the button will be shaded grey, and the characters will turn blue. See Fig. 5-35.

2) Use the trackball and the **Set** key to select ***Focus*** or ***Freeze***.

3) Use the trackball and the **Set** key to select the examination from the ***Select Exam*** dropdown menu.

4) Adding a softkey: All the parameters supported by the current examination will

be displayed under ***Param.*** Use the trackball and the **Set** key to select the desired parameter. Then click >, and the selected parameter will be added as a softkey. If you click on >>, all the parameters will be added as softkeys.

5) Deleting a softkey: To remove a parameter from the softkey, use the trackball and the **Set** key to select the parameter, and then click on < . If you click on <<, all parameters will be removed from the softkeys.

6) Softkey sequence: The display sequence of the parameters in the softkey list, i.e., the display sequence of the softkeys below the ultrasound screen. Can be rearranged. Use the trackball and the **Set** key to select any parameter in the softkey list (if selected, the parameter will turn blue). Then use any of the direction keys  at the bottom edge of the screen to move that parameter left, right, up or down. Click  in the middle to confirm the current operation.

7) When the adjustment is complete, use the trackball and the **Set** key to click on ***Save***. Then click on ***Save*** to save, or on ***Exit*** to exit the command prompt window. Or click on ***Default*** to restore the factory defaults.

b) Setting up the softkeys that are displayed in the film state. Here you can find the steps for setup: Use the trackball and the **Set** key to click on ***Film*** in the upper left corner of the screen for the softkey setup. See Fig. 5-36.

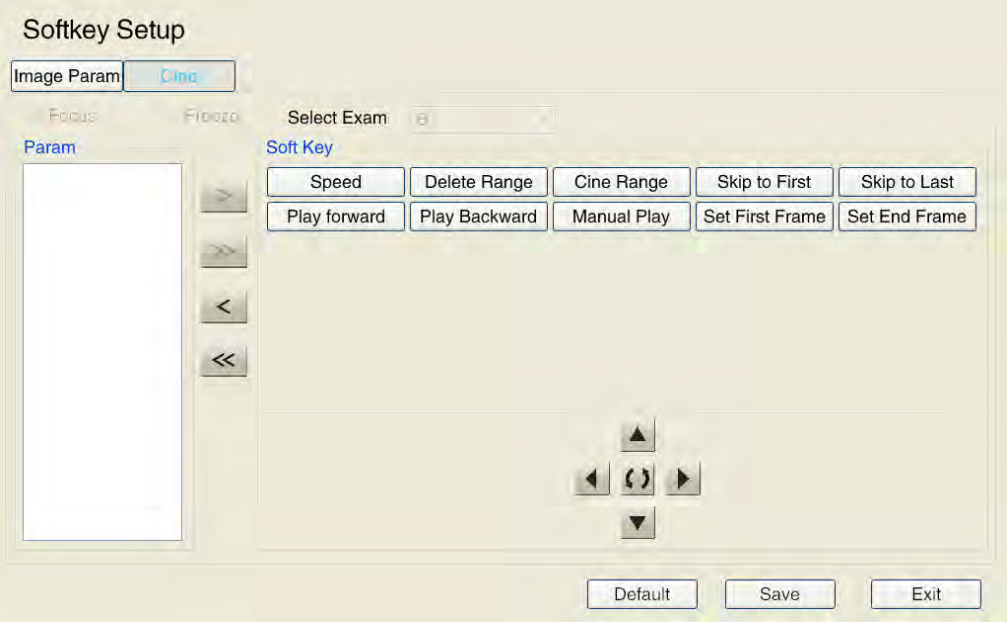


Fig. 5-36 Softkey setup screen (film)

The parameters for the film state are the same in any mode, and it is unnecessary to select the imaging mode. For setup, follow steps 4) to 7) under a).

【**Note**】**:** In Live state, press **Freeze** to display the image as a still image and activate the film state.

Chapter 6

Imaging

6.1 Preparation

6.1.1 Instruments

a) Ultrasound coupling gel: To be applied directly to the body parts of the patient that are to be examined or to the acoustic lens on the probe surface.

b) Tissue paper: To be used to remove ultrasound coupling gel from the patient's skin and the probe after an examination.

c) Video recorder or printer: To record diagnostic images or files.

6.1.2 Operation

a) Turning on: Turn on the main power switch for the power supply unit on the control panel. Press the device's main power switch on the control panel. The display will turn on and the system will boot in about 3 minutes.

【Note】: If the system is not behaving normally and cannot be turned off, press and hold the power switch on the control panel for longer than 8 seconds to fully shut down the system. If the system is not going to be used for a long time, turn the main power switch to *OFF*.

b) Pre-setting the gain control: Set the **Amplifier** control and the slide potentiometers to bring the gain and TGC (time gain compensation/depth compensation) to the correct positions.

6.2 Selecting the probe and examination type

6.2.1 Selecting the probe and examination type

Press **Exam** on the control panel or on ***Preset*** on the touchscreen and all probes connected to the system and all examination types will be displayed on the touchscreen as shown in Fig. 6-1.

Select a probe, and the corresponding probe connected to the probe socket will start working. The name of the selected probe will be displayed on the basic parameter display area on the screen.

【Note】: At system startup, the standard probe is connected to the A socket. When

selecting the probe with the **Exam** button, the default examination type is the last one selected.

First, select the desired examination type. The system will automatically switch to the user interface of the selected examination type, where the name of the examination type will be displayed in the top right of the image area.

The display of the examination type depends on the probe used. For each kind of probe in different examination types (including the area of application and diagnostic position), the system will perform initial settings of the ultrasound control parameters based on that specific examination type, so that the system is best suited for that particular examination type.

Fig.6-1 Exam setup screen

6.2.2 Editing and saving the default examination type

The user can define the examination type him/herself. In the probe and examination type setup screen, tap ***Edit Preset*** on the touchscreen to bring up an examination editing screen, as shown below. For more information on editing, see ***5.2.6*** *Examination setup*.

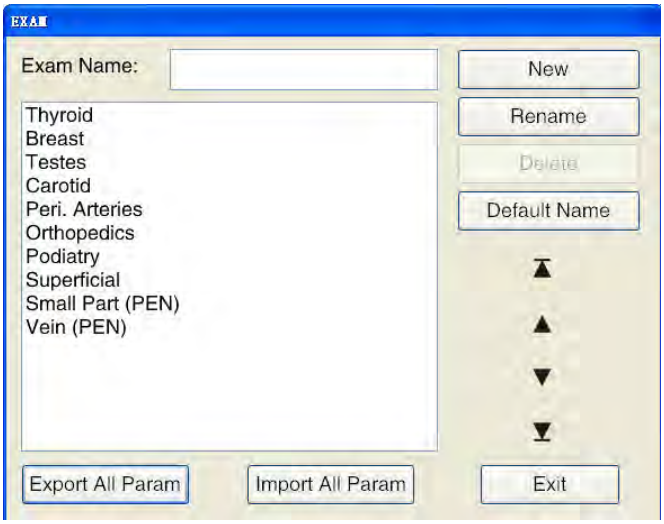


Fig.6-2 Examination type editing screen

The user may change the parameter value and save the changed status to the examination. No need to reset if the examination is selected again. In the probe and examination type setup screen, tap ***Save Preset*** on the touchscreen to bring up the examination type setup screen, as shown below. For more information on saving presets, see ***5.2.6*** *Examination setup*

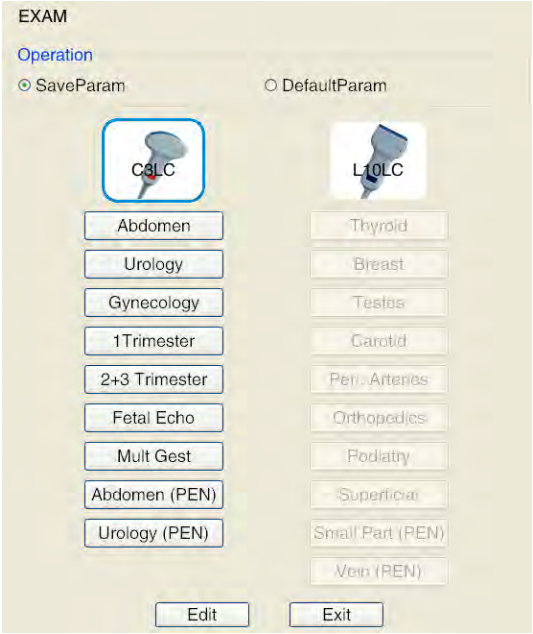


Fig.6-3 Examination settings

The types of examination available are shown in Table 6-1.

Table 6-1 Types of Examination

1T 2+3T, Foetal Echo, Multiple Gestation, Gynaecology
Abdomen, Abdomen (PEN), Urology, Urology (PEN)
Cardiac A, Cardiac A_P, Paediatric
Thyroid, Small part(PEN), Breast, Testes
Peripheral arteries, Carotid, Vein (PEN)
Orthopaedics, Surface

6.3 Preliminary imaging

6.3.1 Using the probe and the ultrasonic coupling gel

a) Apply a sufficient amount of ultrasound coupling gel to the surface of the probe and the parts of the patient's body that are to be examined.

⚠ **【Note】: If there is air between the patient's body and the probe, black dots will appear on the screen. If this happens, apply coupling gel once again.**

b) An image will appear on the screen as soon as the probe is placed on the area being examined.

6.3.2 Selecting the imaging mode

【Note】: The imaging mode marked with the symbol * is optional.

The system has imaging modes, including 2D (B, 2B, 4B and B/M); colour flow map (CFM), colour power angio (CPA), pulsed wave Doppler(PW), continuous wave Doppler(CW), *****tissue Doppler imaging (TDI), 4D Pro imaging, *****3D imaging, and *****elastography imaging.

In Live state, the user can press **B mode, M mode, CFM, PW, TDI, 4D, CW or Elas** on the control panel, and tap on  ,  or ***CPA*** on the touchscreen to select and switch the mode.

If the probe being used is a volume probe, press the **4D** button to open 4D Pro imaging. If the probe used is not a volume probe, press the **3D** button on the console to open 3D imaging.

*****Elastography imaging：Press **Elas** on the control panel to bring up the elastography imaging function, if this function is enabled.

6.3.3 MI/TI display

The MI and TI values shown on the imaging control parameter area are preset in the system depending on the probe type and imaging mode. MI and TI jointly reflect the relationship between ultrasound output parameters (e.g. frequency and acoustic pressure) and bioeffects.

MI (mechanical index): It serves to provide relevant indications for the likelihood of mechanical bioeffects due to the ultrasound beam (e.g. cavitation). The higher the MI is, the greater the likelihood of mechanical bioeffects.

TI (thermal index): It is used to indicate the likelihood of a temperature increase of the tissue. This is an estimation of the rise in temperature for body tissue with certain properties. The TI consists of three indices: TIS (thermal index for soft tissues), TIB (thermal index for bones) and TIC (thermal index for cranial bones).

Adjusting the acoustic power changes the MI or TI display. The higher the PWR, the greater the MI or TI value. In CFM or PWD mode, adjusting the PRF changes the MI or TI value. The higher the PRF, the higher the MI or TI value will be.

6.3.4 Displaying images as still images and live images

Displaying images as still images: To display a live image as a still image when in Live state, press **Freeze** or use the foot switch (if the foot switch is set to the freeze function; see *section **5.2.2** System settings* for details). The auto-still-image time can be set by the system. This means that, if no operation is performed by the user within the setup period, the system will go into the standby state and the image will be shown as a still image automatically.

To view images as live images: In still image state, press **Freeze** or use the foot switch (if the foot switch is set to the still-image function; see *section **5.2.2** System setup* for details) to return to live operation state. When still-image state is exited, the system will refresh the display.

⚠【Note】: The foot switch is a pedal control device that is connected via a cable. The operational voltage is 5 V DC. Careless operation may not necessarily result in any danger. Liquids must not under any circumstances be allowed to infiltrate the foot switch.

6.3.5 Parameter display

In single mode, the parameters of this mode will be displayed on the left side of the screen. When different modes are selected, the parameter of the current mode will be displayed. The parameters of the other modes will be hidden in tab form. The user can

click on 2D, C and PW label cards to switch to other mode parameters and adjust them.

The 2D mode, CFM mode and PW mode displays are shown in Fig. 6-4 (a, b, c).

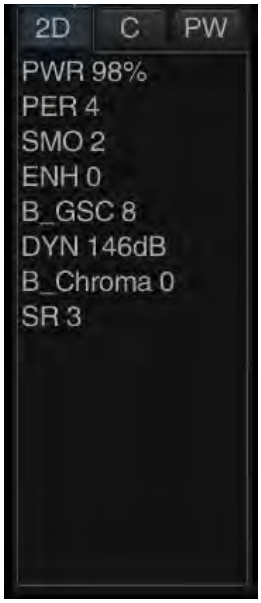


Fig. 6-4 (a) 2D mode

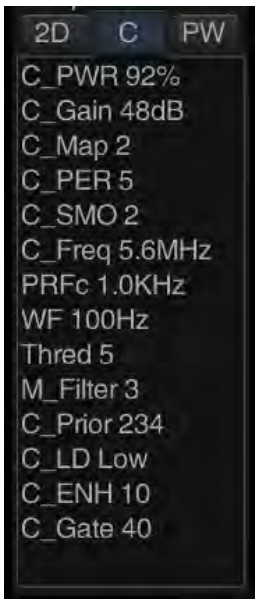


Fig.6-4 (b) CFM mode

Fig. 6-4 (c) PW mode

Fig.6-4 Parameter display

6.3.6 Full-screen display

In non-4D mode, non-input and non-recording state, and without opening any screen, press the **F** key on the keyboard to enable full-screen display. The image will be enlarged and displayed full screen, with its relevant parameter information hidden.

Press the **F** key again to exit full-screen display.

【Note】: In full screen, you cannot open or save media files. If you open *Archive Management* or *Store Setup*, full-screen display will automatically be exited.

6.4 B-mode imaging

6.4.1 Activating B mode

B mode is the default imaging mode on system startup. To re-enter B mode from another imaging mode, press the **B mode** knob. See Fig. 6-5.

Fig.6-5 B mode

6.4.2 B mode imaging – Parameter setup

B mode imaging parameters are displayed on the left-hand side of the ultrasound interface. Some imaging parameters are controlled or adjusted via the buttons and knobs on the control panel, while others are controlled by the buttons and knobs below the touchscreen.

When ***Control Panel*** is highlighted in the following introduction, this means that operation is through the control panel. If ***TouchScreen*** is highlighted, this means operation is via the touchscreen.

B mode	**Control panel:** In Live state, turn the **B mode** knob to adjust the gain of the B mode image. **【Tip1】: Set the appropriate gain. For example, to display the liver, adjust the gain to produce an image with normal balance and normal textures, with identification of the membrane reflector strip close to the back of the liver. The portal vein and the hepatic vein will be displayed as an echo-free tract structure in the cavity. The portal vein wall has echoes, while echoes of the hepatic vein wall are weaker than those of the portal vein.** **【Tip2】: Erroneous gain may result in incorrect diagnosis, or in the inability to make a diagnosis. If the gain is too low, a solid tumour can appear cystic without a detectable echo inside. The echoes on the rear side, however, will be amplified. If the gain is too high, the fluid structure may be full of echoes, similar to a solid tumour. Or normal amniotic fluid can be full of small, bright spot echoes, which makes the picture look like cloudy amniotic fluid, which can lead to misdiagnosis.** **【Tip3】: When the overall gain is low, the overall sensitivity will be low, and the image will appear dark, which is, however, good for BPD measurement.** **【Tip4】: If the image is unclear when the gain is changed, apply more coupling gel on the body part being examined or the probe.**
TGC	**Control panel:** The **TGC** (time gain control) sliders (slide potentiometers) control the strength of echo signals in specific imaging areas. In Live state, slide the control to the right to amplify the echo signals, and to the left to weaken them. When adjusting the TGC, the TGC graph will be displayed on the right side of the image on the screen. **【Suggestion】: Set the values of the TGC slider as follows: weak in the near field, and strong in the far field.**

Frequency (FREQ)	**Control panel:** Press **Set** in Live state to bring up an arrow cursor. Move the cursor over the ***Freq*** control parameter on the left side of the ultrasound user interface, which will turn blue. Move the trackball (or turn the **Value** knob) to increase/reduce the B-mode imaging frequency. **Touchscreen:** In Live state, tap on ***Freq*** on the touchscreen and turn the knob directly underneath to adjust the B-mode imaging frequency.
Persistence (PER)	**Touchscreen:** Tap on ***PER*** and turn the knob directly underneath to increase/reduce the persistence level.
Acoustic power (PWR)	**Touchscreen:** In Live state, tap ***PWR*** and then turn the knob directly underneath ***PWR*** to adjust the acoustic power. During adjustment, the acoustic power output parameters, may be affected. **【Note】: Use a power level that is as low as possible whilst allowing a diagnosis to be made, so as to avoid harm to the patient. Moreover, in order to ensure safety throughout the ultrasound, it is prohibited to position the probe over a specific body part of the patient and to scan this part for a prolonged period of time.**
Focus number (PTN) & Focus Span (SPAN)	**Touchscreen:** a) Setting the focus number: In Live state, tap on ***PTN*** and turn the knob under ***PTN*** to select the desired focus number. b) Adjusting the focus span: In Live state, tap on ***SPAN*** and turn the knob underneath ***SPAN*** to change the distance between focus points. **【Note】: In Live state, if multiple focus points are being used, the frame rate will be decreased, which affects the real-time playback of the image. When scanning a fast-moving organ, it is recommended to use only one focus.**
Focus position	**Touchscreen:** In Live state, tap on ***Focus Pos*** and then turn the knob directly underneath to adjust.
Line density (LD)	**Touchscreen:** In Live state, tap on ***LD*** and then turn the knob directly underneath ***LD*** to adjust the line density. There are several levels of line density available for selection.

Dynamic range (DYN)	**Touchscreen:** In Live state, tap on ***DYN*** and turn the knob directly underneath ***DYN*** to increase/decrease the imaging dynamic range. It is used to adjust the image saturation. **【Note】: If the dynamic range is too low, the image information may be insufficient; while a dynamic range that is too high results in too much useless image information.**
Chroma	**Touchscreen:** Tap on ***B_Chroma*** and turn the knob directly underneath Chroma. There are various chroma to choose from.
Nanoview	**Touchscreen:** Tap on ***Nanoview*** and turn the knob directly underneath **Nanoview** to adjust its value. Several levels are available for selection.
Edge enhancement (ENH)	**Touchscreen:** In Live state, tap on ***ENH*** and then turn the knob directly underneath ***ENH*** to increase/decrease the edge enhancement of the image. Adjustment can improve the clarity of the image edge.
Smoothness (sharpness) (SMO)	**Touchscreen:** In Live state, tap on ***SMO*** and turn the knob underneath SMO to change smooth value. **【Note】: Smoothness and edge enhancement cannot be performed at the same time. If either of these elements is changed, the other is automatically reset to 0.**
B Greyscale (B_GSC)	**Touchscreen:** Tap on ***B_GSC*** and turn the knob directly underneath B_GSC to select the different greyscale curves.

【Note】: Press **Set** on the console to activate the cursor. Then move the cursor to the parameters in the parameter control window on the left side of the screen. The selected parameter (coloured blue) can be adjusted using the **Value** rotary knob**.**

6.4.3 B mode – Setting the display format

The parameter with * is also available for image processing during film loop.

Display depth (DEPTH)	**Control panel:** In Live state, flip the **Depth** switch to adjust the image's display depth. The frame rate depends on the display depth. The lower the depth, the lower the frame rate, and vice versa. **【Note 1】: The setting for the display depth depends on the probe.** **【Note 2】: When zooming in, the depth setting is invalid.**
Angle/Width (ANGLE)	**Touchscreen:** In Live state, tap the ***Angle*** or ***Width*** on the touchscreen and rotate the knob directly underneath to adjust. ◆ When using a convex probe, the display item is ***Angle***; when using a linear probe, the display item is ***Width***. ◆ Use a convex probe and adjust the angle to its maximum value. The control parameter area will display ***Angle Ext***, and this function is for extended sector imaging. ◆ Use a linear probe to set the width to its maximum value. The control parameter area will then display ***Width Ext***. This function is for trapezoidal imaging, enlarging the field of view of the ultrasound area and scan area, so as to incorporate more diagnostic information, which is conducive to better observation.

*L/R Reversal (Reverse)

Touchscreen: If you tap on ***B_LR*** in Live state, you can reverse the B-mode image left/right. The mark ● represents the orientation for the start of the probe scan, and it can be moved from the upper left to the upper right. See Fig. 6-6.

【Note 1】: When the image is reversed, only the orientation mark will be reversed, but not the pictograms, the scale or the active image marking.

【Note 2】: The procedure is also available in still-image state. First tap on *B* on the touchscreen and then on *B_LR*.

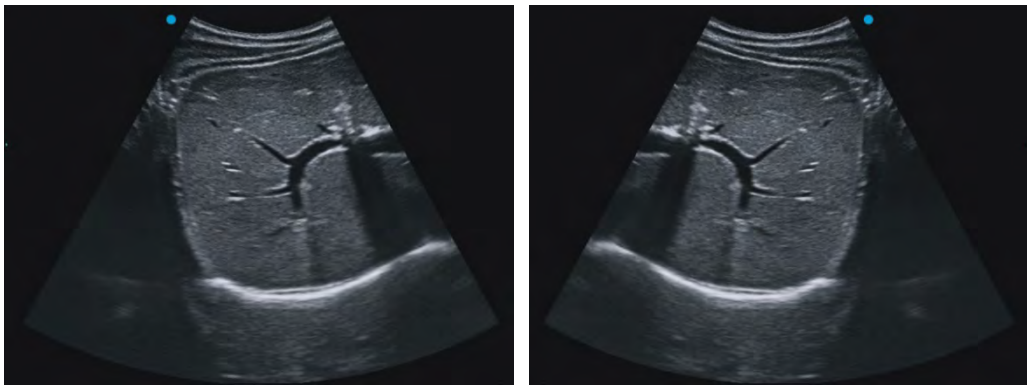


Fig.6-6 L/R Reversal

*Up/Down Inversion (Invert)

Touchscreen: If you tap on ***B_UD*** in Live state, you can invert the B-mode image up/down. The mark ● represents the orientation for the start of the probe scan, and it can be moved from the upper left to the upper right. See Fig.6-7.

【Note 1】: When the image is reversed, only the orientation mark will be reversed, but not the pictograms, the scale or the active image marking.

【Note 2】: The procedure is also available in still-image state. First tap on *B* on the touchscreen and then on *B_UD*.

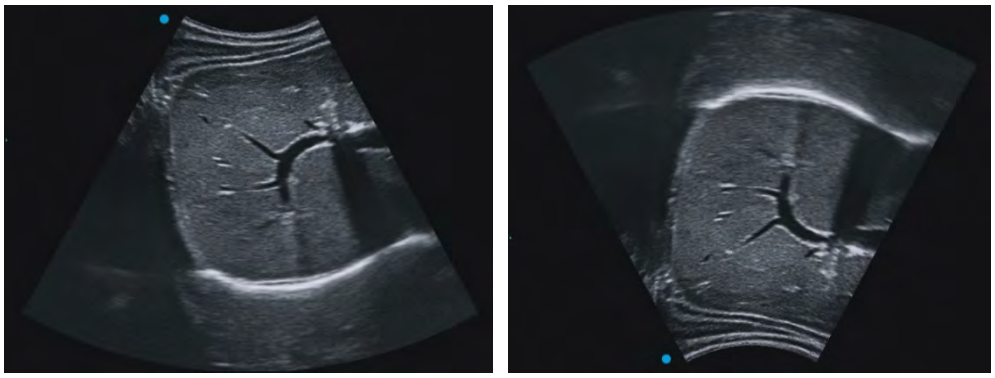


Fig.6-7 Up/Down Inversion

Rotal (rotation)	**Touchscreen:** In Live state, tap on ***Rotal*** on the touchscreen and turn the knob directly underneath. The live B-mode image can be rotated 90° about the image centre. Turn the knob clockwise and the image will rotate clockwise. Or turn it anticlockwise to rotate the image anticlockwise. **【Note】: When the image is inverted, only the orientation marking will be inverted, but not the pictograms, the scale or the active image marking.**

6.4.4 Image zoom (for B mode)

a) In B mode, tap ***Zoom*** on the touchscreen in Live state, or press the **P4** hotkeys. Then a zoom ROI box will be displayed at the bottom left of the image, as shown in Fig. 6-8.

【Note】: The hotkey **P4** is the default setting for the zoom function. If the user needs to reset the hotkey function, he/she should refer to *Chapter* ***5.2.3.1*** for details.

b) Use the trackball to move the zoom ROI box and select the part of the image that is to be enlarged in the original image. The enlarged image will be displayed in the image area;

c) In the zoom state, turn the **Value** knob on the control panel again to change the zoom factor. There are several factors to choose from.

d) Press the **Esc** button, the **B-mode** knob, tap ***Zoom*** on the touchscreen or press the **P4** hotkey again to exit zoom mode.

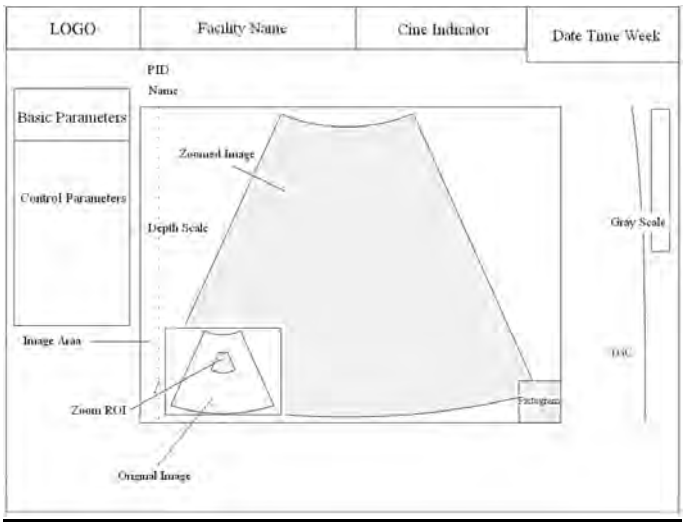


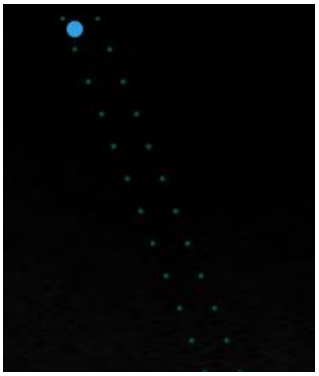
Fig.6-8 Zooming-in state

6.4.5 Biopsy guide line

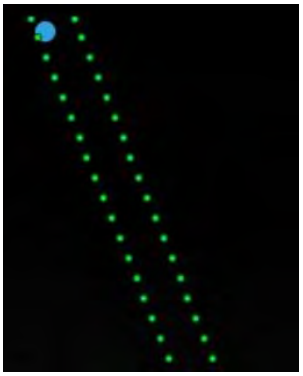
In Live state, tap once on ***Guide*** on the touchscreen to display the biopsy guide line. A pair of parallel dotted lines spaced 1 cm apart will be displayed vertically on the screen. The biopsy needle will be displayed midway between the two biopsy lines.

Press the console key **Y** to switch to a single biopsy guide line. Press **Y** repeatedly to toggle between the single line and the double lines.

Press the **G** key on the keyboard to toggle between the display formats of the biopsy guide line. There are two display formats available for the biopsy guide line, as shown in Fig. 6-9.



Display format 1



Display format 2

Fig.6-9 Display format for the biopsy guide line

The start position and the angle of the puncture line vary according to the different probes.

When the biopsy guide line is displayed, click on ***Guide Pos*** or ***Guide Angle*** on the touchscreen, and turn the knob underneath to move the puncture line left and right or to move the angle of the puncture line up and down. You can also use the keyboard to set the position of the puncture line using the **Q** and **W keys** and to set the angle of the puncture line using the **E** and **R** keys.

Tap ***Guide*** again to turn off the biopsy guide line display. If the biopsy guide line is activated again, the previous setting will be maintained in the system.

【Note】: The biopsy line function depends on the probe model, and it is only available for B-mode images.

⚠ **【Note】: The biopsy may only be carried out by persons qualified in this procedure, otherwise it could result in serious injury to the patient.**

6.4.6 Positioning the centre line

In Live state, press **L**, and a central line will be displayed in the image centre for positioning. Press **L** again to close the display of the central line for positioning. When the central line for positioning is activated, press **Calc** to perform the dynamic measurement.

【Note】: The dynamic measurement function with the central line for positioning is available for all probes, but only for B-mode images.

6.4.7 Optimisation

In Live state, tap ***Auto-Fit*** on the touchscreen or press the **P3** hotkey to achieve one-touch auto-fit/optimisation. If auto-fit is enabled, all the parameters will be set to the optimal status.

【Note 1】: The hotkey P3 is the default setting for the Auto function. If the user needs to reset the hotkey function, refer to *Chapter 5.2.3.1* for details.

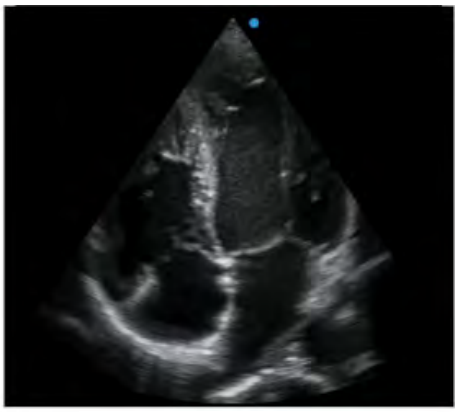
【Note 2】: Adjusting B gain or TGC exits optimisation automatically.

6.4.8 Tissue harmonic imaging

In Live state, tap on ***Harmonic*** on the touchscreen to open or close tissue harmonic imaging. When tissue harmonic imaging is activated, ***H*** will be displayed in front of the frequency on the screen.

The THI images look like in Fig. 6-10.

Bladder polyp



Four-chambered section

Fig.6-10 Tissue harmonic imaging

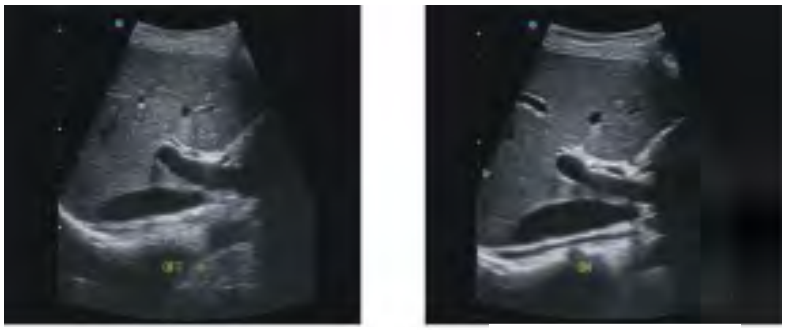
6.4.9 XBeam

In Live state, tap ***XBeam*** on the touchscreen to turn on XBeam. The buttons for adjusting the XBeam parameters will then be displayed on the touchscreen. Tap ***XBeam*** and turn the knobs directly underneath to adjust. There are three options to choose from: High,

Medium, and Low. The result of the adjustment will be displayed in the control parameter area on the left side of the screen.

Tap ***XBeam*** on the touchscreen again to turn the function off.

The comparison between traditional compound imaging and XBeam imaging is shown in Fig. 6-11.



Traditional compound imaging XBeam imaging

Fig.6-11 Comparing the images

6.5 Multiple B-mode imaging

6.5.1 2B mode

In B-mode Live state, tap on  on the touchscreen or press the **P2** hotkey to activate 2B imaging. Only one ultrasound image will be displayed on the screen. Press the **T-Ball** button to activate the second ultrasound image; the first image will be displayed as a still image (see Fig. 6-12).

【Note】: The **P2** hotkey is the default setting for the 2B function. If the hotkey function needs to be reset, the user can refer to *Chapter **5.2.3.1*** for details.

When 2B mode images are displayed, the image with a green focus mark is live. Repeatedly press the **T-Ball** button on the control panel to toggle back and forth between two 2B-mode images.

Press the **B-mode** button in the middle to return to single B-mode imaging.

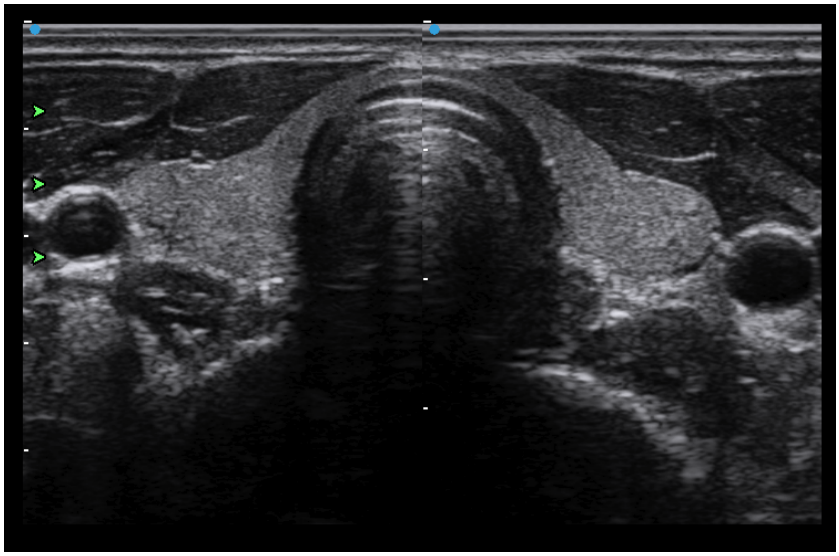


Fig.6-12 2B-mode image

【Note】: If a biplane probe has been purchased as an option, switching the display area in 2B mode will cause the system to switch to another probe scanning plane. In order to use this function, the two connectors of the biplane probe must be connected to two adjacent probe sockets, i.e., to sockets A and B, or to sockets B and C.

1) Once the probe is properly connected, select one of the scan planes in B mode. Tap  on the touchscreen or press the **P2** hotkey to go to 2B mode. Now the left side will display the live B mode image of one scan plane.

2) Press the **T-Ball** button on the control panel. The left-hand image will be a still image, and the system will automatically switch to another scan plane. The live image will be displayed on the right side of the image area.

3) Press the **T-Ball** button again. The system will switch to the original scan plane, with the live image displayed on the left, and the still image on the right side.

4) By pressing the **T-Ball** button repeatedly, one can advance and display the two scan planes of the probe. This function is helpful for the user, to make direct observations and compare images on two scan planes.

6.5.2 4B mode

In B-mode Live state, tap  on the touchscreen to activate 4B imaging. Only one ultrasound image will be displayed on the screen. Tap  on the touchscreen or press the **T-Ball** button to display the 2nd, 3rd and 4th ultrasound image. The current

image will be activated and the others will be displayed as still images.

When 4B-mode images are displayed, the image with a green focus mark ▶ is live. Tap multiple times  on the touchscreen or press the **T-Ball** button on the control panel to toggle between the B-mode images.

Press the **B Mode** button in the middle to return to single B-mode imaging.

【Note】: To adjust multiple B-mode imaging parameters, please refer to section 6.4.2.

6.6 Imaging in B/M mode

6.6.1 Activating B/M mode

In Live state, press **M Mode** on the control panel. A sampling line in M mode will appear on the B-mode image. Move the trackball to control the position of the M-mode sampling line. Press **M mode** again to activate the M-mode sweep and go to B/M mode imaging (Fig. 6-13), where the B-mode image and the M-mode image will be displayed top and bottom. When in Live state of the B/M-mode imaging, use the trackball to control the position of the sampling line in M mode.

Press **M Mode** a third time to activate single imaging state in M mode.

Press the **B-mode** button in the middle to return to single B-mode imaging.

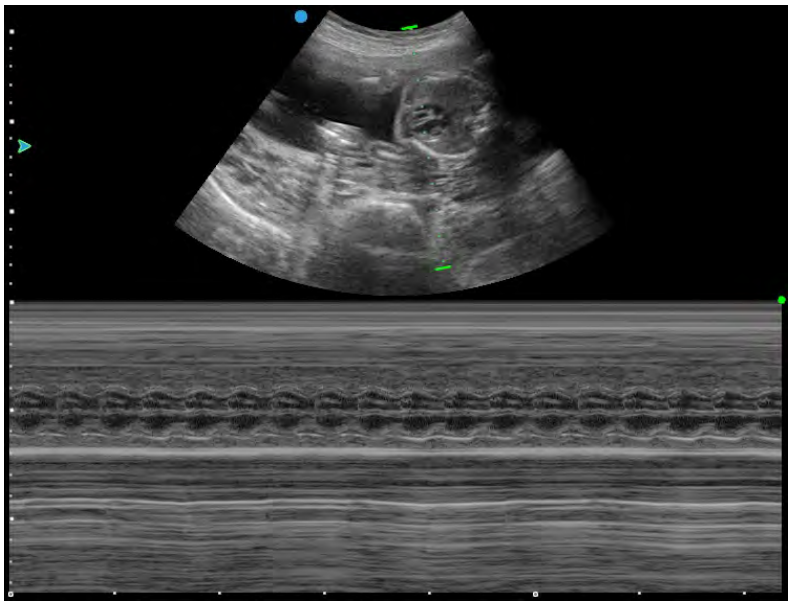


Fig.6-13 B/M mode

6.6.2 Setting the imaging parameters in B/M mode

M greyscale (M_GSC)	**Touchscreen:** In Live state, tap on ***M_GSC*** and turn the knob directly underneath to adjust the M grey levels.
Chroma	**Touchscreen:** The process is the same as in B mode. The value will be displayed on the left side of the screen.
M gain	**Touchscreen:** In Live state, tap ***M_Gain*** and turn the knob directly underneath to adjust the M-mode image gain.
M speed (MSP)	**Touchscreen:** In Live state, tap ***MSP*** and turn the knob directly underneath to adjust the scroll speed and waveform display that can affect M-mode imaging. At higher speeds, fewer but bigger waves will be displayed, whereas smaller waves will be displayed at lower speeds.
M zoom	**Touchscreen**: In Live state, tap ***M Zoom*** and turn the knob directly underneath to zoom in on the M-mode image by selecting the sampling position. The length of the sampling line will change accordingly. Turn the knob clockwise to increase the length of the sampling line, or anti-clockwise to decrease it. Zoom in on the M image by selecting the position and extent of the sample.
Layout	**Touchscreen:** In Live state, tap ***Layout*** to cycle through split-imaging display types for B/M mode: There are eight layout options: B mode image/M mode trace up/down display, 7 options B-mode image/M-mode trace left/right display, 1 option **【Note 1】: This function is only available for some models.** **【Note 2】: For up/down layout, the change in each step will increase or decrease the M-mode image height by 30 pixels, and increase or decrease the B-mode image by 30 pixels.**

【Note】: Press **Set** on the control panel on the console to activate the cursor. Then move the cursor to the parameters in the parameter control window on the left side of the screen. Select the parameter (now blue) and rotate the **Value** knob to adjust.

6.6.3 Anatomical M mode

In preliminary B/M or M mode or in M sweep mode, tap ***AMM*** on the touchscreen while in

Live state, and an M-mode sampling line will be displayed on the B image with a blue soft dot in the middle of the line, as shown in Fig. 6-14.

The system supports triple-line anatomical M mode. The user may set the number of M-mode sampling lines that are displayed. Press **Set** on the touchscreen key to bring up the arrow cursor. Move the cursor to the ***M_Line*** control parameter and turn the **Value** knob to adjust. When multiple sampling lines are displayed, press the **T-Ball** button repeatedly to cycle through control of each sampling line.

Tap ***M_Angle*** on the touchscreen and turn the knob directly underneath to align the angle of the M sampling line, in a controlled manner, with the blue soft centre of the dot. Turn the knob directly underneath ***M Zoom*** to adjust the length of the sampling line in a controlled **manner.** Tap ***AM_Speed*** and turn the knob directly underneath to set the anatomical M-mode speed.

Tap ***General*** on the touchscreen to return to the previous imaging mode (B/M, M stand-by mode or M scanning mode).

【Note】：If the B-mode image is in the rotation state, it will automatically exit that state upon activating anatomical M mode.

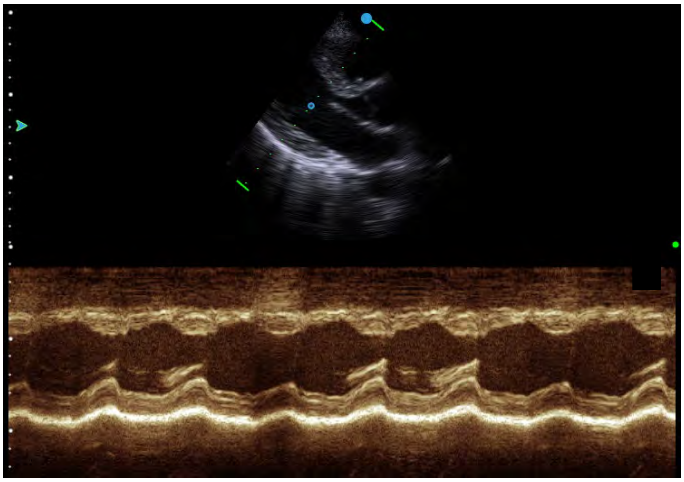


Fig.6-14 Anatomical M-mode imaging

6.7 Colour flow map (CFM)

6.7.1 Activating colour flow map mode

In Live state, press the **CFM** button to enter colour flow map mode (see Fig. 6-15). Use the trackball to move the colour ROI box to the position for scanning. Press **T-Ball**, and the 4 sides of the colour box will change from solid lines to dotted lines. Use the trackball to change the size of the colour box. Press **T-Ball** again to confirm the size of the colour box. The trackball function will then once more be set to change the position of the colour

box.

Press **CFM** again to return to B mode.

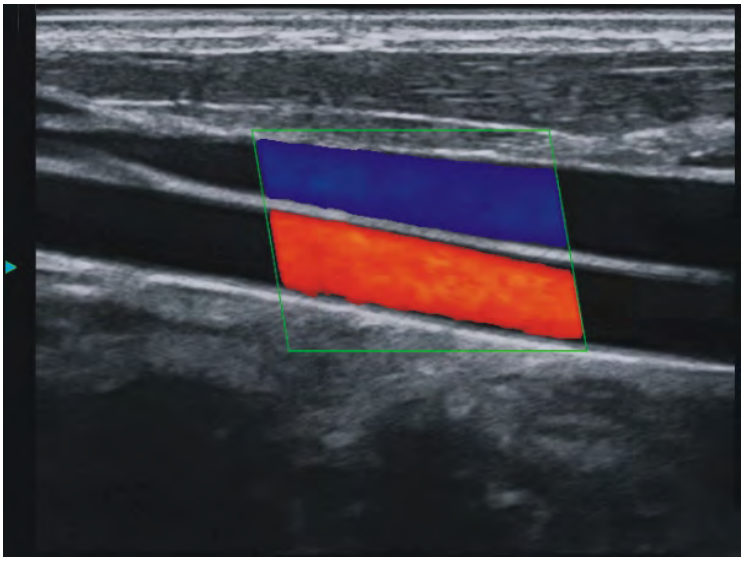


Fig.6-15 Colour flow map

6.7.2 Setting the colour flow map parameters

Colour gain	**Control panel**: Turn the **CFM** knob to adjust the colour gain of the image. Rotate the knob clockwise to increase the flow signal level within the colour ROI box, and anti-clockwise to decrease it. **【Note】: Increasing colour gain will raise colour flow sensitivity. Too little colour gain can lead to poor signal saturation of the colour flow and to murky image colour. Excessively high colour gain can lead to obvious colour outflow.**
Control	**Touchscreen:** If you are using a linear probe and are in Live state, press **Set** to call up an arrow cursor. Move the cursor over the control parameter ***Steer***, on the left of the ultrasound interface, which will change to blue. Then move the trackball (or turn the **Value** knob) to adjust the angle of the colour ROI.

Colour frequency (C_Freq)	**Touchscreen:** In Live state, tap ***C_Freq*** on the touchscreen and turn the knob directly below it to adjust the level of the colour frequency. **【Note】: A higher colour frequency is conducive to detecting low-velocity blood flow. However, an excessively high colour frequency may give rise to disturbances.**
Priority	**Touchscreen:** In Live state, tap ***C_Prior*** on the touchscreen and turn the knob directly underneath to adjust the 2D priority of the CFM.
Colour map (C_Map)	**Touchscreen**: In Live state, tap ***C_Map*** on the touchscreen and rotate the knob directly underneath to select the desired colour map based on the user's needs and preference. Tap ***C_UD on the touchscreen*** to invert the colour map. The colour of the colour flow map in the colour ROI box will change accordingly.
Median filter (M_Filter)	**Touchscreen:** In Live state, tap on the ***M_Filter*** on the touchscreen and turn the knob directly underneath to adjust the colour Doppler median filter. **【Note】: The median filter – without a negative value – is used for eliminating speckles and image noises.**
Colour threshold (Thred)	**Touchscreen:** Tap ***Thred*** on the touchscreen and rotate the knob directly underneath to adjust the colour Doppler threshold. **【Note】: A high threshold value is conducive to reducing image noises. But if the threshold value is too high, blood flow information may easily be filtered out.**
Acoustic power (C_PWR)	**Touchscreen:** The process is the same as that in B mode, with the value displayed on the left of the screen.

Persistence (PER)	**Touchscreen:** In Live state, tap on ***C_PER*** on the touchscreen and turn the knob directly underneath to increase/decrease the persistence level. The higher the level it is, the higher the SNR and the smoother the image will be. **【Note】: The higher the persistence, the better the image quality and the worse the real time. When scanning rapidly moving organs and structures, the image can judder and be un-sharp.**
Smoothness (C_SMO)	**Touchscreen:** The process is the same as that in B mode, with the value displayed on the left of the screen. **【Note】: The negative value represents enhancement while the plus value is for smoothness.**
Pulse repetition frequency (PRF c)	**Touchscreen:** In Live state, tap ***PRFc*** on the touchscreen and rotate the knob directly underneath to increase/reduce the PRF. This setting will increase/reduce the detection range of the blood flow velocity. **【Note】: A higher PRF results in a better detectable speed of blood flow, lower colour saturation, and a higher frame rate. In contrast, a lower PRF results in a poorer detectable speed of blood flow, higher colour saturation, and a lower frame rate. It is better to adjust this value in such a way that no colour inversion occurs. When you detect low-velocity blood flow, decrease the PRF value, so as to increase the sensitivity of the colour flow signal. A low PRF can easily result in colour aliasing and mosaic images.**

Wall filter (WF)	**Touchscreen: In Live state,** Tap ***WF*** on the touchscreen and turn the knob directly underneath to strengthen/reduce the wall filter. It is used for removing colour artefacts due to vascular wall pulse or valve activity. **【Note】: This setting is relative to colour sensitivity.** To detect high-velocity blood flow, increase the WF value to eliminate frequency shift artefacts due to low velocity and low wall activity. To detect low-velocity blood flow, decrease the WF value to avoid flow signals with low frequency being cut off.
Line density (C_LD)	**Touchscreen:** In Live state, tap on ***C_LD*** on the touchscreen and turn the knob directly below to adjust the line density. There are several levels of line density available for selection.
Baseline (BASE)	**Touchscreen:** ◆ In Live state, tap ***Baseline*** on the touchscreen, and rotate the knob right below it to move the baseline up or down in the colour map. ◆ In live CFM state, tap ***C_UD*** on the touchscreen to invert the colour map relative to the centre.
Colour gain (C_ENH)	**Touchscreen:** In Live state, tap ***C_ENH*** on the touchscreen and turn the knob directly underneath to adjust the colour gain. There are several levels to adjust. **【Note】: Increasing the colour gain parameter reduces the image rate.**
Sample volume (C_Gate)	**Touchscreen:** In Live state, tap ***C_Gate*** on the touchscreen, and turn the touchscreen knob directly underneath to adjust. There are several levels to adjust.
B/C split screen (Colour split mode)	**Touchscreen:** In Live state, tap ***B/C Split*** to activate the partial screen on both sides. The left screen shows the live 2D colour-flow image, while the right shows the live 2D B-mode image. Press **B mode** or turn the **CFM** knob to return to B mode or CFM mode.
Colour on/off	**Touchscreen**: In Live state, tap ***Colour On/Off*** to turn CFM on or off. When CFM is turned off, the colour ROI becomes dark.

【**Note**】**:** Press **Set** on the console to activate the cursor. Then move the cursor to the parameters in the window for the parameter controls on the left side of the screen. The selected parameter (now blue) can be adjusted by using the **Value** knob.

6.7.3 VS flow (vector space flow, option)

This function is designed for low-velocity blood flow imaging.

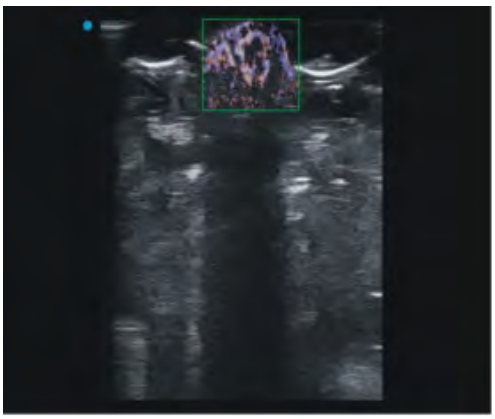
In CFM live mode, tap ***VS Flow*** on the touchscreen or press the **P5** hotkey to turn on the VS flow function.

【**Note**】**:** The **P5** hotkey is the default setting for the VS-flow function. If the user needs to reset the hotkey function, refer to *Chapter **5.2.3.1*** for details.

The ***VS*** parameter will be displayed on the touchscreen. Tap on it and turn the touchscreen knob just below it to adjust the VS flow sensitivity, with high and low levels available.

Tap ***VS Flow*** on the touchscreen again to turn the function off.

The VS flow images can be seen in the figure below.



Fingertip blood flow

Kidney blood flow

Fig.6-16 VS flow imaging

6.7.4 Image zoom (for colour mode)

The zoom function for colour mode has two operating methods available:

Method 1:

1) In live B mode state, tap ***zoom*** on the touchscreen or press the **P4** hotkey. A selection box for the zoom area appears in the bottom-left corner of the image area, as shown in Fig. 6-17 (a).

【**Note**】**:** The hotkey **P4** is the default setting for the zoom function. If the hotkey function needs to be reset, the user should refer to *Chapter **5.2.3.1*** for details.

2) In zoom state, rotate the **Value** knob on the control panel to change the zoom factor, with multiple zoom levels available for selection.

3) After selecting an appropriate image, press the **CFM** knob to activate Colour Flow Map (CFM) mode, and the colour image will be in zoom state. Use **T-Ball** and **Set** to adjust the size of the colour box. The system automatically calculates the zoom factor according to the longitudinal proportion of the colour box and the B image before zooming, as shown in Fig. 6-17 (b).

4) A mini view will appear in the bottom-left corner of the image area. The blue zoom box in the thumbnail indicates where the zoom area is on the whole image. Move the trackball to push the colour box to the edge of the image and move the colour box further to see zoom images of other areas.

5) Press **Esc** or the **B mode** knob to exit zoom mode and return to B-mode imaging.

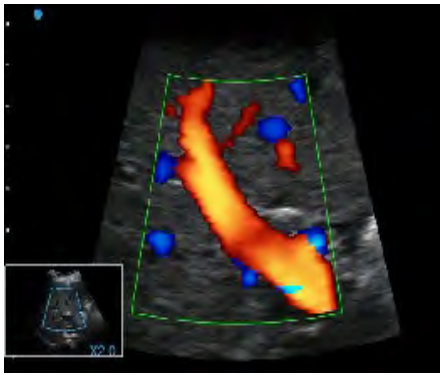


Fig. 6-17 (a) Fig. 6-17 (b)

Fig.6-17 Colour Zoom (Method 1)

Method 2:

1) Press the **CFM** rotary knob to activate colour flow map (CFM) mode. Use **T-Ball** and **Set** to adjust the size of the colour box. Move the colour box to the desired area of the image, as seen in fig. 6-18 (a).

2) Tap ***Zoom*** on the control panel or press the **P4** hotkey. The colour image will be enlarged and the system will automatically calculate the zoom factor according to the longitudinal proportion of the colour box and the B image before zooming, as shown in Fig. 18.6 (b).

3) A mini view will appear in the bottom-left corner of the image area. The blue zoom box in the thumbnail indicates where the zoom area is on the whole image. Move the trackball to push the colour box to the edge of the image and move the colour box further to see zoom images of other areas.

4) Press **Esc** or on the **B mode** rotary knob to exit zoom mode.

Fig. 6-18 (a)

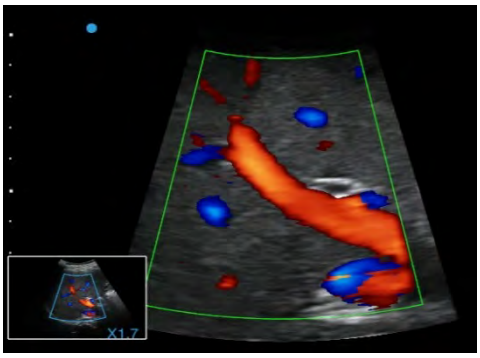


Fig. 6-18 (b)

Fig.6-18 Colour zoom (Method 2)

6.8 Colour power angio imaging (CPA)

In CFM mode, in Live state, tap ***CPA*** on the touchscreen to activate colour power angio imaging mode. See Fig. 6-19. Use the trackball to move the colour ROI box to the position for scanning. Press **Set** to fix the position of the colour ROI box. Press **T-Ball**, and the 4 sides of the colour box are changed from solid lines to dotted lines. Use the trackball to change the size of the colour box. Press **T-Ball** again to confirm the size of the colour box. The trackball function is then once again set to change the position of the colour box.

Press **B Mode** or the **CFM** knob to exit colour power angio imaging and return to B mode or CFM mode.

【Note 1】: To set the colour power angio imaging parameter, see *section 6.7.2*.

【Note 2】: The image zoom function is also available in CPA mode. For detailed operation, see *6.7.3*.

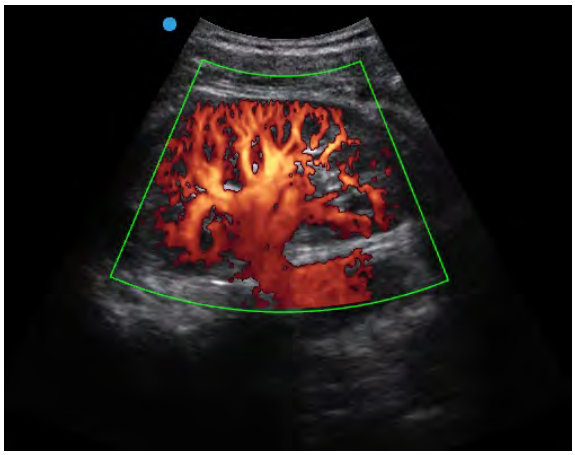


Fig.6-19 CPA imaging

6.9 Pulsed wave Doppler imaging (PWD)

6.9.1 Activating pulsed wave Doppler imaging mode

In Live state, press the **PW** knob to bring the PWD sample volume into the image area and to activate PW standby mode, as shown in Fig. 6-20.

Now turn the **PW** knob to adjust the sample volume. Or turn the **Angle/Focus** knob (if the ***Angle*** backlight is off, press the knob first to toggle) to adjust the correction angle.

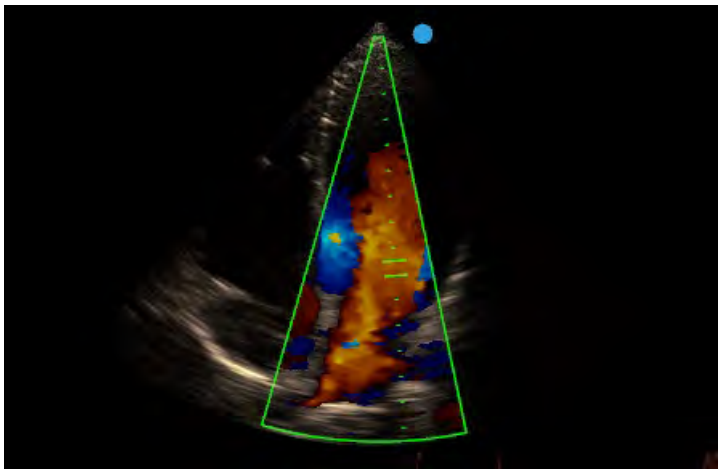


Fig.6-20 Pulsed wave Doppler – Sampling volume

Then press the **PW** knob to activate PWD and enter PW imaging mode. The B-mode image and the PW-image are displayed above and below. The B-mode image is now a still image, as can be seen in Fig. 6-21.

Push the **T-Ball** first of all to activate B mode and deactivate PW mode. Push the **T-Ball** a second time to activate both images at the same time. Push the **T-Ball** a third time to activate PW mode and deactivate B mode. Repeatedly pressing the button allows you to cycle through the above-listed procedures.

【Note】： Press the **Set** button to call up an arrow cursor. Move the cursor over ***Active PW*** in the left control parameter area and the parameter value will turn blue. Now move the Trackball (or turn the **Value** knob), to switch back and forth between the three states: ***Active B, Active B/PW und Active PW*.**

Push the **PW** knob a third time to activate PWD as full screen.

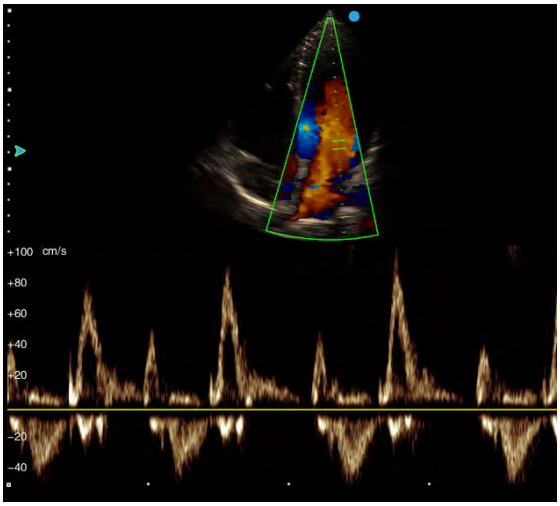


Fig.6-21 Pulsed wave Doppler imaging

6.9.2 Setting the pulsed wave Doppler parameters

D gain	**Control panel:** In Live state, turn the **PW** knob to adjust the pulsed wave Doppler gain. **【Note】: The spectrum exhibits noises when the gain is too high, or weak signals when the gain is too low.**
Angle correction	**Control panel:** In Live or Still image state, turn the **Value** knob directly underneath to adjust the correction angle. The correction guide line and the correction angle will be displayed at the sample volume position. **【Note 1】: When changing the angle, try to keep the correction guideline parallel to the scanned vessel and to change the angle within the range of +60° to -60° so that the flow velocity will be close to the actual one.** **【Note 2】: Tip on *Quick Angle 30°* and turn the knob directly beneath to change the angle in increments of 30°.**
D speed (DSP)	**Touchscreen:** In Live state, tap ***DSP*** and turn the knob directly under ***DSP*** to set the running speed of PWD imagine mode.
D frequency	**Touchscreen:** In Live state, tap ***D_Freq*** and then turn the knob directly underneath to set the PWD frequency.

Sample volume (Gate)	**Touchscreen:** In Live state, tap ***Gate*** and then turn the knob directly underneath to set the sample volume. The position of the sample volume can be moved up or down using the trackball. **【Note】: The wider the sample volume is, the higher the sensitivity.**
Audio volume	**Touchscreen:** In Live state, tap ***Volume*** and then turn the knob directly underneath to set the speaker volume.
Smoothness (D_SMO)	**Touchscreen:** In Live state, tap ***D_SMO*** and turn the knob beneath to set the smoothness of the spectrum.
Pulse repetition frequency (PRF d)	**Touchscreen:** In Live state, tap on ***PRFd*** on the touchscreen and turn the knob underneath to increase or reduce the PRF. Use this function to change the detection range of the pulsed wave Doppler blood flow velocity. **【Note】: Higher-velocity blood flow can be detected when the PRF value is high, and lower-velocity blood flow can be detected when it is low. The value must be set according to the specific situation. An incorrect setting can lead to being unable to determine the blood flow.**
Wall filter (WF)	**Touchscreen:** In Live state, tap on ***WF*** and turn the switch underneath to adjust the wall filter value. **【Note】: This adjustment may filter out low-frequency signal echoes on both sides of the baseline – not only useless low-frequency signals, but also some useful signals. When detecting low-velocity blood flow in particular, this may lead to blood flow signals being unable to be displayed.**
Baseline (BASE)	**Touchscreen:** ◆ In Live state, tap ***Baseline*** on the touchscreen and turn the knob directly underneath to adjust the Doppler sample baseline position. Turn it clockwise to shift the baseline upwards, or anti-clockwise to shift the baseline downwards. ◆ Tap ***D_UD*** on the touchscreen to invert the PW Doppler trace display direction compared to the baseline.
Acoustic power (D_PWR)	**Touchscreen:** In Live state, tap on ***D_PWR*** and proceed as in B mode. The value will be displayed on the left side of the screen.

D_Chroma	**Touchscreen:** Tap ***D_Chroma*** and proceed as in B mode. The value will be displayed on the left side of the screen.
D_Map	**Touchscreen**: In Live state, tap ***D_MAP*** and turn the knob underneath to adjust the map.
Control	**Control panel:** With the linear probe as the currently activated probe, and in Live state, press **Set** to bring up an arrow cursor. Move the cursor over the control parameter ***Steer***, on the left of the ultrasound interface, which will change to blue. Then move the trackball (or turn the **Value** knob) to adjust the steering angle.
Trace on/off	**Touchscreen:** In Live state, tap ***Trace On/Off*** to turn the spectrum auto trace function on and off.
Layout	**Touchscreen**: In Live state, continuously tap ***Layout*** on the touchscreen to toggle to the B/PW mode display layout, with 8 options for selection: B mode imaging/PW mode trace up/down display, 7 options; Display - B- mode imaging/M mode trace left/right, 1 option. **【Note 1】: This function is only available for some models.** **【Note 2】: For up/down layout, every zoom increment will increase the PW image height by 30 pixels, and decrease the B-mode image height by 30 pixels.**

Triplex

Touchscreen: In Live state, when B, PW and CFM modes are turned on, tap ***Triplex*** and activate B/C/PW Triplex (as shown in Fig. 6-22), and ***Active B/C/PW*** will be displayed in the control parameter area. Press continually on the **T-Ball** in the control panel to switch back and forth between ***Active PW***, ***Active B/C*** and ***Active B/C/PW***.

【Note 1】: Tap repeatedly on *Layout* on the touchscreen to switch back and forth between the 8 triplex mode layouts.

【Note 2】: When you call up VS flow in Triplex mode, you will return to the preliminary VS flow spectrum mode.

【Note 3】: When you are in B mode or CFM mode and in the zoom state, activating Triplex mode will automatically cause the zoom state to end.

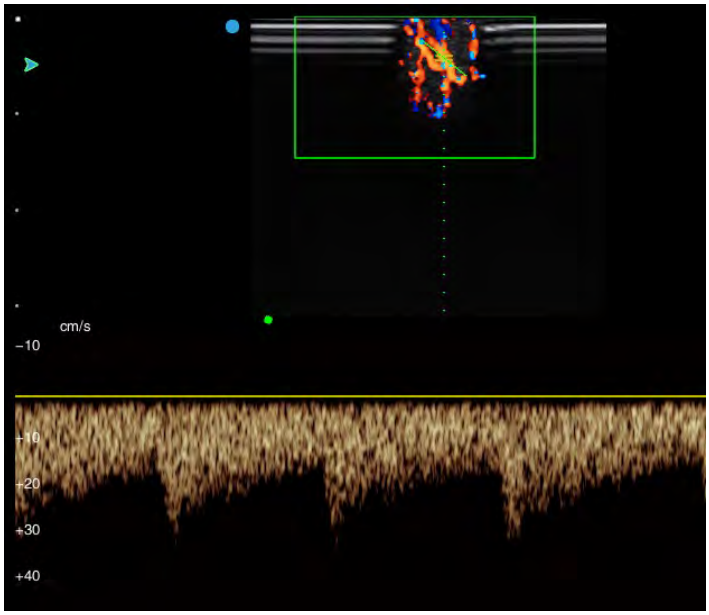


Fig.6-22 Triplex mode

6.10 Panoscope (option)

Panoscope provides a function for creating and reviewing a static B-mode image that is wider than the given transducer field of view. You can use this function to review and measure an area that is bigger than the anatomy of a single image. As the probe scans the skin surface, a panorama will be created based on the individual images.

6.10.1 Activating Panoscope

In Live B-mode state, tap on ***Panoscope*** on the touchscreen to activate Panoscope. The B-mode image will be shifted to the left side of the image area and an ROI box will appear on the image.

Use the trackball to move the ROI box. **Press T-Ball**, and the ROI will change from solid to dotted lines. Then use the trackball to change the size of the ROI. Press on the **T-Ball** again to confirm the ROI size. The trackball function is then set back to being for changing the ROI position.

6.10.2 Creating a panorama image

When the ROI size is confirmed, move the ROI box to the region of interest, press **Set,** and start to capture images in the selected region.

A time progress bar will appear above the image. As recording goes on, the time goes down. Images are captured for up to 60 seconds. The connected panoramic view is displayed live on the right, as shown in Fig. 6-23.

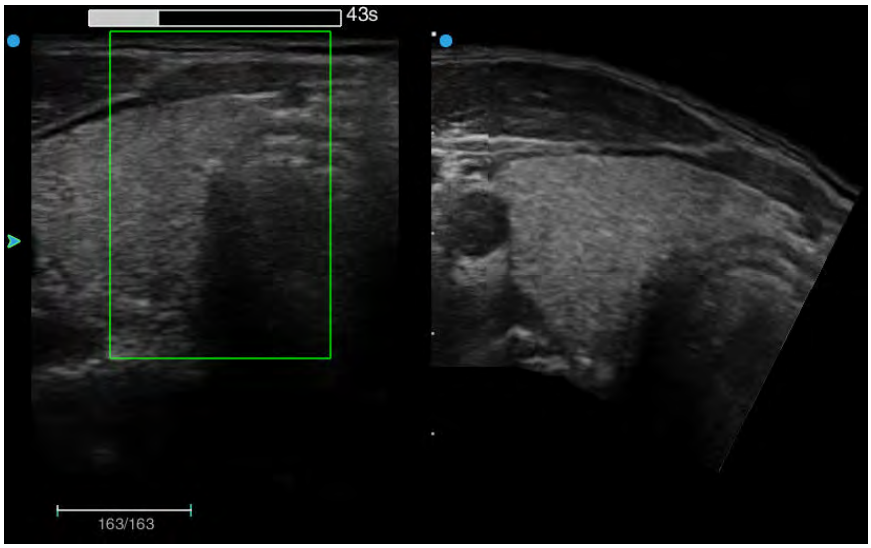


Fig.6-23 Creating a panorama image

When the time for capturing images has reached 60 seconds, the system automatically stops capturing images and enters the panoramic view screen. To stop capturing images

ahead of time, press **Set** to stop and activate the panoramic view screen.

【Note】: While capturing images, try to move the transducer within a constant space. The speed of movement should generally be kept at 0.5cm/s. With a flat and straight body part, the transducer's speed of movement can be increased accordingly. For a body part with a large angle of rotation (e.g. the shoulder joint), try to reduce the transducer's speed of movement so as to optimise the imaging effect.

6.10.3 Review and measurement

If the panoramic image size is bigger than the imaging area, move the image with the trackball in order to view the section beyond the image area.

Distance, circumference, volume and angle measurements can be performed on the panoramic image. The measurement items and the process are the same as for B mode. See ***8.2.1*** *B mode - general measurements* for details.

Tap on ***Panoscope*** to go to the display of the B image (left) and panoramic image (right). Both images are shown as still images, as shown in Fig. 6-24.

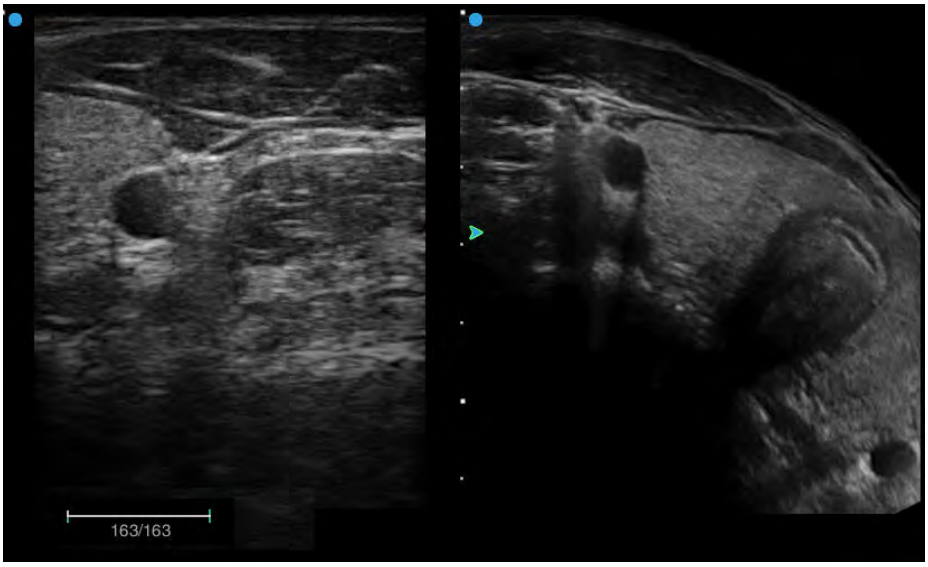


Fig.6-24 Display of the B image and panoramic image

If the green focus ➤ is highlighted on the panoramic image, you can rotate, move, zoom in on or out of the panoramic image. Press the **T-ball** to switch the focus onto the ➤ B image, and it will go to the B-mode scroll film. Use the trackball to replay the B images. Press repeatedly on the **T-Ball** to toggle the control between the two images.

If the green focus ➤ is highlighted on the panoramic image, tap ***Panoscope*** again on the touchscreen to switch to the full screen panorama view.

In panoscope mode, press on **Freeze** to revert to 2B mode. Tap on ***Panoscope*** on the

touchscreen and the ROI box will once more be displayed on the image. Follow the above-listed steps for creating a new panorama image.

6.10.4 Saving panoramic images

When it has finished capturing images for the panoramic image, press the **Save** button on the console and save the image to a designated location. The user may set the save format and the storage location in ***Store Setup***. See ***9.2*** *Store Setup* for further details.

Tap ***Save Cine*** on the touchscreen, and the image will be saved in .cin format.

6.10.5 Post-editing images

Post-editing images means re-taking images that are currently captured or saved images.

6.10.5.1 Post-processing captured images

On the screen that displays both the B image and the image, tap ***Panoscope*** on the touchscreen when the focus is on the B image to call up the ROI box. The panorama image on the right will disappear. Follow the instructions above to change the size and position of the ROI box, and press **Set** to start capturing again.

To capture just a few of the images, roll the trackball in still-image state to the starting point. Tap on ***Set First*** on the touchscreen. Roll the trackball to the end point and tap on ***Set End*** on the touchscreen to confirm a section of the clip, and then start capturing**.**

【Note】: Before capturing, make sure that the currently displayed image is the first or last of the selected clip (to set it, tap on *To First* or *To last* on the touchscreen). This will ensure that the selected section can be fully captured so as to combine a panoramic image.

6.10.5.2 Post-editing saved panoramic images

Procedure:

1) Tap ***Disk*** on the touchscreen to call up the ***Store Setup***.
2) Move the cursor to ***Open File*** and press **Set** to call up a selection box.
3) Search for the folder where the images are saved, select the image, and then tap ***Open***.
4) Follow the procedure in ***6.10.5.1*** for post-editing.

【Note】: Post-editing is only available in film format for panoramic pictures.

6.11 Continuous wave Doppler imaging (CW, option)

When the phased array probe is in use, and you are in B-mode Live state, press **CW**, and the CW sample volume will be displayed in the image area. You will now be in CW standby mode. Turn the **Value** knob to adjust the angle correction.

Press **CW** again to active continuous wave Doppler scanning and enter the CW mode. The B image and CW image will be arranged so as to be facing upwards and downwards. The B image will now be a still image. See Fig.6-25.

Press **T-Ball** to activate the B image and display the CW image as a still image. Press **T-Ball** again to activate CW scanning and display the B image as a still image. You can cycle through the above procedures by repeatedly pressing **T-Ball**.

Press **CW** for the third time to activate full screen continuous wave Doppler scanning. Press **CW** for the fourth time to return to CW standby mode.

【Note】: Press the Set key to bring up an arrow cursor on the screen. Move the cursor over ***Active CW*** in the left control parameter area, and the parameter value will turn blue. Now move the trackball (or turn the **Value** knob) to toggle back and forth between the 2 states: ***Active B and Active CW*.**

Press the **B Mode** knob to exit CW mode and return to B mode.

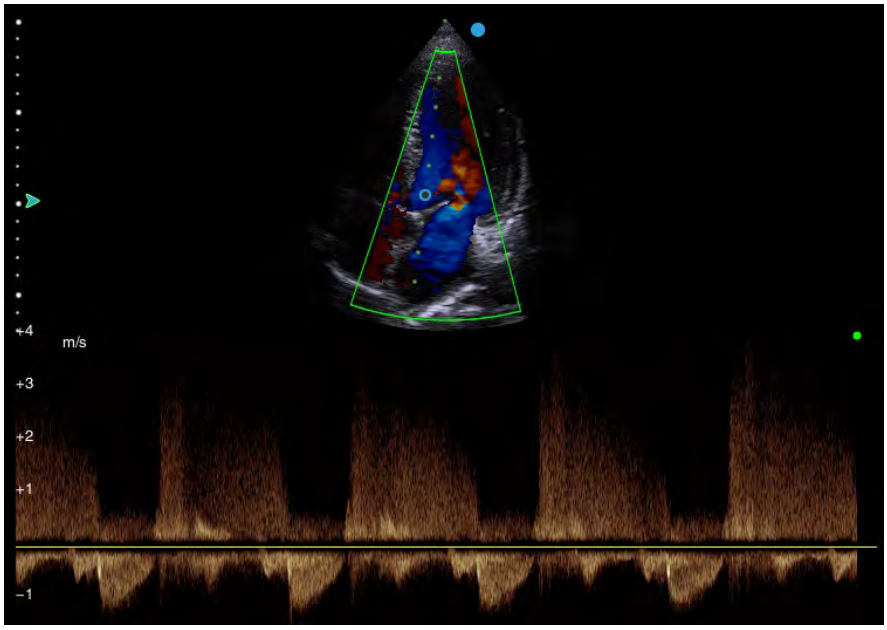


Fig.6-25 Continuous wave Doppler imaging

【Note 1】: You can only activate CW mode when using the phased-array probe or pencil probe.

【Note 2】: For instructions on setting parameters in CW mode, see ***6.9.2 Setting the***

pulsed wave Doppler parameters, whereby ***V_Scale (velocity scale)*** can be adjusted by turning the corresponding knob on the touchscreen. ***D_Freq*** cannot be adjusted.

6.12 Tissue Doppler imaging (TDI, option)

Tissue Doppler imaging (TDI) consists of generating colour images according to the Doppler effect, where colour images overlap the 2D images. TDI provides information on the direction and speed of tissue motion.

In B-mode Live state – and only when using a phased-array probe – press the **TDI** button to activate tissue Doppler imaging (TDI) mode. A colour ROI box will appear on the image. Use the trackball to move the ROI box. Press **T-Ball**, and the 4 sides of the colour box will change from solid lines to dotted lines. Then use the trackball to change the size of the colour box. Press **T-Ball** again, and the trackball function will then once more be set to change the position of box.

Press **TDI** again to exit TDI mode.

In TDI mode, press the **PW** knob twice. Then the B mode image and the PW image will be displayed above and below. See Fig. 6-26.

【Note】: Entering or exiting TDI mode when in PW mode will make you return to the preliminary state.

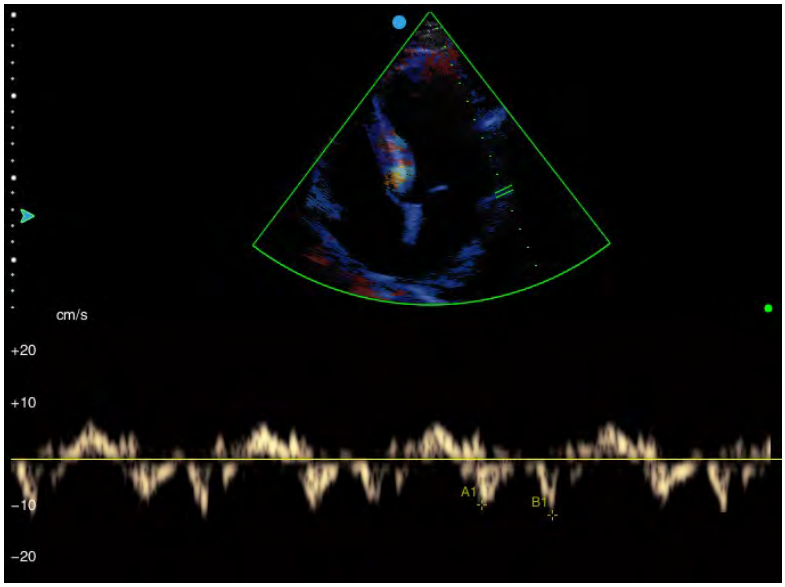


Fig.6-26 Tissue Doppler imaging

【Note 1】: You can only activate TDI mode when using the phased-array probe.

【Note 2】: Setting parameters in TDI mode: To set and describe TDI parameters, refer to Setting parameters in CFM mode.

【Note 3】: TDI velocity display is the display of the Doppler velocity of the myocardium in TDI mode when spectral Doppler is enabled. To set and describe the TDI parameters, see "Setting parameters in PW mode".

6.13 ECG mode (option)

6.13.1 Description of function

ECG mode offers 3-lead ECG signals for cardiac examinations.

R-wave trigger control is for synchronised image capturing for functions such as stress echo.

ECG has three leads: **F** (left leg), **L** (left arm), **R** (right arm). L is a reference line with signals from the ECG module, which usually supplies a bias voltage. The F and R signals come from the patient's body, which is connected to different output terminals on the ECG isolation amplifier.

【Note】: The ECG mode is for capturing and displaying 3-lead ECG signals only and cannot be used as a replacement for an ECG/EKG unit.

6.13.2 Activating ECG

Connect one end of the ECG 3-lead cable to the ECG port on the system. Then connect three lines on the other end of the 3-lead ECG cable to the patient's left leg, left arm and right arm (please note the letters on the leads for proper connection).

Once the connection has been set up, tap ***ECG*** on the touchscreen in B, M, CFM or PW mode Live state to activate ECG mode. Now a live ECG will appear at the bottom edge of the screen, and the patient’s heart rate will be calculated.

Tap ***ECG*** on the touchscreen again to exit ECG mode.

6.13.3 Setting the imaging parameters in ECG mode

Gain	**Touchscreen:** In Live state, tap ***Gain*** and rotate the knob directly underneath to adjust the ECG gain, i.e., the sensitivity of the ECG signals.
Position	**Touchscreen:** In Live or Still-image state, tap ***Position*** and turn the knob directly underneath to change the ECG display position. The bigger the number is, the higher the display position, with multiple positions available for selection.
Interval	**Touchscreen:** In Live or Still-image state, tap ***Interval*** and turn the knob directly underneath to invert the ECG curve. The default value is ***Off***, i.e. no inversion.
Sweep speed (ESP)	**Touchscreen:** In Live state, tap ***ESP*** and turn the knob directly underneath to adjust the ECG speed. The bigger the number is, the higher the speed, with several levels available.
Colour	**Touchscreen:** In Live or Still-image state, tap ***Colour*** and turn the knob directly underneath to adjust the ECG display colour, with several levels available.
Hide	**Touchscreen:** In Live or Still-image state, tap ***Hide*** and turn the knob directly underneath to turn the hide function on or off. Turn it to ***On*** to hide the ECG, or to ***Off*** to show the ECG.

6.13.4 Save cine

Set the number of cardiac cycles in ***Store Setup – Real-Time Cine Setup*** and classify ***Save Type*** as ***Store Film,*** i.e., the function of the **Save** button will be to save the film (For more information on settings, see ***9.2*** in this manual). In live image capturing state, press **Save**, and the system will save the ECG for the set cardiac cycles and 2D images before the button was pressed.

Chapter 7

Annotations for image information

7.1 Managing patient information

Press the **ID** key to call up the patient information editing screen, as shown in Fig. 7-1. Information like ***ID***, ***name***, ***age***, ***gender***, ***DOB*** **(*date of birth)***, ***height***, ***weight***, ***examination***, ***referring doctor, diagnostician*** and ***operator*** can be input via this screen and stored in the database. ***ID*** is a required field. When creating new patient information, the system will automatically generate a new patient ID).

According to the different types of examination, there are four different user interfaces; namely, general mode (Fig. 1.7 (a)), obstetrics and gynaecology mode (Fig. 1.7 (b)), urinary system mode (Fig. 7-1 (c)), and cardiac mode (Fig. 7-1 (d)).

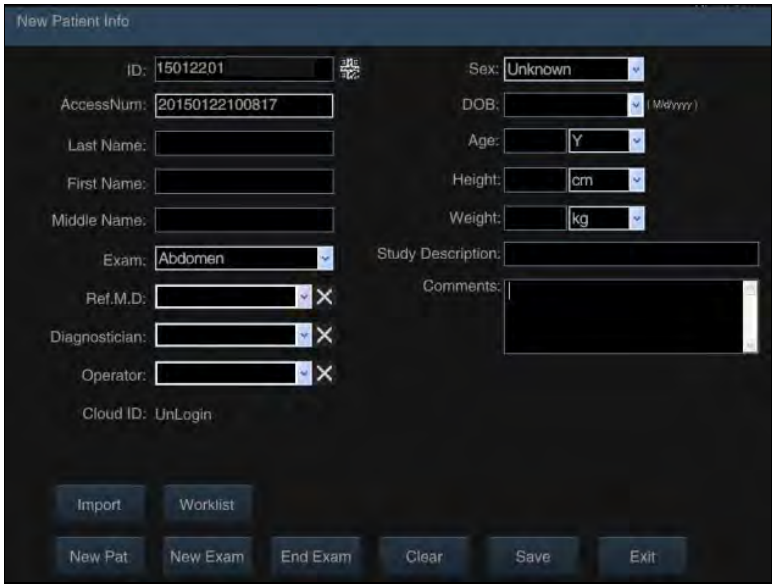


Fig.7-1(a) General mode

【Note】: The buttons *AccessNum* and *Worklist* are only available if DICOM is activated.

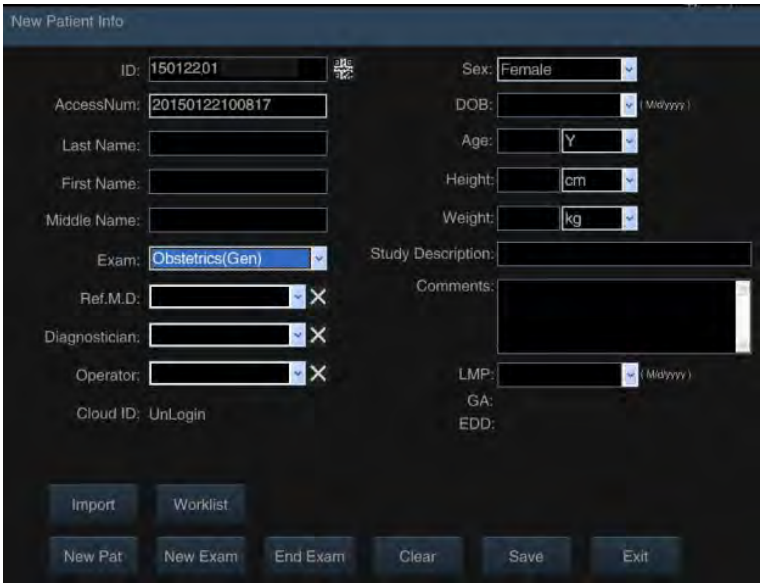


Fig.7-1(b) Obstetrics and gynaecology mode

【Note】: When the gynaecology, obstetrics (general) or obstetrics (multi gest) examination type is selected, the system will automatically display the *gender* as *female*. At the same time, the LMP (last menstrual period), to be input, the gestational age (GA) and the estimated date of delivery (EDD) will be displayed based on the general mode.

Fig.7-1(c) Urology mode

【Note】: PSA will be added to the input in urology mode based on general mode.

Fig.7-1(d) Cardiology mode

【Note】: BSA (body surface area) will be added to the input in cardiology mode based on general mode. After inputting the height and weight, the system will automatically calculate the BSA.

a) **New patient**: Create new patient information after completing the examination of the previous patient.

Press the **ID** button on the control panel to bring up the ***New Patient Info*** screen (see Fig. 7-1). Roll the trackball to move the cursor to the ***New Pat*** and press the **Set** key, and a dialogue window will appear on the screen (see Fig. 7-2). Roll the trackball to move the cursor onto ***Yes*** and press the **Set** button to confirm the end of the current examination and create new patient information. The system will automatically delete the original information and will create a new patient ID (the patient ID can be changed manually). The user can then enter new patient information. Select ***No*** to end the current examination without creating new patient information.

【Note】: The patient ID is generated automatically based on the date (in the format year/month/date, YYMMDD) and the control number (two figures) for the same day. For example, 15060801 is the first patient on 8th June 2015.

If the DICOM feature is activated, an access number will be generated at the same

time as the number. If the medical record is drawn from the worklist server, the access number will be generated by the worklist server. If the patient record is registered locally, the access number will be generated automatically.

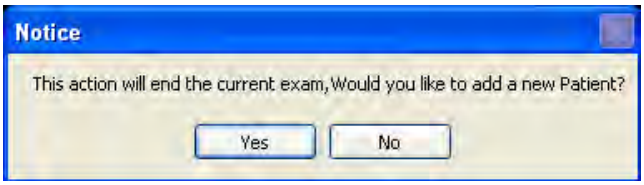


Fig. 7-2 Ending an examination and prompt for creating new patient information

b) **Editing**: In ***New Patient Info***, roll the trackball to move the cursor onto the information input box, press **Set** on the control panel to activate the cursor, and use the keyboard to enter patient information. After editing, move the cursor onto ***Save*** and press **Set** on the control panel. The system will automatically save the patient information and exit the user interface for editing.

【Note 1】: While inputting the text, press Tab on the keyboard to switch to another language (e.g. Russian, so long as the system supports the language).

【Note 2】: Click on in the *date of birth* field to call up the selection controls after the date of birth has been selected. Press Set in "year" to display the up and down arrows for selection (see Fig. 3.7 (a)). Press Set in "month" to display the month list for selection (See Fig. 3.7 (b)). After the date of birth has been set, the age will automatically be generated. The date of birth can be manually entered according to the set format. Then click one of any of the other input boxes, and the age will automatically be generated. If the patient's age is entered first, the system will automatically calculate the date of birth based on the current date. The user can then change certain numbers using this as a basis.

Fig. 7-3(a)

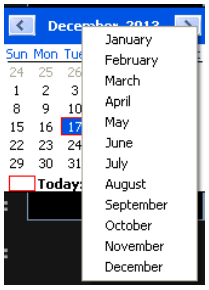


Fig. 7-3(b)

Fig. 7-3 Date selection controls

【Note 3】: Select the name of the "*Referring doctor, the diagnostician* or *operator*" that needs to be deleted from the drop-down list. Move the cursor onto ☒ and press Set. Then move the cursor back onto *Save* on the screen and press Set to completely erase the name of the stored physician. If not saved, the doctor's name will be displayed next time the screen for editing *New Patient Info* is opened.

【Note 4】: The other input involves date information, such as LMP, and can follow the procedure for *date of birth* in note 2. The date format must be consistent with the format displayed on the screen. See section*5.2.2 n)* for how to change the format.

【Note 5】: Editing *Height*: If you select the unit to be in *feet (ft)*, the system will display "inch (in)" in the input field (see Fig. 7-4).

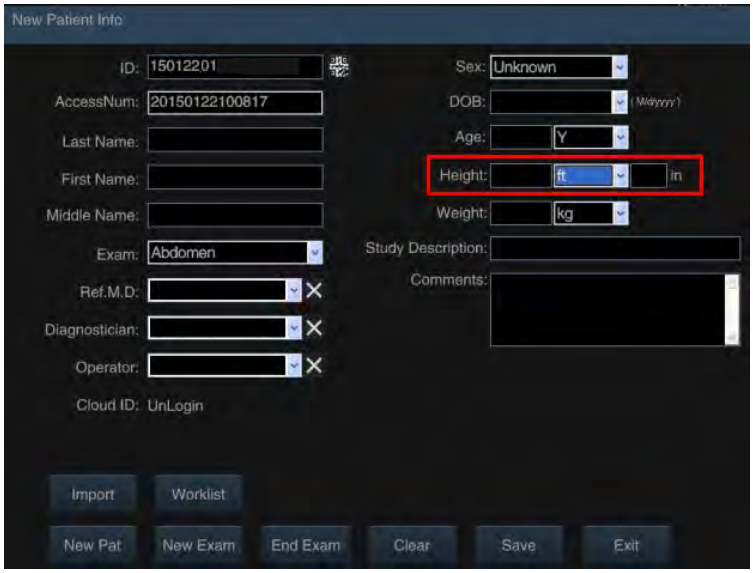


Fig. 7-4 Inputting height

c) **New exam:** For creating a new examination under the same patient ID. There are several events under the same patient ID.

- Continuous examination in the same period (for example: when the patient has an abdominal exam and cardiac exam at the same time, the doctor can create different types of examination under the same ID without needing to create multiple IDs for the same patient).
- Multiple exams in different periods (for example: when the patient undergoes different exams on different days, the doctor can create a new examination type under the same patient ID without needing to create a new ID).
- Importing the ID of cases generated by another system from the same series to carry out a new exam on this system.

Procedure: Call up the ***New Patient Info*** screen, click on the ***New Exam*** button, and a dialogue box will open on the screen (see Fig. 7-5). Roll the trackball to move the cursor over ***Yes*** and press **Set** to confirm that the current examination is complete. Then select a new examination type under the same patient information.

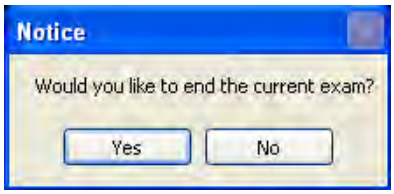


Fig. 7-5 New exam notice

d) **End Exam:** To complete the current exam, use the trackball to move the cursor over ***End Exam*** and then press **Set**. A dialogue box will appear on the screen (see Figure 7-6.). Use the trackball to move the cursor onto ***Yes*** and press **Set** to confirm the end of the current examination or select ***No*** to not end the exam. If end exam is selected, the system will show the prompt if a new ID needs to be created (see Fig. 7-7.). The user may select ***Yes*** or ***No*** according to the situation.

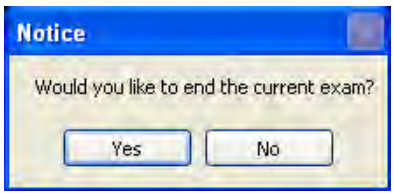


Fig. 7-6 End exam notice

Fig. 7-7 New ID notice

e) **Clear:** In the ***New Patient Info*** editing screen, roll the trackball to move the cursor onto ***Clear*** and press **Set** to delete the currently input patient information, such as name, date of birth, and so on.

f) **Save:** After entering the patient information, roll the trackball to move the cursor onto ***Save*** and press **Set** to save the patient information and complete the procedure.

g) **Exit:** In the ***New Patient Info*** editing screen, roll the trackball to move the cursor onto ***Exit*** and press **Set** to finish editing the patient information and exit the operation.

h) **Import**: For importing previously saved patient information. The current examination will be ended after import.

Import method: In the ***New Patient Info*** editing screen, roll the trackball to move the cursor onto ***Import*** and press **Set** to switch to the ***Archive Management*** screen. Then move the cursor onto the desired patient record from the patient list and press **Set** twice to return to the ***New Patient Info*** editing screen, which will display the selected patient information.

【Note】: A patient ID that has been generated by another system from the same series can be imported into this system for a new examination or for file browsing.

i) **Worklist:** Importing patient information that has been stored on the server via DICOM transfer. After import, the current examination will be ended.

In the ***New Patient Info*** screen, move the cursor using the trackball over ***Worklist***, then press **Set** to call up the worklist screen, as shown in Fig. 7-8.

【Note】: Before loading patient information with this method, make sure that the DICOM function is activated and that the system is correctly connected to the server (see *5.2.11* for DICOM configuration and connection).

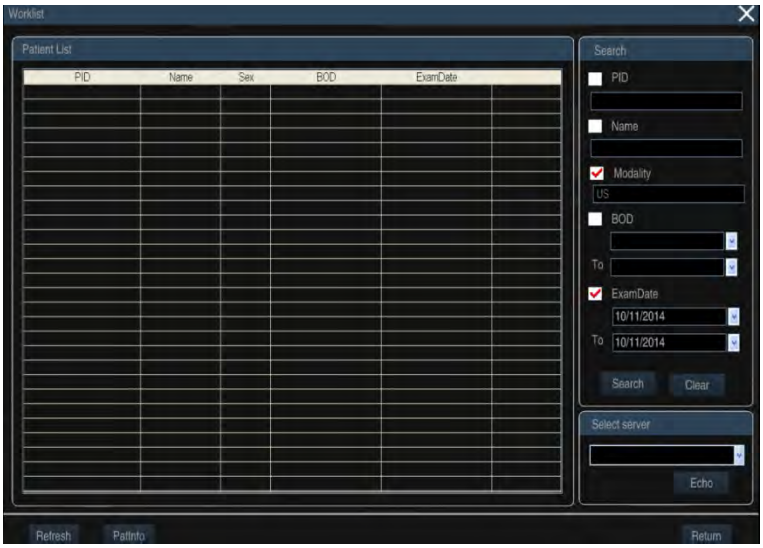


Fig. 7-8 Worklist screen

The patient list stored on the server will be displayed on the screen. Move the cursor to the patient record that is to be imported. Press **Set** twice or use the trackball and **Set** to click on ***PatInfo***, and the ***New Patient Info*** screen will appear, as shown in Fig. 7-9. The patient information will be displayed on the screen.

Confirm that it is all correct and click on ***Save***. The patient information will be stored in the archive, and the system will return to the main screen. Select the examination type and start the examination. If the information is incorrect, click on ***Exit*** to return to the patient list and make a new selection.

Fig. 7-9 Patient information

- If there are multiple servers, select another server from ***Select Server*** at the bottom right of the worklist screen and click on ***Echo*** to connect to the server with the updated patient list.

- If there are too many patient records, you may use the ***Search*** button on the right of the worklist screen to search. To search, move the cursor to the small box of items, and press **Set** to activate the box. Input the keyword and then move the cursor onto the ***Search*** button, press **Set**, and the system will search through the current server's patient database, and the search result will be displayed in the patient list.

【Note】: The more keywords are input, the more accurate the result will be.

- Click on ***Refresh*** in the bottom-left corner of the ***Worklist*** screen to update the patient list. If the selected patient record does not exist (the examination may have been terminated by other ultrasound terminal), you can refresh the list to acquire the latest list data.
- Click ***Return*** at the bottom right of the ***Worklist*** screen to return to the ***New Patient Info*** editing screen.
- If ***End Exam*** or ***New Pat*** is selected, the information will be sent to the server after the examination is complete. Refresh the worklist, and the information for the patient will be removed.

7.2 Adding annotations

7.2.1 Description of function

Users can add text or preset annotations to the images. The text function allows users to enter letters and numbers. In the annotation function, preset annotations can be added to the images, which users can customise (see *section **5.2.10** Annotation setup*).

7.2.2 Procedure

Table 7-1 Description of functions, list of relevant control units

Control unit	Position	Description of function
Text	Touchscreen	For activating or exiting the annotation state.
Annotations on the touchscreen	Touchscreen	For adding annotations.
Set	Control panel	For going to a new line in the annotation state. For adding the selected annotations to the image.
Clear (delete)	Touchscreen	For deleting all the annotations on the screen.
BkSp (Backspace)	Keyboard	For deleting one character or a text arrow in the annotation state.

Delete	Keyboard	For deleting one character while the cursor stays in the annotation state.
Arrow	Touchscreen	For adding text arrows.
Trackball	Control panel	For moving the trackball and selecting the storage location for the annotation.

a) Adding text annotations: In Live state or in Still-image state, tap on ***Text*** on the touchscreen to activate the annotation state, and a cursor will be shown in the annotation area. Move the cursor over the target position and input the text annotations using the keyboard under the control panel.

b) Adding a preset annotation: While in Live or Still-image state, tap on ***Text*** on the touchscreen to call up the preset annotations to the position of diagnosis on the touchscreen. Select the desired annotation and tap the corresponding button on the touchscreen (if the desired annotation is unavailable on the touchscreen, follow the instructions in *section **5.2.10** Annotation setup*). Move the cursor with the selected annotation to the desired position. Press **Set** to position the annotation.

【Note】：Press the **Esc** button on the console to exit the text annotation state.

7.2.3 Preset annotations

The system-preset annotations are shown in Table 7-2 to Table 7-13. In addition, users may customise annotations for each type of examination (see *section **5.2.10** Annotation setup*).

Table 7-2 Preset annotations for an abdominal examination

Abdomen		
LIVER	LONG	HEAD
C.HEP A	TRANS	NECK
SPLEEN	LT KIDNEY	BODY
SPLENIC A	GB	PANCREAS
PORTAL	DUCT	CYST
CELIAC	IVC	STOMACH
HEP V	PANCREAS HEP V	MASS
PANCREAS AORTA	AORTA	TAIL
HEP A	LEFT	CBD
RT KIDNEY	CD	PV
SMA	LTH	AO
HD	CHD	CAUDATE LOBE
EHBD	HEPATIC DUCT	QUADRATE LOBE
LFH	POLYP	BD
PD	GBF	VL
WD	CY	CHA
IMA	STONE	TUMOUR
GDA	SD	ROUND LIGAMENT

Table 7-3 Preset annotations for a 1st trimester examination. Trimester

1st trimester		
BABY 1	LONG	YS
RIGHT	UTERUS	EMBRYO
LEFT	HEART	DECIDUA
BLADDER	CORD	FM
TRANS	GS	CRL
OVARY	ADNEXA	

Table 7-4 Preset annotations for a gynaecology examination

Gynaecology		
UTERUS	LONG	VAGINA
RIGHT	EXT IL	ADNEXA
R OV	INT IL	IUD
ENDOME	FOL 1	UTERUS ARTERY
ILIAC	FOL 2	POLYP
L OV	FOL 3	STONE
TRANS	FOL 4	CY
BLADDER	FOL 5	LEFT UTO
LEFT	FOL 6	RIGHT UTO
UTER A	FOL 7	ROV
OVAR A	FOL 8	LOV
FOLLICLE	FOL 9	ROV A
CONC	FOL 10	OA
CERVIX	UTO	TUMOUR
OVARY	UTERUS CANAL	EN

Table 7-5 Preset annotations for a urological examination

Urology		
RIGHT	UPPER	CORONAL
O RRA	LOWER	URETHRA
P RRA	PELVIS	RRP
M RRA	MID	RRC
INLOB	DRRA	PY
SEG	DLRA	RCO
ARCU	TRANSPLANT	AG
L KID	PROST	LEFT URETERS
LEFT	TZ	RIGHT URETERS
O LRA	EJAC	POLYP
P LRA	DUCT	STONE
M LRA	CZ	CY
LONG	SEM VESICLE	TUMOUR
TRANS	BLADDER	RA
CYST	PZ	PST A
ARTERY		

Table 7-6 Preset annotations for an obstetrics examination

Obstetrics		
RIGHT	AM	HC
LEFT	AM C	AC
TRANS	VILLUS	BPD
UMB CORD	CHORION	THC
HEART	FOETUS	OFD
LONG	FOETAL HEART	EYE
BLADDER	FM	QD
STOMACH	FH	TTD
KIDNEY	F SP	FW
BODY	F THX	UA
PLACENTA	FL	UV
CERV OS	HL	PL
FUNDUS	UC	

Table 7-7 Preset annotations for a foetal echo examination

Foetal Echo		
RIGHT	LONG	PLACENTA
LEFT	BLADDER	CERV OS
TRANS	STOMACH	FUNDUS
UMB CORD	KIDNEY	HEAD
HEART	BODY	

Table 7-8 Preset annotations for an orthopaedics examination

Orthopaedics		
THIGHBONE HEAD	HIPBONE	ACETABULUM

Table 7-9 Preset annotations for a cardiology examination

Cardiology		
AORTIC	REGURG	SEPTUM
LV	AV	RV
TCHZ	RVAW	4 CH
AO ROOT	PULMONIC	LEFT VENT
MITRAL	OUTFLW	AO ARCH
MV	LA	TV
PEAK	DIAS	VSD
R ATRIUM	TRICUSPID	RIGHT VENT
ASC AO	INFLOW	DESC AO
AO	PV	TVI
LVOT	SYST	ASD
L ATRIUM	ATRIAL SEP	

Table 7-10 Preset annotations for a carotid artery examination

Carotid		
BULB	ECA	JUGULAR
DISTAL	CCA	IA
MID	RIGHT	SCA
PROX	VERTEBRAL	IJV
LEFT	ICA	EJV
SUBCLAVIAN	BIF	

Table 7-11 Preset annotations for a podiatry examination

Podiatry		
Left	Plantar	Tendon
Right	Fascia	Neuroma
LONG	Achilles Tendon	Calcaneus
TRV	PT Tendon	Injection

Table 7-12 Preset annotations for a small parts examination

Small parts		
RIGHT	ADENOMA	PCA
LEFT	FIBROMA	LGA
OCULUS	UI	STA
SUPERIOR	MEDIAL	OV
TRANS	LATERAL	SOV
LONG	UO	STV
THYROID	TAIL	CRV
ISTHMUS	AXILLA	VV
RT LOBE	LI	LIVER
LENS	LO RIGHT	SAGITTAL
INFERIOR	VARICOCELE	3RD VENT
THROAT	EPIDIDYMUS	L KID
LT LOBE	TESTICLE	CORONAL
PARA	HYDROCELE	4TH VENT
CCA	EYEBALL	R KID
CORNEA	IRLS	SPLEEN
ANT CHAMBER	SCLERA	LAT VENT
MID	ANTER CH	CAVUM
RETINA	VITREOUS BODY	CHOROID
AROTID GLAND	OPTIC DISK	THALAMUS
SUBJAW GLAND	MASS	CEREBELLUM
OPTIC NERVE	SOA	PL
MAMMILLA	OA	HEMORRHAGE
CA	CRA	

Table 7-13 Preset annotations for a peripheral vessels examination

Peripheral vessels		
RIGHT	PROXIMAL	GASTRO
PERONEAL A	M SFA	DFV
ILIAC	D SFA	LSV
CFA	P SFA	D GSV
EXT IL	RADIUS A	M GSV
POST TIBIAL A	M PTA	P SFV
P PTA	SCA	D SFV
ATA	EJV	D PTA
INT IL	CFV	DR PED
ANT TIBIAL A	P GSV	ARTERY
PERON	M SFV	DISTAL
POP	POP	VEIN
LT CIR	P PTV	LEFT
BRACHIAL A	M PTV	ULNAR A
ARTERY	D PTV	IA
MID	ATV	IJV
PROFUN		

7.3 Pictograms

7.3.1 Description of function

Pictograms are a group of pictorial diagrams of human organs preset by the system. They are used to mark an ongoing organ examination. A movable and rotatable green symbol •| (referred to as a “probe indicator”) is used to indicate the position and direction of the probe.

7.3.2 Procedure

1) Tap on ***Body Mark*** to display pictograms supported by the current examination type on the touchscreen.
2) Tap the desired pictogram, then the selected pictogram and a “probe indicator” will be displayed in the image area.

3) Use the trackball to shift the probe indicator and turn the knob directly underneath ***Reverse*** or turn the **Value** knob on the control panel to adjust the arrow angle.

4) Tap ***Clear*** on the touchscreen to delete the pictogram on the screen.

7.3.3 Format

Only one pictogram can be displayed on an image element, and on each B/B or 4B image element.

7.3.4 Displayed position:

There are 4 displayed positions for user selection; namely, the bottom-left, bottom-right, top-right and top-left corners. While the state of the control target is ***Pictogram***, the pictogram's displayed position can be shifted by pressing the **P** key directly or by turning the knob directly underneath ***Position*** on the touchscreen.

7.3.5 Application

Type of pictogram predefined by the system changes according to the various applications. Specified pictorial representations are as shown below:

a) Abdomen pictograms

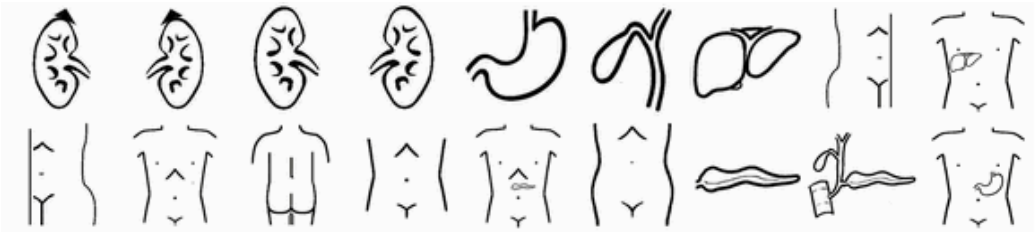


Fig. 7-6 Abdomen pictograms

b) Cardiology pictograms

Fig. 7-7 Cardiology pictograms

c) Gynaecology pictograms

Fig. 7-8 Gynaecology pictograms

d) Obstetrics pictograms (including 1st, 2nd and 3rd trimesters and foetal echo)

Fig. 7-9 Obstetrics pictograms

e) Pictograms of peripheral blood vessels

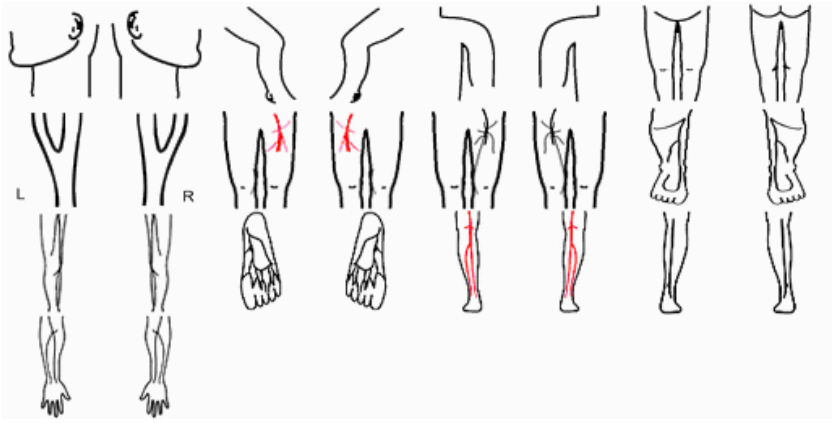


Fig. 7-10 Pictograms of peripheral blood vessels

f) Urology pictograms

Fig. 7-11 Urology pictograms

g) Marks for small parts

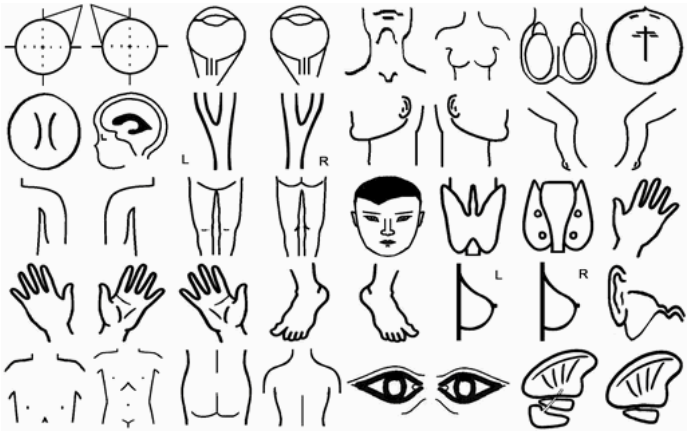


Fig. 7-12 Pictograms for small parts

7.4 Adding an arrow

In Live or Still-image state, tap on  the touchscreen. An arrow will then appear in the centre of the image area.

a) Adjusting the angle: Use the trackball.

b) Fixing: The arrow can only be fixed by pressing **Set** (the arrows will now turn yellow). Otherwise, the arrow will be deleted when activating another state.

【Note】: The fixed arrow will be automatically deleted when toggling to another imaging mode.

c) Press **Esc** or tap  on the touchscreen to exit before fixing the arrow.

d) Calling up multiple arrows: After the first arrow has been fixed, the second movable arrow will appear automatically.

e) In Live or Still-image state, tap on ***Clear*** on the touchscreen to delete all the arrows. In arrow annotation state (current arrows are green), arrows can be removed one by one by pressing **BkSp** on the keyboard.

Chapter 8

Measurements, calculations and reports

8.1 Introduction to measurements and calculations

The measurement and calculation functions allow the user to perform a clinical ultrasound analysis, including measurements on ultrasound images and various calculation results based on various calculation methods. These results are automatically and entered into reports for processing user diagnostic messages.

Measurement and calculation functions consist of general measurement and calculation software.

8.1.1 Control units for measurements and calculations

The control units used for measurements and calculations (Meas/Calc) and their functions are listed in Table 8-1.

Table 8-1 Control unit function list

Control unit	Position	Function
Calc	Control panel	To activate the measurement and calculation function and bring up the general measurement menu
Clear (delete)	Touchscreen	To delete all the annotations on the screen. **【Note】: This button is not for deleting measurement data in reports.**
Set	Control panel	To select, set up and activate the cursor, and to confirm a measurement.
T-Ball	Control panel	To toggle between cursors before confirming a measurement.
BkSp	Keyboard	To correct operating errors during trace measurement or to correct particular measurements.

P	Keyboard	Switch the display position of the measurement result. There are two possible positions: the lower-right corner of the screen or the lower-right corner of the image area. **【Note】: This button is only available when no pictogram is displayed or when the pictogram is in inactive state (the probe identifiers are fixed).**

8.1.2 CALC Menu

Press **Calc**, and the calc menu will be displayed on the monitor or the touchscreen. The user can choose the menu type: ***Menu*** (on the screen) or ***Touch*** (on the touchscreen) in *Settings - Measurement setup*. See ***5.2.9*** *Measurement setup* for detailed settings. The type displayed in the default menu is touchscreen.

◆ The Calc menu is displayed on the left of the screen. As soon as it is switched on, it displays the calculation software of the current examination type. The calculation software may contain many measurement cards (blue shading), and one measurement card has multiple measurement items. If there are too many items, they will be displayed page by page. Move the cursor over  bottom right and press **Set** to turn the page, as shown in Fig. 8-1.

Use the trackball to move the cursor to a calculation software package, for example, 

, and press **Set** to access the package's drop-down menu and display all calculation software, as shown in Fig. 8-2 (a).

Roll the trackball to move the cursor to the measurement card, for example 

. Press **Set** to collapse the drop-down menu of this measurement card and display all measurement cards of this calculation software package, as shown in Fig. 2.8 (b).

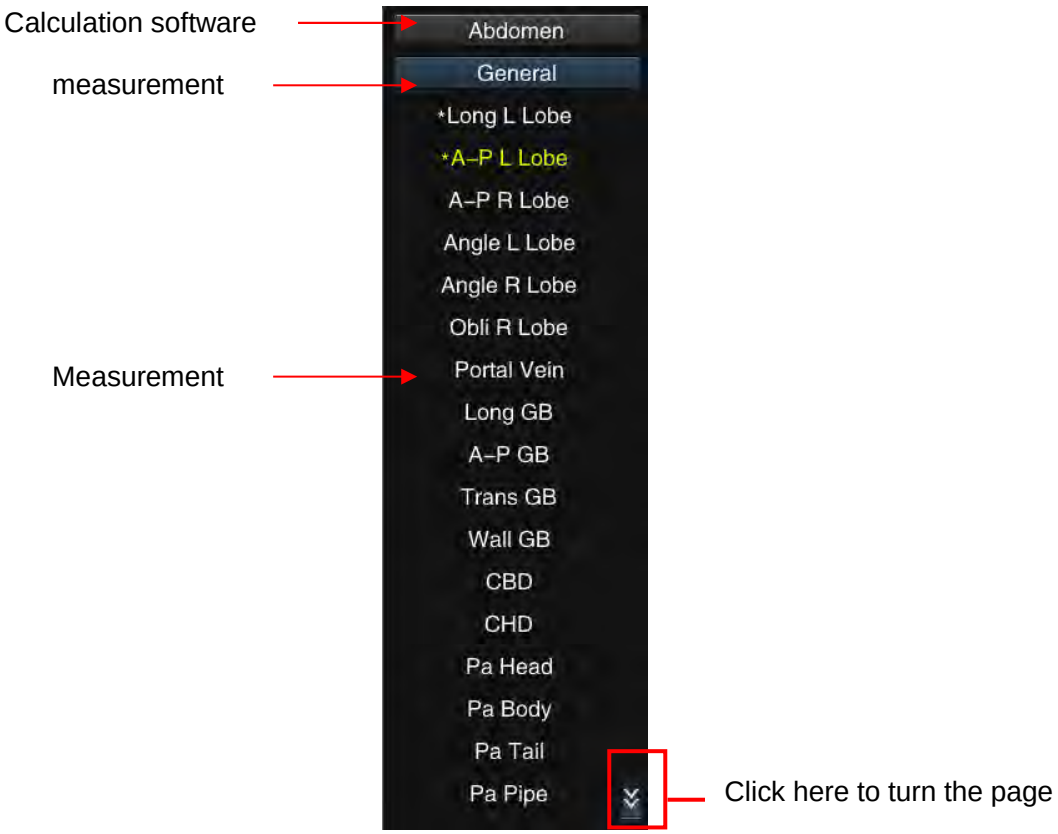


Fig. 8-1

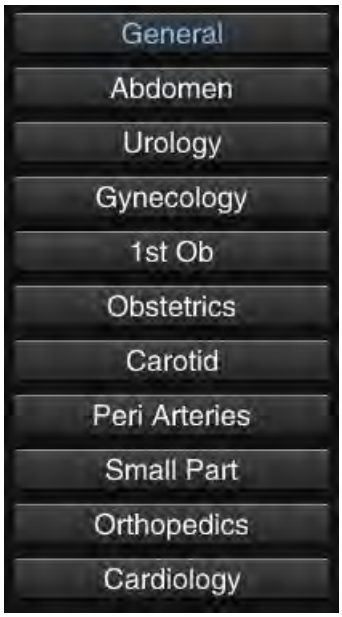


Fig. 8-2 (a)

Fig. 8-2 (b)

Fig. 8-2

Use the trackball and the **Set** button to click on the measurement card, and the items to be measured that are contained in the measurement card will be displayed at the bottom. Move the cursor over a measurement object, and it will turn blue. Press **Set** to select. The element currently measured will be displayed in yellow, and there will be a ***** sign displayed in front of the element to be measured (see Fig. 8-1).

◆ If the Calc menu is displayed on the touchscreen, it displays the specific measurement and calculation software package of the current examination type. The measurement package can contain many measurement cards. The first line of the touchscreen displays the measurement card. Click on it. The elements to be measured that are contained in the measurement card will be displayed at the bottom, as shown in Fig. 8-3.

Tap on ***Calc*** on the bottom left of the touchscreen to display all the calculation software, as shown in Fig. 8-4.

Tap ***General*** to display all the general elements to be measured. The currently measured element will be displayed darker, and there will be a ***** sign displayed in front of the element to be measured, as shown in Fig. 8-5, in front of the ***Distance*** element.

Tap ***Clear (delete)*** to delete all measurement curves and results

Fig. 8-3

Calculation software

Fig. 8-4

If there are too many measurement items, they will be displayed page by page. Click on the arrow to turn the page.

Fig. 8-5

8.2 General measurements

8.2.1 B mode – General measurements

The B mode – General measurements menu is displayed as follows.

Measurement object	Description of function
Distance	Measuring distance between two points.
Depth	Measuring the depth of the target object.
Trace length	Measuring the length of the target object.
Ellipse	Measuring the area and circumference of an enclosed region using the ellipse method.
Trace	Measuring the area and circumference of an enclosed region using the trace method.
Angle (general) Angle (cross)	Measuring the angle between two intersecting planes.
Vascular diameter	Measuring the distance between two points of the vessel.
Variable ellipse	Measuring the area and a circumference of an enclosed region using the variable ellipse method.
IMT	Measuring the maximum, minimum, mean and standard deviation of the IMT (intima-media thickness), as well as the intima-media length.
Histogram	Greyscale distribution of ultrasonic echo signals within an enclosed area.
Volume – 3 Axes	Volume measurement using the three-line method.
Vol (Auto)	Automatic measurement of the volume of the target object.
Biplane vol.	Measuring volume using the biplane method.
Ellipse vol.	Measuring volume using the ellipse method.
Simpson volume	Measuring volume using the Simpson method.
Sphere volume	Measuring volume using the Sphere method.
Area ratio (t)	Area ratio using the trace method.

Area ratio (e)	Area ratio using the ellipse method.
%area redu (t)	Percentage reduction of the area using the trace method.
%area redu (e)	Percentage reduction of the area using the ellipse method.
% diam. Reduce	Length reduction percentage.

8.2.1.1 Distance

Measurement:

1) In B mode imaging state, press **P6,** and a cross cursor ＋ will be displayed in the image area.

   【Note】: The program key P6 is by default a button for measuring the distance. It can be set up to assume other functions.

2) Move the cursor over the measurement starting point, press **Set** to fix the starting point, and bring up another cross cursor ＋.

3) The second cursor, connected to the start point cursor with a dotted line, can be moved using the trackball. The measurement result will be displayed in the measurement results window. Press the **T-Ball** to toggle between the two cursors, positioning either one or both of them.

4) Move the second cursor to the measurement endpoint. Press **Set** to fix the measurement endpoint and finalise the measurement result.

5) Repeat the operation in steps 2) to 4) to continue with another distance measurement. Press **Esc** to exit the measurement state.

Fig. 8-6 Distance measurement

8.2.1.2 Depth

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Press ***General*** on the bottom edge of the screen and select ***Depth*** to display the **+** cursor and activate depth measurement state.

   【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then choose ***Depth***.

2) Roll the trackball to move the cursor to the target object and press **Set** to measure the depth of the target object. The measurement result will be displayed in the bottom-right corner of the screen, and the measurement procedure will be finished.

3) Tap ***Depth*** again and repeat the second step to start the next depth measurement.

   【Note】: Depth measurement and depth scale are consistent. If you go from the top of the scale to 0 cm, you will have negative measurement results.

Fig. 8-7 Depth measurement

8.2.1.3 Trace length

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap on ***General*** at the bottom edge of the screen and select ***Trace Length*** to activate trace measurement state; a cross cursor **+** will be displayed in the image area.

   【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then choose ***Trace Length***.

2) Move the cursor over a definite point and press **Set** to fix the measurement starting point.

3) Drag the track with the trackball along the edge of the target area.

4) Press **Set** on the measurement endpoint to finish the measurement. The length of the measured object will be displayed in the measurement result window.

5) Touch ***Trace Length*** again and repeat steps 2) to 4) to perform further scan length measurements.

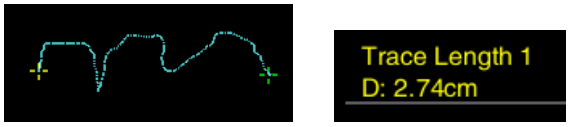


Fig. 8-8 Measuring the scan length

8.2.1.4 Ellipse

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap ***General*** on the bottom edge of the screen and select ***Ellipse*** to activate ellipse measurement state; a cross cursor **+** will be displayed in the image area.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Ellipse***.

2) Move the cursor over a definite point in the region being measured and press **Set** to fix the axis starting point.

3) Then move the cursor to select the desired axis endpoint and press **Set** to fix it. Press the **T-Ball** to toggle between the two cursors, positioning either one or both of them.

4) Move the cursor to change the ellipse shape based on the fixed axis. To adjust the ellipse to the measurement area, press **Set** to fix the ellipse measurement area and finish the measurement. The measurement results of the ellipse circumference and

area will be displayed in the measurement result window.

5) Tap ***Ellipse*** again and repeat the procedure in steps 2) to 4) to continue with another ellipse measurement.

Fig. 8-9 Ellipse measurement

8.2.1.5 Trace

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap on ***General*** at the bottom edge of the screen and select Trace to activate the trace measurement state; a cross cursor **+** will be displayed in the image area.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Trace***.

2) Move the cursor over a definite point and press **Set** to fix the measurement starting point.

3) Drag the track with the trackball along the edge of the target area. To delete the track point by point, press **BkSp** on the keyboard.

4) Press **Set** on the measurement endpoint to finish the measurement. If the area is not an enclosed region, the system will automatically connect the start point with the endpoint by means of a line. The measurement result will be displayed in the measurement results window.

5) Touch ***Trace*** again and repeat the procedure in steps 2) to 4) to perform another scan measurement.

Fig. 8-10 Scan measurement

8.2.1.6 Angle (general)

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap ***General*** at the bottom edge of the screen and select Angle ***(general)*** to activate the angle state; a cross cursor **+** will be displayed in the image area.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Angle (General)***.

2) Fix a line section using the distance measurement method where the end of the section is the start of the second section. Use the trackball to change the inclination between the 2 segments. Press **T-Ball** to toggle the control between the 3 cursors. The angle is adjustable, and the angle values are displayed in the measurement result window. Press **Set** at the correct position to fix the angle and finish the measurement.

3) Tap Angle ***(general)*** again and repeat the procedure in step 2) to carry out another angle measurement.

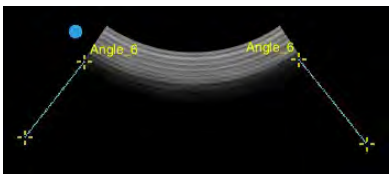
Fig. 8-11 Angle measurement (general)

8.2.1.7 Angle (cross)

Measurement:

1) Click on ***Angle (cross)*** in the ***General*** menu. Fix the two sections using the distance measurement method. The displayed angle is the inclination between the two straight lines along the direction of the marking.
2) Repeat the procedure to perform another angle measurement.

【**Note**】**:** If the angle of the 2 fixed sections needs to be changed, press **Esc** to exit measurement state. Press **Set** again to bring up the cursor. Move the cursor to the endpoints of the section that you need to change. Press **Set** again to adjust the section. Press the **BkSp** button on the keyboard to delete the two sections and start another measurement.



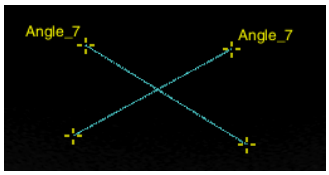


Fig. 8-12 Angle measurement (cross)

8.2.1.8 Vascular diameter

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap ***General*** on the bottom edge of the screen and select ***Vascular Diameter*** to display the **+** cursor and access measurement state for the vascular diameter.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Vascular Diameter***.

2) Move the cursor over a point in the measurement area and press **Set** to fix the point and display a second ＋ cursor.

3) The second cursor, connected to the start point cursor with a dotted line, can be moved using the trackball. The measurement result will be displayed in the measurement results window. Press **T-Ball** to toggle between the two cursors,

positioning either one or both of them.

4) To move the second cursor to the measurement endpoint, press **Set** to fix the measurement endpoint and finalise the measurement result. The system will automatically calculate the vascular area in accordance with the measurement result. The result will be displayed in the measurement result area.

5) Tap ***Vascular Diameter*** again and repeat the procedure in steps 2）to 4）to perform another vascular diameter measurement. Press **Esc** to exit measurement state.

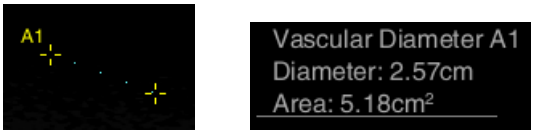


Fig. 8-13 Measuring vascular diameter

8.2.1.9 Variable ellipse

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap on ***General*** on the bottom edge of the screen and select ***Variable ellipse*** to display the **+** cursor and activate the variable ellipse measurement state.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Variable Ellipse***.

2) Draw an ellipse in line with the procedure for ***Measuring ellipses*** (see section ***8.2.1.4***); there are many control points in the ellipse, as shown in Fig. 8-14 (a).

3) Move the cursor to one control point and press **Set** to activate it. At this point, the control point will become yellow. Then move the trackball to move the control point (then press **T-Ball** to switch between the control points). Adjust the graphics as closely as possible to the measurement object, as shown in Fig. 14.8 (b). The measurement results for the circumference and the area are displayed in the bottom-right corner of the screen, as shown in Fig. 8-14 (c).

4) Tap Variable Ellipse ***again*** and repeat steps 2) to 3) to start the next variable ellipse measurement.

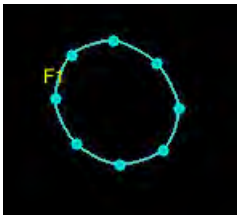


Fig. 8-14 (a)

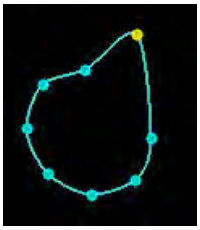


Fig. 8-14 (b)

Fig. 8-14 (c)

Fig. 8-14 Variable ellipse measurement

8.2.1.10 Intima-media (IMT)

Measurement:

1) In B-mode image state, press the **Calc** button on the console to open the Calc menu. Tap on ***General*** on the bottom edge of the screen and select ***IMT***. An ROI box will appear in the image area, which means that intima media measurement is now taking place.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***IMT***.

2) Use the trackball to move the ROI box. Press **T-Ball**, and the ROI will change from having solid to dotted lines. Then use the trackball to change the size of the ROI. Then press **T-Ball** again to confirm the ROI size. The trackball function is then set back to being for changing the ROI position.

3) Once the size and position of the ROI box has been adjusted, press **Set**, and the system will automatically calculate the maximum, minimum, mean and standard deviation of the IMT (intima-media thickness), as well as the intima-media length. The positions with 2 arrow marks indicate where the biggest IMT is, as shown in the figure below.

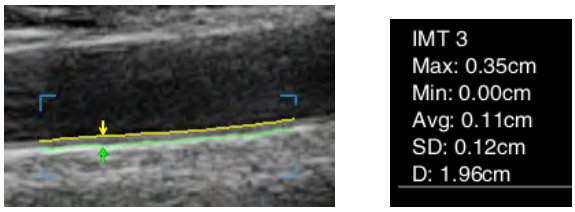


Fig. 8-15 IMT measurement

8.2.1.11 Histogram

The map with the probability density distribution based on experimental data and the statistical method is called a histogram. The probability distribution histogram in B mode refers to the greyscale distribution map.

In PW image mode, press **Calc** to open the menu. Tap on ***General*** on the bottom edge of the screen and select ***Histogram***. A transparent, rectangular box will appear in the centre of the image in which the measurement result will be displayed in the bottom-left corner of the image area, where the x-axis represents the greyscale within the range of 0 to 255, and the y-axis represents the probability percentage that each grey level will be displayed, as shown in Fig. 8-16.

Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Histogram***.

Use the trackball to move the position of the ROI in the image. Press **T-Ball** to change the size of the ROI box.

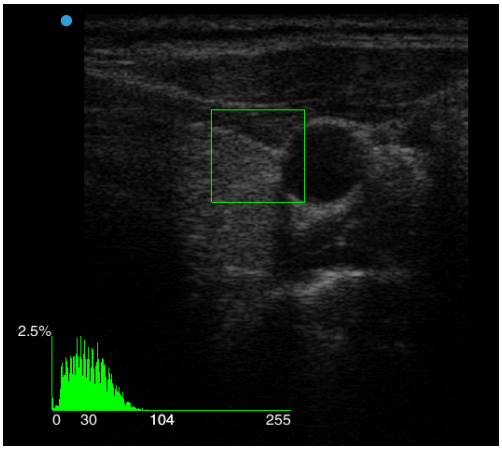


Fig. 8-16 Histogram

8.2.1.12 Volume – 3 Axes

Tap  on the touchscreen or press the **P2** hotkey on the console to activate 2B mode. Record the area with the maximum longitudinal diameter. Press **T-Ball** to activate another image window and display the area with the maximum longitudinal diameter as a still image. Capture the image of the area with the maximum transverse diameter perpendicular to the area with the longitudinal diameter. Then press **Freeze (still image)** to display the image as a still image.

The measurement procedure is as follows:

1) Press **Calc** and move the cursor to the calculation software. Tap on ***General*** on the bottom edge of the screen and select ***Volume-3 Axes*** to call up the volume 3-axis measurement screen.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Volume-3 Axes***.

2) Move the trackball so as to position the ＋ cursor over the maximum longitudinal diameter of the image. Follow the procedure for measuring distance (see ***8.2.1.1*** for instructions) to obtain the values for D1 and D2, namely the longitudinal diameter and the anteroposterior diameter of the object.

3) Move the cursor onto the maximum transverse diameter of the image and follow the procedure for measuring distance (see ***8.2.1.1*** for instructions) to obtain the value for D3 and complete the measurement. Now the volume value and the values for D1, D2 and D3 will be displayed in the results window.

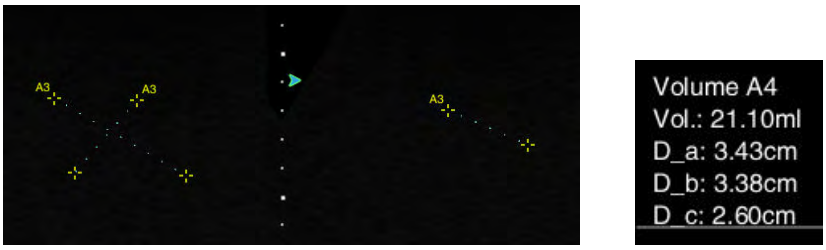


Fig. 8-17 Measuring volume – 3 axes

8.2.1.13 Automatic volume measurement

Measurement:

1) In B-mode image state, press the **Calc** button on the console to open the calc menu. Tap ***General*** on the bottom edge of the screen and select ***Vol (Auto)***. An a + cursor will appear in the image area, which means that the volume is now being automatically measured.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Vol (Auto)***.

2) Move the cursor to the position of the measurement object and press **Set** to fix a point. Then use the trackball to draw a rectangular box that covers the entire measurement object. Press **Set** again to confirm.

3) The system will identify the measurement object automatically and outline it. Meanwhile, a rotatable axis will appear.

4) You can rotate the axis 360° using the trackball. The system will calculate the volume of the measurement object based on the position of the axis (the longitudinal axis of the organ being measured), and the measurement result will be displayed on the right screen. When the axis position is confirmed, press **Set** to fix it and complete the measurement.

5) Tap ***Vol (Auto)*** again and then repeat steps 2) to 4) to continue with another measurement.

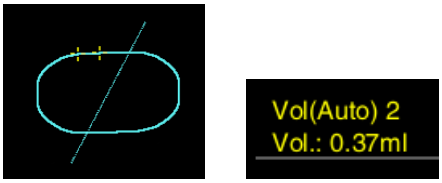


Fig. 8-18 Vol (Auto) measurement

8.2.1.14 Biplane volume

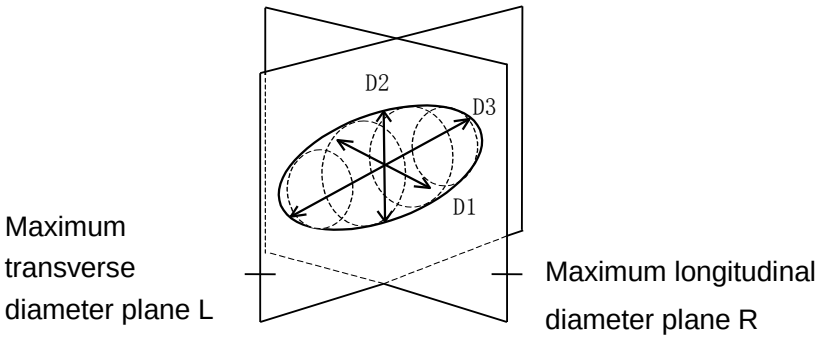


Fig. 8-19 Graphical representation of the biplane volume measurement

Tap  on the touchscreen or press the **P2** hotkey on the console to activate 2B mode. Record the area with the maximum longitudinal diameter (area **R** in Fig. 8-19). Press **T-Ball** to activate another image window and display the area with the maximum longitudinal diameter as a still image. Capture the image of the surface with the maximum transverse diameter (plane **L** in Fig. 8-19), perpendicular to the plane **R**. Then press **Freeze (still image)** to display the image as a still image.

The measurement procedure is as follows:

1) Press **Calc** and move the cursor to the calculation software. Press **Set**. Tap ***General*** at the bottom edge of the screen and select ***Biplane vol.*** to bring up the measurement screen for biplane volume.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Biplane vol.***

2) Use the trackball to place the ＋cursor over the start point of the longitudinal axis of the maximum longitudinal diameter of the image (plane R). Follow the procedure in ***Ellipse*** (See ***8.2.1.4*** for instructions) to obtain the values of D1 and D2 – namely, the longitudinal diameter and the anteroposterior diameter of the object. Then press **Set** to confirm.

3) Follow the procedure for measuring distance (see ***8.2.1.1*** for instructions) to obtain the value for D3 and finish the measurement. Now the volume value and the values for D1, D2 and D3 will be displayed in the results window.

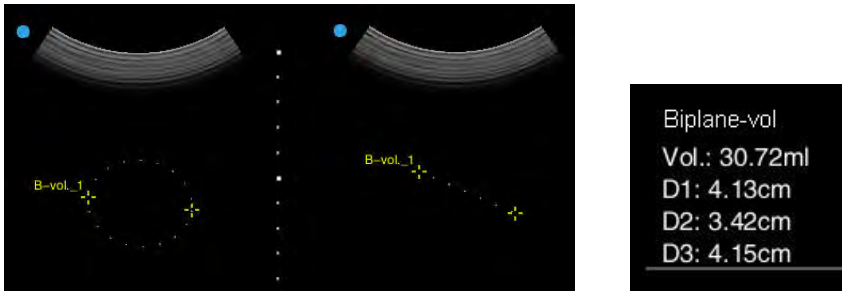


Fig. 8-20 Biplane volume measurement

8.2.1.15 Sphere volume

The measuring process is similar to that of the ellipse area. Please refer to procedure for ellipse measurement (see 8.2.1.4).

8.2.1.16 Simpson volume

During Simpson volume measurement, the area captured by the trace method is divided into several equal parts (here, 5 pixels apart) along the longitudinal axis. Each part is regarded approximately as a cylinder for calculating the volume. The accumulated cylinder volume of all parts is the approximate volume of the whole area.

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap on ***General*** at the bottom edge of the screen and select Simpson ***Vol*** to call up the Simpson volume measurement state; a cross cursor **+** will be displayed in the image area.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Simpson Vol***.

2) Follow the procedure for the trace area (see ***8.2.1.5*** for instructions) to get an enclosed area.

3) A dotted line will be displayed as a longitudinal axis between the two points that are furthest apart within the area. The user can adjust the position of the longitudinal axis. During the adjustment process, the two ends of the dotted line are kept on the border of the area. The measurement result changes when the longitudinal axis position is adjusted.

4) Press Set to fix the longitudinal axis and complete the measurement. The measurement result will be displayed in the measurement results window.

Fig. 8-21 Simpson volume measurement

8.2.1.17 Sphere volume

Sphere volume is used in obstetrics for measuring the volume of the ovarian follicle. Its measuring procedure is similar to that of ellipse area (see ***8.2.1.4*** for instructions), but the length of the longitudinal axis and the short axis must be the same.

8.2.1.18 Area ratio (t)

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap on ***General*** at the bottom edge of the screen and select ***Area ratio (t)*** to call up the state for the area ratio measurement (t); a cross cursor **+** will be displayed in the image area.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Area ratio (t)***.

2) Follow the procedure for trace measurement to measure an outlined area (see ***8.2.1.5*** for instructions);

3) Follow the procedure for trace measurement to carry out another measurement of an outlined area (see ***8.2.1.5*** for instructions).

4) The area ratio will be calculated automatically, and the two area results and the area ratio in the trace method will be displayed in the results window.

Fig. 8-22 Measuring area ratio(t)

8.2.1.19 Area ratio (e)

Please follow the measurement procedure for area ratio (t), where the measurement method is trace instead of ellipse.

8.2.1.20 %Area redu (t)

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap on ***General*** on the bottom edge of the screen and select ***% Area redu (t)*** to call up the state measurement of % Area redu (t); a cross cursor **+** will be displayed in the image area.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***%Area Redu (t)***.

2) Follow the procedure for trace measurement (See ***8.2.1.5*** for instructions) to perform an exterior measurement of a delineated area.

3) Follow the measuring process for trace measurement (See ***8.2.1.5*** for instructions) to perform an interior measurement of a delineated area.

4) The area reduction ratio will be calculated automatically, and the two area results and the area reduction ratio in trace method will be displayed in the results window.

8.2.1.21 %Area redu (e)

The Area redu (e) operation is similar to the Area redu (t) operation. Please follow the %Area redu (t) measurement procedure where the measurement method is Ellipse instead of Trace.

8.2.1.22 % diam. Reduce

Measurement:

1) In B-mode imaging state, press **Calc** to open the menu. Tap on ***General*** on the bottom-edge of the screen and select ***% diam.Reduce*** to access the state for measuring the length reduction in percent; a cross cursor **+** will be displayed in the image area.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then choose ***% diam.Reduce***.

2) Follow the procedure for distance measurement (see ***8.2.1.1*** for instructions) to carry out the measurement of the distance between the two line segments **a** and **b**.

3) After the measurement, the measurement results for the distances and the ratio will be displayed in the results window.

Fig. 8-23 Diameter reduction measurement

8.2.2 M mode – General measurement

In B/M and M modes, the ***General*** calculation software package includes ***General*** and ***M General*** measurement cards. The measurement card ***General*** contains many measurement items, such as distance, depth, trace length, ellipse, trace, etc. The measurement methods are the same as those in B mode.

The measurement items in ***M General*** are as follows:

Measurement	Function
Time	Time interval between any two points
Slope	The average velocity (slope) calculated based on the measurement of the distance and time between two points
Heart rate	The number of heart beats per minute, based on measurement of the time interval between *n* heartbeat cycles. The number of beat cycles can be preset.
Multi-distance	The vertical distance between two points of multiple segments

8.2.2.1 Time

Measurement:

1) In B/M or M mode, click on **Calc** on the control panel to open the menu. Tap ***General*** at the bottom edge of the screen and select ***M General***. Again, select ***Time*** to bring up a＋ cursor and a vertical line in the image area, and time measurement state will be activated.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – M General*** and press **Set**. Then select ***Time***.

2) Move the trackball cursor to the measurement start point and press **Set** to fix the measurement start point. Then move the trackball to show the second ＋ cursor and a vertical line.

3) Use the trackball to move the cursor. The measurement result will be displayed in the results display window. Use **T-Ball** to toggle between the two cursors and fix one or both.

4) Use the trackball to move the second cursor to the measurement endpoint. Press **Set** to fix the measurement endpoint; the final result will be displayed in the results display area. The measurement is completed, as shown in the figure below.

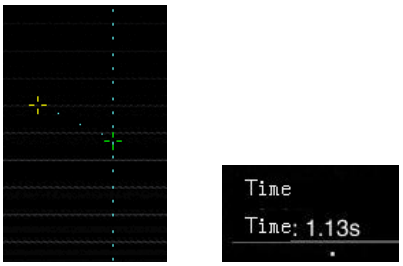


Fig. 8-24 Time measurement

8.2.2.2 Slope

Measurement:

1) In B/M or M mode, click on **Calc** on the control panel to open the menu. Tap ***General*** at the bottom edge of the screen and select ***M General***. Again, select ***Slope*** to show a ＋ cursor and a vertical line in the image area, and slope measurement state will be activated.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – M General*** and press **Set**. Then select ***Slope***.

2) Move the trackball over the measurement start point and press **Set** to fix it. Then move the cursor to bring up the second ＋ cursor and a vertical line will be displayed.

3) Use the trackball to move the cursor. The measurement result will be displayed in the results display window. Press **T-Ball** to toggle between the two cursors and to fix one or both.

4) Use the trackball to move the second cursor to the measurement endpoint. Press **Set** to fix the measurement endpoint and confirm the measurement result. The measurement result will be displayed in the measurement results area. The measurement is completed, as shown in the figure below.

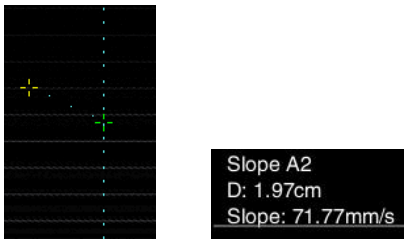


Fig. 8-25 Slope measurement

8.2.2.3 Heart rate

Measurement:

1) In B/M or M mode image state, press **Calc** to open the calc menu. Tap ***General*** at the bottom edge of the screen and select ***M General***. Again, select ***Heart Rate*** to display a ＋ cursor and vertical dotted lines in the image area, and heart rate measurement state will be activated.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – M General*** and press **Set**. Then select ***Heart Rate***.

2) The measurement is the same as that of time in M mode.

3) After measurement, the measurement result will be displayed in the results area. The beat cycle can be preset in ***Setup – Measurement Setup***. The setup method is explained in ***5.2.9***.

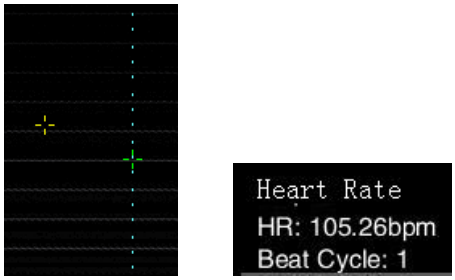


Fig. 8-26 Heart rate measurement

8.2.2.4 Multi-distance

Measurement:

1) In B/M or M mode, press **Calc** to open the menu. Tap ***General*** at the bottom edge of the screen and select ***M General***. Again, select ***Multi distance*** to display a ＋

cursor and its extended dotted line in the image area, and multi-distance measurement state will be activated.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – M General*** and press **Set**. Then select ***Multi distance***.

2) Move the trackball to the start point of the first distance measurement. Press **Set** to fix the start point and move the trackball to display the second ＋cursor.

3) Move the trackball. The second cursor can only be moved vertically; the measurement result will be displayed in the results window.

4) Use the trackball to move the second cursor to the measurement endpoint. Press **Set** to fix the measurement endpoint. Measurement of the first distance is finished.

5) Repeat steps 2) to 4) to finish measuring the distance of the 2nd, 3rd, 4th, 5th or 6th segment. Before confirming the last item to be measured, press **T-Ball** to toggle between the control elements of each item to be measured, and to re-adjust the position of items to be measured.

6) The measurement results area displays six distances, as shown in the following figure:

Fig. 8-27 Multi-distance measurement

【**Note**】**:** After measurement, re-adjust the position of the measurement point. Move the cursor to a measurement point, press **Set** to activate the measurement point, and move the trackball to adjust. When the adjustment is finished, press **Set** again to skip to the next measurement point or press **Esc** to exit measurement state.

8.2.3 General measurement in C mode

Measurement items in CFM and CPA modes are shown in the table below:

Measurement	Function
Flow distribution	To measure probable distribution of flow velocity within an enclosed area.
Blood speed	For measuring average flow velocity and maximum velocity and calculating flow volume.

【Note】: Measurement items in C mode are the same as those in B mode.

8.2.3.1 Flow distribution

Measuring flow distribution in CFM is similar to the histogram in B mode. Its probability distribution refers to the flow velocity probability distribution.

In CFM mode, press **Calc** to open the menu. Tap on ***General*** on the bottom-edge of the screen and select ***Flow Distribution***. Then a transparent, rectangular box will be displayed in the middle of the image, in the bottom-left corner of the screen, along with the measurement result, where the x-axis represents flow velocity, with an adjustable range, and the y-axis represents the percentage frequency with which each velocity appears, as shown in Fig. 8-28.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Flow Distribution***.

Use the trackball to move the box within the image area. Press **T-Ball** and roll the trackball to change the size of the box. Press **T-Ball** again, and the trackball function will go back to being for changing the position of box.

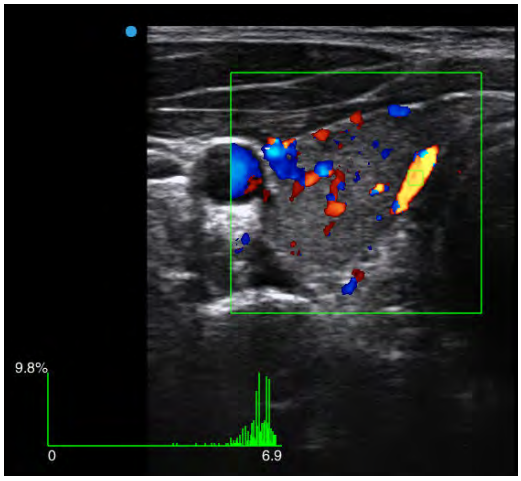


Fig. 8-28 Measuring flow distribution

8.2.3.2 Blood speed

Measurement:

1) In CFM mode, press **Calc** to open the menu. Press ***General (General)*** on the bottom of the screen and select ***Blood Speed*** to display a + cursor. Blood speed measurement state will be activated.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Blood Speed***.

2) Move the cursor onto the vessel and use ***Distance measurement*** to obtain the diameter of the vessel.

3) When the diameter is determined, a dotted line will be displayed. The default angle between the dotted line and the diameter is 60°. If you move the trackball, the dotted line will be rotated around the red dot in the centre of the vessel diameter. If it rotates parallel to the vessel, press Set to confirm and stop the measurement.

4) The system will automatically calculate the flow angle, the average flow velocity, the maximum value and the flow volume and will display the measurement values in the results area.

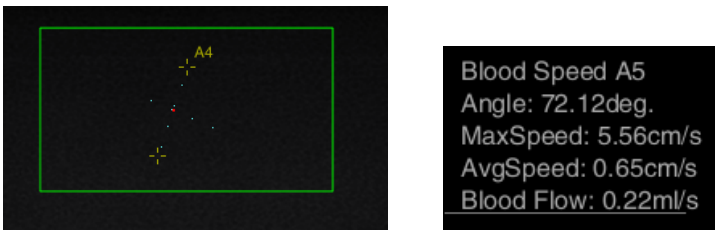


Fig. 8-29 Blood speed

8.2.4 General measurement in PW mode

In PW mode, the ***General*** calculation software package incorporates the ***General*** and ***Doppler General*** measurement cards. The ***general*** measurement card contains five measurement items; namely, depth, trace length, ellipse, trace and blood flow. The measurement methods are the same as those in B mode. The measurement items in ***Doppler General*** are as follows:

Measurement	Function
Velocity	To measure velocity and the pressure gradient of a certain point in the Doppler spectrum waveform.
Instant velocity	To measure the velocity and the pressure gradient of a certain point in the Doppler spectrum waveform.
ACC	To measure velocity and the time interval between two points, and to capture the difference in velocity within a certain unit of time.
Manual trace	For manually tracing one or more Doppler waveforms, so as to obtain clinical indices such as velocity, acceleration and heart rate.
Auto trace	For automatically tracing one or more Doppler waveforms according to the waveform scan system, so as to obtain clinical indices such as velocity, acceleration and heart rate.
Range trace	By setting the start line and end line of the region to be traced on the Doppler spectrum, you can acquire clinical indices such as velocity, acceleration and heart rate.
Blood flow	For measuring flow volume in an enclosed area within a certain unit of time.

【Note】: Other measurement items in PW mode are the same as those in M mode.

8.2.4.1 Velocity

Measurement:

1) In PW image mode, click on **Calc** on the control panel to open the menu. Tap ***General*** at the bottom edge of the screen and select ***Doppler General***. Again, select ***Velocity*** to display a + cursor (PSV) and its two intersecting dotted lines. Velocity measurement state will be activated.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – Doppler General*** and press Set. Then select ***Velocity***.

2) Use the trackball to move the cursor over the peak systolic spectrum and press **Set**. The ＋ cursor (PSV) will be fixed and the PSV value will be confirmed as well. Move the trackball to display the second ＋ cursor (EDV) and its two intersecting dotted lines.

3) Use the trackball to move the cursor. The measurement result will be displayed in the results display window. Press **T-Ball** to toggle between the two cursors and to fix one or both.

4) Use the trackball to move the cursor over the maximum of the systolic spectrum and press **Set** to fix the + cursor (EDP). The EDV, S/D and RI values will also be confirmed. The measurement is now done.

5) The measurement result will be displayed in the results area, as shown below:

Velocity

PSV: ×.×× cm/s

EDV: ×.×× cm/s

S/D: ×.××

RI: ×.××

PPG: ×.×× mmHg

MIN_PG: ×.×× mmHg

8.2.4.2 Instant velocity

Measurement:

1) In PW image mode, click on **Calc** on the control panel to open the menu. Tap ***General*** at the bottom edge of the screen and select ***Doppler general***. Select ***Instant Velocity*** again to display the + cursor and its two intersecting dotted lines. The state for instantaneous velocity measurement will be activated.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – Doppler general*** and press Set. Then select ***Instant Velocity***.

2) Move the cursor to the point position needed to measure the velocity, press **Set** to confirm, and fix the point position to complete the velocity measurement. The system will automatically calculate the pressure gradient (PG) value. The measurement and calculated result will be shown as follows.

Instant velocity

V: ×.×× cm/s

PG: ×.×× mmHg

8.2.4.3 Acceleration

Measurement:

1) In PW image mode, click on **Calc** on the control panel to open the menu. Tap ***General*** at the bottom edge of the screen and select ***Doppler General***. Choose ***ACC*** again to display the + cursor and its two intersecting dotted lines in the image area. The state for acceleration measurement will be activated.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – Doppler general*** and press Set. Then select ***ACC***.

2) Move the cursor over the position of a desired measurement point. Then press **Set** to confirm and fix the point. The velocity measurement of the first point will now be

finished.

3) Use the trackball to move the cursor. The measurement result will then be displayed in the results area. Use the **T-Ball** to toggle between the two cursors and fix one or both.

4) Move the trackball to fix the position of the second point in the same way. The current measurement will now be finished after the velocity measurement of the second point is complete.

5) The results area will be displayed as follows:

ACC

ACC: ×.×× cm/s^2

8.2.4.4 Manual trace

Measurement:

1) In PW image mode, press **Calc** to open the menu. Tap ***General*** at the bottom edge of the screen and select ***Doppler General***. Select ***Manual Trace*** again to display the + cursor and to activate manual trace measurement state.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – Doppler General*** and press Set. Then select ***Manual Trace***.

2) Move the measurement cursor over the desired Doppler spectrum starting point and press **Set** to confirm the starting point position.

3) Use the trackball to move the cursor along the Doppler spectrum scan target edge and to make the scan coincide with the Doppler spectrum as much as possible. To revise the scan trace, move the trackball to the left to delete the previously scanned trace.

4) Trace the desired Doppler spectrum end point and press **Set** again to confirm the Doppler scan trace and complete the measurement.

The measurement result will be displayed in the measurement result area, as shown below:

PSV: ×.×× cm/s;

EDV: ×.×× cm/s;

MNV: ×.×× cm/s;

S/D: ×.××;

RI: ×.××;

PI: ×.××;

ACC: ×.×× cm/s²;

VTI: ×.××cm;

AT: ×.×× s;

DT: ×.××s;

PPG: ×.××mmHg;

MNPG: ×.××mmHg;

HR: ×.×× bpm.

8.2.4.5 Auto trace

Measurement:

1) In PW image mode, press **Calc** on the control panel to open the menu. Tap ***General*** at the bottom edge of the screen and select ***Doppler General***. Choose ***Auto Trace*** again to access the state for automatic scanning trace measurement.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – Doppler general*** and press Set. Then select ***Auto Trace***.

2) Press **Freeze (still image)** to display the start line and the end line of a cardiac cycle. The trackball can now move two lines. Press **Set** to activate the start line and move the trackball to move the start line. Press **Set** again to activate the end line and move the trackball to move the end line.

The measurement result will be displayed in the measurement result area, as shown

below:

Auto trace

MN_PG: ×.×× mmHg;

PSV: ×.×× cm/s;

EDV: ×.×× cm/s;

MN: ×.×× cm/s;

ACC: ×.×× cm/s²;

S/D: ×.××;

RI: ×.××;

PI: ×.××;

HR: ×.×× bpm.

【Note 1】: If auto-tracing is being used, press **Tab** on the keyboard or tap ***Trace Type*** on the touchscreen to switch between scanning trace types. You can choose between an upper trace, a lower trace and a full trace.

【Note 2】: Set up the first type for the scanning trace – ***Manual trace, Auto trace*** or ***Range Trace –*** in ***Setup – Measurement Setup*.**

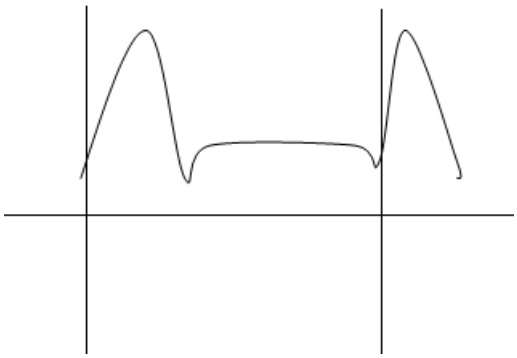
8.2.4.6 Range trace

1) In PW image mode, press **Calc** on the control panel to open the menu. Tap ***General*** at the bottom edge of the screen and select ***Doppler General***. Choose ***Range Trace*** again to access the state for scanning trace ranges measurement.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General – Doppler general*** and press Set. Then select ***Range Trace***.

2) A vertical line will appear on the Doppler spectrum. Use the trackball to move the line to the starting point of the desired scanning region. Press **Set** to fix the line, and another line will appear. Then use the trackball to move the line to the endpoint. Press **Set** to fix it. The start line will also be reactivated for repositioning. Press **Set** again to complete the measurement.

The measurement result will be displayed in the measurement result area, as shown below:



Range trace

PSV: ×.×× cm/s;

EDV: ×.×× cm/s;

MNV: ×.×× cm/s;

S/D: ×.××;

RI: ×.××;

PI: ×.××;

ACC: ×.×× cm/s²;

VTI: ×.××cm;

AT: ×.×× s;

DT: ×.××s;

PPG: ×.××mmHg;

MNPG: ×.××mmHg;

HR: ×.×× bpm.

【Note】: To display the Auto Trace and Range Trace calculation objects, you can select the necessary calculation objects in *Setup – Measurement Setup – Advanced Setting*. *Trace result,* as shown in Fig. 8-30. For information on the setup procedure, please refer to section *5.2.9 n*.

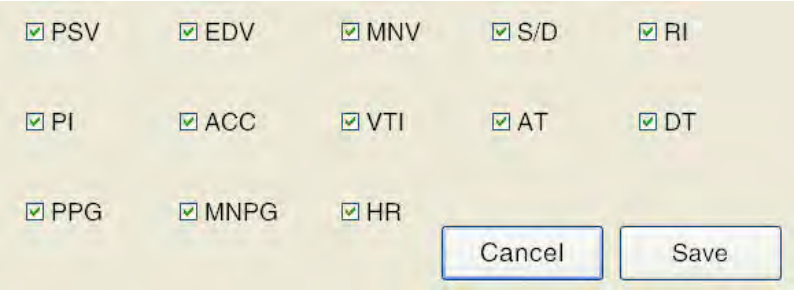


Fig. 8-30 Trace result

8.2.4.7 Blood flow

Measurement:

1) In upwards and downwards B-image and PW-image state, press **Calc** on the control panel to open the menu. Tap ***General*** at the bottom edge of the screen and select ***Vascular Diameter*** to display a ＋ in the image area.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over the calculation software package and press **Set**. Move the cursor again over ***General*** and press **Set**. Then select ***Vascular Diameter***.

2) Move the cursor to the B image, using the ***Vascular Diameter*** measurement procedure (see section ***8.2.1.8***) to measure the cross-sectional area of the target object.

3) Then tap the ***Doppler General*** measurement card and select ***Blood Flow*** to display a ＋ on the image area and access blood flow measurement state.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***General***, and press **Set.** Move the cursor again over ***Doppler General*** and select ***Blood Flow***.

4) Move the cursor onto the starting position of the measurement area in the Doppler spectrum and press **Set** to fix the starting point.

5) Move the trackball to move the measurement cursor along the edge of the target area of the Doppler spectrum trace. Move the trackball to the left to delete the curve displayed previously. Press **Set** to fix the end point in the end position, upon which the mean blood flow velocity (MNV) will be measured.

6) The system will combine the value of the flow velocity and the blood flow area to automatically calculate the blood flow (BF). The measurement results are shown below:

Vascular diameter

Diameter: ×.×× cm

Area: ×.×× cm^2

Blood flow

MNV: ×.×× cm/s

BF: ×.×× ml/s

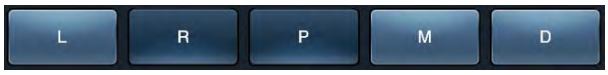
8.3 Calculation software

8.3.1 Introduction to the calculation software

The system provides calculation software packages for obstetrics, abdomen, small parts, urology, gynaecology, carotid artery, peripheral vessels, cardiology and orthopaedics. Users can apply different packages based on their diagnostic needs.

【Note】: Press **Calc** to call up the Calc menu for the current examination type. If it is necessary to set a different Calc menu as the default menu, click on ***Setup*** on the touchscreen to call up ***Measurement Setup – Advanced Settings*** and to close ***Measure Continuously*** 【see ***5.2.9 n*** for detailed instructions】. After selecting the required Calc menu as the default menu, click on ***Setup*** on the touchscreen to bring up the ***Setup*** screen. Select ***Examination Setup***, click on ***Save Param***, and then select the desired examination type for the parameters to be saved. The system will save this automatically and exit the program. When the same examination type is selected next time, the default calc menu is the last selected calc menu.

◆ **Marking paired organs and/or vessels with large span**

When the menu type is displayed on the touchscreen, there is an option box 

used to select the part of the paired organ and/or the vessel with large span to be measured. The selected mark key will be

displayed darker (see ***R*** and ***P*** in the picture above).

When the menu type is displayed on the monitor, the option box 

will be above the measurement menu and is used to select the part of the paired organ and/or vessel with large span to be measured. The selected mark key will be displayed in yellow.

If the currently displayed measurement menu includes an organ which is paired, the ***R (right)*** and ***L (left)*** mark keys are optional; if it includes a vessel with large span, the ***P (proximal), M (mid)*** and ***D (distal)*** mark keys are optional. The user can simply click on the desired measurement item with the mark key to start the measurement.

If the measurement item is a not a paired organ, the ***R*** and ***L*** mark keys are optional, but invalid. Similarly, if the measurement item is not a large-span vessel, the ***P***, ***M*** and ***D*** mark keys are invalid.

Example 1: AO is a vessel with a large span. Users can click on ***P*** and then click ***Abdomen-Vascular-AO*** to access the proximal AO measurement state. Fig. 8-31 shows the proximal abdominal aorta being measured. At this point in time, the ***R*** and ***L*** mark keys are invalid.

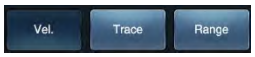
Example 2: SMA is a paired organ. Users can click ***L*** and then ***Abdomen-Vascular-SMA*** to activate the measurement state for the left SMA. At this time, the ***P***, ***M*** and ***D*** mark keys are invalid.

【Note】: A * mark before the *AO* measurement object means that the proximal AO has been measured, but not all parts of the AO have been measured.

Fig.8-31 (a) Menu on the monitor Fig. 8-31 (b) Menu on the touchscreen

Fig. 8-31

◆ **PW specialist measurement options**

When the menu type is displayed on the touchscreen and the measurement of specialist items is to take place in PW mode, an option box 

will be displayed that is used for selecting the measuring method. The selected mark will be displayed darker.

When the menu type is displayed on the screen and the measurement of specialist items is to take place in PW mode, an option box 

will be displayed above the measurement menu, which is used for selecting the measurement method. The selected mark will be displayed in yellow.

If the currently displayed measurement menu includes measurement items that use velocity, trace and range measurement methods, the three marking buttons are optional. If none of the three measurement methods is being used, the three marking buttons are not optional.

The system uses the ***Vel. (Velocity)*** method as a default measurement. When users need to change the measurement method, click on the corresponding icon to switch the measurement method. ***Trace*** is the same procedure as the ***Manual Trace*** method, and ***Range*** is the same as the ***Range Trace*** method. Specific measurement methods are

shown in ***8.2.4*** *General measurement in PW mode*.

◆ ***Continuous measurement*:**

When, in ***Setup – Measurement Setup – Advanced Settings***, the option ***Measure Continuously*** is selected, the system will continuously measure the calc menu items to be measured. When the previous item is finished, simply press **Set** to automatically call up the next measurement item without having to select any measurement item. Also, after the approval (selection of other sections) and retrieval of the measurement, the system remembers the previously measurement item and automatically performs the next measurement.

If you need to repeat measurement of the previous item or the next item to be measured is not in its appropriate place in the order, simply move the cursor to the measurement menu and click on the item in question to be measured. To exit the measurement state, press **Esc**.

Example: When users need to measure the amount of residual urine, they only need to go into the relevant sections. After selecting ***Trans AU Blad (transverse diameter of the bladder after urination)*** , the remaining two diameter measurements will be performed directly and continuously. The measurement sequence is shown in Fig. 8-32.

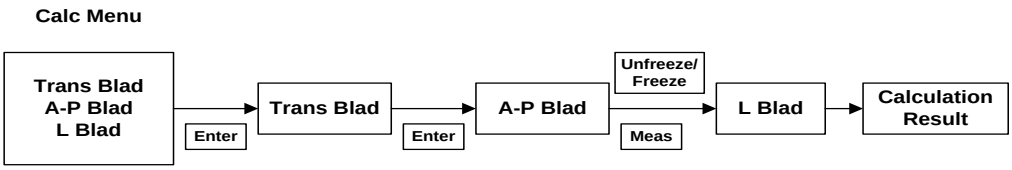


Fig. 8-32 Scheme for the continuous measurement process

【Note】: For items that need measuring multiple times in order for any conclusion to be drawn, it is recommended to use continuous measurement so as to make the process more convenient.

【Note】: The following procedures uses continuous measurement by default.

8.3.2 Obstetrics

8.3.2.1 Introduction to the calculation software

The obstetrics calculation software is used to calculate the foetal age and estimated time of delivery, to measure various foetal growth indices, such as foetal weight, and to determine foetal growth, based on growth charts and foetal biophysical profile.

In B mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is an obstetrics-related examination type (e.g. 2 + 3 trimesters, multiple pregnancy etc.), the system will by default display the ***Obstetrics – Foetal general*** measurement item, as shown in Fig. 8-33.

The ***obstetrics*** calculation software is divided into several measurement cards based on different measurement items to make it easy for users to quickly find measurement items. All measurement cards are displayed on the first line of the touchscreen, including 1stOb General (first general obstetrics), Foetal General, Foetal Bones etc., as shown in Fig. 8-33. If there are too many measurement cards, they will be displayed page by page. Click the arrow on the right to turn the page.

Fig. 8-33 Obstetrics – Measurement items (touchscreen)

If the process for the measurement menu is displayed on the screen, **press Calc** on the control panel to open the calculation software, and the ***Obstetrics Foetal General***

element to be measured will be displayed by default, as shown in Fig. 8-34 (a). Move the cursor over ***Foetal General*** and press **Set** to display all measurement cards, as shown in Fig. 8-34 (b).

Fig.8-34 (a)

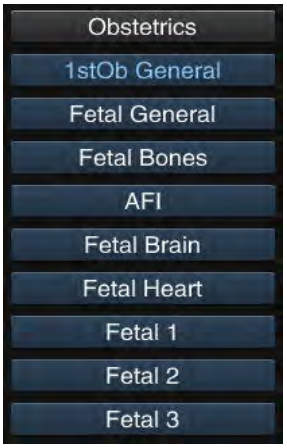


Fig.8-34 (b)

Fig. 8-34 Obstetrics measurement items (Monitor)

The system will perform calculation of foetal age, foetal weight, amniotic fluid indexes and estimated date of delivery based on the measurement results from obstetrics (users can preset the default formula prior to obstetric measurement. See *section **5.2.9*** on setting up specific measurement procedures). On the basis of calculation results, analysis of foetal growth will be performed for the final obstetrics report.

8.3.2.2 Obstetrics measurement procedure

The obstetrics measurement procedure is the same as that for the general measurement process. See *section **8.2** General measurements* for the detailed procedure.

For example, in B mode, distance measurement for GS, CRL and BPD and other length measurements; in B mode, ellipse measurement or trace measurement for HC and AC and other circumference measurements; in M mode or PW mode, heart rate measurement for foetal HR; in PW mode, velocity measurement or manual trace measurement (Trace) or range trace measurement (Range) for umbilical artery, venous catheter etc.

◆ Use **GS** as an example. The steps for the distance measurement are briefly presented below:

1) In B-imaging mode, press **Calc** to open the menu. Tap the ***Obstetrics*** measurement card and select ***GS***.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***Foetal General*** and select ***GS***.

2) After selecting ***GS***, a cross cursor ＋ will be displayed on the screen . Move the cursor over the measurement start point, press **Set** to fix the start point and call up another cross cursor ＋.

3) To move the second cursor to the measurement endpoint, press **Set** to fix the measurement end point and finalise the measurement result. The system will automatically calculate GA (gestational age) and EDD (expected delivery date) according to the measurement result.

   The measurement result will be displayed in the measurement result area, as shown below:

GS
D: ×.×× cm
GA: ××
EDD (expected delivery date): YY/MM/DD

◆ Use **HC** as an example. The steps for measuring the circumference are briefly presented below:

1) In B-imaging mode, press **Calc** on the control panel to open the menu. Tap ***HC*** on the touchscreen to access the measurement state.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***HC*** and press **Set**.

2) After selecting ***HC***, a cross cursor ＋ will appear on the screen. Use the trackball and the **Set** key to confirm the start point and endpoint of the ellipse fixed axis.

3) Move the cursor to change the ellipse shape based on the fixed axis. To adapt the ellipse to the measurement area, press **Set** to fix the ellipse measurement area and

finish the measurement. The system will automatically calculate GA (gestational age) and EDD (expected delivery date) according to the measurement result. The measurement result will be displayed in the measurement result area, as shown below:

HC

E_C: ×.×× cm

GA: ××

EDD (expected delivery date): YY/MM/DD

【Note 1】: After finishing measuring the basic item, the system will automatically calculate the ratios of the various items, such as HC/AC, FL/BPD, FL/AC, CER/AC, LVW/HW, etc. The calculated result will be imported into the report.

【Note 2】: An explanation of the abbreviations used in the table can be found in *Appendix A*.

◆ The measurement steps for foetal heart rate

1) In B-imaging mode, press **Calc** on the control panel to open the menu. Directly tap ***Foetal HR*** on the touchscreen to activate the measurement state.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***Foetal HR*** and press **Set**.

2) Follow the procedure for measuring ***Heart Rate*** in M mode (see section ***8.2.2.3*** for the detailed procedure).

3) The measurement result will be displayed in the measurement result area, as shown below:

Foetal HR

HR: ×.×× bpm

Beat cycle: ×

【Note】: In PW mode, the measurement steps for foetal heart rate are the same.

◆ The measurement steps for the umbilical artery

1) In B mode, press **Calc** on the control panel to open the measurement menu. Directly tap ***Umb A*** on the touchscreen to access the measurement state.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***Umb A*** and press **set**.

2) The system uses the ***Vel. (Velocity)*** measurement method by default. When users need to change the measurement method, they should click on the ***Trace*** or ***Range*** option above the measurement menu to switch before selecting ***Umb A***.

3) Choose ***Vel.*** Please follow the procedure in section ***8.2.4.1***. Select ***Trace***, following the procedure in section ***8.2.4.4***; select ***Range*** following the procedure in section 8.2.4.6.

The measurement result will be displayed in the measurement result area, as shown below:

PSV: ×.×× cm/s;
EDV: ×.×× cm/s;
MNV: ×.×× cm/s;
S/D: ×.××;
RI: ×.××;
PI: ×.××;
ACC: ×.×× cm/s²;

VTI: ×.××cm;
AT: ×.×× s;
DT: ×.××s;
PPG: ×.××mmHg;
MNPG: ×.××mmHg;
HR: ×.×× bpm.

【Note】: In PW mode, the measurement method for other items to be measured can be performed according to the umbilical artery measurement procedure

8.3.2.3 Amniotic fluid index (AFI)

Amniotic fluid index is obtained by measuring the depth of amniotic fluid in four regions, and the calculation formula is as follows:

$$AFI = AFI\ Q1 + AFI\ Q2 + AFI\ Q3 + AFI\ Q4$$

Measurement:

1) When the obstetrics calculation software is in B mode, click on the ***AFI*** measurement card and select ***AFI Q1***. Use the ***Distance*** measurement (see section ***8.2.1.1***) to measure the first index.

2) Use the same method to measure Q2, Q3 and Q4.

3) Once the four indexes have been obtained, the system will automatically calculate the AFI value and the average value. The average value will not be displayed on the screen, but it can be checked in the report.

8.3.2.4 Foetal weight

Foetal weight is a calculation and estimation made on the basis of a number of foetal parameter measurements. There are various formulae for calculating foetal weight. Objects to be measured and the order of measurement vary with different formulae. The result of the foetal weight calculation will be obtained by substituting the arithmetical mean values into the selected formula.

The measurement objects and calculation results of the empirical formulae supported by the system are listed below:

Formula	Measurement	Calculation result
EFW Shepard	AC, BPD	Weight, GA
EFW Hadlock1	AC, FL	Weight, GA, EDD
EFW Hadlock2	AC, FL, HC	Weight, GA, EDD
EFW Hadlock3	AC, FL, HC, BPD	Weight, GA, EDD
EFW Hadlock4	AC, FL, BPD	Weight, GA, EDD
EFW Campbell	AC	Weight, GA, EDD
EFW Hansmann	BPD, TAD	Weight, GA, EDD
EFW Tokyo	BPD, APD, TAD, FL	Weight, GA, EDD

【Note】: An explanation of the abbreviations used in the table can be found in *Appendix A*.

Take EFW-Shepard as an example. The measuring procedure is as follows:

1) Set the foetal weight calculation formula in ***Setup – Measurement Setup – Foetal Age Estimating*** and select ***AC BPD (Shepard***). Follow the specific method for setup in section ***5.2.9 q)***.

2) In B-imaging mode, press **Calc** on the control panel to open the menu. Tap ***AC*** on the touchscreen to access measurement state. Follow the measurement procedure for ellipse measurement.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***AC*** and press **Set**.

3) Select ***BPD*** and follow the procedure for general distance measurement;

4) After measurement, the system will automatically calculate the foetal weight, and will import the calculation results into the report.

【Note】: The unit of the foetal weight can be reset in *Setup* – *Measurement Setup*. You may choose between g, oz, lb and kg.

8.3.2.5 Worksheet – Obstetrics report

When using the measurement & calculation function in the calc software, the measurement result will automatically be imported into the report. Press the **Report** button on the control panel during or after the measurement and calculation to call up the screen with the report worksheet (as shown in Fig. 8-35) and check the examination result.

Click on ☒ in the upper right-hand corner of the screen or click on **Report** again to exit the report worksheet screen.

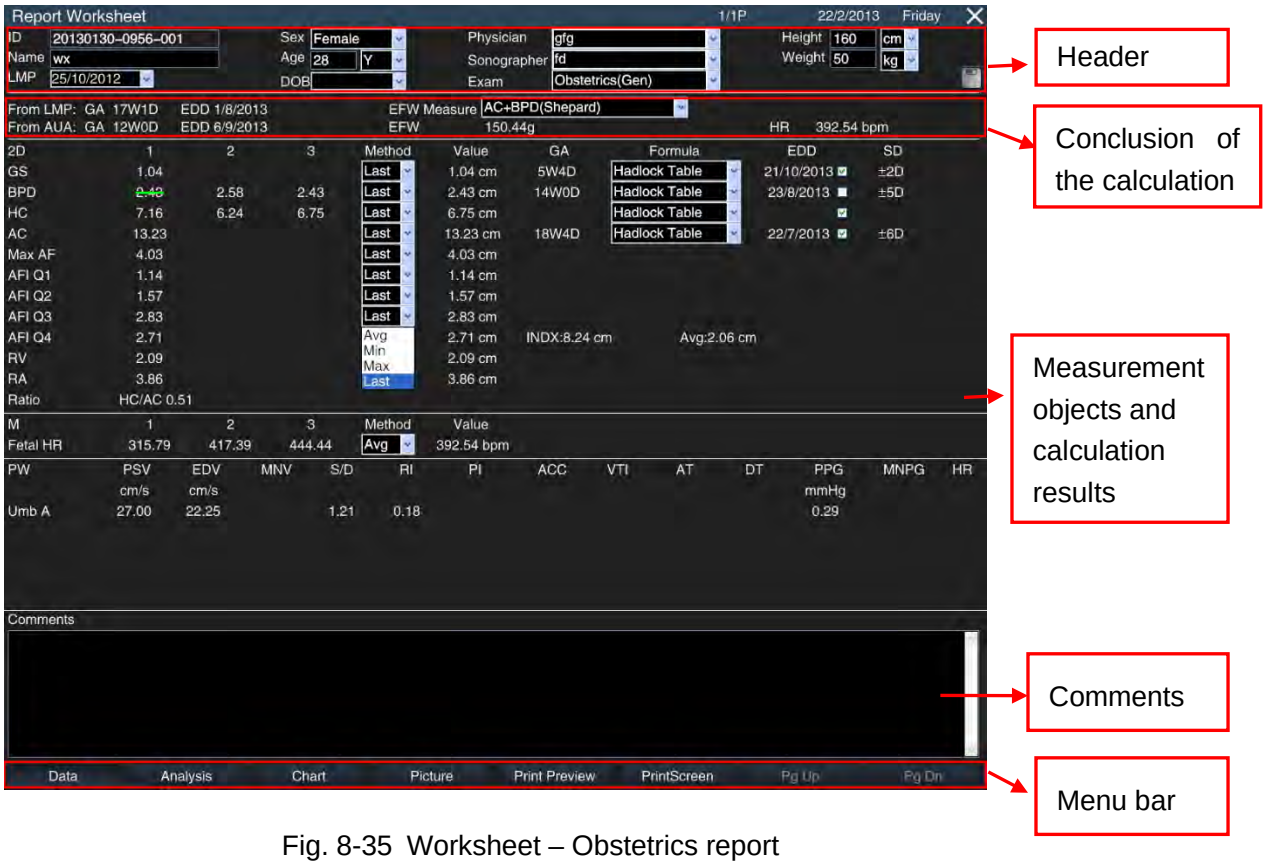


Fig. 8-35 Worksheet – Obstetrics report

◆ Header

Patient information is displayed in the header. If the patient information was not input in the ***New Patient Info*** screen, it can still be input in the header. After entering the patient data, click on the button for ***Save*** on the right side of the header, and the input data will be saved. If you leave the report worksheet screen before doing this, the added information will be lost.

【Note】 The "Name" field in the report is not editable.

◆ Conclusion of the calculation

The conclusion drawn from the calculation will be displayed in the calculation area, including the gestational age (GA), the expected date of delivery (EDD), and the foetal weight (EFW) determined via LMP or the calculation.

EFW Measure is the preset formula for measuring the foetal weight that is displayed by default in the measurement setup and can be modified here. Click the arrow on the right to

open the drop-down menu and choose a different calculation formula. The result of the foetal weight calculation will change.

【Note】: If you select another formula for calculating foetal weight in the report worksheet, the calculation result will not be saved. When you exit the worksheet and re-enter it again, the conclusion that is displayed is drawn from the default calculation formula.

◆ **Measurement objects and calculation results**

This area displays the measurement results of all measuring objects as well as the conclusion that is drawn from the calculation result, and they can be edited.

Three measurement values can be recorded for each measurement object in 2D mode. To delete measurement results, move the cursor onto the value and press **Set** to cross it out, as shown in Fig. 8-35.

In connection with the three measurement values, there is a drop-down box where you can select Avg (average of all effective measurement values), Min (the minimum value), Max (the maximum value) or Last (the last measured value). Based on the user's selection, the system will provide the final value and calculate the GA and expected date of delivery.

The formula for each object to be measured can be preset in ***Setup*** – ***Measurement Setup***. The system calculates the corresponding gestational age and the estimated date of delivery based on the formula selected. The user can also change the formula in the report worksheet, and the calculation results will change accordingly. However, this change will only apply to the current patient.

After each measurement of an object that can be used for calculating the GA, a check box ☑ is displayed. The checked items are used for a comprehensive calculation of the GA. Click on **Set** to activate or deactivate it. The final calculated GA will be displayed above the check box, as shown in Fig. 8-35.

The measurement results of the measurement objects will be listed in the report

worksheet in PW mode, as shown below:

PW	PSV	EDV	MNV	S/D	RI	PI	ACC	VTI	AT	DT	PPG	MNPG	HR
	cm/s	cm/s									mmHg		
Umb A	27.00	22.25		1.21	0.18						0.29		

Fig. 8-36 Measurement results in PW mode

◆ **Comments**

The user can fill in the relevant diagnostic information in the ***Comments*** area. Move the cursor to the annotations area and press **Set** to input the information.

◆ **Menu bar**

Click on the object in question on the menu bar to enter the corresponding screen.

Data: When you are in another screen, click this to return to the report worksheets screen.

Analysis: Calls up the foetal biophysical analysis and profile screen (see section ***8.3.2.6***).

Graphic: Calls up the screen for editing the growth curve (see section ***8.3.2.7***).

Image: Calls up the image editing screen in the report (see section ***8.3.2.8***).

Print Preview: Calls up the report preview screen (see section ***8.3.2.9***).

Print screen: Click here to save the current page to the specified directory in BMP format.

Pg Up, Pg Dn: Turns the page if there are multiple pages.

8.3.2.6 Foetal biophysical analysis and profile

In the report worksheet, click on ***Analysis*** to enter the ***foetal Analysis*** screen (see Fig. 8-37)***.*** In this screen, the user can record the results of the observation and enter a biophysical score.

A foetal biophysical profile (BPP) is a prenatal ultrasound evaluation of foetal well-being (conducted in the 2nd and 3rd trimesters). It uses ultrasound to measure foetal movement, foetal breathing, amniotic fluid volume and placental maturity.

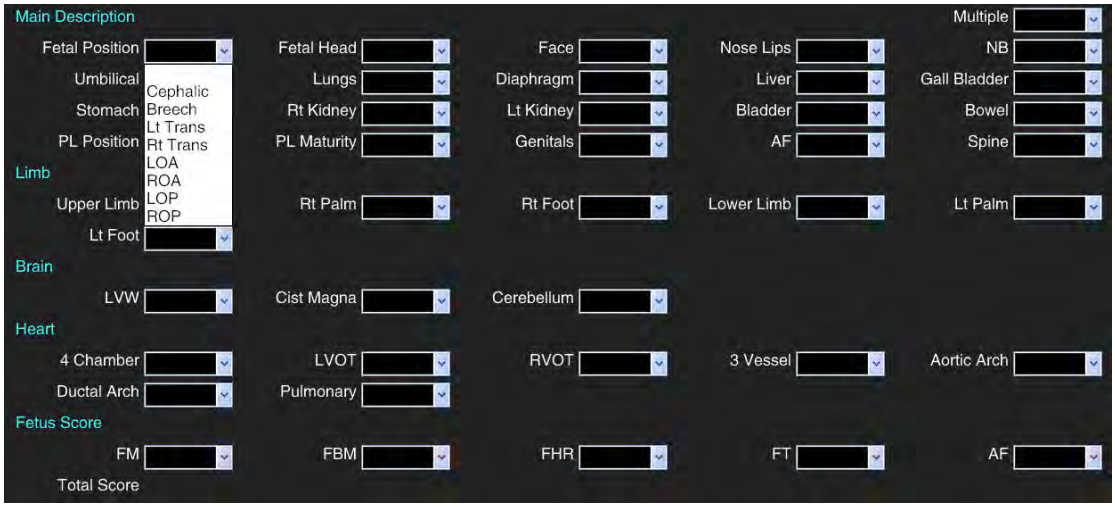


Fig. 8-37 Foetal analysis screen

8.3.2.7 Growth chart

Foetal growth charts are used to compare the foetal measurement data with the normal growth curve to ascertain whether the foetal development is normal. Click on ***Chart*** on the report worksheet menu bar to call up the foetal growth chart screen (see Fig. 8-38).

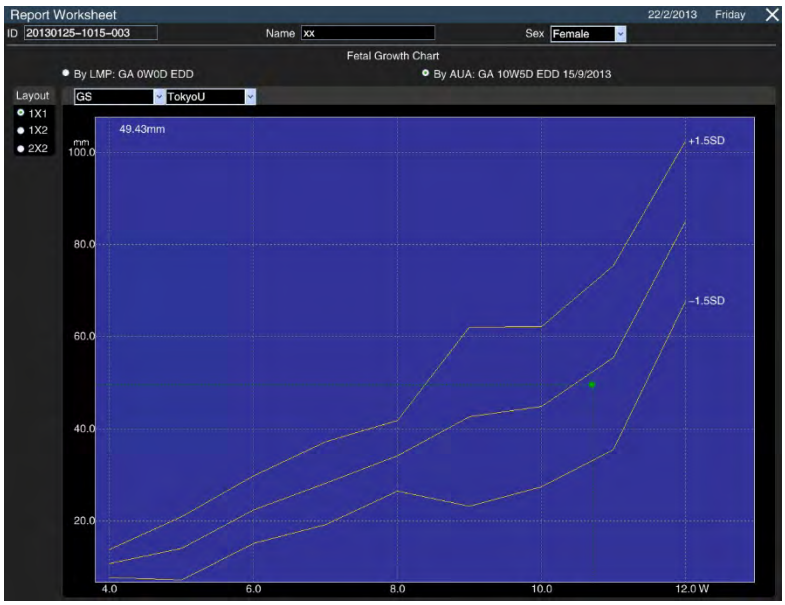


Fig. 8-38 Growth chart (one image)

Layout, on the left side of the screen, is for choosing displayed growth curves and the position that is convenient for a comparative analysis. 1 × 2 is for two images displayed side-by-side. 2 × 2 is for four images displayed in two lines, as shown in Fig. 8-39.

At the top left of the graph, there are several measurement items and measurement

formulae to choose from.

Growth curves display percentile or variance, based on different statistical methods.

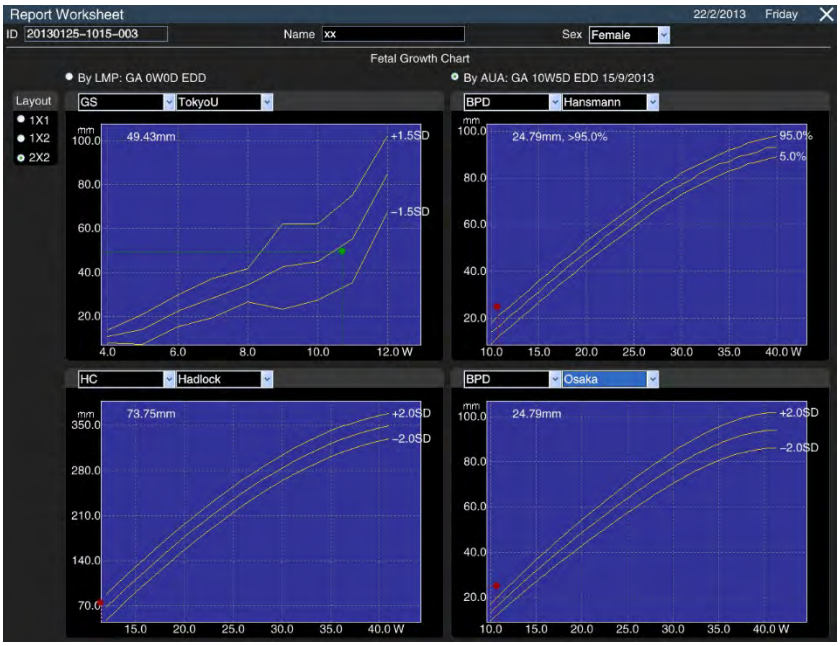


Fig. 8-39 Growth chart (four images)

The measurement procedure is as follows:

1) Enter LMP in the field ***New patient info***. Save and exit.

2) Select from ***BPD***, ***HC***, ***AC***, ***FL*** etc. in the obstetrics calculation software for the measurement.

3) After retrieving the report worksheet, click on ***Chart*** to bring up the growth chart screen. Select any growth curve from the left corner of the screen, e.g. ***BPD [Hadlock]***. Two gestational ages and the approximate date of delivery will be displayed for user reference: one is calculated using LMP, the other from BPD. There are three curves in the growth chart: The middle one is the age curve of the foetus. The other two curves refer to foetal age errors. The actual measurement result is marked in the growth chart with ●. The y-coordinate of the result marked with ● comes from the measurement, while the x-coordinate (i.e. GA) is acquired by selecting either ***GA (via AUA)*** or ***GA (via LMP)***. If the "●" mark is green, this means the item being measured is in the normal range. If the "●" mark is red, this means that the object being measured is outside the normal range.

8.3.2.8 Image

Images saved during the examination process can be viewed in the report worksheet. These images can also be typeset according to user preferences, can be sorted, and, together with a text message, can become part of the report content.

After calling up the report worksheet, click on ***Picture*** to enter the image editing screen, as shown in Fig. 8-40.

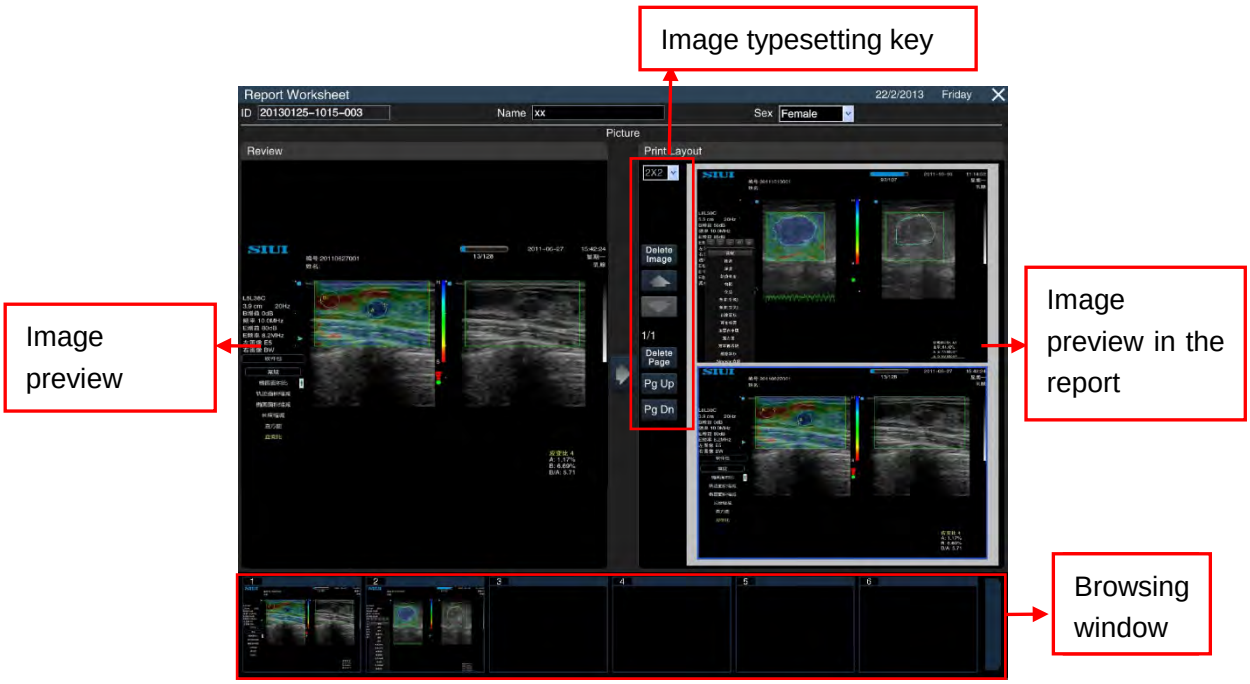


Fig. 8-40 Screen in image-mode

Edit:

a) **Browse images**: Images saved during the examination process will be displayed in the browsing window on the lower edge of the screen so that users can browse through them in advance and select the image for the report.

【Note】: A film format in the browsing window can only be inserted into the report as its final single frame. If it is necessary to find an image from a video to put in the report, exit the report and use the film loop to find the frame and save the image.

b) **Preview Image**: Click on **Set** to activate the cursor. Move the cursor to select the image and click on **Set** again. This image is highlighted in the browser area for review by the user on the left side of the screen.

c) **Import Image**: If you are sure that you would like to include an image in the report, click on  in the centre of the screen to import the image into the preview area on the right side of the screen.

【Note】: The display layout on the right side is 1 × 1 by default, which means that only one image can be imported. If you want to import more than one image, you can change the format or click on *Pg Dn* to add a page.

d) **Image layout**: the imported image can be deleted, sorted and typeset.

- ***Delete***: If you wish to delete an image, move the cursor over it and click on **Set** to select it (the selected image will be marked in the blue box) and then click on ***Delete Image*** to remove the image from the report. If you click on ***Delete Page***, all the images on the currently displayed page will be deleted.
- ***Sort***: Move the cursor onto the image that is to be sorted and click on **Set** to select it. Press  or  to move the image up or down.
- ***Typesetting:*** The user can select the layout for the image in ***Print Layout***. There are several types of layout to choose from; namely, single image as a large-page display and multiple images in single-page display (for example, 3 x 3 means that three lines are displayed, with three images in each row). Multi-page and multiple layouts are supported.

8.3.2.9 Print preview

Call up the report and click on ***Print Preview*** to view the appearance of the entire report in the print preview screen, as shown in Fig. 8-41. The image will be attached at the end of the report. Click on ***Pg Up*** and ***Pg Dn*** to view another page. Click on  to shrink or enlarge the page and click on ***Print*** to print this report.

【Note】: The printer should be installed before printing the report. How to connect the printer is shown in section *4.1.1.5* of the operating instructions.

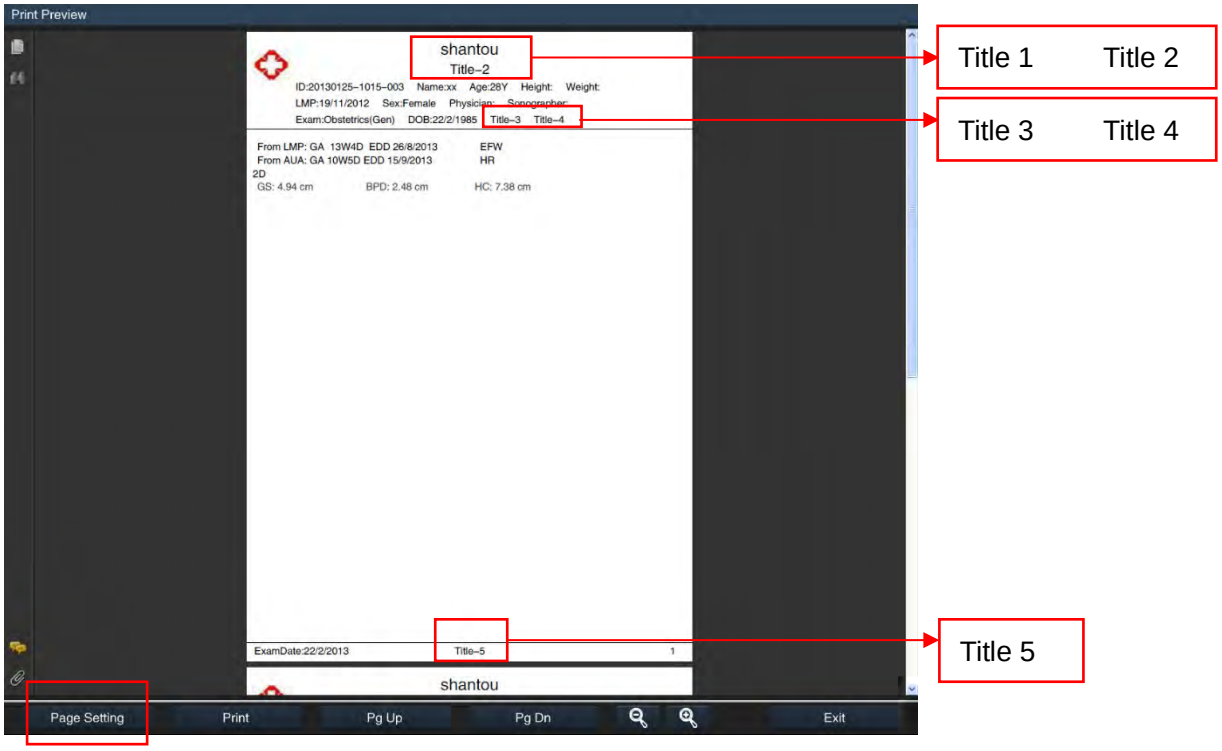


Fig. 8-41 Print preview

◆ **Page settings**

Click on ***Page Setting***, bottom left, to call up the page settings screen, as shown in Fig. 8-42. Up to five title names can be set up here. Move the cursor to the corresponding title input box, and press **Set** to enter the title using the keyboard.

Fig. 8-42 Page settings screen

Move the cursor to the field on the right side of the image and press **Set** here to check it; this icon will be displayed in the left corner of the report. Press **Set** again to disable it and no icon will be displayed. Click on ***Browse*** and the file selection box will open, as shown in Fig. 8-43. You can select more icon files. (The recommended icon size is 64 ***** 64).

After setting, click on ***Save*** bottom right to save the settings and exit.

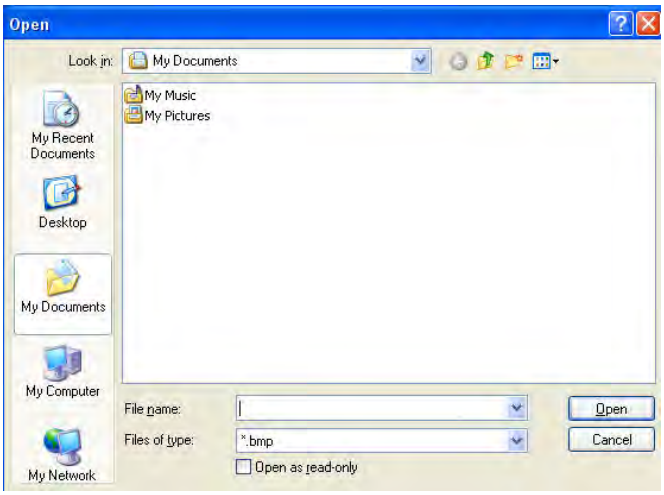


Fig. 8-43 File selection box

8.3.3 Abdomen

8.3.3.1 Function

The abdominal calculation software package is for examining abdominal organs such as the liver, gallbladder, pancreas, spleen and so on. You can use the results that have been measured and calculated to analyse whether the abdominal organs are sick or not.

8.3.3.2 Measurement in B mode

In B-mode state, press **Calc** on the control panel to open the measurement menu. If the current examination type is an abdomen examination type, the system will display ***Abdomen – Abdomen*** measurement items by default. The measurement card includes the general, vascular and urology systems. The touchscreen display is as shown in Fig. 8-44.

If the measurement menu is displayed on the screen, use **Calc** to open the calculation software. The ***Abdomen – General*** object to be measured will be displayed by default, as

shown in Fig. 8-2 above. Move the cursor over ***General*** and press **Set** to display all measurement cards, as shown in Fig. 8-3 above.

Click on the measurement card to display all the measurement items.

Fig. 8-44 Abdomen measurement items in B mode (Touchscreen)

◆ The method for measuring long L lobes (longitudinal diameter of the left lobe), A-P L lobes (anteroposterior diameter of the left lobe), long GB (longitudinal diameter of the gallbladder), Pa Head (pancreatic head), PV (portal vein), AO (aorta) can follow ***Distance Measurement***.

Take the *long* ***lobe*** as an example. The steps for measuring the length are briefly presented below:

1) Create a section of the long L lobe, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the ***Abdomen – General*** measurement cards and select ***long L lobe*** to enter measurement state, and a cross cursor ＋ will be displayed in the image area.

3) Use the trackball to move the cursor onto the measurement start point, press **Set** to fix the measurement start point, and the second “+” cursor will appear.

4) The second cursor, connected to the start point cursor with a dotted line, can be moved using the trackball. The measurement result will be displayed in the measurement results window. Press the **T-Ball** to toggle between the two cursors, positioning either one or both of them.

5) Move the second cursor to the measurement end point. Press **Set** to fix the measurement end point and finalise the measurement result.

【Note】: Objects for vascular measurement, such as *AO,* are to be found on the *Vascular* measurement card. Users can select between *P (proximal), M (mid)* and *D (distal)* positions to measure a vessel with a large span.

◆ See ***Angle measurement (cross)*** for the angle measurement method for the L lobe angle and R lobe angle.

Let us take the **L lobe angle** as an example. The steps for the angle measurement are briefly described below:

1) Create a section of the long L lobe, and press **Freeze (still image)** to display the image as a still image.

2) ***Follow the steps above to display the Abdomen – General*** measurement cards and select ***angle L lobe*** to enter measurement state, and a cross cursor ＋ will be displayed in the image area.

3) Fix one side of the L lobe angle using ***Distance Measurement***. The steps are as follows: Move the cursor to the top of a page, click on **Set** to fix a point, then move the cursor to the end. Click on **Set** to fix the end point. Before the end point is fixed, press **T-Ball** to toggle control between the two cursors and readjust.

4) Follow step 3) to fix the other side of the L lobe angle, and the angle value will be displayed in the measurement result area. The displayed value is the angle between the two lines along the marked direction.

【Note】: Move the cursor to the endpoints of the section that you need to change. Press **Set** again to adjust the section. Press the **BkSp** button on the keyboard to delete the

two sections and start another measurement.

◆ To measure the percentage reduction in the aortic area, please follow ***%Area Redu(t) Measurement***. The blockage of the aorta can be assessed by calculating the percentage reduction of the area.

Measurement:

1) Create the aortic cross section for the area reduction, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the Abdomen **– *Vascular*** measurement cards and select ***% Area redu(t)*** to enter measurement state, and a cross cursor ＋ will be displayed in the image area.

3) Move the cursor over the edge of the original aortic cross section, and press **Set** to fix the measurement start point.

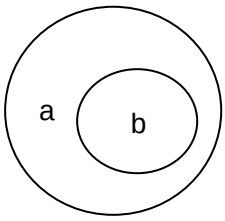
4) Draw the scanning trace along the edge of the cross section using the trackball. To delete the trace point by point, press **BkSp** on the keyboard.

5) At the measurement endpoint, click on **Set** to measure ***Area A*** of the original aortic cross-section. The measurement result will be displayed in the measurement results window.

6) Follow steps 3) to 5) to measure the reduced aortic cross section ***Area B***. The measured value will be displayed in the measurement result area, and the percentage reduction of the area will be calculated automatically.

The calculation formula is as follows:

Reduce % = (a-b)/a×100 %



a: Original aorta

b: Reduced area of the aorta

Fig. 8-45 Sketch for the measurement of % Aortic Area Redu(t)

8.3.3.3 Measurement in PW mode

In PW mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is an abdomen examination type, the system will display ***Abdomen – Artery*** measurement items by default. The measurement card includes artery, vein and kidney, as shown in Fig. 8-46.

If the measurement menu is displayed on the screen, use **Calc** to open the calculation software. The ***Abdomen – Artery*** object to be measured will be displayed by default, as shown in Fig. 8-47 (a). Move the cursor over ***Artery*** and press **Set** to display all measurement cards, as shown in Fig. 8-47 (b).

Click on the measurement card to display all the measurement items.

Fig. 8-46 Abdomen measurement items in B mode (Touchscreen)

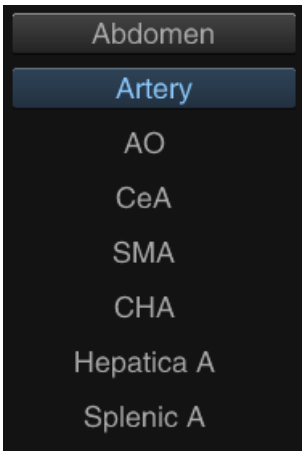


Fig. 8-47 (a)

Fig. 8-47 (b)

Fig. 8-47 Abdomen measurement items in B mode (Monitor)

◆ For measuring arteries such as AO (abdominal aorta), SMA (superior mesenteric artery), CHA (common hepatic artery), and Main Renal A (main renal artery), the flow data are acquired through measuring the vessel blood flow in the Doppler spectrum (e.g. PSV, EDV and S/D). Use ***Velocity Measurement***, ***Trace Measurement*** or ***Range Measurement*** for the measurement.

Take AO as an example. The steps for measuring the circumference are briefly presented below:

1) In PW mode, create the Doppler spectrum of the AO and press **Freeze (still image)** to display the image as a still image.

2) Follow the above-described steps to display the ***Abdomen – Artery*** measurement cards. Select the AO position that is to be measured, with a choice of ***P (proximal), M (mid)*** and ***D (distal)***. Then select the measurement method, where you will have a choice of ***Vel.*** (***velocity measurement)***, ***Trace Measurement*** or ***Range Measurement***. Click on the option to make your selection. Then select ***AO*** to enter measurement state, and a cross cursor ＋ will be displayed in the image area.

3) The three measurement methods are slightly different:

Vel. (Velocity): Use the trackball and the **Set** button to fix the PSV and EDV points at the peak of the systolic spectrum and the lowest value of the diastolic spectrum to obtain the calculation results for items such as PSV, EDV, S/D and PPG. See ***8.2.4.1***

Velocity for details.

Trace: Use the trackball and the **Set** button to trace the target region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG, and HR. See ***8.2.4.4 Manual trace*** for details.

Range: Use the trackball and the **Set** key to confirm the start and finish lines of the enclosed region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG, and HR. See ***8.2.4.6 Range Trace*** for details.

4) The measurement result will be displayed in the measurement results window on the right-hand side of the screen.

【Note】: Measurement items for the kidneys, such as *Main Renal A* are on the *Kidney* measurement card.

◆ For measuring veins such as IVC (inferior vena cava), PV (portal vein), hepatic vein, Splenic V (Splenic Vein), and renal vein, the flow data are acquired through measuring the vessel blood flow in the Doppler spectrum (e.g. velocity, differential pressure, etc.). Use ***Instant Velocity*** for the measurement.

Take IVC as an example. The steps for measuring the circumference are briefly presented below:

1) In PW mode, create the Doppler spectrum of the IVC, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the ***Abdomen – Vein***. Select IVC to display the + cursor and its two intersecting dotted lines. Measurement state will be activated.

3) Move the cursor to the point position needed to measure the velocity, and press **Set** to get the V and PG value. See also ***Instant Velocity*** (see ***8.2.4.2*** for an introduction).

4) The measurement result will be displayed in the measurement results window on the right-hand side of the screen.

【Note】: Measurement items for the kidneys, like the *renal vein* are on the *Kidney measurement card.*

8.3.3.4 Report worksheet – Abdomen

When using the measurements & calculations function in the Calc software, the measurement result will automatically be imported into the report. Press the **Report** button on the control panel during or after the measurement and calculation to call up the screen with the report worksheet (as shown in Fig. 8-35) and check the examination result.

Click on ☒ in the top right-hand corner of the screen or click on **Report** again to exit the report worksheet screen.

Fig. 8-48 Report worksheet – Abdomen

◆ **Header**

Patient information is displayed in the header. If the patient information was not input in the ***New Patient Info*** screen, it can be input in the header bar. After inputting the patient information, click the ***Save*** button on the right of the header bar, and the input information will be saved, otherwise, if you exit the report worksheet screen, the additional

information will be lost.

【Note】: The "Name" field in the report is not editable.

◆ **Measurement objects and calculation results**

This area displays the measurement results of all measuring objects as well as the conclusion that is drawn from the calculation result, and they can be edited.

Three measurement values can be recorded for each measurement object in 2D mode. To delete any of the measurement results, move the cursor onto the value and press **Set** to cross it out.

Following the three measurement values, there is a drop-down box for selecting Avg (average of all the effective measurement values), Min (the minimum value), Max (the maximum value) or Last (the last measured value).

The measurement results of the measurement items in PW mode will be listed in the report worksheet, as shown above;

◆ **Comments**

The user can fill in the relevant diagnostic information in the ***Comments*** area. Move the cursor to the annotations area, and press **Set** to input the information.

◆ **Menu bar**

Click on the object in question on the menu bar to enter the corresponding screen.

Data: When you are in another screen, click this to return to the report worksheets screen.

Image: Calls up the image of the report-editing screen. The procedure is the same as for the ***obstetrics report worksheet*** (see section ***8.3.2.8***).

Print preview: Calls up the report preview screen. The procedure is the same as for obstetrics ***report worksheet*** (see section ***8.3.2.9***).

Print screen: Click here to save the current page to the specified directory in BMP format.

Pg Up, Pg Dn: Turns the page, if there are multiple pages.

【Note】: *Analyses* and *graphs* that were not intended for the abdomen report worksheet are invalid.

8.3.4 Small parts

8.3.4.1 Function

The small parts calculation software package is used for examining the minor organs such as the thyroid, breast, testicle, neonate and so on. You can use the results that have been measured and calculated to analyse whether the abdominal organs are sick or not.

8.3.4.2 Measurement in B mode

In B-mode state, press Calc on the control panel to open the measurement menu. If the current examination type is a small parts examination type (e.g. thyroid, breast, testicle, etc.), the system will display the ***Small Part – Thyroid*** measurement items by default, as shown in Fig. 8-49. The measurement card includes breast, testicle, neonate, etc.

If the measurement menu is displayed on the screen, use **Calc** to open the calculation software. The ***Small part – Thyroid*** measuring object will be displayed by default, as shown in Fig. 8-50. Move the cursor over ***Thyroid*** and press **Set** to display all the measurement cards.

Click on the measurement card to display all the measurement items.

Fig. 8-49 Thyroid measurement in B mode (Touchscreen)

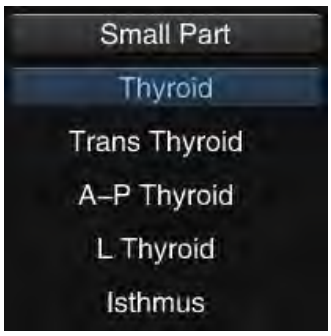


Fig. 8-50 Thyroid measurement in B mode (Monitor)

◆ The measurement method for the thyroid volume and testicle volume can draw on ***Volume-3 Axes Measurement*** by measuring the transverse distance, lateral distance and longitudinal distance of the target object.

Take the thyroid as an example. The steps for measurement are presented briefly below:

1) Create a section of the transverse diameter of the thyroid gland. Call up the image as a still image.

2) Follow the steps above to display the ***Small Part – Thyroid*** measurement cards and select ***Trans – Thyroid*** to activate measurement state.

3) Use ***Distance Measurement*** to continually measure the length of the transverse diameter (***L Thyroid***) and the width diameter (***AP Thyroid***).

4) Press **Freeze (still image)** to display the image in Live state and determine the thyroid diameter sections (the measuring data will be saved when it is displayed as a live image), and then retrieve the image as a still image again.

5) Use continuous ***Distance Measurement*** to measure the longitudinal diameter. The system will then automatically calculate the volume of the thyroid gland.

【Note 1】: For detailed measurement, see section *8.2.1.12 Volume-3 Axes*.

【Note 2】: The user can perform multiple measurements. The system saves the last three measurement values for viewing and editing in the report.

Data measurements can be used to judge whether the organ has lesions. For example: In the normal thyroid, the anteroposterior diameter should not be more than 2 cm in cross

section. The diameter from left to right should not be longer than 2 cm. The length of the anteroposterior diameter of the isthmus should be no more than 0.5 cm, and the length of the diameter from top to bottom (longitudinal diameter) should be measured 4 to 5 cm below the longitudinal section (above data are for reference only). If the measurement result is abnormal, the organ may have lesions.

◆ The method for measuring the lengths of the UI Breast, LI Breast, UE Breast, LE Breast, L-Testicle (longitudinal diameter of the testicle), A-P Testicle (anteroposterior diameter of the testicle), Trans Testicle (transverse diameter of the testicle), L Epididymis (longitudinal diameter of the epididymis), A-P Epididymis (anteroposterior diameter of the epididymis), LVW (lateral ventricle), Third Ventricle, and HW (hemisphere width) can make reference to Distance Measurement.

Take UI breast as an example. The steps for measurement are presented briefly below:

1) Create a section of the UI Breast, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the ***Small Part – Breast General*** measurement cards, and select the measurement target (left breast or right breast) by clicking on ***L*** or ***R***. Next, select ***UI Breast*** to activate measurement state, and a cross cursor + will be displayed in the image area.

3) Use the trackball to move the cursor onto the measurement start point, press **Set** to fix the measurement start point, and the second "+" cursor will appear.

4) Move the second cursor to the measurement end point. Press **Set** to fix the measurement end point and finalise the measurement result.

【Note】: Testicle measurement items, such as *L Testicle*, are on the *Testicle* measurement card. Neonate measurement items, such as *LVW*, are on the *Neonate* measurement card. Users can select the *R (right)* and *L (left)* positions to measure paired organs.

◆ You can use ***Variable Ellipse*** for the measurement method for the breast area.

Take the breast area as an example. The steps for the length measurement are briefly presented below:

1) Create a section of the breast, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the ***Small Part – Breast Area*** measurement cards.

   Select the measurement target (left breast or right breast) by clicking on ***L*** or ***R*** above the measurement menu. Next, select ***Breast Area*** to activate the measurement state, and a cross cursor + will be displayed in the image area.

3) Draw an ellipse in accordance with the steps for ***Measuring ellipses***. There are many control points in the ellipse. Move the cursor to one control point and press **Set** to activate it. Move the control point using the trackball. Adjust the graphics as closely as possible to the measurement target to get the measurement results for the circumference and area.

【Note】: For detailed measurement, please consult section *8.2.1.9 Variable ellipse*.

8.3.4.3 Measurement in PW mode

In PW mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is an examination type for near-surface organs, the system will display the ***Small Part*** measurement package. The touchscreen display is as shown in Fig. 8-51, and the screen display as shown in Fig. 8-52.

Fig. 8-51 Small part measurement in PW mode (touchscreen)

Fig. 8-52 Small part measurement in PW mode (monitor)

The user can first select the ***Vel. (velocity)***, ***Trace*** or ***Range*** measurement method to measure the thyroid artery, and then select the measurement object. Meanwhile, for paired organs, users can select the ***L(Left)*** or ***R(Right)*** position to measure.

Vel. (velocity): Use the trackball and the **Set** button to fix PSV and EDV points at the peak of the systolic spectrum and the lowest point of the diastolic spectrum so as to acquire the calculation results for items such as PSV, EDV, S/D and PPG. See ***8.2.4.1 Velocity*** for details.

Trace: Use the trackball and the **Set** button to trace the target region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG, and HR. See ***8.2.4.4 Manual trace*** for details.

Range: Use the trackball and the **Set** button to confirm the start and finish lines of the enclosed region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG and HR. See ***8.2.4.6 Range Trace*** for details.

8.3.4.4 Report worksheet – Small parts

When using the measurements & calculations function in the Calc software, the measurement result will automatically be imported into the report. During or after the measurement and calculation, press the **Report** button on the control panel to bring up the report worksheet screen and check the examination result.

Click on ☒ in the top right-hand corner of the screen or click on **Report** again to exit the report worksheet screen.

The display for the small parts report worksheet is the same as that for the abdomen report worksheet. See section ***8.3.3.4 Report worksheet – Abdomen*** for the procedure.

8.3.5 Urology

8.3.5.1 Function

The urology calculation software package is for examining the kidney, bladder, prostate, and so on. Bladder volume, bladder residual urine, prostate volume and prostate specific antigen density can be calculated using the results. The measurement result can be used to analyse whether these organs are diseased or not.

8.3.5.2 Measurement in B mode

In B mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is an examination type for urology, the system will by default display ***Urology – General*** measurement items. The measurement card includes General, Adrenal, Prost, etc., as shown in Fig. 8-53.

If the measurement menu is displayed on the screen, use **Calc** to open the calculation software. The ***Urology – General*** measuring object is displayed by default, as shown in Fig. 8-54 (a). Move the cursor over ***General*** and press **Set** to display all measurement cards, as shown in Fig. 8-54 (b).

Click on the measurement card to display all the measurement items.

Fig. 8-53 Urology measurement in B mode (Touchscreen)

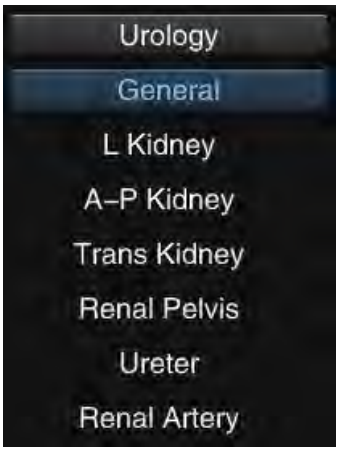


Fig. 8-54 (a)

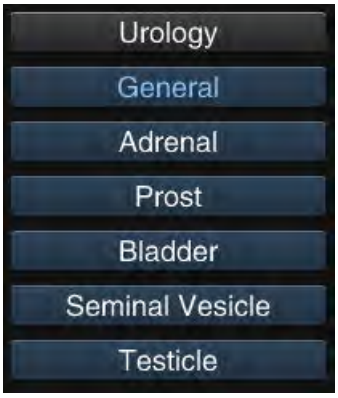


Fig. 8-54 (b)

Fig. 8-54 Urology measurement in B mode (monitor)

◆ The length measurement method for L Kidney, Renal Pelvis, Ureter, Renal Artery, L Adrenal (longitudinal diameter of the adrenal gland), Trans Prost (transverse diameter of the prostate), Trans BU Blad (transverse diameter of the bladder before urination), L Seminal Vesicle (longitudinal diameter of the seminal vesicle), and L-Testicle (longitudinal diameter of the testicle) can make reference to ***Distance Measurement.***

Take **L kidney** as an example. The steps for the length measurement are briefly presented below:

1) Create a section of the L Kidney, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the ***Urology – General*** measurement cards and select the measurement target (left kidney or right kidney) by clicking on ***L*** or ***R*** . Then select ***L Kidney*** to activate measurement state, and a cross cursor + will be displayed in the image area.

3) Use the trackball to move the cursor to the measurement start point. Press Set to fix the start point of the measurement, and the second "+" cursor will appear. The measurement result will be displayed in the measurement results window.

4) Move the second cursor to the measurement end point. Press **Set** to fix the measurement endpoint, and the length of the kidney will be calculated and displayed in

the measurement results window (calculate the volume *V* after you have measured the renal transverse distance and the renal lateral distance).

【Note 1】: Adrenal measurement items, such as *L Adrenal*, are on the adrenal measurement card. Prostate measurement items, such as *Trans Prost* are on the *Prost* measurement card. Bladder measurement items such as *Trans BU Blad* are on the *Bladder* measurement card. Seminal vesicle measurement items such as *L Seminal Vesicle* are on the *Seminal Vesicle* measurement card. Testicle measurement items such as *L Testicle* can be found on the *Testicle* measurement card.

【Note 2】: Users can select the *R (right)* and *L (left)* positions to measure paired organs, and select the positions *P (proximal), M (mid)* and *D (distal)* to measure a vessel with a large span.

◆ The measurement method for bladder volume, kidney volume, adrenal volume, seminal vesicle volume, testicle volume can draw on ***Volume-3 Axes measurement.***

Urine output can be calculated by measuring the volume of the bladder before and after urination. Measurement of urine output in 2B mode is shown below. Other volume measurements can draw on this.

1) In 2B mode, before urination, create two orthogonal image sections of the bladder, then display the image as a still image.

2) Follow the above-described steps to open the ***Urology – Bladder*** measurement card. Select ***Trans BU Blad*** to activate measurement state.

3) Use the ***Distance Measurement*** (see section ***8.2.1.1 Distance***) to continuously measure the transverse and lateral diameters of the bladder before urination in the maximum diameter image section and move the cursor to another image section to measure the longitudinal diameter. The system automatically calculates the bladder volume after urination and imports the result into the report worksheet.

4) In 2B mode, after urination, create two orthogonal image sections of the bladder then

display the image as a still image. Freeze the image and open the ***Bladder*** measurement card. Select ***Trans AU Blad*** to activate measurement state.

5) Use the ***Distance Measurement*** (see section ***8.2.1.1 Distance***) to continuously measure the transverse and lateral diameters of the bladder after urination in the maximum diameter image section and move the cursor to another image section to measure the longitudinal diameter. The system will automatically calculate the bladder volume after urination and will import the result into the report worksheet.

【Note】: This measurement can be carried out in single B mode. If it is necessary to measure the transverse section, unfreeze the image, and measure the longitudinal diameter.

8.3.5.3 Prostate specific antigen density

Measurement:

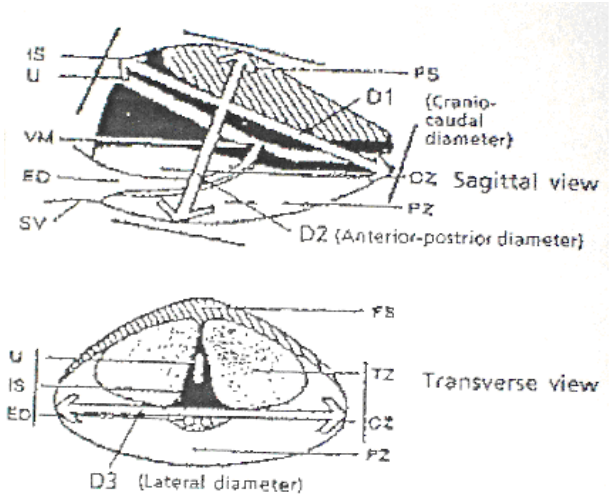
1) Ensure that the patient's PSA value has been entered. Press **ID** to bring up a ***New patient info*** window. Select ***Urology*** in the drop-down menu of the ***Exam***, and the ***PSA*** edit box will be displayed on the screen. Move the cursor onto the edit box. Press the **Set** key and input using the keyboard. Then click ***Save*** to finish the process.

【Note】: When *Female* is selected, the *PSA* edit box will not be displayed.

2) In 2B mode, create two orthogonal image sections of the prostate. Display the image as a still image and open the ***Prostate*** measurement card. Select ***Trans Prost*** to activate measurement state.

3) Use the ***Distance Measurement*** (see section ***8.2.1.1***) to continuously measure the transverse diameter and lateral diameter of the prostate in the maximum diameter image section and move the cursor to another image section to measure the longitudinal diameter. The system will automatically calculate the prostate volume and the PSAD value and will import the result into the report worksheet.

【Note】: The PSAD coefficient will affect the PSAD value. The user can modify the PSAD coefficient in *Setup – Measurement Setup.*



$$WGVOL = \frac{\pi}{6} * D1 * D2 * D3$$

Fig. 8-55 Measuring the prostate volume

【Note】: This measurement can be carried out in single B mode. Users should determine the transverse diameter of the section to be measured, display the image as a still image and determine the longitudinal diameter of the section to be measured.

8.3.5.4 Measurement in PW mode

In PW mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is a Urology examination type, the system will display ***Urology*** measurement items by default. The touchscreen display is as shown in Fig. 8-44.

If the measurement menu is displayed on the screen, use **Calc** to open the calculation software. The ***Urology*** measuring element is displayed by default, as shown in Fig. 8-57.

Fig. 8-56 Urology measurement in PW mode (touchscreen)

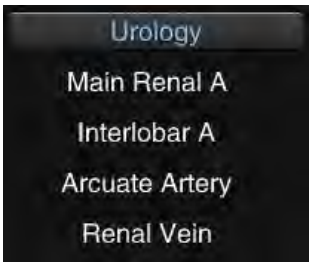


Fig. 8-57 Urology measurement in PW mode (monitor)

- The user can first select the ***Vel. Velocity)***, ***Trace*** or ***Range*** measurement method to measure the urological artery and then select the measurement object. Meanwhile, you may select the ***R (Right)*** and ***L (Left)*** positions to measure.

  Vel. (velocity): Use the trackball and the **Set** button to fix PSV and EDV points at the peak of the systolic spectrum and the lowest point of the diastolic spectrum so as to acquire the calculation results for items such as PSV, EDV, S/D and PPG. See ***8.2.4.1 Velocity*** for details.

  Trace: Use the trackball and the **Set** button to trace the target region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG, and HR. See ***8.2.4.4 Manual trace*** for details.

  Range: Use the trackball and the **Set** button to confirm the start and finish lines of the enclosed region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG and HR. See ***8.2.4.6 Range Trace*** for details.

- Measuring the urological vein: Select the measurement item (e.g. the renal vein). Use the trackball to move the cursor to the point position needed to measure the velocity, and press **Set** to get the V and PG value. Refer to ***Instant Velocity*** (see ***8.2.4.2*** for an introduction).

8.3.5.5 Report worksheet – Urology

When using the measurements & calculations function in the Calc software, the measurement result will automatically be imported into the report. During or after the measurement and calculation, press the **Report** button on the control panel to bring up the report worksheet screen and check the examination result.

Click on ☒ in the upper right-hand corner of the screen or click on **Report** again to exit the report worksheet screen.

The display for the urology report worksheet is the same as that for the abdomen report worksheet, except that there is a “PSA” value in the header bar. See section ***8.3.3.4 Report worksheet – Abdomen*** for the procedure.

8.3.6 Gynaecology

8.3.6.1 Function

The gynaecology calculation software package is for examining the uterus, follicles, and so on. The measurement result can be used to analyse whether or not the uterus is diseased and whether or not the follicle is mature.

8.3.6.2 Measurement in B mode

In B mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is a Gynaecology examination type, the system will display ***Gynaecology – Uterus*** measurement items by default. The measurement card includes the uterus, ovary and follicle, as shown in Fig. 8-58.

If the measurement menu is displayed on the screen, use **Calc** to open the calculation software. The ***Gynaecology – Uterus*** measurement item is displayed by default, as

shown in Fig. 8-59 (a). Move the cursor over ***Uterus*** and press **Set** to display all measurement cards, as shown in Fig. 8-59 (b).

Click on the measurement card to display all the measurement items.

Fig. 8-58 Gynaecology measurement in B mode (touchscreen)

Fig. 8-59 (a) Fig. 8-59 (b)

Fig. 8-59 Gynaecology measurement in B mode (monitor)

a) Measuring the uterus

In order to measure the longitudinal diameter of the uterus, the transverse diameter of the uterus and the longitudinal diameter of the cervix, you can refer to distance measurement. If the uterus is normal, the long diameter of the uterus in the longitudinal section should amount to 5.5 to 7.5 cm, and the anteroposterior diameter, to 3.0 to 4.0 cm (the above-specified data is for reference only).

b) Measuring the ovary

Calculate the volume of the ovaries by measuring the ovarian length, transverse diameter and thickness. See ***8.3.4.2 Measuring the thyroid*** for measurement methods and steps.

c) Measuring the follicle:

Determine the degree of maturity of the follicle by measuring the follicle volume. There are two methods for measuring the follicle volume.

◆ **The first method:** When examining the follicle as an ellipse, measure it using ***Ellipse Measurement***. The measurement steps are as below:

1) In still-image B mode, open the measurement card for ***Follicle.***

2) Click on ***L*** or ***R*** to select the measurement target (the left follicle or the right follicle), then select ***Follicle X Vol***.

3) The "+ " cursor will appear in the image area. Use the trackball and the **Set** button to fix two points and the ellipse axis. Fix the ellipse axis. Move the cursor, and the ellipse will change its shape as the cursor moves. Based on the fixed ellipse axis, move the cursor to bring the ellipse as close to the measured area as possible. Press **Set** to fix the measurement area and finish the measurement.

4) The follicular volume and L (long axis) and S (short axis) values will be displayed in the bottom-right corner of the screen.

- **The second method:** Use the ***Volume – 3 Axes measurement*** to calculate the volume of the follicle by measuring follicle length, transverse diameter and thickness. The measurement steps are as below:

  1) Create two orthogonal image sections of the follicle in 2B mode. Freeze the image.

  2) Press **Calc** to open the measurement menu and find the ***follicle*** measurement card.

  3) Click on ***L*** or ***R*** to select the measurement target (the left follicle or the right follicle), and select ***Follicle X Vol*.**

  4) Use ***Distance Measurement*** (see section ***8.2.1.1***) to measure the longitudinal diameter of the follicle in the maximum diameter image section, then move the cursor to another image section to measure the transverse diameter and the lateral diameter. The system will automatically calculate the follicle volume and will display it on the right side of the screen.

8.3.6.3 Measurement in PW mode

In PW mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is a gynaecology examination type, the system will display the ***gynaecology*** measuring software package. The touchscreen display is as shown in Fig. 8-60, and the screen display as shown in Fig. 8-61.

Fig. 8-60 Gynaecology measurement in PW mode (touchscreen)

Fig. 8-61 Gynaecology measurement in PW mode (monitor)

All the measurement items are arteries. The user can first select the measurement method for ***Vel. (velocity)***, ***Trace*** or ***Range***, and then select the object to be measured. Meanwhile, you may select the ***R (Right)*** and ***L (Left)*** positions to measure.

Vel. (velocity): Use the trackball and the **Set** key to fix the PSV and EDV points at the peak of the systolic spectrum and the lowest point of the diastolic spectrum so as to acquire the calculation results for items such as PSV, EDV, S/D and PPG. See ***8.2.4.1 Velocity*** for details.

Trace: Use the trackball and the **Set** key to trace the target region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG, and HR. See ***8.2.4.4 Manual trace*** for details.

Range: Use the trackball and the **Set** key to confirm the start and finish lines of the enclosed region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG, and HR. See ***8.2.4.6 Range Trace*** for details.

8.3.6.4 Report worksheet – Gynaecology

When using the measurements & calculations function in the Calc software, the measurement result will automatically be imported into the report. During or after the measurement and calculation, press the **Report** button on the control panel to bring up the report worksheet screen and check the examination result.

Click on ☒ in the upper right-hand corner of the screen or click on **Report** again to exit the report worksheet screen.

The display for the gynaecology report worksheet is the same as that for the abdomen report worksheet, except that there is an ***LMP*** value in the header bar. See section ***8.3.3.4 Report worksheet – Abdomen*** for the procedure.

8.3.7 Carotid

The carotid calculation software package is for measuring CCA, CCA stenosis, bulb stenosis, VA, SCA, etc.

8.3.7.1 Measurement in B mode

In B mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is a carotid examination type, the system will display carotid measurement items by default. The touchscreen display is as shown in Fig. 8-62. The menu type displayed on the screen is shown in Fig. 8-63.

Fig. 8-62 Carotid measurement in B mode (touchscreen)

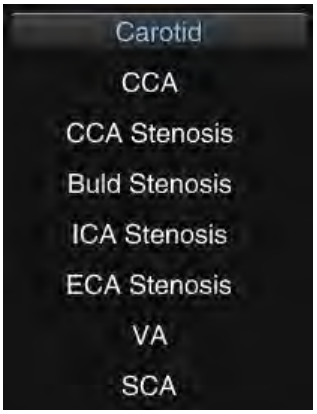


Fig. 8-63 Carotid measurement in B mode (monitor)

◆ For length measurements, such as ***CCA*** and ***CCA stenosis***, you can refer to ***distance measurement*** (see ***8.2.1.1*** for instructions). Take ***CCA (arteria carotis communis)*** as an example. The steps for measurement are presented briefly below:

1) Create a section of the carotid, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the ***Carotid*** measurement package. Before selecting the ***CCA*** measured value element, the user can select a specific measurement target (for paired organs, the user can select R ***(right)*** or ***L (left)*** as positions for the measurement. For measuring vessels with a large span, the user can select from the positions ***P (proximal), M (mid)*** or ***D (distal)***. Since CCA is a paired organ, there is a choice of ***R (right), L (left), P (proximal), M (mid)*** and ***D (distal)*** for vessels with a large span. ***R (right)*** and ***P (proximal)*** are selected by default. Then select ***CCA*** to enter measurement state, and a cross cursor ＋ will be displayed in the image area.

3) Use the trackball to move the cursor to the measurement start point, press **Set** to fix the measurement start point, and a second “+ " cursor will appear.

4) Move the second cursor to the measurement end point. Press **Set** to fix the measurement endpoint. By default, the ***R (right) P (proximal)*** length of the ***CCA*** will be determined as the measurement result.

◆ To measure the ratio of area reduction, such as ***%A Redu CCA***, you can refer to

%area redu (t) measurement and ***%area redu (e) measurement*** (see ***8.2.1.1*** for instructions). Take ***%A Redu CCA*** as an example. The steps for measurement are presented briefly below:

1) Create a section of the carotid, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the ***Carotid*** measurement package. Select ***%A Redu CCA*** to activate measurement state and a cross cursor ＋ will be displayed in the image area.

3) Use ***Ellipse Measurement*** to measure the original aortic cross-sectional area. The procedure is as follows: Move the cursor over a specific point in the measurement area. Press **Set** to fix the axis of the start point. Then move the cursor to select the desired axis endpoint and press **Set** to fix it. Move the cursor to change the ellipse shape based on the fixed axis. To adapt the ellipse to the measurement area, press **Set** to fix the ellipse measurement area and complete the measurement.

4) Then a cross cursor ＋ will be displayed in the image area. Use ***Trace Measurement*** to measure the aortic cross-sectional area after the reduction. The procedure is as follows: Move the trackball beyond the start point of the measurement and press **Set** to fix it. Draw the scanning trace along the edge of the cross section using the trackball. Press **Set** on the measurement endpoint to finalise the measurement result.

5) The measurement results area will display the area and reduction ratio values before and after CCA reduction.

◆ The steps for IMT measurements, such as ***CCA IMT***, are introduced briefly below:

1) Create a section of the carotid, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the ***Carotid*** measurement software package and select ***CCA IMT***. An ROI box will appear on the image. Press **T-Ball**, and the 4 sides of the colour box will change from solid lines to dotted lines. Then use the trackball to change the size of the colour box, and press **Set** to confirm.

3) Move the ROI box to the desired vascular wall and press **Set**. The system will automatically calculate the maximum, minimum, mean and standard deviation of the IMT (intima-media thickness), as well as the intima-media length. The measurement result will be displayed on the right of the screen. The positions with 2 arrow marks indicate where the biggest IMT is.

8.3.7.2 Measurement in PW mode

In PW mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is an examination type for the carotid artery, the system will display the ***Carotid*** measurement software. The touchscreen display is as shown in Fig. 8-64. The menu type displayed on the screen is shown in Fig. 8-65.

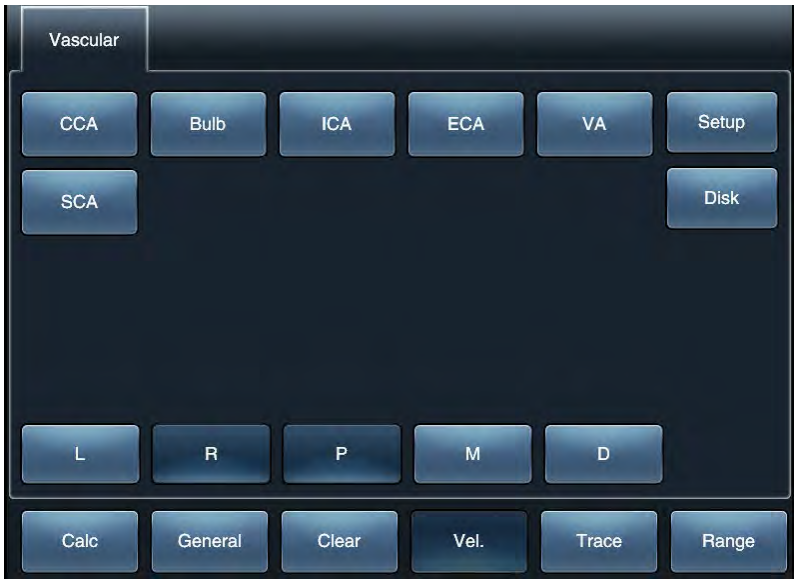


Fig. 8-64 Carotid measurement in PW mode (touchscreen)

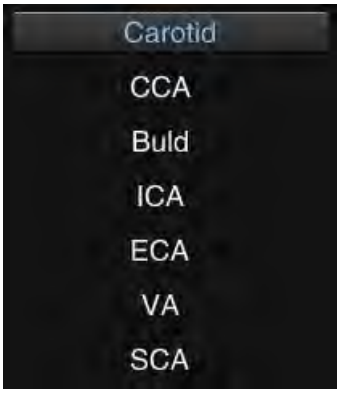


Fig. 8-65 Carotid measurement in PW mode (monitor)

All the measurement items are arteries. The user can first select the measurement method for ***Vel. (velocity)***, ***Trace*** or ***Range***, and then select the object to be measured. Meanwhile, for paired organs, the user can select the ***R (right)*** or ***L (left)*** position to perform the measurement. For a vessel with a large span, the user may select between ***P (proximal), M (mid)*** or ***D (distal)*** positions for the measurement.

Vel. (velocity): Use the trackball and the **Set** button to fix PSV and EDV points at the peak of the systolic spectrum and the lowest point of the diastolic spectrum so as to acquire the calculation results for items such as PSV, EDV, S/D and PPG. See ***8.2.4.1 Velocity*** for details.

Trace: Use the trackball and the **Set** button to trace the target region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG, and HR. See ***8.2.4.4 Manual trace*** for details.

Range: Use the trackball and the **Set** button to confirm the start and finish lines of the enclosed region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG and HR. See ***8.2.4.6 Range Trace*** for details.

8.3.7.3 Report worksheet – Carotid

When using the measurements & calculations function in the Calc software, the measurement result will automatically be imported into the report. During or after the measurement and calculation, press the **Report** button on the control panel to bring up the report worksheet screen and check the examination result.

Click on  in the upper right-hand corner of the screen or click on **Report** again to exit the report worksheet screen.

The display for the carotid report worksheet is the same as that for the abdomen report worksheet. See section ***8.3.3.4 Report worksheet – Abdomen*** for the procedure.

8.3.8 Peripheral blood vessels

The peripheral blood vessels calculation software package is for examining the arteries and veins of the upper and lower limbs. By measuring the longitudinal diameter, or intima thickness etc., the user can analyse whether or not the peripheral blood vessels are diseased.

8.3.8.1 Measurement in B mode

In B mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is an examination type for peripheral blood vessels, the system will by default display ***Peri Arteries – Upper limb A*** measurement items. Arteries and veins of the upper and lower limbs, as shown in Fig. 8-66.

If the measurement menu is displayed on the screen, use **Calc** to open the calculation software. The ***Peri Arteries (peripheral arteries) – Upper limb A*** measurement items are displayed by default, as shown in Fig. 8-67 (a). Move the cursor over ***Upper limb A (Upper vessels A)*** and press **Set** to display all measurement cards, as shown in Fig. 8-67 (b).

Click on the measurement card to display all the measurement items.

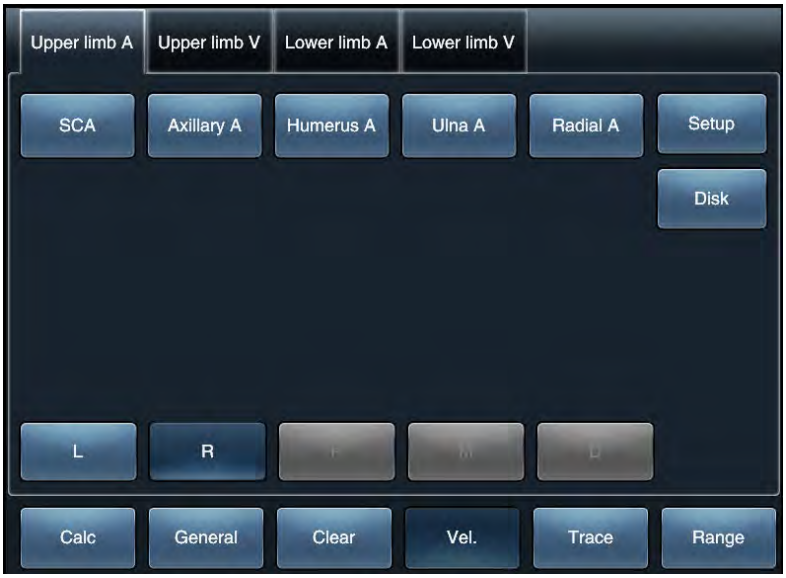


Fig. 8-66 Measuring peripheral blood vessels (touchscreen)

Fig. 8-67 (a) Fig. 8-67 (b)

Fig. 8-67 Measuring peripheral blood vessels (monitor)

All measurement items in the calculation software are for length measurement. The user can refer to ***Distance Measurement*** (see ***8.2.1.1*** for instructions).

Take SCA as an example. The steps for the longitudinal measurement are briefly described below:

1) Create a section of the SCA, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the measurement cards for Peri ***Arteries (peripheral arteries A) – Upper limb A***, and select the measurement target (left or right clavicle) by clicking on ***L*** or ***R***. Next, select ***SCA*** to activate measurement state, and a cross cursor + will be displayed in the image area.

3) Use the trackball to move the cursor to the measurement start point, press **Set** to fix the measurement start point, and a second “+ " cursor will appear. The measurement result will be displayed in the measurement results window.

4) Move the second cursor to the measurement end point. Press **Set** to fix the measurement end point and the length of the SCA will be calculated and displayed in the measurement results window.

【Note 1】: Measurement items relating to upper limb veins, such as the *SCV* (vena subclavia inferior), are on the *Upper limb V* measurement card. Measurement items relating to upper limb arteries, such as the *CIA* (common ilium artery) are on the *Lower limb A measurement card.* Measurement items relating to lower limb

veins, such as the *CIV* (common ilium vein), are on the *Lower limb V* measurement card.

【Note 2】: Users can select the *R (right)* and *L (left)* positions to measure paired organs, and select the positions *P (proximal), M (mid)* and *D (distal)* to measure a vessel with a large span.

8.3.8.2 Measurement in PW mode

In PW mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is an examination type for peripheral blood vessels, the system will by default display ***Peri Arteries – Upper limb A***. The measurement card includes arteries and veins of the upper and lower limbs. The display on the touchscreen or the monitor is the same as in B mode.

- Measuring ***Upper limb A*** and ***Lower limb A***: First select the measurement method, ***Vel. (velocity)***, ***Trace*** or ***Range***. Then select the measuring element. Then select the position to be measured, ***R (right)*** or ***L (left)***.

  Vel. (velocity): Use the trackball and the **Set** key to fix the PSV and EDV points at the peak of the systolic spectrum and the lowest point of the diastolic spectrum to obtain the calculation results for items such as PSV, EDV, S/D and PPG. See ***8.2.4.1 Velocity*** for details.

  Trace: Use the trackball and the **Set** key to trace the target region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG and HR. See ***8.2.4.4 Manual trace*** for details.

  Range: Use the trackball and the **Set** button to confirm the start and finish lines of the enclosed region on the spectrum so as to acquire the calculation results for items such as PSV, EDV, MNV, S/D, ACC, VTI, AT, DT, PPG, MNPG and HR. See ***8.2.4.6 Range Trace*** for details.

- Measuring ***Upper limb V*** and ***Lower limb V***: Select the measurement item (e.g. SCV). Move the cursor to the point position needed to measure the velocity, and press

Set to get the V and PG values. See ***8.2.4.2 Instant velocity*** for details.

8.3.8.3 Report worksheet – Peripheral blood vessels

When using the measurements & calculations function in the Calc software, the measurement result will automatically be imported into the report. During or after the measurement and calculation, press the **Report** button on the control panel to bring up the report worksheet screen and check the examination result.

Click on ☒ in the upper right-hand corner of the screen or click on **Report** again to exit the report worksheet screen.

The display screen for the peripheral blood vessels report worksheet is the same as that for the abdomen report worksheet. See section ***8.3.3.4 Report worksheet – Abdomen*** for the procedure.

8.3.9 Cardiology measurement

8.3.9.1 Function

The cardiac calculation software package is for examining the aorta, mitral valve, tricuspid valve, left ventricle, left ventricular function, and so on. The system provides many cardiac measurements, such as PISA, Teichholz, Cubed, Gibson, Simpson, etc. The user can choose the appropriate measurement method, and the data of the left ventricular function can be worked out from the measurement results, and then the state of cardiac health can be analysed.

In 2D mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is an examination type for cardiology, the system will by default display ***Cardiology – General*** measurement items. The measurement card contains PISA, Teichholz, Cubed etc., as shown in Fig. 8-68.

If the measurement menu is displayed on the screen, use **Calc** to open the calculation software. The ***Cardiology – General*** measurement object is displayed by default, as shown in Fig. 8-69 (a). Move the cursor over ***General*** and press **Set** to display all measurement cards, as shown in Fig. 8-69 (b).

Click on the measurement card to display all the measurement items.

Fig. 8-68 Cardiology measurement in 2D mode (touchscreen)

Fig. 8-69 (a)

Fig. 8-69 (b)

Fig. 8-69 Cardiology measurement in 2D mode (monitor)

When in PW mode, click on **Calc** on the control panel to open the measurement menu. If the current examination type is an examination type for cardiology (e.g. cardiology A), the system will by default display ***Cardiology – HR*** measurement items. The measurement card includes HR, MV, TDI, MVA VTI, as shown in Fig. 8-70.

If the measurement menu is displayed on the screen, use **Calc** to open the calculation software. The ***Cardiology – HR*** measurement object is displayed by default, as shown in Fig. 8-71 (a). Move the cursor over ***HR*** and press **Set** to display all measurement cards, as shown in Fig. 8-71 (b).

Click on the measurement card to display all the measurement items.

Fig. 8-70 Cardiology measurement in PW mode (touchscreen)

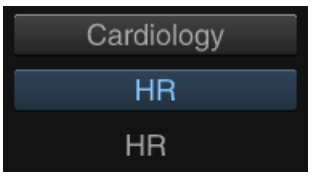


Fig. 8-71 (a)

Fig. 8-71 (b)

Fig. 8-71 Cardiology measurement in PW mode (monitor)

8.3.9.2 General cardiology measurement in B mode

◆ In B mode, general measurements include length measurement of LA (left atrium diameter), MV (mitral valve), RVDs (right ventricular diameter in the systolic phase), RVDd (right ventricular diameter in the diastolic phase), etc.; see ***Distance Measurement***.

Let us take MV as an example. The steps for the longitudinal measurement are briefly described below:

1) In B mode, create a section of the MV, and press **Freeze (still image)** to display the image as a still image.

2) Follow the above-described steps to display the measurement cards for ***Cardiology – General*** and select ***MV*** to open the measurement state, whereby a cross cursor + will be displayed on the screen.

3) Use the trackball to move the cursor to the measurement start point, press **Set** to fix the measurement start point, and a second “+ " cursor will appear. The measurement result will be displayed in the measurement results window.

4) Move the second cursor to the measurement end point. Press **Set** to fix the measurement endpoint. The length of the MV will be calculated and automatically imported into the report worksheet.

【Note 1】: A measurement object with an (s) mark, such as *RVD(s)*, denotes that the measurement concerns the right ventricular diameter in systole. A measurement item with (d) mark, such as *RVD(d)*, denotes that the measurement concerns the right ventricular diameter in diastole.

【Note 2】: After measuring the length of the LA, the system will automatically calculate the ratio of LA/AO and AO/LA, and then import the result into the report worksheet.

◆ For measuring the area of the MVA, AVA, TVA, etc., refer to ***Trace Measurement*** (see ***8.2.1.5*** for an introduction).

Take ***MVA*** as an example. The steps for the trace measurement are briefly presented below:

1) In B mode, create a section of the MVA, and press **Freeze (still image)** to display the image as a still image.

2) Follow the steps above to display the ***Cardiology – General*** measurement cards, select ***MVA*** to activate measurement state, and a cross cursor ＋will be displayed in the image area.

3) Roll the trackball to move the cursor to the measurement start point, and press **Set** to fix the measurement start point.

4) Draw the scanning trace along the edge of the cross section using the trackball. To delete the trace point by point, press **BkSp** on the keyboard.

5) Press **Set** on the measurement end point to finalise the measurement result. If the area is not an enclosed region, the system will automatically connect the start point with the endpoint by means of a line. The measurement result will be displayed in the measurement results window.

8.3.9.3 Teichholz

In this measurement method, left ventricular function is calculated by measuring the inter-ventricular septal thickness, the left ventricular inner diameter, and the left ventricular posterior wall thickness in diastole and systole. Click on the ***Teichholz*** measurement card to display the measurement items. The touchscreen display is as shown in Fig. 8-72. The menu type displayed on the screen is shown in Fig. 8-73.

Fig. 8-72 Measurement items for Teichholz (touchscreen)

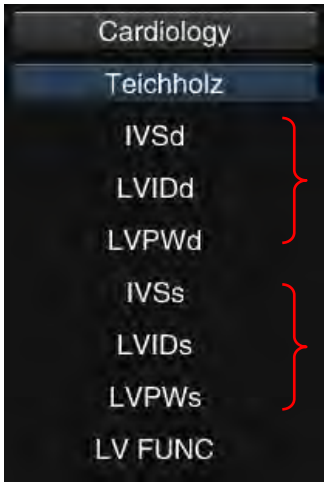


Fig. 8-73 Measurement items for Teichholz (monitor)

【Note】: An explanation of the abbreviations used in the table can be found in *Appendix A*.

Measurement:

1) In B mode, create sections of the left ventricle in diastole and systole, and display the image as a still image.

2) Locate the ***Teichholz*** measurement card as per section ***8.3.9.1***, and then click on it to open the measurement menu.

3) Select ***IVSd*** to activate measurement state.

4) Move the cursor to the start point of the inter-ventricular septum in the diastolic phase

and press **Set** to fix the measurement start point, and the second "+" cursor will appear.

5) Move the second cursor to the measurement endpoint and click on **Set** to measure IVSd. The endpoint of the measurement is the start point of the second measurement object, ***IVIDd***.

6) Move the cursor to the end of the left ventricular internal diameter, and press **Set** to measure the left ventricular internal diameter (d); the endpoint of the measurement will be the start point of the third measurement object, ***IVPWd***.

7) Move the cursor to the end of the left ventricular posterior wall and click on **Set** to complete measurement of this section.

8) Then select ***IVSs*** and follow the steps above to measure the three values in the systolic phase.

9) Once the six measurements have been completed, the system will automatically calculate the data for the left ventricular function. The measurement and calculation results will be displayed in the bottom-right corner of the screen. The calculation objects and formulae are as follows:

Calculation object	Interpretation	Calculation formula
EDV	End-diastolic volume (ml)	$\text{EDV (Teichholz)} = \frac{7 \times (LVIDd)^3}{2.4 + LVIDd}$ $\text{EDV (Cubed)} = (LVIDd)^3$ $\text{EDV(Gibson)} = \frac{\pi}{6} \times (LVIDd)^2 \times (0.98 \times LVIDd + 5.90)$
ESV	End-systolic volume (ml)	$\text{ESV (Teichholz)} = \frac{7 \times (LVIDs)^3}{2.4 + LVIDs}$ $\text{ESV (Cubed)} = (LVIDs)^3$ $\text{ESV(Gibson)} = \frac{\pi}{6} \times (LVIDs)^2 \times (0.98 \times LVIDs + 5.90)$
SV	Stroke volume (ml)	$SV = EDV - ESV$
EF	Ejection fraction (%)	$EF = \frac{EDV - ESV}{EDV} \times 100$
FS	Fraction of shortening of the left ventricle (%)	$FS = \frac{LVIDd - LVIDs}{LVIDd} \times 100$

CO	Cardiac output (L/min)	$CO = \frac{SV \times HR}{1000}$
dTIVS	Fraction of shortening of the interventricular septum (%)	$dTIVS = \frac{IVSd - IVSs}{IVSd} \times 100$
dTPW	Fraction of shortening of the posterior wall (%)	$dTPW = \frac{LVPWd - LVPWs}{LVPWd} \times 100$
SI	The stroke index is the ratio of stroke volume to body surface area.	$SI = \frac{SV}{BSA}$
CI	The cardiac index is the ratio of the cardiac output to the body surface area.	$CI = \frac{CO}{BSA}$
LV Mass	Left ventricular mass (g)	$LVMass = 1{,}055\,[(LVIDd + IVSd + LVPWd)^3 - LVIDd^3] - 14$
LV MI	Left ventricular muscle mass index (g/cm²)	$LV\ MI = \frac{LV\ Mass}{BSA}$

【Note 1】: If the cardiac output needs to be calculated per minute (CO), the HR value should be measured in M or PW mode. The measurement object is in the *General* calculation software package.

【Note 2】: The BSA (body surface area) value is needed for some measurement objects. The value is calculated using the patient's height and weight. Make sure that the patient's height and weight is input in *New patient info*.

【Note 3】: When performing the measurement procedure for *Cubed* and *Gibson*, you can refer to *Teichholz*. In B/M mode or M mode, you can resort to B mode for the measurement procedures for *Cubed, Gibson* and *Teichholz*.

【Note 4】: The table above contains all the calculation objects. If it is not necessary to display all calculation objects, you can select the required calculation objects (as shown in Fig. 8-74) in Setup – *Measurement Setup – Advanced Setting – LV Measurement*. For information on the setup method, please see section *5.2.9 n)*.

Fig. 8-74 LV measurement screen

8.3.9.4 Biplane discs

This measurement is a combination of Simpson A4C and Simpson A2C in that it measures the endocardium in diastole and systole of a four-chambered section and in diastole and systole of a two-chambered section in order to calculate the left ventricular function. Click on the ***Biplane discs*** measurement card to display the measurement items. The touchscreen display is as shown in Fig. 8-75. The menu type displayed on the screen is shown in Fig. 8-76.

Fig. 8-75 Biplane discs measurement items (touchscreen)

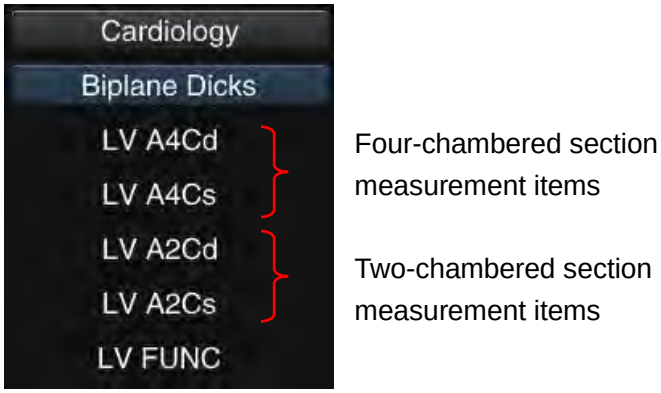


Fig. 8-76 Biplane discs measurement items (monitor)

Measurement object	Interpretation
LV A4Cd	The endocardial length and volume of a four-chambered section in diastole.
LV A4Cs	The endocardial length and volume of a four-chambered section in systole.
LV A2Cd	The endocardial length and volume of a two-chambered section in diastole.
LV A2Cs	The endocardial length and volume of two-chambered section in systole.

Measurement:

1) In 2B mode, create a cross-sectional drawing of a four-chambered section in diastole or systole, and freeze the image.

2) Bring up the ***Biplane discs*** measurement card as per section ***8.3.9.1*** and click on it to open the measurement menu.

3) Select ***LV A4Cd*** to activate measurement state.

4) Roll the trackball to move the cursor to the four-chambers in diastole and fix two points on the mitral annulus and the third point at the apex, as shown in Fig. 8-77. Once the third point has been fixed, the system will automatically sketch the outline of the heart, as shown in Fig. 8-78.

Fig. 8-77 Confirm the three points in the four-chambered diastolic section

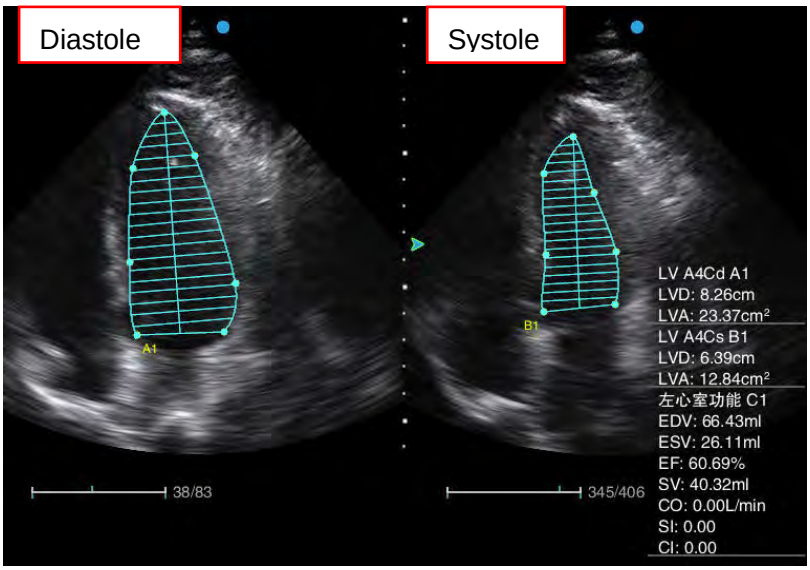


Fig. 8-78 Simpson A4C

5) If the outline cannot cover the target area, you can move the cursor to any point on the edge of the outline and press **Set** to activate this point. Roll the trackball to make the appropriate adjustment, and press **T-Ball** to switch to the next control point and make an adjustment. After making the adjustment, click on **Set** to confirm.

6) At this point, the values for the endocardial length in diastole and for the area of the left ventricle will be displayed in the bottom-right corner of the screen.

7) Then select ***LV A4Cs*** to activate measurement state for another section.

8) Use the method described above to measure the values for the endocardial length in systole and for the area of the left ventricle for the four-chambered section of the

heart in the systolic phase, and the measurement result will be displayed in the bottom-right corner of the screen.

9) Unfreeze the image and create the diastolic and systolic phases of the two-chambered section in 2B mode, and then freeze the image as a still image again.

10) Measure ***LV A2Cd*** and ***LV A2Cs*** as per measurement of a four-chambered section to get the endocardial length in diastole and systole of the two-chambered section and the left ventricular area value, and the measurement result will be shown in the bottom-right corner of the screen.

11) Finally, select ***LV FUNC***, and the system will calculate the relevant data based on the results of the above measurements, which will be displayed in the bottom-right corner of the screen. The calculation objects and formulae are as follows:

Calculation objects	**Interpretation**	**Calculation formulae**
EDV	End-diastolic volume (ml)	$EDV\ (Biplane\ Dicks) = \frac{\pi}{4}\sum_{i=1}^{20} a_i b_i \times \frac{LVLd(A4C)+\frac{LVLd(A2C)}{2}}{20}$ a and b stand for the diameter of each disc for 20 equal parts of the diastolic A4C and A2C sections.
ESV	End-systolic volume (ml)	$ESV\ (Biplane\ Dicks) = \frac{\pi}{4}\sum_{i=1}^{20} a_i b_i \times \frac{LVLs(A4C)+\frac{LVLs(A2C)}{2}}{20}$ a and b stand for the diameter of each disc for 20 equal parts of the systolic A4C and A2C sections
SV	Stroke volume (ml)	$SV = EDV - ESV$
EF	Ejection fraction (%)	$EF = \frac{EDV - ESV}{EDV} \times 100\%$
CO	Cardiac output (L/min)	$CO = \frac{SV \times HR}{1000}$
SI	The stroke index is the ratio of stroke volume to body surface area.	$SI = \frac{SV}{BSA}$
CI	The cardiac index is the ratio of the cardiac output to the body surface area.	$CI = \frac{CO}{BSA}$

【Note 1】: If the cardiac output needs to be calculated per minute (CO), the HR value should be measured in M or PW mode. The measurement object is in the *General* calculation software package.

【Note 2】: The BSA (body surface area) value is needed for some measurement objects. The value is calculated using the patient's height and weight. Make sure that the patient's height and weight is input in *New patient info*.

【Note 3】: The EF value is normal when it reaches 50 % to 80 %.

8.3.9.5 Simpson A4C

This measurement is used to calculate the left ventricular function by measuring the endocardium of the four-chambered section in diastole and in systole. Click on the ***Simpson A4C*** measurement card to display the measurement items, as shown in the table below.

Measurement object	Interpretation
LV A4Cd	The endocardial length and volume of a four-chambered section in diastole.
LV A4Cs	The endocardial length and volume of a four-chambered section in systole.

For the ***Simpson A4C*** measurement method, please refer to section ***8.3.9.4 Biplane Discs, steps 1) to 8),*** to measure the endocardium length and the volume of the four chambers Next, select ***LV Measurement,*** and the system will automatically calculate the data for the left ventricular function.

The calculation objects and formulae are as follows:

Calculation objects	Interpretation	Calculation formulae
EDV	End-diastolic volume (ml)	$EDV\ (Simp\ A4C) = \frac{\pi}{4}\sum_{i=1}^{20} a_i^2 \times \frac{LVLd}{20}$ a stands for the diameter of each disc for 20 equal parts of the diastolic A4C section.
ESV	End-systolic volume (ml)	$ESV\ (Simp\ A4C) = \frac{\pi}{4}\sum_{i=1}^{20} a_i^2 \times \frac{LVLs}{20}$ a stands for the diameter of each disc for 20 equal parts of the systolic A4C section.
SV	Stroke volume (ml)	$SV = EDV - ESV$
EF	Ejection fraction (%)	$EF = \frac{EDV - ESV}{EDV} \times 100\%$
CO	Cardiac output (L/min)	$CO = \frac{SV \times HR}{1000}$
SI	The stroke index is the ratio of stroke volume to body surface area.	$SI = \frac{SV}{BSA}$
CI	The cardiac index is the ratio of the cardiac output to the body surface area.	$CI = \frac{CO}{BSA}$

【Note 1】: If the cardiac output needs to be calculated per minute (CO), the HR value should be measured in M or PW mode. The measurement object is in the *General* calculation software package.

【Note 2】: The BSA (body surface area) value is needed for some measurement objects. The value is calculated using the patient's height and weight. Make sure that the patient's height and weight is input in *New patient info*.

8.3.9.6 Simpson A2C

This measurement is used to calculate the left ventricular function by measuring the endocardium of the two-chambered section in diastole and in systole. Click on the ***Simpson A2C*** measurement card to display the measurement items, as shown in the table below.

Measurement object	Interpretation
LV A2Cd	The endocardial length and volume of a two-chambered section in diastole.
LV A2Cs	The endocardial length and volume of two-chambered section in systole.

To use the ***Simpson A2C*** method for the measurement, first create a section in the diastole and in the systole, and then refer to ***Simpson A4C*** for the measurement. See section ***8.3.9.4, Biplane Discs, steps 1) to 8)*** for details. The calculation objects and formulae are as follows:

Calculation objects	Interpretation	Calculation formulae
EDV	End-diastolic volume (ml)	$EDV(Simp\ A2C) = \frac{\pi}{4}\sum_{i=1}^{20} b_i^2 \times \frac{LVLd}{20}$ b stands for the diameter of each disc for 20 equal parts of the diastolic A2C section.
ESV	End-systolic volume (ml)	$ESV(Simp\ A2C) = \frac{\pi}{4}\sum_{i=1}^{20} b_i^2 \times \frac{LVLs}{20}$ b stands for the diameter of each disc for 20 equal parts of the systolic A2C section.
SV	Stroke volume (ml)	$SV = EDV - ESV$
EF	Ejection fraction (%)	$EF = \frac{EDV - ESV}{EDV} \times 100\%$
CO	Cardiac output (L/min)	$CO = \frac{SV \times HR}{1000}$

SI	The stroke index is the ratio of stroke volume to body surface area.	$SI = \frac{SV}{BSA}$
CI	The cardiac index is the ratio of the cardiac output to the body surface area.	$CI = \frac{CO}{BSA}$

【Note 1】: If the cardiac output needs to be calculated per minute (CO), the HR value should be measured in M or PW mode. The measurement object is in the *General* calculation software package.

【Note 2】: The BSA (body surface area) value is needed for some measurement objects. The value is calculated using the patient's height and weight. Make sure that the patient's height and weight is input in *New patient info*.

8.3.9.7 Bullet

This measurement is used to calculate the left ventricular function by measuring the longitudinal diameter of the four-chambered left ventricle in diastolic and systolic phase and the left-ventricular area in diastolic and systolic phase (mitral valve plane). The bullet measurement sketch is shown below. Click on the ***Bullet*** measurement card to display the measurement items, as shown in the table below.

Fig. 8-79 Bullet sketch map

Measurement object	Interpretation
LVLd	Longitudinal diameter of the four-chambered left ventricle in diastole.
LVLs	Longitudinal diameter of the four-chambered left ventricle in systole
LVAd psa MV	Left ventricular area in diastole (mitral valve plane)
LVAs psa MV	Left ventricular area in systole (mitral valve plane)

Measurement:

1) When in 2B mode, create a cross-sectional drawing of a four-chambered section in diastole or systole and bring up the image as a still image.

2) Bring up the ***Bullet*** measurement card as per section ***8.3.9.1*** and click on it to open the measurement menu.

3) Select ***LVLd*** to enter measurement state.

4) Roll the trackball to move the cursor to the four-chambered section in the diastolic phase and to the start point of the longitudinal diameter of the left ventricular. Press **Set** to fix the start point. Then move the cursor to the endpoint of the longitudinal diameter of the left ventricle and press **Set** to fix the point. Use ***Distance Measurement*** to measure the LVLd value (longitudinal diameter of the left ventricle in the diastolic phase).

5) Roll the trackball to move the cursor to the four-chambered section in the systolic phase and to the start point of the longitudinal diameter of the left ventricular. Press **Set** to fix the start point. Then move the cursor to the endpoint of the longitudinal diameter of the left ventricle and press **Set** to fix the point. The LVLs value (longitudinal diameter of the left ventricle in the systolic phase) will be calculated.

6) Press **Freeze** to display the image as a live image. Determine the section of the left ventricle on the mitral valve plane in diastole or in systole.

7) If the image is displayed as a still image, press **Calc** to open the measurement menu. Activate measurement state to directly measure the LVAD psa MV.

8) Roll the trackball to move the cursor to the left ventricle of the mitral valve plane in the diastolic phase, and press **Set** on the edge of the left ventricle to fix the start point. Draw the trace along the edge of the left ventricle with the trackball. To delete the trace point by point, press **BkSp on the keyboard.** Then press **Set** to fix the endpoint. Use ***Trace Measurement*** to measure the LVAd psa MV value (left ventricular area in the diastolic phase (mitral valve plane)).

9) Use the trackball to move the cursor to the left ventricle of the mitral valve plane in the systolic phase. Refer to the last step to measure the LVAs psa MV value (left ventricular area in the systolic phase (mitral valve plane)).

10) Once the four measurements are complete, the system will automatically calculate the data for the left ventricular function. The calculation objects and formulae are as follows:

Calculation objects	Interpretation	Calculation formulae
EDV	End-diastolic volume (ml)	$EDV\ (Bullet) = \frac{5 \times (LVAd \cdot psa \cdot MV) \times LVLd}{6}$
ESV	End-systolic volume (ml)	$ESV\ (Bullet) = \frac{5 \times (LVAs \cdot psa \cdot MV) \times LVLs}{6}$
SV	Stroke volume (ml)	$SV = EDV - ESV$
EF	Ejection fraction (%)	$EF = \frac{EDV - ESV}{EDV} \times 100\%$
CO	Cardiac output (L/min)	$CO = \frac{SV \times HR}{1000}$
SI	The stroke index is the ratio of stroke volume to body surface area.	$SI = \frac{SV}{BSA}$
CI	The cardiac index is the ratio of the cardiac output to the body surface area.	$CI = \frac{CO}{BSA}$

【Note 1】: If the cardiac output needs to be calculated per minute (CO), the HR value should be measured in M or PW mode. The measurement object is in the *General* calculation software package.

【Note 2】: The BSA (body surface area) value is needed for some measurement objects. The value is calculated using the patient's height and weight. Make sure that the patient's height and weight is input in *New patient info*.

8.3.9.8 Single-plane ellipsoid

This measurement is used to calculate the left ventricular function by measuring the longitudinal diameter of the four-chambered left ventricle in diastolic and systolic phase and the endocardial volume of a four-chambered section in the diastolic and systolic phase. You will find the sketch for the single-plane ellipsoid measurement below. Click on the ***Single-plane E*** measurement card to display the measurement items, as shown in the table below.

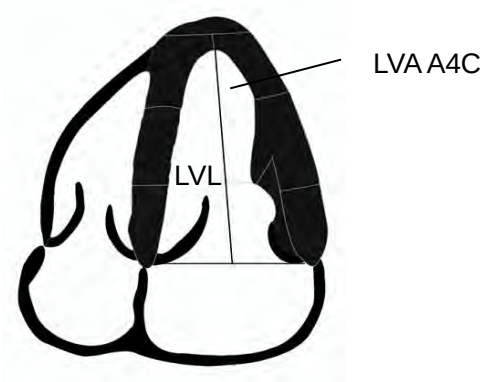


Fig. 8-80 Single-plane E sketch map

Measurement object	Interpretation
LVLd	Longitudinal diameter of the four-chambered left ventricle in diastole.
LVLs	Longitudinal diameter of the four-chambered left ventricle in systole
LVAd A4C	Left ventricular area in the diastolic phase (four-chamber)
LVAs A4C	Left ventricular area in the systolic phase (four-chamber)

Measurement:

1) In 2B mode, create sections of the diastole or systole with four chambers. Use ***Distance Measurement*** to measure the longitudinal diameter of the left ventricle in the diastolic and systolic phase.

2) Then use ***Trace Measurement*** to measure the left ventricular area in the diastolic and systolic phases.

3) Refer to section ***8.3.9.7 Bullet*** for detailed measurement steps.

4) Once the four measurements are complete, the system will automatically calculate the data for the left ventricular function. The calculation objects and formulae are as follows:

Calculation objects	Interpretation	Calculation formulae
EDV	End-diastolic volume (ml)	$EDV\ (single-plane\ ellipsoid) = \frac{8}{3} \times \frac{LVAd(A4C)^2}{\pi \times LVLd}$
ESV	End-systolic volume (ml)	$ESV\ (single-plane\ ellipsoid) = \frac{8}{3} \times \frac{LVAds}{\pi \times LVLs}$
SV	Stroke volume (ml)	$SV = EDV - ESV$
EF	Ejection fraction (%)	$EF = \frac{EDV - ESV}{EDV} \times 100\%$
CO	Cardiac output (L/min)	$CO = \frac{SV \times HR}{1000}$
SI	The stroke index is the ratio of stroke volume to body surface area.	$SI = \frac{SV}{BSA}$
CI	The cardiac index is the ratio of the cardiac output to the body surface area.	$CI = \frac{CO}{BSA}$

【Note 1】: If the cardiac output needs to be calculated per minute (CO), the HR value should be measured in M or PW mode. The measurement object is in the *General* calculation software package.

【Note 2】: The BSA (body surface area) value is needed for some measurement objects. The value is calculated using the patient's height and weight. Make sure that the patient's height and weight is input in *New patient info*.

8.3.9.9 Biplane ellipsoid

This measurement is used to calculate the left ventricular function by measuring the left ventricular medial-lateral dimension in the diastolic and systolic phase (four-chamber), the left ventricular area in the diastolic and systolic phase (mitral valve plane), and the endocardial volume of the four-chambered section in the diastolic and systolic phase.

Click on the ***Biplane E*** measurement card to display the measurement items, as shown in the table below.

Measurement object	Interpretation
LVMLd	Left ventricular medial-lateral dimension in the diastolic phase (four-chamber)
LVMLs	Left ventricular medial-lateral dimension in the systolic phase (four-chamber)
LVAd psa MV	Left ventricular area in diastole (mitral valve plane)
LVAs psa MV	Left ventricular area in systole (mitral valve plane)
LVAd A4C	Left ventricular area in the diastolic phase (four-chamber)
LVAs A4C	Left ventricular area in the systolic phase (four-chamber)

Measurement:

1) When in 2B mode, create sections of the left ventricular mitral valve plane in diastole or systole. Use ***Trace Measurement*** to measure the left ventricular area of the mitral valve plane in the diastolic and the systolic phases.

2) Then create the section of the four chambers in diastole and systole. Use ***Distance Measurement*** to measure the left ventricular medial-lateral dimension in the diastolic and systolic phases. Use ***Trace Measurement*** to measure the left ventricular area in the diastolic and systolic phases.

3) Refer to section ***8.3.9.7 Bullet*** for detailed measurement steps.

4) Once the six measurements have been completed, the system will automatically calculate the data for the left ventricular function. The calculation objects and formulae are as follows:

Calculation objects	Interpretation	Calculation formulae
EDV	End-diastolic volume (ml)	$EDV\ (biplane\ ellipsoid) = \frac{8}{3} \times \frac{LVAd(psaMV) \times LVAd(A4C)}{\pi \times LVMLd}$
ESV	End-systolic volume (ml)	$ESV\ (biplane\ ellipsoid) = \frac{8}{3} \times \frac{LVAs(psaMV) \times LVAs(A4C)}{\pi \times LVMLs}$
SV	Stroke volume (ml)	$SV = EDV - ESV$
EF	Ejection fraction (%)	$EF = \frac{EDV - ESV}{EDV} \times 100\%$
CO	Cardiac output (L/min)	$CO = \frac{SV \times HR}{1000}$
SI	The stroke index is the ratio of stroke volume to body surface area.	$SI = \frac{SV}{BSA}$
CI	The cardiac index is the ratio of the cardiac output to the body surface area.	$CI = \frac{CO}{BSA}$

【Note 1】: If the cardiac output needs to be calculated per minute (CO), the HR value should be measured in M or PW mode. The measurement object is in the *General* calculation software package.

【Note 2】: The BSA (body surface area) value is needed for some measurement objects. The value is calculated using the patient's height and weight. Make sure that the patient's height and weight is input in *New patient info*.

8.3.9.10 Modified Simpson

This measurement is used to calculate the left ventricular function by measuring the longitudinal diameter of the four-chambered left ventricle in the diastolic and systolic

phase, the left ventricular area in the diastolic and systolic phase (mitral valve plane), and the left ventricular area in the diastolic phase (papilla muscle plane). The sketch for the modified Simpson measurement is shown below.

Click on the ***Modified Simpson*** measurement card to display the measurement items, as shown in the table below.

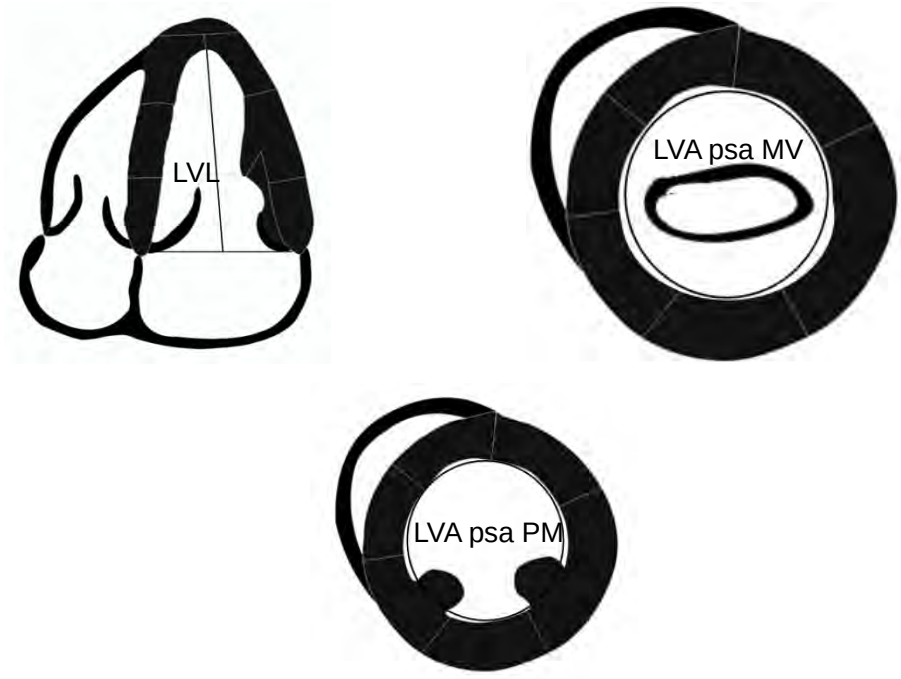


Fig. 8-81 Modified Simpson sketch map

Measurement object	Interpretation
LVLd	Longitudinal diameter of the four-chambered left ventricle in diastole.
LVLs	Longitudinal diameter of the four-chambered left ventricle in systole
LVAd psa MV	Left ventricular area in diastole (mitral valve plane)
LVAs psa MV	Left ventricular area in systole (mitral valve plane)
LVAd psa PM	The left ventricular area in diastole (papilla muscle plane)
LVAs psa PM	Left ventricular area in systole (papilla muscle plane)

Measurement:

1) When in 2B mode, create sections of the left ventricular mitral valve plane in diastole or systole. Use ***Trace Measurement*** to measure the left ventricular area of the mitral valve plane in diastole and systole.

2) Create sections of the left-ventricular papilla muscle plane in diastole and systole. Use ***Trace Measurement*** to measure the left ventricular area of the papilla muscle plane in diastole and systole.

3) Then create the section of the four chambers in diastole and systole. Use the ***Distance Measurement*** to measure the longitudinal diameter of the left ventricle in diastole and systole.

4) Refer to section ***8.3.9.7 Bullet*** for detailed measurement steps.

5) Once the six measurements have been completed, the system will automatically calculate the data for the left ventricular function.

The calculation objects and formulae are as follows:

Calculation objects	Interpretation	Calculation formulae
EDV	End-diastolic volume (ml)	$\text{EDV (Modified Simpson)} = \frac{LVLd}{3} \times \left\{LVAd(psaMV) + \frac{LVAd(psaMV)+LVAd(psaPM)}{2} + \frac{LVAd(psaPM)}{3}\right\}$
ESV	End-systolic volume (ml)	$\text{ESV (Modified Simpson)} = \frac{LVLs}{3} \times \left\{LVAs(psaMV) + \frac{LVAs(psaMV)+LVAs(psaPM)}{2} + \frac{LVAs(psaPM)}{3}\right\}$
SV	Stroke volume (ml)	$SV = EDV - ESV$
EF	Ejection fraction (%)	$EF = \frac{EDV - ESV}{EDV} \times 100\%$
CO	Cardiac output (L/min)	$CO = \frac{SV \times HR}{1000}$
SI	The stroke index is the ratio of stroke volume to body surface area.	$SI = \frac{SV}{BSA}$
CI	The cardiac index is the ratio of the cardiac output to the body surface area.	$CI = \frac{CO}{BSA}$

【Note 1】: If the cardiac output needs to be calculated per minute (CO), the HR value should be measured in M or PW mode. The measurement object can be found in the *General* calculation software package.

【Note 2】: The BSA (body surface area) value is needed for some measurement objects. The value is calculated using the patient's height and weight. Make sure that the patient's height and weight is input in *New Patient Info*.

8.3.9.11 LA Vol A-L

This measurement is used to calculate the left atrial volume by measuring the longitudinal diameter of the left atrium, the left atrial area (four-chamber) and the left atrial area (two-chamber). Click on the ***LA Vol AL*** measurement card to display the measurement items, as shown in the table below.

Measurement object	Interpretation
LAL	Longitudinal diameter of the left atrium
LAA (A4C)	Left atrial area (four-chamber)
LAA (A2C)	Left atrial area (two-chamber)
LA Vol (A-L)	Left atrial volume

Measurement:

1) In B mode, create the section of the longitudinal diameter of the left atrium. Use ***Distance Measurement*** (see section ***8.2.1.1***) to measure the longitudinal diameter of the left atrium.

2) Create a section of the four chambers. Use ***Trace-Measurement*** (see section ***8.2.1.5***) to measure the area of the left atrium.

3) Create a section of the two chambers. Use ***Trace-Measurement*** (see section ***8.2.1.5***) to measure the area of the left atrium again.

4) Once the three measurements are complete, the system will automatically calculate the left atrial volume.

8.3.9.12 Mitral valve (MV)

When in PW mode and when the current examination type is a cardiology examination type (e.g., Cardiology A), press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement objects by default. Click on the ***MV*** measurement card to display the MV measurement items, as shown below.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***MV*** measurement card and press **Set** to open the measurement menu.

Measurement object	Interpretation	Measurement procedure
MV E Vel	Maximum E-wave velocity of the mitral valve	***Instant velocity measurement***: After selecting the measurement object, move the cursor to E-wave or A-wave in the spectrogram and press **Set** to calculate the velocity. See section ***8.2.4.2 Instant velocity measurement*** for instructions.
MV A Vel	Maximum A-wave velocity of the mitral valve	
MV DT	Deceleration time of the mitral valve	***Time measurement***: After selecting the measurement object, move the cursor onto the spectrogram. Press **Set** on the starting position of the measurement target to fix the starting point. Then move the cursor to the end position and press **Set**. See section ***8.2.2.1 Time measurement*** for notes on use.
MV AT	Acceleration time of the mitral valve	
MV E Dur	Duration of the mitral valve E-wave	
MV A Dur	Duration of the mitral valve A-wave	
IVRT	Isovelocity relaxation time	

【Note】: After measuring the *MV E Vel* and *MV A Vel,* the system will automatically calculate the ratio and display it in the results window. Then it imports the result into the report worksheet.

8.3.9.13 Mitral valve area (MVA)

The mitral valve area can be measured in two ways: using VTI and using PHT:

First method:

Measurement:

1) In B mode, use ***Distance Measurement*** (see section ***8.2.1.1*** for notes on use) to measure the length value of ***LVOT***.

【Note】: The ***LVOT*** **measuring object is on the** Cardiology **–** ***General*** measurement

card.

2) Activate PW mode and press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap on the ***MVA VTI*** measurement card to open the measurement menu.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***MVA VTI*** measurement card and press **Set** to open the measurement menu.

3) Select ***LVOT VTI*** to activate measurement state. Refer to the ***Manual trace*** method (see ***8.2.4.4*** for instructions) to continuously measure the ***LVOT VTI*** (velocity time integral of left ventricular outflow tract) and ***MV VTI*** (velocity time integral of mitral valve velocity) values in the spectrogram.

4) The system will automatically calculate the mitral valve area based on the VTI value, which will be displayed in the bottom-right corner of the screen. The calculation formula is as follows:

$$MVA = \Pi\left(\frac{LVOT}{2}\right)^2 \times \frac{VTI\ (LVOT}{VTI\ (MV)}$$

Second method:

1) Press **Calc** on the control panel in PW mode to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap on the ***MVA PHT*** measurement card to open the measurement menu.

【**Note**】**:** The procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***MVA PHT*** measurement card and press **Set** to open the measurement menu.

2) Select ***MVA PHT*** to activate the measurement state. Refer to ***Time Measurement*** (see ***8.2.2.1*** for notes on use) to measure the ***MV PHT*** (half-time of the mitral valve differential pressure) in the spectrogram.

3) The system will automatically calculate the mitral valve area based on the PHT value, which is then displayed in the bottom-right corner of the screen. The calculation formula is as follows:

$$MVA = \frac{220}{PHT}$$

【Note】: The measurement methods for other measurement items on the *MVA PHT* measurement card are listed below:

Measurement object	Interpretation	Measurement procedure
MV MPG	Mitral valve mean pressure gradient	Use ***Manual trace measurement*** *(*see section ***8.2.4.4*** for notes on use).
MS Max Vel	Maximum velocity of mitral valve stenosis	In CW mode, use ***Instant Velocity measurement*** *(*see section ***8.2.4.2*** for instructions).

8.3.9.14 Measuring mitral valve regurgitation

Use the PISA measurement to measure the area and return of mitral regurgitation. The measurement method is shown below.

1) In CFM mode, move the colour box to the area of mitral regurgitation, tap on ***Baseline*** on the touchscreen, and rotate the knob underneath anticlockwise until the colour changes (from blue to red), and then freeze the image.

2) Press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – General*** measurement items by default. Tap the ***PISA*** measurement card to open the measurement menu.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***PISA*** measurement card and press **Set** to open the measurement menu.

3) Select ***PISAr*** (hemisphere radius) to activate the measurement state.

4) Use the distance measurement method (see ***8.2.1.1*** for notes on use) and measure

the PISAr of the colour change on the upper edge of the mitral valve. The system will calculate the HAS value (surface of the hemisphere).

5) The system will open up the Alias Vel (reflux velocity) prompt window, as shown in Fig. 8-82. Enter the velocity displayed under the baseline in the blood speed scale in the upper-right corner of the screen into the input box.

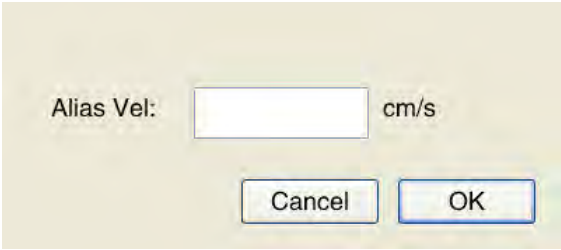


Fig. 8-82 Alias velocity input window

6) Activate CW mode and press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap the ***PISA*** measurement card to open the measurement menu.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***PISA*** measurement card and press **Set** to open the measurement menu.

7) Select ***MR Max Vel*** (the maximum reflux velocity). Measure the maximum reflux velocity in the spectrogram according to the ***Instant velocity measurement*** (see Section ***8.2.4.2*** for notes on use).

8) The system will automatically calculate the EROA value (reflux area) according to the following formula:

$$EROA = HAS \times \frac{Alias\ Vel}{MR\ Max\ Vel}$$

9) Measure the MR VTI value in the spectrogram continually using ***Manual Trace*** measurement (see ***8.2.4.4*** for notes on use). The system will automatically calculate the MR Vol (reflux) value. The calculation formula is as follows:

$$MR\ Vol = EROA \times MR\ VTI$$

8.3.9.15 Measuring the right ventricular systolic pressure (RVSP)

Measurement:

1) Create a tricuspid regurgitation section and activate CW mode. Press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap the ***RVSP*** measurement card to open the measurement menu.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***RVSP*** measurement card and press **Set** to open the measurement menu.

2) Select ***TR Max Vel*** (tricuspid maximum blood flow velocity). Use ***Instant velocity measurement*** (see ***8.2.4.2*** for notes on use) to measure the maximum velocity and maximum differential pressure (TR PPG) in the spectrum .

3) In this case, the system will display the RA Press (right atrium pressure) input window, as shown in Fig. 8-83. Now, the value can be entered based on the actual situation of the patient, for example, 10 mmHg.

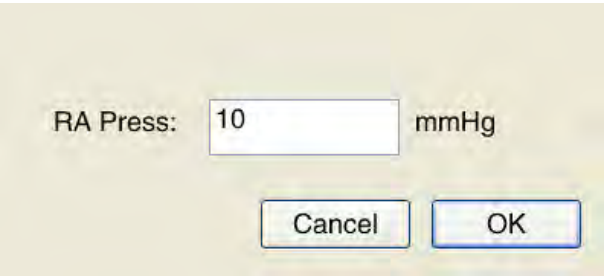


Fig. 8-83 Right atrium pressure input window

4) The system automatically calculates the PA pressure (pulmonary artery pressure). The calculation formula is as follows:

$$PA\ Press = TR\ PPG + RA\ Press$$

8.3.9.16 Ratio of pulmonary circulation to systemic circulation (Qp : Qs)

Measurement:

1) When in B mode, create a section of the right ventricular outflow tract. Use ***Distance measurement*** (see section ***8.2.1.1***) to measure the length of the right ventricular outflow tract (**Note**: the ***RVOT*** is located in the ***Cardiology – General*** measurement card).

2) Activate PW mode and create the baseline at the top.

3) Press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement cards by default. Tap the ***Qp : Qs*** measurement card to open the measurement menu.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***Qp: Qs*** measurement card and press **Set** to open the measurement menu.

4) Select ***RVOT VTI*** to activate measurement state. Refer to ***Manual trace measurement*** (see ***8.2.4.4*** for instructions). Measure the RVOT VTI value in the spectrogram continuously.

5) Return to B mode and create the left-ventricular outflow tract section. Measure the length of the left-ventricular outflow tract using ***Distance measurement*** (see section ***8.2.1.1*** for notes on use) (**Note:** The ***LVOT*** measurement object is on the ***Cardiology – General*** measurement card).

6) Re-activate PW mode and open the ***Qp : Qs*** measurement card. Click on the ***LVOT VTI*** measurement object. Refer to ***Manual trace measurement*** (see section ***8.2.4.4*** for notes on use) to measure the LVOT VTI value on the spectrogram.

7) The system will automatically calculate the Qp: Qs value (pulmonary circulation: systemic circulation). The calculation formula is as follows:

$$Qp : Qs = \frac{RVOT^2 \times RVOT\ VTI}{LVOT^2 \times LVOT\ VTI}$$

8.3.9.17 TEI

The TEI index is calculated using the isovolumetric contraction time (IVCT), the isovolumetric relaxation time (IVRT) and the ejection time (ET).

Measurement:

1) In PW mode, press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap on the ***TEI*** measurement card to open the measurement menu.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***TEI*** measurement card and press ***Set*** to open the measurement menu.

2) Select ***IVCT***. Refer to the ***Time measurement*** (see section ***8.2.2.1*** for notes on use) to continuously measure the IVCT, IVRT and ET values in the spectrogram, as shown in Fig. 8-84.

3) Once the three measurements are complete, the system will automatically calculate the TEI index. The calculation formula is as follows:

TEI = (IVCT + IVRT) / ET

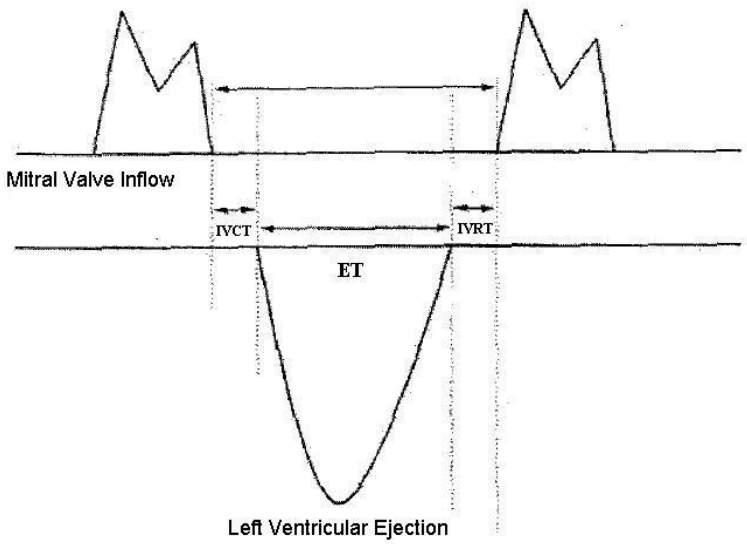


Fig. 8-84 TEI sketch map

8.3.9.18 Aortic valve

In PW mode, and as long as the current examination type is a cardiology examination type (e.g., Cardiology A), press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap on ***AV*** to open the AV measurement menu. The aortic valve (AV) measurement items and measurement methods are shown below.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***AV*** measurement card and press **Set** to open the measurement menu.

Measurement object	Interpretation	Measurement procedure
AV Vel	Aortic valve velocity	Measuring the ***Instant velocity***: After selecting the measurement object, move the cursor to the desired measurement point in the spectrogram. Press **Set** to calculate the velocity and differential pressure (V, PG) values. See section ***8.2.4.2 Instant velocity measurement*** for notes on use.
DAo Vel	Velocity of descending aorta	
AV AT	Aortic valve acceleration time	***Time measurement***: After selecting the measurement object, move the cursor onto the spectrogram. Press **Set** on the starting position of the measurement target to fix the starting point. Then move the cursor to the end position and press **Set**. See section ***8.2.2.1 Time measurement*** for notes on use.
AV DT	Aortic valve deceleration time	

8.3.9.19 Aortic valve/left ventricular outflow tract (AV/LVOT)

In PW mode, and as long as the current examination type is a cardiology examination type (e.g., Cardiology A), press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap ***AV/LVOT*** to open the AV/LVOT measurement menu. The measurement items and measurement methods are shown below.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***AV/LVOT*** measurement card and press **Set** to open the measurement menu.

<table>
<tr><th>Measurement object</th><th>Interpretation</th><th>Measurement procedure</th></tr>
<tr><td>LVOT</td><td>Left ventricular outflow tract</td><td rowspan="2">Measuring the Instant velocity: After selecting the measurement object, move the cursor to the desired measurement point in the spectrogram. Press Set to calculate the velocity and differential pressure (V, PG) values. See section 8.2.4.2 Instant velocity measurement for notes on use.</td></tr>
<tr><td>AV Vel</td><td>Aortic valve velocity</td></tr>
<tr><td>LVOT AT</td><td>Left ventricular outflow tract acceleration time</td><td rowspan="2">Time measurement: After selecting the measurement object, move the cursor onto the spectrogram. Press Set on the starting position of the measurement target to fix the starting point. Then move the cursor to the end position and press Set. See section 8.2.2.1 Time measurement for instructions.</td></tr>
<tr><td>LV ET</td><td>Left ventricular ejection time</td></tr>
</table>

8.3.9.20 Aortic valve area (AVA)

The aortic valve area can be measured in two ways: by VTI and by continuous equation.

First method:

Measurement:

1) In B-mode, use ***Distance measurement*** *(*see section ***8.2.1.1*** for instructions*)* to measure the value of the length of LVOT.

【**Note**】: The ***LVOT*** **measurement object is located on the** ***Cardiology – General*** **measurement card.**

2) Activate PW mode and press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap the ***AVA VTI*** measurement card to open the measurement menu.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***AVA VTI*** measurement card and press **Set** to open the measurement menu.

3) Select ***LVOT VTI*** to activate measurement state. Refer to the ***Manual trace*** method (see ***8.2.4.4*** for instructions) to continuously measure the ***LVOT VTI*** (velocity time integral of left-ventricular outflow tract) and ***AV VTI*** (velocity time integral of aortic valve velocity) values in the spectrogram.

4) The system will automatically calculate the aortic valve area based on the VTI value, which will be displayed in the bottom-right corner of the screen. The calculation formula is as follows:

$$AVA = \Pi \left(\frac{LVOT}{2}\right)^2 \times \frac{VTI(LVOT)}{VTI\ (AV)}$$

Second method:

1) In B-mode, use ***Distance measurement*** *(*see section ***8.2.1.1*** for notes on use*)* to measure the value of the length of ***LVOT*** .

【**Note**】: The ***LVOT*** **measurement object is located on the** ***Cardiology – General*** **measurement card.**

2) Activate PW mode and press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap the ***AVA C*** measurement card to open the measurement menu.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***AVA C*** measurement card and press **Set** to open the measurement menu.

3) Select ***LVOT Vel*** to activate measurement state. Refer to the ***Instant velocity*** method (see ***8.2.4.2*** for notes on use) to measure the ***LVOT Vel*** (left ventricular outflow tract velocity) value in the spectrogram.

4) Activate CW mode and press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement cards by default. Tap the ***AVA C*** measurement card to open the measurement menu.

【**Note**】**:** Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***AVA C*** measurement card and press **Set** to open the measurement menu.

5) Select ***AS Max Vel*** to activate the measurement state. Refer to the ***Instant velocity*** method (see ***8.2.4.2*** for notes on use) to measure the ***AS Max Vel*** (maximum velocity of mitral valve stenosis) value.

6) After completing the three measurements, the system will automatically calculate the area of the aortic valve and displays it in the bottom-right corner of the screen. The calculation formula is as follows:

$$AVA = \Pi\left(\frac{LVOT}{2}\right)^2 \times \frac{LVOT\ Vel}{AS\ Max\ Vel}$$

8.3.9.21 Aortic valve regurgitation (AR)

In PW mode, and as long as the current examination type is a cardiology examination type (e.g., Cardiology A), press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap ***AR*** to open the aortic valve regurgitation measurement menu. The aortic valve regurgitation (AR) measurement items and measurement methods are shown below.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***AR*** measurement card and press **Set** to open the measurement menu.

Measurement object	Interpretation	Measurement procedure
AR PHT	Aortic valve regurgitation pressure half time	***Time measurement***: After selecting the measurement object, move the cursor onto the spectrogram. Press Set on the start position of the measurement target to fix the start point. Then move the cursor to the end position and press **Set**. See section ***8.2.2.1 Time measurement*** for notes on use.
AR Max Vel	Maximum velocity of aortic valve regurgitation	Measuring the ***Instant velocity***: After selecting the measurement object, move the cursor to the desired measurement point in the spectrogram. Press **Set** to calculate the velocity (V) value. See section ***8.2.4.2 Instantaneous velocity measurement*** for notes on use.
AR VTI	Aortic valve regurgitation velocity time integral	***Manual trace***: After selecting the measurement item, use the trackball and the **Set** button to trace the target region on the spectrum and calculate the VTI and MNPG values. See section ***8.2.4.4 Measurement using manual trace*** for notes on use.
AR MPG	Aortic valve regurgitation mean pressure gradient	

8.3.9.22 Tricuspid valve (TV)

In PW mode, and as long as the current examination type is a cardiology examination type (e.g., Cardiology A), press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap ***TV*** to open the tricuspid valve measurement menu. The tricuspid valve (TV) measurement items and measurement methods are shown below.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***TV*** measurement card and press **Set** to open the measurement menu.

Measurement object	Interpretation	Measurement procedure
TV E Vel	Maximum velocity of tricuspid valve E-wave	Measuring the ***Instant velocity***: After selecting the measurement object, move the cursor to the E-wave or A-wave in the spectrogram. Press **Set** to calculate the speed. See section ***8.2.4.2 Instantaneous velocity measurement*** for notes on use.
TV A Vel	Maximum velocity of tricuspid valve E-wave	
TV VTI	Velocity time integral of tricuspid valve	***Manual trace***: After selecting the measurement item, use the trackball and the **Set** button to trace the target region on the spectrum and calculate the VTI value. See section ***8.2.4.4 Measurement using manual trace*** for notes on use.
TV DT	Deceleration time of tricuspid valve	***Time measurement***: After selecting the measurement object, move the cursor onto the spectrogram. Press Set on the start position of the measurement target to fix the start point. Then move the cursor to the end position and
TV AT	Acceleration time of tricuspid valve	
TV E Dur	Tricuspid valve E-wave duration	

Measurement object	Interpretation	Measurement procedure
TV A Dur	Tricuspid valve A-wave duration	press **Set**. See section ***8.2.2.1 Time measurement*** for notes on use.

【Note】: After measuring the *TV E Vel* and *TV A Vel,* the system automatically calculates the ratio and displays it in the results window. Then it imports the result into the report worksheet.

8.3.9.23 Tricuspid valve area (TVA)

1) In B-mode state, press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap ***TVA*** to open the tricuspid valve measurement menu.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***TVA*** measurement card and press **Set** to open the measurement menu.

2) Select ***TVA PHT*** to bring up the measurement state. Refer to ***Time measurement*** (see ***8.2.2.1*** for notes on use) to measure the ***TV PHT*** (tricuspid valve differential pressure half-time) in the spectrogram.

3) The system will automatically calculate the tricuspid valve area based on the PHT value, which will be displayed in the bottom-right corner of the screen. The calculation formula is as follows:

$$TVA = \frac{220}{PHT}$$

【Note】: The measurement methods for other measurement items in the *TVA* measurement card are listed as follows:

Measurement object	Interpretation	Measurement procedure
TV MPG	Tricuspid valve mean pressure gradient	Use ***manual tracing*** to measure (see section ***8.2.4.4***).
TS max vel	Maximum velocity of tricuspid valve stenosis	In CW mode, use the ***instant velocity measurement*** (see section ***8.2.4.2***).

8.3.9.24 Pulmonary valve (PV)

In PW mode, and as long as the current examination type is a cardiology examination type (e.g., Cardiology A), press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap ***PV*** to open the pulmonary valve measurement menu. The pulmonary valve (PV) measurement items and measurement methods are shown below.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***PV*** measurement card and press **Set** to open the measurement menu.

Measurement object	Interpretation	Measurement procedure
PV Max Vel	Maximum velocity of pulmonary valve	Measuring the ***Instant velocity***: After selecting the measurement object, move the cursor to the point of maximum velocity in the spectrogram. Press **Set** to calculate the velocity (V) value. See section ***8.2.4.2 Instant velocity measurement*** for notes on use.

Measurement object	Interpretation	Measurement procedure
PV VTI	Velocity time integral of the pulmonary artery	***Manual trace***: After selecting the measurement item, use the trackball and the **Set** button to trace the target region on the spectrum and calculate the VTI value. See section ***8.2.4.4 Measurement using manual trace*** for notes on use.
PV AT	Pulmonary valve acceleration time	***Time measurement***: After selecting the measurement object, move the cursor onto the spectrogram. Press Set on the start position of the measurement target to fix the start point. Then move the cursor to the end position and press **Set**. See section ***8.2.2.1 Time measurement*** for notes on use.
PV DT	Pulmonary valve deceleration time	

8.3.9.25 Pulmonary reflux (PR)

In PW mode, and as long as the current examination type is a cardiology examination type (e.g., Cardiology A), press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap ***PR*** to open the pulmonary valve reflux measurement menu. The pulmonary valve reflux (PR) measurement items and measurement methods are shown below.

【Note】: The procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***PR*** measurement card and press **Set** to open the measurement menu.

Measurement object	Interpretation	Measurement procedure
PR PHT	Pulmonary valve reflux pressure half time	***Time measurement***: After selecting the measurement object, move the cursor onto the spectrogram. Press Set on the start position of the measurement target to fix the start point. Then move the cursor to the end position and press **Set**. See section ***8.2.2.1 Time measurement*** for notes on use.
PR Max Vel	Maximum velocity of pulmonary valve reflux	Measuring the ***Instant velocity***: After selecting the measurement object, move the cursor to the desired measurement point in the spectrogram. Press **Set** to calculate the velocity (V) value. See section ***8.2.4.1 Instant velocity measurement*** for notes on use.
PR VTI	Pulmonary valve reflux velocity time integral	***Manual trace***: After selecting the measurement item, use the trackball and the **Set** button to trace the target region on the spectrum and calculate the VTI and MNPG values. See section ***8.2.4.4 Measurement using manual trace*** for notes on use.
PR MPG	Pulmonary valve reflux mean pressure gradient	

8.3.9.26 Pulmonary flow (Pul Flow)

In PW mode, and as long as the current examination type is a cardiology examination type (e.g., Cardiology A), press **Calc** on the control panel to open the measurement menu. The system will display ***Cardiology – HR*** measurement items by default. Tap ***Pul Flow*** to open the pulmonary flow measurement menu. The pulmonary flow (Pul Flow) measurement items and measurement methods are shown below.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***Pul Flow*** measurement card and press **Set** to open the measurement menu.

Measurement object	Interpretation	Measurement procedure
Pul S Vel	Pulmonary vein S-wave velocity	Measuring the ***instant velocity***: After selecting the measurement object, move the cursor to the point of maximum velocity of the S-wave, the D-wave and the A-wave on the spectrogram. Press **Set** to calculate the velocity (V) value. See section ***8.2.4.2 instant velocity measurement*** for notes on use.
Pul D Vel	Pulmonary vein D-wave velocity	
Pul A Vel	Pulmonary vein A-wave velocity	
Pul A Dur	Pulmonary vein A-wave duration	***Time measurement***: After selecting the measurement object, move the cursor onto the spectrogram. Press Set on the start position of the measurement target to fix the start point. Then move the cursor to the end position and press **Set**. See section ***8.2.2.1 Time measurement*** for notes on use.

【Note】: After measuring the *Pul S Vel* and the *Pul D Vel*, the system automatically calculates the S/D value and displays it in the results window. Then it imports the result into the report worksheet.

8.3.9.27 Tissue Doppler imaging (TDI)

If TDI and PW images are displayed in the upper and lower layout, and the examination is a cardiology exam (e.g. Cardiology A), press **Calc** on the control panel to open the measurements and calculations menu. The system will display ***Cardiology – HR*** measurement items by default. Tap ***TDI*** to open the TDI measurement menu.

【Note】: Procedure for the measurement menu on the screen: Move the cursor over ***HR*** and press **Set** to display the measurement cards. Move the cursor again over the ***TDI*** measurement card and press **Set** to open the measurement menu.

Measurement object	Interpretation	Measurement procedure
BIS E` Vel	Basal inferoseptum E` velocity	***Instant velocity measurement***: Select one measurement item. Move the cursor to the E peak or A peak on the spectrum and click on **Set** to obtain the velocity (V). See ***8.2.4.2*** for more information. **【Note 1】:** If ***BIS E` Vel*** and ***BIS A` Vel*** are being measured, the system automatically calculates their ratio (***BIS E` / A '***). If ***BAL E` Vel*** and ***BAL A` Vel*** are being measured, the system automatically calculates their ratio (***BAL E` / A '***). **【Note 2】:** If ***MV E Vel*** and ***MV A Vel*** are being measured, the system automatically calculates ***MV E / BIS E`, MV A / BIS A`, MV E / BAL E`*** and ***MV A / BAL A`*** to further evaluate the diastolic function. The four ratios can be reviewed in the report.
BIS A' Vel	Basal inferoseptum A' velocity	
BAL E' Vel	Basal anterolateral E` velocity	
BAL A' Vel	Basal anterolateral A' velocity	
MIS E' Vel	Mid inferoseptum E' velocity	***Instant velocity measurement***: Select one measurement item. Move the cursor to the E peak or A peak on the spectrum and click on **Set** to obtain the velocity (V). See ***8.2.4.2*** for more information. **【Note】:** If ***MIS E'` Vel*** and ***MIS A` Vel*** are being measured, the system automatically calculates their ratio (***MIS E` / A '***).
MIS A' Vel	Mid inferoseptum A' velocity	

8.3.9.28 Report worksheet – Cardiology

The result of the cardiac measurement will automatically be imported into the report. Press the **Report** button on the control panel during or after the measurement to bring up the report worksheet screen (as shown in Fig. 8-85) and check the examination result.

Click on ✕ in the upper right-hand corner of the screen or click on **Report** again to exit the report worksheet screen.

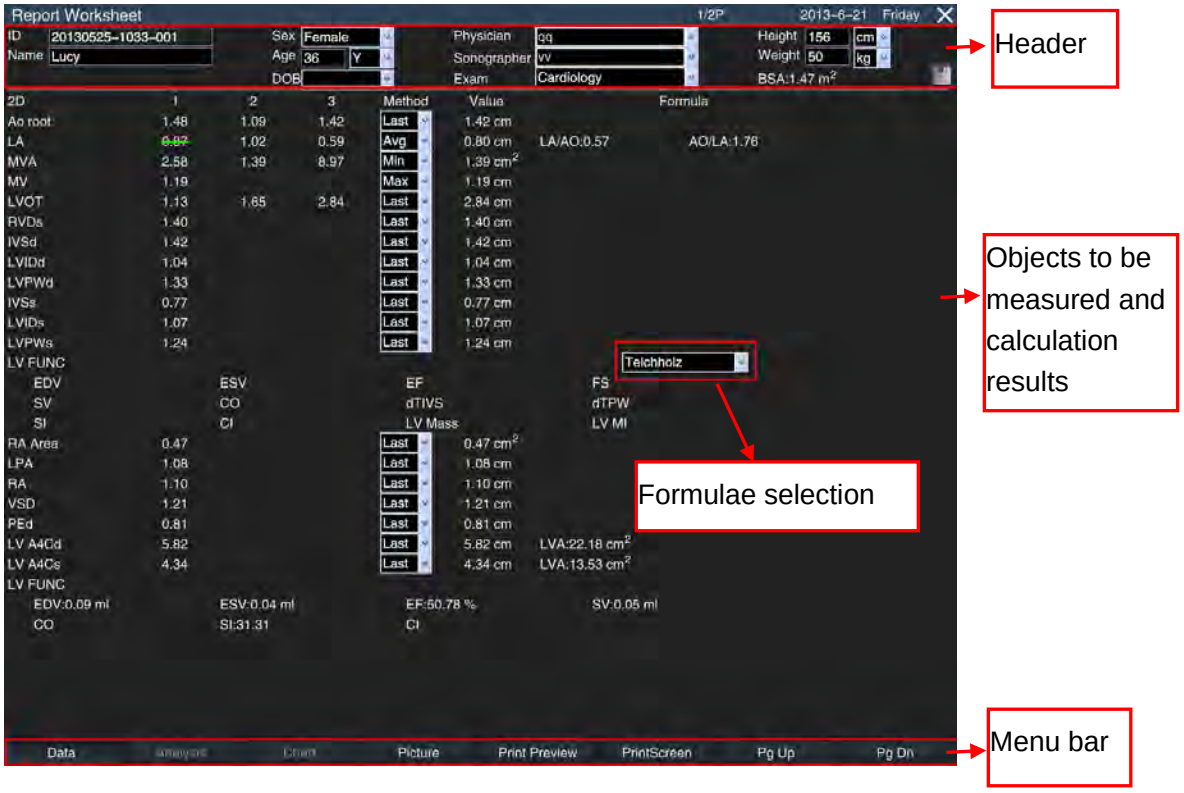


Fig. 8-85 Report worksheet – Cardiology

◆ **Header**

Patient information is displayed in the header. If the patient information was not input into the ***New Patient Info*** screen, it can be input into the header bar. After entering the patient data, click on the ***Save*** button on the right side of the header bar, and the input information will be saved. Otherwise, the additional information will be lost when you exit the report worksheet screen.

When ***body height*** and ***body weight*** are input, the system will automatically calculate the BSA value.

【Note】: The "Name" field in the report is not editable.

◆ **Measurement objects and calculation results**

This area displays the measurement results of all measuring objects as well as the conclusion that is drawn from the calculation result, and they can be edited.

Three measurement values can be recorded for each measurement object in 2D mode. To delete any of the measurement results, move the cursor onto the value and click on **Set** to cross it out, as shown above.

Following the three measurement values, there is a drop-down box for selecting Avg (average of all the effective measurement values), Min (the minimum value), Max (the maximum value) or Last (the last measured value).

Several formulae are available for calculating the left ventricular function, for example Teichholz, Cubed, or Gibson. The calculation result will change depending on which formula is chosen.

◆ **Comments**

The user can fill in the relevant diagnostic information in the ***Annotations*** section. Move the cursor into the annotations area and press **Set** to input the information.

◆ **Menu bar**

Click on the object in question on the menu bar to enter the corresponding screen.

Data: When you are in another screen, click this to return to the report worksheets screen.

Image: Calls up the image of the report-editing screen. The process is the same as for the ***obstetrics*** report worksheet (see section ***8.3.2.8***).

Print preview: Calls up the report preview screen. The operation is the same for the ***obstetrics*** report worksheet (see section ***8.3.2.9***).

Print screen: Click here to save the current page to the specified directory in BMP format.

Pg Up, Pg Dn: Turns the page if there are multiple pages.

【Note】: *Analyses* and ***graphs*** that are not intended for the cardiology report worksheet are invalid.

8.3.10 Orthopaedics

8.3.10.1 Function

The orthopaedics calculation software can be used for examining the hip joint. It is

necessary to correctly place three lines on the ultrasound image: BL, Alpha and Beta. The system will automatically calculate the value of the two angles (alpha angle, and beta angle), as shown in Fig. 8-86. By analysing the data from these two angles, you can check whether the joints have signs of deformity or dislocation.

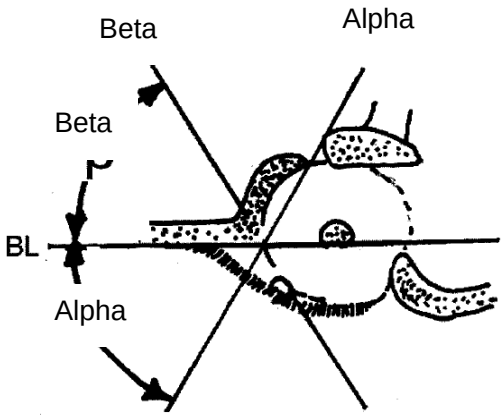


Fig. 8-86 Measuring the hip joint

8.3.10.2 Procedure

Measurement:

1) In B mode, press **Calc** on the control panel to open the measurement menu. If the current examination type is an examination type for orthopaedics, the system will by default display the ***Hip joint*** measurement object. Select the measurement object to enter the measurement state.

2) A + cursor will appear in the centre of the image. Press **Set** to fix point ***A***. Then use the trackball and press **Set** to fix point ***B***. The first line ***BL*** (baseline) will be displayed.

3) Move the trackball to display the ***alpha*** line (limbus acetabuli line). Rotate it to the appropriate position and press **Set** to fix it.

4) Move the trackball again to display the ***beta*** line (fall line). Rotate it to the appropriate position and press **Set** to fix it.

5) Having plotted the three lines, press **Set** at the start/end point of the line to activate and modify it.

6) The display result is:

Angle ***alpha***: The slope between the line B and the line ***alpha***.

Angle ***beta***: The slope between the line B and the line ***beta***.

Chapter 9

Film and File Management

9.1 Film

9.1.1 Description of function

Images are continuously stored in the real-time state in the memory. When the memory is full, new images continuously replace previous images. After displaying the image as a still image, the images stored in the memory before being displayed as still images can be played back.

【Note 1】: The number of individual film frames depends on the mode in question.

【Note 2】: When the mode is changed, all cached film images will be deleted. When the system is in Live state or turned off, all stored images will be deleted.

9.1.2 Operational methods

9.1.2.1 Manual film

a) In still image state, the system is in the default manual single-frame film state. The film bar will appear at the bottom edge of the screen for the user. Move the trackball to play back the images stored in the memory.

b) In still image state, tap on ***Manual*** on the touchscreen and turn the knob directly underneath to play back the film.

9.1.2.2 Continuous film

In still image state, tap on ***Forward*** or ***Backward*** on the touchscreen to start the continuous film. Tap on it again to stop the continuous film.

9.1.2.3 Setting the playback speed

In still image state, tap on ***Speed*** on the touchscreen and turn the knob directly underneath to set the playback speed. Several levels are available for selection.

Fig. 9-1 Film touchscreen display

9.1.2.4 Film segment

In still image state, set the position of the film start point and endpoint to play a film segment.

To set a frame as a start point, manually go to this frame and tap on ***Set First*** on the touchscreen to confirm. Then go manually to play back another frame and tap on ***Set Last*** on the touchscreen to confirm the endpoint. When the setup is complete, tap on ***Forward*** or ***Backward*** on the touchscreen to play the film.

Tap on ***Del Range*** on the touchscreen to delete the setting for the start and endpoint. You can then reset the start and endpoints.

If ***Film Range*** on the touchscreen shows ***Off***, the whole film will be played back in the film state. Tap on ***Cine Range*** to switch to ***On***. Then only the set range of the film will be played.

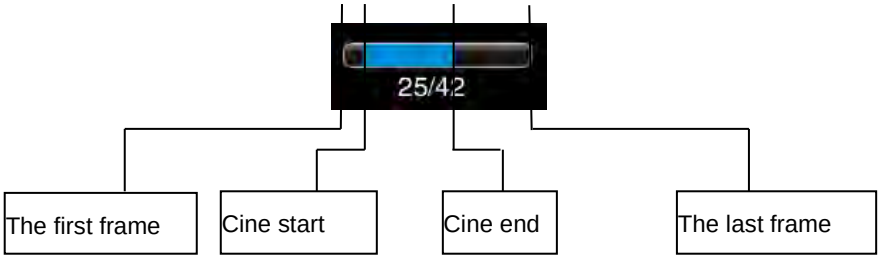


Fig. 9-2 Film segment

Tap on ***To First*** or ***To Last*** on the touchscreen to jump to the first or last frame. If the film range has been set, it will jump to the start or end of the film.

9.2 Store setup

Tap on ***Disk*** on the touchscreen to call up the screen shown in Fig. 9-3:

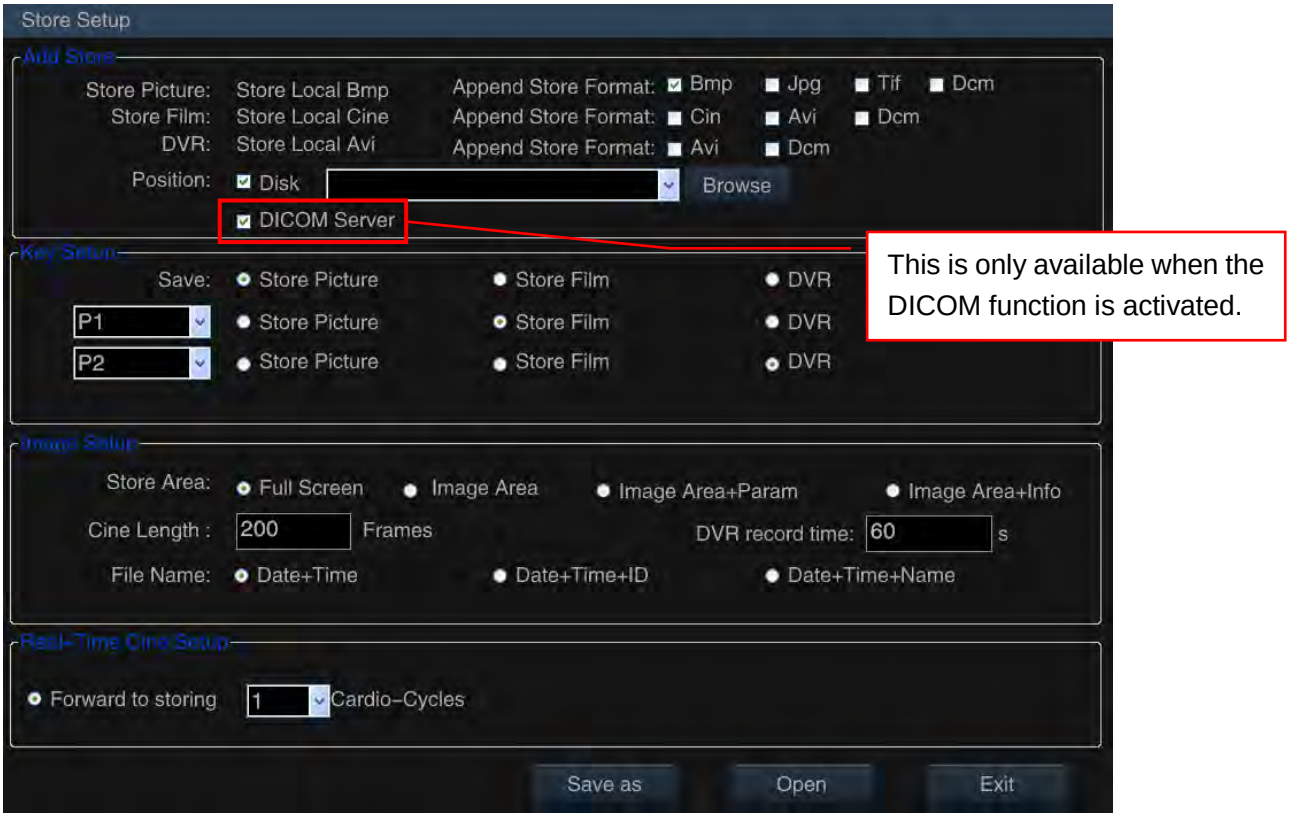


Fig. 9-3 Store setup

9.2.1 Key setup

Fig. 9-4 Key setup

- **Save:** For selecting the type for saving the file. 3 types are available: ***Picture***, ***Film and DVR***. When the setup is finished, press **Save** to save the file under that type.
- **Hotkeys P1 ~ P6 (Dis):** Select a hotkey from the drop-down menu and define it as **Save** key (**Note: If this hotkey has already been set, the old function will be overwritten**). Next, select the file save type. When the setup is finished, press **the hotkey** to save the file in that type.

【Note】: In non-4D mode, the storage formats for *Picture, Film or DVR* are *Jpg, Cin or Avi*. In 4D mode, the storage formats for *Picture, Film or DVR* are *Vol, Vols or Avi*. Cin, Vol and Vols formats cannot be viewed directly on a PC. To view on a PC, attach the file to be saved in another PC format (see the description *Appending storage* below), or transform the file to PC format when sending files (for more information, see *9.4.5*).

9.2.2 Appending storage

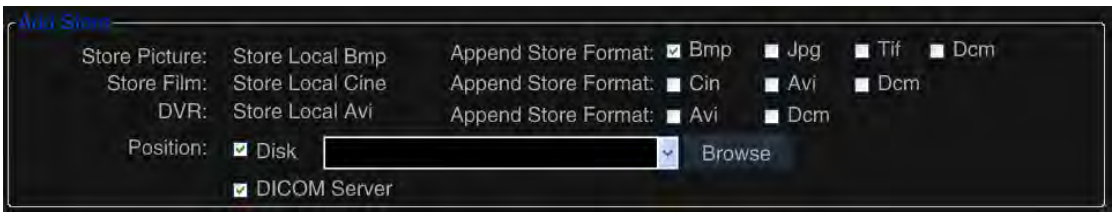


Fig. 9-5 Adding storage

There are two options for choosing the destination for the attached storage files: ***Disk*** and ***DICOM server***. ***DICOM Server*** is only available when the DICOM feature is activated. Select the option, press **Save** or the hotkey **P1 ~ P6 (Dis)** to save the image to the local hard drive. At the same time, a DICOM frame will be sent to the DICOM server.

Append Store Format is available for selection only when ***Disk*** is selected.

As a rule, the following ***image*** formats can be attached: ***BMP***, ***JPG*** and ***TIFF;*** the available ***film*** formats are: ***Cin*** and ***AVI;*** the available ***DVR*** format is ***AVI***. If the DOCM function is activated, one further ***DCM*** format is available.

Select ***Disk***, click on ***Browse*** on the right-hand side, and the ***Browse For Folder*** window will appear (see Fig. 9-6). You may select the specific folder for storage or select the folder from the dropdown menu.

【Note】: The drop-down menu will be empty before the first save. If a storage operation has already been performed, the system will save the storage path automatically.

When the setup is finished, press **Save** or the **P1~P6(Dis)** hotkey to save the file in two formats at the same time (system default format and the format for appending). The file in system default format will be saved in the system default folder (usually in the E:\\PatInfo folder), and the appended file will be saved in the user-defined folder.

Fig. 9-6 Browse for folder

9.2.3 Image setting

Fig. 9-7 Image setting

- ***Store area***: For setting up an image store area, where 4 types are available:

  Full screen: For saving the full screen, including the image area, parameter area and image preview area.

  Image Area: For saving only the image area.

  Image area + param: Only the image area and the parameters for the left screen will be saved.

  Image area + info: Only the image area and the patient information displayed on the screen will be saved.

- ***Cine length***: For setting up the maximum number of frames that will be saved for the film. Move the cursor onto the input box, press **Set**, and then use the keyboard to input the number.

- ***DVR record time*** : For setting up the duration for saving DVR files. If the recording is not stopped manually upon reaching the set time, the recording will be stopped automatically and then saved as a video by the system. The setup is the same as for ***Cine Length***.

- ***File name***: For selecting the name format of the file to be saved.

9.2.4 Film setup in real time

Fig. 9-8 Film setup in real time

【Note】: This setting is only available when the system's ECG feature has been activated.

This setting allows the user to set the number of cardiac cycles for the film to be saved. When the setup is complete and the ECG function is being used, press **Save**. The system will save the ECG for the cardiac cycles and 2D images set before the button was

pressed.

How to adjust: Use the trackball and the **Set** button to click on the right arrow (as shown in Fig. 9-8) and select the number from the drop-down menu.

9.2.5 Save as

Use ***Save as*** to save the current image or film to a specified location in the designated format.

Bring up the image in still-image mode and tap ***Disk*** on the touchscreen to call up the ***Store Setup*** screen. Use the trackball and the **Set** key to click on the ***Save as*** button, and it the ***Save as*** dialogue window will appear (see Fig. 9-9).

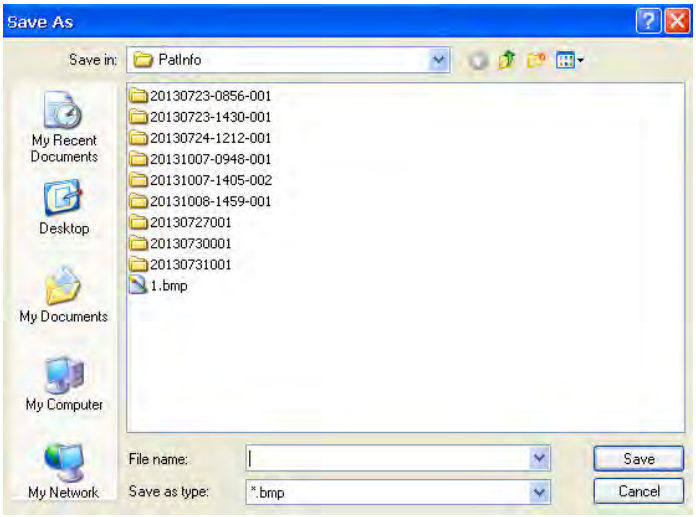


Fig. 9-9 Save as dialogue window

Select the save location, enter the file name in the ***File name*** field, select the storage type from the ***Save as type*** drop-down menu (*bmp*, *jpg* and *cin* formats are available), and click on ***Save***.

9.2.6 Open

Use ***Open*** to open any image or film saved in the local system.

Click on ***Open*** on the ***Store Setup*** screen to call up the ***Open*** dialogue window (see Fig. 9-10). Find the target folder and click on ***Open*** to open it.

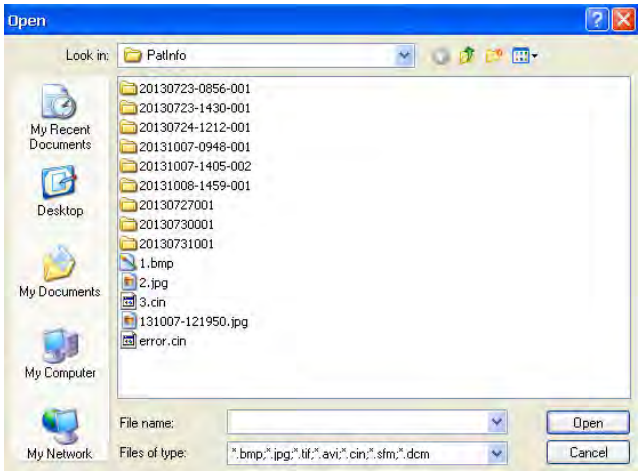


Fig. 9-10 Open dialogue window

9.3 Immediate writing, reading and deletion of images

9.3.1 Quick-saving images

In various modes, press the button (**Save** or **P1~P6 (Dis)**) for temporarily storing the still image or film in the default system folder (usually this is the E:\\PatInfo folder). (When the image is in Live state, it will first be put into still image state and then saved.)

The saved image will be displayed in the image preview area at the bottom, so that the user can review it at his/her convenience.

Before saving, first go into cine state and then move the trackball to select and save the desired images.

In still-image state, tap on ***Save Film*** on the touchscreen, and the current clip will be saved in Cin format to the system default folder.

9.3.2 Quick-saving AVIs

AVI files can be saved in both Still-image and Live state.

In Live state, press the button for enabling DVR recording (this can be set up in ***Store Setup***; see ***9.2.1*** for further information). A flashing red mark at the bottom right of the screen means that it is recording, and the duration of the recording (time lapsed/time remaining) will be displayed. See Fig. 9-11.

Press the **Freeze** button or the button for enabling DVR recording to stop recording ahead of the time. If the recording is not stopped manually, it will automatically be stopped by the system upon reaching the set time (***the DVR recording time*** can be set up in ***Store Setup***; see ***9.2.1*** for further information) and saved as a video.

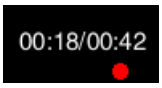


Fig. 9-11 DVR recording duration

In Still-image state, press the key for enabling DVR recording to start recording. During the recording process, no operations can be performed. This is only possible again once the recording has ended automatically.

The recorded AVI file will be displayed in the image preview area at the bottom edge of the screen.

【Note】: The AVI files recorded in real time do not have any sound, while the spectral AVI files that are recorded after activating Still-image state or transcoding have sound. No sound is available when playing back on the ultrasound system, but sound is available when playing on a computer.

9.3.3 Quick-reading images

The system has an image preview area. You can press **Set** to activate the cursor and move it to the image in the preview area. Then press **Set** to call up and review the image.

Use the trackball to move the cursor onto a ***CIN*** format file. Press **Set** twice to display the film loop automatically. After opening the AVI file, tap ***Forward*** or ***Backward*** on the touchscreen to play.

Alternatively, click on ***Open*** on the ***Store Setup*** screen and select the desired file from the file list to read it (see section ***9.2.6*** for detailed instructions).

While the images are being read, the operation mode may not be changed. Measurement, calculation and annotation functions can be performed but not saved (i.e., all the corresponding data will be deleted after the above operation).

9.3.4 Immediate deletion of images

The system has an image preview area. You can use the immediate deletion of files function there.

Press **Set** to activate the cursor. Move the cursor to the file to be deleted in the preview area, and the file format will appear above the file, with a ☒ (deletion mark) top right, as shown in Fig. 9-12. Move the cursor onto the mark and press **Set**. The delete input window will appear. Click on ***Yes*** to delete the file immediately.

Fig. 9-12 Immediate deletion of images

9.4 Patient archive

Press **Smarchive** on the control panel to bring up the ***Archive Management*** window, as shown in Fig. 9-13. It integrates features such as the patient list, patient retrieval, patient reports, information search, transfer of patient data, and so on.

Fig. 9-13 Archive management

9.4.1 Retrieval:

Two methods:

a) The user can find the required patient records in the patient list. The system arranges the patient information according to PID, Name, Sex, Age, Exam Date and Exam (examination type). Move the cursor onto PID, Name, Sex, Exam Date or Exam, and press **Set** to fuzzy search. For example: Select PID, and the list of patient data will be arranged in ascending or descending order. Select Sex, and the list will be divided into female and male. If you select Age, the list will be arranged from young to old or from old to young.

【Note】: The default list of patient information is arranged in ascending order.

b) The user can use the retrieval bar on the right side of the ***Smarchive***. Items able to be retrieved include ID, name, age group and exam time. You can use individual retrieval or general retrieval with multiple items (more keywords and a smaller range can help find the target more quickly). Move the cursor to the small box in front of the item needing to be retrieved, and press **Set** to mark the box with a "√". Then enter the relevant information and move the cursor onto ***Search*** and press **Set** to search in the patient database. The aforementioned fuzzy search helps users to quickly find matching patients or to narrow the range of matching patients, as shown in Fig. 9-14.

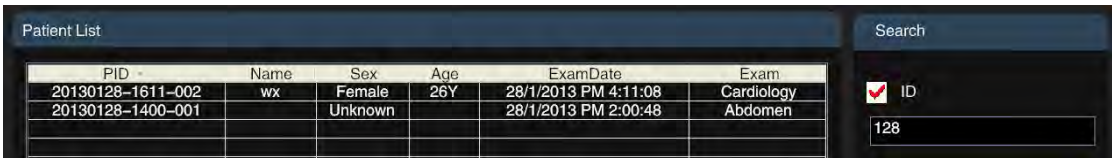


Fig. 9-14 Retrieving patient information

9.4.2 Hard disk information

Hard disk information, including file information and free memory space on the hard disk, is displayed in the bottom-right corner of the screen.

9.4.3 Patient information

After you have found the exact patient information you required, move the cursor to this patient information record, and press **Set** to select it. Move the cursor to ***PatInfo*** at the bottom edge of the screen and press **Set** to call up the ***Patient Info*** window, as shown in Fig. 9-15.

Fig. 9-15 Basic patient information

【Note】: The user interface is only for browsing, and cannot be edited. See section 7.1 b) for how to modify patient information.

9.4.4 Browsing

After you have found the exact patient information you required, move the cursor to this patient information record, and press **Set** to select it. Move the cursor to ***Browse*** at the bottom edge of the screen and then press **Set** or double-click on this patient information to bring up the browse media files window, as shown in Fig. 9-16.

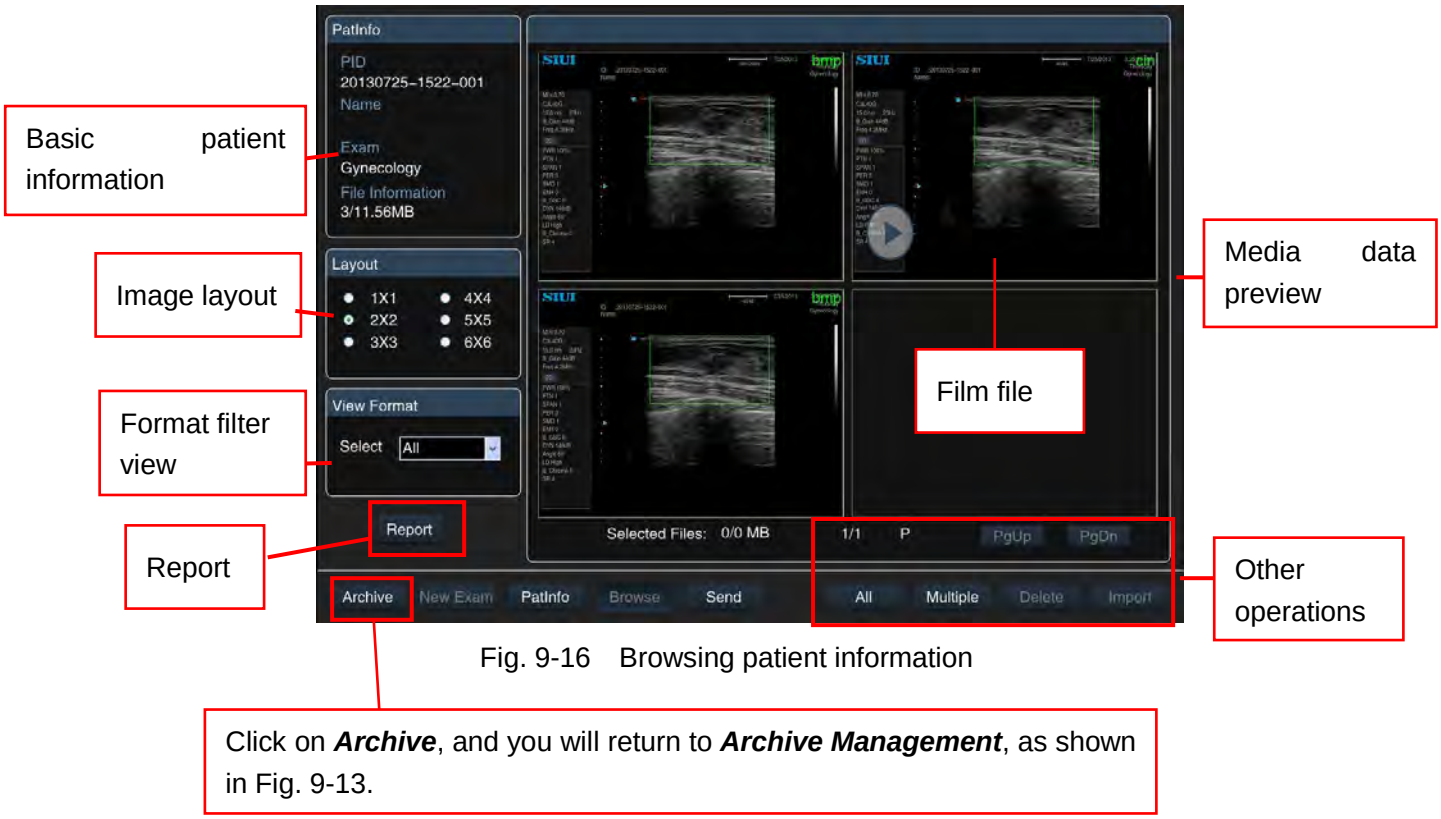


Fig. 9-16 Browsing patient information

Click on ***Archive***, and you will return to ***Archive Management***, as shown in Fig. 9-13.

a) **Basic information: Call up** Browse, and the selected basic information will be displayed in the top-left corner. This is necessary to ensure that the wrong patient is not selected. Basic information includes: PID, name, exam type, and volume of media data stored and data size.

b) **Image layout:** Select media data display layouts in the preview interface. Six layouts are available to choose from, and the required page will be displayed based on the chosen layout and media data quantity. Use the trackball to move the cursor to the (previous) option and click on **Set** to select it.

c) **View format:** For filtering out files in the desired format. Use the trackball to move the cursor. Press **Set** to open the dropdown menu. Select a file format (e.g., jpg) and all files in this format will be displayed in the right preview area.

d) Media preview: Preview all media information on the current patient, including images and films in JPG, AVI, CIN and VOLS, etc. formats. (The file format is displayed top right, and the cine files are marked with bottom left, as shown in Fig. 9-16).

【Note】: Double click on one choice of media data, and the system will call up the ultrasound screen and will play all media files. If this is during the examination procedure, the following note will appear on the screen: ***"This action will end the current exam, would you like to go on? "*** Select ***No*** for no action and select ***Yes*** to end the current exam. Import the selected patient data, and the media data will be listed in the browsing window. At the same time, media data that has been double-clicked will be opened (see section ***9.1.2*** on film loops). Press the **Smarchive** button on the control panel to return to the current ***Archive Management*** screen.

e) Report: Call up ***Browse***, move the cursor onto ***Report*** in the bottom-left corner, and press **Set** to bring up the ***Report Worksheet*** screen to view the patient's report. See section ***8.3.2.5*** for details about the report.

f) Other operations: Turn Page, Select All, Multi Select and Delete Preview Image.

【Note】: When you click on one patient, this means that you are either making a single selection or want to change the selection. If you want to select multiple patients, you need to first click on the ***Multiple*** key and then click on multiple patients.

9.4.5 Data transfer

If you want to send all of a patient's data (including basic information, reports, media files, etc.), you must select the desired patient record from the list of files and move the cursor to ***Send***. Then click on **Set** to open the transfer screen. See Fig. 9-17.

【Note 1】: You can select patient data individually or use ***All*** and ***Multiple*** to select multiple patients. The process is the same as above.

【Note 2】: DICOM is an optional feature that will not be activated if it has not been purchased, and the ***send*** screen will not show any items from ***STORESCU*** and ***PRINTSCU*.**

Fig. 9-17 Data transfer

9.4.5.1 Sending data to the hard disk

The steps for sending patient information to the hard disk are as follows:

1) Select the target path

Check ***Disk*** and select the sub folder from the dropdown menu. Use the drop-down button to select the subfolder (**【Note】: Before the first transfer, the drop-down menu will be empty. Once the transfer has been performed already, the system will save the transfer path in the dropdown menu for quick selection during the next transfer**).

If the drop-down menu is empty, click the ***Browse*** button to the right of ***Disk*** to display the ***Browse For Folder*** window (see Fig. 9-20). This allows the user to select the particular path for the hard disk. The user can create a new folder under "*aa*" (as shown below). The file will be named according to ***Transmission date*** _ ***Time*** and sent to the new folder.

Fig. 9-18 Browsing for a folder when sending data

2) Confirming the content for transfer

The content of the transfer includes: The media file (image or film) and the report.

- To send patient information only, uncheck ***Output Media Files*** and ***Report***.
- To send patient information and media file only, uncheck ***Report***.
- To send patient information, media file and report, check ***Output Media Files*** and ***Report***.

3) Selecting and setting up media files

Check the item ***Output Media Files***, and all saved media files will be sent by default.

If you want to select some images for transfer, you should go to the ***Browse*** screen first. The cursor will remain on the image to be sent. Press **Set** (to select multiple files, click on ***Multiple*** before selection). Then move the cursor to ***Send*** on the bottom edge of the screen and press **Set** to call up the ***Send*** screen, as shown in Fig. 9-17. If no media file is selected, click on ***Send***, and the message ***"There are no select any pictures, whether or not to continue?"*** will appear on the screen. Select ***Yes*** to send the patient information without the media file or select ***No*** to stop the transfer.

Media files can be converted to PC format during transfer for direct viewing on the PC, and the transfer area can be set up. The detailed procedure is as follows: First, activate ***Output Media Files on the Send*** screen and then choose the format (an image can be converted to Bmp, Jpg or Tif format, or to DCM format if the DICOM function is activated. Films can be converted into AVI or DCM format if the DICOM function is activated. To send in the default format, check ***Org_format***).

【Note】: ***Image Size*** can only be selected when sending files in Cin, Vol or Vols format (with 4 options: ***Org_Size, Image, Image+Param, Image+Info***).

4) Other

Other can only be chosen if ***Output Media Files, Report*** is activated. All media files will be sent.

There are two options: ***Keep Files*** (when the transfer is finished, the patient file will still be kept in the local system) and ***Delete Files*** (when the transfer is finished, the patient file will be deleted and the user will no longer be able to find the data in the local system).

5) Send

After finishing the steps above, use the trackball and the **Set** key to click on the ***OK*** button on the bottom-right edge of the screen to start sending.

The transfer is finished when the current status once more shows ***Send Successfully !***.

9.4.5.2 Burning data

To burn the data onto a CD, first connect the burner and then follow the steps below:

1) Select the destination path: Activate ***Burn*** and select the burner model using the drop-down button.

【Note】: The drop-down menu will be empty if no burner is connected.

2) Confirm the content of the transfer.

3) Select and set up the media file.

4) Other operations.

5) Send.

【Tip】: The procedure for steps 2) ~ 5) is the same as that in ***9.4.5.1 Sending data to the hard disk.***

9.4.5.3 Printing using a digital printer

To print the data using a digital printer, connect a digital printer, and then follow the steps below:

1) Select the destination path: Select ***Digital Print*** and then the digital printer model from the drop-down menu.

【Tip】: The drop-down menu will be empty if no digital printer is connected.

2) Confirm the content of the transfer, using the same procedure as in ***9.4.5.1 Sending data to the hard disk***.

3) Selecting media files and layout

   If you want to select some images for transfer, you should first call up the ***Browse*** screen. Move the cursor to the desired media file and press **Set** (to select multiple files, click on ***Multiple*** before selection). Then move the cursor to ***Send*** on the bottom edge of the screen and press ***Set*** to call up the **Send** screen, as shown in Fig. 9-17.

   【Note】: If the selected file is in film format, only the last frame can be printed. To select a better frame of the film, close the patient management system and play the film file. Find the right frame and save it as a picture.

   Then use the trackball and the **Set** key to click on the ***Layout*** button to the right of Digital Print. Call up the ***Print Typeset*** screen (see Fig. 9-19). The selected image will be displayed as a thumbnail at the bottom of the screen. Printing will follow when typesetting is finished.

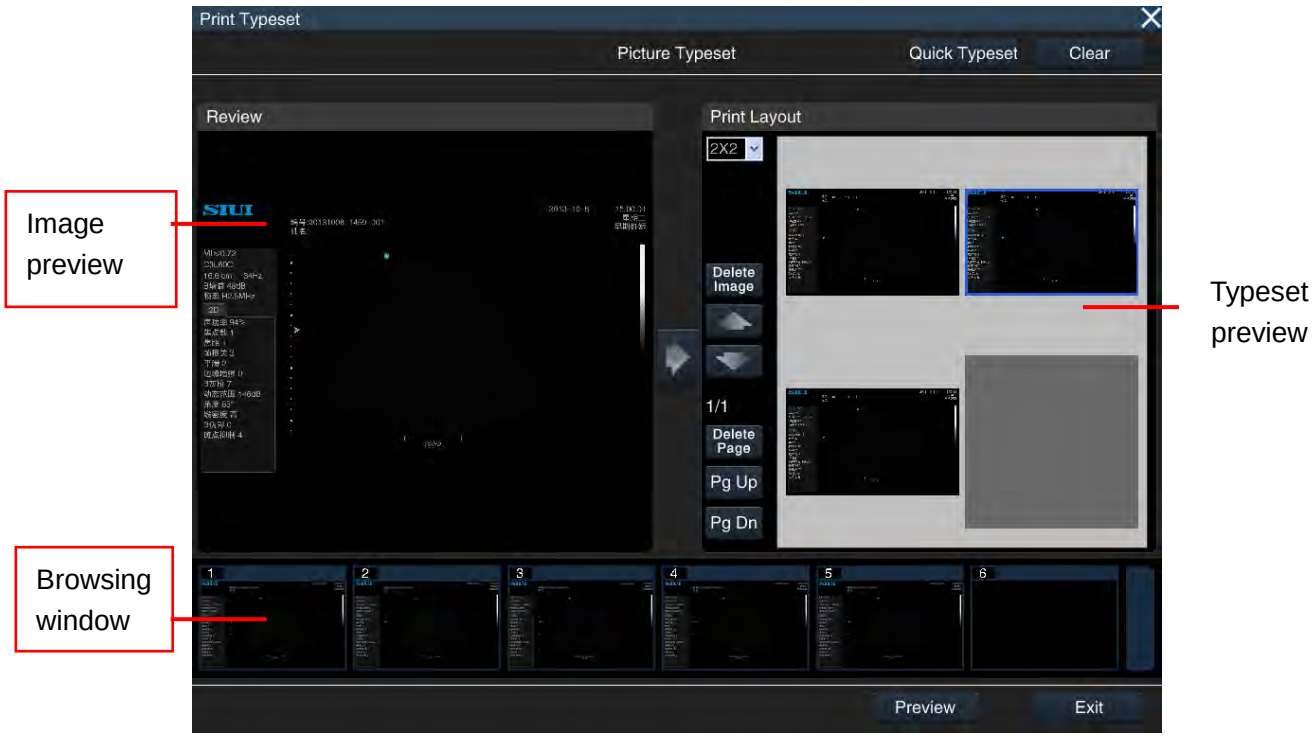


Fig. 9-19 Layout screen

The layout is as follows:

a) ***Quick typesetting***: Use the trackball and the **Set** button to click on ***Quick Typeset*** at the top right of the screen, and the selected pictures will be arranged in the typeset layout and displayed in the Typeset Preview Area on the right side of the screen.

b) ***Manual typeset***

- View: Click on **Set** to activate the cursor. Move the cursor to an image in the browsing window and then click on the **Set** key. The image will be resized and displayed in the preview area on the left side of the screen for review by the user.

- Load: Press  in the centre of the screen, and load images from the left Image Preview area to the right Typeset Preview area.

- Changing the typesetting: Use the trackball and the **Set** key to select from the ***Print Layout*** drop-down list. For example, the 3×3 layout means there are 3

lines and 3 images in each line.

- Change the position of the image: Click on  or  to move the image up or down.
- If the images cannot be displayed on the same page, click on ***Pg Up*** or ***Pg Dn*** to turn the page and view other images.
- Deleting images: Move the cursor to the image you want to delete. Click on **Set** to select it (the selected image will be displayed in a blue box), then click on ***Delete Image*** to remove the image from the Typeset Preview area.
- Deleting pages: Click on ***Delete Page***, and all images displayed on the current page will be deleted.
- Clearing images: Click on the ***Clear*** button at the top right of the screen, and all images in the Typeset Preview area will be cleared for a new typeset setup.
- Preview: Click on ***Preview*** to enter the Print Preview screen.
- Exit: When the typeset process is finished, click on ***Exit*** at the bottom right of the screen to return to the ***Send*** screen.

4) When the above steps are finished, use the trackball and the **Set** key to click on the ***OK*** button at the bottom of the ***Send*** screen, and start printing.

9.4.5.4 Sending data to the DICOM server

When sending data to the DICOM server, ensure that the system is connected to DICOM server properly (see ***5.2.11*** for a detailed description of the connection), and that the DICOM feature is activated. Then follow the steps below:

1) Select the destination path: Check ***STORESCU***. Select the target server from the drop-down menu.

2) Confirm the content of the transfer, using the same procedure as in ***9.4.5.1 Sending data to the hard disk***.

【Note】: When exiting the report, a DICOM structured report file will automatically be generated in the Patient Media Files directory. If the *"Report"* item is enabled, the report will be sent to the DICOM server.

3) Selecting and setting up media files

If you want to select some images for transfer, you should first call up the ***Browse*** screen. Move the cursor to the desired media file and press **Set** (to select multiple files, click on ***Multiple*** before selection). Then move the cursor to ***Send*** on the bottom edge of the screen and press ***Set*** to call up the **Send** screen, as shown in Fig. 9-17.

If the file to send is in Cin, Vol or Vols format, you might have to set the ***Image Size*** before the transfer. All files are converted to DCM format during transfer.

4) Send

After finishing the steps above, use the trackball and the **Set** key to click on the ***OK*** button at the bottom right of the screen and start sending.

When the transfer is finished, the current status will show the number of files sent, regardless of whether these have been successful or have failed.

9.4.5.5 Printing data using a DICOM printer

To print data via the DICOM server, ensure that the system is properly connected to the DICOM server (see ***5.2.11*** for a detailed description of the connection), and that the DICOM feature is activated. Then follow the steps below:

1) Select the destination path: Enable ***PRINTSCU***, and then select the target server from the drop-down menu.

2) Determine the content of the transfer: To print only media files, activate ***Output Media Files.*** Printing reports is not supported, i.e. ***Report*** cannot be activated.

3) Select and adjust the media files.

To select a media file for printing, go to the ***Browse*** screen and return to the ***Send*** screen. Click on ***Layout*** on the right of ***PRINTSCU*** to call up the Print Typeset screen for setting the typesetting. For detailed steps on this, see ***9.4.5.3 Printing using a digital printer***.

【Note】 : PRINTSCU is only for printing images, not for printing films.

4) Printing

After finishing the steps above, use the trackball and the **Set** key to click on the ***OK*** button at the bottom-right edge of the screen to send the print request to the DICOM server.

9.4.6 Data import

Data import allows the import of patient data that is transferred from this system or another system in the same series for review and a new examination.

Call up ***Archive Management*** and click on ***Import*** in the bottom-right corner of the screen to call up the ***Browse for Folder*** window (as shown in Fig. 9-20) and look for the saved folder containing the patient information. Click on ***OK*** to import data into the system. If the same data is present in the system, a box will appear asking if the files should be overwritten. The user can choose ***Yes*** or ***No*** as the situation requires.

【Note】: The user should select a folder, instead of creating a new one for data storage, as shown in Fig. 9-22.

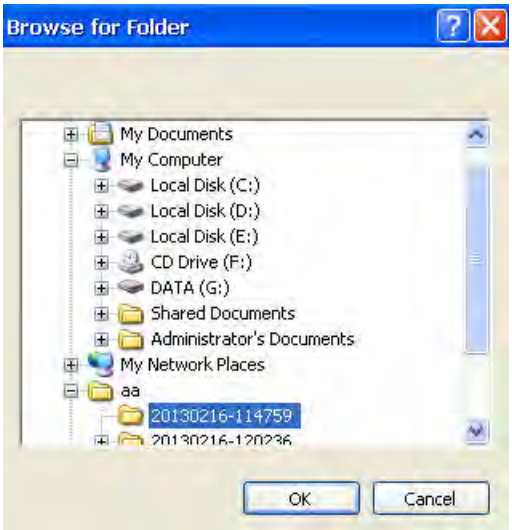


Fig. 9-20 Browsing for a folder in data import

9.4.7 New examination

This feature helps the user create a new examination type for the patient under the same ID. After the examination, the new examination for the same patient will be displayed according to the different examination times, examined body parts (or the same), the doctor, etc. All you have to do is retrieve the ID, and the different examination times and examined body parts for that patient will be listed.

Methods:

1) Refer to the retrieval procedure in section ***9.4.1*** for finding patient information for a new exam.

2) Move the cursor to the patient information record, and press **Set** to select.

3) Then move the cursor to ***New Exam*** at the bottom of the screen and press **Set**. The screen will display a note to confirm the end of the current exam, and to call up the ***New Patient Info*** screen after confirmation (see Fig. 9-23).

4) When you have finished creating a new exam, move the cursor to ***Save*** and press **Set**. The system will switch to the ultrasound screen. Users can start with the examination directly or move the cursor to ***Exit*** and press **Set** to cancel editing.

Fig. 9-21 New examination

9.5 Printing images

Tap ***Print*** on the touchscreen, and the still-image can be printed out via a system printer or a DICOM printer (see *section **4.1.1.5** Printer Installation* for connecting a printer in *section **5.2.3.3** Printer Setup* for setting up the printer).

Chapter 10

Maintenance, Inspection, Transport and Storage

10.1 System maintenance

Before operating the system, every time, the user should inspect the probe cable connector, the probe cable, the equipotential bonding conductor and the power cable carefully to check whether any of the sheath has separated or whether there is any shedding or other signs of damage. Verify that the equipotential bonding conductor is correctly and safely earthed. Special attention should be paid to these daily inspections so as to avoid unexpected danger and use the system safely.

Upon each system power-up, check whether both the power indicator and the fan are operating normally. The buttons and knobs must be fully inspected just once every six months. For detailed information, please refer to *section **4.4** System inspection and maintenance*.

10.2 Troubleshooting

The following table lists some common failures, along with possible causes and solutions (see Table 10-1). The user can refer to these solutions to perform troubleshooting. If the causes of failure cannot be identified, or problems cannot be solved when the provided solutions are attempted, please contact our customer service team. DO NOT disassemble the system without instructions from our service technician. Otherwise, incorrect operation can damage the system or even threaten personal safety.

Table 10-1 Troubleshooting list

Failures	Causes and solutions
No power supply	Make sure the power cord is well connected to the back of the system. If it is, unplug the power cord and check whether the fuse is faulty. If it is faulty, please replace it with a new one that is of the same specifications. One replacement safety fuse is contained amongst the product accessories.
Power supply is present, but no image is on the screen	If the monitor's indicator light is red, make sure that the monitor's DVI video cable is properly connected. If the monitor's indicator light is green and no image is displaying, it could be a monitor failure.
No ultrasound image is displayed on the screen in any scanning mode, but characters and the greyscale bar are displayed normally	Check that the probe is correctly connected to the main unit.
The printer is not working	Check whether the printer is correctly connected to the main unit and whether the power is on. If there is no response upon pressing the print button, but the print button on the printer responds when pressed, the potential reason is that the remote printer cable is not correctly connected.
Incorrect date display	Follow the procedure in *Section* ***5.2.2*** to reset the date.

If any abnormality occurs, turn off the power supply immediately and inform our customer service team about the abnormality in as much detail as possible.

Please contact our customer service team if the system needs to be repaired or readjusted. We are not responsible for failures caused by repairs made to the system by unauthorised technicians.

⚠ **【Note 1】: Should any abnormality occur on the system, in order to shorten the maintenance time, please try to describe the failure in detail and send us this description.**

⚠ **【Note 2】: The requirement placed upon our service technicians: A competent technician with Zimmer MedizinSysteme training and an accredited degree.**

Declaration: Circuit diagrams, component part lists, descriptions, calibration instructions or other information may be provided by Zimmer MedizinSysteme to approved qualified service personnel in order to repair those parts of the device that are designated BY Zimmer MedizinSysteme as repairable by SERVICE PERSONNEL.

【Warning 1】: Changes to these devices are not allowed.

【Warning 2】: In case of a system failure, replace the faulty components only with the special components supplied by Zimmer MedizinSysteme.

10.3 Transport and storage conditions

a) Ambient temperature range: -20°C ~ 60°C

b) Relative air humidity: 15% ~ 93%

c) Air pressure range: 500 hPa ~ 1.060 hPa

Shipment shall be arranged in accordance with the provisions of the purchase contract. Avoid drenching caused by rain or snow, as well as mechanical collision during transportation.

10.4 Disposal

The service life of the system is ten years from the date of manufacture (see the label on the main unit). The system and its accessories and waste should be disposed of or recycled at the end of their useful life in accordance with the relevant national safety and environmental standards and regulations, so as to keep risks arising therefrom to an absolute minimum.

Appendix A
Abbreviations

3rd:	Third ventricle
%A Redu:	Reduced area, in percent
%D Redu:	Reduced diameter, in percent

A

AA:	Abdominal area
AAO:	Ascending aorta
AAO Vmax:	Maximum velocity of ascending aortic valve
AC:	Abdominal circumference
AC:	Atrial chamber
A-C:	Time from point A to point C
AC A:	Anterior cerebral artery
ACS:	Aortic valve cusp size
Aepi:	Apical cap
AFI:	Amniotic fluid index
Alias Vel:	Aliasing velocity
AO:	Aorta
AOAMP:	Aortic posterior wall amplitude
AO Arch:	Diameter of the aortic arch
AO Asc:	Ascending aortic diameter
AOD:	Aortic diameter
AO Desc:	Descending aortic diameter
AO Isthmus:	Aortic isthmus
AO Sinus:	Diameter of aortic sinus
AO st junct:	Aorten ST junction

AP:	Anteroposterior diameter
APAD:	Anteroposterior diameter of abdomen
A-P Adrenal:	Anteroposterior diameter of the adrenal glands
A-PAU:	Anteroposterior diameter after urination
A-P AU Blad:	Anteroposterior diameter of bladder after urination
A-P BU Blad:	Anteroposterior diameter of bladder before urination
A-P CX:	Anteroposterior diameter of cervix
A-P Epididymis:	Anteroposterior diameter of the epididymis
A-P Follicle:	Anteroposterior diameter of the follicle
A-P GB:	Anteroposterior diameter of the gallbladder
A-P L Lobe:	Anteroposterior diameter of the left lobe
A-P Kidney:	Anteroposterior diameter of the kidney
A-P Ovary:	Anteroposterior diameter of the ovary
A-P Prost:	Anteroposterior diameter of the prostate
A-P Seminal Vesicle:	Anteroposterior diameter of the seminal vesicle
A-P Spleen:	Anteroposterior diameter of the spleen
APTD:	Anteroposterior trunk diameter
A-P Testicle:	Anteroposterior diameter of the testicle
A-P Thyroid:	Anteroposterior diameter of the thyroid
A-P UT:	Anteroposterior diameter of the uterus
AR:	Aortic regurgitation
Area-E:	Measurement of the area using the ellipse method
Area-T:	Measurement of the area using the trace method
ASD:	Atrial septal defect
ASD Vmax:	Maximum velocity of atrial septal defect
AS Vmax/AS Max Vel:	Maximum velocity of the aortic valve stenosis
A tibial A / ATA:	Anterior tibial artery
A tibial V:	Anterior tibial vein
AU Blad Vol:	Bladder volume after urination
AV:	Aortic valve

AVA:	Aortic valve area
AVAO CUSP:	Aortic valve aortic CUSP separation
AV-IN:	Aortic valve acceleration time
AVD:	Open removal of the aortic valve
AV DT:	Aortic valve deceleration time
AVR AT:	Aortic valve regurgitation acceleration time
AVR DT:	Aortic valve regurgitation deceleration time
AVR Vmax:	Maximum velocity of aortic valve regurgitation
AVR VTI:	Aortic valve regurgitation velocity time integral
AV Vel:	Aortic valve velocity
AV Vmax:	Maximum velocity of aortic valve
AV VTI:	Aortic valve velocity time integral
A-wave V:	A-wave velocity
Axillary A:	Axillary artery
Axillary V:	Axillary vein

B

BAL E` Vel:	Basal anterolateral E` velocity
BAL A` Vel:	Basal anterolateral A` velocity
Basilic V:	Basilic vein
BIF:	Bifurcation
Blad:	Bladder
BIS E` Vel:	Basal inferoseptum E` velocity
BIS A` Vel:	Basal inferoseptum A` velocity
BPD:	Biparietal diameter
BSA:	Body surface area
Bladder Vol:	Bladder volume
BU Blad Vol:	Bladder volume before urination
Buld stenosis:	Buld stenosis diameter

C

CBD:	Common bile duct
CCA:	Common carotid artery
CCA stenosis:	Common carotid artery stenosis diameter
CD:	Cardiac diameter
CeA:	Caeliac axis
CELIA:	Caeliac artery
Cephalic V:	Cephalic vein
CER:	Transverse cerebellar diameter
CFA:	Common femoral artery
CFV:	Common femoral vein
CHA:	Common hepatic artery
CHD:	Common hepatic duct
CI:	Cardiac index
CIA / ILIAC:	Common ilium artery
CIV:	Common ilium vein
Cist Magna:	Cisterna magna
CLAV:	Clavicle length
CO:	Cardiac output
Coarc Post-Duct:	Coarctation of the post-ductus
Coarc Pre-Duct:	Coarctation of the pre-ductus
CRL:	Crown rump length

D

DAo Isthmus:	Descending aortic isthmus
DAo Vmax:	Maximum velocity of descending aorta
D-E:	Height from point D to point E
DFA:	Deep femoral artery
DFV:	Deep femoral vein
Diam:	Diameter

DPA / DR PED:	Dorsal artery
dP/dt:	Rate of pressure change
Duct Art:	Ductus arteriosus

E

Ear:	Ear length
ECA:	External carotid artery
ECA stenosis:	External carotid artery stenosis diameter
EDD:	Estimated date of delivery
EDV:	End-diastolic volume
E-E:	Height from point E to point E’
EF:	Ejection fraction
EFSLP:	EF speed
EFW:	Estimated foetal weight
EIA/EXT IL:	External ilium artery
EIV:	External ilium vein
EN / EN-T:	Endometrial thickness
EPSS:	E-point septal separation
EROA:	Effective reflux orifice area
ESV:	End-systolic volume
ET:	Ejection time
E-wave V:	E-wave velocity
Eye AC:	Eye anterior chamber
Eye OA:	Eye oculi axis
Eye ON:	Eye optic nerve

F

Foetal AO:	Foetal aorta
Foetal DAO:	Foetal descending aorta
Foetal HR:	Foetal heart rate
Foetal Kidney:	Foetal kidney length
FIBL:	Fibular length
FL:	Femur length
Follicle Vol:	Follicle volume
FS:	Left ventricular diameter fractional shortening
FTA:	Foetal trunk cross-sectional area

G

GB Vol:	Gallbladder volume
Grow Chart:	Graphical representation of growth
GS:	Gestational sac
GSV:	Great saphenous vein

H

HA:	Head area
HC:	Head circumference
Heart C:	Heart circumference
Hepatica A:	Hepatic artery
HIP:	Hip joint
HL / Humerus:	Humeral length
HR:	Heart rate
Humerus A:	Humerus artery
HAS:	Surface area of the hemisphere
HW:	Hemisphere width

I

ICA:	Internal carotid artery
ICA stenosis:	Internal carotid artery stenosis diameter
IG:	Internal gland
IIA/ INT IL:	Internal ilium artery
IIV:	Internal ilium vein
INFA:	Inferior artery
IOD:	Internal orbit diameter
IVC:	Inferior vena cava
IVCT:	Isovelocity compression time
IVC Vel:	Inferior vena cava velocity
IVRT:	Isovelocity relaxation time
IVS:	Inter-ventricular septum
IVSD:	Inter-ventricular septal diameter at end diastole
IVSS:	Inter-ventricular septal diameter at end systole

K

Kidney:	Kidney length
Kidney Vol:	Kidney volume

L

LA:	Left atrium
LAA(A2C):	Left atrial area (two-chamber)
LAA(A4C):	Left atrial area (four-chamber)
LA Area:	Left atrial area
LAD:	Left atrial diameter
L Adrenal:	Longitudinal diameter of adrenal gland
L-AG:	Left adrenal gland
LAL:	Longitudinal diameter of the left atrium
LAU:	Longitudinal diameter after urination

L AU Blad:	Longitudinal diameter of bladder after urination
LA Vol (A-L):	Dimensions of the left atrium volume with area and longitudinal diameter
L AXIA:	Left axillary artery
L BU Blad:	Longitudinal diameter of bladder before urination
L BRAA:	Left brachial artery
L Breast:	Left breast
LCA:	Left coronary artery
LCCA:	Left common carotid artery
L CX:	Longitudinal diameter of cervix
L DORA:	Left dorsal artery
L ECA:	Left external carotid artery
L Epididymis:	Longitudinal diameter of epididymis
L Eye:	Left eyeball
L FEMA:	Left femoral artery
L Follicle:	Longitudinal diameter of follicle
LHD:	Left hepatic duct
LI:	Lower internal
L ICA:	Left internal carotid artery
L-Inf Parathyroid:	Left inferior parathyroid
L Kidney:	Left kidney
LL:	Lower lateral
L Lobe:	Left lobe
L LV:	Left lateral ventricle
Long:	Longitudinal diameter
Long GB:	Longitudinal diameter of gallbladder
Long L Lobe:	Longitudinal diameter of left lobe
L Ovary:	Left ovary
LPA:	Left pulmonary artery diameter
LPA Vmax:	Maximum velocity of left pulmonary artery

L POPA: Left popliteal artery

L Prost: Longitudinal diameter of prostate

LRA: Left renal artery

L RADA: Left radial artery

L-Renal Cortex: Left renal cortex thickness

L Seminal Vesicle: Longitudinal diameter of seminal vesicle

L Spleen: Longitudinal diameter of spleen

LSV: Lesser saphenous vein

L-SV: Left seminal vesicle

L-Sup Parathyroid: Left superior parathyroid

L- Testicle: Longitudinal diameter of testicle

L Testis / L-Ts: Left testis

L-thyroid: Longitudinal diameter of the thyroid

Lt OV H: Left ovary height

Lt OV L: Left ovary length

Lt OV W: Left ovary width

Lt Uterin A: Left uterus artery

L ULNA: Left ulnar artery

L Ureter: Left ureter

L UT: Longitudinal diameter of uterus

LV: Left ventricle

LVAd A4C: Left ventricular area in the diastolic phase (four-chamber)

LVAd psa MV: Left ventricular area in the diastolic phase (mitral valve plane short axes)

LVAd psa PM: Left ventricular area in the diastolic phase (papillary muscle plane short axes)

LVAs A4C: Left ventricular area in the systolic phase (four chambers)

LVAs psa MV: Left ventricular area in the systolic phase (mitral valve plane short axes)

LVAs psa PM: Left ventricular area in the systolic phase (papillary muscle plane short axes)

LV Area (d):	Left ventricular area in the diastolic phase
LV Area (s):	Left ventricular area in the systolic phase
LVET:	Left ventricular ejection time
LVLd:	Longitudinal diameter of left ventricle in the diastolic phase
LVLs:	Longitudinal diameter of left ventricle in the systolic phase
LV Mass:	Left ventricle cardiac muscle mass
LV MI:	Left ventricle cardiac muscle index
LVMLd:	Left ventricular medial-lateral dimension in the diastolic phase (four-chamber)
LVMLs:	Left ventricular medial-lateral dimension in the systolic phase (four chambers)
LVW:	Lateral ventricle
LV Func:	Left ventricle functions
LVIDd:	Left ventricular internal diameter in the diastolic phase
LVIDs:	Left ventricular internal diameter in the systolic phase
LVOT:	Left ventricular outflow tract
LVOT AccT:	Left ventricular outflow tract acceleration time
LVOT Vel:	Left ventricular outflow tract velocity
LVOT Vmax:	Maximum velocity of left ventricular outflow tract
LVOT VTI:	Velocity time integral of left ventricular outflow tract
LV outflow Diam:	Left ventricular outflow diameter
LVPEP:	Left ventricular pre-ejection period
LVPWD:	Left ventricular posterior wall thickness in the diastolic phase
LVPWS:	Left ventricular posterior wall thickness in the systolic phase
LVDS:	Left ventricular diameter in the systolic phase

M

Main PV:	Main portal vein
Main Renal A:	Main renal artery
Major Pa Duct:	Major pancreatic duct
Max AF:	Maximum depth of amniotic fluid
MC A:	Middle cerebral artery
MCS:	Mitral valve cusp separation
Meas avera:	Average measurement
MIS E` Vel:	Mid inferoseptum E` velocity
MIS A` Vel:	Mid inferoseptum A` velocity
MNPG:	Mean pressure gradient
MPA:	Main pulmonary artery
MPA Vmax:	Maximum velocity of main pulmonary artery
MPD:	Main pancreatic duct
MS Vmax:	Maximum velocity of mitral valve stenosis
Mult Dist:	Measurement of multiple distances
MR Max Vel:	Maximum velocity of mitral valve regurgitation
MR VTI:	Velocity time Integral of mitral valve regurgitation
MR Vol:	Mitral valve regurgitation volume
MV:	Mitral valve
MVA:	Mitral valve area
MV A:	Mitral valve A-wave
MV A Dur:	Mitral valve A-wave duration
MV AT:	Mitral valve acceleration time
MV A Vel:	Maximum velocity of mitral valve A-wave
MV A VTI:	Velocity time integral of mitral valve A-wave
MVA(VTI):	Calculation of the mitral valve area using the velocity time integral
MVCF:	Mean velocity of circumferential shortening
MV DT:	Mitral valve deceleration time
MV E:	Mitral valve E-wave velocity

MV E/A:	Mitral valve E/A value
MV E Dur:	Mitral valve E-wave duration
MV E-F Slope:	Mitral valve E-F slope
MV E Vel:	Maximum velocity of mitral valve E-wave
MV E VTI:	Velocity time integral of mitral valve E-wave
MV D-E:	Mitral valve DE amplitude
MV D-E Slope:	Mitral valve D-E slope
MV PHT:	Mitral valve PHT
MVR AT:	Mitral valve regurgitation acceleration time
MVR DT:	Mitral valve regurgitation deceleration time
MVR Vmax:	Mitral valve regurgitation maximum velocity
MVR VTI:	Mitral valve regurgitation velocity time integral
MV Vmax:	Mitral valve maximum velocity
MV VTI:	Mitral valve velocity time integral

N

NB:	Nose bone
NT:	Neck transparency

O

OA:	Ocular axis
OB:	Obstetrics
Obli R Lobe:	Maximum oblique diameter of the right lobe
OFD:	Occipitofrontal diameter
OOD:	Outer orbital diameter
ON:	Optic nerve
Ovary Vol:	Ovary volume

P

PA:	Pulmonary artery
Pa Head:	Pancreatic head
Pa Body:	Pancreatic body
PAP:	Pulmonary artery pressure
Pa Tail:	Pancreatic tail
PC A:	Posterior cerebral artery
PDA:	Patent ductus arteriosus
PDA Vel(d):	Patent ductus arteriosus velocity in the diastolic phase
PDA Vel(s):	Patent ductus arteriosus velocity in the systolic phase
PEd:	Pericardial effusion in the diastolic phase
PEs:	Pericardial effusion in the systolic phase
Peroneal A / PERON:	Peroneal artery
Peroneal V:	Peroneal vein
PFO:	Patent foramen ovale
P Grade:	Inclination of the placenta
PHT:	PHT
Placenta A:	Placenta artery
PL Thickness:	Placenta thickness
Popliteal A / POP:	Popliteal artery
Popliteal V:	Popliteal vein
PR:	Pulmonary regurgitation
Prost:	Prostate
Prost Vol:	Prostate volume
P tibial A / PTA:	Posterior tibial artery
P tibial V:	Posterior tibial vein
Pul A Vel:	Pulmonary vein A-wave velocity
Pul D Vel:	Pulmonary vein D-wave velocity
Pul S Vel:	Pulmonary vein S-wave velocity
PUL. Valve Diam:	Pulmonary valve diameter

PV:	Portal vein
PV / PUL. Valve:	Pulmonary valve
PV A:	Pulmonary valve A-wave depth
PV AT:	Pulmonary valve acceleration time
PV DT:	Pulmonary valve deceleration time
PV Max Vel:	Maximum velocity of the pulmonary valve
PV VTI:	Velocity time integral of the pulmonary artery
Pul A Dur:	Pulmonary vein A-wave duration
Pul DT:	Pulmonary vein deceleration time
Pul D VTI:	Velocity time integral of pulmonary vein D-wave
Pul S VTI:	Velocity time integral of pulmonary vein S-wave
PVR AT:	Acceleration time of pulmonary valve regurgitation
PVR DT:	Deceleration time of pulmonary valve regurgitation
PVR VTI:	Velocity time integral of pulmonary artery regurgitation
PVR Vmax:	Maximum velocity of pulmonary artery regurgitation
PV VTI:	Velocity time integral of the pulmonary artery

R

RA:	Right atrium
RA Area:	Right atrial area
Radial A:	Radial artery
Radial V:	Radial vein
R-AG:	Right adrenal gland
RAP:	Right atrium pressure
R AXIA:	Right axillary artery
R BRAA:	Right brachial artery
R Breast:	Right breast
RCA:	Right coronary artery
RCCA:	Right common carotid artery
R DORA:	Right dorsal artery

R ECA:	Right external carotid artery
R Eye:	Right eyeball
R FEMA:	Right femoral artery
RHD:	Right hepatic duct
R ICA:	Right internal carotid artery
Ribs Dn Spleen:	Ribs down spleen
R-Inf Parathyroid:	Right inferior parathyroid
R Kidney:	Right kidney
RL/Radius:	Radial length
R Lobe:	Right lobe
R LV:	Right lateral ventricle
R Ovary:	Right ovary
RPA:	Right pulmonary artery diameter
RPA Vmax:	Right pulmonary artery maximum velocity
R POPA:	Right popliteal artery
RRA:	Right renal artery
R RADA:	Right radial artery
R-Renal Cortex:	Right renal cortex thickness
PSAD:	Prostate specific antigen density
R-SV:	Right seminal vesicle
R-Sup Parathyroid:	Right superior parathyroid
R Testis/R-Ts:	Right testis
Rt OV H:	Right ovary height
Rt OV L:	Right ovary length
Rt OV W:	Right ovary width
Rt Uterin A:	Right uterine artery
R ULNA:	Right ulnar artery
R Ureter:	Right ureter
RV:	Right ventricle
RV Area (d):	Right ventricular area in the diastolic phase

RV Area (s):	Right ventricular area in the systolic phase
RVAW:	Right ventricular anterior wall
RVAWd:	Right ventricular anterior wall thickness in the diastolic phase
RVAWs:	Right ventricular anterior wall thickness in the systolic phase
RVDd:	Right ventricular diameter in the diastolic phase
RVDs:	Right ventricular diameter in the systolic phase
RVET:	Right ventricular ejection time
RVOT:	Right ventricular outflow tract
RVOTD:	Right ventricular outflow tract diameter
RVOT Vmax:	Maximum velocity of right ventricular outflow tract
RVOT VTI:	Velocity time integral of right ventricular outflow tract
RVPEP:	Right ventricular pre-ejection period
RVSP:	Right ventricular systolic pressure

S

SCA:	Inferior subclavian artery
SCV:	Inferior subclavian vein
SFA:	Superficial femoral artery
SFV:	Superficial femoral vein
S-I:	Superior/inferior diameter
SMA:	Superior mesenteric artery
SMV:	Superior mesenteric vein
Splenic A:	Splenic artery
Splenic V:	Splenic vein
SUPA:	Superior artery
SV:	Stroke volume
SVC:	Superior vena cava
SVC Vel:	Superior vena cava velocity

T

TAD: Trans-abdominal diameter

TAU: Transverse diameter after urination

TC: Thoracic circumference

TD/THD: Thoracic diameter

Testicle Vol: Testicle volume

Thy Lower A: Thyroid lower artery

Thy Mid A: Thyroid middle artery

Thy Upper A: Thyroid upper artery

TL / Tibia: Tibial length

TP Trunk V: Tibial peroneal trunk vein

TR: Tricuspid regurgitation

Trans: Transverse diameter

Trans Adrenal: Transverse diameter of the adrenal glands

Trans AU Blad: Transverse diameter of the bladder after urination

Trans BU Blad: Transverse diameter of the bladder before urination

Trans CX: Transverse diameter of the cervix

Trans Follicle: Transverse diameter of the follicle

Trans GB: Transverse diameter of the gallbladder

Trans Kidney: Transverse diameter of the kidney

Trans Ovary: Transverse diameter of the ovary

Trans Prost: Transverse diameter of the prostate

Trans Seminal Vesicle: Transverse diameter of the seminal vesicle

Trans Testicle: Transverse diameter of the testicle

Trans-thyroid: Transverse diameter of the thyroid gland

Trans UT: Transverse diameter of the uterus

TrZoneProst Vol: Transfer zone prostate volume

TTD: Transverse trunk diameter

TV: Tricuspid valve

TVA: Tricuspid valve area

TV A Dur:	Tricuspid valve A-wave duration
TVA(PHT):	Calculation of the tricuspid valve area using PHT
TV AT:	Tricuspid valve acceleration time
TV A Vel:	Maximum velocity of tricuspid valve A-wave
TV DecT:	Tricuspid valve deceleration time
TV E/A:	Tricuspid valve E-Vel/A-Vel
TV E Vel:	Maximum velocity of tricuspid valve E-wave
TV MPG:	Tricuspid valve mean pressure gradient
TVR AT:	Tricuspid valve regurgitation acceleration time
TVR DT:	Tricuspid valve regurgitation deceleration time
TVR Vmax:	Maximum velocity of tricuspid valve regurgitation
TVR VTI:	Tricuspid valve regurgitation velocity time integral
TV Vmax:	Maximum velocity of tricuspid valve
TV VTI:	Tricuspid valve velocity time integral

U

UI:	Upper internal
UL:	Upper lateral
UL / Ulna:	Ulnar length
Ulna A:	Ulna artery
Ulna V:	Ulna vein
Umb A:	Umbilical artery
Umb VD:	Umbilical artery diameter
Ureter:	Ureter diameter
UT Artery:	Uterine artery
UT Body Diam:	Uterine body diameter
UT H:	Uterus height
UT L:	Uterus length
UT Vol:	Uterus volume
UT W:	Uterus width

V

VA:	Vertebral artery diameter
Vm:	Mean velocity
Vol:	Volume
Volume-A:	Measurement of volume using the area method
Volume-B:	Measurement of volume using the Biplane method
Volume-E:	Measurement of volume using the Ellipse method
Volume-S:	Measurement of volume using the Simpson method
VSD:	Ventricular septal defect)
VSD Vmax:	Maximum velocity of ventricular septal defect

W

Wall GB:	Gallbladder wall thickness
WholeProst Vol:	Whole prostate volume

Y

YS:	Yolk sac

Appendix B Description of the Symbols

Number	Symbol	IEC publication	Description
1		IEC 60878-5333	Applied part type BF
2		IEC 60878-5335	Applied part type CF
3		IEC 60878-5036	Hazardous voltage
4		IEC 60878-5019	Protective conductor (earth)
5		IEC 60878-5017	Earthing (ground)
6		IEC 60878-5021	Equipotentiality
7		IEC 60878-5032	Alternating current
8		IEC 60878-5008	Off (power supply)
9		IEC 60878-5007	On (power supply)
10		IEC 60878-5009	Standby
11		ISO 15223-1	Manufacture date
12		ISO 7010-M002	See operating instructions/booklet.
13		ISO 7010-W001	General warning
14	IPX1	IEC 60529	Protection against vertically falling water drops
15	IPX4	IEC 60529	Protection against splashing water
16	IPX7	IEC 60529	Protection against the effects of temporary immersion in water

17		ISO 7000-0623	This way up
18		ISO 7000-0621	Fragile; handle with care
19		ISO 7000-0626	Keep away from rain
20		——	USB interface
21		——	Ethernet interface
22		——	Wireless interface
23		——	Input (audio interface)
24		——	Output (audio interface)
25		——	Microphone interface
26		ISO 7010-M002	Hand being crushed
27		ISO 15223-1	Manufacturer
28		ISO 15223-1	Serial number
29		ISO 15223-1	Item number

Appendix C

Acoustic output parameters

Operating mode：B mode　　Probe：C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.72	0.87				
Associated acoustic parameters	P_{ra}		(Mpa)	1.26					
	P		(mW)		82.2				
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	5.48					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	3.13	3.13				
	Dim. of A_{aprt}	X	(cm)		1.42				
		Y	(cm)		1.58				
Other information	t_d		(μsec)	0.317					
	P_{rr}		(Hz)	8333					
	p_r at max. I_{pi}		(Mpa)	2.28					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. MI		(W/cm²)	97.09					
Operational control conditions	Frequency		(MHz)	3.5	3.5				
	Power supply		(dB)	0	0				
	Focus number			1	1				
	Focus position		(mm)	55	55				
	Depth of focus		(cm)	6.3	6.3				

Operating mode：BM mode　　Probe：C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.71	0.71		0.14	0.39	
Associated acoustic parameters	P_{ra}		(Mpa)	1.26					
	P		(mW)		66.4			17.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				9.22		
	Z_s		(cm)				3.07		
	Z_{bp}		(cm)				2.53		
	Z_b		(cm)					4.95	
	z at max. $I_{pi,\alpha}$		(cm)	5.48					
	d_{eq}		(cm)					0.35	
	f_{awf}		(MHz)	3.14	3.14		3.13	3.13	
	Dim. of A_{aprt}	X	(cm)		1.42		1.42	1.42	
		Y	(cm)		1.56		1.57	1.57	
Other information	t_d		(μsec)	0.317					
	P_{rr}		(Hz)	8,000					
	p_r at max. I_{pi}		(Mpa)	2.28					
	d_{eq} at max. I_{pi}		(cm)					0.34	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	98.03					
Operational control conditions	Frequency		(MHz)	3.5	3.5		3.5	3.5	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	55	55		55	55	
	Depth of focus		(cm)	6.3	6.3		6.3	6.3	

Operating mode：BM（anatomical）mode　　Probe：C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.71	0.71		0.14	0.39	
Associated acoustic parameters	P_{ra}		(Mpa)	1.26					
	P		(mW)		66.4			17.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				9.22		
	Z_s		(cm)				3.07		
	Z_{bp}		(cm)				2.53		
	Z_b		(cm)					4.95	
	z at max. $I_{pi,\alpha}$		(cm)	5.48					
	d_{eq}		(cm)					0.35	
	f_{awf}		(MHz)	3.14	3.14		3.13	3.13	
	Dim. of A_{aprt}	X	(cm)		1.42		1.42	1.42	
		Y	(cm)		1.56		1.57	1.57	
Other information	t_d		(μsec)	0.317					
	P_{rr}		(Hz)	8,000					
	p_r at max. I_{pi}		(Mpa)	2.28					
	d_{eq} at max. I_{pi}		(cm)					0.34	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	98.03					
Operational control conditions	Frequency		(MHz)	3.5	3.5		3.5	3.5	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	55	55		55	55	
	Depth of focus		(cm)	6.3	6.3		6.3	6.3	

Operating mode: M mode Probe: C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.90			0.10		0.07
Associated acoustic parameters	P_{ra}		(Mpa)	1.64					
	P		(mW)						6
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				9.22		
	Z_s		(cm)				3.07		
	Z_{bp}		(cm)				2.53		
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	2.13					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	3.33			3.13		3.33
	Dim. of A_{aprt}	X	(cm)				1.42		1.00
		Y	(cm)				1.57		3.20
Other information	t_d		(μsec)	0.59					
	P_{rr}		(Hz)	287					
	p_r at max. I_{pi}		(Mpa)	2.09					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	116					
Operational control conditions	Frequency		(MHz)	3.5			3.5		3.5
	Power supply		(dB)	0			0		0
	Focus number			1			1		1
	Focus position		(mm)	55			55		55
	Depth of focus		(cm)	6.3			6.3		6.3

Operating mode: B + colour mode Probe: C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.78	0.03				0.14
Associated acoustic parameters	P_{ra}		(Mpa)	1.23					
	P		(mW)		2				2
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	3.67					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	2.50	2.50				2.50
	Dim. of A_{aprt}	X	cm		1.00				1.00
		Y	cm		1.00				1.00
Other information	t_d		(μsec)	1.42					
	P_{rr}		(Hz)	90					
	p_r at max. I_{pi}		(Mpa)	1.69					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	55					
Operational control conditions	Frequency		(MHz)	3.5	3.5				3.5
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	55	55				55
	Pulse repetition frequency		(KHz)	6	6				6
	Depth of focus		(cm)	6.3	6.3				6.3

Operating mode: B + CPA mode Probe: C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.78	0.03				0.14
Associated acoustic parameters	P_{ra}		(Mpa)	1.23					
	P		(mW)		2				2
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	3.67					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	2.50	2.50				2.50
	Dim. of A_{aprt}	X	(cm)		1.00				1.00
		Y	(cm)		1.00				1.00
Other information	t_d		(μsec)	1.42					
	P_{rr}		(Hz)	90					
	p_r at max. I_{pi}		(Mpa)	1.69					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	55					
Operational control conditions	Frequency		(MHz)	3.5	3.5				3.5
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	55	55				55
	Pulse repetition frequency		(KHz)	6	6				6
	Depth of focus		(cm)	6.3	6.3				6.3

Operating mode: PW mode Probe: C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.44			2.79	1.19	2.33
Associated acoustic parameters	P_{ra}		(Mpa)	0.82					
	P		(mW)				167	157	159
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	3.67					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	3.50			3.50	3.50	3.50
	Dim. of A_{aprt}	X	(cm)				1.00	1.00	1.00
		Y	(cm)				1.00	1.00	1.00
Other information	t_d		(μsec)	2.28					
	P_{rr}		(Hz)	1,250					
	p_r at max. I_{pi}		(Mpa)	1.27					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	23					
Operational control conditions	Frequency		(MHz)	3.45			3.45	3.45	3.45
	Power supply		(dB)	0			0	0	0
	Focus number			1			1	1	1
	Focus position		(mm)	25			25	25	25
	Pulse repetition frequency		(KHz)	12.5			12.5	12.5	12.5
	Depth of focus		(cm)	3.2			3.2	3.2	3.2

Operating mode: B+PW mode Probe: C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.69	0.69		0.14	0.35	
Associated acoustic parameters	P_{ra}		(Mpa)	1.30					
	P		(mW)		64.4			16.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				9.01		
	Z_s		(cm)				3.05		
	Z_{bp}		(cm)				2.04		
	Z_b		(cm)					4.75	
	z at max. $I_{pi,\alpha}$		(cm)	5.42					
	d_{eq}		(cm)					0.32	
	f_{awf}		(MHz)	3.5	3.5		3.5	3.5	
	Dim. of A_{aprt}	X	(cm)		1.50		1.50	1.50	
		Y	(cm)		1.54		1.56	1.56	
Other information	t_d		(μsec)	0.322					
	P_{rr}		(Hz)	8,000					
	p_r at max. I_{pi}		(Mpa)	2.28					
	d_{eq} at max. I_{pi}		(cm)					0.34	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	97.03					
Operational control conditions	Frequency		(MHz)	3.45	3.45		3.45	3.45	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	25	25		25	25	
	Pulse repetition frequency		(KHz)	12.5	12.5		12.5	12.5	
	Depth of focus		(cm)	3.2	3.2		3.2	3.2	

Operating mode: B+CFM+PW mode Probe: C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.62	0.61		0.24	0.25	
Associated acoustic parameters	P_{ra}		(Mpa)	1.21					
	P		(mW)		58			118.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				9.56		
	Z_s		(cm)				3.14		
	Z_{bp}		(cm)				2.03		
	Z_b		(cm)					4.75	
	z at max. $I_{pi,\alpha}$		(cm)	5.40					
	d_{eq}		(cm)					0.32	
	f_{awf}		(MHz)	3.74	3.74		3.74	3.74	
	Dim. of A_{aprt}	X	(cm)		1.55		1.55	1.55	
		Y	(cm)		1.60		1.60	1.60	
Other information	t_d		(μsec)	0.322					
	P_{rr}		(Hz)	8,480					
	p_r at max. I_{pi}		(Mpa)	2.38					
	d_{eq} at max. I_{pi}		(cm)					0.34	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	96.03					
Operational control conditions	Frequency		(MHz)	3.45	3.45		3.5	3.5	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	25	25		25	25	
	Pulse repetition frequency		(KHz)	12.5	12.5		12.5	12.5	
	Depth of focus		(cm)	3.2	3.2		3.2	3.2	

Operating mode: B+CPA+PW mode Probe: C3LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.62	0.61		0.24	0.25	
Associated acoustic parameters	P_{ra}		(Mpa)	1.21					
	P		(mW)		58			118.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				9.56		
	Z_s		(cm)				3.14		
	Z_{bp}		(cm)				2.03		
	Z_b		(cm)					4.75	
	z at max. $I_{pi,\alpha}$		(cm)	5.40					
	d_{eq}		(cm)					0.32	
	f_{awf}		(MHz)	3.74	3.74		3.74	3.74	
	Dim. of A_{aprt}	X	(cm)		1.55		1.55	1.55	
		Y	(cm)		1.60		1.60	1.60	
Other information	t_d		(μsec)	0.322					
	P_{rr}		(Hz)	8,480					
	p_r at max. I_{pi}		(Mpa)	2.38					
	d_{eq} at max. I_{pi}		(cm)					0.34	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	96.03					
Operational control conditions	Frequency		(MHz)	3.45	3.45		3.5	3.5	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	25	25		25	25	
	Pulse repetition frequency		(KHz)	12.5	12.5		12.5	12.5	
	Depth of focus		(cm)	3.2	3.2		3.2	3.2	

Operating mode: B mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.49	0.82				
Associated acoustic parameters	P_{ra}		(Mpa)	1.03					
	P		(mW)		79.3				
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	2.30					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	4.47	4.47				
	Dim. of A_{aprt}	X	(cm)		1.20				
		Y	(cm)		1.42				
Other information	t_d		(μsec)	0.476					
	P_{rr}		(Hz)	4,730					
	p_r at max. I_{pi}		(Mpa)	1.83					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	47.9					
Operational control conditions	Frequency		(MHz)	4.5	4.5				
	Power supply		(dB)	0	0				
	Focus number			1	1				
	Focus position		(mm)	55	55				
	Depth of focus		(cm)	6.3	6.3				

Operating mode: BM mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.50	0.68		0.10	0.29	
Associated acoustic parameters	P_{ra}		(Mpa)	1.03					
	P		(mW)		65.8			13.6	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				8.31		
	Z_s		(cm)				3.23		
	Z_{bp}		(cm)				2.53		
	Z_b		(cm)					4.62	
	z at max. $I_{pi,\alpha}$		(cm)	2.30					
	d_{eq}		(cm)					0.32	
	f_{awf}		(MHz)	4.47	4.47		4.47	4.47	
	Dim. of A_{aprt}	X	(cm)		1.20		1.20	1.20	
		Y	(cm)		1.42		1.42	1.42	
Other information	t_d		(μsec)	0.476					
	P_{rr}		(Hz)	5,200					
	p_r at max. I_{pi}		(Mpa)	1.83					
	d_{eq} at max. I_{pi}		(cm)					0.35	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	50					
Operational control conditions	Frequency		(MHz)	4.5	4.5		4.5	4.5	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	55	55		55	55	
	Depth of focus		(cm)	6.3	6.3		6.3	6.3	

Operating mode: BM (anatomical) mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.50	0.68		0.10	0.29	
Associated acoustic parameters	P_{ra}		(Mpa)	1.03					
	P		(mW)		65.8			13.6	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				8.31		
	Z_s		(cm)				3.23		
	Z_{bp}		(cm)				2.53		
	Z_b		(cm)					4.62	
	z at max. $I_{pi,\alpha}$		(cm)	2.30					
	d_{eq}		(cm)					0.32	
	f_{awf}		(MHz)	4.47	4.47		4.47	4.47	
	Dim. of A_{aprt}	X	(cm)		1.20		1.20	1.20	
		Y	(cm)		1.42		1.42	1.42	
Other information	t_d		(μsec)	0.476					
	P_{rr}		(Hz)	5,200					
	p_r at max. I_{pi}		(Mpa)	1.83					
	d_{eq} at max. I_{pi}		(cm)					0.35	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	50					
Operational control conditions	Frequency		(MHz)	4.5	4.5		4.5	4.5	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	55	55		55	55	
	Depth of focus		(cm)	6.3	6.3		6.3	6.3	

Operating mode: M mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.501			0.11		0.07
Associated acoustic parameters	P_{ra}		(Mpa)	1.05					
	P		(mW)				6		6
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	2.420					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	4.43			4.43		4.43
	Dim. of A_{aprt}	X	(cm)				0.67		1.22
		Y	(cm)				1.20		3.18
Other information	t_d		(μsec)	0.460					
	P_{rr}		(Hz)	409					
	p_r at max. I_{pi}		(Mpa)	1.74					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	47					
Operational control conditions	Frequency		(MHz)	4.5			4.5	4.5	
	Power supply		(dB)	0			0	0	
	Focus number			1			1	1	
	Focus position		(mm)	55			55	55	
	Depth of focus		(cm)	6.3			6.3	6.3	

Operating mode: B+colour mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.51	0.04				0.10
Associated acoustic parameters	P_{ra}		(Mpa)	1.10					
	P		(mW)		3				3
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	4.57					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	4.68	4.68				4.68
	Dim. of A_{aprt}	X	(cm)		1.22				1.22
		Y	(cm)		1.23				1.23
Other information	t_d		(μsec)	1.32					
	P_{rr}		(Hz)	90					
	p_r at max. I_{pi}		(Mpa)	1.53					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	54					
Operational control conditions	Frequency		(MHz)	4.5	4.5				4.5
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	55	55				55
	Pulse repetition frequency		(KHz)	6	6				6
	Depth of focus		(cm)	6.3	6.3				6.3

Operating mode: B+CPA mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.51	0.04				0.10
Associated acoustic parameters	P_{ra}		(Mpa)	1.10					
	P		(mW)		3				3
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	4.57					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	4.68	4.68				4.68
	Dim. of A_{aprt}	X	(cm)		1.22				1.22
		Y	(cm)		1.23				1.23
Other information	t_d		(μsec)	1.32					
	P_{rr}		(Hz)	90					
	p_r at max. I_{pi}		(Mpa)	1.53					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	54					
Operational control conditions	Frequency		(MHz)	4.5	4.5				4.5
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	55	55				55
	Pulse repetition frequency		(KHz)	6	6				6
	Depth of focus		(cm)	6.3	6.3				6.3

Operating mode: PW mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.61		2.62		1.01	3.31
Associated acoustic parameters	P_{ra}		(Mpa)	1.08					
	P		(mW)			145		151	147
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	3.55					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	3.80		3.80		3.80	3.80
	Dim. of A_{aprt}	X	(cm)			0.90		0.90	0.90
		Y	(cm)			1.00		1.00	1.00
Other information	t_d		(μsec)	2.12					
	P_{rr}		(Hz)	1,230					
	p_r at max. I_{pi}		(Mpa)	1.30					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	21					
Operational control conditions	Frequency		(MHz)	5.0		5.0		5.0	5.0
	Power supply		(dB)	0		0		0	0
	Focus number			1		1		1	1
	Focus position		(mm)	35		35		35	35
	Pulse repetition frequency		(KHz)	12.5		12.5		12.5	12.5
	Depth of focus		(cm)	6.3		6.3		6.3	6.3

Operating mode: B+PW mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.57	0.63		0.20	0.28	
Associated acoustic parameters	P_{ra}		(Mpa)	1.2					
	P		(mW)		60.1			14.9	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				9.45		
	Z_s		(cm)				3.13		
	Z_{bp}		(cm)				2.21		
	Z_b		(cm)					4.45	
	z at max. $I_{pi,\alpha}$		(cm)	2.38					
	d_{eq}		(cm)					0.31	
	f_{awf}		(MHz)	4.42	4.42		4.42	4.42	
	Dim. of A_{aprt}	X	(cm)		1.20		1.20	1.20	
		Y	(cm)		1.42		1.42	1.42	
Other information	t_d		(μsec)	0.465					
	P_{rr}		(Hz)	5,200					
	p_r at max. I_{pi}		(Mpa)	1.73					
	d_{eq} at max. I_{pi}		(cm)					0.35	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	55					
Operational control conditions	Frequency		(MHz)	5.0	5.0		5.0	5.0	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	35	35		35	35	
	Pulse repetition frequency		(KHz)	12.5	12.5		12.5	12.5	
	Depth of focus		(cm)	6.3	6.3		6.3	6.3	

Operating mode: B+CFM+PW mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.68	0.58		0.21	0.23	
Associated acoustic parameters	P_{ra}		(Mpa)	1.42					
	P		(mW)		5.9			15.8	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				9.33		
	Z_s		(cm)				3.24		
	Z_{bp}		(cm)				2.34		
	Z_b		(cm)					4.43	
	z at max. $I_{pi,\alpha}$		(cm)	2.26					
	d_{eq}		(cm)					0.31	
	f_{awf}		(MHz)	4.32	4.32		4.32	4.32	
	Dim. of A_{aprt}	X	(cm)		1.20		1.20	1.20	
		Y	(cm)		1.42		1.42	1.42	
Other information	t_d		(μsec)	0.455					
	P_{rr}		(Hz)	5,200					
	p_r at max. I_{pi}		(Mpa)	1.69					
	d_{eq} at max. I_{pi}		(cm)					0.35	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	55					
Operational control conditions	Frequency		(MHz)	5.0	5.0		5.0	5.0	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	35	35		35	35	
	Pulse repetition frequency		(KHz)	12.5	12.5		12.5	12.5	
	Depth of focus		(cm)	6.3	6.3		6.3	6.3	

Operating mode: B+CPA+PW mode Probe: C5LF

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.68	0.58		0.21	0.23	
Associated acoustic parameters	P_{ra}		(Mpa)	1.42					
	P		(mW)		5.9			15.8	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)				9.33		
	Z_s		(cm)				3.24		
	Z_{bp}		(cm)				2.34		
	Z_b		(cm)					4.43	
	z at max. $I_{pi,\alpha}$		(cm)	2.26					
	d_{eq}		(cm)					0.31	
	f_{awf}		(MHz)	4.32	4.32		4.32	4.32	
	Dim. of A_{aprt}	X	(cm)		1.20		1.20	1.20	
		Y	(cm)		1.42		1.42	1.42	
Other information	t_d		(μsec)	0.455					
	P_{rr}		(Hz)	5,200					
	p_r at max. I_{pi}		(Mpa)	1.69					
	d_{eq} at max. I_{pi}		(cm)					0.35	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	55					
Operational control conditions	Frequency		(MHz)	5.0	5.0		5.0	5.0	
	Power supply		(dB)	0	0		0	0	
	Focus number			1	1		1	1	
	Focus position		(mm)	35	35		35	35	
	Pulse repetition frequency		(KHz)	12.5	12.5		12.5	12.5	
	Depth of focus		(cm)	6.3	6.3		6.3	6.3	

Operating mode: B mode Probe: L8LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.88	0.51				
Associated acoustic parameters	P_{ra}		(Mpa)	1.99					
	P		(mW)		20.6				
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	1.81					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	5.16	5.16				
	Dim. of A_{aprt}	X	(cm)		1.02				
		Y	(cm)		0.91				
Other information	t_d		(μsec)	0.266					
	P_{rr}		(Hz)	16,667					
	p_r at max. I_{pi}		(Mpa)	2.76					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	119.5					
Operational control conditions	Frequency		(MHz)	10.0	10.0				
	Power supply		(dB)	0	0				
	Focus number			1	1				
	Focus position		(mm)	23	23				
	Depth of focus		(cm)	2.4	2.4				

Operating mode: BM mode Probe: L8LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.87	0.46	0.052		0.12	
Associated acoustic parameters	P_{ra}		(Mpa)	1.99					
	P		(mW)		18.2	2.1		2.1	
	Min. of [Pα(zs), Ita,α(zs)] (mW)								
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					1.74	
	z at max. $I_{pi,\alpha}$		(cm)	1.81					
	d_{eq}		(cm)					0.23	
	f_{awf}		(MHz)	5.22	5.22	5.19		5.19	
	Dim. of A_{aprt}	X	(cm)		1.00	1.02		1.02	
		Y	(cm)		0.92	0.93		0.93	
Other information	t_d		(μsec)	0.278					
	P_{rr}		(Hz)	15,924					
	p_r at max. I_{pi}		(Mpa)	2.76					
	d_{eq} at max. I_{pi}		(cm)					0.23	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	115.5					
Operational control conditions	Frequency		(MHz)	10.0	10.0	10.0		10.0	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	23	23	23		23	
	Depth of focus		(cm)	2.4	2.4	2.4		2.4	

Operating mode: BM (anatomical) mode Probe: L8LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.87	0.46	0.052		0.12	
Associated acoustic parameters	P_{ra}		(Mpa)	1.99					
	P		(mW)		18.2	2.1		2.1	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					1.74	
	z at max. $I_{pi,\alpha}$		(cm)	1.81					
	d_{eq}		(cm)					0.23	
	f_{awf}		(MHz)	5.22	5.22	5.19		5.19	
	Dim. of A_{aprt}	X	(cm)		1.00	1.02		1.02	
		Y	(cm)		0.92	0.93		0.93	
Other information	t_d		(μsec)	0.278					
	P_{rr}		(Hz)	15,924					
	p_r at max. I_{pi}		(Mpa)	2.76					
	d_{eq} at max. I_{pi}		(cm)					0.23	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	115.5					
Operational control conditions	Frequency		(MHz)	10.0	10.0	10.0		10.0	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	23	23	23		23	
	Depth of focus		(cm)	2.4	2.4	2.4		2.4	

Operating mode: M mode Probe: L8LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.65		0.07			0.05
Associated acoustic parameters	P_{ra}		(Mpa)	0.66					
	P		(mW)			2			2
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	1.59					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	6.67		6.67			6.67
	Dim. of A_{aprt}	X	(cm)			0.70			0.70
		Y	(cm)			1.50			1.50
Other information	t_d		(μsec)	0.47					
	P_{rr}		(Hz)	335					
	p_r at max. I_{pi}		(Mpa)	0.95					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	14					
Operational control conditions	Frequency		(MHz)	10.0		10.0			10.0
	Power supply		(dB)	0		0			0
	Focus number			1		1			1
	Focus position		(mm)	23		23			23
	Depth of focus		(cm)	2.4		2.4			2.4

Operating mode: B + colour mode Probe: L8LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.45	0.10				1.87
Associated acoustic parameters	P_{ra}		(Mpa)	1.15					
	P		(mW)		3				4
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	1.06					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	6.66	6.66				6.66
	Dim. of A_{aprt}	X	(cm)		0.70				0.70
		Y	(cm)		0.60				0.60
Other information	t_d		(μsec)	0.58					
	P_{rr}		(Hz)	162					
	p_r at max. I_{pi}		(Mpa)	1.47					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	70					
Operational control conditions	Frequency		(MHz)	8.2	8.2				8.2
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	23	23				23
	Pulse repetition frequency		(KHz)	3	3				3
	Depth of focus		(cm)	2.4	2.4				2.4

Operating mode: BB+CPA mode Probe: L8LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.45	0.10				1.87
Associated acoustic parameters	P_{ra}		(Mpa)	1.15					
	P		(mW)		3				4
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	1.06					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	6.66	6.66				6.66
	Dim. of A_{aprt}	X	(cm)		0.70				0.70
		Y	(cm)		0.60				0.60
Other information	t_d		(μsec)	0.58					
	P_{rr}		(Hz)	162					
	p_r at max. I_{pi}		(Mpa)	1.47					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	70					
Operational control conditions	Frequency		(MHz)	8.2	8.2				8.2
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	23	23				23
	Pulse repetition frequency		(KHz)	3	3				3
	Depth of focus		(cm)	2.4	2.4				2.4

Operating mode: PW mode Probe: L8LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.25		0.26		0.72	1.55
Associated acoustic parameters	P_{ra}		(Mpa)	0.50					
	P		(mW)			14		51	45
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	1.62					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	4.00		4.00		4.00	4.00
	Dim. of A_{aprt}	X	(cm)			0.70		0.70	0.70
		Y	(cm)			0.60		0.60	0.60
Other information	t_d		(μsec)	2.40					
	P_{rr}		(Hz)	1,250					
	p_r at max. I_{pi}		(Mpa)	0.62					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	11					
Operational control conditions	Frequency		(MHz)	7.1		7.1		7.1	7.1
	Power supply		(dB)	0		0		0	0
	Focus number			1		1		1	1
	Focus position		(mm)	18		18		18	18
	Pulse repetition frequency		(KHz)	6		6		6	6
	Depth of focus		(cm)	2.4		2.4		2.4	2.4

Operating mode: B+PW mode Probe: L8LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.77	0.65	0.09		0.23	
Associated acoustic parameters	P_{ra}		(Mpa)	1.78					
	P		(mW)		22.3	3.2		4.1	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					1.64	
	z at max. $I_{pi,\alpha}$		(cm)	1.75					
	d_{eq}		(cm)					0.24	
	f_{awf}		(MHz)	5.3	5.3	5.29		5.29	
	Dim. of A_{aprt}	X	(cm)		1.00	1.02		1.02	
		Y	(cm)		0.92	0.93		0.93	
Other information	t_d		(μsec)	0.264					
	P_{rr}		(Hz)	5,924					
	p_r at max. I_{pi}		(Mpa)	2.76					
	d_{eq} at max. I_{pi}		(cm)					0.23	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	121.4					
Operational control conditions	Frequency		(MHz)	7.1	7.1	7.1		7.1	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	18	18	18		18	
	Pulse repetition frequency		(KHz)	6	6	6		6	
	Depth of focus		(cm)	2.4	2.4	2.4		2.4	

Operating mode: B+CFM+PW mode Probe: L8LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.77	0.74	0.11		0.30	
Associated acoustic parameters	P_{ra}		(Mpa)	1.92					
	P		(mW)		24.0	4.2		4.9	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					1.54	
	z at max. $I_{pi,\alpha}$		(cm)	1.87					
	d_{eq}		(cm)					0.24	
	f_{awf}		(MHz)	5.2	5.2	5.21		5.21	
	Dim. of A_{aprt}	X	(cm)		1.00	1.02		1.02	
		Y	(cm)		0.92	0.93		0.93	
Other information	t_d		(μsec)	0.271					
	P_{rr}		(Hz)	5,120					
	p_r at max. I_{pi}		(Mpa)	2.76					
	d_{eq} at max. I_{pi}		(cm)					0.23	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	121.4					
Operational control conditions	Frequency		(MHz)	7.1	7.1	7.1		7.1	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	18	18	18		18	
	Pulse repetition frequency		(KHz)	6	6	6		6	
	Depth of focus		(cm)	2.4	2.4	2.4		2.4	

Operating mode: B+CPA+PW mode Probe: L8LC

Index labelling				MI	TIS			TIB	TI C
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.77	0.74	0.11		0.30	
Associated acoustic parameters	P_{ra}		(Mpa)	1.92					
	P		(mW)		24.0	4.2		4.9	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					1.54	
	z at max. $I_{pi,\alpha}$		(cm)	1.87					
	d_{eq}		(cm)					0.24	
	f_{awf}		(MHz)	5.2	5.2	5.21		5.21	
	Dim. of A_{aprt}	X	(cm)		1.00	1.02		1.02	
		Y	(cm)		0.92	0.93		0.93	
Other information	t_d		(μsec)	0.271					
	P_{rr}		(Hz)	5,120					
	p_r at max. I_{pi}		(Mpa)	2.76					
	d_{eq} at max. I_{pi}		(cm)					0.23	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	121.4					
Operational control conditions	Frequency		(MHz)	7.1	7.1	7.1		7.1	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	18	18	18		18	
	Pulse repetition frequency		(KHz)	6	6	6		6	
	Depth of focus		(cm)	2.4	2.4	2.4		2.4	

Operating mode: B mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.70	0.46				
Associated acoustic parameters	P_{ra}		(Mpa)	1.22					
	P		(mW)		56.4				
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	5.43					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	3.08	3.08				
	Dim. of A_{aprt}	X	(cm)		1.80				
		Y	(cm)		1.62				
Other information	t_d		(μsec)	0.441					
	P_{rr}		(Hz)	8333					
	p_r at max. I_{pi}		(Mpa)	2.17					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	128.5					
Operational control conditions	Frequency		(MHz)	3.0	3.0				
	Power supply		(dB)	0	0				
	Focus number			1	1				
	Focus position		(mm)	60	60				
	Depth of focus		(cm)	7.1	7.1				

Operating mode: BM mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.70	0.80	0.18		0.49	
Associated acoustic parameters	P_{ra}		(Mpa)	1.22					
	P		(mW)		54.2	12.2		12.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					4.90	
	z at max. $I_{pi,\alpha}$		(cm)	5.43					
	d_{eq}		(cm)					0.21	
	f_{awf}		(MHz)	3.08	3.08	3.07		3.07	
	Dim. of A_{aprt}	X	(cm)		1.80	1.78		1.78	
		Y	(cm)		1.60	1.54		1.54	
Other information	t_d		(μsec)	0.440					
	P_{rr}		(Hz)	8,000					
	p_r at max. I_{pi}		(Mpa)	2.17					
	d_{eq} at max. I_{pi}		(cm)					0.21	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	128.1					
Operational control conditions	Frequency		(MHz)	3.0	3.0	3.0		3.0	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	60	60	60		60	
	Depth of focus		(cm)	7.1	7.1	7.1		7.1	

Operating mode: BM (anatomical) mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.70	0.80	0.18		0.49	
Associated acoustic parameters	P_{ra}		(Mpa)	1.22					
	P		(mW)		54.2	12.2		12.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					4.90	
	z at max. $I_{pi,\alpha}$		(cm)	5.43					
	d_{eq}		(cm)					0.21	
	f_{awf}		(MHz)	3.08	3.08	3.07		3.07	
	Dim. of A_{aprt}	X	(cm)		1.80	1.78		1.78	
		Y	(cm)		1.60	1.54		1.54	
Other information	t_d		(μsec)	0.440					
	P_{rr}		(Hz)	8,000					
	p_r at max. I_{pi}		(Mpa)	2.17					
	d_{eq} at max. I_{pi}		(cm)					0.21	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	128.1					
Operational control conditions	Frequency		(MHz)	3.0	3.0	3.0		3.0	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	60	60	60		60	
	Depth of focus		(cm)	7.1	7.1	7.1		7.1	

Operating mode: M mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.59		0.11			0.12
Associated acoustic parameters	P_{ra}		(Mpa)	1.08					
	P		(mW)			7			6
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	4.71					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	3.33		3.33			3.33
	Dim. of A_{aprt}	X	(cm)			0.70			0.70
		Y	(cm)			1.63			1.63
Other information	t_d		(μsec)	0.69					
	P_{rr}		(Hz)	3.03					
	p_r at max. I_{pi}		(Mpa)	1.86					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	40					
Operational control conditions	Frequency		(MHz)	3.0		3.0			3.0
	Power supply		(dB)	0		0			0
	Focus number			1		1			1
	Focus position		(mm)	60		60			60
	Depth of focus		(cm)	7.1		7.1			7.1

Operating mode: B+colour mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				1.22	0.08				4.13
Associated acoustic parameters	P_{ra}		(Mpa)	1.73					
	P		(mW)		8				6
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	4.34					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	2.00	2.00				2.00
	Dim. of A_{aprt}	X	(cm)		0.70				0.70
		Y	(cm)		0.51				0.51
Other information	t_d		(μsec)	0.74					
	P_{rr}		(Hz)	180					
	p_r at max. I_{pi}		(Mpa)	2.34					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	131					
Operational control conditions	Frequency		(MHz)	3.0	3.0				3.0
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	60	60				60
	Pulse repetition frequency		(KHz)	6	6				6
	Depth of focus		(cm)	7.1	7.1				7.1

Operating mode: B+CPA mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				1.22	0.08				4.13
Associated acoustic parameters	P_{ra}		(Mpa)	1.73					
	P		(mW)		8				6
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	4.34					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	2.00	2.00				2.00
	Dim. of A_{aprt}	X	(cm)		0.70				0.70
		Y	(cm)		0.51				0.51
Other information	t_d		(μsec)	0.74					
	P_{rr}		(Hz)	180					
	p_r at max. I_{pi}		(Mpa)	2.34					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	131					
Operational control conditions	Frequency		(MHz)	3.0	3.0				3.0
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	60	60				60
	Pulse repetition frequency		(KHz)	6	6				6
	Depth of focus		(cm)	7.1	7.1				7.1

Operating mode: PW mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.03		0.09		0.09	4.02
Associated acoustic parameters	P_{ra}		(Mpa)	0.06					
	P		(mW)			3		3	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	1.23				1.23	
	d_{eq}		(cm)					0.29	
	f_{awf}		(MHz)	6.00		6.00		6.00	6.00
	Dim. of A_{aprt}	X	(cm)			0.70		0.70	0.70
		Y	(cm)			0.41		0.41	0.41
Other information	t_d		(μsec)	2.28					
	P_{rr}		(Hz)	1,250					
	p_r at max. I_{pi}		(Mpa)	0.08					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)						
Operational control conditions	Frequency		(MHz)	3.0		3.0		3.0	3.0
	Power supply		(dB)	0		0		0	0
	Focus number			1		1		1	1
	Focus position		(mm)	30		30		30	30
	Pulse repetition frequency		(KHz)	12.5		12.5		12.5	12.5
	Depth of focus		(cm)	7.1		7.1		7.1	7.1

Operating mode: B+PW mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.76	0.80	0.21		0.45	
Associated acoustic parameters	P_{ra}		(Mpa)	1.31					
	P		(mW)		54.2	14.2		11.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					4.80	
	z at max. $I_{pi,\alpha}$		(cm)	5.43					
	d_{eq}		(cm)					0.21	
	f_{awf}		(MHz)	3.00	3.00	3.00		3.00	
	Dim. of A_{aprt}	X	(cm)		1.80	1.78		1.78	
		Y	(cm)		1.60	1.54		1.54	
Other information	t_d		(μsec)	0.410					
	P_{rr}		(Hz)	8,000					
	p_r at max. I_{pi}		(Mpa)	2.34					
	d_{eq} at max. I_{pi}		(cm)					0.21	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	138.1					
Operational control conditions	Frequency		(MHz)	3.0	3.0	3.0		3.0	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	30	30	30		30	
	Pulse repetition frequency		(KHz)	12.5	12.5	12.5		12.5	
	Depth of focus		(cm)	7.1	7.1	7.1		7.1	

Operating mode: B+CFM+PW mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.86	0.80	0.20		0.42	
Associated acoustic parameters	P_{ra}		(Mpa)	1.52					
	P		(mW)		54.2	13.2		12.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					4.80	
	z at max. $I_{pi,\alpha}$		(cm)	5.53					
	d_{eq}		(cm)					0.21	
	f_{awf}		(MHz)	3.1	3.1	3.1		3.1	
	Dim. of A_{aprt}	X	(cm)		1.80	1.78		1.78	
		Y	(cm)		1.60	1.54		1.54	
Other information	t_d		(μsec)	0.420					
	P_{rr}		(Hz)	8,000					
	p_r at max. I_{pi}		(Mpa)	2.42					
	d_{eq} at max. I_{pi}		(cm)					0.21	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	127.0					
Operational control conditions	Frequency		(MHz)	3.0	3.0	3.0		3.0	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	30	30	30		30	
	Pulse repetition frequency		(KHz)	6	6	6		6	
	Depth of focus		(cm)	7.1	7.1	7.1		7.1	

Operating mode: B+CPA+PW mode Probe: P3FC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.86	0.80	0.20		0.42	
Associated acoustic parameters	P_{ra}		(Mpa)	1.52					
	P		(mW)		54.2	13.2		12.2	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					4.80	
	z at max. $I_{pi,\alpha}$		(cm)	5.53					
	d_{eq}		(cm)					0.21	
	f_{awf}		(MHz)	3.1	3.1	3.1		3.1	
	Dim. of A_{aprt}	X	(cm)		1.80	1.78		1.78	
		Y	(cm)		1.60	1.54		1.54	
Other information	t_d		(μsec)	0.420					
	P_{rr}		(Hz)	8,000					
	p_r at max. I_{pi}		(Mpa)	2.42					
	d_{eq} at max. I_{pi}		(cm)					0.21	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	127.0					
Operational control conditions	Frequency		(MHz)	3.0	3.0	3.0		3.0	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	30	30	30		30	
	Pulse repetition frequency		(KHz)	6	6	6		6	
	Depth of focus		(cm)	7.1	7.1	7.1		7.1	

Operating mode: B mode Probe: V6LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.70	0.46				
Associated acoustic parameters	P_{ra}		(Mpa)	1.22					
	P		(mW)		56.4				
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	5.43					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	3.08	3.08				
	Dim. of A_{aprt}	X	(cm)		1.80				
		Y	(cm)		1.62				
Other information	t_d		(μsec)	0.441					
	P_{rr}		(Hz)	8333					
	p_r at max. I_{pi}		(Mpa)	2.17					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	128.5					
Operational control conditions	Frequency		(MHz)	6.0	6.0				
	Power supply		(dB)	0	0				
	Focus number			1	1				
	Focus position		(mm)	65	65				
	Depth of focus		(cm)	7.1	7.1				

Operating mode: BM mode Probe: V6LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.85	0.65	0.11		0.26	
Associated acoustic parameters	P_{ra}		(Mpa)	2.40					
	P		(mW)		25.4	4.3		4.3	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					2.09	
	z at max. $I_{pi,\alpha}$		(cm)	2.09					
	d_{eq}		(cm)					0.18	
	f_{awf}		(MHz)	5.36	5.36	5.35		5.35	
	Dim. of A_{aprt}	X	(cm)		0.49	0.47		0.47	
		Y	(cm)		0.96	0.98		0.98	
Other information	t_d		(μsec)	0.346					
	P_{rr}		(Hz)	9,960					
	p_r at max. I_{pi}		(Mpa)	3.53					
	d_{eq} at max. I_{pi}		(cm)					0.18	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	250.3					
Operational control conditions	Frequency		(MHz)	6.0	6.0	6.0		6.0	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	65	65	65		65	
	Depth of focus		(cm)	7.1	7.1	7.1		7.1	

Operating mode: M mode Probe: V6LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.62	0.02				0.01
Associated acoustic parameters	P_{ra}		(Mpa)	0.58					
	P		(mW)		1				1
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	1.56					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	6.00	6.00				6.00
	Dim. of A_{aprt}	X	(cm)		0.70				0.70
		Y	(cm)		0.90				0.90
Other information	t_d		(μsec)	0.37					
	P_{rr}		(Hz)	378					
	p_r at max. I_{pi}		(Mpa)	0.80					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	10					
Operational control conditions	Frequency		(MHz)	6.0	6.0				6.0
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	65	65				65
	Depth of focus		(cm)	7.1	7.1				7.1

Operating mode B+colour mode Probe: V6LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.15					2.61
Associated acoustic parameters	P_{ra}		(Mpa)	0.34					
	P		(mW)						
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	1.52					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	5.00	5.00				5.00
	Dim. of A_{aprt}	X	(cm)		0.70				0.70
		Y	(cm)		0.41				0.41
Other information	t_d		(μsec)	0.89					
	P_{rr}		(Hz)	162					
	p_r at max. I_{pi}		(Mpa)	0.44					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	4					
Operational control conditions	Frequency		(MHz)	5.7	5.7				5.7
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	60	60				60
	Pulse repetition frequency		(KHz)	6	6				6
	Depth of focus		(cm)	7.1	7.1				7.1

Operating mode: B+CPA mode Probe: V6LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.15					2.61
Associated acoustic parameters	P_{ra}		(Mpa)	0.34					
	P		(mW)						
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	1.52					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	5.00	5.00				5.00
	Dim. of A_{aprt}	X	(cm)		0.70				0.70
		Y	(cm)		0.41				0.41
Other information	t_d		(μsec)	0.89					
	P_{rr}		(Hz)	162					
	p_r at max. I_{pi}		(Mpa)	0.44					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	4					
Operational control conditions	Frequency		(MHz)	5.7	5.7				5.7
	Power supply		(dB)	0	0				0
	Focus number			1	1				1
	Focus position		(mm)	60	60				60
	Pulse repetition frequency		(KHz)	6	6				6
	Depth of focus		(cm)	7.1	7.1				7.1

Operating mode: PW mode Probe: V6LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.29		1.88		1.18	3.66
Associated acoustic parameters	P_{ra}		(Mpa)	0.46					
	P		(mW)			158		155	152
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max. $I_{pi,\alpha}$		(cm)	4.71					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	2.50		2.50		2.50	2.50
	Dim. of A_{aprt}	X	(cm)			0.70		0.70	0.70
		Y	(cm)			0.51		0.51	0.51
Other information	t_d		(μsec)	2.42					
	P_{rr}		(Hz)	1,250					
	p_r at max. I_{pi}		(Mpa)	0.68					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	10					
Operational control conditions	Frequency (MHz)			6.25		6.25		6.25	6.25
	Power supply		(dB)	0		0		0	0
	Focus number			1		1		1	1
	Focus position		(mm)	30		30		30	30
	Pulse repetition frequency		(KHz)	12.5		12.5		12.5	12.5
	Depth of focus		(cm)	7.1		7.1		7.1	7.1

Operating mode: B+PW mode Probe: V6LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.73	0.61	0.13		0.24	
Associated acoustic parameters	P_{ra}		(Mpa)	2.45					
	P		(mW)		26.8	4.1		4.1	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					2.09	
	z at max. $I_{pi,\alpha}$		(cm)	2.15					
	d_{eq}		(cm)					0.18	
	f_{awf}		(MHz)	5.24	5.24	5.24		5.24	
	Dim. of A_{aprt}	X	(cm)		0.49	0.47		0.47	
		Y	(cm)		0.96	0.98		0.98	
Other information	t_d		(μsec)	0.354					
	P_{rr}		(Hz)	9,960					
	p_r at max. I_{pi}		(Mpa)	3.41					
	d_{eq} at max. I_{pi}		(cm)					0.18	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	248					
Operational control conditions	Frequency		(MHz)	6.25	6.25	6.25		6.25	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	30	30	30		30	
	Pulse repetition frequency		(KHz)	12.5	12.5	12.5		12.5	
	Depth of focus		(cm)	7.1	7.1	7.1		7.1	

Operating mode: B+CFM+PW mode Probe: V6LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.90	0.63	0.23		0.19	
Associated acoustic parameters	P_{ra}		(Mpa)	2.21					
	P		(mW)		24.8	4.9		3.1	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					2.09	
	z at max. $I_{pi,\alpha}$		(cm)	2.25					
	d_{eq}		(cm)					0.18	
	f_{awf}		(MHz)	5.3	5.3	5.3		5.3	
	Dim. of A_{aprt}	X	(cm)		0.49	0.47		0.47	
		Y	(cm)		0.96	0.98		0.98	
Other information	t_d		(μsec)	0.361					
	P_{rr}		(Hz)	9,960					
	p_r at max. I_{pi}		(Mpa)	3.18					
	d_{eq} at max. I_{pi}		(cm)					0.18	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	244					
Operational control conditions	Frequency (MHz)			6.25	6.25	6.25		6.25	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	30	30	30		30	
	Pulse repetition frequency		(KHz)	6.0	6.0	6.0		6.0	
	Depth of focus		(cm)	7.1	7.1	7.1		7.1	

Operating mode: B+CPA+PW mode Probe: V6LC

Index labelling				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global maximum index value				0.96	0.63	0.23		0.19	
Associated acoustic parameters	P_{ra}		(Mpa)	2.21					
	P		(mW)		24.8	4.9		3.1	
	Min. of [Pα(zs), Ita, α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					2.09	
	z at max. $I_{pi,\alpha}$		(cm)	2.25					
	d_{eq}		(cm)					0.18	
	f_{awf}		(MHz)	5.3	5.3	5.3		5.3	
	Dim. of A_{aprt}	X	(cm)		0.49	0.47		0.47	
		Y	(cm)		0.96	0.98		0.98	
Other information	t_d		(μsec)	0.361					
	P_{rr}		(Hz)	9,960					
	p_r at max. I_{pi}		(Mpa)	3.18					
	d_{eq} at max. I_{pi}		(cm)					0.18	
	$I_{pa,\alpha}$ at max. *MI*		(W/cm²)	244					
Operational control conditions	Frequency		(MHz)	6.25	6.25	6.25		6.25	
	Power supply		(dB)	0	0	0		0	
	Focus number			1	1	1		1	
	Focus position		(mm)	30	30	30		30	
	Pulse repetition frequency		(KHz)	6.0	6.0	6.0		6.0	
	Depth of focus		(cm)	7.1	7.1	7.1		7.1	

Operating Mode: CW Probe: TR5-14

Index Label				MI	TIS			TIB	TIC
					Scan	Non-scan		Non-scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum index value				#	-	0.05	-	0.12	0.1
Associated Acoustic parameters	P_{ra}		Mpa	#					
	P		mW		-	2.4		2.4	
	Min.of[$P_a(z_s)$,$I_{ta,a}(z_s)$]		mW				-		
	z_s		cm				-		
	z_{bp}		cm				-		
	z_b		cm					1.05	
	z at max. $I_{pi,a}$		cm	#					
	$d_{eq}(z_b)$		cm					0.33	
	f_{awf}		MHz	#	-	3.96	-	3.96	3.96
	Dim of A_{aprt}	X	(cm)		-	0.7	-	0.7	0.7
		Y	(cm)		-	1.4	-	1.4	1.4
Other information	t_d		μsec	#					
	p_{rr}		Hz	#					
	p_r at max. I_{pi}		Mpa	#					
	d_{eq} at max. I_{pi}		cm					0.33	
	$I_{pi,\alpha}$ at max.MI		W/cm²	#					
Operating Control conditions	Freq		(MHz)	#	-	3.5	-	3.5	3.5
	D_PWR		(%)	#	-	100	-	100	100

(a) Intended use does not include cephalic so TIC is not computed

No data reported

Transducer Model: L10LC Operating Mode：B-Mode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.60	0.48				
Associated Acoustic Parameters	P_{ra}		(Mpa)	1.91					
	P		(mW)		17.5				
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max.. $I_{pi,\alpha}$		(cm)	0.98					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	9.56	9.56				
	Dim of A_{aprt}	X	(cm)		0.48				
		Y	(cm)		0.32				
Other Information	t_d		(μsec)	0.198					
	P_{rr}		(Hz)	14232					
	p_r at max. I_{pi}		(Mpa)	2.12					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pi,\alpha}$ at max. MI		(W/cm²)	97.2					
Operating Control Conditions	Frequency		(MHz)	10.0	10.0				
	Power		(%)	100	100				
	Focus Number			1	1				
	Focus Position		(cm)	1.8	1.8				
	Focal Depth		(cm)	2.4	2.4				

Transducer Model: L10LC Operating Mode：BM-Mode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.60	0.48	0.14		0.3	
Associated Acoustic Parameters	P_{ra}		(Mpa)	1.91					
	P		(mW)		17.5	7.5		7.5	
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					0.86	
	z at max.. $I_{pi,\alpha}$		(cm)	0.98					
	d_{eq}		(cm)					0.16	
	f_{awf}		(MHz)	9.56	9.56	9.56		9.56	
	Dim of A_{aprt}	X	(cm)		0.48	0.48		0.48	
		Y	(cm)		0.32	0.32		0.32	
Other Information	t_d		(μsec)	0.198					
	P_{rr}		(Hz)	14232					
	p_r at max. I_{pi}		(Mpa)	2.12					
	d_{eq} at max. I_{pi}		(cm)					2.03	
	$I_{pi,\alpha}$ at max. MI		(W/cm²)	97.2					
Operating Control Conditions	Frequency		(MHz)	10.0	10.0	10.0		10.0	
	Power		(%)	100	100	100		100	
	Focus Number			1	1	1		1	
	Focus Position		(cm)	1.8	1.8	1.8		1.8	
	Focal Depth		(cm)	2.4	2.4	2.4		2.4	

Transducer Model: L10LC Operating Mode：BM Anatomical Mode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.60	0.48	0.14		0.3	
Associated Acoustic Parameters	P_{ra}		(Mpa)	1.91					
	P		(mW)		17.5	7.5		7.5	
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					0.86	
	z at max.. $I_{pi,\alpha}$		(cm)	0.98					
	d_{eq}		(cm)					0.16	
	f_{awf}		(MHz)	9.56	9.56	9.56		9.56	
	Dim of A_{aprt}	X	(cm)		0.48	0.48		0.48	
		Y	(cm)		0.32	0.32		0.32	
Other Information	t_d		(μsec)	0.198					
	P_{rr}		(Hz)	14232					
	p_r at max. I_{pi}		(Mpa)	2.12					
	d_{eq} at max. I_{pi}		(cm)					2.03	
	$I_{pi,\alpha}$ at max. MI		(W/cm²)	97.2					
Operating Control Conditions	Frequency		(MHz)	10.0	10.0	10.0		10.0	
	Power		(%)	100	100	100		100	
	Focus Number			1	1	1		1	
	Focus Position		(cm)	1.8	1.8	1.8		1.8	
	Focal Depth		(cm)	2.4	2.4	2.4		2.4	

Transducer Model: L10LC Operating Mode：M-Mode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.60		0.04		0.1	
Associated Acoustic Parameters	P_{ra}		(Mpa)	1.91					
	P		(mW)			1.1		1.1	
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					0.76	
	z at max.. $I_{pi,\alpha}$		(cm)	0.8					
	d_{eq}		(cm)					0.16	
	f_{awf}		(MHz)	9.56		9.56		9.56	
	Dim of A_{aprt}	X	(cm)			0.48		0.48	
		Y	(cm)			0.32		0.32	
Other Information	t_d		(μsec)	0.198					
	P_{rr}		(Hz)	400					
	p_r at max. I_{pi}		(Mpa)	2.12					
	d_{eq} at max. I_{pi}		(cm)					2.03	
	$I_{pi,\alpha}$ at max. MI		(W/cm²)	97.2					
Operating Control Conditions	Frequency		(MHz)	10.0		10.0		10.0	
	Power		(%)	100		100		100	
	Focus Number			1		1		1	
	Focus Position		(cm)	1.8		1.8		1.8	
	Focal Depth		(cm)	2.4		2.4		2.4	

Transducer Model: L10LC Operating Mode：BMode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.54	0.72				1.72
Associated Acoustic Parameters	P_{ra}		(Mpa)	1.01					
	P		(mW)		20				20
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max.. $I_{pi,\alpha}$		(cm)	0.76					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	9.32	9.32				9.32
	Dim of A_{aprt}	X	(cm)		0.72				0.72
		Y	(cm)		0.32				0.32
Other Information	t_d		(μsec)	0.650					
	P_{rr}		(Hz)	3000					
	p_r at max. I_{pi}		(Mpa)	1.31					
	d_{eq} at max. I_{pi}		(cm)						
	Ipi,α at max. MI		(W/cm²)	78.2					
Operating Control Conditions	Frequency		(MHz)	10.0	10.0				10.0
	Power		(%)	100	100				100
	Focus Number			1	1				1
	Focus Position		(mm)	23	23				23
	Pulse Repetition Frequency		(KHz)	3	3				3
	Focal Depth		(cm)	2.4	2.4				2.4

Transducer Model: L10LC Operating Mode：B + CPA-Mode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.54	0.72				1.72
Associated Acoustic Parameters	P_{ra}		(Mpa)	1.01					
	P		(mW)		20				20
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max.. $I_{pi,\alpha}$		(cm)	0.76					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	9.32	9.32				9.32
	Dim of A_{aprt}	X	(cm)		0.72				0.72
		Y	(cm)		0.32				0.32
Other Information	t_d		(μsec)	0.650					
	P_{rr}		(Hz)	3000					
	p_r at max. I_{pi}		(Mpa)	1.31					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pi,\alpha}$ at max. *MI*		(W/cm²)	78.2					
Operating Control Conditions	Frequency		(MHz)	10.0	10.0				10.0
	Power		(%)	100	100				100
	Focus Number			1	1				1
	Focus Position		(mm)	23	23				23
	Pulse Repetition Frequency		(KHz)	3	3				3
	Focal Depth		(cm)	2.4	2.4				2.4

Transducer Model: L10LC Operating Mode：PW-Mode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.46		0.82		1.18	1.87
Associated Acoustic Parameters	P_{ra}		(Mpa)	0.75					
	P		(mW)			17		17	17
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)						
	z at max.. $I_{pi,\alpha}$		(cm)	1.10					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	9.15		9.15		9.15	9.15
	Dim of A_{aprt}	X	(cm)			0.76		0.76	0.76
		Y	(cm)			0.32		0.32	0.32
Other Information	t_d		(μsec)	1.05					
	P_{rr}		(Hz)	3000					
	p_r at max. I_{pi}		(Mpa)	1.98					
	d_{eq} at max. I_{pi}		(cm)						
	$I_{pi,\alpha}$ at max. MI		(W/cm²)	165					
Operating Control Conditions	Frequency		(MHz)	9.0		9.0		9.0	9.0
	Power		(dB）	0		0		0	0
	Focus Number			1		1		1	1
	Focus Position		(cm）	1.5		1.5		1.5	1.5
	Pulse Repetition Frequency		（KHz）	6		6		6	6
	Focal Depth		(cm）	2.4		2.4		2.4	2.4

Transducer Model: L10LC Operating Mode：B + PW-Mode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.70	0.41	0.52		0.89	
Associated Acoustic Parameters	P_{ra}		(Mpa)	1.83					
	P		(mW)		16.7	16.7		16.7	
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					0.8	
	z at max.. $I_{pi,\alpha}$		(cm)	0.9					
	d_{eq}		(cm)						
	f_{awf}		(MHz)	9.5	9.5	9.5		9.5	
	Dim of A_{aprt}	X	(cm)		1.02	1.02		1.02	
		Y	(cm)		0.32	0.32		0.32	
Other Information	t_d		(μsec)	0.422					
	P_{rr}		(Hz)	6000					
	p_r at max. I_{pi}		(Mpa)	2.03					
	d_{eq} at max. I_{pi}		(cm)						
	Ipi,α at max. MI		(W/cm²)	123.2					
Operating Control Conditions	Frequency		(MHz)	10.0	10.0	9.0		9.0	
	Power		(%)	100	100	100		100	
	Focus Number			1	1	1		1	
	Focus Position		(cm)	1.8	1.8	1.8		1.8	
	Pulse Repetition Frequency		(KHz)	6	6	6		6	
	Focal Depth		(cm)	2.4	2.4	2.4		2.4	

Transducer Model: L10LC Operating Mode：B + CFM+PW-Mode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.70	0.70	0.36		0.56	
Associated Acoustic Parameters	P_{ra}		(Mpa)	1.83					
	P		(mW)		28	28		28	
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					0.78	
	z at max.. $I_{pi,\alpha}$		(cm)	0.82					
	d_{eq}		(cm)					0.24	
	f_{awf}		(MHz)	9.2	9.2	9.2		9.2	
	Dim of A_{aprt}	X	(cm)		0.72	0.72		0.72	
		Y	(cm)		0.32	0.32		0.32	
Other Information	t_d		(μsec)	0.374					
	P_{rr}		(Hz)	6000					
	p_r at max. I_{pi}		(Mpa)	2.61					
	d_{eq} at max. I_{pi}		(cm)					0.25	
	$I_{pi,\alpha}$ at max. MI		(W/cm²)	128.2					
Operating Control Conditions	Frequency		(MHz)	9.0	9.0	9.0		9.0	
	Power		(%)	100	100	100		100	
	Focus Number			1	1	1		1	
	Focus Position		(cm)	1.8	1.8	1.8		1.8	
	Pulse Repetition Frequency		(KHz)	6	6	6		6	
	Focal Depth		(cm)	2.4	2.4	2.4		2.4	

Transducer Model: L10LC Operating Mode：B + CPA-P-Mode

Index Label				MI	TIS			TIB	TIC
					Scan	Non-Scan		Non-Scan	
						A_{aprt}≤1cm²	A_{aprt}＞1cm²		
Global Maximum Index Value				0.70	0.70	0.36		0.56	
Associated Acoustic Parameters	P_{ra}		(Mpa)	1.83					
	P		(mW)		28	28		28	
	Min. of [Pα(zs), Ita,α(zs)]		(mW)						
	Z_s		(cm)						
	Z_{bp}		(cm)						
	Z_b		(cm)					0.78	
	z at max.. $I_{pi,\alpha}$		(cm)	0.82					
	d_{eq}		(cm)					0.24	
	f_{awf}		(MHz)	5.2	5.2	5.21		5.21	
	Dim of A_{aprt}	X	(cm)		0.72	0.72		0.72	
		Y	(cm)		0.32	0.32		0.32	
Other Information	t_d		(μsec)	0.374					
	P_{rr}		(Hz)	6000					
	p_r at max. I_{pi}		(Mpa)	2.61					
	d_{eq} at max. I_{pi}		(cm)					0.25	
	$I_{pi,\alpha}$ at max. MI		(W/cm²)	128.2					
Operating Control Conditions	Frequency		(MHz)	9.0	9.0	9.0		9.0	
	Power		(%)	100	100	100		100	
	Focus Number			1	1	1		1	
	Focus Position		(cm)	1.8	1.8	1.8		1.8	
	Pulse Repetition Frequency		(KHz)	6	6	6		6	
	Focal Depth		(cm)	2.4	2.4	2.4		2.4	

Appendix D
Instructions for 4D pro imaging

【Note】: This function can only be used when the volume probe is connected.

D.1 Activating the 4D pro option

After connecting the volume probe, press **4D** and an ROI (region of interest) box will appear.

Press **T-Ball** to toggle back and forth between the ROI box states. If the ROI box has a solid line, the position of the ROI box can be changed using the trackball, as shown in Fig. D-1 (a). If the ROI box has a dotted line, the size of the ROI box can be increased or decreased, as shown in Fig. D-1 (b).

When the position of the ROI box has been confirmed, press **Set**. This will take you to the 4D Pro screen, and you can start imaging.

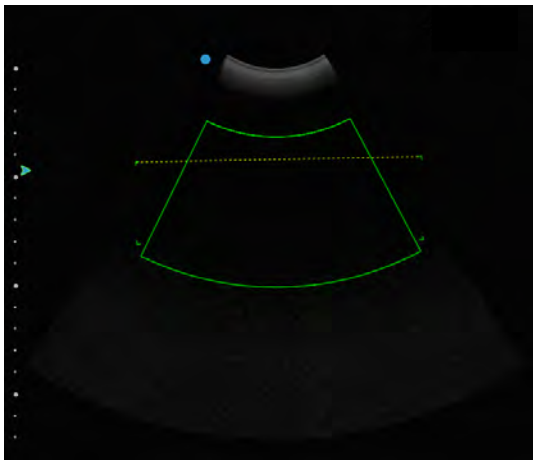


Fig. D-1(a)

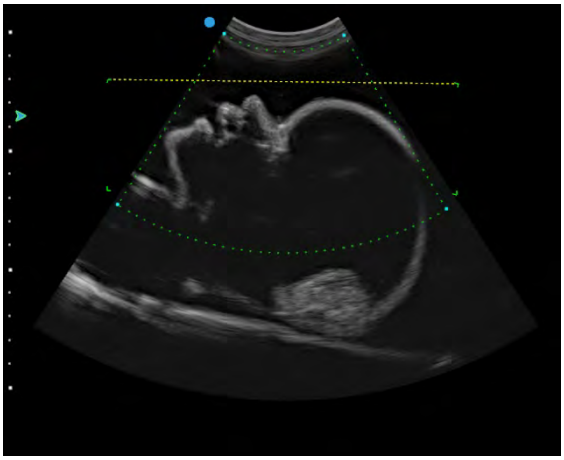


Fig. D-1(b)

Fig.D-1 4D ROI

Section field: ROI for an ultrasound image in 4D image rendition in slice B. See Fig. D-2

Horizontal line: The sector area below the cut line is the 4D Pro imaging area.

【Note】: When sampling for the area of interest, make sure that the imaging area is within the range, as shown in Fig. D-1 (b). There are 4 corners, on both sides of the horizontal line and the far side of the sector. The rectangular area enclosed by the 4 corners is the slice box area of the volume image.

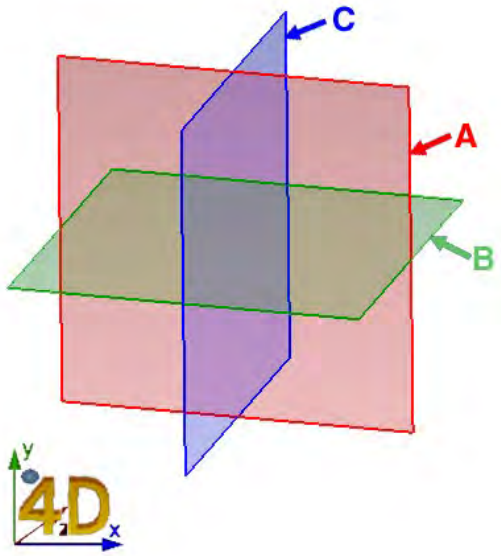


Fig. D-2 (a)

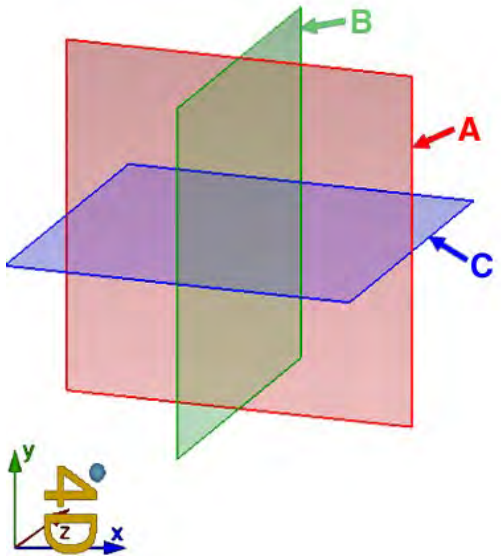


Fig. D-2 (b)

Fig.D-2 Graphical representation of the slices

(1) When the rotation is 0° or 180°, the A/B/C slices are as shown in Fig. D-2(a).

(2) When the rotation is 90° or 270°, the slices A/B/C are as shown in Fig. D-2 (b).

There are ”5D” characters and coordinates with direction indicators at the bottom left of the volume image for guiding the rotation of the image. A small ball icon on the top left of the "4D" volume sign is used to indicate the direction of the probe. The direction indicated by this icon is the same as that of the probe.

D.2 Rotation control

D.2.1 Slice image rotation

In auto 3D or 4D mode, press **Set** to activate the cursor. Then move the cursor to an ABC layer and press **Set** to activate the image on this layer. Tap on ***X***, ***Y*** and ***Z*** on the touchscreen and turn the knob underneath to change the image rotation angle in the directions X, Y and Z, and the images of the other layers will change accordingly.

To adjust the images of other slice, follow the method above, activate the image, and rotate it.

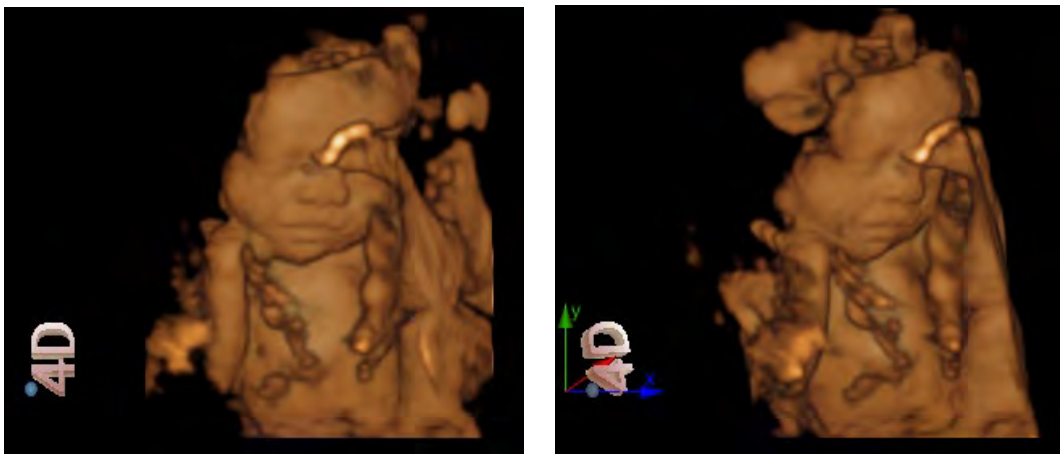
【Note】: The coordinates at the lower left of the image are for the currently activated image.

D.2.2 Volume image rotation

Press and hold the **Set** button on the volume image and at the same time move the trackball to rotate the volume image, as shown in Fig. D-3. The volumetric “4D” characters at the lower left of the image indicate the direction of image rotation.

The volume image rotates individually, without affecting other slices.

To revert to the state before rotation, tap RST ***VR*** on the touchscreen.



Before rotation After rotation

Fig.D-3 Rotation – Graphical representation of the volume image

D.3 Layout of the 4D Pro display screen

The 4D Pro display screen consists mainly of an image display area, an image preview area, and a control parameters area. See Fig. D-4.

While in Live or Still-image state, press **Set** to activate the cursor. Then move the cursor to a parameter item in the control parameters area on the left screen, like ***B Gain***. The parameter item will have changed blue. Then turn **Value** to set the parameter value.

While in Live or Still-image state, press **Set** to activate the cursor. Then move the cursor onto an image in the image preview area and press **Set**. The image will be displayed in the image area for review.

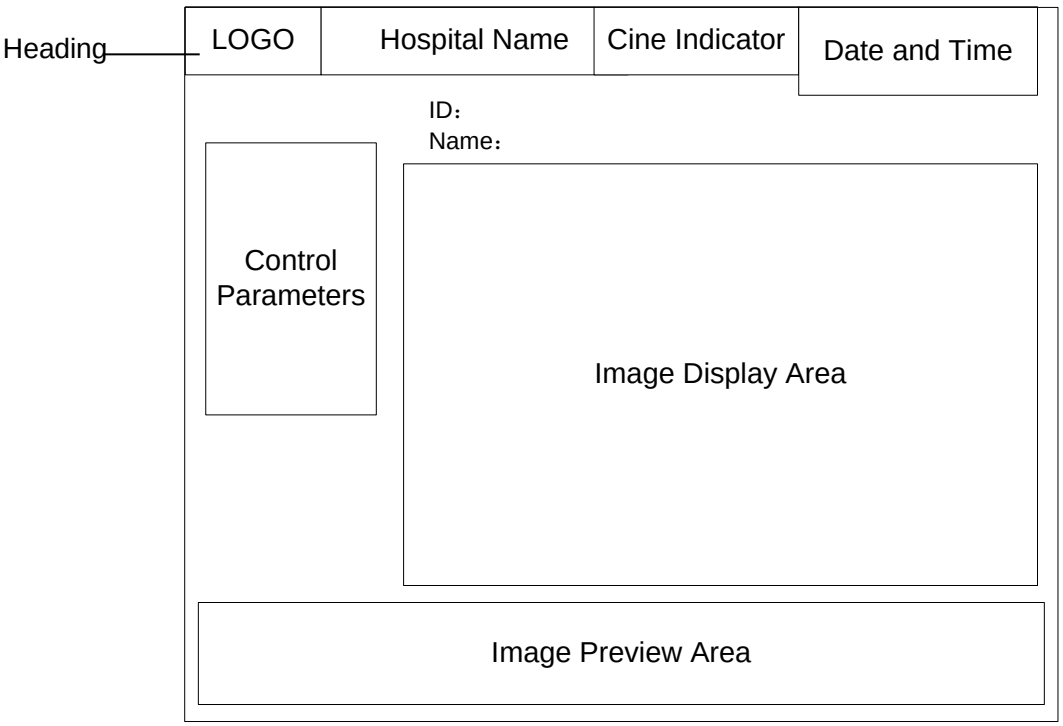


Fig.D-4 Graphical representation of the 4D Pro screen

【Note】: If you press on **4D,** you can switch to full screen mode. The control parameters are hidden in the heading. Press **4D** again to exit.

The main function control buttons for 4D Pro are on the touchscreen, including 4D, Img Mode, Any Cut and nSlice.

D.4 4D menu

In the setup menu, the user can toggle the image display mode, adjust the cut section, set the image rotation angle, the zoom factor, colour, smoothness and thred, as shown in Fig. D-5.

Fig.D-5 4D

D.4.1 Toggling the image display mode

Three modes of image display are available: single window, dual window and multi-window. Tap the display mode on the touchscreen to select the image display mode, as shown as Fig. D-6. (a) single-window mode; (b) dual-window mode; (c) multi-window mode.

(a) (b) (c)

Fig.D-6 Image display mode

When the display mode is confirmed, tap the icon on the touchscreen, as shown in Fig. D-7, to select or activate the desired slice. ***A*** is for slice A, ***B*** for slice B, ***C*** for slice C, and ***VR*** for volume image.

Fig.D-7 Slice display

Display modes include:

a) A/B/C/VR mode (as shown in Fig. D-8), which is the quad-window display.

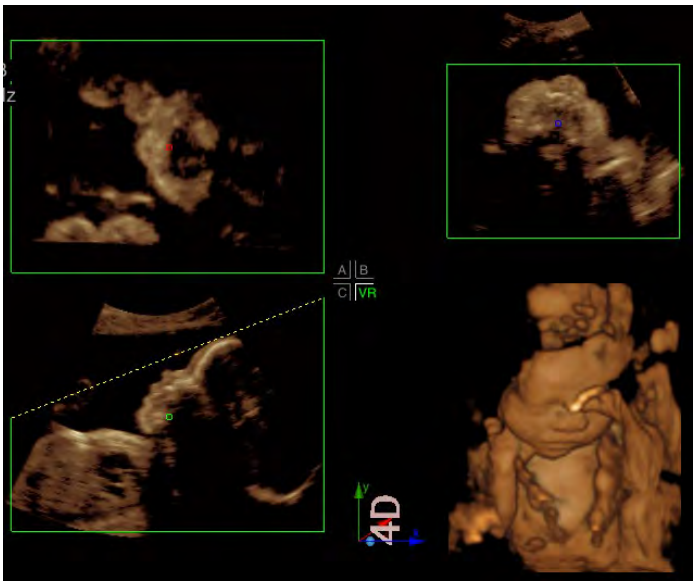


Fig.D-8 A/B/C/VR mode

A/B/C/VR mode consists of 4 areas; namely, 3 slice images of the three slices A/B/C, and a volume image.

The 

in the middle of the screen indicates that four images, A, B, C, VR, are being displayed, and the colour green indicates that VR is the currently activated image.

In this mode, you can see 2D images for each slice of the 3D volume. Press **Set** in any A/B/C view or click on the icon in Fig. D-7 to activate a slice image of A/B/C. Move the cursor onto the image centre point and a "十" cursor will appear. Press **Set**, and the cursor will change to "十". Then move the dot with the trackball, and the other two 2D images will display slice images corresponding to the position of the dot. Press **Set** to exit.

b) A/VR mode is a dual-display mode.

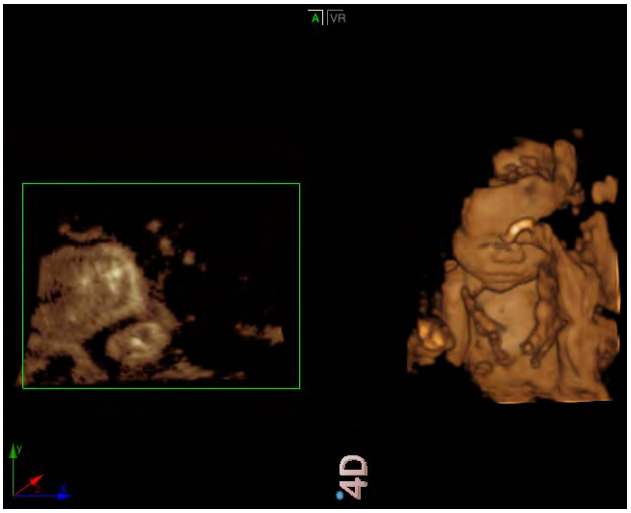


Fig.D-9 A/VR Mode

A/VR mode consists of a section of image in direction A and a volume image.

The A VR at the upper edge of the screen indicates that two images A and VR are being displayed, and the colour green indicates that A is the currently activated slice.

The slice image in direction A is the slice of B in the same direction.

c) B/VR mode is a dual-display mode.

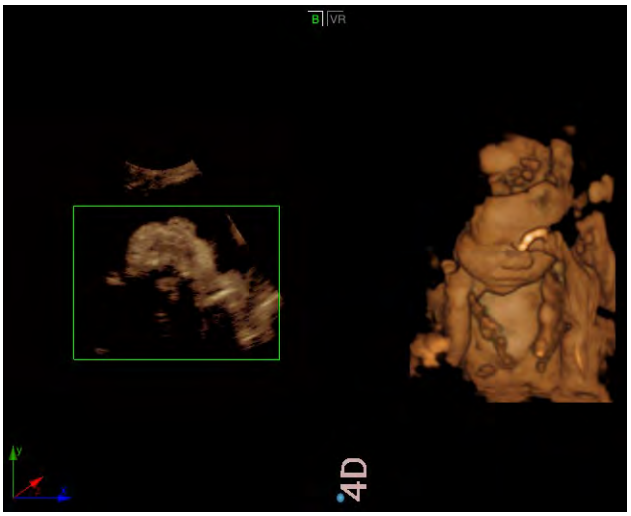


Fig.D-10 B/VR mode

B/VR mode consists of a section of image in direction B and a volume image.

The B|VR at the upper edge of the screen indicates that two images B and VR are being displayed, and the colour green indicates that B is the currently activated slice.

The slice image in direction B is the slice of B in the same direction.

d) C/VR mode is a dual-display mode.

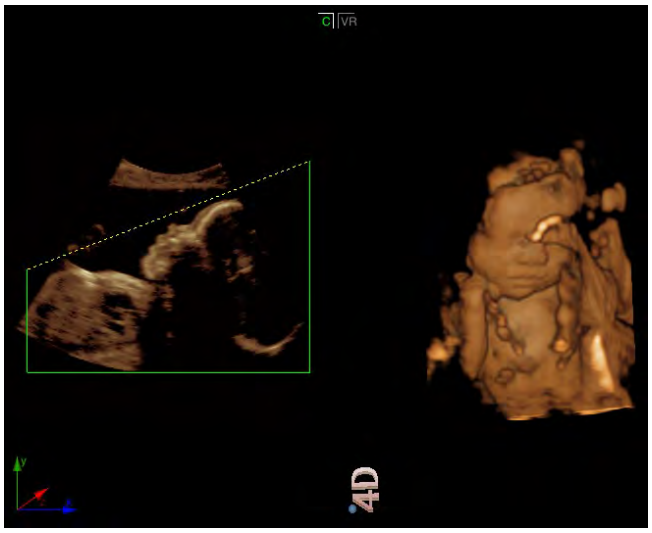


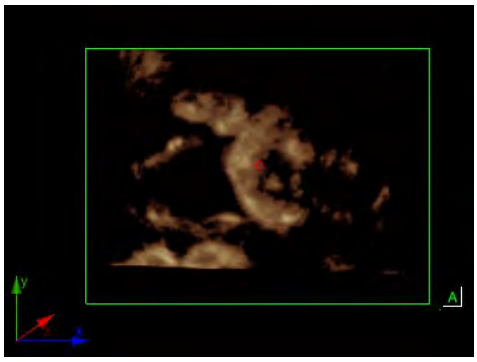
Fig.D-11 C/VR mode

C/VR mode consists of a section of image in direction C and a volume image.

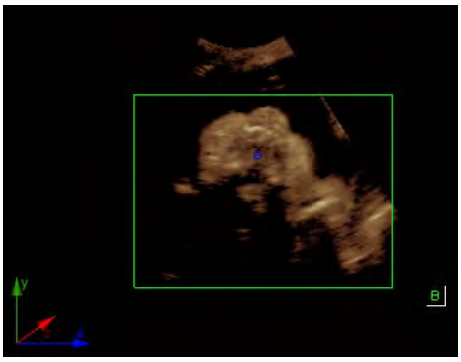
The C|VR at the upper edge of the screen indicates that two images C and VR are displayed, and the colour green indicates that VR is the currently activated slice.

The slice image in direction C is the slice of B in the same direction.

e) Single-window display mode: Slice A, B, C or VR (volume image)

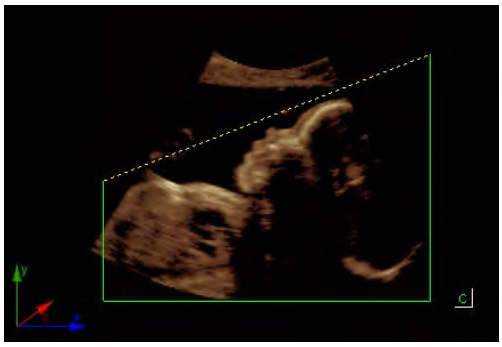


Slice A



Slice B

Fig. D-12 (a)



Slice C

Slice VR

Fig. D-12 (b)

Fig.D-12 Single-window display mode

D.4.2 Line cut and Q-cut

There are two options for setting the cut section: **line cut** and **Q-cut** (quick cut).

D.4.2.1 Line cut

Enter 4D Pro imaging, and a cut box will appear on the 2D slice B. The default cut is ***Q-cut***. To change from ***Q-cut*** to ***Line cut***, tap ***Line Cut*** on the touchscreen. Tap on ***Cut*** and turn the knob underneath to change the angle of the cut line.

Press the **T-Ball** button to toggle the status of the cut area. When the cut area has been fixed, the position of the cut area will be moved by moving the trackball, as shown in Fig. D-13 (a). If the cut box is dotted, the cut box will be changed by moving the trackball, as shown in Fig. D-13 (b).

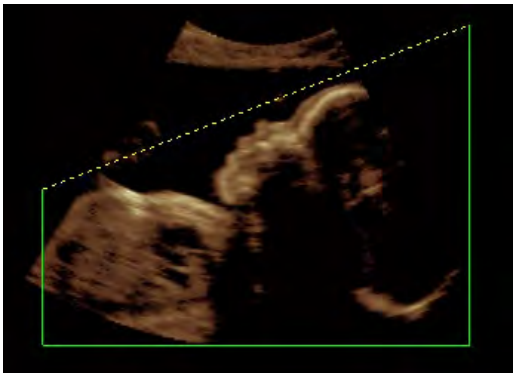


Fig. D-13(a)

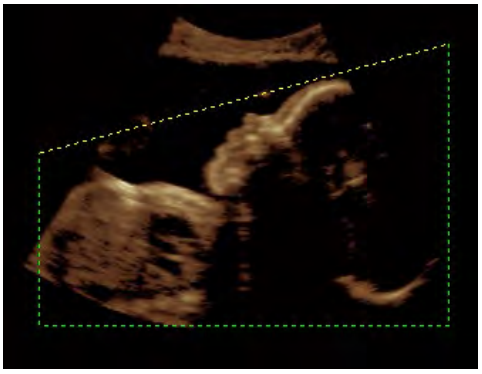


Fig. D-13(b)

Fig.D-13 Line cut

D.4.2.2 X-section

Enter 4D Pro imaging, and x-section will be opened by default. If it is in line cut state, tap on x-***section*** on the touchscreen and it will switch from ***line cut*** to ***x-section***. Now a yellow dot will appear on the cut box, which is the curve control point, as shown in Fig. D-14.

Press **Set** to release the cursor and use the trackball to move the cursor to the curve control point. Press **Set** and move the trackball to change the curvature of the cut line, as shown in Fig. D-14. Or tap ***Cut*** and rotate the knob underneath to adjust.

Press **Set** again or **Esc** to exit settings state.

【Note】: When in x-section mode, you can use ***x-section*** in the touchscreen menu to change to ***line cut*.** If this is selected, the system will switch to line-cut mode.

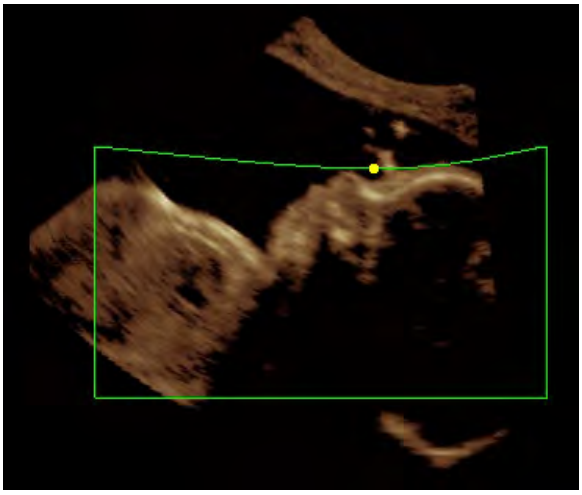


Fig.D-14 X-section

D.4.3 Parameter settings

◆ **Img result (image result)**

In Live or Still-image state, tap ***Img Result*** and rotate the knob underneath to adjust the setting, with ***L***, ***M*** and ***H*** being available for selection.

【Note】: The following parameter setting method refers to ***Img Result*** setup

◆ Angle

Angle adjustment is for changing probe wobble angle; several options are available for selection.

◆ Scan rate

Scan rate is for adjusting the scan rate of 4D images. Increasing the scan rate will increase the displayed frame rate as the image quality decreases. Therefore, the lower the scan rate, the higher the image quality. The default scan rate is ***M***. One can select between ***L***, ***M*** and ***H***.

◆ Blend

Blend is for adjusting the degree of image blend, so as to be able to discern different tissues. There are several steps for the setup.

◆ Ref Slice

When slice A, B, or C is activated, adjust the ***Ref Slice*** parameter to review multiple 2D slices parallel to the slice.

◆ Rotal (rotation)

This parameter is used for adjusting the image rotation angle, where 0 ° ~ 270 ° are available. Every rotation equates to 90 °.

【Note】: This parameter setting is only available for VR images, and does not have any effect on the A/B/C slice.

◆ Colour

With this function, the user can change the image colour. There are many colours for selection.

【Note】: This parameter setting is only available for VR images, and does not have any effect on the A/B/C slice.

◆ Smoothness (sharpness)

With this function, the user can set the image sharpness. There are many gradations available for selection.

【Note】: This parameter setting is only available for VR images, and does not have any effect on the A/B/C slice.

◆ Zoom

With this function, the user can zoom in on, or out of, the image; there are many levels available to be set.

Set the parameter when the A/B/C view is activated. The cut section will remain unchanged, but all images will be enlarged in proportion. Certain changes can now be made to the captured image.

If the VR image is activated, adjust the parameter, and the cut section and the VR image will be magnified proportionally. Now the captured VR image remains unchanged.

◆ Brightness

With this function, the user can adjust the image brightness; there are many levels available for selection.

◆ Thred

Thred adjustment is used to filter out image data below certain grey levels. Several levels are available for selection.

◆ Grey and opacity

First, set the ***greyscale***. Then, the ***greyscale map***, so as to change the greyscale curve, so that you can adjust the greyscale arrangement in the image.

First, set ***Opaci pos (opacity position)***. Then set ***Opaci map (opacity map)*** to change the curve so that you can adjust the opacity arrangement in the 4D image.

When adjusting grey or opacity, a grey/opacity dialogue box is displayed on the bottom left of the main screen (see Fig. D-15). If the grey/opacity level is not adjusted within 3 seconds, the dialogue box will close automatically.

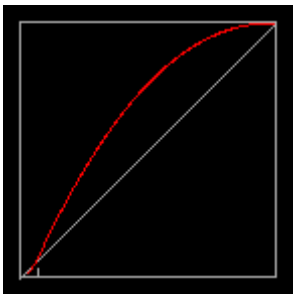


Fig.D-15 Grey/opacity curve dialogue box

D.4.4 Reset all

Tap ***RST All*** on the touchscreen, and all the images will be reset to their original states.

D.4.5 Reset VR

Tap ***RST VR*** on the touchscreen, and only the volume image will be reset to its original state, while other images remain unchanged.

D.4.6 Hide ROI

Tap ***Hide ROI*** on the touchscreen to hide all the ROIs. Meanwhile, the icon will change to ***DSP ROI***; click on it to display the ROI.

D.4.7 Cancel opt (cancel optimisation)

Tap Cancel ***Opt*** on the touchscreen to cancel optimisation of 3D volume. The button will then change to ***Opti-4D***; click on it to optimise the 3D volume.

D.4.8 Probe RST (probe reset)

If the 4D probe wobble is obviously inclined to one side, tap ***Probe RST*** to correct the probe wobble range.

D.4.9 Auto 3D

In Live or Still-image state, tap on ***Auto 3D*** on the touchscreen. The 4D probe will then automatically scan the image. Enter the Auto 3D imaging interface and create a 3D image.

【Note】: In 3D still-image state, press **Freeze (still image)** to return to B mode.

D.5 Image mode

Tap ***Img Mode***, and the setup items will be displayed, including four image modes and six parameter settings elements, as shown in Fig. D-16.

【Note】: Please refer to D.4 for the method for setting parameters.

Fig.D-16 Image mode setup menu

D.5.1 Image mode

There are four image modes to choose from, including: ***Surface***. ***Max***. ***X-Ray*** and ***Negative***. Tap the corresponding icon on the touchscreen to select.

Different image capturing modes are available for the parts to be examined. For example, select ***Max*** for a bone examination, or select ***Negative*** + ***Surface*** for a liver, vascular or cyst examination.

【Note】: Under *Surface* imaging mode, Opti-4D is the default setting upon opening. Under *Max* imaging mode, Opti-4D is the default setting upon closing.

D.5.2 Parameter settings elements

All the parameter settings stated above will be automatically saved and loaded next time you enter 4D mode. There is no need to reset again. Users can use this menu to restore or save the latest reset.

The system has a preset of six groups of parameter settings for various objects of examination, including: ***Foetus(>20W), foetus(≤20W), bone & tumour, cavity, endometrium, vascular***.

Users can load the parameters as required or save the user-defined setup. These setups, which can be saved, include all the current parameters.

(1) **Save:** To save the parameters set for an item. Let us take vascular as an example.

Procedure:

1) Set the parameters correctly to accord with a vascular examination.
2) Tap ***Vascular*** on the touchscreen.
3) Tap ***Save***.

(2) **Load:** To load the saved parameter values to the current state and change the parameters in use for the current image.

Procedure:

1) Freeze the image.
2) Tap a preset parameter, ***Vascular*** for example.
3) Tap ***Load***, and the current parameter values will be changed to the preset values.

D.6 Any cut

Tap on ***Any Cut*** on the touchscreen to display the elements for adjustment, as shown in Fig. D-17.

Fig.D-17 Any cut menu

【Note】: See D.4 on switching the display mode, R ST All, RST VR and parameter settings.

The Any Cut function contains 4 options: ***Inside, Outside, Undo*** and ***Undo All***.

a) Inside: To cut out the inside of the selected area, tap on ***Inside*** on the touchscreen and move the cursor onto the 4D image, and drag the area to be cut out in keeping with the ***Trace*** measurement, as shown in Fig. D-18 (a). Press **Set**, and the selected area will be cut out, as shown in Fig. D-18 (b).

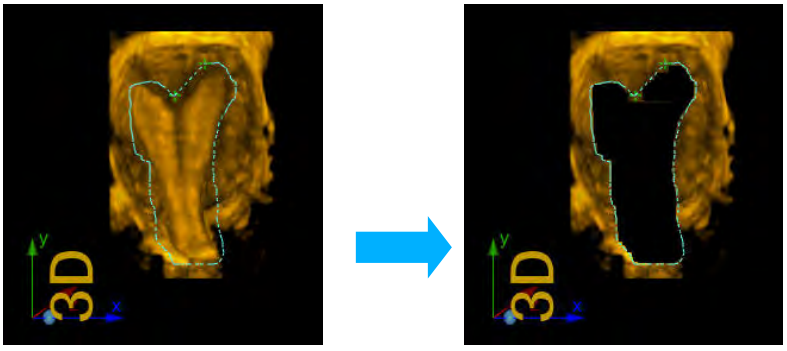


Fig. D-18 (a) Fig. D-18 (b)

Fig.D-18 Cutting out the inside

b) Outside: To maintain the selected area but cut out the outside. Tap ***Outside*** on the touchscreen and move the cursor onto the 4D image. Draw the area to be cut out as per ***Trace*** measurement, as shown in Fig. D-19 (a). Press **Set** and the outer area will be cut out, with the selected area displayed on the screen, as shown in Fig. D-19 (b).

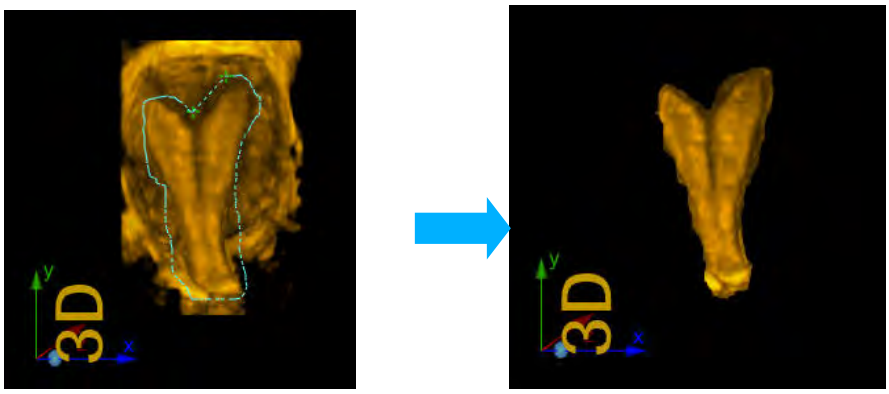


Fig. D-19(a) Fig. D-19(b)

Fig.D-19 Cutting out the outside

c) ***Undo***: To cancel the last step of a cutting operation, tap ***Undo*** on the touchscreen.

d) ***Undo All***: To undo all cutting operations, tap ***Undo All*** on the touchscreen.

D.7 nSlice

With the nSlice function, the user can cut out any slice image from A/B/C and zoom in on and display the cut slice for diagnosis and analysis. Tap on ***nSlice*** to activate the nSlice mode, as shown in Fig. D-20.

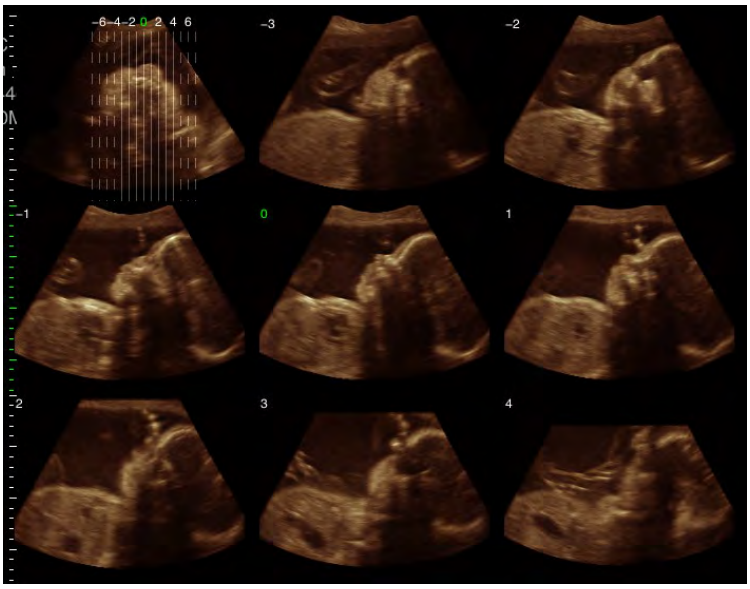


Fig.D-20 nSlice screen

Tap ***"A/B/C"*** on the touchscreen to confirm the slice to be cut. The cutting of Slice A and C is guided by Slice B, and the cutting of Slice B is guided by Slice C; the guidance image is displayed in the top-left corner of the screen.

◆ Slices and distance

Tap ***Slices*** and ***Distance*** on the touchscreen and rotate the knob directly underneath to adjust. ***Slices*** are the number of cuts, as shown in Fig. D-21; the slice is number 7. ***Distance*** is the distance between the layers, as shown in Fig. D-21. The distance in the first image is bigger than that in the second one.

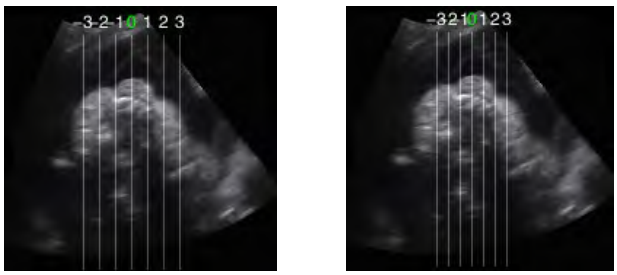


Fig.D-21 nSlice screen

Based on the settings, the slicing will be performed from the left and right towards the centre of the 0 line using symmetrical and equal cuts, and the slice number will be marked on the cut lines. The cut slices will be displayed in turn, as shown in Fig. D-20, and the number will be provided on the top left of the slice.

◆ Ref Slice

Tap ***Ref Slice*** on the touchscreen and turn the knob underneath on the right to adjust. All cut lines will be shifted horizontally to the left and right, as shown in Fig. D-22, and every slice will change accordingly.

Fig.D-22 Ref Slice

◆ Displaying slices full screen

Press **Set** to activate the cursor. Move the cursor over a slice; this will then be highlighted with a dotted line. Meanwhile, the cut lines will become brighter, as shown in Fig. D-23. Press **Set** again, and the slice will be displayed as full screen.

Tap the double-window icon  on the touchscreen when the slice is displaying as full screen to enter into dual-display mode. The guidance image and the slice will be displayed side by side. Tap the multi-window icon  on the touchscreen to return to the nSlice screen. The currently displayed layout is the same as the one before entering full screen.

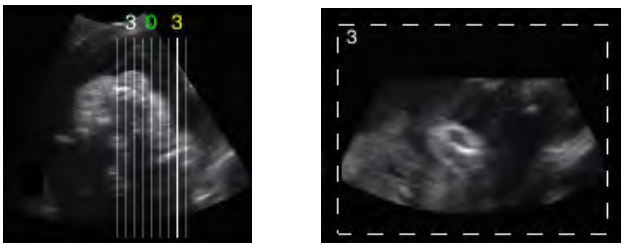


Fig.D-23 Select a slice.

◆ Layout

Press Layout on the ***touchscreen*** and turn the knob directly underneath to adjust the display layout. There are several layouts available. For example, 4×4 means a display with 4 rows and 4 images in each row.

If there are too many slices, press ***Prev. (previous) Next*** on the touchscreen and turn the knob underneath on the right to turn pages and view more slices. The solid line on the guidance image means that the slice image is being displayed on the current screen, while the dotted line means that this is not the case.

◆ Rotating images

In nSlice mode, tap ***X***, ***Y*** and ***Z*** on the touchscreen and turn the knob underneath these to change the rotation angle of the slice image in the X, Y and Z directions. To restore the original angle, click ***RST All*** in the setup menu.

◆ Zoom

Press ***Zoom*** in nSlice mode on the touchscreen and turn the knob directly underneath to adjust. All images will be enlarged; several levels are available.

◆ Chroma

Press ***Chroma*** in nSlice mode on the touchscreen and turn the knob directly underneath to adjust; several colours are available. When you make this setting, all 2D slice images will be affected.

◆ Opti-4D (4D optimisation)

Press Cancel Opt on the touchscreen in ***nSlice mode*** to cancel all 2D slice optimisations. The button will now switch to ***Opti-4D***. Click on it to optimise all 2D slices.

◆ Measurement

In nSlice mode, press **Calc** to open the measurement and calculation menu. Then select the desired menu item for the measurement.

It is recommended to carry out the measurement when the layer is being displayed as full screen. For the detailed measurement steps, see ***Chapter 8***.

D.8 Saving and recalling images

D.8.1 Saving images

Press **Save** on the control panel to save the current image.

【Note】: Tap on **Disk** on the touchscreen and select ***Save*** as ***Store Film (save as film)***. The system will then automatically save the images in ***Vols*** format. The relevant parameters may have changed while opening images in Vols format.

D.8.2 Retrieving images

Press **Set** to activate the cursor and move the cursor to the image preview area at the bottom or right of the screen. Then press **Set** to select and review the desired image.

Or click on ***Open*** on the Store Setup screen ***(storage settings)*** and select the desired file from the file list to open it.

Then press **Freeze (still image)** to display the image as a still image. As soon as you are in the film state, tap ***Manual*** on the touchscreen, and rotate the knob underneath to play back the film in individual frames. Tap ***Forwards*** or ***Backwards*** to automatically play the film forwards or backwards. For detailed operation, please refer to the instructions in ***Chapter 9***.

D.9 Exit

Press **B Mode** on the control panel to exit the 4D Pro screen. An ROI box will still be displayed on the screen. Press **4D** again or **Esc** to exit 4D mode and return to B mode.

Appendix E

Instructions for Elastography Imaging (Option)

E.1 Starting elastography imaging

E.1.1 Elastography imaging function

In Live state, press the **Elas** button on the control panel to turn on elastography imaging, as shown in Fig. E-1.

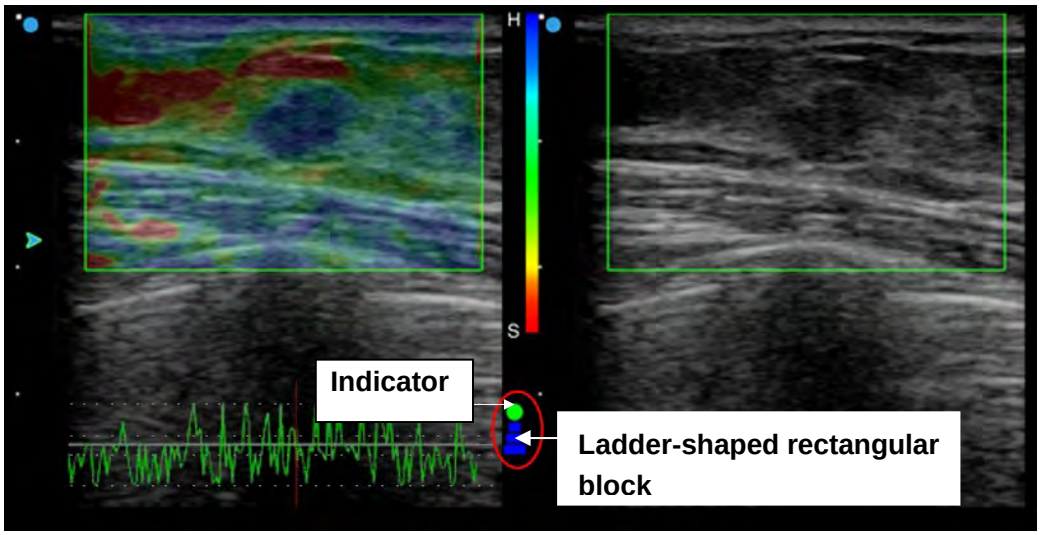


Fig. E-1 Elastography imaging

E.1.1.1 ROI box

After activating elastography imaging mode, an ROI box will be displayed on the screen. Move the trackball to change the ROI box position or change the ROI size. Press **T-Ball** to switch the trackball status that controls the ROI box, i.e., to confirm whether the trackball will control changing the ROI position or the ROI size.

E.1.1.2 Indicator and ladder-shaped rectangular block

An indicator and a ladder-shaped rectangular block that indicates the specific state of the current image will be displayed in the image area.

E.1.1.2.1 Indicator

When the indicator is green, the elastography imaging is authentic, as shown in Fig. E-1.

When the indicator is red, the elastography imaging is inauthentic, as shown in Fig. E-2 above.

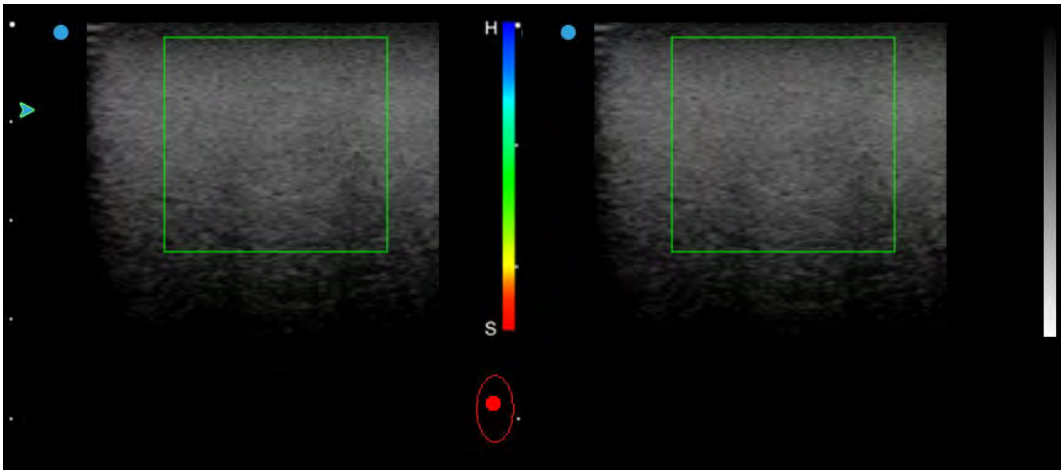


Fig. E-2 Inauthentic image

E.1.1.2.2 Ladder-shaped rectangular block

The ladder-shaped rectangular block is used to indicate the pressure: If the probe exerts pressure in the direction of or near the tissue, the rectangular block will light up blue, as in Fig. E-1. If the rectangular block is on the top of the indicator and lights up red, it means that the probe is moving away from the human body, i.e., there is a "release" after the application pressure, as shown in Fig. E-3.

If the display has no pressure indication (i.e. no display of the ladder-shaped, rectangular block), it means that the probe is relatively still, in a vertical direction relative to the tissue, as shown in Fig. E-2 above.

【Note】: The pressure indicator is used to show the contact status between the current probe and the tissue, so as to guide the user for better operation. If the probe stands relatively still in relation to the body part being examined, the pressure is too high or the probe is too far away, and you will not be able to produce a quality image.

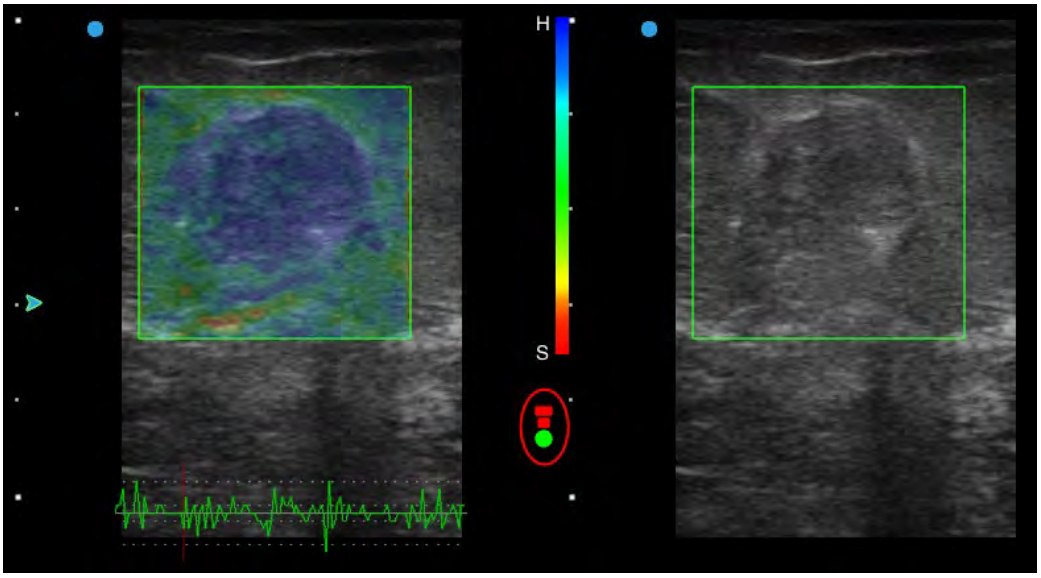


Fig. E-3 Authentic image

E.1.1.3 Elastography imaging screen layout

The elastography imaging screen consists essentially of 2 parts: the imaging area and the control parameter area, as shown in Fig. E-4.

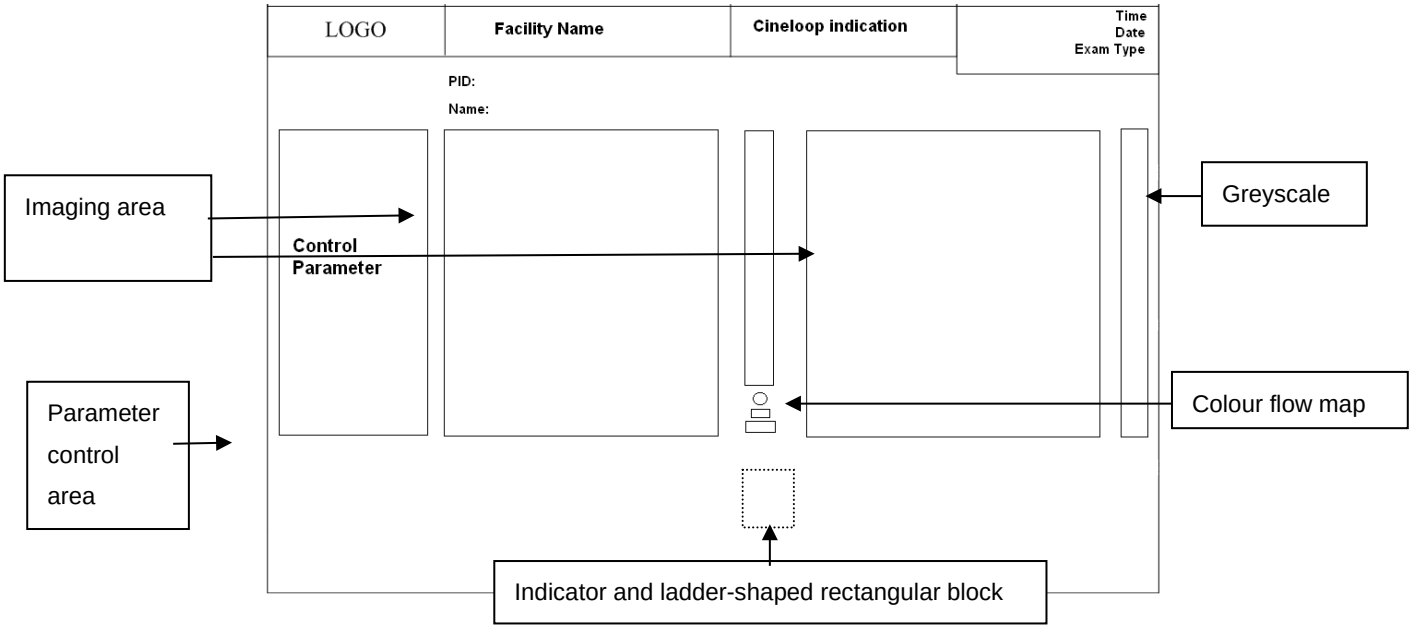


Fig. E-4 Elastography imaging screen layout

E.2 Parameter setup for elastography imaging

E.2.1 E_Gain

E_Gain is for changing the gain of the signal source for elastographic images.

In Live or Still image state, tap ***E_Gain*** on the touchscreen, and turn the knob underneath to control the gain for elastographic images. Or use the trackball to move the cursor over the ***E_Gain*** control parameter on the left side of the ultrasound interface, which will change blue. Then move the trackball (or turn the **Value** knob) to adjust.

【Note】: To set the parameters below, please refer to Using *E_Gain* in this section.

E.2.2 E_Freq

E-Freq is for changing the transmit frequency of elastographic imaging.

E.2.3 Map_L and Map_R

Map_L and ***Map_R*** are for changing the image mode and the map that is displayed in the left and right images.

Example 1: ***Map_R BW*** means that the image displayed on the right is a black-and-white image.

Example 2: ***Map_L E5*** means that the image displayed on the left is an elastographic image, whose colour map is ***5***.

E.2.4 Alpha

Alpha denotes the mixed level of the elastographic image and the B image.

When alpha is at any level between ***0 and 2*** and the image in elastography imaging is considered inauthentic by the system (i.e., the indicator is lit up red), the system will recognise this automatically and hide the image, and only a black-and-white image will be displayed in the image area. If inauthentic images occur frequently, the images will flash.

When alpha is at any level between ***3 and 5***, the inauthentic images that occur as a result of improper operation or restrictive conditions with the patient (i.e., the indicator is lit up

red) will be displayed continuously together with the correct authentic elastographic images (i.e., the indicator is lit up green). That is to say, the system cannot identify whether the image is correct and hides it, and the images will not flash.

E.2.5 E_DYN

Select the appropriate value according to the situation in hand. If the image contrast is not sufficient, increase the value properly, so as to achieve better differentiation of soft and hard tissues.

E.2.6 E_SMO

This is for the smooth processing of elastographic images. Increase the value, and the image will look smooth and soft, but the boundary clarity of the image colour will decrease.

E.2.7 E_PER

This is for persistence when processing elastographic images. The higher the persistence, the smoother the transition between the individual images, and there is also less image noise. However, the resolution of the elastographic images is impaired. Be careful when adjusting the parameters.

E.3 Calculations and measurement

E.3.1 Strain ratio

Strain ratio, also called strain rate ratio, refers to the ratio of the strain rate of normal tissue and the strain rate of injured tissue.

Measurement:

1) In elastography mode, press the **Calc** button to open the measurement menu.

2) Tap ***Strain Ratio*** on the touchscreen (when the measurement menu appears on the screen, move the cursor onto ***Strain Ratio*** and press the **Set** key). The "+" cursor will appear in the image area and the measurement state will be called up.

3) Move the cursor onto one point of the focal area in the image, and then press the **Set** key to fix one point.

4) Roll the trackball to draw a circle and ensure that the circle covers the measurement area as closely as possible. Press **T-Ball** to switch between two cursors for readjustment. Press on the **Set** key to confirm a circular area. Another "+" cursor will appear simultaneously.

5) Move the cursor to the normal tissue around the lesion area and draw a circle of the same size using the method above. When the circle sizes are not the same, these two circles will be displayed with dashed lines. When the circle sizes are the same, these two circles will be displayed with solid lines. Press the **Set** key to complete the measurement, as shown in Fig. E-5. The system will then automatically calculate the ratio, and the measurement and calculation results will be shown in the bottom-right corner of the screen.

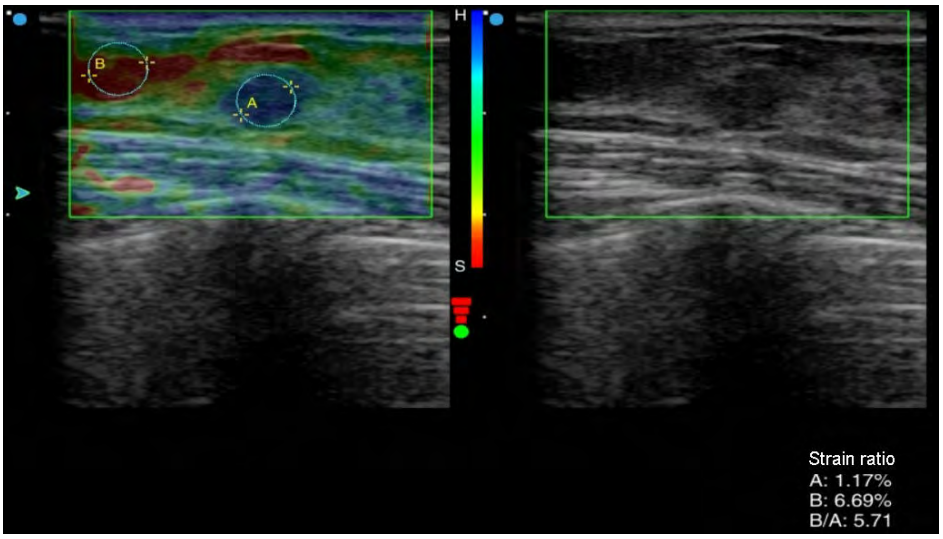


Fig. E-5 Measuring the strain ratio

E.3.2 Area ratio

Area ratio refers to the ratio between the lesion area of the elastography mode image and the lesion area of the B-mode image.

Measurement:

1) In elastography mode, press the **Calc** key to open the measurement menu.

2) Tap ***Strain Ratio*** on the touchscreen (when the measurement menu appears on the screen, move the cursor onto ***Strain Ratio*** and press the **Set** key). The "+" cursor will appear in the image area and measurement state will be activated.

3) Move the cursor onto the lesion area of the image and press the **Set** key to fix the starting point of the measurement.

4) Roll the trackball to move the cursor along the edge of the target area to draw a trajectory. If you want to modify the trajectory, press the **BkSp** key on the keyboard and delete the trajectory dot by dot or section by section.

5) Press the **Set** key to complete the area measurement of the image (if a non-enclosed area is drawn, the system will automatically connect the start and end points with a line). At the same time, another “+” cursor will appear.

6) Move the cursor onto the injured area in the B-mode image and draw the injured area using the method described above, as shown in Fig. E-6.

7) The system will automatically calculate two area ratios, while the measurement and calculation results will be shown in the bottom-right corner of the screen.

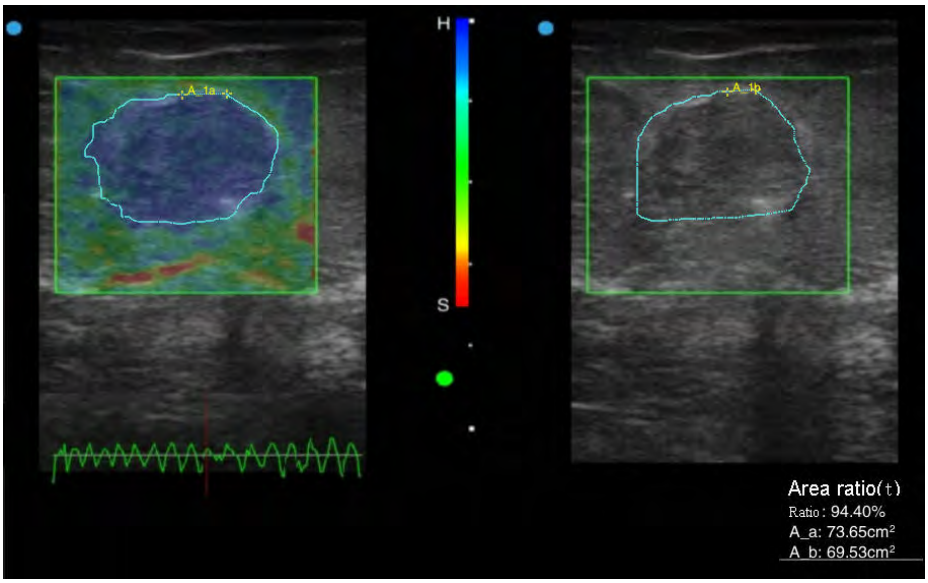


Fig. E-6 Measuring the elastography area ratio

E.4 Exit

Press the **Esc** button on the console or the **B mode** button on the control panel to exit elastography imaging.

Appendix F

Instructions for Ultracloud (option)

The Ultracloud system can be connected to a remote Zimmer MedizinSysteme server via 2G, 3G or a WiFi network to perform tasks such as uploading and downloading diagnostic patient files, adjusting parameter settings, sending files, specialist consultation, remote applications for maintenance and software updates. With a QR (Quick Response) code that is generated automatically, the user may access the server and retrieve personal diagnostic data.

F.1 Network connection

F.1.1 Local area connection

1) Plug the network cable into the network port on the back of the system.

2) Tap ***Setup*** on the touchscreen. Then use the trackball and **Set** to click on ***Connection Setup***. Then click on ***Advance***, as shown in Fig. F-1.

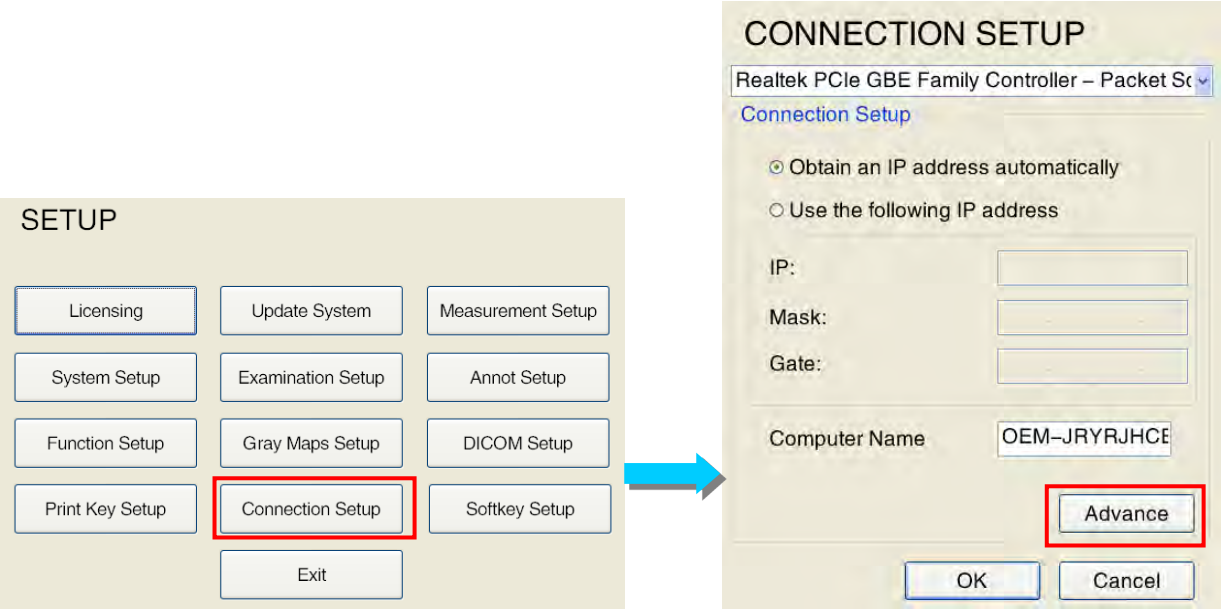


Fig. F-1

3) You can see the ***Network Connections*** user interface in Fig. F-2. Roll the trackball onto the ***Local Area Connection*** icon and press on **T-Ball** to bring up the menu. Click on ***Properties*** to bring up the settings window, as shown in Fig. F-3.

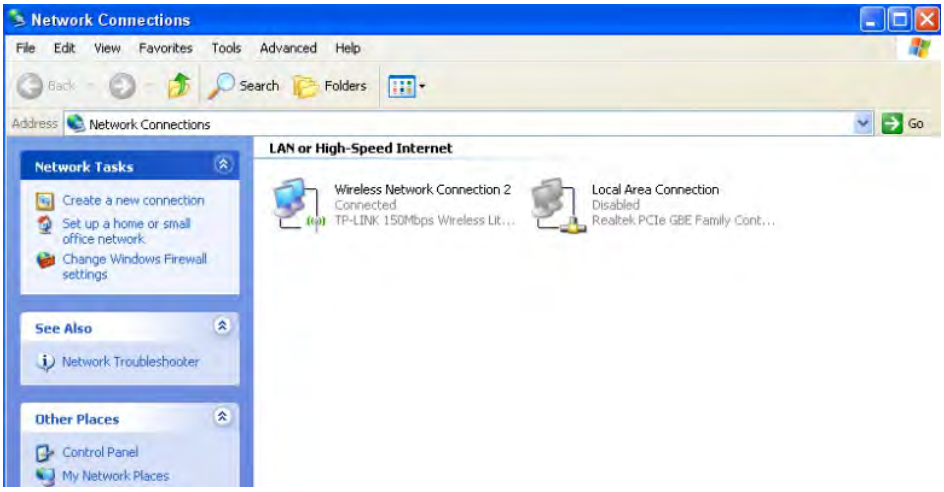


Fig. F-2 Network connection

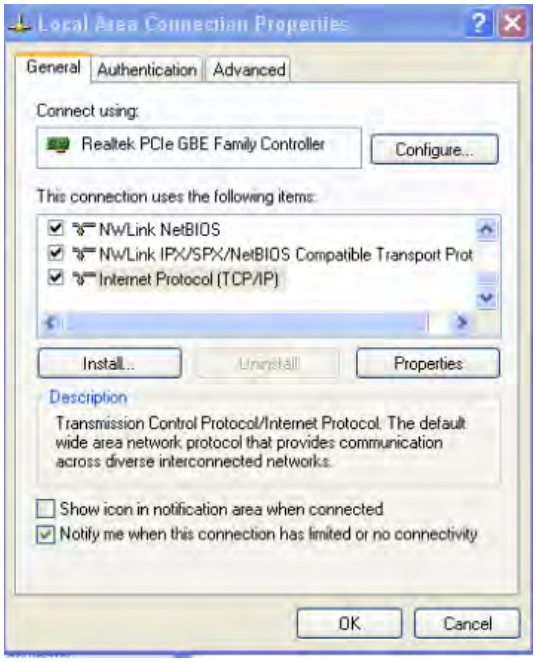


Fig. F-3 Local area connection properties

4) Roll the trackball onto ***Internet Protocol (TCP/IP)*** (as shown in the above figure) and press **Set** twice to bring up the settings window (see Fig. F-4).

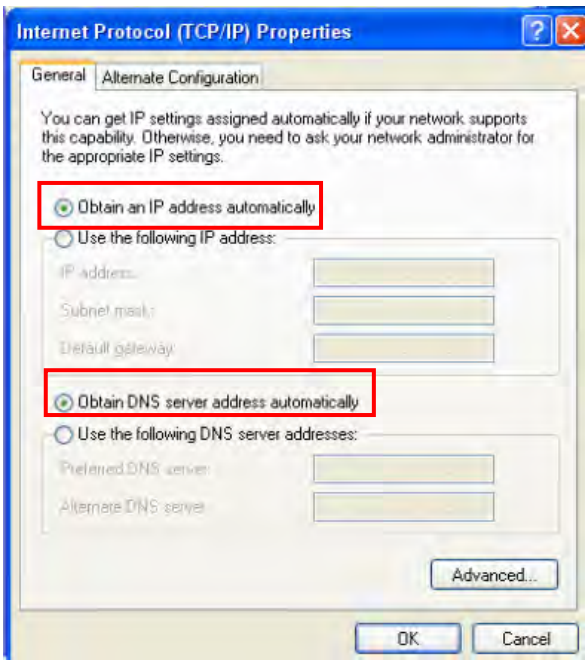


Fig. F-4 Internet Protocol (TCP/IP) Properties

5) Use the trackball and **Set** to click on ***Obtain an IP address automatically*** and ***Obtain DNS server address automatically***, and then click on ***OK*** to set the network connection.

F.1.2 Wireless network connection

1) After calling up the ***Network Connections*** interface, as indicated above (see Fig. F-2), roll the trackball onto the icon ***Wireless Network Connection 2*** and press **T-Ball** to bring up the menu. Click on ***Properties*** to bring up the settings window, as shown in Fig. F-3. Click on ***Wireless network*** (see Fig. F-5). Then choose ***Use Windows to configure my wireless network settings***. To confirm, click on ***OK***.

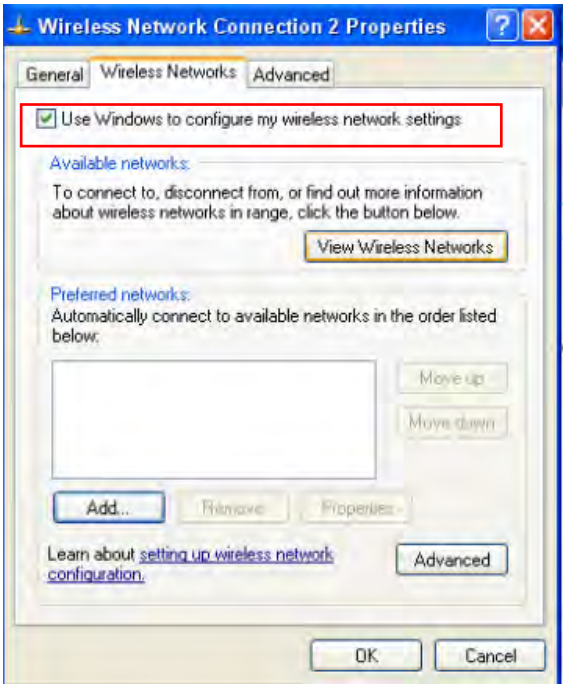


Fig. F-5 Wireless network connection setup

2) Press **T-Ball** on ***Wireless Network Connection 2*** to enter the menu. Choose ***View Available Wireless Networks***, as shown in Fig. F-6.

Fig. F-6 View available wireless networks

3) In the pop-up window with the WLAN networks (Fig. F-7), use the trackball and **Set** and double-click on the desired WLAN network. In the pop-up window with the connections (Fig. F-8) enter the WLAN key and click on ***Connect*** to connect to the network.

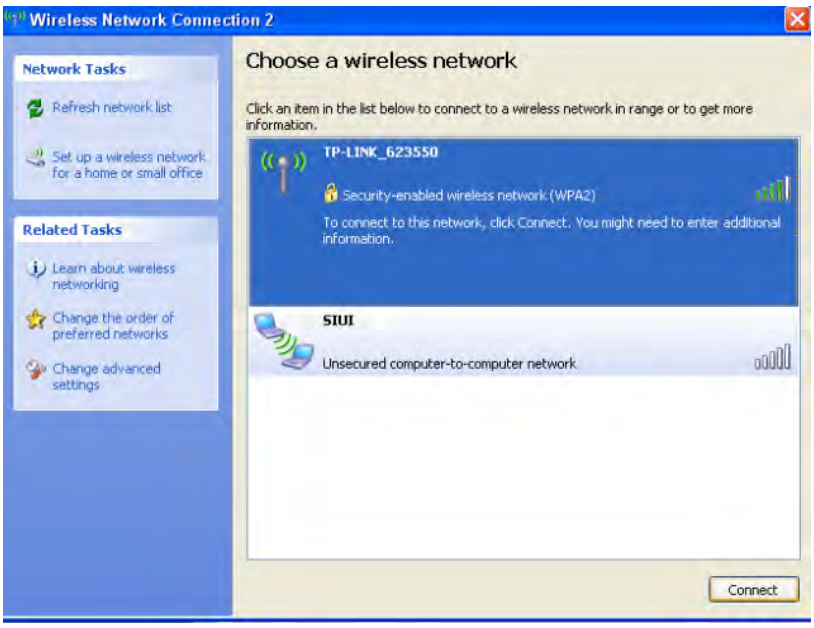


Fig. F-7 Wireless network connection

Fig. F-8 Entering the network key

F.2 Initialising Ultracloud

Press the  button on the control panel to connect to the remote Zimmer MedizinSysteme server. When successfully connected, you can launch Ultracloud and access the Ultracloud system interface. The interface for logging in multiple users is shown in Fig. F-9.

【Note】: If the network connection fails, the screen will display the message "*Connect Ultracloud system failed*". Make sure that the Internet connection is good and press the  button again to connect to Ultracloud.

Fig. F-9 User interface for initialising Ultracloud (multiple user login)

When you log in for the first time, without a user ID that the system remembers, click on ***Login as another*** to call up the user interface for single users (see Fig. F.10).

Fig. F-10 Single user login

Move the cursor over the input fields for the user name and password, press **Set** using the keyboard to input directly, and then use the trackball and the **Set** button to click on ***Login*** and bring up the Ultracloud main screen.

【Note】: If *Remember me* is checked, the logged-in user ID will be displayed in the user interface for multiple user login the next time you log in, as shown in Fig. F-9.

Zimmer MedizinSysteme can employ several user IDs, user names and passwords for users. To add more user IDs, a registration code from Zimmer MedizinSysteme is required. Log on to the Ultracloud website http://cloud.siui.com via the PC system to

register.

F.3 Ultracloud main screen

After successfully logging in, the Ultracloud main screen will be displayed, as shown in Fig. F-11.

Fig. F-11 Ultracloud main screen

F.3.1 Changing user information

Use the trackball and **Set** to click on ***Change user information*** on the bottom left of the screen and call up the editing interface, as shown in Fig. F-12. After editing the user's name, password, contact information, etc., click on ***Modify***.

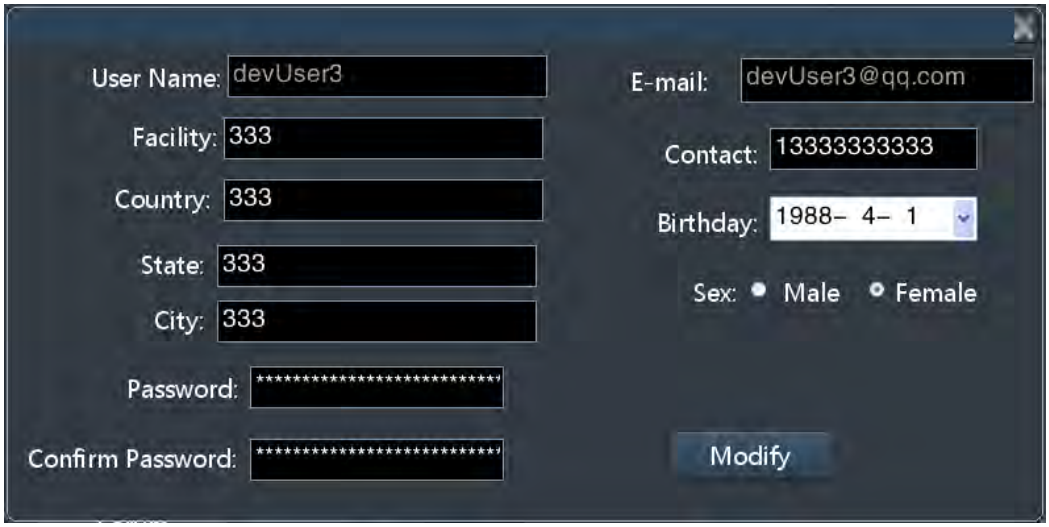


Fig. F-12 Modifying user information

F.4 Data backup

Move the cursor to the current menu sector. The sector will be expanded with its function buttons displayed, as shown in Fig. F-13. Move the cursor over the menu sector and press the **Set** button to access the menu.

The functions included in the Backup menu are Parameter, File, Send Files and others.

Fig. F-13 Backup display

F.4.1 Parameter

Use the trackball and the **Set** button to click on the ***Parameter*** button, and the parameter input screen will open. See Fig. F-14.

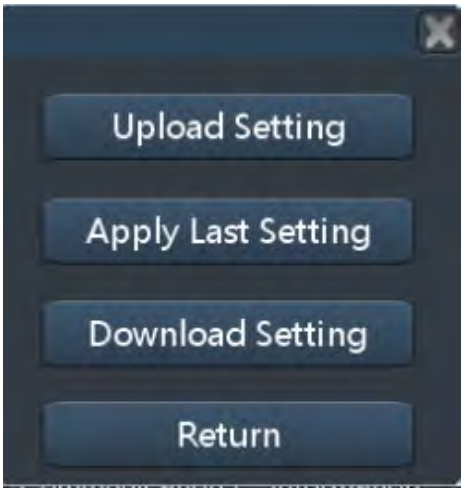


Fig. F-14 Parameter input screen

F.4.1.1 Upload setting

With this feature, users can upload preset parameters and associated settings (such as

hotkey settings) for the current ultrasound system to the Zimmer MedizinSysteme server. If required, the user can download it onto the ultrasound system from the server through Ultracloud.

Procedure: Use the trackball to move the cursor onto the ***Upload Setting*** button, and then press the **Set** button to bring up the window for naming the file. Enter the name for saving in the box and click ***OK***, as shown in Fig. F-15. If upload succeeds, the bottom of the main screen will display ***"Setting Upload done"***.

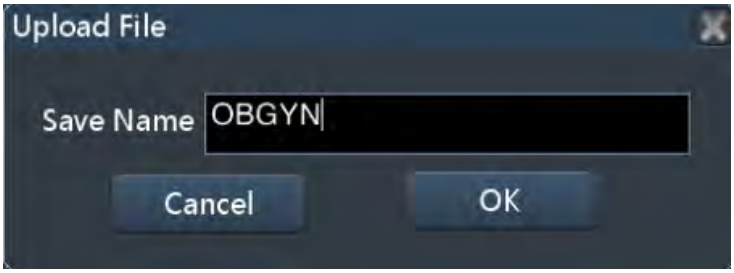


Fig. F-15 Upload setting

F.4.1.2 Apply last setting

This function is for applying the last personalised parameter settings to the current ultrasound system.

Procedure: Use the trackball to move the cursor onto ***Apply Last Setting*** and press the **Set** button. If this has been successful, the bottom of the main screen will display ***"Setting applied done"***.

F.4.1.3 Download setting

With this function, the user can select any uploaded personalised parameter settings and download them to the current ultrasound system.

Procedure: Use the trackball to move the cursor over the ***Download Setting*** button and press the **Set** key to call up the ***Download File*** screen, as shown in Fig. F-16. All the personalised parameter settings uploaded to the server will be listed in chronological order in the list. Click on a file, and then click ***Apply*** in the bottom-right corner to download the personalised parameter settings to the current ultrasound system.

【Note】: If there are too many personalised parameter settings, you can search by the upload date. Click on the arrow to the right of Upload Date, and an area will pop up for selecting the date. Select the date period (...to ...), click on the *Query* button, and the individual parameter settings uploaded during this period will be listed in the table below.

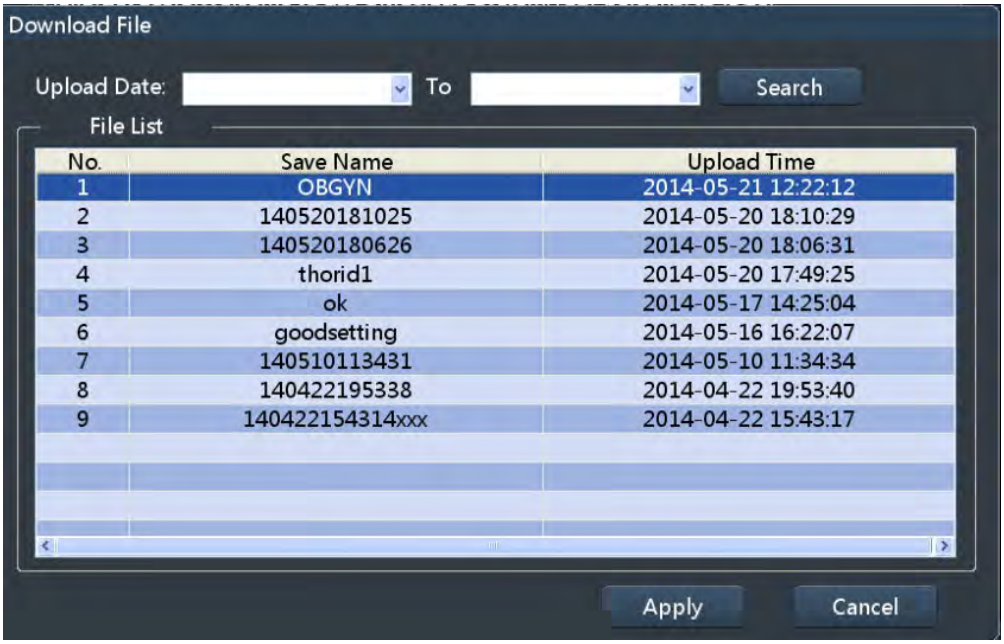


Fig. F-16 Download File screen

F.4.2 Send files

This feature is available for users to quickly send the current patient's information to the server. With a QR code and an automatically generated serial number, the user can access the server to retrieve the detailed personal information.

Use the trackball and the **Set** key to click on the ***Send Files*** button.

If upload succeeds, a QR code scanning window will pop up, as shown in Fig. F-17. Directly scan the QR code for the examination details.

Fig. F-17 QR code for examination details

Now a serial number will also be generated and shown in "***Report – Print Preview***". To review it, you must first log out of Ultracloud. Press **Report** on the control panel to call up the report screen. Then click ***Print Preview*** on the bottom edge of the screen to call up the preview screen, as shown in Fig. F-18. Log in to the website http://cloud.siui.com and enter the serial number to review the examination data.

Fig. F-18 View serial number

F.4.3 File

Use the trackball and the **Set** button to click on the ***File*** button, and the file function screen will pop up, as shown in Fig. F-19.

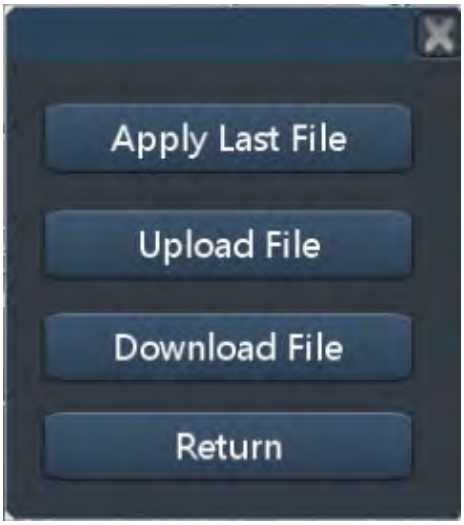


Fig. F-19 File operations screen

F.4.3.1 Apply last file

With this feature, users can make use of the last uploaded patient information for the ultrasound system's patient ID in question for diagnostic purposes.

Procedure: Use the trackball to move the cursor over the ***Apply Last File*** button and press the **Set** button.

F.4.3.2 Upload File

This feature is for users to upload patient information to the Ultracloud system.

Procedure: Use the trackball to move the cursor over the ***Upload File*** button and press the Set button to open the file list, as shown in Fig. F-20. Move the cursor to the desired record and to confirm, press **Set**. Then move the cursor to ***Upload*** and press **Set** to upload the file.

Fig. F-20 Upload File interface

F.4.3.3 Download file

With this feature, users can select the uploaded patient information and then download it to the ultrasound system.

Procedure: Use the trackball to move the cursor over the ***Download File*** button and press the **Set** key to call up the ***Download File*** screen, as shown in Fig. F-21. All the files uploaded to the server will be listed in chronological order in the table.

Click on a file and then on ***Apply*** in the bottom-right corner of the screen. The file will then be automatically downloaded to the default folder (usually the current patient directory in E:\\PatInfo), with the image displayed in the ultrasound image preview area. If you click on ***Save to***, the browsing window will appear (Fig. F-22) and the user can customise the storage path (the user-defined storage path, whereby the system does not update the saved images in the image preview area).

【Note】: If there are too many files, you can search by the upload date. Click on the arrow to the right of Upload Date, and an area will pop up for selecting the date. Select the date period (...to ...), click on the *Query* button, and the individual parameter settings uploaded during this period will be listed in the table below.

Fig. F-21 Download file screen

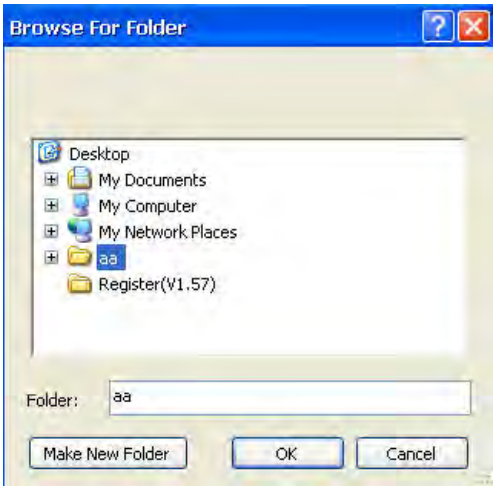


Fig. F-22 Browse for folder window

F.4.4 Others

This feature is for users to be able to backup files. It can upload the saved files or data folders to the server or download the files or data folders to the system.

Use the trackball and the **Set** button to click on the ***Others*** button, and the function screen in question will pop up, as shown in Fig. F-23.

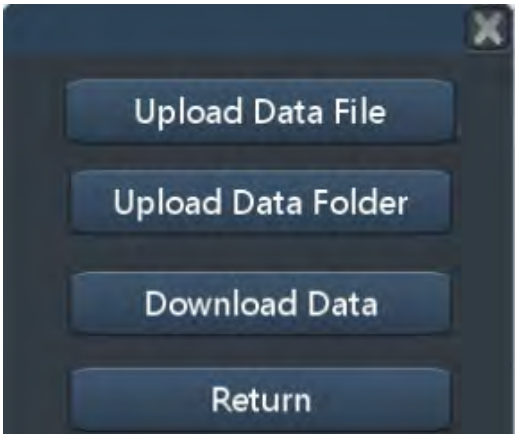


Fig. F-23 User interface – Other functions

F.4.4.1 Upload data file

Use the trackball and the **Set** key to click on the ***Upload Data File*** button. A file selection window will pop up, as shown in Fig. F-24. After selecting the file, click on ***Open*** to upload the file.

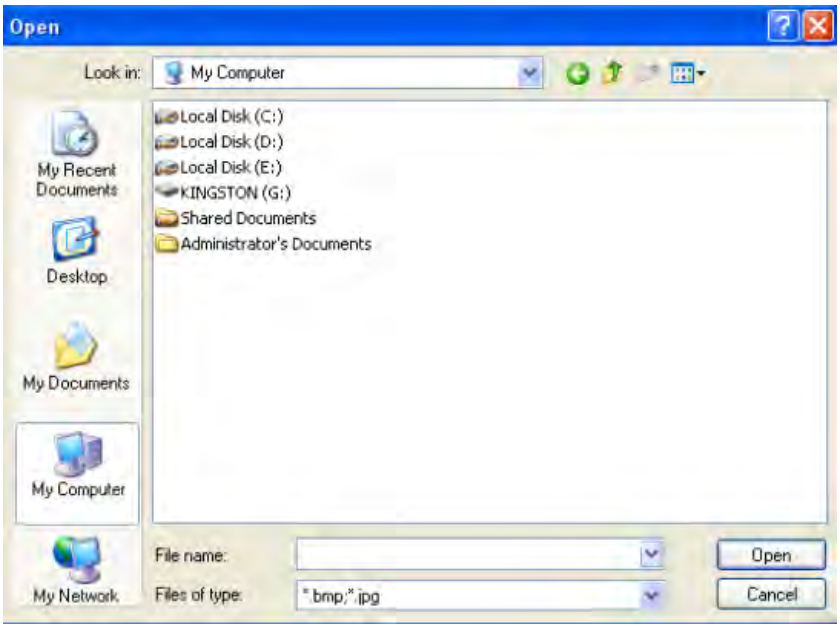


Fig. F-24 Upload data file

F.4.4.2 Upload data folder

Use the trackball and the **Set** key to click on the ***Upload Data Folder*** button. A Browse for Folder window will pop up, as shown in Fig. F-25. After selecting the folder, click on OK to upload the folder.

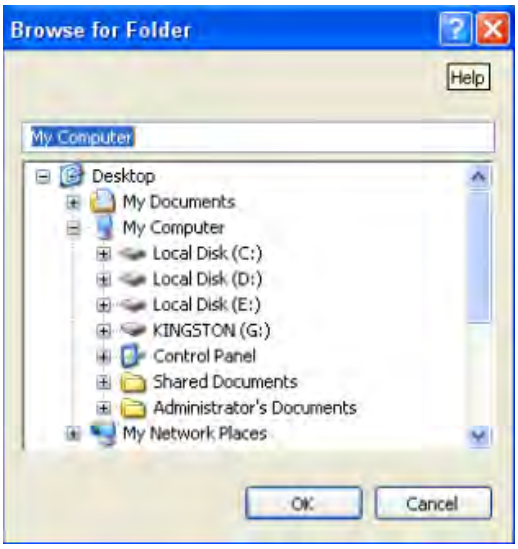


Fig. F-25 Upload data folder

F.4.4.3 Download data

Use the trackball and the **Set** key to click on the ***Upload Data Folder*** button. A Download File window will pop up, as shown in Fig. F-26. After selecting the desired file or folder, click on ***Save*** to call up a Browse for Folder window, as shown as Fig. F-27. Select the root file and click on ***OK***. The data will be stored by the server in the specified root directory of the system.

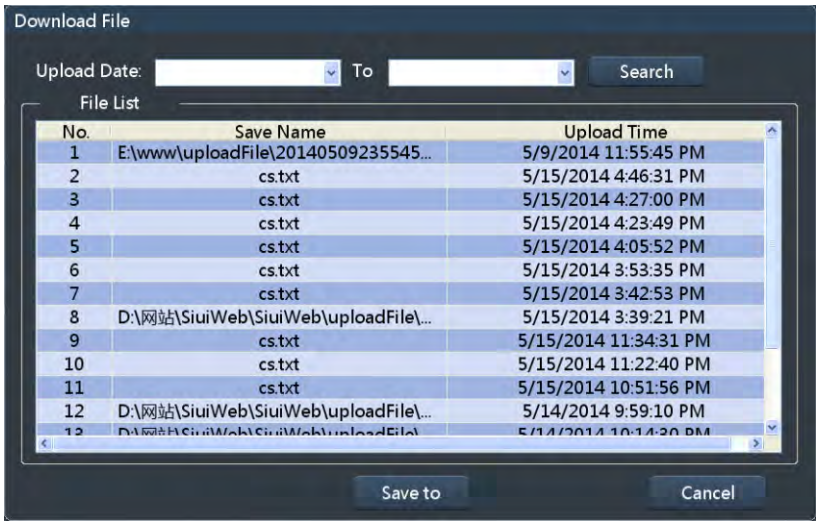


Fig. F-26 Download data

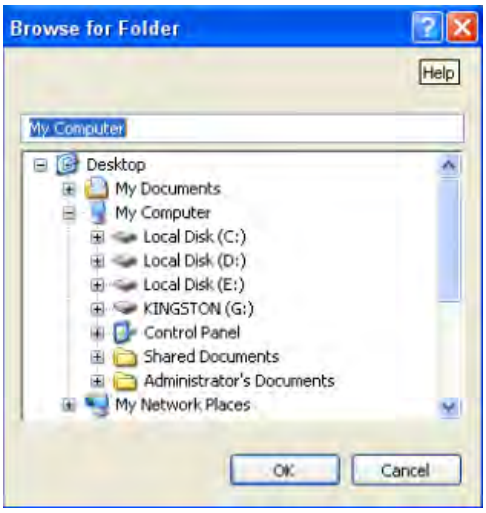


Fig. F-27 Browse for folder

F.5 Maintenance

Move the cursor onto the ***Maintenance*** menu. The sector will be expanded, displaying its function buttons, which include functions such as Help, Update, and Initialisation. See Fig. F-28.

Fig. F-28 Display of the maintenance functions

F.5.1 Help

This feature is for users to be able to send error messages to the server to get help.

Procedure: Use the trackball and the **Set** key to click on the ***Help*** button, and the Worksheet Maintenance window will open, as shown in Fig. F-29. The maintenance requirement for the system and for within a set timeframe will be listed in the window. Users can search by ***Status*** or ***Application***.

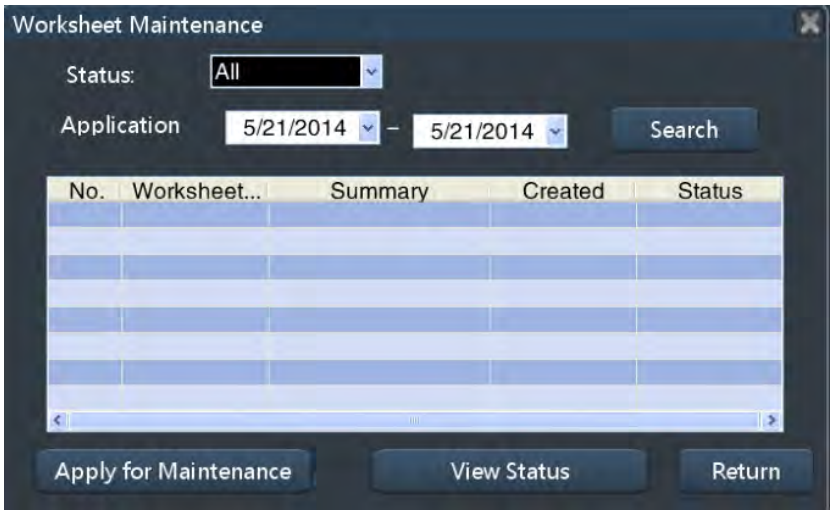


Fig. F-29 Worksheet maintenance window

Use the trackball and the **Set** key to click on the ***Apply for Maintenance*** button, and the maintenance requirement window will open, as shown in Fig. F-30. The window lists several possible malfunctions for the user to check. If the malfunction that occurred is not listed, the user may go to ***Others*** and fill in a malfunction description in the box underneath. Once the message has successfully sent, ***"Help request sent"*** will be displayed at the bottom edge of the main screen.

The maintenance request will be sent to the system-appointed customer service facility. After the request has been accepted by the customer service facility, the request status will change to ***processing***.

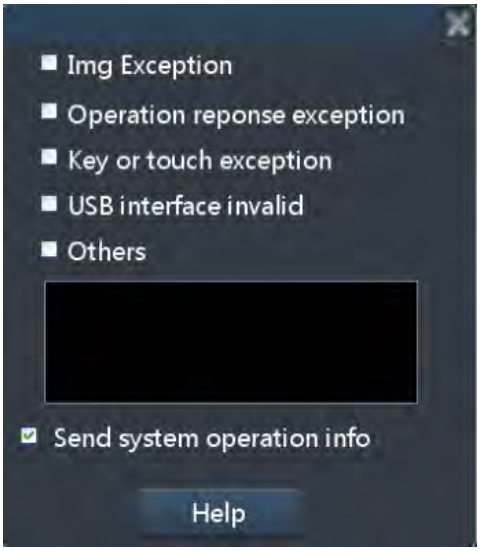


Fig. F-30 Maintenance requirement window

In the Worksheet Maintenance window, select a desired object. Use the trackball and the **Set** key to click on the ***View status*** button, and the worksheet information will open, as shown in Fig. F-31. This window displays the worksheet information, the current status, and the communication record.

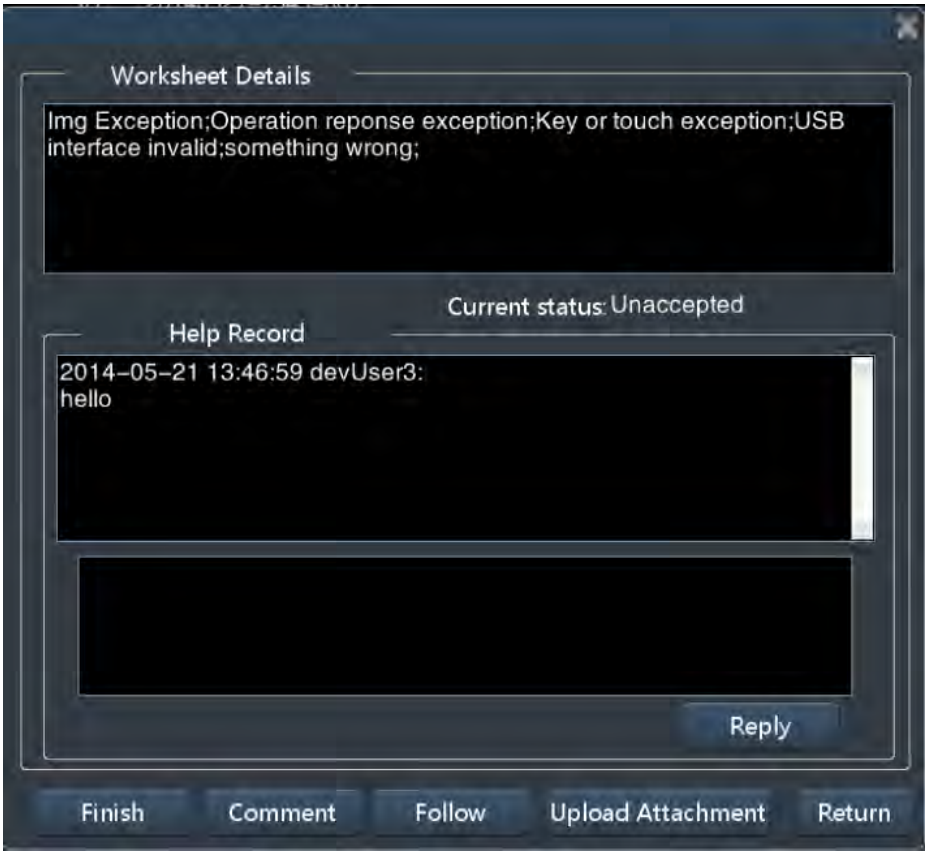


Fig. F-31 Worksheet information

- ***Repl***y: The user can enter the content into the communication box and click on ***Reply*** to send it to the customer service facility. The information that is provided in the reply will be displayed in the ***Help Record***.

- ***Finish:*** If the request has been resolved, click ***Finish*** to close the worksheet.

- ***Comment:*** Click ***Comment*** to bring up the following window. Make a selection in the ***Service*** box and enter your comment.

Fig. F-32 Comment window

- ***Follow:*** Click the button to edit the worksheet. When the user logs into the Ultracloud system via the browser on the PC, only the worksheet under that user's ID can be called up. However, all the worksheets sent from the ultrasound system can be called up under any ID which a user has used to log into that system. If the user wants to retrieve worksheet procedures from under other users' IDs by logging into the Ultracloud system via the browser on a PC, he can do this by clicking on ***Follow***.

- ***Upload Attachment***: Click on ***Upload Attachment*** to bring up the following window. Click on ***Browse*** and select the file to be uploaded. Then click on ***Upload Attachment*** to finish.

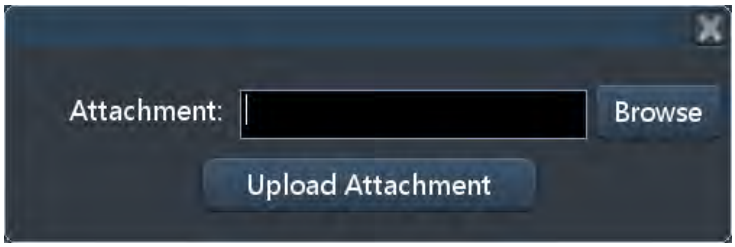


Fig. F-33 Uploading attachment

F.5.2 Update

Users can use this feature to update the ultrasound software.

Procedure: Use the trackball and the **Set** key to click on the ***Update*** button. If the current software version is up to date, the "***Latest version***. ***Update not required***" window will pop up. If the current software is not the latest version, the relevant information for the latest software will be displayed, as shown as Fig. F-34. The user can click on ***Download*** at the bottom-right corner of the screen, select the root file to be saved, and click on ***Save*** to download the latest software to the root directory indicated.

How to update: Exit the Ultracloud system and enter ***SETUP – update system*** to find the downloaded software update. Detailed operation steps can be found in ***section 5.2.5 System-Upgrade***.

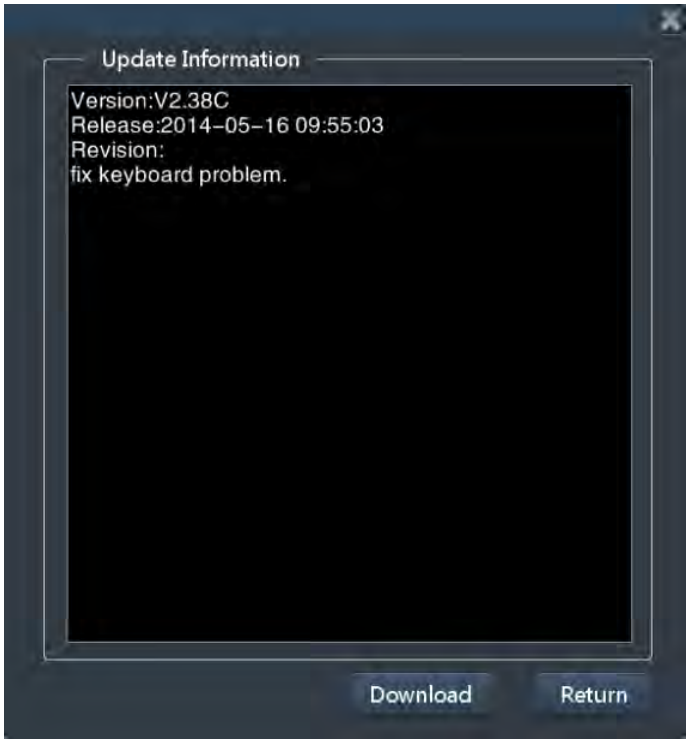


Fig. F-34 System update

F.5.3 Initialisation

Use the trackball and the **Set** button to click on the ***Initialisation*** button. A note window will appear, as shown in Fig. F-35. The cloud server will then check the whether the configuration of the system's software and hardware is up to date or whether an upgrade is needed. If an upgrade is needed, the note will remind the user to download and install the upgrade for the ultrasound system.

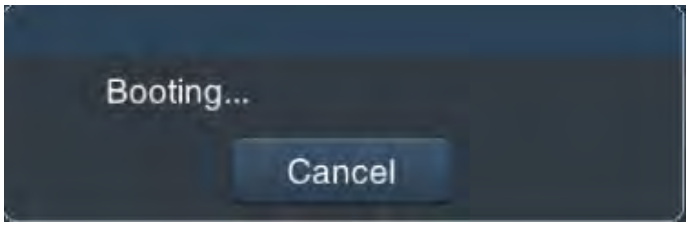


Fig. F-35 Initialisation

F.6 Diagnosis

Move the cursor onto the ***Diagnosis*** menu. The sector will be expanded, with its function buttons displayed, with functions such as Consultation, see Fig. F-36.

Fig. F-36 Function display for diagnosis

F.6.1 Search for consultation documents

Use the trackball and the **Set** key to click on the Consultation button. A window with a list of consultation documents will be displayed, as shown in Fig. F-37. All the consultation documents sent by the user within a period will be listed in the window. The user can search by ***Status*** and ***Request Date***.

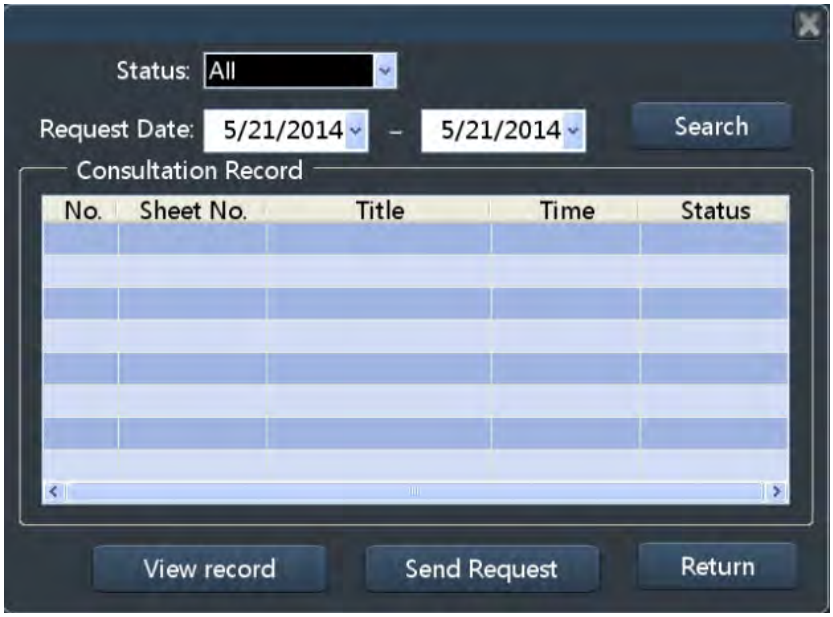


Fig. F-37 Consulting documents window

F.6.2 View records

Select a consultation from the list of consultation documents and click on ***View record*** to call up the consultation details, as shown in Fig. F-38. The special field, the consultation state and the communication records will be displayed. The user can enter information in the communication field and click on ***Reply*** to send. The contents will be displayed in the Consultation Information field. Click on ***End*** to finish the consultation and click on ***Comment*** to enter a comment for the consultation.

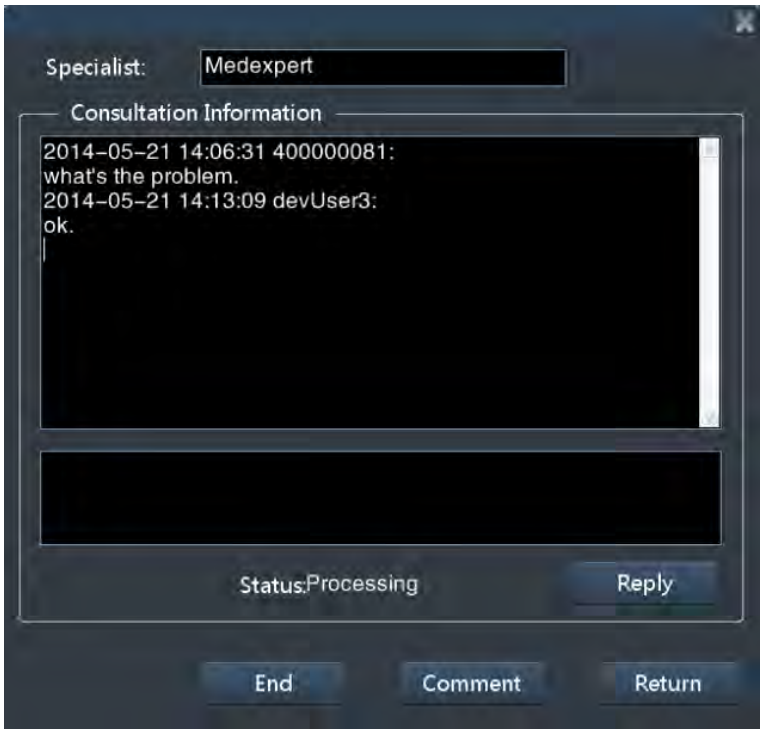


Fig. F-38 Details on the consultation documents

F.6.3 Send request

Select the ***Send request*** button from the list of consultation documents to call up the window with the list of specialties, as shown in Fig. F-39. The user can search by ***Specialty*** and ***Online Status***.

Fig. F-39 List of specialist areas.

Select a specialist area and click on ***Consultation Request*** to bring up the window for the consultation request, as shown in Fig. F-40. The user can enter data in the ***Diag Caption*** box and in the ***Description*** box and select patient data from the patient data list, which was sent to the cloud server. Then click ***Send*** to send the consultation request.

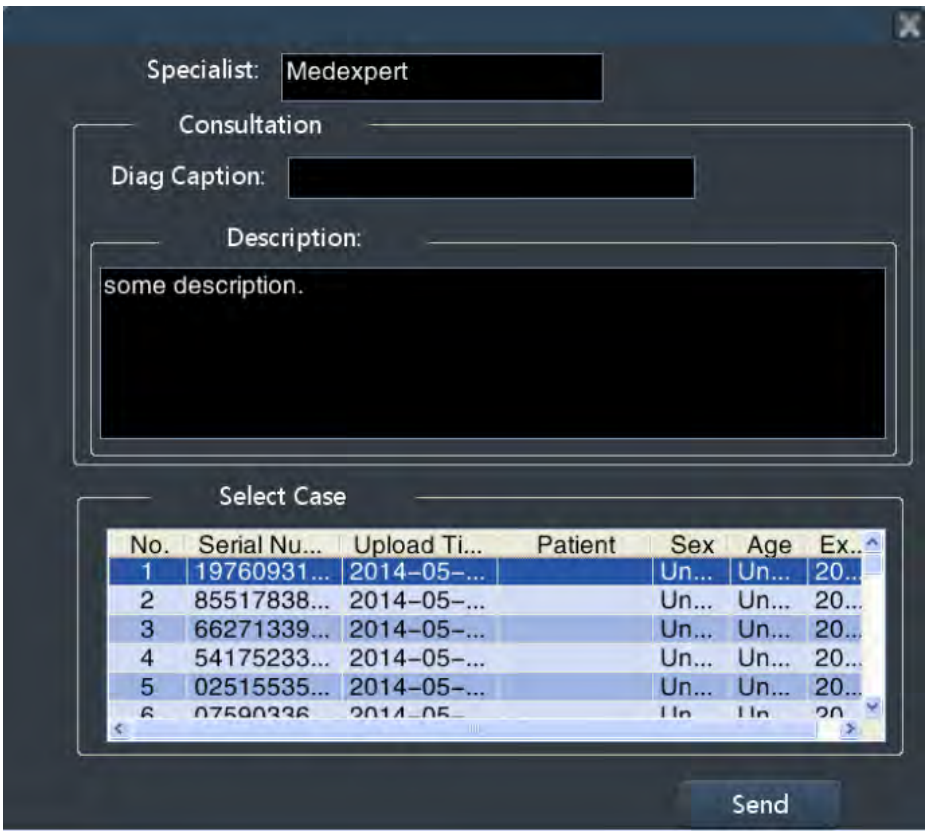


Fig. F-40 Consultation request

F.7 Teaching (reserved function)

The functions included in Teaching are operating instructions, training and online courses.

See Fig. F-41.

Operating instructions: Provides the operating instructions, video, etc.

Training: Provides ultrasound diagnostics tutorials, etc.

Online training: Provides instructional videos on specialist areas, etc.

Fig. F-41 Teaching function

F.8 Information (reserved function)

The functions included in Information are industry news and training info. See Fig. F-42.

Industry news: Provides industry-related news and information, etc.

Training info: Provides information on scientific research into medical ultrasound.

Fig. F-42 Information function

F.9 Communication (reserved function)

The functions included in Communication are industry articles and forum. See Fig. F-43.

Industry articles: Provides cases and experiences published by users, etc.

Forum: Provides communication in forums, etc.

Fig. F-43 Communication function

Appendix G

Installation and use of SIUI PIE-3 (option)

The SIUI PIE-3 is a remote ultrasound diagnostic application. By connecting to a remote Zimmer MedizinSysteme ultrasound imaging system, the application receives and displays ultrasound images in real time via 2G, 3G or a Wi-Fi network. The application also has functions such as save, zoom, film playback, report (for specific models only) and send reports via email, so that live diagnosis and report documentation can take place.

G.1 How to set up the Apple device (client)

When using the Apple device as the client, you need to have an App Store account in order to purchase or download the desired software from the App Store. You can find information on registering an App Store account and on the general operation of the Apple device in the user manual of the Apple device in question. For more information, visit www.apple.com.

G.1.1 Setting up the Apple device

G.1.1.1 Connecting to a wireless LAN network

In a wireless LAN network setup, you may choose whether to connect your Apple device to the Internet via the local WLAN network.

G.1.1.1.1 Enabling a wireless network

On the main screen, tap 

to access the settings screen, as shown in Fig. G-1. Tap 

to access the Wi-Fi network settings. Tap the Wi-Fi network switch  to enable the wireless network, as shown in Fig. G-2.

Fig. G-1

Once Wi-Fi is enabled, the Apple device will automatically search all the wireless network devices in the range of the network communication. If the network (i.e. the ultrasound system) is set up properly, a network with the same name as the SSID will be found. Select the network for the ultrasound system. Touch the blue arrow on the right side of the network name to access the Wi-Fi setting, as shown in Fig. G-2.

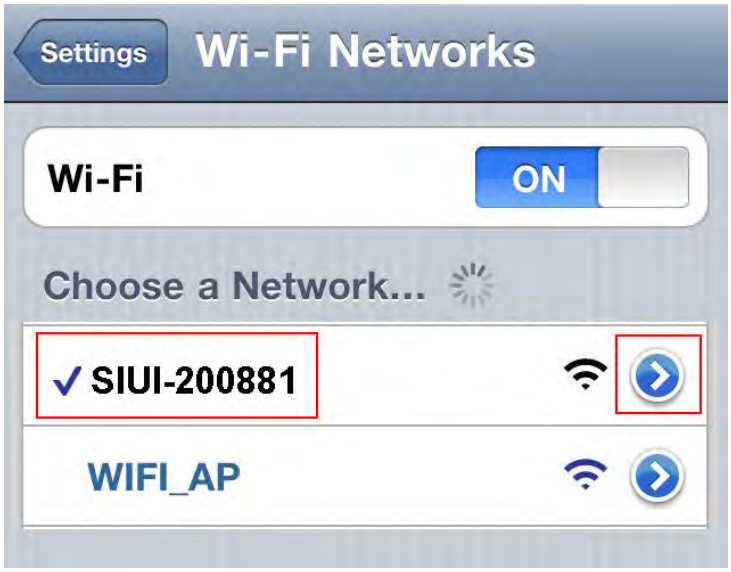


Fig. G-2

【Tip】： The network (ultrasound system) parameters were set up properly before shipping the system from the factory. The user does not need to set it up again, and the default SSID is "SIUI-XXXXXX" (XXXXXX is six figures, and this is the identification code for the corresponding system).

G.1.1.1.2 Setting up the Wi-Fi network

Access the screen for setting up the Wi-Fi network, as shown in Fig. G-3. Tap Static first, and then input the IP Address and the subnet mask. Make sure the first three numbers of the IP address are the same as those of the network (ultrasound system). The default IP address of the network (ultrasound system) is "192.168.0.120". The first three digits of the IP address on the Apple device should therefore be "**192.168.0.**XXX", and the last segment may be any number between 10 and 250, except 120. Please note that if multiple Apple devices are connected to the same ultrasound system, the last number of the IP address for each Apple device must be different.

【Note】: The "." in the IP address must be entered using the English input format. To switch the input language, tap . After setting, tap Wi-Fi Networks top left to return to the menu and close the setup.

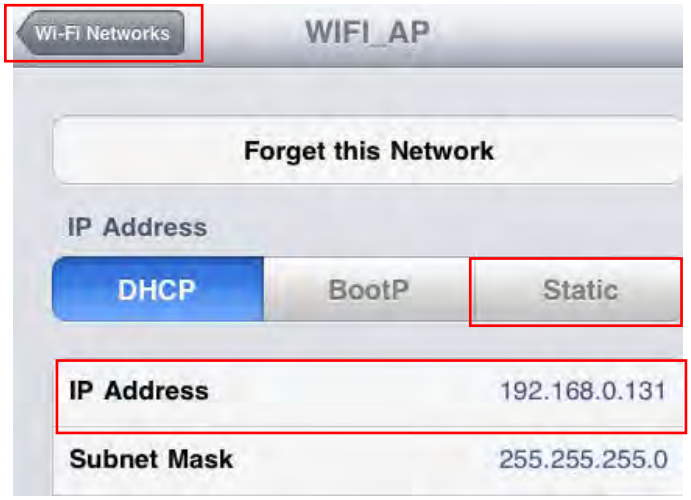


Fig. G-3 Wi-Fi network setup

G.2 Installing the SIUI PIE-3 software

G.2.1 Searching for SIUI PIE-3

Tap on 

on the main screen, enter ***SIUI*** in the search field and tap 

on the keyboard to search, as shown in Fig. G-4.

Fig. G-4 App Store search screen

The search result will be displayed after the search step, as shown in Fig. G-5.

Fig. G-5

Tap on the SIUI application in the search results, and you can look at the introduction for that application. To confirm the purchase of the application, tap $99.99. When the price is changed to BUY NOW, tap on it again, and follow the instructions to complete the purchase, as shown in Fig. G-6. Wait until the installation has finished. Now the Apple device (client) setup is complete.

【Note】: The price $99.99 in the illustration is for reference only.

Fig. G-6

G.3 Activation and configuration

After setting up the Apple device (client), the SonoAir function on the ultrasound system needs to be activated and set up.

G.3.1 Activate the SonoAir on the ultrasound system

Bring up the main screen for setting up the ultrasound system, as shown in Fig. G-7. Select ***Licensing***, and then ***Import LicenceKey File...*** to import the file acquired from SIUI and activate the SonoAir feature (for detailed instructions on how to activate the SonoAir feature, see *5.2.1* in the operating instructions). The licensing screen is shown in Fig. G-8.

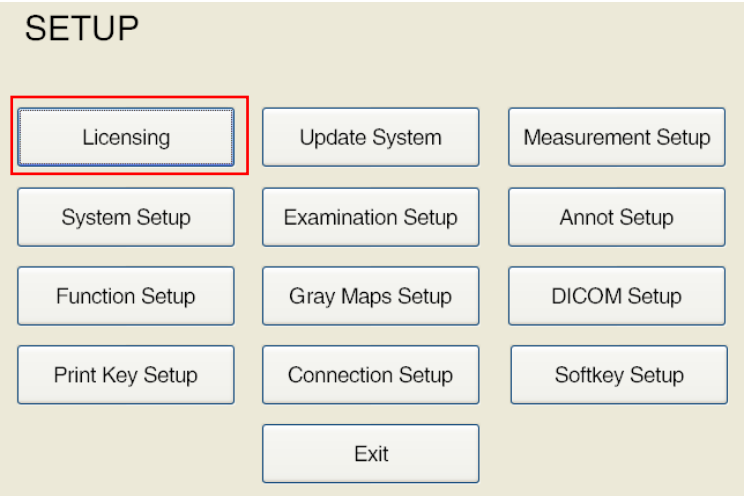


Fig. G-7 Setting up the main monitor

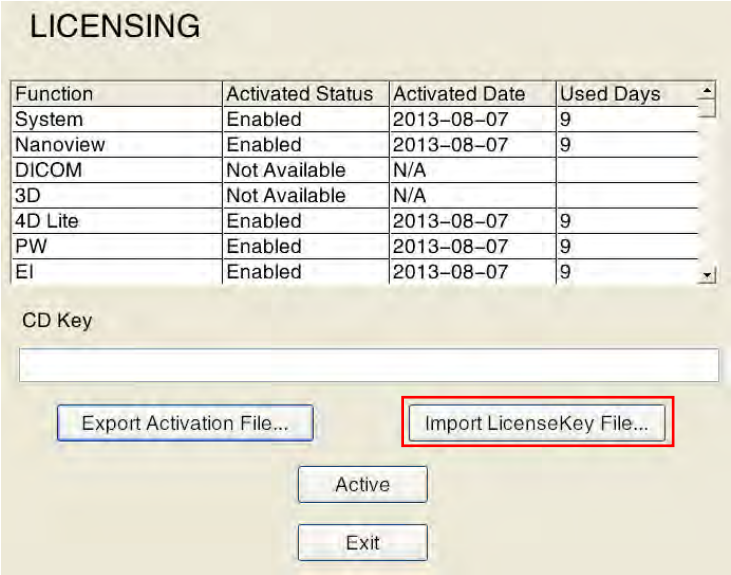


Fig. G-8 Licencing screen

G.3.2 Setting up the SonoAir feature

When the SonoAir feature is activated, go to the main settings screen of the ultrasound system, and then select ***SonoAir*** from the functions setup, as shown in Fig. G-9.

【Note】: SonoAir is an optional feature that is not activated unless it has been purchased. In such cases, *SonoAir* remains grey, and no setup is available.

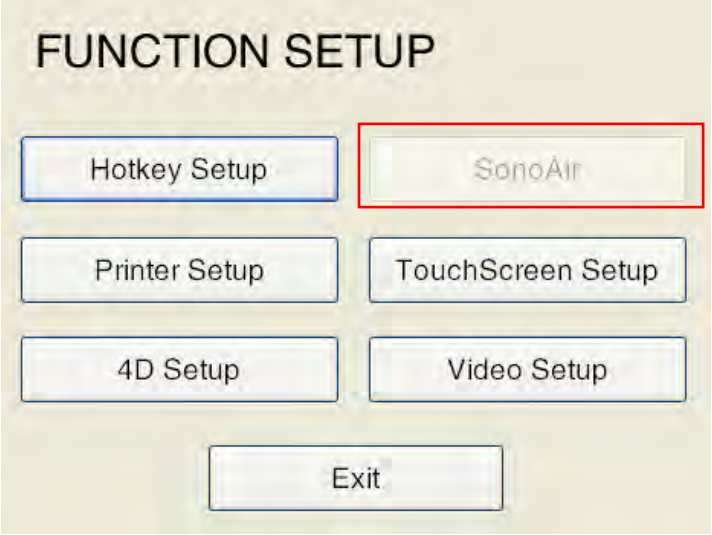


Fig. G-9 Function setup

Open "SonoAir". Check ***On***, click on ***OK*** to confirm and exit the settings screen, as shown in Fig. G-10. Now the ultrasound system setup is complete.

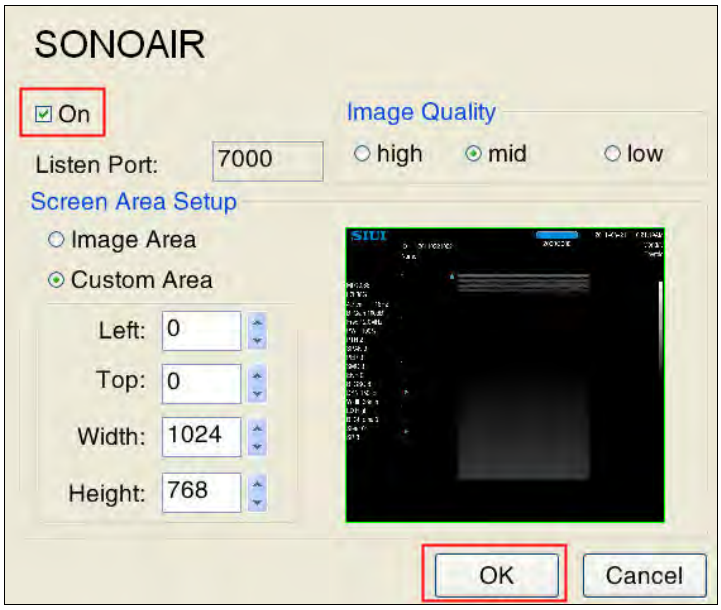


Fig. G-10 SonoAir

As soon as the Apple device and the ultrasound system have been set up properly, you can perform remote ultrasound diagnosis using the Apple device.

G.4 Remote ultrasound diagnosis

G.4.1 Starting by using SIUI PIE-3

Tap on the SIUI PIE-3 icon  on the main screen of the Apple device to call up the SIUI PIE-3 applications. A dialogue box will open on the screen, as shown in Fig. G-11. Confirm that the IP address matches the network (ultrasound system) and tap on ***OK*** to start the SIUI PIE-3 remote ultrasound diagnosis.

Fig. G-11

【Note】: The IP address of the network (ultrasound system) is "192.168.0.120" by default. If you do not need to change it, press OK directly to gain access. Please note that the IP address of the network (ultrasound system) should match the IP that is prompted by the Apple device (client).

G.4.2 How to perform remote ultrasound diagnosis

G.4.2.1 How to use SIUI PIE-3 on iPhone/iPod touch

When you access the remote ultrasound diagnostics main screen, you will see 3 circular icons that you use for remote ultrasound diagnostics, as shown in Fig. G-12.

Fig. G-12 SIUI PIE-3 icons for iPhone/iPod touch

G.4.2.1.1 Displaying images as still or live images

Tap on  to display the image as a still or live image. When the image is shown as a still image, drag the progress bar or tap on the left/right arrow to play back manually, as shown in Fig. G-13. Or you can double tap on the saved image to zoom in or out on it (double tap the area to be zoomed in on, or open/close with 2 fingers to zoom in/out).

Fig. G-13

【Note】: The ultrasound system does not change, no matter whether the image is displayed as a still or live image on the Apple device (client).

G.4.2.1.2 Saving diagnostic images

Tap on  to save diagnostic images.

- If the Apple device in use is an iPhone or iPod touch, the screen will display the latest 4 diagnostic images only, and the saved images will be saved permanently in the album of the Apple device. To view the images, tap on 

, and they will be displayed as shown in Fig. G-14.

Fig. G-14 Saving images to iPhone/iPod touch

- If the Apple device in use is an iPad, the screen can display up to 12 diagnostic images, which are saved in the report format. Up to four images can be saved in one report. To save 12 images, 3 reports need to be created, as shown in Fig. G-15.

Fig. G-15 Saving images on an iPad

G.4.2.1.3 Sending diagnostic images by email

Diagnostic images can be sent via email when the Apple device has 2G or 3G or is connected to a Wi-Fi network.

Tap on the saved image. If an icon for sending emails is displayed in the top-left corner of the image, as shown in Fig. G-16, tap on the icon for sending emails on the bottom edge of the screen to bring up the editing emails screen, as shown in Fig. G-17. Fill in the email address(es) of the recipient(s) (or tap the add icon to select email address from the saved contacts list), the subject and the message body, and tap on Send to send the email to the recipient(s).

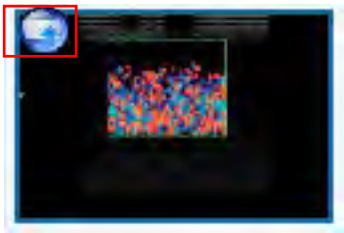


Fig. G-16

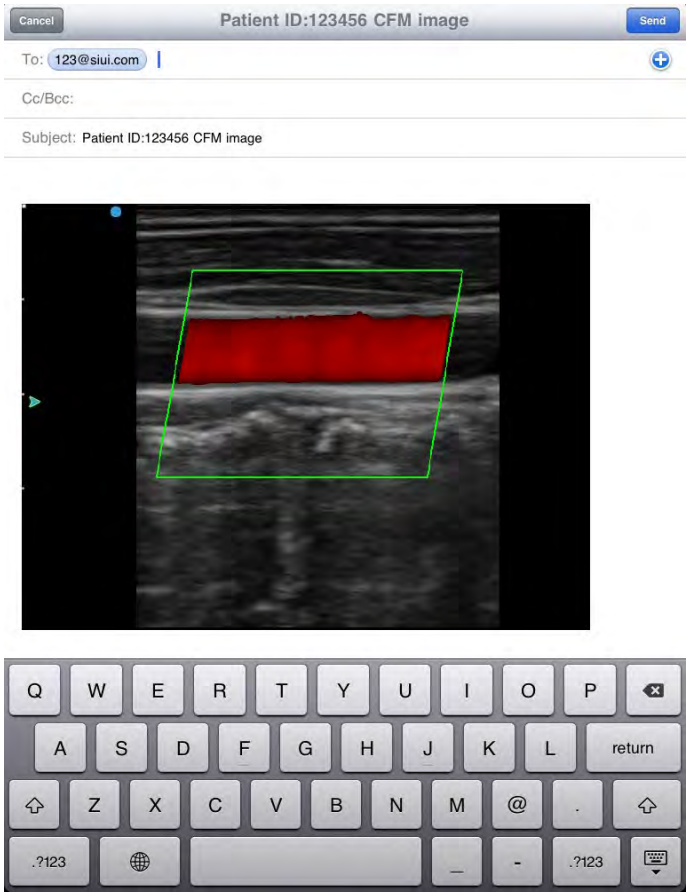


Fig. G-17 Sending emails

G.4.2.2 How to use SIUI PIE-3 on iPad

On the remote ultrasound diagnostics main screen, there are 4 circular icons that are used for remote ultrasound diagnosis, as shown in Fig. G-18. For how to operate other functions, except for the report function, see *G.4.2.1 How to use SIUI PIE-3 on iPhone/iPod touch*.

Fig. G-18 SIUI PIE-3 icons on iPad

G.4.2.2.1 How to edit a report on the iPad

During diagnosis, the patient information can be entered using the report function. The 4 latest saved images are displayed in the image preview area. To delete any of the images, tap the desired image and follow the onscreen instructions to delete it. To add a new image, tap an area where there is no image in the image preview area, and select the desired image from the 12 images already saved, as shown in Fig. G-19.

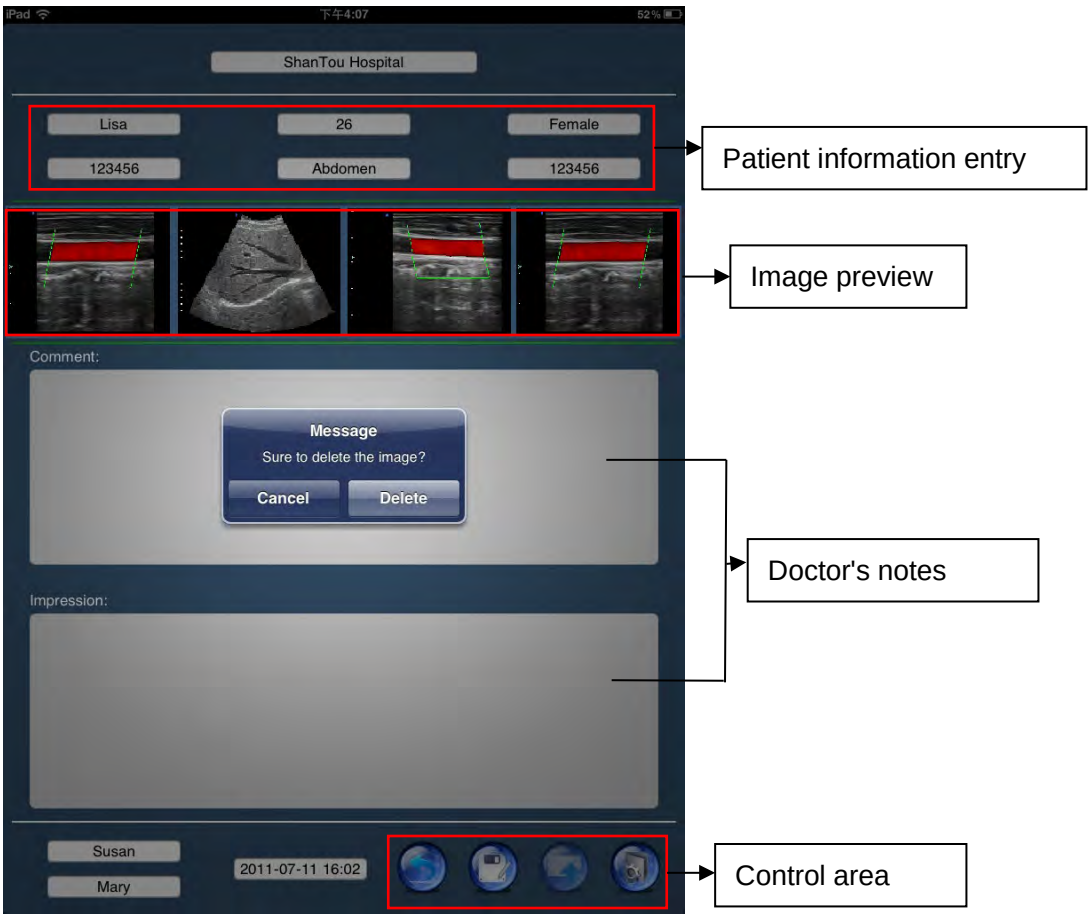


Fig. G-19 Editing a report

- After editing the report, tap the save icon  bottom right to save the report in PDF format. The saved images will be saved permanently in the PDF report.
- After saving the report, tap on the view icon  bottom right to view the saved PDF report.
  - To change the name of the saved PDF report, tap on  to bring up the editing screen. When the input is complete, tap on  top left or on  the keyboard to complete the name change.
  - To delete a saved PDF report, tap the view icon to view the list of reports. Slide gently over the title of the report that you want to delete, and you will see a delete icon. Tap on  to delete the report, as shown in Fig. G-20.

◆ Tap on the search icon on the top right of the report list, and you can search through the saved PDF reports. Go to the search screen and use the search icons Fuzzy Search or Exact Search on the top right to perform a fuzzy or exact search of the reports.

- Tap on the email icon on the report screen, and you can send the PDF report as an attachment to the email. See *G.1.2.2* for detailed operating instructions.

Fig. G-20 Report list

G.5 Caution

If the ultrasound imaging system and the Apple device containing the SIUI PIE-3 software are purchased at the same time, the SIUI PIE-3 software will be preinstalled on the Apple device before delivery (SIUI PIE-3 for iPhone/iPod touch, or SIUI PIE-3 HD for iPad). You can then use the software function immediately upon receiving the system and Apple device.

Please pay attention to the following notes concerning operation:

- An App Store ID was requested in advance. The ID and the password are enclosed in the Apple device package. You can also use your own ID to download other software from the App Store. However, to synchronise the device with a PC, you must use the App Store ID provided. Using any other ID may result in losing the SIUI PIE-3 installed on the Apple device.
- Please keep the App Store ID and password appropriately safe. When you receive a message concerning a SIUI PIE-3 software update, please use the ID for a free update.
- If the SIUI PIE-3 software gets lost, use the App Store ID provided to log on to the App store, search for ***SIUI PIE-3***, and download the software for free (see ***G.2.1*** for detailed instructions). Using another ID to download the PIE-3 software may result in an additional charge.

Appendix H

Operating Instructions for the DICOM Function (Option)

H.1 Network connection and setup

H.1.1 LAN or WLAN network connection

Before using the DICOM feature, make sure that the network connection between the ultrasound system and the DICOM server is effective.

To use a LAN network connection between the ultrasound system and the DICOM server, connect both ends of the power cable to the network ports of the ultrasound system and the DICOM server respectively (the network port of the ultrasound system is on the interface panel. See ***Chapter 3*** of the operating instructions for its specific location).

To use a WLAN network connection between the ultrasound system and the DICOM server, install the configured wireless network antenna (see Fig. H-1) into the WLAN antenna port of the ultrasound system. See ***Chapter 4*** of the operating instructions for the specific connection. The DICOM server must have its own WLAN port.

Fig. H-1 WLAN antenna

H.1.2 Network setup of the ultrasound system

Here are the setup steps:

1) Tap ***Setup*** on the touchscreen to open the main SETUP screen, as shown in Fig. H-2.

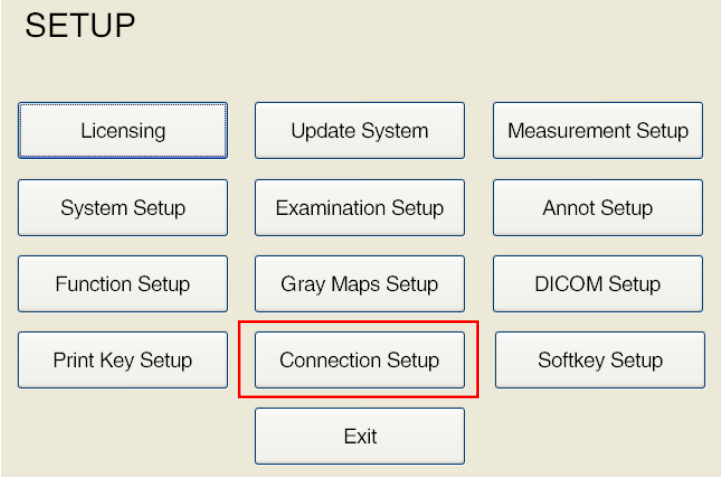


Fig. H-2 Main SETUP screen

2) Select ***Connection Setup*** to call up the screen for the ***CONNECTION SETUP***, as shown in Fig. H-3.

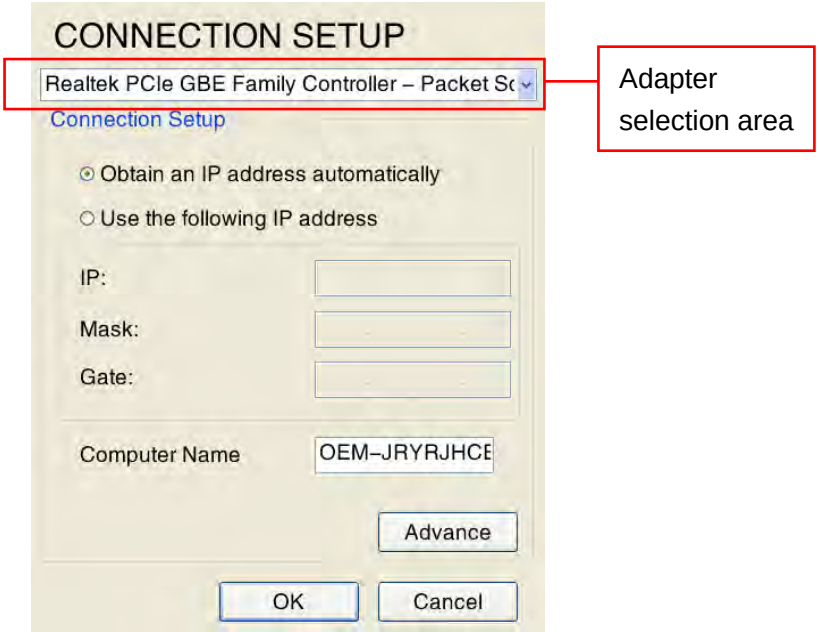


Fig. H-3 Screen for the connection setup

3) Select the desired adapter from the drop-down menu at the top edge of the screen. Some ultrasound system models may have both LAN and WLAN adapters.

4) Select ***Use the following IP address***, and input the IP address and mask. The IP addresses of the LAN and WLAN adapters should be set in different fields, to avoid conflicts. Please contact your network administrator to find out the available IP addresses. After setup, click on ***OK*** to save the settings.

【Note】: Many network environments use IP addresses that are automatically managed and allocated by the router DHCP. If this is the case in your network environment, please select *Obtain an IP address automatically*.

H.1.3 Network setup for the DICOM server

A mask is generally set to 255.255.255.0, and the IP address of the network adapter for the connection between the DICOM server and the ultrasound system should be allocated to the same field, that is, the first three segments should be the same.

Example: The IP address of the ultrasound system is set to: 192.168.0.123 (LAN adapter) and 192.168.123.1 (WLAN adapter). Therefore, the IP address of the DICOM server should be set to 192.168.0.XXX (LAN adapter) and to 192.168.123.XXX (WLAN adapter). The last segment can be set to an arbitrary number from 1 to 255 but should not be identical to the IP address of the ultrasound system.

【Note 1】: When several DICOM servers are connected to the same ultrasound system, the last segments of the server IP addresses should not be identical. Please contact your network administrator to find out the available IP addresses.

【Note 2】: The DICOM server firewall should be disabled.

H.2 DICOM licensing

For DICOM transfer, the DICOM feature of the ultrasound system should be activated.

1) Tap ***Setup*** on the touchscreen to open the main SETUP screen, as shown in Fig. H-4.

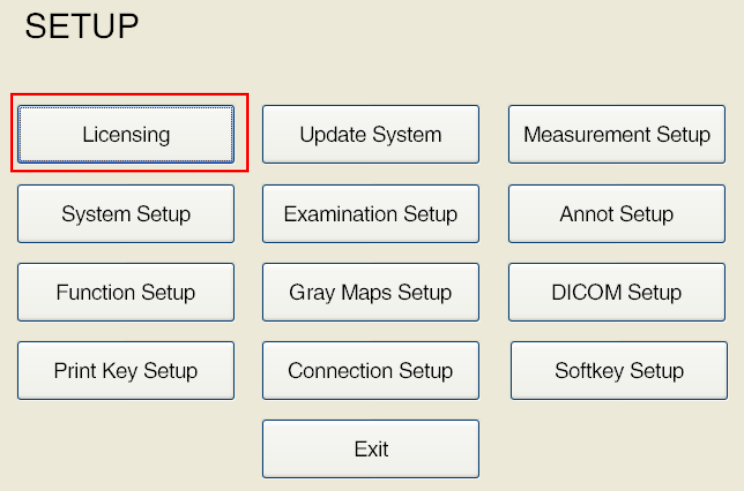


Fig. H-4 Main SETUP screen

2) Select ***Licencing*** and then ***Import LicenceKey File...*** to import the licence key data received from Zimmer MedizinSysteme and to activate the DICOM function (for detailed instructions on activating the DICOM function, see section ***5.2.1*** of the operating instructions). The licencing screen is shown in Fig. H-5.

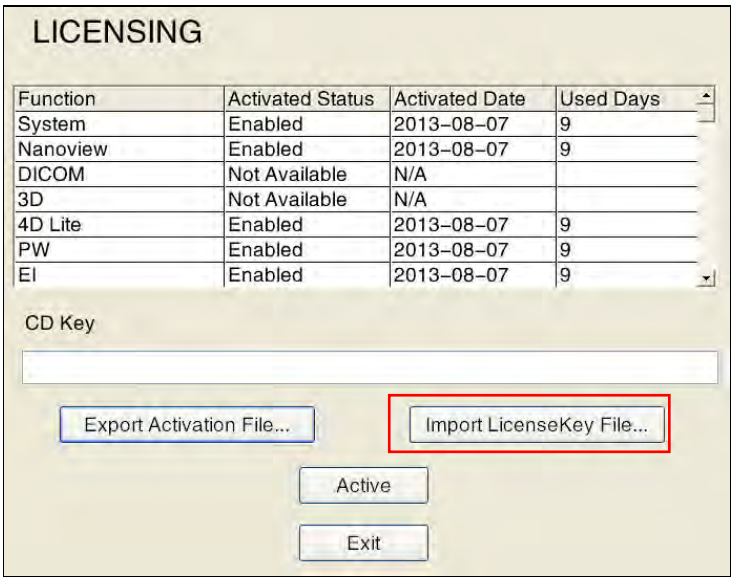


Fig. H-5 Licencing screen

H.3 Setting up DICOM Store Setup

1) Tap ***Setup*** on the touchscreen of the ultrasound system to open the main setup screen, as seen in Fig. H-6.

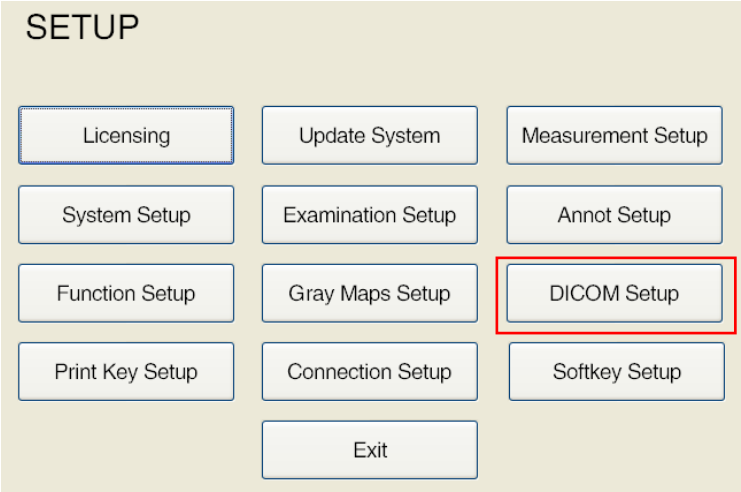


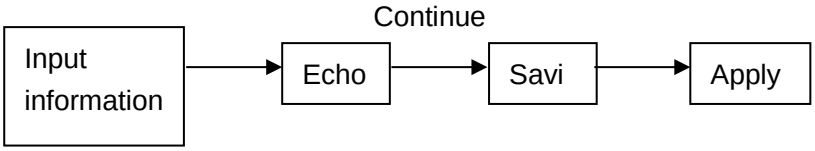
Fig. H-6 Main SETUP screen

2) Click on ***DICOM Setup*** to call up the DICOM configuration screen. The default display is ***Local***, as shown in Fig. H-7.

Fig. H-7 DICOM Local configuration screen

3) Click on the ***Store*** button to call up the "DICOM Store Setup" screen, as shown in Fig. H-8. Fill in the ***Facility, AE, IP*** and ***Port*** of DICOM server, then click ***Echo***. If the connection is successful, click on ***Save***. The server-related information will be displayed in the table below. Select the information and click on ***Apply*** to start the transfer. For other specific operations, see the description in ***5.2.11.2*** *DICOM Store*

server configuration.



【Note 1】: Please follow the instructions above to correctly set the DICOM IP address. Otherwise the connection will fail. Please contact your network administrator for the precise details for Facility, AE, IP and Port.

【Note 2】: The *compression type* should match DICOM SETUP. Otherwise, the transfer will fail.

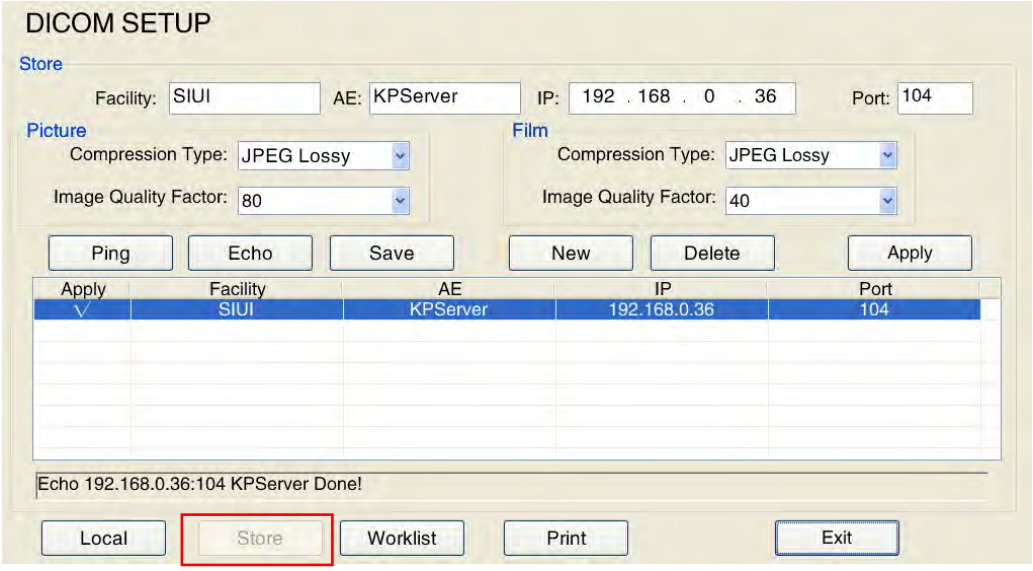


Fig. H-8 DICOM Store Setup screen

H.4 How to use DICOM

Once you have a successful connection between the ultrasound system and the DICOM server, follow any of the three methods below to send files.

H.4.1 Method 1: Send via "Archive Management – Send"

1) On the ultrasound's control panel, press **Smarchive** to call up the screen for archive ***Management***, as shown in Fig. H-9.

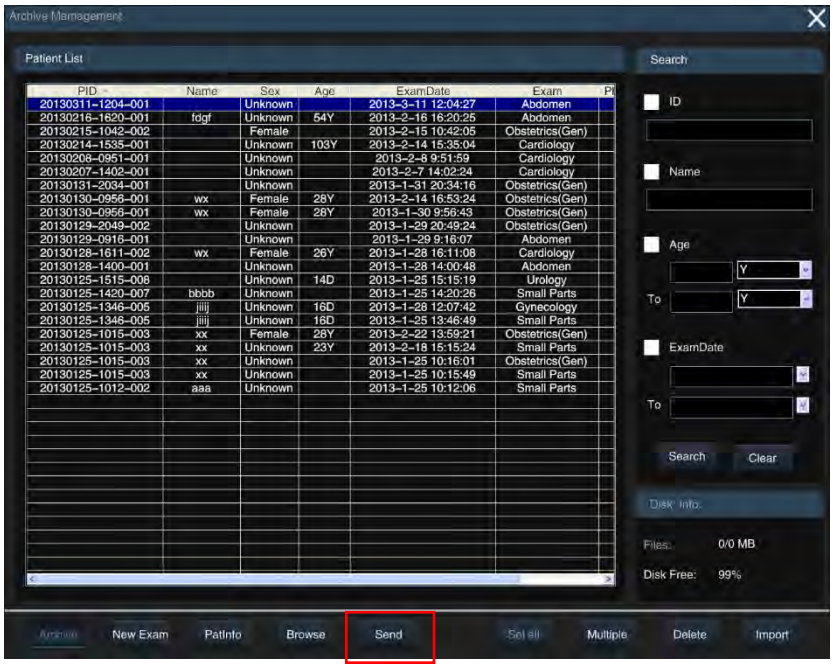


Fig. H-9 Archive management screen

2) Select the patient file from the patient list and click on ***Send*** on the lower edge of the screen to call up the ***Send*** screen, as shown in Fig. H-10.

3) Check ***STORESCU*** and select the target server from the dropdown menu. Then determine the content and scope of the transfer. Then click on ***Send*** and all files will be converted into DCM format for the transfer. For the exact procedure, see section ***9.4.5.4***.

Fig. H-10 Archive Management – Send screen

H.4.2 Method 2: Sending using the print key

1) Then tap ***Setup*** on the touchscreen of the ultrasound system to open the main SETUP screen, as shown in Fig. H-11.

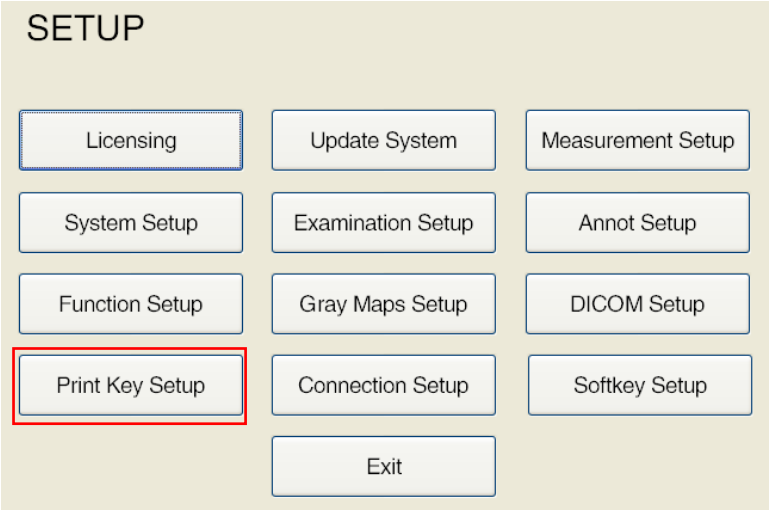


Fig. H-11 Main SETUP screen

2) Click on ***Print Key Setup*** to call up the screen for ***setting up the print key***, as shown in Fig. H-12.

Fig. H-12 Print Key Setup screen

3) Select ***To DICOM Storage*** and click on ***OK*** to save the setting. When, after setup, you press the **Print** button, the current image will be sent in DCM format to the DICOM server.

【Note】: This method is only suitable for sending images, not for sending films.

H.4.3 Method 3: Sending using the save button

1) Tap ***Disk*** on the ultrasound's touchscreen to call up the screen for Store ***Setup***.

2) Select ***DICOM Server***, as shown in Fig. H-13. When, after setup, you press the **Save** key or the **key combination P1 ~ P6 (Dis)**, the image will be saved to the local hard disk, and meanwhile a DICOM single frame image will be sent to the DICOM server.

【Note】: This method is only suitable for sending images, not for sending films.

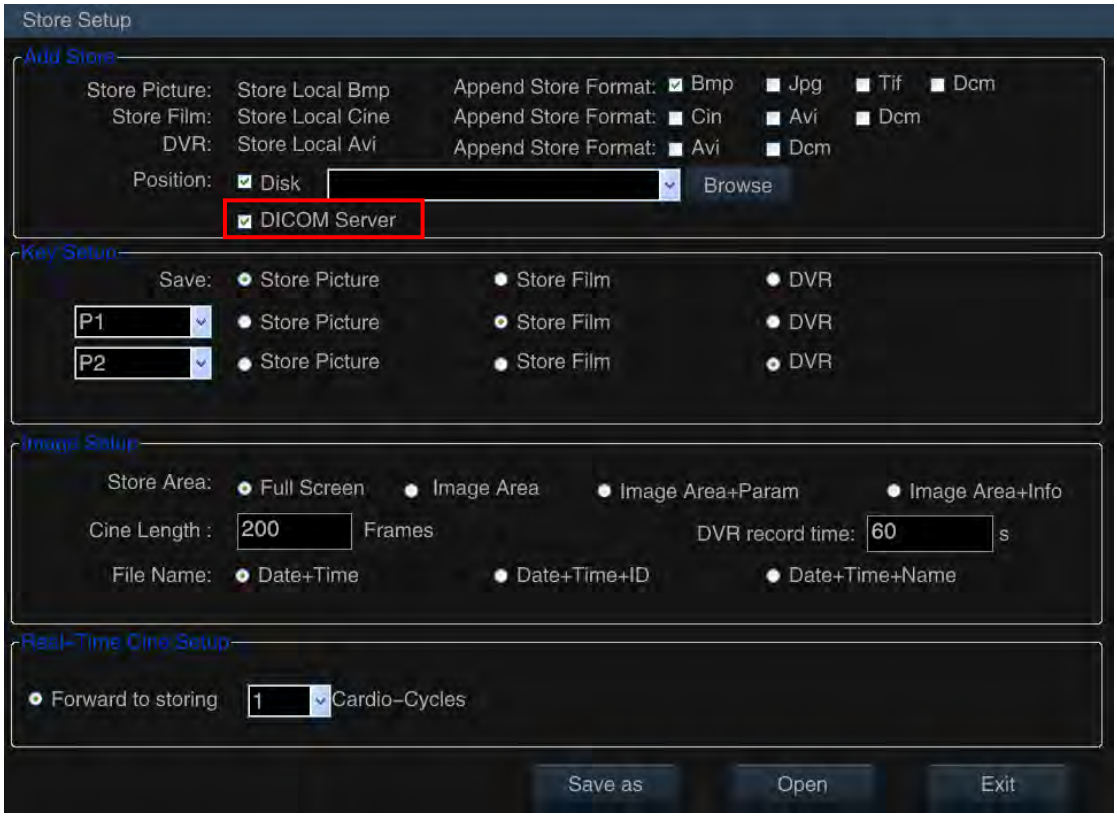


Fig. H-13 Store Setup screen

H.5 DICOM worklist settings

As mentioned above, go to the "Setup -DICOM Setup" screen and click on the ***Worklist*** button to activate the "DICOM worklist Setup" screen, as shown in Fig. H-14.

On this screen, you can establish a connection to the DICOM worklist server and bring the server into operation. For the detailed process, see ***H.3*** *DICOM Store Setup* above.

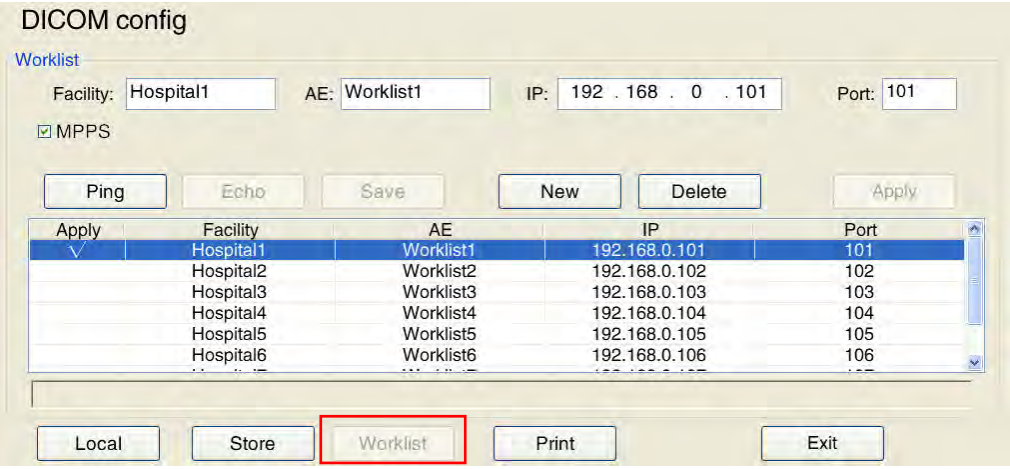


Fig. H-14 DICOM worklist setup screen

H.6 How to use DICOM worklist service

Once you have a successful connection between the ultrasound system and the DICOM server, follow the method below for the worklist service:

1) Press **ID** on the control panel of the ultrasound system to open the ***New Patient Info*** screen, as shown in Fig. H-15.

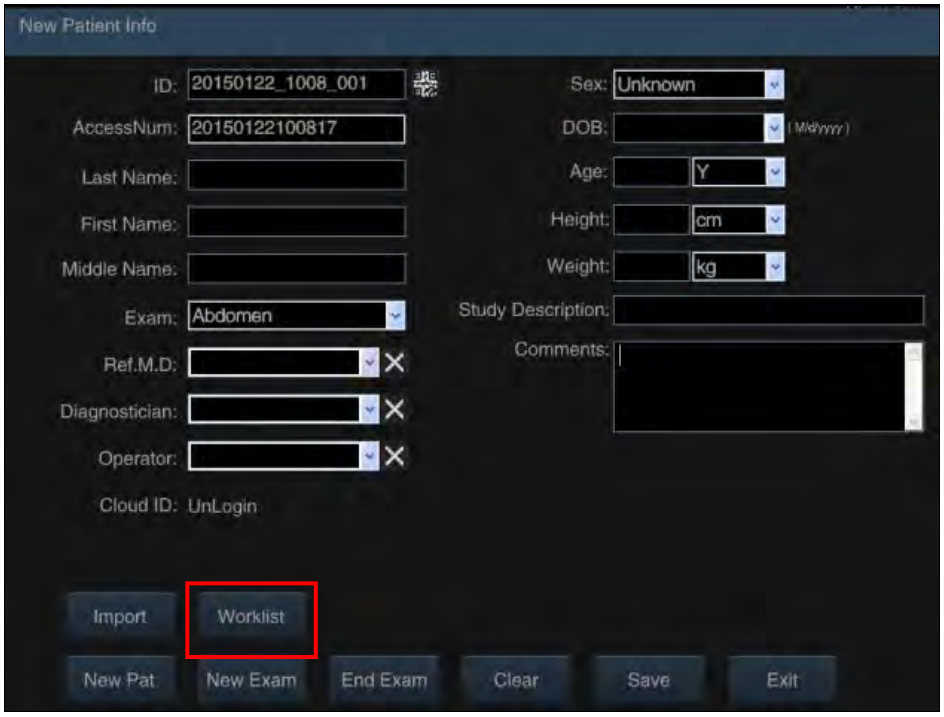


Fig. H-15 New patient info screen

2) Click on ***Worklist***, to call up the ***worklist*** screen, as shown in Fig. H-16. This screen shows the patient list that is stored in the worklist server. The user may call up the patient data and save it to the local archive for a new examination. For the exact procedure, see section ***7.1***.

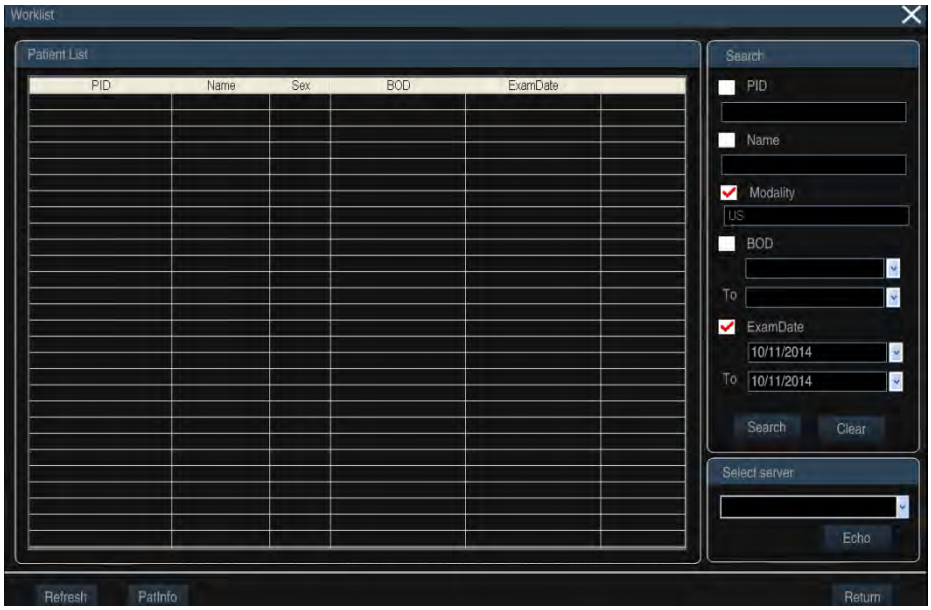


Fig. H-16 Worklist screen

Appendix I
Instructions for 3D imaging

I.1 3D-imaging procedure

If the probe in use is not a volume probe, press **4D** on the control panel in Live state; the system will now be in 3D-imaging mode (press the **Esc** key to exit 3D imaging mode). A "+" cursor will then be displayed on the ultrasound image. The "Select ROI area" prompt box will appear in the lower half of the screen (ROI is the imaging area. Only one image in this area can be rendered as a 3D image). See Fig. I-1.

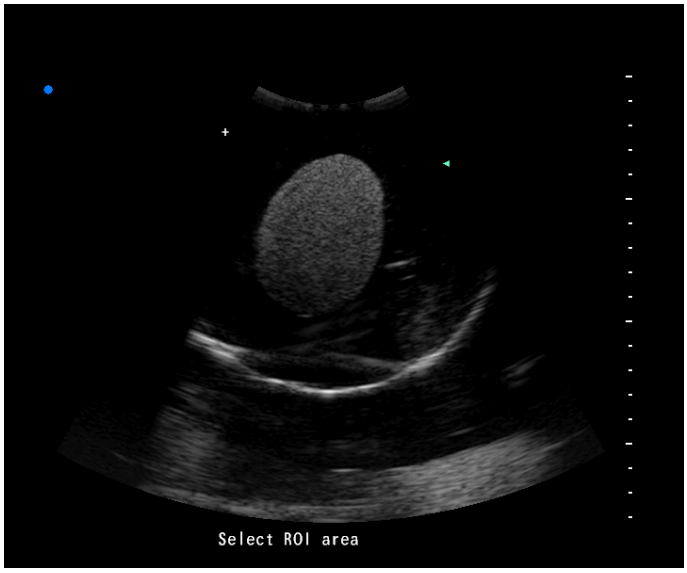


Fig. I-1 3D-imaging mode

Move the trackball to shift the position of the "+" cursor to the start of the ROI. Press the **Set** key on the keyboard to fix its position. Then move the trackball to select a rectangular area. See Fig. I-2.

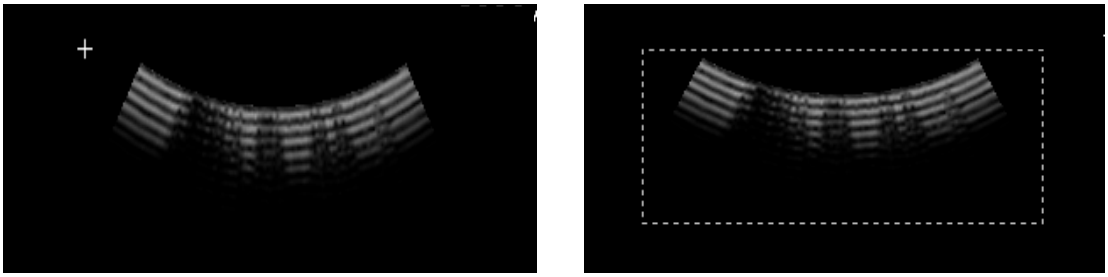


Fig. I-2 Selecting the imaging area

Click on the **Set** key again. You can now render a 3D image based on the ultrasound image in the selected area. The screen display is shown in Fig. I-3. Click on the **Set** key to complete the 3D rendering. To exit the rendering process, press the **Esc** key. A 3D image will now be rendered. Then you can set up the imaging parameters.

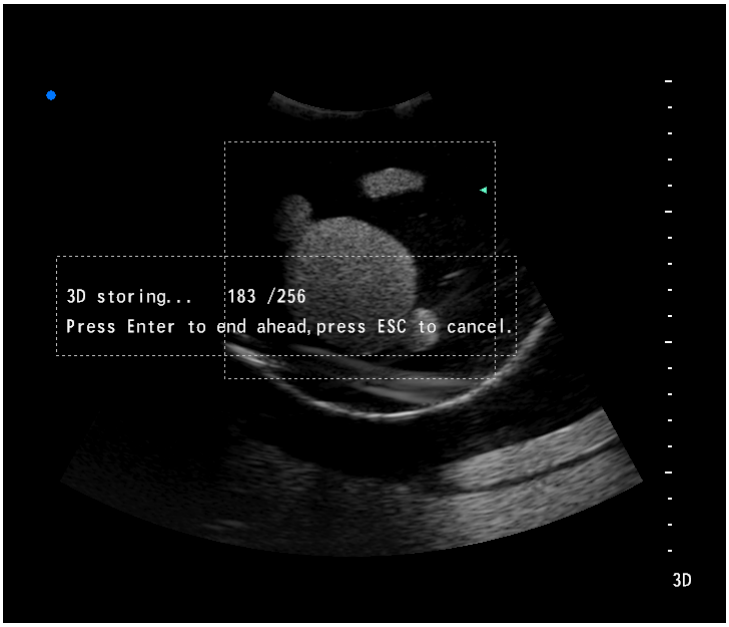


Fig. I-3 Capturing images in the ROI area

I.2 Image processing

I.2.1 Scale settings

After entering 3D imaging mode, set the values of ***X, Y*** and ***Z***, which correspond to the physical distances of every pixel on the 3D image in the direction of the length, width and height. Only the value of ***Z*** is adjustable; values of ***X*** and ***Y*** are acquired automatically by the 2D ultrasound software. See Fig. I-4.

Use the trackball and **Set** to adjust. Now click on ***OK*** and a 3D image will be shown.

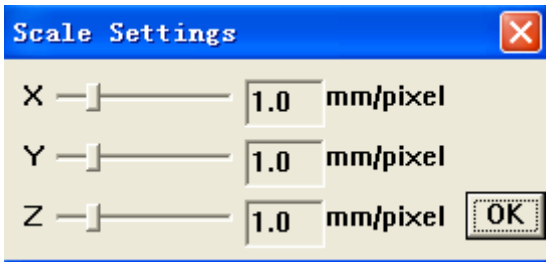


Fig. I-4 Scale settings

See Fig. I-5 for the 3D user interface.

Fig. I-5 3D-imaging interface

The largest window on the right-hand screen displays a 3D image from the ROI area. On the left, three small windows display 2D images from different viewing angles. If the 3D image does not appear, double-click on the **Set** key in the 3D imaging area to accelerate the rendering of the 3D image.

I.2.2 Imaging effect

Grey and ***Opacity*** are used to adjust the imaging effect. Use Grey to alter the brightness. Use Opacity to filter pixels in different ranges of greyscale.

Use the trackball and **Set** to adjust. Opacity is generally set at 30. See Fig. I-6 (a) and Fig. I-6 (b).

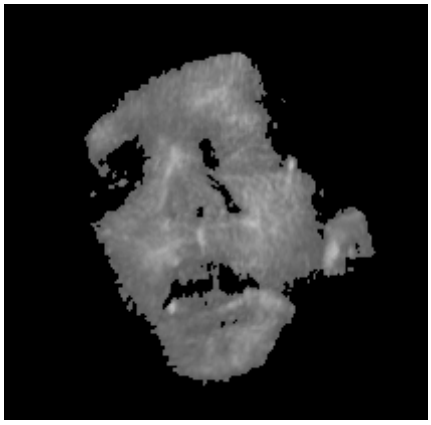


Fig. I-6 (a) Opacity at 45

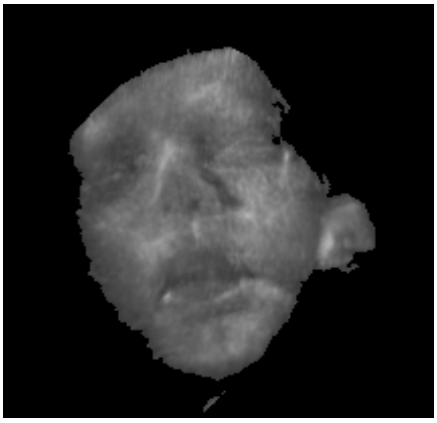


Fig. I-6 (b) Opacity at 30

Fig. I-6

I.2.3 3D resizing

Set the values for ***Top, Bottom, Left, Right, Front*** and ***Back*** to cut out the surrounding areas. Use the trackball and **Set to adjust.** See Fig. I-7 (a) and Fig. I-7 (b).

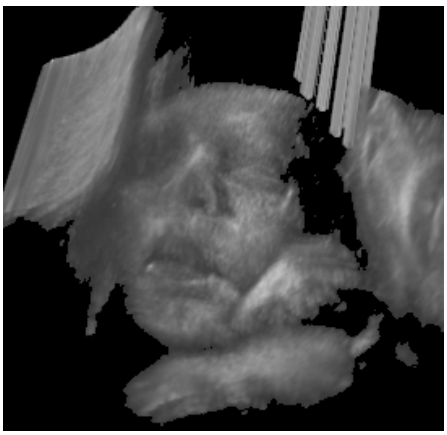


Fig. H-7(a) Before the incision

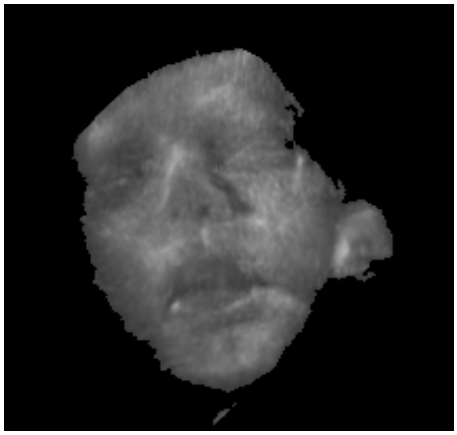


Fig. H-7(b) After the incision

Fig. I-7

I.2.4 Image control

Hold down the **Set** key and rotate the trackball to rotate the 3D image.

I.2.5 Measurement

Use the trackball and **Set** to click on the  key for the measurement angle. Click on  for distance measurement. The measurement tool will appear on the image when either of the above buttons is clicked. See Fig. I-8.

Use the trackball and **Set** to click on the arrow or the start point in the measurement tool and change the angle or distance. The measurement results will be displayed in the Angle and Dist box in real time.

Use the trackball and **Set** to click on and delete the measurement result.

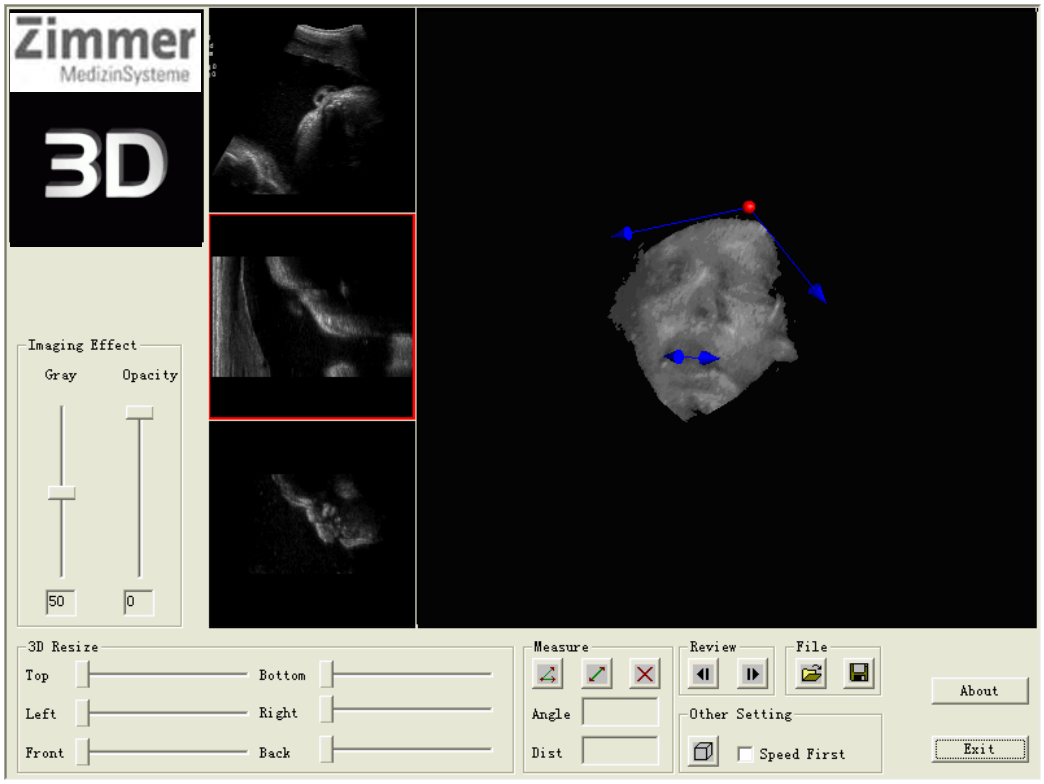


Fig. I-8 Photogrammetry

I.2.6 Review

In the Review area, use the trackball and **Set** to click on and play 2D images backwards as single images, or click on to play 2D images forwards as single images.

I.2.7 File

Use or to open or save 3D image files in the *. im0 format.

I.2.8 Further settings

Use to call up the ***Scale Settings*** screen to change the proportions of the 3D

images again, as shown in Fig. I-4.

Enable ***Speed First*** to increase the speed of imaging processing with a lower resolution. Disable ***Speed First*** to return to high resolution.

I.2.9 Notes

- Enable ***Speed First*** when adjusting Grey and Opacity or making 3D resizing adjustments. When the resolution of the image is reduced, the processing speed is increased. When the above processing is completed, disable ***Speed First***, and you will get the image in high resolution.
- If the 3D image does not appear for a long time after "***Scale Settings***" has been set, double click on the **Set** button over the 3D imaging area. The image will appear immediately.
- The 3D image becomes clearer when it stays still for a few seconds.
- The image can be temporarily hidden to increase the speed for a few operations (e.g. File). Press the **Set** key over the imaging area and the image will appear again.

Appendix J
Instructions for 3D Cloud Printing (Option)

J.1 Installing the Microsoft NET plug-in

The framework 3.5 SP1 plug-in should be installed on the system before using 3D Cloud Print.

This plug-in is usually installed in the system before delivery. For some older versions of the system that do not have this plug-in installed, the user will need to download and install it.

J.2 Activating 3D Cloud Print

To enable 3D printing, please activate 3D Cloud Print in the ultrasound system.

Tap ***Setup*** on the touchscreen to open the ***SETUP*** screen, as shown in Fig. J-1. Click on ***Licensing*** and get the file to activate 3D cloud printing from Zimmer MedizinSysteme (see ***5.2.1*** in the operating instructions for how to activate this function). Click on ***Import LicenceKey File*** to enable the 3D Cloud Print feature. The ***Licensing*** screen will be displayed as shown in Fig. J-2.

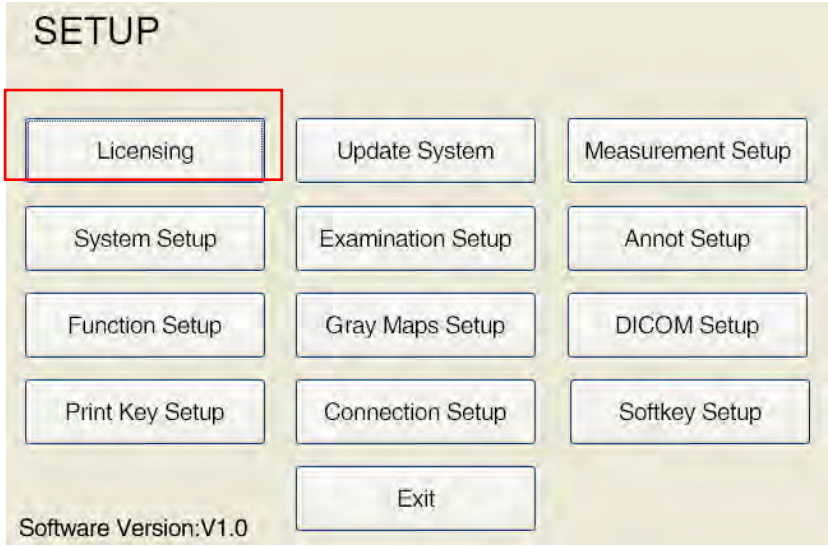


Fig. J-1 Setting up the main monitor

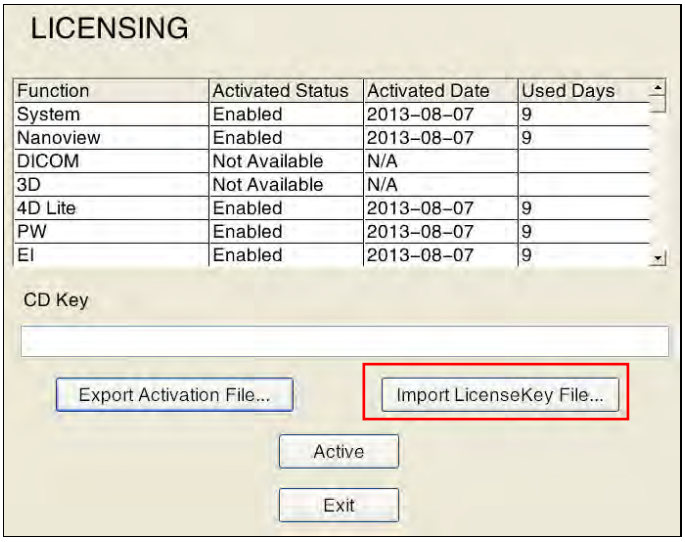


Fig. J-2 Activating the system

J.3 Capturing a 4D image

Switch the probe being used to a 4D probe. Press the **4D** button on the control panel, enter 4D Pro imaging mode, and capture a 4D image. See ***Appendix D*** of the operation manual for instructions on 4D Pro imaging.

After taking the picture, press the **Freeze (still image)** button on the control panel to display the image as a still image. Then tap ***3D Cloud Print*** on the touchscreen and a time bar will appear on the screen: ***3D Cloud Print Loading***. Wait for a while before calling up the 3D cloud print editing screen, as shown in Fig. J-3.

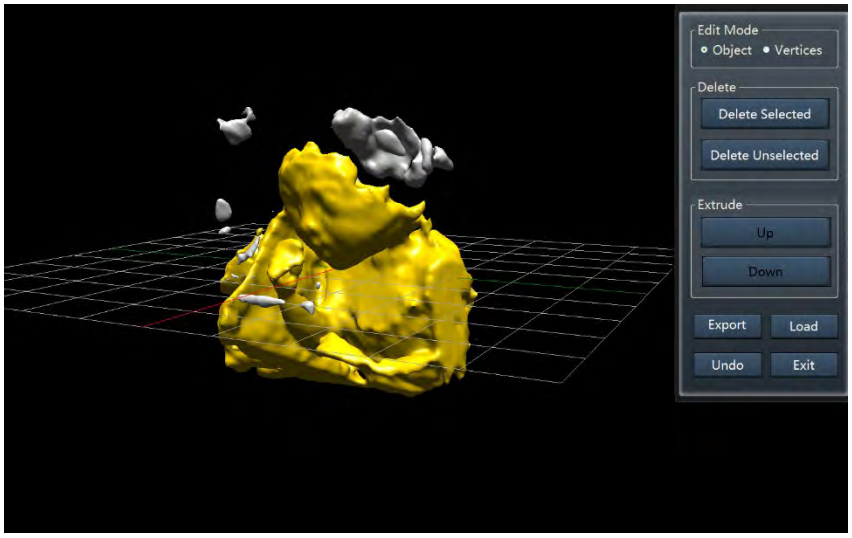


Fig. J-3 Editing screen for 3D cloud printing

J.4 Editing 4D images

After calling up the 3D cloud print editing screen, press the **Set** button on the operator panel to activate the image. Use the knobs for PW, **CFM** and **B mode** to adjust the image for all-around observation. Turn the **PW** knob to zoom in or out on the image. Turn the **CFM** knob to rotate the image on the X axis. Turn the **B Mode** knob to rotate the image on the Z axis.

The editing menu for 3D Cloud Print is shown in Fig. J-4.

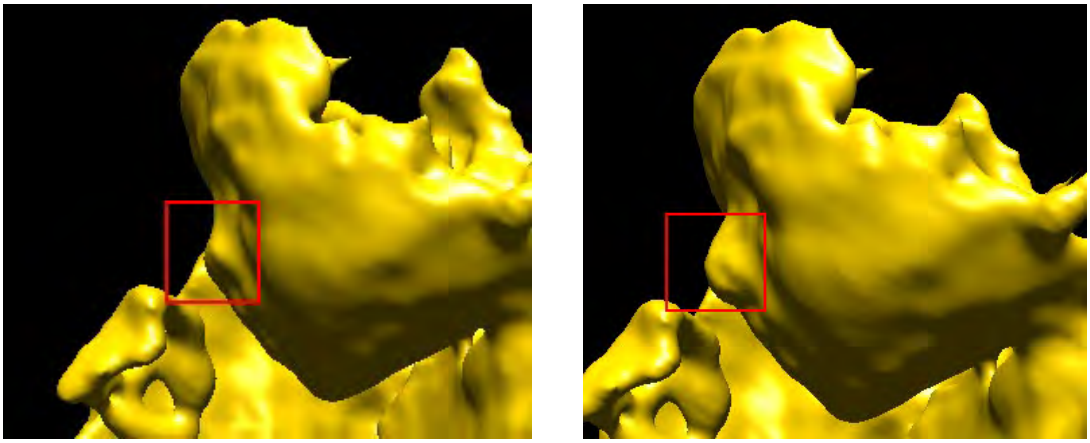
Fig. J-4 Editing menu

When, in ***Edit Mode***, an ***Object (object)*** is selected, the ***Extrude*** buttons are not available. When, in ***Edit Mode, Vertices*** are selected, the ***Delete*** buttons are not available.

Use the trackball to move the cursor over the image. Press the **Set** button to keep the section, which will turn yellow, as shown in Fig. J-3. Move the cursor to the editing menu in the upper-right corner of the screen (see Fig. J-4). Use the trackball, press the **Set** button, and click on ***Delete unselected*** to keep the selected section. To select the section to be deleted, click on ***Delete selected*** to remove it.

Select the object, click on ***Vertices*** and hold down the **Set** key. Use the trackball to select a part of the object. Now the vertex for this part will turn green. Click ***Down*** or ***Up***,

and the vertex of this part will move "down" or "up". Note the occurrence of nasal effects before and after the "Up" action in Fig. J-5.



Before "Up" After "Up"

Fig. J-5 Effect comparison

【Note】: When editing the extrusion effect, try to enlarge the image as much as possible. This makes it easier to select organs for editing (e.g. eyes and nose).

If an operation is wrong, click ***Undo*** to undo the last step. Up to six steps can be undone. After the image has been edited, click on ***Export*** to bring up the save window. Select the save destination, click ***Save***, and the image will be saved in STL format to the specified destination.

【Note】: The user may connect the USB hard drive first and save STL images directly to the USB hard drive for printing.

Click ***Load***, and a selection window will appear. Select the STL file to import, click ***Open***, and the image will be imported into the system.

Click on ***Exit*** to exit the 3D Cloud Print interface.

【Note】: If possible, you can send the STL data file to a professional 3D image processing company for data remodelling to get more features, such as the ability to add a background or a base area.

J.5 Using a 3D printer for printing

Connect the 3D printer to the system's computer and download and install the 3D printer client.

Take the "MakerBot Replicator Mini" 3D printer as an example for explaining the steps of 3D printing.

1) Connect the USB hard drive with the saved STL images to a computer that has a 3D printer connected to it.

2) Open the 3D printer client, with the screen as shown in Fig. J-6.

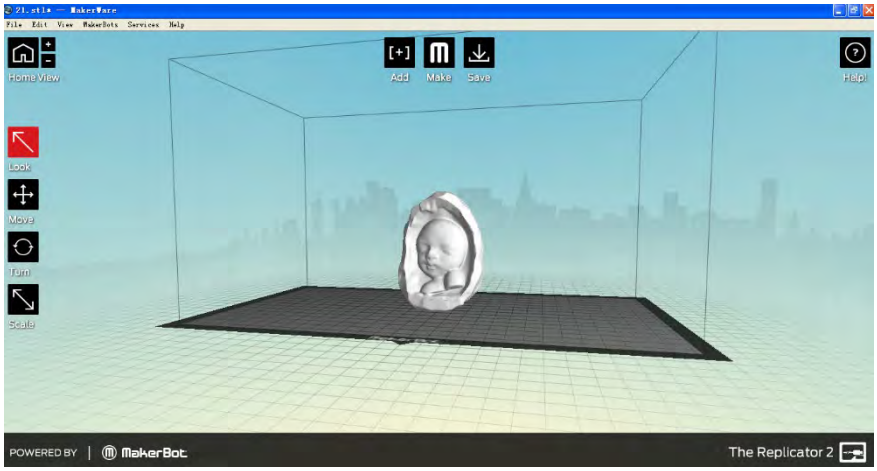


Fig. J-6 3D printer client interface

3) Click ***Add***, and search for the STL image on the USB hard drive in the pop-up window and open it.

4) When the setup is complete, click ***Make*** in the middle of the screen and set everything correctly in the pop-up window. Then press ***Print*** to start the printing process. See Fig. J-7 for the printout.

Fig. J-7 Printout effect

Appendix K

Range, Precision and Accuracy of Adjustment/Display Parameters

Adjustment/ display parameter	Range	Precision	Accuracy
Depth	1.6 cm ~ 30.4 cm	0.8cm	≥95%
B_Gain	0 ~ 100	1	≥90%
B_PWR	0 ~ 100	2	≥90%
PTN	1 ~ 8	1	≥95%
Span	1 ~ 4	1	≥95%
B_PER	0 ~ 7	1	-
Smo	0~ 3	1	-
Edg	0~ 3	1	-
Smo	0 ~ 3	1	-
Edg	0 ~ 3	1	-
B_GSC	0 ~ 23	1	-
DYN	30 ~ 180	4	≥85%
LD	High, Low	-	-
Zoom	1.5, 2.0, 3.0, 4.0	0.5/1.0	≥90%
B_Chroma	0 ~ 7	-	-
SRT	0~6	1	-
M_Gain	0 ~ 100	2	≥90%
M_GSC	0 ~ 23	1	-
MSP	Low, mid, high, most	-	≥95%
M_Chroma	0 ~ 7	-	-
D_Gain	0 ~ 100	2	≥90%
D_Smo	0 ~ 3	1	-
DSP	1 - 5	2.5	≥85%
D_PRF	1.0 ~ 12 k	1 k	≥95%
D_Angle	-80 ~ 80 degrees	2 degrees	≥90%
D_Control	-10, 0, +10 degrees	10	≥90%
D_WF	60~ 300	10	≥95%

Adjustment/ display parameter	Range	Precision	Accuracy
D_Chroma	0 ~ 7	-	-
C_PER	0 ~ 7	1	-
C_Smo	-3 ~ +3	1	-
C_Map	0 ~ 9	1	-
C_PRF	0.25 ~ 6.0 k	0.25	≥95%
C_WF	20~ 1,000	20	≥95%
C_Control	-10, 0, +10 degrees	10	≥90%
C Gain	0 ~ 100	2	≥90%
C_Thred	0~10	1	≥90%
4D_Smo	0 ~ 3	1	-
4D_Colour	0 ~ 3	1	-
4D_Thred	0~ 100	1	≥95%
4D_Map	-15 ~ 15	1	-
4D_Bright	0~10	1	-
4D_Rotal	0~270	90 degrees	≥95%

SonoSys*Touch*

Instructions for use

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