WELLD®

M5V

Veterinary Ultrasound Scanner

User Manual

(Version:V1.0,July, 2021)

AISON INTERNATIONAL

Authorized Distributor
AISON INTERNATIOANL
Stigs Center 2B,
42246, Hisings Backa,Sweden
Tel:0046-73-5543108
Email: info@autoclave.se
www.autoclave.se

Shenzhen Well. D Medical Electronics Co., Ltd.

Important warning information

1. **Be sure to read the Warnings, Notes and Cautions contained in this manual. This manual contains warnings, notes and cautions regarding the foreseeable potential hazards, and vigilance shall be kept at all times. We shall not be liable for any damage, injury or loss caused by negligence or disregard of the precautions specified in the manual, so please ensure that you do not lose this manual.**

2. **It is strictly forbidden to disassemble any hardware and software of this system, and the Company shall not be held responsible for the consequences caused by the repairs or re-installation of the equipment by the non-designated personnel of the Company.**

3. **Under unnecessary conditions, we do not recommend use of UPS power supply; if you need to configure the UPS power supply, please buy the products of qualified manufacturers or contact the Company; when it is not used, switch off the host of B-ultrasound instrument and the UPS, and the Company is not responsible for any damage to this system due to UPS power supply failure (short circuit, fire, etc.).**

4. **Other equipment connected to the system (such as regulated power supply) must comply with the relevant electrical safety requirements, and the Company is not responsible for damage to the system and customer loss caused by failure of other equipment.**

5. **The battery can be charged and discharged cyclically 300-500 times, and when the usable time of battery is found to be shortened significantly, please replace the new battery in time to avoid failure.**

6. **Charging time of the system: about 5 hours, discharging time: about 3.5 hours. The battery can be used for about 3.5 hours when it is normal in the early stage, with the increase of charging and discharging times in the later stage, the battery capacity will gradually decrease, and the battery service time will also decrease.**

7. **Please be sure to turn off the power when the equipment is not in use, and unplug the power cord and the power terminal board if necessary. The equipment (power connection panel) should be kept away from the roof with water leakage, including other water sources. Such conditions may cause short circuit of power supply, fire or even burn down the equipment. The company shall not be responsible for the above consequences.**

8. **Before connecting or disconnecting the probe, you must first confirm that the device is off. Otherwise, the company will not be responsible for the above consequences caused by the damage.**

Preface

Copyright

Statement

Information in this document are not annotated to change. The manufacture shall not state nor observe any warranty basing on this point, and definitely give up any implied warranty basing on any special purpose of selling or making benefit.

Without previous written permission from the producer, this document must not be photocopied, reproduced or translated into other languages.

We preserve the right of revision on this document without still further notice.

Some pictures in this manual, which are schematic diagrams for indication only, may disaccord with the real object, and then the real object should be regarded as the final.

WELLD® are trade marks of Shenzhen Well. D Medical Electronics Co., Ltd. Any abuse of these trade marks without permission will be sued to assume legal responsibility according to laws.

Manufacturer's warranty

Shenzhen Well. D Medical Electronics Co., Ltd. assumes the responsibility for device security, reliability and performance only under the preconditions that the disassembly, assembly and maintenance of the device are all performed by its assigned professional and the device is used strictly in compliance with the operation manual.

Shenzhen Well. D Medical Electronics Co., Ltd. ensures a guarantee period within a year and a half since the delivery day and promises there is no problem with the new device in material and technology. Within the guarantee period, Shenzhen Well. D Medical Electronics Co., Ltd. will maintain the device and replace the parts of non-man-made damages free of charge. But will not repair or replace the device surface if it is damaged.

This guarantee is only available for failures occurred when the device is operated in compliance with the operation manual. And the guaranteed device can only be used in the prescribed range given in manual.

This guarantee excludes losses or damages caused by external reasons such as thunder struck, earthquake, theft, unsuitable use or abuse and refitting the device.

Shenzhen Well. D Medical Electronics Co., Ltd. shall not be responsible for damages caused by other devices or arbitrary connection to other devices.

Shenzhen Well. D Medical Electronics Co., Ltd. shall not be responsible for losses, damages or injuries caused by delayed service request.

When there is problem with the products, please contact Shenzhen Well. D Medical Electronics Co., Ltd. and explain the device model, serial number, date of purchase and the problem.

Matters need Attention

To ensure operational safety and long-term stable equipment performance, please read this operation manual closely and understand the device functions, operation and maintenance at all points before operating the device, especially contents of "Warning", "Caution" and "Note".

Disoperation or inobservance of the instructions given by manufacturer or its agents may result in device damage or personal injury.

The following convention works through this manual to lay special emphasis on some information.
"Warning": Stands for neglect of it will cause severe personal injury, death or realized property loss.

"Caution": Stands for neglect of it will cause slight personal injury or property damage.
"Note": to remind user of installation, operation or maintenance information. These information is very significant but with no risk. Any warning against dangers shall not be contained in NOTE.

Safety labels

Device labels explanation:

	Attention！consult accompanying documents
	Strictly follow instructions
	Switch on and off indicator light
	Signal output
	USB port
IPX7	Protected against the effects of immersion
IPX5	Anti-splash equipment
	Class Ⅱ device
	DC input 13.8V,3.6A
	Charge lamp
	High voltage risk
	Electronics electrical equipment separate collection

Packing and transportation labels explanation:

	Handle with care
	Temperature limit
	Upwards
	Limited layers of stowage
	Protect against wetness
	Protect against heat

Device safety classification

- According to the degree of safety of application in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide:
  M5V can not be used in situation of mixture of inflammable anaesthesia gas and air or nitrous oxide.
- Classify as per work system:
  M5V is continuous operation device.
- Classify as per harmful liquid leakage:
  The host machine of M5V is IPX5 (anti-splash equipment); the probe is a device of resistance to flooding.

●Classify according to shockproof type:
M5V is Group Ⅱ device powered by external adapter.
●Classify according to shockproof level:
M5V is Type B Applied part

General tips for device operation

In operation

1.Heat radiation lump are strictly prohibited to be covered.
2.After closedown, do not switch on the device within 1 minute.
3.On scanning, if any abnormal case is found, stop scanning immediately and shut down the device.

After operation

1. Power off the device.
2. Pull out the plug from power supply socket instead of pulling the cable.
3. Clean off the couplant on the probe with soft medical sterilized cotton ball.

General Safety Message

Safety of the operator and patients and reliability of the device are taken into consideration during designing and producing, the following safety precaution must be implemented:

1. The device shall be operated by qualified operating staff or under their instructions.
2. Do not open the device and change the parameters without permission. If necessary, please turn to for Shenzhen Well.D Medical Electronics Co., Ltd. or its authorized agent for service.
3. The device has already been regulated into its optimal performance. Do not adjust any preset control or switch unless operate as per instructions in the manual.
4. If there is device failure, please shut down the device at once and contact for Shenzhen Well.D Medical Electronics Co., Ltd. or their authorized agent.
5. If it is needed to connect the device with other company's' electronic or mechanical devices，please contact Shenzhen Well. D Medical Electronics Co,. Ltd. before connection.
6. Device operation, storage and transportation environment
   Environmental requirements on normal operation:
   a) Environment temperature range:+5℃～ +40℃
   b) Relative humidity range: ≤80%
   c) Atmosphere pressure range: 700hPa～1060hPa
   Environment requirements on device storage and transportation:
   a) Environment temperature range: -20℃～+55℃
   b) Relative humidity range: <80%（20℃）
7. Do not hit the fragile TFT-LCD display. If it cracks, deal carefully with it in case the liquid crystal gets into eyes or mouths.
8. Must not hit the inner rechargeable lithium battery nor throw it into fire in case it trigger an explosion；Do not short circuit the battery output electrodes in case the battery be damaged; and please use the original binding charger to charge the battery. More over, because used battery will cause environment pollution, please handle the battery correctly for recovery processing.
9. Must not disassemble the power supply adapter. If failures happen, it should be handled by the professional; the charging output can only be used for charging the battery of the device, any improper use on other battery may cause explosion, fire and other unexpected hazards.
10. Must not short circuit the output of the adapter，a long term short circuit shall result in adapter damage.
11. Please use standard power cord as the input line of the network power supply for the adapter to reduce risk.
12. Shenzhen Well. D Medical Electronics Co., Ltd. shall not take any responsibility for any risk resulted from propelled / unauthorized re-fitment by the users.
13.To disconnect the device from the power supply network by unplug the adapter from the power supply network.

Chapter One Summary

1.1 Brief introduction

This equipment is high resolution linear/convex ultrasound scanning diagnostic equipment. It adopts micro-computer control and digital scan converter (DSC), digital beam-forming (DBF), real time dynamic aperture (RDA), real time dynamic receiving apodization, real time Dynamic receiving focusing (DRF), Digital frequency Scan (DFS), frame correlation technologies to endue its image with clarity, stability and high resolution.

◆Five display modes: B, B+B, B+M, M; Can realize image real time display, frozen, save,svload,cineloop；farm,vpid,time,pseudo color;backfat measurement,distance measurement ,volume measurement ,obstetric measurement ,heart rate measurement ; Image gray scale 256 levels.

◆Combined power supply mode of AC adapter and built-in Li-ion chargeable battery, the specialized brownout mode enables more lasting battery operation.

1.2 Range of application

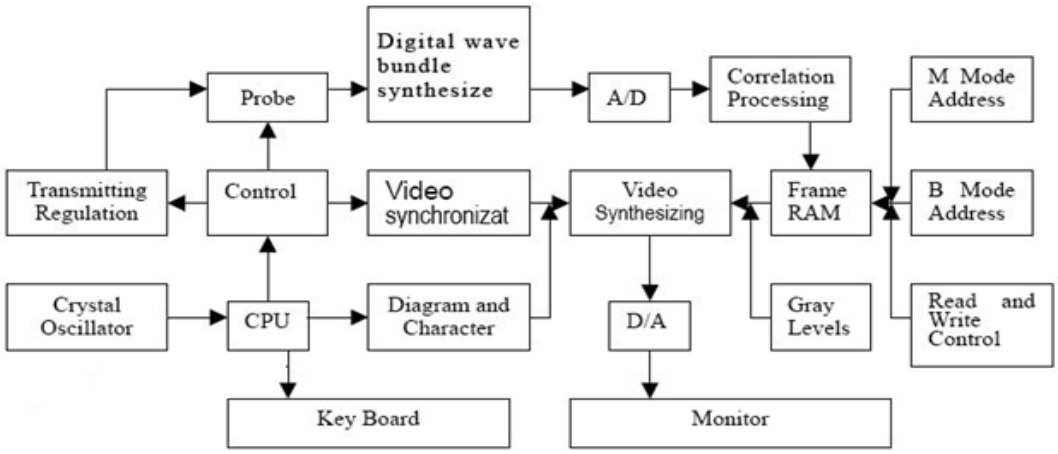
Suitable for diagnosis on horses, cows, sheep, pigs, cats and dogs and other animals.

1.3 Technical specification

Probe		L1-5/7.5MHz HF linear probe LV2-4 6.5MHz Rectal probe	C1-11/50R/3.5MHz convex probe	C4-9/20R/5.0MHz Convex rectal probe	35LV150CP/3.5 MHz Backfat probe
Detect Depth(mm)		≥50	≥140	≥140	≥160
Resolution (mm)	Lateral	≤2(Depth≤40)	≤3 (Depth≤80) ≤4 (80＜Depth≤130)	≤3 (Depth≤80) ≤4 (80＜Depth≤130)	≤3 (Depth≤80) ≤4 (80＜Depth≤130)
	Axial	≤1 (Depth≤50)	≤2(Depth≤80)	≤2 (Depth≤80)	≤2 (Depth≤80) ≤3 (80＜Depth≤130)
Blind zone(mm)		≤3	≤7	≤7	≤5
Geometric position precision	Horizontal	≤10	≤20	≤20	≤15
	Vertical	≤5	≤10	≤10	≤10
Monitor size		7.0 inch（16:9）			
Display mode		B, B+B, B+M, M			
Image gray scale		256 Scale			
Image storage		64 Frame			
Cine loop		≥400 frame			
Image Process		Pseudo Color			
Frame correlation		Adjustable			

Measurement	Distance,Volume,Heart rate
Notation	FARM,Number,TIME
Output	USB2.0, Video(if the backfat probe is selected, there will be no image printing function)
Battery Continuous work	≥1Hour
Size	L (200mm)*W(160mm)*H(35mm)
Net weight	950g

1.4 Electric principle block diagram



Picture 1-1 Electric principal block diagram

1.5 Basic principle

Veterinary ultrasound scannerworks in this following procedure: different tissues of animal body possess different densities and speeds of transmission of ultrasound, i.e. different acoustic impedance (product of media density and sound speed).when piezo-chip (transductor) gets certainly regulated electric impulse, it will produce ultrasound with certain frequency. when this ultrasound (sound energy) is injected into animal body, different organ surfaces will produce reflection echo, the different size reflection is received by the transductor which emitted ultrasound and is changed into electric impulse, when this electric impulse is amplified, demodulated, digital scanned, shifted and some other handling, video standard signal is produced and organ cross-sectional images are displayed on the monitor.

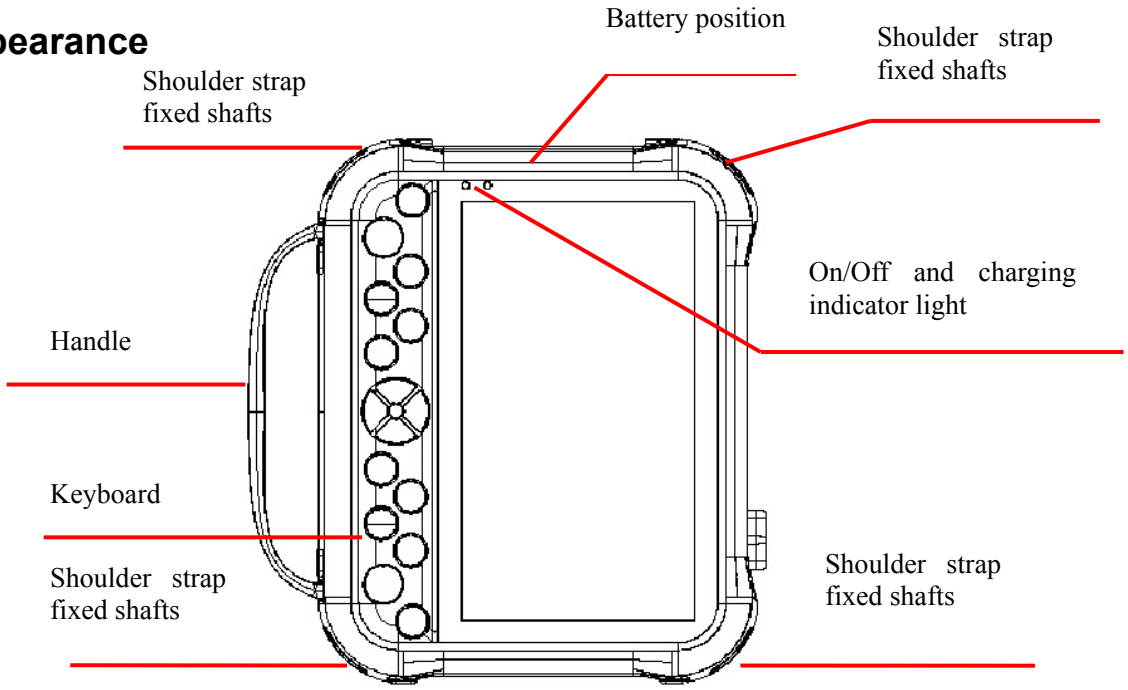
1.6 Configurations

◆Mainframe(containing a piece of Li-ion battery)
◆Optional probes: LV2-4 Rectal probe,
C1-11/3.5MHz Convex probe,
C4-9/Convex rectal probe,
L1-5/7.5MHz HF linear probe,
35LV150CP Backfat probe,
◆Manual/ technical instructions
◆Main charger (AC-adapter)
◆Optional pieces: Printer

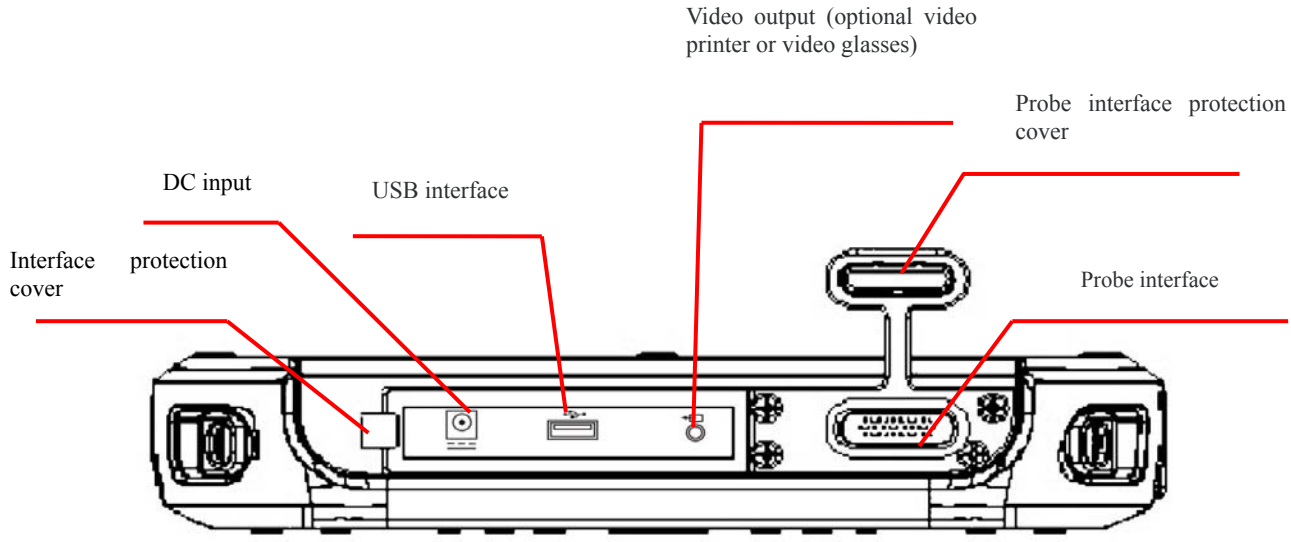
Warning:

Please select spare parts models prescribed above. The manufacturer will not assume the risks such as safety problem, non-expected drop of EMC performance that cause by arbitrary adoption of spare parts out of prescription.

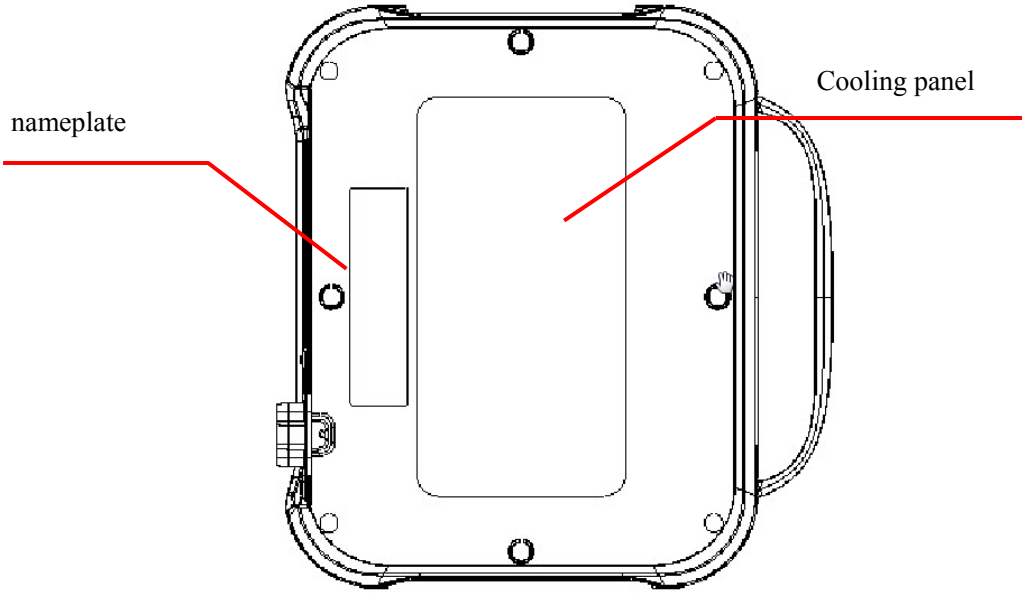
1.7 Appearance



Picture 1-2. front sketch map



Picture 1-3. Schematic diagram of right interface



Picture 1-4 back side sketch map

1.8 EMC statement:

M5V shan't affect the basic performance of radio service and other equipments, and can work well in the expected and declared electromagnetic environments.

Warning:
Working in intense electromagnetic environment, its images may be interfered and the diagnoses may be affected. By this time, stop operating to avoid misdiagnosis. Reuse after the electromagnetic interference is removed.

Warning:
Working when the device is overlapped with other devices or close to others might cause unexpected EMC problems; If they have to be put together, please check every one to ensure no one is affected by unexpected EM coupling.

Warning:
Replacement of parts that not according with specs or connection to other devices might cause unexpected EMC problems. The possibility of unexpected EM coupling effect should be testifies carefully.

Chapter Two Installation

2.1 Operating environmental requirements

1. Environment temperature range：+5℃～+40℃
2. Relative humidity range：≤80%
3. Atmosphere pressure range：700hPa～1060hPa

When using, avoid strenuous vibration, keep it away from devices with high field, intense magnetic field or high voltage; avoid strong sunlight blazing down on the display; keep the device well-ventilated, moisture proof and dustproof.

2.2 Unpacking inspection

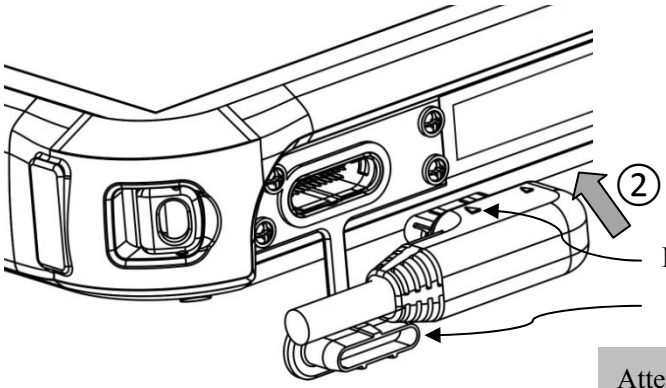
After unpacking, check the device according to "Packing List" and install it according to requirements and methods described in "Installation" after affirm that there is no shipping damage.

Warning：
If there is breakage at unpacking check, it is banned to use the device to ensure security.

2.3 Installation and disassembly

2.3.1 Connection between probe and main unit

The probe socket is located on the lower right side of the equipment. There is only one plug jack which is also compatible for those optional probes (as shown in the figure).



Attention：
When the probe is not connected, be sure to cover the socket protective cover.
The probe must be inserted or removed in the shutdown state.

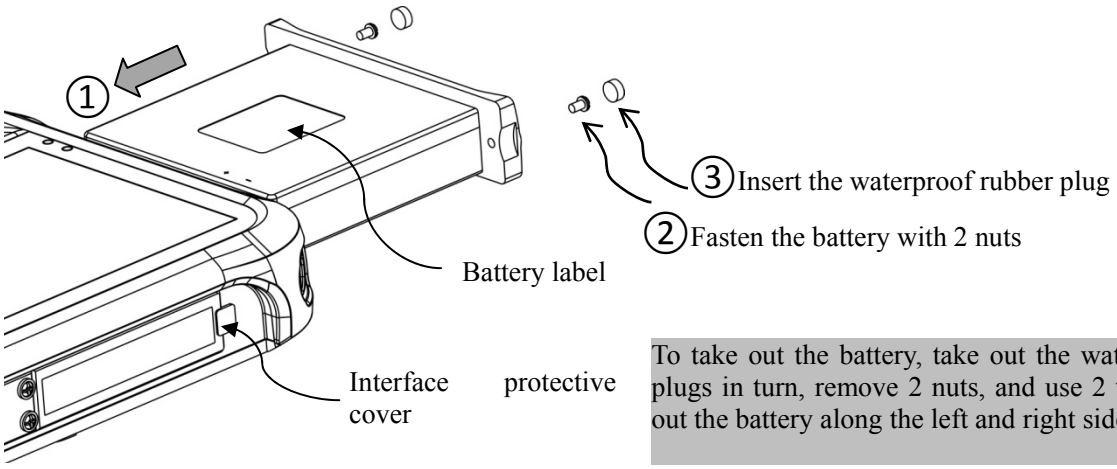
Warning：
Avoid by all means unplugging or plugging the probe connector at state of log on in case the probe and main unit be damaged. **Once the probe is connected with the main unit, do not unplug nor plug it at discretion in case poor contact happen.**

Warning:
Must not touch the contact pin in the probe connector.

Warning:
The probe should be protected from felling off or crashing and the manufacturer assumes no responsibility for this kind of hazard.

Warning:
Please handle the device carefully.

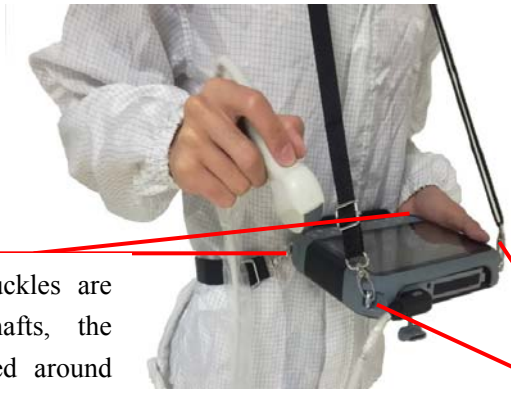
2.3.2 Installing and Removing Batteries



To take out the battery, take out the waterproof rubber plugs in turn, remove 2 nuts, and use 2 thumbs to pick out the battery along the left and right sides.

2.3.3 Shoulder Strap Installation

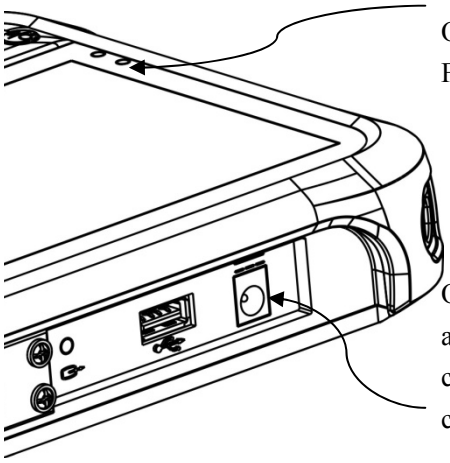
Shoulder Strap Installation: As shown in the Figure below, connect the lock buckles of the two shoulder straps to the four fixed shafts of the instrument.



If the shoulder strap buckles are connected to fixed shafts, the instrument can be looped around the waist

If the shoulder strap buckles are connected with fixed shafts, the instrument can be suspended on the neck

2.4 Charging



Charging indicator:
Green on: Charging
Off: The battery is fully charged
Flashing: No battery installed

Open the interface protective cover, and insert the DC plug of adapter into the charging port of host machine. After the charging is complete, there is need to unplug the plug, and close the interface protective cover.

Attention：
Charging time: About 5 hours. Battery service time in the early stage is about 3.5 hours. With the increase of charging and discharging times in the later stage, the battery capacity may gradually decrease and the battery service time may also decrease.

Chapter Three Operation Keyboard

3.1 Screen display

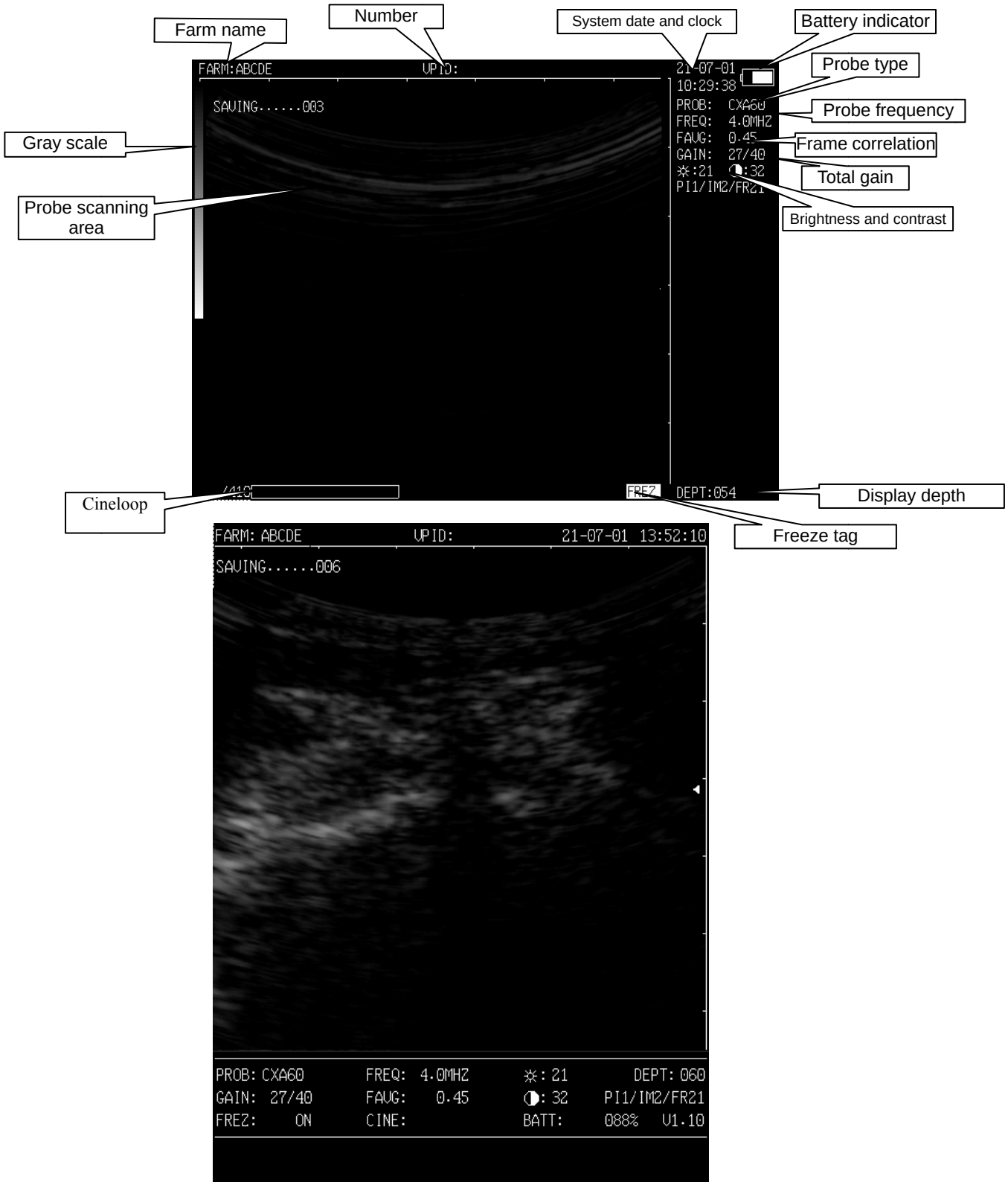


Figure 3-1. Screen display image(Horizontal and Vertical)

3.2 Keyboard functions

The keyboard of the whole machine is shown in the figure.

Horizontal Operation & Control 1

In the state of vertical control & operation with left hand, press the → key in turn to enter

Horizontal Operation & Control 2

In the state of vertical control & operation with right hand, press the → key in turn to enter

Vertical control & operation with left hand

In the state of horizontal control & operation 1, press → key to enter

In the state of vertical control & operation with right hand, continuously press 0/ key twice to enter

Vertical control & operation with right hand

In the state of horizontal control & operation 2, press → key in turn to enter.

In the state of vertical control & operation with left hand, press 9/ →0/ key in turn to enter.

Figure 3-2. Operation panel diagram

Power on/off key

Press this key for 2 seconds to start or close the instrument.

Image freeze or Function menu key

Image freeze: Press this key to switch freeze and real-time status.

Function menu: Press this key to display function menu.

There are two  keys on the panel. When operating horizontally, the left-side  key is used to freeze/unfreeze, and the right-side  key is used to display the Function Menu1. When operating & controlling with left or right hand, the upper  key is used to freeze or unfreeze, and the lower  key is used to display the Function Menu 1

Images storage Key.

Press this key to save the image to this instrument.

Obstetric table menu key/Backfat measuring line

Press this key under real-time scanning state to active the backfat measuring line； Press this key under freeze state to enter the obstetric table.

Measurement key

Pressing this key to enter the routine measurment.

Conversion key

The key is used to measure the cursor conversions.

Direction key

Used to adjust display depth,activeate/adjust screen parameters,move coursor,turn page,etc.

B mode selection key

Press this key to enter B mode.

B B mode selection key

Press this key to enter B+B mode.

BM/ Mmode selection key

Press this key tcontinuously to enter B+M or M mode.

Clear screen key

Press this key to clear all markings from the screen.

Functiopn menu 2

Press this key to display the function menu2.Press the preceding Number Key to enter the corresponding function. To exit, there is need to press this key or Direction Key.

0~9 Number key

When used as a function key, it is used to select a submenu in the function menu operation.

When used as a character key, it is used to input characters and numbers in the input options of farm,S/N,and time in the comment menu.

Chapter Four Operating Procedures

4.1 Boot

Press the  key for two seconds, the power indicator on the panel is on, and the startup interface appears. At this time, any key is pressed to enter the scanning work state.

Tip:The LCD display effect is related to the viewing angle, and the operator should adjust the viewing angle appropriately.

Note
The ventilate panel on the back of the instrument must not be covered, otherwise the instrument may be damaged due to overheating.

4.2 Image display mode

B mode: Press the 

key to enter single B mode (the default is B mode after boot).

BB Mode: In B mode, press 

to enter B+B mode. The screen displays two B-type images. One of them is a “frozen” image and the other is a “real-time”image . Pressing 

continuously can switch the “frozen” and “real-time”states of the left and right images .

BM/M Mode: In B mode, press 

key to enter B+M mode. A real-time B image and M image will be displayed on the screen. In BM mode, press 

to switch to M mode.

4.3 Image parameters adjustment

In the real-time scanning state, when the screen parameters are not activated, there is need to continuously press the direction key △ and ▽ to adjust the depth. And continuously press the direction key ◁ and ▷ to activate the screen parameters, including gain, frequency, frame correlation, brightness and contrast. When parameters are activated, there is need to continuously press △ and ▽ to adjust the values.

4.4 Function menu1

When operating horizontally, there is need to press the  key on the right side to display the Function Menu 1.

V1.10 0.LEFT-RIGHT 1.UP-DOWN 2.DEFAUL TSET

V1.10 : Software version number.

4.4.1 Rotate the Screen Interface by 180°(Switch between left and right hand operations)

After the function menu 1 is displayed, press the number key 0 to realize 180° rotation of the entire screen interface, which can be used for switching between left and right hands.

4.4.2 Image flip

When operating vertically, after the Function Menu 1 is displayed, there is need to press the Number Key 0 to realize 180°rotation of the entire screen interface, which is suitable for switching between left & right hand operations.

4.4.3 Restore Factory Defaults

When operating horizontally or vertically, after the Function Menu 1 is displayed, there is need to press the Number Key 2 to restore factory defaults.

4.5 Function menu2

Pressing the  key to display the Function Menu 2

V1.10
0.CINE
1.SVLOAD
2.SV-UDISK
3.COLOR
4.PHIV
5.ROT90
6.VPID
7.FARM
8.TIME
9.ERASE

V1.10 : Software version number.

4.5.1 Cineloop

The instrument provides continuous playback of more than 400 images and single-frame playback.

The image is collected in the real-time scanning state, and the acquisition time is about 30 seconds. Freeze the image, successively press the  key→0 key to enter the cine loop, and the image will realize automatic loop playback. During the cine loop process, there is need to press the direction key to realize manual single-frame playback, and press the  key to exit the cine loop mode.

4.5.2 Image storage and Callout

Local-storage:

Press the key to store the image directly. and "SAVING... 05" will be displayed in the upper left corner of the screen, indicating that the image is being saved. Do not perform other operations at this time. After the image to be saved is completed, the prompt message disappears, and the image will be automatically frozen. Press to return to the real-time state.

The device can store up to 64 images, and the images can be automatically numbered in sequence after storage. When the image `storage is full, the saved image will overwrite the earliest image.

U disk storage:

Insert the USB disk to USB port on the right side, press the key →2 in turn, and "SAVING..... 005" will be displayed in the upper left corner of the screen, indicating that the image is being saved. Do not perform other operations at this time. After the image to be saved is completed, the prompt message disappears, and the image will be automatically frozen. Press to return to the real-time state.

Call out the Image:

Press the key in turn→1 key, input the two-digit image number, and then press the key to confirm. Press the direction key continuously to call out other numbered images, and press to return to the real-time state.

4.5.3 Pseudo- color

Press the key in turn→3 key, and the image will be displayed in pseudo-color mode. Repeat this operation to display other colors.

4.5.4 Harmonics waves and Fundamental waves

Press the key→4 key in turn and repeat its operation to switch between the states of harmonic and fundamental wave. PI1 and PI0 on the right side of the screen represent the harmonic and fundamental wave respectively.

4.5.5 Screen Rotation by 90°(switching between horizontal and vertical screens)

Press the key →5 key in turn and repeat its operation to realize 90°rotation of the entire screen interface, and switch the horizontal and vertical control modes, as shown in Figure 3-2.

4.5.6 S/N

Press the  key→6 key in turn, and the following dialog box will appear:

Press the corresponding number key to enter S/N. Press the ◁ key to delete the wrong number. After the input, there is need to press ▷ or  key to confirm and exit. If you want to abandon the input, there is need to directly press the ▷ key or  key.

4.5.7 Farm

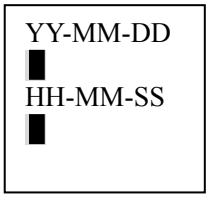
Press the  key in turn→7 key to display the following dialog box:

0-A 1-B 2-C 3-D 4-E 5-F

There will be 26 English letters and some special characters under the prompt box. △ and ▽ keys are used to scroll up and down to display other characters. Press the corresponding number key in front to display the corresponding character at the cursor, and press the ◁ key to delete the wrong character. After the input, there is need to press ▷ or  key to confirm and exit. If you want to abandon the input, there is need to directly press the ▷ key or  key.

4.5.8 Time

Press the  key→8 key in turn to enter the dialog box for date and time adjustment:



Input method: For example, if the present time is 17:35:00 on May 17, 2021, then there is need to enter 210517173500 in turn.

YY-MM-DD 210517 HH-MM-SS 173500

4.5.9 Clear the Image

Press the key in turn→9 key in turn to display thefollowing dialog box:

ERASE ALL STORAGE? 1.YES 2.NO

Press the key in turn→9 key→1 key, and the prompt message of "ERASING" will be displayed in the upper left corner of the screen, indicating that the image is being cleared. At this time, no operation is allowed. When the prompt disappears, the image clearing operation will be completed.

4.6 Distance measurement

● Keyboard operation:

1. In the freeze mode, press the key. The measurement cursor is displayed on the screen.
2. Use the arrow keys to move the measurement cursor to the measurement start point.
3. Press the key to determine the start point of the distance measurement.
4. Press the direction key, another cursor appearing, move to the measurement end point, and press the key to complete the measurement. (**Tip:Continueand press to switch between the start cursor and end cursor**).

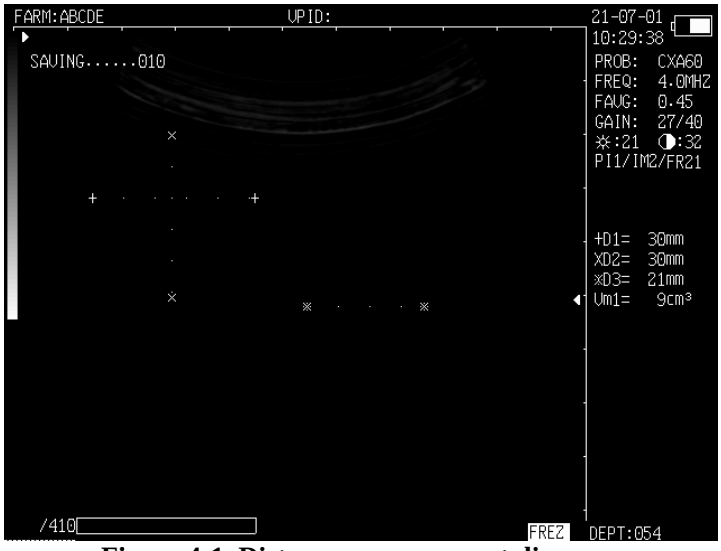


Figure 4-1. Distance measurement diagram

To continue the distance measurement, repeat steps 1-4.Up to 3 sets of data can be measured, and the measurement results are displayed on the right side of the screen, as shown in Figure 4-1.

After the measurement is completed, press the key to complete the clear screen operation.

4.7 Volume measurement

To complete the volume measurement, be sure to measure the distance three times, and then press the key to obtain the volume value.

If the measured distance data is less than three sets, the volume value will not be displayed after key is pressed; if key is pressed after measurement of the four sets of distance data, the displayed volume is the value calculated on the basis of the first three sets of data (D1, D2, D3).

Operation method: (Take kidney as an example)

1. Take kidney cross-section views and longitudinal section views separately and freeze.

2. Using the distance measurement method, measure the length of the major and minor axes of the kidney cross-section.

3. Measure the diameter of the longitudinal section of the kidney by distance measurement.

4. Press the key to complete the volume measurement. The volume value is displayed at "Vm1" on the right side of the screen, as shown in the figure below:

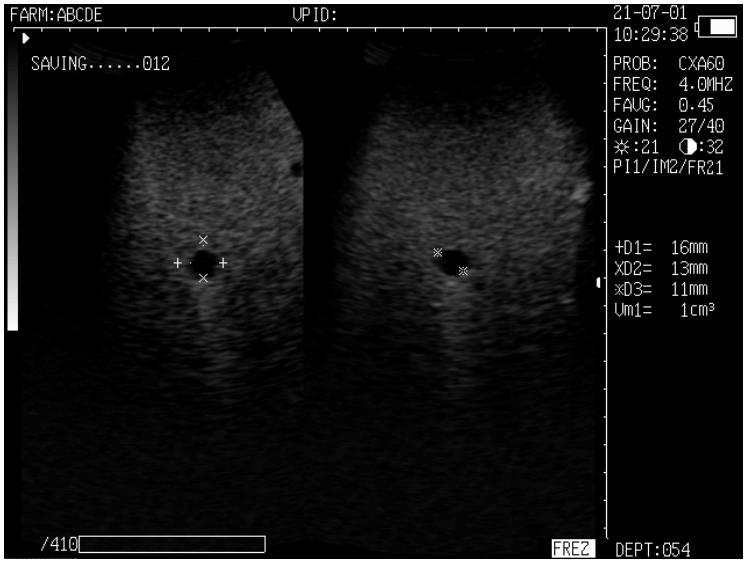


Figure 4-2. Volume measurement diagram

4.8 Backfat measurement

In the real-time state, press the key to activate the backfat measurement line, and then freeze the image. Adjust the depth of backfat measurement line through △ and ▽ key, and display the backfat measurement value at the same time. To exit the backfat line, there is need to unfreeze the image at first, and then press the key to exit.

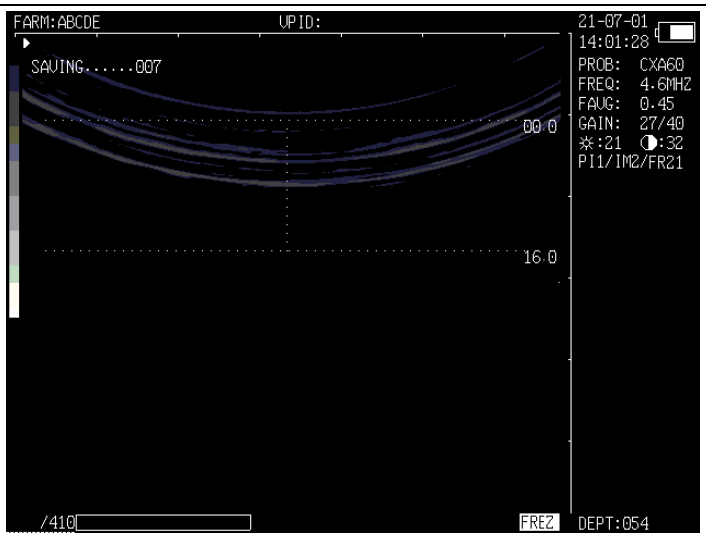
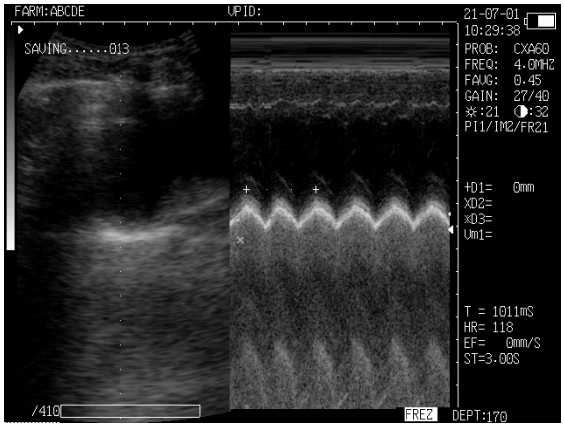


Figure 4-3. Backfat measurement diagram

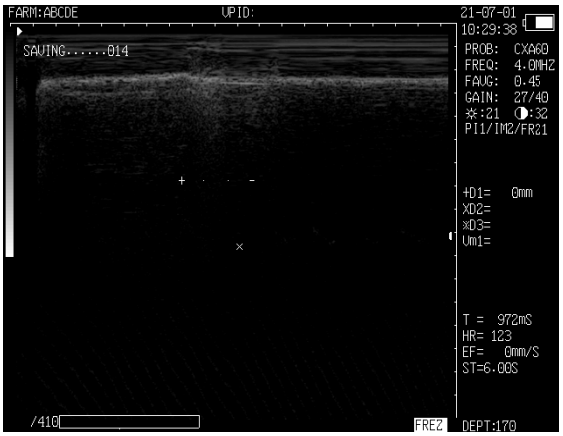
4.9 Heart rate measurement

1. In B/M mode, freeze a satisfactory cardiogram waveform.

2. Measure the distance between two periodic wave peaks according to the distance measurement method, and display 4 sets of data in the lower right corner of the screen, from top to bottom: Time T (unit: ms), heart rate HR (unit: beats/minute), slope EF (unit: mm/s), refresh rate ST (unit: S). As shown below:



B/M mode



Single M mode

Figure 4-4. Heart rate measurement diagram

4.10 OB calculation

The device is capble of measurement on GA of equine, bovine, sheep, swine,cat and dog, and so on.The GA (GW) can be acquired after measuring GSD, BL, HL, SL, USD, HD, BD, CRL etc., among them, the EDD of cat and dog will be given.

Operation process:

Freeze the image, press  key to display equine, bovine, swine, sheep OB menu; Press ▽ key to switch between this two menus as the following figure shows:

0. EQUINE：GSD 1. BOVINE：BL 2. BOVINE：SL 3. BOVINE：HL 4. SWINE：HL 5. SHEEP：USD

0. CAT：HD 1. CAT：BD 2. DOG：GSD 3. DOG：CRL 4. DOG：HD 5. DOG：BD

Input the number and select the related OB menu and acquire the distance as per distance measurement method. The corresponding GA result displays behind "G·A=" on screen right, and the EDD displays behind "EDD=" as given below in details:

● EQUINE-GSD：Calculate the gestation age according to horse GS

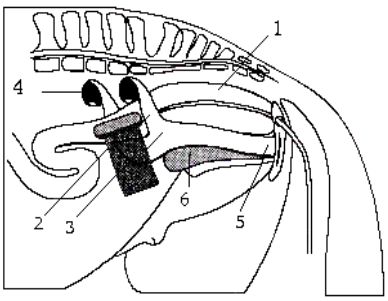
Examination steps on equine:

1. Clear off the egesta in rectum.

2. Feel the pregnancy with hand and give a primary estimation and confirm the examing organ with ultrasound.

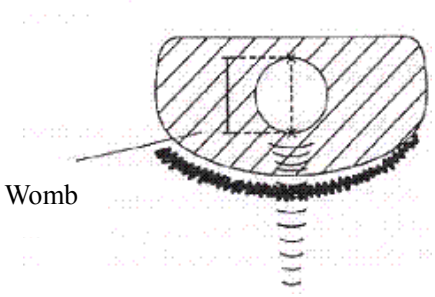
3. Hold the probe closely and and put it into rectum and ensure that your hand can feel the coming change inside recta. Keep hand closing to the back and between the probe and recta wall.

4. The inner construction of equine displays on the screen, bladder lies in the portrait cross place and the behind is uterine horns and body. From the horizontal view, uterine horns are in shape of round usually. Move the probe around to acquire a better observation on the joint of uterine horns and body, and then switch the probe to uterine horns as the following figure shows:



1 Rectum
2 Uterine horns
3 Uterine bodies
4 Ovaries
5 Vaginas
6 Bladders

5. The measurement method of GS diameter is given below and measurement can be done horizontally or vertically.



6. Confrim the distance value as per distance measurement methods and the corresponding data display behind “G·A”. With this measurement to set up a chart to find the growth curves to estimate embryo size and GA.Here GA refers to the duration from the copulation instead of impregnation.

● BOVINE-BL：Calculate the gestation age according to bovine BL

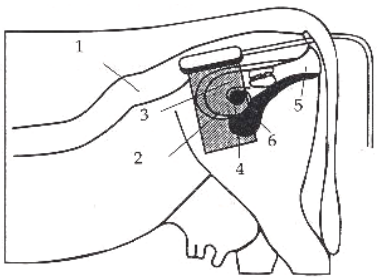
Examination steps on bovine:

1. Clear off the egesta in rectum.

2. Feel the pregnancy with hand and give a primary estimation and confirm the examing organ with ultrasound.

3. Hold the probe closely and and put it into rectum and ensure that your hand can feel the coming change inside recta. Keep hand closing to the back and between the probe and recta wall.

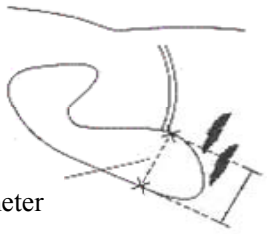
4. The inner construction of bovine displays on the screen, bladder lies in the portrait cross place and the behind is uterine horns and body. From the horizontal view, uterine horns are in shape of round usually. Move the probe around to acquire a better observation on the joint of uterine horns and body, and then switch the probe to uterine horns as the following figure shows:



1 Rectum
2 Uterine horns
3 Uterine bodies
4 Ovaries
5 Vaginas
6 Bladders

5. To measure the fetus body diameter, select a vertical section first, that is a section from two side to the neck, chest and abdomen. Body diameter can be acquired when the GA is between 60 to 150 days.

The measurement method of ody diameter is given below:



Body diameter

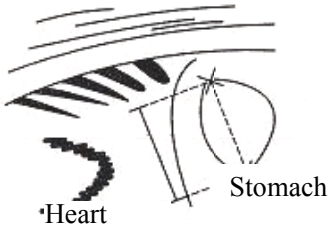
6. Confrim the distance value as per distance measurement methods and the corresponding data display behind “G·A”.

● BOVINE-SL：Calculate the gestation age according to bovine SL

1. Keep the cow standing.

2. Put the probe against the abdomen side center, shift it a little bit left or right and hold it closely against the skin. Clean the abdomen skin if there is mud to ensure a clear display of the abdominal pelvic structure.

3. The maximum vertical axile of the stomachi should be displayed on the screen. With the time going on, futus stomachi long axile increases regularly. The measuremenet method is given below:



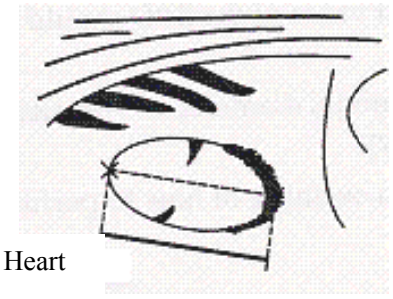
4. Confrim the distance value as per distance measurement methods and the corresponding data display behind “G·A”.

● BOVINE-HL：Calculate the gestation age according to bovine HL

1. Keep the cow standing.

2. Put the probe against the abdomen side center, shift it a little bit left or right and hold it closely against the skin. Clean the abdomen skin if there is mud to ensure a clear display of the abdominal pelvic structure.

3. The maximum vertical axile of the heart should be displayed on the screen. With the time going on, futus heart long axile increases regularly. The measuremenet method is given below:



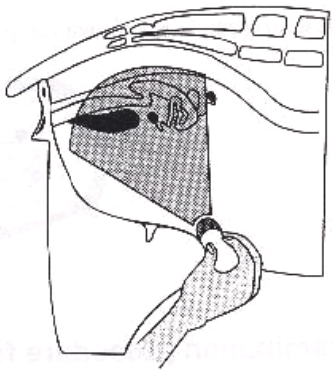
4. Confrim the distance value as per distance measurement methods and the corresponding data display behind “G·A”.

● SWINE-HL：Calculate the gestation age according to SWINE HL

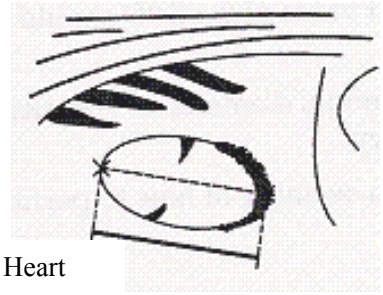
Check routine on pigs:

1. Make the swine in a state of stand.

2. Put the probe, a little bit left or right of the centre, on the ventral abdominal wall closely along the side of teats and skull to rear leg. If the is mud on this part, clean with water first incase the abdomen pelvic structure could not be displayed accurately.



3. To measure the heart macro-axis, screen should display the maximal longitudinal axis of heart. With the growth of gestation age, the fetal heart macro-axis increase regularly. Measuring method is given in the following figure:



Heart

4. Measure selected parameter distance according to distance measurement method, the corresponding gestation age data will automatically shows behind " G·A ".

● **SHEEP-USD: Estimate gestation age according to hilum-spine length of sheep**

There are two methods to exam pregnant sheep:

Use convex or linear probe to check abdomen and endo-rectal probe to rectum. These two methods are the same usful. It is proofed as cording to some publication that these two methods are the same effective in pregnancy examination.

Rectum exmanination is more exact than abdomen examination within first 35 days pregnancy;

The two methods are the same effective between 35 to 70 days pregnancy;

— After 70 days pregnancy, abdomen examination is better because it is more practical when the uterine becomes large.

Abdomen check:

1. Abdomen examination can be done when the sheep is standing or lying or seating. Put the probe against the appointed abdomen center where there is no fur.

2. Clean the abdomen skin if there is mud to ensure a clear display of the abdominal pelvic structure.

3. Measure the length of USD.

4. Confrim the distance value as per distance measurement methods and the corresponding data display behind “G·A”.

● CAT-HD：Calculate the gestation age according to cat HD

Head diameter refers to the maximum inner skull diameter from the side of abdomen to back. This value can be acquired within 8 month pregnancy.

The HDmeasurement is given below:

●CAT-BD：Calculate the gestation age according to cat BD

After fetal head formed, binary top diameter measurement becomes a routine in ultrasonic examination.The measuring method is:

1. Fetal head axial plane scanning, look for BPD measuring standard plane from top to bottom.

2. According to distance measurement method to measure distance of selected parameters, the corresponding gestation age data will automatically show behind " G·A".

● DOG-GSD: Calculate the gestation age according to dog gestation saccus diameter

The method is the same as that of equine.

● DOG-CRL: Calculate the gestation age according to dog CRL

The method is the same as that of cow.

● DOG-HD: Calculate the gestation age according to dog HD

The method is the same as that of cat.

● DOG-BD: Calculate the gestation age according to BD

The method is the same as that of cat.

Note
At OB measurement, when the distance is less than the following value, the GA of this animal will not display. Refer to the following table for detailed data:

EQUINE	D1<6mm
BOVINE－BL	D1<8mm
BOVINE－SL	D1<1mm
BOVINE－HL	D1<3mm
SHEEP	D1<15mm
SWINE	D1<31mm
CAT－HD	D1<15mm
CAT－BD	D1<17mm
DOG－GSD	D1<1mm
DOG－CRL	D1<1mm
DOG－HD	D1<14mm
DOG－BD	D1<16mm

4.11Image Printing(Optional)

Use a video cable to connect the video printer interface to the video output interface on the side of the device, and follow user instructions of the video printer (if the backfat probe is selected, there will be no image printing function).

4.12Power Off

Press  key for two seconds, turn off the instrument,unplug the adapter network power plug ,and complete the disconnect form the network power supply.

Chapter Five Transportation and Storage

5.1 Environment requirements on transportation and storage

The transportation of diagnostic system is stipulated by the order contract, but it shall avoid from the rain and snow splashing and mechanical collision, not allowing the mixed loading and transportation with corrosive substance.

The storage warehouse of diagnostic system shall be dry, with environment temperature -20^{o}C～+55^{o}C, as well as the relative humidity less than 80% (20^{o}C). The indoor shall avoid from the strong sunlight and other gases causing the corrosion, in excellent ventilation.

5.2 Transportation

Signs on the packing box conform to 《Iconograph and sign of packing, storage and transportation》 (GB/T191-2008). Simple shockproof establishment is fitted within the box，which apply to aviation, railway, highway or steamship transportation. Keep dry, avoid inversion and collision.

5.3 Storage

Equipment should be taken out from the packing when storage time exceeds six months，power on it for four hours, and then pack it correctly and keep it in a warehouse. The device must not be piled, and do not place it closely against the floor, walls or roof.

Keep it well ventilated, do not expose it to strong sunlight or caustic gases.

Chapter Six Check and Maintenance

6.1 Service life

Bases on the manufacturer's design, production related files, this model's use life is six years. The Product's material will gradually aging, if the product continually use over the designed use life, it may bring the problem of the performance reduced and fault rate raise.

Note:
The Discard the device according to local law. **Do not discard it mixing with other household garbage.**

Warning:
The manufacturer shall not assume the responsibility of risks caused by using the device beyond its service life.

6.2 Check

Check the device power cord and probe cable and waterproof cover, if find any damage or breakage, must not use the device and replace the broken immediately.

Check if the probe and main unit are connected rightly.

Check the adapter EPS regularly, when the supply voltage exceeds specified accommodation limit (AC100V-240V±10%, 50/60Hz),Do not supply the main unit or charge the battery with adapter.

Check the adapter power cord and probe cable, if find any damage or breakage, replace the broken immediately.

Adapter is the dedicated power of the device, it adopts omniseal insulation design, do not replace it with other adapters or attempt to open it incase there be any hazard.

6.3 Main unit maintenance

Instrumentation environment should accord with "2.1 operation environmental requirement".

If device enclosure needs cleaning， shutdown the device first and then wipe with alcohol sponges.

Device should not be turned on and off frequently.

When the device does not work for a long time, pack the device according to the instructions on the packing. Store it properly in the warehouse. The storage environment should accord with "5.1 Transportation and storage environmental requirements".

6.4 Probe maintenance

The probe is a valuable and vulnerable part. It is strictly prohibited to collide or drop. When the diagnosis is suspended, it should be placed properly and the instrument should be in a "frozen" state.

See to use medical ultrasound coupling gel during diagnosis. Degree of protection against harmful ingress of water is IPX7. For the probes, water should not immerge over the probe acoustic window 14mm. Regularly check the probe enclosure to ensure it is good incase liquid ingression spoil the inner components.

The probe is a part that is in direct contact with the patient. In order to avoid bacterial infection, it should be cleaned and disinfected after each use:

1) The probe cable, plug and sheath shall not be stained with water.
2) Check the acoustical window of probe, shell and cable regularly. Do not use it if cracks or damages are found.

3) It is strictly forbidden to drop the probe to the floor or hard objects, or collide with the acoustic window of the probe.

4) It is recommended to clean the probe after each use.

Note:

Do not press the probe on patient body too long in case the patient feel uncomfortable.

Warning:

After each use, the probe is recommended to be cleaned and disinfected immediately, Never dry the probe by heating.
Do not use a brush during cleaning or disinfection, otherwise it may damage the probe.
Before cleaning or disinfecting the probe, turn off the power and disconnect the probe from the host. Failure to do so may result in electric shock.
When cleaning or disinfecting, do not spill any liquid into the host. Failure to do so may result in malfunction or electric shock.

6.5 Cleaning of Principal Machine

Turn off the power supply, pull off the probe, and cover all protective covers;

1) Wash the principal machine with water (it is strictly forbidden to use high-pressure water gun) to ensure that all dirt is removed;

2) Wipe dry the water stains around the principal machine, the protective cover, and the pits;

3) Open all protective covers, wipe off water stains at the connection between the protective cover and the interface, and close all protective covers.

Warning:

To prevent accidents, take out the battery when cleaning the main unit enclosure and separate the device from the power supply network first and then clean the adapter enclose.
Prevent all the plugs, sockets from water splash or socking.

Caution:

Please refer to instructions prescribed by the manufacturer closely when using detergents.
Be careful with cleaning of the display, because it is very easy to scratch and spoil. Please wipe it with dry soft cloth.
Please do not clean the inner base of the device.
Please do not place the device in liquid.
Do not leave any detergent on the device surface.
Though there will be no chemical reaction between the device enclosure and most of those detergents, We still suggest no detergent in cleaning lest the device surface is spoiled.

6.6 Correct usage of probe

In order to prolong probe's service life and obtain optimum performance，follow these instructions:

1. Periodic inspection on probe cable, socket and acoustic window.
2. Shutdown the device first and then connect or disconnect the probe.
3. Do not drop probe or flint body，and never hit the probe acoustic window, otherwise probe should be damaged.
4. Never heat the probe.
5. Never bend or pull probe cable, otherwise the internal connection should be broken.
6. Use couplant only on probe header and then clean probe.
7. Inspect probe acoustical window, enclosure and cable seriously after probe cleaning. Never use the probe again if any crack or breakage is found.

6.7 Battery information

1. The equipment is fitted with rechargeable li-ion battery.

2. For optimum efficiency, the new battery must be charged and discharged (regular service，not enforced discharging) two or three rounds completely.

3.The battery can be charged and discharged for hundred times，but it will be worn-out. When the work time shortens apparently, please replace it with a new one.

4. Be sure to use electricity charger appointed by Shenzhen Well.D Electronics CO., Ltd. (i.e. AC adapter) to charge the battery. Do not connect the battery to the electricity charger (AC adapter) when charging is not needed. Do not connect the battery to the electricity charger (AC adapter) longer than 10 hours; otherwise the battery life may shorten. The fully charged battery will discharge by itself if it is long-time out of use.

5.The battery should be charged and discharged once in every 3 months to prevent it unuseful.

6. Extreme environment temperature (overcooling or overheating) will influence battery charging effect. Must not charge the battery near the ignition source or under extreme hot condition! Do not use or store battery near source of heat (such as fire or heater)! If find the battery is leaking or smelling, move the battery away from the naked flame immediately.

7. Don’t go on using non-serviceable battery and electricity charger (AC adapter).

8. Don't try demounting battery.

9. Don't short circuit the battery.

10. Do not throw the battery into the fire or heat it, otherwise it would trigger an explosion.

11. Do not souse or wet the battery.

12. Do not incorrectly connect the positive and negative polarity.

13. Do not directly connect the battery to wall outlet or car-lit socket.

14. Must not short circuit the positive and negative polarity of the battery with led or other metal objects. Must not transport nor store the battery with necklace, hair pin or other metal objects.

15. Must not pierce battery shell with nail or other sharp objects, must not hammer nor step on the battery.

16. Must not hit, cast the battery and avoid mechanical shock on it.

17. Must not bead the battery terminals.

18. Must not decompound the battery in any way.

19. Must not place the battery in microwave oven or pressure vessels.

20. Must not combine the battery with primary battery (such as dry battery) or battery with different capacity, models and types.

21. Do not use the battery if it is smelling, heating, straining, discolored or with other abnormal phenomena and remove it from the current consumer or electricity charger immediately and stop using it any longer.

22. Do deal carefully with the discarded battery according to local related waste handling regulations.

6.8 Instrument test and calibration

1. Check the leakage current of the device annually referring to the following data.

Test Items			Standard Requirements
Continuous leakage current under normal temperature (uA)	Leakage current to Shell	Normal	≤100
		Single Malfunction	≤500
	Leakage current to Patient	Normal	≤100
		Single Malfunction	≤500
Dielectric endurance under normal temperature (V)		A- a_2	4000V/1min No flashover No breakdown

Chapter Seven Trouble Shooting

7.1 Simple Trouble shooting

Simple trouble can be handled according to the following table. If the trouble still cannot be eliminated, please contact Shenzhen Well. D Medical Electronics Co., Ltd.

	Simple failure	Solutions
1	The power adapter indicator does not light.	1. Check the adapter power cord and plug. 2. Check the power supply.
2	Open the equipment power switch,the power indicator does not light.	1. Check to see whether the rear power cable of the equipment has connected.
3	Interrupt strip interference and snow-shaped interference occur on the display screen	1. Check the equipment power supply caused by ignition interference of other equipment; 2. Environment inspection, causing by the electric and magnetic field interference in the space around the equipment; 3. Check to see whether the plug and socket of equipment power supply and probe are in good contact.
4	Unclear display of image	1. Adjust STC (Overall, near field, far field gain); 2. Adjust Brightness and Contrast;