FarmScan® L60

The Versatile Ultrasound machine for small and large animal scanning



User Guide

BMV1956-C English P/N No.: MX30-02463 Release date: June



We specialize because you do.

Thank you for choosing our <u>FarmScan®</u> for On-farm Animal fertility and pregnancy detection.

We, BMV TECHNOLOGY CO., LIMITED are great provider of animal diagnostic imaging equipment. We are focused on large pregnancy ultrasound scanning suitable for breeders of most livestock, including beef cattle, dairy cattle, water buffalo, deer, swine, sheep, goats, llamas, ponies, etc. We always focused on supplying the best ultrasound products and services to our customers, distributors and suppliers.

Our Objectives are :

1) To supply the best quality ultrasound products and steady services to our users;

2) To work hand in hand with farm industry partners to promote ultrasound device worldwide.

BMV TECHNOLOGY CO., LIMITED

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If you have comments about the documentation, please write to us at the email address above. We would like to hear from you.

BMV Technology Customer Satisfaction

Input from our customers helps us improve our products and services. As part of our customer satisfaction program, we contact a sample of our customers a few months after they receive their orders. If you receive an email message from us asking for your feedback, we hope you will be willing to answer some questions about your experience buying and using our products. Your options are important to us. You are of course always welcome to contact us via your BMV Technology representative or by contacting us directly.

Service Email: service@bmv.cc

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Regulation

Declaration of Conformity(Europe only)

(FarmScan® M30,FarmScan® M50,FarmScan® L60 ,FarmScan® L70)

BMV Technology Co., Ltd

declare that this product is in compliance with the essential requirements of Directives 93/42/EEC As amended by 2007/47/EC:

ENISO14971:2009 ISO10993-1:2009 EC60601-2-37:2008EN1041:1998 EN980:2008 EN62304:2006 EN60601-1:1988+A1:1991+A2:1995 IEC60601-1-2: 2007I EN60601-1-4:1996+A1:1999

The declaration of Conformity(DoC) is on our website.

Execution Standard (Safety)

Standard Number	Standard Name		
EN60601-1	Medical Electronic Device, Part I : General safety requirements		
	Medical Electronic Device, Part I to II: General Safety Requirement		
IEC60601-1-2:2007	Parallel Standard: Requirement and Testing of Electromagnetism		
	Compatibility		
	Medical Electronic Device, Section I to IV: A Program-controlled		
IEC60601-1-4.2000	Medical Electronic System		
	Medical Electronic Device, Specialized Safety Requirements for		
1600001-2-37	Medical Ultrasound Diagnosis and Custodial Care Facility		

If you need our help, please contact info@bmv.cc

Introduction

This Veterinary Ultrasound Systems **FarmScan® L60 User Guide** provides information on preparing and using the FarmScan® L60 ultrasound equipment and on cleaning and disinfecting the system and transducers. It also provides system specifications, and safety information.

The user guide is for a reader familiar with ultrasound techniques. It does not provide training in solography or on-farm practices. Before using the system, you must have ultrasound training. See the applicable BMV Technology Co., Ltd accessory user guide for information on using accessories and peripherals. See the manufacturer' s instructions for specific information about peripherals.

Customer comments

Questions and comments are encouraged.

BMV Technology Co., Ltd is interested in your feedback regarding the system and the user guide. You can call the nearest manufacturer' s representative. You can also e-mail BMV Technology Co., Ltd at <u>info@bmv.cc</u>.

Conventions

The user guide follows these conventions:

• **AWARNING**

A **WARNING** label applies to information that may cause severe personal injury, death or actual property loss if neglected.

• **ACAUTION**

A **CAUTION** applies to information that may cause mild personal injury or property loss if neglected.

• **()**NOTE**()**

A **NOTE** label applies to information on installation, operation or maintenance, which is very important but poses no risk potential.

- Numbered steps in procedures must be performed in order.
- Items in bulleted lists do not require a sequence.

• 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".

Mis-operation 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:

		AV	Signal output
\triangle	Attention ! consult accompanying documents	4	USB port
==	Switch on the main electrical supply	IPX7	Protected against the effects of immersion
ወ	Switch off the main electrical supply	D Ř	Class II device Electronics electrical equipment separate collection

• Packing and transportation labels explanation:



Handle with care



Temperature limit



Limited layers of stowage

Protect against wetness

Protect against heat

• Device safety classification :

Upwards

•According to the degree of safety of application in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide:

THIS EQUIPMENT cannot be used in situation of mixture of inflammable anaesthesia gas and air or nitrous oxide.

- •Classify as per work system: THIS EQUIPMENT is continuous operation device.
- •Classify as per harmful liquid leakage: The main unit of THIS EQUIPMENT is conventional device; the probe is a device of resistance to flooding.
- •Classify according to shockproof type: THIS EQUIPMENT is GroupII device powered by external adapter.
- •Classify according to shockproof level: THIS EQUIPMENT is Type B Applied part

Statement

Information in this document is 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.

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.

Manufacturer's warranty

Our company 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.

We provides 2 years after-service for FarmScan® L60, specifically, machines for 2 years while probes for 12 months, calculated from shipping of factory ,and that the new system is free from any fault in material or workmanship

If unfortunately broken (non-man-made)during first 12 months, we will offer free shipping and

free repair. But the remaining years of machine, the manufacturer will offer free repair service, all under BMV Pro-Support service, and the end-user buyers should pay for the any fees back and return.

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 accidents, misuse, abuse, falls, modification or alteration to any part or component of the system or abuse and refitting the device.

Surface damage is not included in the free repair or replacement range. Battery replacement, training material supply, etc. are not free, either.

Our company shall not be responsible for damages caused by other devices or arbitrary connection to other devices.

Our company shall not be responsible for losses, damages or injuries caused by delayed service request.

When there is problem with the products, please contact our company and explain the device model, serial number, date of purchase and the problem.

BMV Pro-Support service: service@bmv.cc



Responsibility of the manufacturer

BMV takes responsibilities for safety, reliability and performance of the system under only the following conditions:

- Installation, expansion, readjustment, upgrade and repair are all conducted by personnel authorized by BMV TECHNOLOGY CO., LIMITED
- > Relevant electrical systems conform to applicable national standards.
- > The system is used according to conditions and requirements in the instruction.

User notice

> To ensure operation safety and long-term stable performance of the system, it's

strongly recommended reading this manual to get a full knowledge on the function, operation and maintenance before operating the system.

- Pay special attention to contents of "Warning", "Caution" and "Notice" in this manual.
- BMV takes no responsibility for any damage or harm caused by incorrect operation or maintenance inconsistent with instructions of BMV or its agent thereof.
- Following messages which can be read throughout this manual are supposed to be paid special attention to.

FAQS for BMV PRO-SUPPORT SERVICE

BMV Technology's Brand mark is a trusted brand worldwide .We are passionate about ensuring that our customers obtain the best from our products. Wherever you are, you can rely on receiving the best customer service.

How we care and maintenance FarmScan® ?

- Wipe display gently with a lint free cloth. Cleaning cloth and cleaners for glasses/sunglasses work well. Care should be taken not to scratch the screen.
- Video cap or goggle must be plugged in at all times during cleaning so water does not enter the scanner.
- Store in a dry environment. Corrosion will occur if stored damp.

How do I get my ultrasound machine repaired ?Where do I ship my ultrasound equipment for repair?

Call your distributor or head office to arrange repair. Find service@bmv.cc

How should I ship my ultrasound equipment for repair?

We recommend shipping via air freight company (FEDEX/DHL/UPS/EMS), that provides you with a tracking number. We do not typically insure packages; that is at your discretion.

And you should select freight company at lowest price.

What are the warranty terms and conditions?

We have two warranties for main unit and one warranty for probes.

Highlights

• The warranty covers defects in the manufacturing of the goods.

• The warranty does not cover accidental damage of the goods while in storage or use.

• BMV will ensure only authentic/original BMV brand parts are used when servicing equipment.

• Failure to use authentic/original BMV parts on or within equipment by customer invalidates warranty.

• All BMV ultrasound scanners and accessories are delivered, serviced and maintained by our authorized service center or head office. Staffed by our experienced service personnel ensuring dedicated customer focus and quick turnaround at all times.

How do I know if my product is still under warranty?

Your equipment is typically covered for 2 years, or as noted on your invoice. You can also call distributor in your country or email to BMV service center and check your account for a warranty expiration date. In regards to repairs, we cannot determine if an item is under warranty until it is sent in and checked by our service department.

How often are there upgrades?

There is not a set schedule for upgrades. Upgrades are completed when your item is in for service. Most upgrades just enhance the functionality of the unit. If an upgrade is needed because of a serious problem we will contact those customers that need the upgrade individually and get the units in for an upgrade immediately.

Can I leave my ultrasound machine outside in the cold?

While in use your ultrasound machine is built to stand up to extreme weather conditions, including those below 0° days. However, your ultrasound is a piece of electronic equipment and should be treated as such. Your machine should always be stored in a room temperature environment when not in use.

Do you have a product to send in for repair?

Our dedicated service specialists and fast turn-around time will have your product back to you faster than you expect.

HOW TO SEND IN

Follow these easy steps to send in your equipment for repair.

1. Contact us

To contact the Customer Service Department of Manufacturer first. Please provide the model number, serial number, and a brief description of the reason for return. It is for the purpose to obtain a Return Materials Authorization (RMA) number.

This (RMA) number must appear on the outside of the shipping container. Any returned shipments will not be accepted if the number is not clearly visible.

2. Pack it

In order to complete your ultrasound scanner repairs in a timely manner please include a document in the box with your name, business name, contact telephone number and a brief description of the problem(s) you have been experiencing.

To avoid delays in your service, we recommend only sending in your ultrasound scanner which is broken.

Be sure to pack your equipment well to prevent damage in shipment. The recommended padding/cushion amount is two inches of padding between the object you are shipping and the sides of the box.

3. Ship it

We recommend shipping via an air freight company that provides you with a tracking number. We typically do not insure packages; that is at your discretion.

4. Repair returned

We aim to complete your repair and return your system as soon as possible. As soon as we receive your equipment in our BMV service center, 99% of our repairs are completed and shipped back within 48 hours. This lessens the need for a loan ultrasound machine.

General tips for device operation

In operation

1.Heat radiation holes are strictly prohibited to be covered.

2.After closedown, do not switch on the device within 2 - 3 minutes.

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 Our company 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 Our company or their authorized agent.
- 5. If it is needed to connect the device with other company' s' electronic or mechanical devices , please contact Our company before connection.
- 6. Device operation, storage and transportation environment Environmental requirements on normal operation:
 - a) Environment temperature range: +5°C ~ +40°C
 - b) Relative humidity range: 30% ~ 80%
 - c) Atmosphere pressure range: 700hPa ~ 1060hPa

Environment requirements on device storage and transportation:

- a) Environment temperature range: -5°C ~ +40°C
- b) Relative humidity range: <80% (20° C)
- 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. Moreover, 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. Our company 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.
- 14.Ultrasound might cause hazard on human body so long time radiation should be avoided. Refer to appendix A for sound output parameters.

Chapter 1: Getting Started

1.1 About the system

Thanks to **six(6)** different probes , I.F.R[™] introducer and I-Scan® video glasses, FarmScan® L60 can perform all veterinarian applications and even more easily. FarmScan® L60, featuring premium image quality, considerate design for comfortable, fast and reliable detection of pregnancy and gynecological diagnosis in difficult field conditions on a daily basis. (Manufacturer: BMV Technology Co., Ltd www.bmv.cc)

• Fast and reliable detection of pregnancy from 28th day on cows, 13th on mares, 25th on sheep and goats ,18th on pigs (pregnancy control, ovarian examinations, postpartum diagnosis, ...)

- Foetal sexing on cows , mares, sheep and goats
- Back fat measurements on pigs, cows and sheep
- Teats' control, genital bull tract exams, ...

We' re the only one in market, because of:

- 32 digital channels and 128 elements probe
- Video output, support I-Scan® video glasses eases your job and gets you focused (optional)
- I.F.R[™] introducer engineered to lessen fatigue and stress by allowing arm-free scanning, use in a variety of reproductive diagnostic procedures.(optional, compatible with the Rectal convex

and Rectal Linear transducers)

Advance Features:

- Only weight 0.6 kg;
- Excellent imaging quality and ergonomic design;
- Provides versatile solutions with the greatest ease of use for all veterinarian applications bovine , equine, swine, ovine , Lama and small ruminants;
- 5.8 inch WVGA LCD monitor, wide viewing angle, LCD monitor can turn off when use I-Scan® Video Goggle
- 4.5~5.5 hours Li-ion battery for operating;
- support USB 2.0 for ultrasound station to transfer images and video to your computer, 450~550-frame cine loop insider;
- Support leather sheath, designed to be resistant to extremely harsh farm conditions;
- Software & Report for reproductive system, and measurement for distance, area, circumference, volume, angel, heart rate;
- Uses the 3rd generation innovative navigation, direct access keys and user buttons for fast,

single handed menu selection and setting changes;

Basic steps

1 Attach a transducer.

- 2 Turn the system on.
- 3 Tap Patient, and complete the animal ID information form.
- 4 Tap Mode and select an imaging mode.



Figure 1 System front (top) and back (bottom)

- 1. Menu
- 2. Screen
- 3. Power switch, Probe connector, USB ports (on side)
- 4. Handle
- 5. Kickstand
- 6. Cool Fan Out
- 7. Battery compartment
- 8. Cool Fan In

1.2 EMC statement:

FarmScan® L60 can't affect the basic performance of radio service and other equipment, 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.

THE CONSTRUCTION OF THE SCANNER

The device is comprised of 2 main parts:

- 1. Casing with the screen and keyboard
- 2. Ultrasound probe(s) integrated with the scanner

The probe is very important part of the scanner, because of its sensitive mechanism. it is important to be careful and protect the probe from falling or hitting.

1.3 Range of application

Suitable for all veterinary applications –bovine beef, bovine dairy, Lama and small ruminants, swine, ovine; pets such as dogs and cats.

1.4 Preparing the system

Operating environmental requirements

- 1. Environment temperature range : +5°C ~ +40°C
- 2. Relative humidity range : 30% ~ 75%
- 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.

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.

Compartments and connectors

First, Connection between probe and main unit

The probe jack lies in the top of the right side of the equipment. There is only one plug jack which is also compatible for those optional probes (refer to figure 1).



Picture 1. Probe connection sketch

Dismounting is the reverse process of installation.



Picture 2. Disassemble probes

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.

Installing and disassembling battery

Install battery: Set the battery into the battery slot and move the battery release key on its back to top till the battery is inserted completely and then release the key (refer to Picture 2-3).

1.5 Power Supply

The device provides two automatic switch-over modes to supply power: adapter and built-in battery.

Installing or removing the battery

	To avoid injury to the operator and to prevent
WARNING:	damage to the ultrasound system, inspect the
	battery for leaks prior to installing.
	To avoid data loss and to conduct a safe system
	shutdown, always keep a battery in the system.

1.6 Battery Charging

When the main unit displays the battery in the empty status in the right top corner of the display screen, it indicates that the batter should be charged. The battery should be charged via the charging adapter cable.

Using AC power and charging the battery	The battery charges when the system is
	connected to the AC power supply. A fully
	discharged battery recharges in less than three
	hours.
	The system can run on AC power and charge the
	battery if AC power is connected to the system.

The system can run on battery power for up to
four hours, depending on the imaging mode and
the display brightness. When running on battery
power, the system may not restart if the battery is
low. To continue, connect the system to AC
power.

1)Charging through direct with battery

1. Take out the battery from the main unit or take out the spare battery.

2. Connect the round end of the adaptive line to the "===12. 6V/1A" terminal of the adapter, and the flat end to the charging terminal of the battery.

3. Connect power cord of " $\sim 100-240$ 50/60Hz" of the adapter to the AC EPS.

4. When the "POWER" indicator light on the adapter turns into red, the battery is in charging; when the "POWER" indicator light turns into green, the battery is fully charged.

2)Charging through main unit

Direct contact with the FarmScan® L60 main unit.

3)Charging through auto-charger

1. Take out the battery from the main unit or take out the spare battery.

2. Connect the flat end marked with an arrow of the auto-charger to the charging terminal of the battery.

3. Plug the other end of the auto-charger into the cigar lighter socket.

4. When the "Charging" indicator light on the adapter turns into red, the battery is in charging; when the "Charging" indicator light turns into green, the battery is fully charged.



Tips:

1. The input voltage of the auto-charger is DC9~14V/1.5A.

2. The output voltage of the auto-charger is DC12.6V/1A.

3. The operations and storage environment are the same as those of the main unit.

Note

To avoid the battery failure, the battery should be charged and discharged once per 3 months.

1.7 Battery Operation

1. Install the battery correctly into the main unit.

2. Push down the main unit power switch to power on the main unit, the power indicator will turn on.

3. The device can start operation.

Note :

When the main unit under-voltage indicator turn into red, it means the battery is running up and needs charging.

Warning :

It is prohibited to use any other power supply except the standard adapter as the external power supply for the main unit.

Charter 2: Operation Sequence



2.1 Screen Display

2.2 Keyboard Functions

The following is the keyboard of THIS EQUIPMENT



Picture Operation Panel

OK Press it to shift between the states of freeze and real time.

Notes: If **FREEZE** exists in the right lower corner, the image is frozen.

 $(B-M_9) \sim (B-M_9)$ are multifunction keys

As character keys :

- During menu operation, they are used for selecting the sub-menu.
- While inputting Age and Time in the menu, they are used as numbers. (Further details are

available)



patient.(Further details are available.)

As functions keys :

MENU () Function menu key

Press to display function menu. Choose the number to enter the corresponding sub0menu. Refer to the following chapter for further details and press (CLEAR) to quit.

In the state of real-time scanning, press it to alter the image multiple. The range is : 80 ~ 220 ,

with 8 levels.

Press it in Freeze state, then "+" will be displayed on the screen. Use direction keys or mouse to move it. (Refer to next chapter for further details)

\checkmark_{3} ~ \checkmark_{6} Direction Keys

They are used for moving the cursor. \frown_3 . \frown_6 are used for altering the scanning
depth in the real-time state in "B" mode. Press to decrease the depth, while press
$\underbrace{\mathbf{v}_{6}}_{\mathbf{b}}$ to increase, with the current depth displayed in the lower right-hand corner. While
inputting names of patients and hospitals, use 3 . to turn the page up and

down.

are used for activating the parameters on the right side, with activated parameters \mathbf{v}_{6} to alter. lighten. At this time, use

B 7 B and 4B mode key

At real time or freeze state, press to enter B mode (default single B mode at switch-on)

to enter 4B mode. One is real time image and the rest are Press again and then with $\frac{5}{2}$ to shift between real time and freeze among these four images. "freeze" images; Press repeatedly to switch among B and 4B mode. Press B-B 8

Double B Mode Display

In the state of freeze or real time, press it to enter double B mode. There are two B picture on the screen. One is "Freeze" picture, the other is "Real time" one; Repeat pressing, the OK then both of them picture can shift between "Freeze" and "Real time". Press show freeze picture.

B-M 9 **B** and **M** Mode Display

At real time or freeze state, press this key to enter B/M mode. . B mode and M mode images will be displayed simultaneously on the screen ("BM" or "B+M" for short). B mode real time image is on the left and M mode real time image is on the right.

On the B mode image, there is a vertical line formed by equidistant dots, which is named

 $\mathbf{Y}_{\mathbf{key}}$ key to move the key to move the sampling line left and press sampling line. Press sampling line right. (Tips: the sampling line can also be moved by controlling the tracking ball)

Press this key again to enter M mode, screen displays one M mode image, Press repeatedly to switch among B+M and M mode.



Single B





B-M o





Μ



Picture kinds of mode display



Obstetrics

Press it in freeze mode of "B" or "BB" to display the obstetrics menu. Press the number keys and further details are available in the following instructions. To exit, please press



MEASURE) Measure Reference

Along with $\left(\frac{1}{2} \right)$. $\left(\frac{MENU}{0} \right)$ and direction keys, the measure of distance, perimeter, area,

volume and histogram can be done. Further details are available in the following chapter.

Press it, the note menu is displayed. Then press the number keys to enter the sub-menu.

Refer to the following chapter for further details. Press

Clean Screen

Press it to clean marks, notes and results. In menu status, press it to quit the menu. Press it when the device crashes by accidents or operation mistakes, then the device can return to normal.

2.3 Power on

Press Power, the indicator is lighten and starting interface appears. At this moment, press



Notes: You can adjust the observation angle for better displaying effect, for the effect is associated with the observation angle.

Attention:
The cooling holes in the back cannot be covered, or the device
may be damaged by overheat.

2.4 Diagnose

Spread medical sonic couplant on diagnostic area, and attach the probe sound window closely to it. The ultrasound image of the tissue section will be displayed on the screen. Move the probe and find out the right place. Adjust the gain to maintain the best image.

Attention

1. Excessive force is not allowed while the probe touching diagnostic area, for it may damage the probe.

2. Use appropriate probe to diagnose.

Attention

1. If there is no image signal, restore the factory settings, see

Press "M/0" \rightarrow "2" button in real-time scanning mode , The total gain, the

near field, far field and brightness values will be restored to the default.

2.5 Modify Image Parameters

The parameters include frequency of probe, Focus, frame rate, image smoothen, gamma

correction, gain, brightness and contrast. Press or 4^{5} in real-time state, one of them is lightened. Use 3^{3} and 5^{6} to set the parameters and they are displayed in the upper right-hand corner.

2.5.1 Frequency Setting

Press in real-time state to lighten frequency in the upper right-hand corner and use 3 and 5 to adjust, Work frequencies of each probe are: LR65 5.5MHz, 6.5MHz, 7.5MHz C350 2.5MHz, 3.5MHz, 5.0MHz (3.5MHz Convex probe) C520 4.5MHz, 5.0MHz, 5.5MHz (5.0MHz micro-convex probe) LH75 6.5MHz, 7.5MHz, 8.5MHz (7.5MHz HF linear probe)

Note: In the acoustic output table, the probe's working frequency is the frequency corresponding to highest acoustic output.

2.5.2 Focus settings Press 5^{5} or 4^{4} to lighten up FPIN on up right screen and press 3^{3} to move focus up and press 3^{3} 5^{5} to move focus down.

2.5.3 Frame correlation settings

At B,BB, BM mode, enter real time scanning and press 4_{5} or 4_{4} to lighten up FAVG on the up right screen and press 3_{3} or 4_{6} to set the index. There are 16 indexes such as 0.2,0.25, 0.3,0.35,0.4,0.45,0.5,0.55,0.6,0.65,0.7,0.75,0.8,0.85,0.9,0.95.

2.5.4 Image Smoothen

Press $\overbrace{}_{5}$ or $\overbrace{}_{4}$ to lighten up IM on up right screen and press $\overbrace{}_{3}$ or $\overbrace{}_{6}$ to modify the smoothness and the image is displayed in the upper right-hand corner of the screen in real-time state. They are respectively : IM0. IM1. IM2. IM3.



Normal



Smooth

2.5.5 Gamma correction



2.5.6 Gain Setting

At real time press 4 to lighten GAIN, NG, FG in the upper right-hand corner and use and 4 to adjust.

2.5.7 Modify Brightness and Contrast

Press \swarrow_5 or \searrow_4 to lighten " $\overset{\checkmark}{\smile}$. ", and use $\textcircled{}_3$ and $\textcircled{}_6$ to modify the

brightness and contrast.

2.5.8 Probe Setting

The device can automatically identify probes, There are 4 probes are available with this device. The current probe type displays on the upper right screen and the probe type and models are listed below:

LR65 : 6.5 MHz Rectal Linear probe

- C350: 3.5MHz Convex probe
- C520 : 5.0MHz convex probe
- LH75: 7.5MHz high frequency linear probe

TIPS: Please shut down the system first before replacing probes. Restart the system, it

can realize automatic identification.

2.6 Note

In freeze state , press, and the note menu is displayed (as follow). You can complete these functions:

V3.03 0. NAME 1. AGE 2. SEX 3. COMMENT 4. TIME 5. HOSP 6. BODYMARK 7. REPORT

V3.03 : Software Version Number

• Press (, select "0.NAME" to input the patient name , as follow :

Λ3 There are 26 letter keys and space key under it and use to turn page up V. and down. Correspondant characters can be displayed when pressing the number key, with CLEAR NOTE to clean the wrong character. Press the maximum of 15 letters. Press to NOTE confirm and exit after inputting, or you can directly press to exit from inputtina. Q 1 , select "1.AGE" to input the patient age, the maximum input number is 3 Press bits, the input interface is as follow: PLEASE ENTER AGE:

Press NOTE to confirm and exit after inputting, or you can directly press To exit from inputting.



•Press \checkmark_{6} key to select body mark, Operation:

- 1. Press key to display annotation menu.
- 2. Press (\mathbf{v}_6) key to display body mark.

There are 16 body marks, repeat step 1-2, to display these marks circularly.



The information of patient, diagnostic comments, measuring results as well as hospital, date, time, doctor will be saved in the report, Distance, circumference, area, volume, ect. will be saved in Report.

1 At B, BB, BM, M or 4B mode, finish patient comment, diagnosis, focus distance, circumference, area and/or volume measurement and keep the image freezed.

2 Press key to display function menu.

3 Press

 $\left(\frac{B_{7}}{2}\right)$ key and select 7.REPORT to switch to report page as given bellow:



Picture Routine Report page

4 Press (OK) key to exit report page.

Notes : When 0.NAME. 3.COMMENT. 5.HOSP are input, no number input is available. In

note menu, press note to exit directly.

2.7 Function Introduction

At freeze state, press (MENU) key to display function menu (as given below). In this menu,

Save, load, color code, area, volume, histrogram measurement can be set.

V3.03
0. CINE LOOP
1. SAVE
2. SVLOAD
3. AREA-VOLM
4. HISTOGRAM
5. COLOR
6. ERASE
7. PALD-NTSC

At real time, press key to display function menu (as given below) In this menu, image

flip, default factory set can be set.

V3.03
0. UP-DOWN
1. LEFT-RIGHT
2. DEFAUL TEST

V3.03: Software version number.

2.7.1 Cineloop playback

There is \geq 400 images cineloop playback or single frame review function.

Start the system and enter real time state, first capture images for cineloop about 30 seconds.

1. Freeze the image, Press to display image process menu, and then press start playback.

2. During playback, press 3 or 4 keys to enter manual play mode. Press 3 key to go to the next image and press 4 key to go back the previous image. Repeat step 1 to return to auto-playback mode.

3. When playing at "B/B" mode, cineloop can be played in different windows when

switching between "B/B".

4. Press OK key to exit cineloop playback.

2.7.2 Image Storage

64 images can be stored even when the power is off.

•Press $(MENU_0)$ to display image process menu after a satisfying image is frozen, and then press (Q_1) to store, with its number displayed in the upper left-hand corner, such as

"SAVING......05" . When the storage is complete, the number disappears. Press OK to return to real-time state.

•This device can store the maximum of 64 images and they are numbered automatically in order. For example: If there are No. 01—20 images , the next storage is numbered 21 ; When the storage is full(reaches 64), the following will appear :

STORAGE IS FULL. ERASE NO.01? 1. YES 2.NO

It is the hint for whether to erase No. 01 ; Press (a_1) to replace ; Press (a_2) to abandon the storage of the current image.

Select "2.NO" to abandon the current storage. In the later storing operation, there will be hint for whether to erase No. 02. The process continues.

Notes :

If the storage is full, and at this time you pick out certain image to store it. There will be

hint for whether to erase the existed one of specific number and store the new one.

2.7.3 Pick out Image

Press (-1-2) in the mode of real time or freeze to display image process menu. Then press (-1-2), the following will appear :

PLEASE ENTER STORAGE NO.:

Input the number of stored image according to the hint, for example 01. Press after input, then No. 01 image is picked out. (If it is the wrong input, press to clean the characters one by one and reinput) .01/64 is displayed in the lower left-hand corner on the screen. 01 is the number of current image and 64 stands for the storage volume. At this time,

press \checkmark or \checkmark to pick out images in other storage areas.

Press to return to real-time state. To pick out other images, repeat the above

procedures.

2.7.4 Image up/down flip

- •At real time , press $(MENU_0)$ key to display function menu.
- •Press (MENU to upend the image.
- •Repeat the above steps to flip image up and down.





. Image up and down flip

2.7.5 Image left/right flip

•At real time, press (MENU) key to display function menu.

- •Press (to change scan direction of the probe.
- •Repeat the above steps to flip image left and right.





. Image left and right flip

Probe scan direction sign (in the red circle) is the left and right flip sign. The default scan direction is given as the left image shows.

2.7.6 Color

Press $\left(MENU_{0} \right)$ in the mode of real time or freeze to display image process menu. Then press

, the following will appear :



2.7.7 Measure of perimeter, area and volume

Two methods are available.

- Press $(MENU_0)$ in the state of freeze, the menu is displayed on the screen.
- Press to select 3.AREA-VOLM, and it is displayed as follow :

PLEASE ENTER: 1. FREEHAND 2.ELLIPSE

The first one is Freehand method and the second is Ellipse method.

a.Freehand :

Keyboard Operation

1. Press (Ref.) to select Freehand method. Then measure cursor appears on the screen. Use direction keys to move the cursor to the start of the examined spot.

2. Press (MEASURE), and use direction keys to move the cursor along the fringe of the examined

area to the end.

3. Press

again to finish the measuring.

If measuring should be continued, press $(MENU_0)$ and (A3) or directly press (-1, 2), and repeat Step 2-3. You can get 2 groups of data at most. The results are on the right side of the screen.



Illustration of Measuring perimeter and Area (Freehand Method)

C1 and A1 are respectively perimeter and area of the first group ;

C2 and A2 are respectively perimeter and area of the second group ;

C1/C2 is the ratio of two perimeters ;

A1/A2 is the ratio of two areas.

Notes: There are limitations of measuring perimeter and area by keyboard. For more conveniences, you can use the following Mouse Operation.

Mouse Operation

1. Press $\left(\bigotimes_{1} \right)$ to select Freehand method. The cursor appears on the screen, and then use

the mouse to move the cursor to the starting spot of the examined area ;

2. Press right button to move the cursor along the fringe of examined area to the end ;

3. Press right button again to complete the measuring of perimeter and area.

If measuring should be continued, press \underbrace{MENU}_{0} and $\underbrace{\Lambda_{3}}_{3}$ or directly press $\underbrace{-2}_{2}$, and repeat Step 2-3. You can get 2 groups of data at most. The results are on the right side of the screen.

After the measuring, press Middle button to clean the screen.

b. Ellipse Method :

Keyboard Operation

Press $(+_2)$ to select Ellipse method. At this time an ellipse area appears which is called the examined area. Use direction keys to move this area. + is applied to shift among three functions of direction keys to adjust the size and angle.

1. Use direction keys to move the examined area to image display area ;



5. After the location, size, angle of the examined area are confirmed, the measuring can be done.

If measuring should be continued, press (1 + 2) and (1 + 2) and repeat Step 1-5. You can get 2 groups of data at most. The results are on the right side of the screen.



Picture. Illustration of Measuring perimeter and Area (Ellipse Method)

C1 and A1 are respectively perimeter and area of the first group ;

C2 and A2 are respectively perimeter and area of the second group ;

C1/C2 is the ratio of two perimeters ;

A1/A2 is the ratio of two areas.

Mouse Operation

Press $(-i^{-2})$ to select Ellipse Method. At this time an ellipse area appears which is called the examined area. Use direction keys to move this area. The right button is applied to shift among three functions of the mouse to adjust the size and angle ;

1. Use the mouse to move the examined area to image display area ;

2. Press the right button , and then move the mouse to alter the size of the examined area. Move the mouse left and right to decrease or increase the area vertically, and then move the mouse up and down to decrease or increase the area horizontally ;

3. Press the right button again , then move the mouse left and right to revolve the examined area anticlockwise and revolve clockwise ;

4. Press the right button again , the function of the mouse will be shifted into Move the Examined Area ;

5. After the location, size, angle of the examined area are confirmed, the measuring can be done.

If measuring should be continued, press $(1)^{\text{MENU}}_{0}$ and $(1)^{3}$ or directly press $(1)^{-2}_{-2}$ and repeat Step 1-5. You can get 2 groups of data at most. The results are on the right side of the screen.

After measuring, press the middle button to clean the screen.

Volume measuring is in the later chapter.

2.7.8 Statistics of Histogram

Press MENU 0 in freeze mode, the menu is displayed on the screen.
 Press to select 4.HISTOGRAM , sampling window is displayed. Use direction keys or

mouse to move to certain area, and press or the right button to complete the counting, with the result on the right side of the screen, as follow:



. Illustration of the histogram statistics

the	process,	press	Q ₁	- <u>+</u> - 2
the	process,	press		<u> </u>

to reduce or enlarge the sampling window.

Press to exit.

●In

2.7.9 Erase image storage

Press key to display function menu.
Press and select "6.ERASE" to clean all image storage, as follow :

ERASE ALL STORAGE? 1. YES 2.NO

Press (<u>Q</u>) to confirm. During the process, "ERASING..." will appear in the upper left-hand corner and at the same time, other operations are unavailable. When it disappears, the storage is erased.

Press $\begin{pmatrix} -\frac{1}{2} \\ 2 \end{pmatrix}$ to abandon and exit.

Attention: Before the erasing is completed, (when "ERASING..." exists),other operations are not allowed, for they may damage the device.

2.7.10 Output format of video

• Press B7 and select "7.PALD-NTSC" to change the output format of video as the following dialog box shows: PLEASE ENTER VIDEO: 1.PALD 2.NTSC Press A1 key to select PALD and 2 key to select NTSC.

2.7.11 Restore factory settings

Press " $(MENU_0) \rightarrow "2"$ button in real-time scanning mode , The total gain, the near field, far field and brightness values will be restored to the default.

2.8 Distance measuring

•Keyboard Operation :

- 1. Press OK in freeze mode, the cursor is displayed on the screen.
- 2. Use direction keys to move the cursor to the starting spot.

3. Press

 $\stackrel{!}{\cup}$ to confirm the starting spot for distance measuring.

4. Press direction keys, another cursor appears. And move it to the ending spot. Then press

to complete the measuring. (Notes: Repeat pressing to shift between the cursor of the starting spot and the ending spot.)

If the distance measuring needs to be continued, you can repeat step 1-4, with the maximum of 4 groups of data. The results are displayed on the right side of the screen.



. Illustration of Distance Measuring

The four groups are respectively D1. D2. D3. D4, in which

D1/D2 is the ratio of D1 , D2 ;

D3/D4 is the ratio of D3, D4.

• Mouse Operation :

1. Press the left button and the cursor is displayed ;

- 2. Use the mouse to move the cursor to the starting spot ;
- 3. Press the right button to confirm the starting spot ;
- 4. Use the mouse to move, and another cursor appears (cursor of the ending spot). Move it to the ending spot and press is to complete the measuring. (Notes: Repeat pressing the right button can shift between the beginning spot and the ending spot of the cursor.)
 If the distance measuring needs to be continued, you can repeat step 1-4, with the maximum of 4 groups of data. The results are displayed on the right side of the screen, as in Picture 4-5. Press the middle button to clean the screen after the measuring.

2.9 Volume Measuring

Two methods are available to measure the volume.

1. 3 groups of distance data are measured by 3 axis method and the result is obtain by calculation.

The distance should be measured for three times before the volume measuring, and then press $(MENU_0)$ to obtain the value.

If the data are less than three groups, there will be no value displaying when you press $(MENU_0)$. If you input four groups of data and then press $(MENU_0)$, the value displayed is the calculating result of the first three groups (D1, D2, D3).

Procedures : (Kidney as example)

1. Catch the cross and longitudinal sections of the kidney respectively and freeze them.

2. Measure the long axis and short axis of the cross section by means of distance measuring.

3. Measure the diameter of the longitudinal section by means of distance measuring.

4. Press $(MENU_0)$ to complete the measuring, with the value of volume in "Vm1" on the right side, as follow :



. Illustration of volume measuring (3 Axis Method)

2. Measure two groups of perimeter and area by Ellipse Method and obtain the result by calculating.

Procedures : (Kidney as example)

- 1. Catch the cross and longitudinal sections of the kidney and freeze.
- 2. Measure the perimeter and area of cross and longitudinal sections.

3. The system will automatically complete the measuring, with the value of volume in "Vm1" on the right side, as follow :



Illustration of Volume Measuring (Ellipse Method)

2.10 Heart Rate Measuring (Only in "B/M" and "M" Modes)

1.In B/M mode, freeze a satisfying cardiograph.

2. Measure the distance between wave crests of two periods by means of distance measuring method, and 4 groups of data will be displayed in the lower right-hand corner. The marks are respectively : Time T (unit : ms). Heart Rate HR (unit : /m). Slope EF (unit : mm/s). refresh rate ST (units)



Illustration of Heart Rate Measuring

2.11 OB calculation

The device is capable of measurement on GA of equine, bovine, sheep, swine, cat and dog, and so on. The GA (GW) can be acquired after measuring GS, 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 again to display cat and dog OB menu, press key to switch between this two menus as the following figure shows:

0. EQUINE: GSD	0. CAT: HD
1. BOVINE: BL	1. CAT: BD
2. BOVINE: SL	2. DOG: GSD
3. BOVINE: HL	3. DOG: CRL
4. SWINE: HL	4. DOG: HD
5. SHEEP: USD	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 " $G \cdot A =$ " 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 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:



Rectum
 Uterine horns
 Uterine bodies
 Ovaries
 Vaginas
 Bladders

. Probe position for uterine and ovaries examination

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



Equine GA measurement

6. Confirm the distance value as per distance measurement methods and the corresponding data display behind " $G \cdot A$ ". 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 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:



Probe position for uterine and ovaries examination

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:



Picture. BL measurement

6. Confirm the distance value as per distance measurement methods and the corresponding data display behind " $G \cdot A$ ".

• 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 stomach should be displayed on the screen. With the time going on, fetus stomach long axile increases regularly. The measurement method is given below:



Picture. Bovine stomach measurement

4. Confrim the distance value as per distance measurement methods and the corresponding data display behind " $G \cdot A$ ".

• 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, fetus heart long axile increases regularly. The measurement method is given below:



Picture. Bovine heart measurement

4. Confirm the distance value as per distance measurement methods and the corresponding data display behind " $G \cdot A$ ".

• 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 center, 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.



Picture. Swine GA measurement

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:



Picture. Swine Heart measurement

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 useful. It is proofed as cording to some publication that these two methods are the same effective in pregnancy examination.

- Rectum examination 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. Confirm 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 HD measurement is given below:



Picture. Cat HD measurement

•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.

Tips: After display the OB menu, press key to exit.

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

2.12 Image Printing

Use Video line to connect VIDEO IN port in the printer and VIDEO OUT port in the device and operate according to the instructions of video printer.

2.13 Image upload to computer

Connect the device and the computer with USB cable, the high speed USB2.0 port can transfer the image to computer at a high speed.

2.14 Power Off

Press Power on the right side to turn the device off.

Notes: There is still some power consumption in power-off state. If the device will not be used in a long time, the battery should be removed from the main engine and the plug be pulled out.

Attention:

No unplugging and plugging is allowed when the power is still on ; If power-on is needed after power-off, the interval is better to be 2-3 minutes, or the device may be damaged.

Chapter 3 Troubleshooting and Maintenance

3.1 Troubleshooting

S.N	Simple failure	Solutions
1	When power on, PS indicator light does not turn on and no display on screen.	1.Check if 14V of adapter works well; 2.Check if battery needs charging.
2	Noisy display of image	 Check if 14V output of the adapter is stable; Check if there is electric or magnetic fiend interference around the equipment; Check if the probe plug and jack are connected properly.
3	Unclear display of image	 Adjust STC (Overall, near field, far field gain); Adjust Brightness and Contrast; Clear the screen optical filter.

3.2 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.

3.3 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 in case there be any hazard.

3.4 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 turn 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 "Transportation and storage environmental requirements".

• Environment requirements on transportation and storage :

Environment temperature range : - 20°C ~ +55°C

Relative humidity range : < 80% (20° C)

• 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.

• 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.

3.5 Probe maintenance

Probe is an expensive and frangible part. Never hit it or drop it on floor. When diagnoses pauses, put the probe in its case and press OK key to keep it in a state of "Frozen".

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 (refer to figure 6-1, 6-2, 6-3, 6-4). Regularly check the probe enclosure to ensure

it is good incase liquid ingression spoil the inner components.



R50/3.5MHz Convex probe protection Against water ingression sketch map





R20/5.0MHz Convex probe protection Against water ingression sketch map



7.5MHz HF linear probe protection Against water ingression sketch map

R13/6.5MHz endo-vaginal probe Protection against water ingression sketch map

Probe and host machine once tie , be request not to take down at will , for fear probe pin and socket's contract badness.

Note:

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

3.6 Cleansing

1. When the enclosure need cleaning, wipe it with soft dry cloths and then wipe gently with sponge dipped with 75% medical alcohol.

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.

Warning:

Must not use extender, ethylene oxide or any other organic solvent which tend to deface the probe's protective foil.

Keep device or probe from any type of liquid's infiltration.

Must not clean device or probe by airing or heating.

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.

3.7 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.

3.8 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 Our company (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.

3.9 Instrument test and calibration

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

	Standard Requirements		
Continuous leakage	Leakage current to	Normal	≤100
current under normal	Shell	Single Malfunction	≤500
temperature (uA)	Leakage current	Normal	≤100
	to Patient	Single Malfunction	≤500
Dielectric endurance temperature (V)	under normal	A- a ₂	4000V/1min No flashover No breakdown

3. Test the software of obstetrics, area, and circumference measurement; please refer to Appendix B for detailed data.

3.10 Maintenance of THIS EQUIPMENT Veterinary Ultrasound Scanner

Periodic maintenance on the ultrasound system is an effective means to reduce and avoid failures, prolong its service life and keep it in good working order at every turn. Therefore, maintenance on the Ultrasound equipment is a non-negligible key job for both operators and engineers. This section will introduce basic items, methods and matters need attention during maintenance.

Basic content of maintenance

- (1) Periodically clear up dust, dirt and humidity inside and outside the equipment according to operating ambient and sanitary conditions.
- (2) Observe circuits closely to check if there is any abnormity or spoiled components, analyze and remove the abnormal phenomena.
- (3) Swab conducting contact parts and high-voltage insulation components surface of connectors with detergent to ensure good electric contact of each connector and prevent leakage of electricity through dirt on high-voltage component surface.
- (4) Fasten each connector and setscrew to ensure good and stable electrical system contact.
- (5) Check the detecting performance of the equipment and the control performance panel of control keys, setup each performance control knob correctly and keep the whole set in good working order.

Basic methods of maintenance

(1) Clean the inside and outside: first clean up the dust collected in the sagging parts of the

enclosure, then open the enclosure and clean up the dust inside. Run the vacuum cleaner during cleaning. While cleaning with small brush, use the vacuum cleaner' s sucker to follow the brush to pick up dust. Due to complicated and compact inboard circuits, take down some circuit cards if necessary for convenient cleaning.

- (2) Cleaning electrical connectors: after inboard dedusting, erase dirt and tarnish on connector electrical contact parts with detergent, which can be alcohol (absolute alcohol or 95% alcohol solution) or carbon tetrachloride. These two kinds of detergents are colorless liquid with penetrating odor and prone to vaporize.
- (3) Ventilation and dehumidification: If found it is quite humid or after cleaning with alcohol, damping cloth , it is suggested to process ventilation and dehumidification with fan or hot-air fan.
- (4) Strengthening: mainly check and wound each fix screw.
- (5) System debug: timing and necessary adjustment.

Notes of maintenance

- (1) Set up scientific system for maintenance work. Surface maintenance should be done every day, mainly wipe the exterior of the equipment and check the panel and switch knobs; Inner maintenance should be done periodically according to operating ambient, in a general way no less than two times in a year, and it is advised to be done at the end of spring and middle of autumn, because the humidity in spring and torridity in summer and autumn will cause adverse effect on the equipment easily.
- (2) Daily simple maintenance can be done by operators, but inboard maintenance should be charged by engineers with the assistance of operators. Must not open the cover and start maintenance without instructions.
- (3) During inboard maintenance, it is strictly prohibited to power on the equipment. Please unplug the system power supply to ensure the equipment and personal safety.
- (4) When finishing maintenance, check foul lines and plug-in boards of the whole set in case the equipment should be switched on with wrong connection or tools left inside. Only power on and test running the equipment after confirming everything is ok.
- (5) During maintenance, must not pull circuit parts or move wiring position at will, furthermore do not swirl each tunable component at will.
- (6) It is prohibited to wash inboard components with water, or swab transformer, lucite, electrical line and other rubber goods with gasoline, kerosene or acetone, etc. Wipe cables, rubber-insulated wires, gelatin plates and paint-spraying parts with wring out damping cloth instead of alcohol and carbon tetrachloride, which can dissolute rubber and other organic materials.
- (7) It is strictly prohibited to burnish those gold plated (or silver plated) electrical contacting parts of connectors with emery cloth or other metalwork, nor direct contact them with hands lest sweat cause tarnish.
- (8) Use all sorts of tools correctly in case setscrews are deformed due to over-force moment.

Appendix A Acoustic output reporting table

B mode

frequency: 6.5MHz

Trans ducer Model: L1-5

Index label			TIS			TIB		
		МІ	Non-scan		Non-	тіс		
			Scan	A _{aprt} ≤1cm ²	A _{aprt} >1cm ²	scan		
Maximum index value		0.507	0.043	-	-	-	Note	
	P _{ra}	(MPa)	1.170					
	Ρ	(mW)		6.8	-		-	#
	Min.of [P _{α} (z _s), I _{zpta,α} z _s)] (mW)					-		
	Z _s Associated					-		
Associated						-		
acoustic	Z _b	(cm)						
parameters	Z at max. $I_{pi,\alpha}$	(cm)	2.30					
	$d_{eq}\left(Z_{b} ight)$	(cm)					-	
	f _{awf}	(MHz)	5.331	5.331	-	-	-	#
	Dim of A _{aprt}	X (cm)		4.00	-	-	-	#
		Y (cm)		0.90	-	-	-	#
	t _d	(µsec)	0.334					
	prr	(Hz)	4800					
Other information	p _r at max. I _{pi}	(MPa)	1.786					
	d_{eq} at max. I_{pi}	(cm)					-	
	$I_{pa,\alpha}$ at max. MI (W/cm ²)		79.16					
	De	pth		40mm				
Operating	Focal F	Position		2D3				
conditions								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.

2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.

3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic output reporting table B mode

frequency: 2.5MHz

Trans ducer Model: C1-11

Index label		MI Scan	TIS			TIB		
			Non-	scan	Non-	тіс		
			Scan	A _{aprt} ≤1cm²	A _{aprt} >1cm ²	scan	_	
Maximum index value		0.463	0.063	-	-	-	Note	
	P _{ra}	(MPa)	0.799					
	Р	(mW)		27.3	-		-	#
	$Min.of \left[P_{\alpha}(z_s), I_{zpta,\alpha}z_s) \right] (mW)$					-		
	Zs	(cm)				-		
Associated	Z _{bp}	(cm)				-		
acoustic	Z _b	(cm)						
parameters	Z at max. $I_{pi,\alpha}$	(cm)	3.80					
	d _{eq} (Z _b)	(cm)					-	
	f awf	(MHz)	2.982	2.982	-	-	-	#
	Dim of A _{aprt}	X (cm)		6.16	-	-	-	#
		Y (cm)		1.45	-	-	-	#
	t _d	(µsec)	0.589					
	prr (Hz)		6490					
Other information	p _r at max. I _{pi}	(MPa)	1.181					
	d_{eq} at max. I_{pi}	(cm)					-	
	$I_{pa,\alpha}$ at max. M	I (W/cm ²)	25.76					
	De	pth						
Operating	Focal F	Position						
conditions								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.

2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.

3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic output reporting table B mode

frequency: 5.0MHz

Trans ducer Model: C1-12

Index label			TIS			TIB		
		MI Scan	Non-	scan	Non-	тіс		
			Scan	A _{aprt} ≤1cm²	A _{aprt} >1cm ²	scan		
Maximum index value		0.349	0.042	-	-	-	Note	
	P _{ra}	(MPa)	0.732					
	Р	(mW)		6.3	-		-	#
	$Min.of [P_{\alpha}(z_s),$	Min.of [$P_{\alpha}(z_s)$, $I_{zpta,\alpha}z_s$)] (mW)				-		
	$ Z_{s} \qquad (cm) $					-		
Associated						-		
acoustic	Zb	(cm)						
parameters	Z at max. $I_{pi,\alpha}$	(cm)	2.80					
	d _{eq} (Z _b)	(cm)					-	
	f awf	(MHz)	4.389	4.389	-	-	-	#
	Dim of A _{aprt}	X (cm)		3.12	-	-	-	#
		Y (cm)		1.00	-	-	-	#
	t _d (µsec)		0.312					
	prr (Hz)		4800					
Other information	p _r at max. I _{pi}	(MPa)	1.119					
	d _{eq} at max. I _{pi}	(cm)					-	
	$I_{pa,\alpha}$ at max. MI (W/cm ²)		36.7					
Operating	De	pth						
	Focal F	Position						
conditions								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.

2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.

3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Appendix B Obstetrics

Gestational Table 1: Equine

Measurement(mm)	Week	Dav	
(Gestational Sac Diameter)	WEEK	Day	
6	1	4	
8	1	4	
10	1	5	
12	1	6	
14	1	6	
16	2	0	
18	2	0	
20	2	1	
22	2	2	
24	2	3	
26	2	5	
28	4	1	
30	4	2	
32	4	3	
34	4	4	
40	5	0	
42	5	2	
44	5	3	
46	5	4	
48	5	5	
50	5	6	
52	6	1	
54	6	2	
56	6	3	

All measurements +/- 3 days

Measurement(mm)	W 1	D	
(Body Length)	week	Day	
8	4	0	
10	5	0	
12	5	1	
14	5	2	
16	5	3	
18	5	5	
20	5	5	
22	5	6	
24	5	6	
26	6	1	
28	6	1	
30	6	1	
32	6	2	
34	6	3	
36	6	3	

Gestational Table 2: Bovine

All measurements +/- 3 days

Measurement(mm)	Wool	Dav	
(Umbilicus to Spine Distance)	week	Day	
15	7	1	
18	7	3	
21	7	6	
24	8	1	
27	8	4	
30	9	0	
33	9	2	
36	9	4	
39	10	0	
42	10	2	
45	10	5	
48	11	3	
51	11	5	
54	12	1	
57	12	2	
60	12	4	
63	12	6	
66	13	2	
69	13	4	
72	14	2	
75	14	4	
78	15	0	
81	15	2	
84	15	5	
87	16	6	
90	17	0	
93	17	1	
96	17	3	
99	17	6	

Gestational Table 3: Sheep

All measurements +/- 3 days



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