User Manual

Portable Ultrasound V16

Veterinary Ultrasound Scanner

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Statement

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Responsibility on Manufacturer

All information contained in this manual is believed to be correct. The Dodson shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this manual.

The Dodson is responsible for the effects on safety, reliability and performance of this product,

only if:

- ⌘ all installation operations, expansions, changes, modifications and repairs of this product are conducted by The Dodson authorized personnel;

- ⌘ the electrical installation of the relevant room complies with the applicable national and local requirements; and

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

Note:

Skilled/trained clinical professionals must operate this equipment.

Warning:

It is important for the hospital or organization that employs this equipment to carry out a reasonable service/maintenance plan. Neglect of this may result in machine breakdown or personal injury.

Packing List

S/NO	Description		QTY	Checklist	Remarks
1	Main unit		1	√	
2	Probe	L60/6.5MHz Vet Rectal Linear Probe	1	√	
		R50/3.5MHz Convex Probe	1	x	
		L40/7.5MHz Linear Probe	1	x	
		R20/5.0MHz Micro-convex Probe	1	x	
3	Rubber Protector		1	√	
4	AC-Adapter with Cables		1	√	
5	Rechargeable Battery		1	√	
6	Shoulder & Wrist Belts		1	√	
7	Operation manual		1	√	

Please to contact the manufacturer immediately if there is any shortage, damage. Otherwise the manufacturer will not be responsible of such shortage or damage.

E-mail : CustomerCare@valuestore.us

Warranty

This warranty is exclusive and is in lieu of all other warranties. Expressed or implied, including warranties of merchantability or fitness for any particular purpose.

Definitions

- **Main unit**: Integrated facility that implements the specified function separately, the main unit includes power supply.

- **Accessories**: Materials connected to the main unit to extend or implement specified function.

- **Consumables**: Disposable or short-life parts which should be replaced each time after use or periodically like batteries.

Exemptions

The seller's obligation or liability under this warranty does not include any transport or shipping fee or other charges or liability for direct, indirect or consequential damages or delay resulting from the improper use or application of the product or the use of parts or accessories not approved by the seller.

This warranty shall not extend to:

1. Malfunction or damage caused by improper use or man-made failure.
2. Malfunction or damage caused by unstable or out-of-range power input.
3. Malfunction or damage caused by force majeure such as fire and earthquake.
4. Malfunction or damage caused by improper operation or repair by unqualified or unauthorized service people.
5. Malfunction of the instrument or part whose serial number is not legible enough.

The standard warranty period is as below:

- Main unit: 12 months from shipment.
- Probe: 12 months from shipment.
- Accessories: AC-adapter, cables, rubber protector and shoulder belts.
- Consumables: N/A

Return Policy

Return Procedure

In case that it becomes necessary to return this product or part of this product, the following steps should be followed:

1. Return authorization:
Contact Customer Care at customercare@valuestore.us and please provide the **Order Number**, and a brief description of the reason for return (just for statistics propose). Returns will not be processed by phone or live chat. This return authorization slip must appear on the outside of the shipping box. Returns will not be accepted if the return slip is not clearly visible from the outside box.

2. Freight policy:
The customer is responsible for freight charges when this product is shipped to seller for service. The seller will pay the shipping back once the product is repaired.

3. Return address:
The return address will appear in the return authorization slip.

Contact

E-mail : CustomerCare@valuestore.us

Important Information

1. The responsibility for maintenance and management of the product after delivery resides with the customer who has purchased the product.

2. The warranty does not cover the following items, even during the warranty period:

    (1) Damage or loss due to misuse or abuse.
    (2) Damage or loss caused by Acts of God such as fires, earthquakes, floods, lightning, etc.
    (3) Damage or loss caused by failure to meet the specified conditions for this system, such as inadequate power supply, improper installation, or unacceptable environmental conditions.
    (4) Damage or loss due to use outside the territory in which the system was originally sold.
    (5) Damage or loss involving system purchased from a source other than The Dodson or its authorized agents.

3. This system can be used only by fully qualified and certified medical personnel.

4. Do not make changes or modifications to the software or hardware of this product.

5. In no event shall The Dodson be liable for problems, damage or loss caused by relocation, modification, or repair performed by personnel other than those designated by The Dodson.

6. The purpose of this system is to provide physicians with data for clinical diagnosis. The responsibility for diagnostic procedures lies with the physicians involved.

7. The Dodson shall not be liable for loss of data stored in the memory of this system caused by operator error or accidents.

8. This manual contains Warnings regarding foreseeable potential dangers. Be alert at all times to dangers other than those indicated. The Dodson shall not be liable for damage or loss that results from negligence or from ignoring the precautions and operating instructions contained in this operator's manual.

Preface

To ensure safe and correct operation of the system, carefully read and understand this user manual before operating the system.

1.1 Product Information

Product Name: Portable ultrasound scanner.

Model: V16

Symbols in User Manual

The following table explains the safety symbols that may be used in this manual.

Symbol	Signification
DANGER:	Indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury.
WARNING:	Indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.
CAUTION:	Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.
NOTE:	Indicates a potentially hazardous situation, which if not avoided, may result in property damage.

Labels and Symbols on System

The following table explains the labels and symbols attached on the system.

Symbol	Signification
⚠	Indicates the points requiring attention. Be sure to read the operator's manual concerning these points before using the system.
AC	AC (alternating current)
|	Power switch OFF
○	Power switch ON
⊖→	Video output
⟜	USB port

Packing and transportation labels explanation:

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

Safety Precautions

The operators are asked to observe the following safety precautions.

DANGER :	Do not use flammable gasses such as anesthetic gas, oxygen or hydrogen, or flammable liquid such as ethanol, near the system, because there is danger of explosion.

WARNING :	1. Only medical personnel fully trained in clinical examination techniques can use the system.
	2. Connect the power plug of the system to the wall receptacle properly grounded and meeting the ratings indicated on the rating nameplate.
	3. When the system is connected with other equipment, be sure to connect their equipotential terminals before inserting any of their power plugs into a receptacle, and also, be sure to remove the power plugs from receptacles before disconnecting the equipotential terminals.
	4. Use peripherals and optional parts provided with the system or recommended. Use cables provided with the system. Use other peripherals or cables may degrade system performance or even cause electric shock.
	5. Do not connect the system to receptacles that control current to devices such as life-support systems and are equipped with the same circuit breakers and fuses as those of the system. If the system malfunction and generates an overcurrent, the circuit breakers and fuses of the mainboard circuit may be tripped.
	6. This system is not waterproof. Do not use the system in any place with the possibility of water penetration. There is risk of electric shock if any water is sprayed on or into the system.
	7. Use the system only in the environment specified in this manual.
	8. Use probes specified in this manual. Using any probe not specified in this manual may damage the system and probe or even cause an accident such as a fire.
	9. Use the transducer carefully. In case that the human body contacts the scratched probe surface, immediately stop using the probe and contact our company's Customer Service Department or your local distributor. Using scratched probe may cause electric shock.
	10. If finding any abnormality in the system or probe during the scan, stop scanning immediately and turn off the system.
	11. The system and accessories are neither disinfected nor sterilized before they are sold. Disinfect or sterilize the probe before usage.
	12. After disinfecting or sterilizing accessories, thoroughly clear chemicals from the accessories. Residual chemicals may damage the accessories and cause injury.

13. Do not let the patient contact the system or other equipment.

14. Do not subject probe to knocks. Using defective probe may cause electric shock.

15. Do not open the shell or panel. Opening the shell or panel may cause short circuit or electric shock.

16. Do not use the system at the same time when using equipment such as an electro-surgical unit, high-frequency therapy equipment or a defibrillator, etc.

17. Before moving the system, power it off, close the control panel and then remove all connections (including the probe).

18. Before cleaning the system, power it off and remove the power plug from the main unit to avoid electric shock.

19. To avoid system damage or electric shock, do not remove the power plug from the main unit before turning off the system.

20. Use ultrasound gel complying with local regulations.

CAUTION :

1. This manual does not describe clinical examination techniques. Selection of proper clinical examination technique must be based on specialized training and clinical experience.

2. There is no risk of high-temperature burns during routine ultrasound examinations. To prevent high-temperature burns, do not place the probe on the same spot for a long time.

3. Ensure the system date and time are consistent with current date and time. If they are not consistent, misdiagnosis may occur.

4. Always keep the system dry. Do not move the system quickly from a cold place to a warm one. Condensation or water drops formed may cause short circuit. Observe the local safety/health regulations.

5. If the circuit breaker is tripped or the fuse is broken, it indicates that the system or peripherals have problems. In these cases, do not repair by yourself but contact our company's Customer Service Department or your local distributor.

6. Do not place any object on the system.

7. Ensure other equipment is secured before moving the system. Otherwise, the equipment may fall and cause injury.

8. Ensure proper measurement targets and images and measurements are performed in valid image area. Incorrect measurement results may cause misdiagnosis.

NOTES :

1. Do not use the system in the vicinity of strong electromagnetic field (like transformers), which may affect the performance of the monitor.

2. Using devices transmitting RF signals in the vicinity of the system may affect the system's performance. Do not use or take any devices intentionally transmitting RF signals such as cellular phones, transceivers and radio-controlled products in the room placing the system.

3. Transport, store and use the system under the circumstance specified in this manual. Additionally, store and use the system in a clean location where there is direct sunlight, sudden changes in temperature, condensation, dust, vibration, and heat generators.

4. After turning off the system, wait at least 10 seconds before turning it on again.

5. Before connecting/disconnecting the probe, turn off the system or stop emitting (freeze the image). Otherwise, the system or probe may malfunction.

6. After using the probe, remove the gel on it. Otherwise, water in the gel may enter the acoustic lens to adversely affect the performance and safety of the probe.

7. If the system is used in a small room, the room temperature may rise. Proper ventilation must used.

8. Do not cover the fan outlet.

9. Only engineers of our company or authorized by our company can replace the fuses.

11. Do not modify system parameters. If it is necessary to change system parameters, contact our company's Customer Service Department or your local distributor.

12. Deterioration of electrical and mechanical safety characteristics and of image sensitivity and precision may occur over a period of time. Check and maintain the system periodically. To ensure system performance, it is recommended to sign a maintenance and service contract to avoid accidents and misdiagnosis.

13. To dispose of the system or any part, contact our company's Customer Service Department or your local distributor first. Our company does not assume any responsibility for damage resulting from disposal of the system without consulting our company.

1 System Basics

This ultrasound scanner is suitable for diagnosis on swine, goats, cattle, horse, horses, cat, dog and other animals, depending on the kind of animal you will need to use rectal or convex probe.
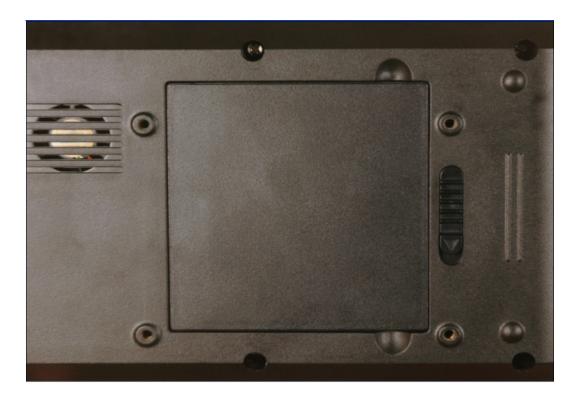
1.1 Structure

Picture 1-1.Front-side of Scanner

Picture 1-2. Left-side of Scanner

Picture 1-3 Back Side of Scanner

No.	Part	Description
1	Keyboard	Program the scanner
2	TFT color LCD	5.5 inch screen
3	Rubber Protector	Around the scanner against dirt and impact from the outside
4	Probe	Probe connection
5	DC12.6	Connection of AC-adapter, input power supply is by DC12.5V
6	USB-1, USB-2	The factory uses these USB ports for the main unit maintenance
7	TV port	Video output to allow the image recorded by Video Printer, connection of external PAL-D LCD
8	⏻	Power switch
9	Nut holes	4 nut holes to install the scanner bracket (optional)
10	Hanging holes	6 holes on Rubber Protector for hanging the shoulder & wrist belts.
11	Battery lock	Lock/unlock the battery

1.2 Main Features

◆ Light weight and portable, perfect for outdoor use and farms.
◆ Compact main unit with shoulder and rubber protector.
◆ Built-in memory to storage up to 128 images.
◆ Li-ion rechargeable battery can be removed easily.
◆ AV port to see real time images with your TV or monitor, this feature is Plug & Play.
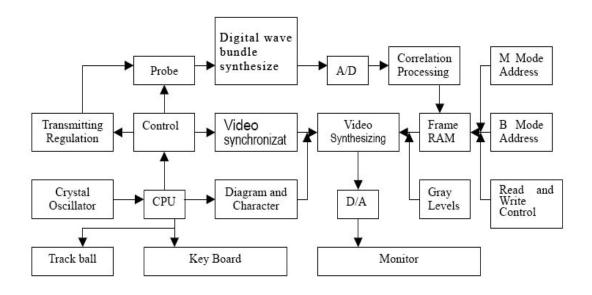
1.3 Technical Specifications

MODEL		Ultrasound Scanner V16		
Probe		Linear probe 6.5MHz Rectal probe	Convex probe	Micro-convex probe
Detect Depth(mm)		≥80	≥140	≥90
Resolution (mm)	Lateral	≤1 (Depth≤60)	≤3 (Depth≤80) ≤5 (80＜Depth≤130)	≤3 (Depth≤60)
	Axial	≤1 (Depth≤80)	≤1 (Depth≤80)	≤1 (Depth≤60)
Blind zone (mm)		≤3	≤6	≤5
Geometric position precision	Horizontal	≤5	≤7.5	≤7.5
	Vertical	≤5	≤5	≤5
Monitor size		5.5 inch		
Display mode		B, B+B, B+M, M, 4B		
Image gray scale		256		
Image storage		64		
Cine loop		≥400 frame		
Scan depth		70 mm～140 mm		
Image flip		Up/down, left/right		
Focus position		Adjustable		
Body mark		16		
Image Process		Histogram, Color encode, GAMA, Image Smoothen		
Probe Frequency		Adjustable (3 point each probe)		

Frame correlation	Adjustable
Measurement	Distance, circumference, area, volume, heart rate. GA, EDD
Notation	Date, time, name, sex, age, hospital name、Full screen words edit
Output report	Measurement
Battery continuous working	≥ 2 Hours

1.4 Principle diagram

Picture 1-4 Electric principal block diagram

2 System Connection

This chapter introduces how to operate & install system and the battery

NOTE ： Before connecting the system, put the scanner in a proper place and ensure at least 20cm of clearance at the back and sides of the system. The transportation, storage and operating environments of the scanner must meet requirements listed in the appendix. Besides, store and use the system in a clean location where there is no direct sunlight.

2.1 Environmental Requirements

1. Environment temperature range：+5　～+40
2. Relative humidity range：30%～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 & Disassembly

2.3.1 Probe Connection & Disconnection

The probe socket lies in the right side of the equipment. There is only one plug that is also compatible for those optional probes (refer to figure 2-1).
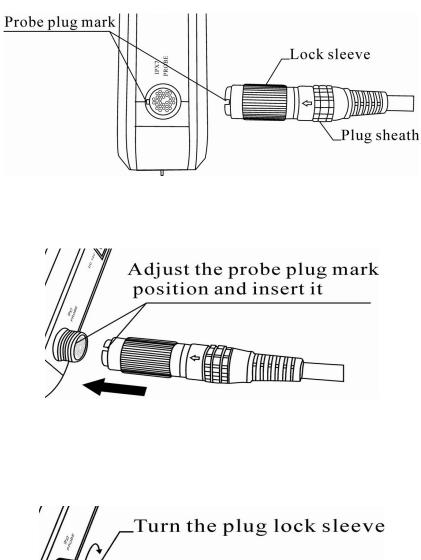
Probe Connection:
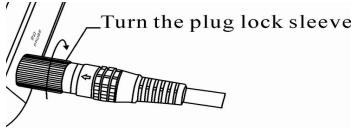
Step 1: Match the marks of both the probe socket and the plug
Step 2: Rotate the sleeve clockwise to lock the plug.

Probe Disconnection:

Step 1: Rotate the safe-sleeve anticlockwise to the bottom position
Step 2: Take the sealed head and pull out the plug out of the socket.

Probe plug mark

Lock sleeve

IPX7 PROBE

Plug sheath

Adjust the probe plug mark position and insert it

Turn the plug lock sleeve

Picture 2-1. Probe connection sketch

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.

2.3.2 Battery Installation & Disassembly

Battery Installation:

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 .

Push the battery into the battery compartment.

That's all.

Battery Disassembly:

Pull the battery Lock like shown on photo.

Take the battery off like shown on photo.

2.4 Power Supply

There are two ways to supply power to the device, by the adapter and the built-in battery. They are switched automatically.

2.4.1 Supply via Adapter

1.Check the input power cord plug of the adapter to see if it matches the EPS outlet.

2.Check the EPS to see if it is in the specified range and the power cord to see if it is connected well.

3.Check the adaptor to see if it works well: Plug the power cord into the AC input outlet, switch on the power switch of the outlet, if the DC output indicating light turns on green, it works well.

4.Shut the power switch of the outlet.

5.Insert the DC output plug of the adapter into the DC14V outlet in the right side of the device outlet.

6.Switch on the main unit.

2.4.2 Supply via Battery

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.

2.5 Battery Charging

There are 2 ways to charge the battery.

2.5.1 Charging via Scanner

1. Take out the battery from the scanner or take out the spare battery.

2. Connect the "$\overline{===}$12.6V/1A" terminal of the adapter to the charging terminal of the battery with charging adaptive line.

3. Connect power cord of "$\sim$100-240V 50/60Hz" terminal of the adapter to the 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 from red, the battery is fully charged.

2.5.2 Charging via Adapter

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

Notes:

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.

2.6 Startup

1   Before the startup, complete the following checks:

- You are asked to check the environment temperature, humidity and atmospheric pressure, which must meet the requirements listed in the appendix.
- The scanner is placed in a clean location where there is no direct sunlight, no sudden changes in temperature, no condensation, few dust, no vibration, and far from heat generators. Ensure at least 20cm of clearance at the back and sides of the system.
- The scanner and its peripherals have no deformation, damage or dirt. If necessary, clean the scanner (see the "System Maintenance" chapter for details).
- There are no obstacles in the area where the scanner can be moved and near the radiator holes of the system.
- All power cables and connection cables are intact.
- The probe(s) has (have) been cleaned and disinfected (see 10.4 probe maintenance and 10.5 cleaning for details)
- The probe(s), connector(s) and cable(s) are intact.
- The probe(s) is (are) connected to the system.
- Peripherals to be used are connected to the system.
- All connections are secure.

2   Ensure the power plug of the scanner is connected to an outlet meeting requirements. For peripherals to be used, ensure their power plugs are connected to receptacles meeting requirements.

3   Turn on the scanner.

4   After the startup, check the system:

| WARNING | : | If you find any abnormality, turn off the system and see if the section lists any solution for the problem. If not, contact our company's Customer Service Department or your local distributor. |

- Check whether the startup is normal.
- Check whether the system has any abnormal noise or smell or is overheated.
- Check by hand whether the surface of transducer is overheated

| WARNING | : | Using overheated transducers may burn patients. |

- Check whether the keys and trackball on the control panel can work properly.
- Check whether the image is normal.
- Check whether any error information appears.
- Check whether the system date and time are the same as current ones and whether they are displayed correctly. If not, modify the system date and time.

| CAUTION | : | If the system date and time are not the same as current ones, misdiagnosis may occur. |

2.7 Shutdown

1 Put the probe (s) on its holder.
2 Turn off peripherals connected to the scanner.
3 Turn off the scanner.
4 If the scanner is not to be used for a period of time, remove power plugs of the system and peripherals from receptacles.
5 Clean and disinfect the probe(s) (see 10.4 probe maintenance and 10.5 cleaning for details)
6 And keep the probe(s).

| NOTE | : | The system can be turned on again at least 10 seconds after it is turned off. |

2.10 Power Off

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

Note: 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.

3 Operating & Setting
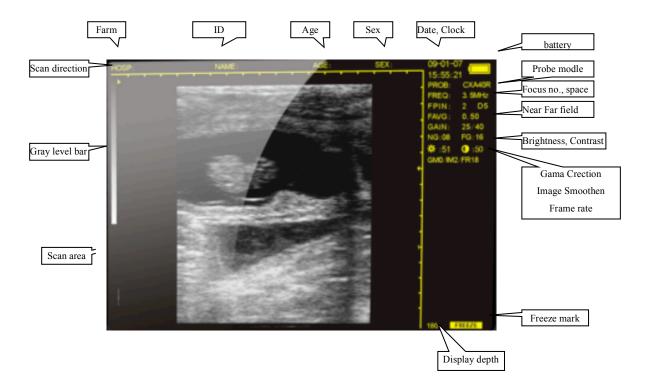
This chapter describes how to use the keyboard function and preset parameters

You can preset system operating status, configuration parameters of each exam mode, post process and others. The system runs automatically with the preset parameters after each startup. Before examining patients, ensure proper parameters have been preset.

3.1 Screen Display

Picture 3-1. Screen Display

3.2 Keyboard

3.2.1 keyboard

This is the keyboard of the device:

Picture 3-2 Keyboard of V16

Freeze Key

Press it to freeze/Unfreeze the echo image.

If [FREEZE] is **righted at the lower corner of the screen, the image is at frozen status.**

M　0 ～ BM/9 **Alphanumeric keys**

All of them are dual functional keys.

As for alphanumeric inputting:

- They are for selection in the sub-menu while in menu operation.
- They are for number keys while in "AGE" and "TIME" menus.

● The keys, M/0. ⊕/1. +/2. B/7. BB/8. BM/9 , are for alphanumeric inputting while in "Hospital" and "Patient" annotations (Further details are available).

As functions keys：

● M 0   **Function MENU key (**when the scanner is frozen)

[Freeze] the screen first, then press it to display Func. MENU on the sceen.

```
        V1.20
 0. CINE LOOP
 1.SAVE
 2.SVLOAD
 3.UP-DOWN
 4.LEFT-RIGHT
 5.COLOR
 6.AREA-VOLM
 7.HISTOGRAM
 8.ERASE
 9. PALD-NTSC
```

---- Reference Article 2.7 to make the selection
---- Press [Clear] to quit.

● ⊕/1   **Image Magnification Key**

Press it to have the image magnified at difference depth when the scanner is in real-time status.
The depth range is between 80~220 mm in 8 difference levels.

● +/2   **Caliper Key**

Press it to generate a caliper "+" shown on the screen when [Freeze] lighted.
Please reference Article 2.6 to understand how to move this caliper to do the measurement.

●▲3 ～ ▼6   **Direction Keys**

These 4 keys are all multifunctional.
---- When the system is in real-time B mode, press ▲3 and ▼6 to scroll the image up and down.
---- Wen the system is in measurement program, press them to move the caliper "up/down" and "left/right".
---- When the system is in annotation of "Patient" and "Hospital", press ▲3 and ▼6 to turn the page up and down.
---- When the system is in real-time, press 5◄ and ►4 to select and light the parameter on the right side of the screen. Then, press ▲3 and ▼6 to adjust it up and down.

● B/7   B & 4B Mode Key

(The default setting of the system is in B mode)

---- Press it to have the scanner in B mode whenever it is in real-time or frozen.

---- Repeat it and then ▶4 key, the screen will be in 4B mode. One of them is in real-time and the rest are in Frozen. Press ▶4 again to shift these 4 images from Real-time to Frozen one by one.

---- Press B/7 to switch the screen between B and 4B mode.

● BB/8   B+B Mode Key

---- Press it to have the screen into B+B mode whenever it is in real-time or frozen. One of them is in real-time and another is in frozen.

---- Press it again to shift them between real-time and frozen.

---- Press [Freeze] key to have this real-time image frozen. Then the both B images are all in frozen status.

● BM/9   B+M Mode Key

---- Press it to B+M mode on whenever it is in real-time or frozen. Both B and M are all in real-time, B is on the left and M is in on the right.

---- There is a vertical line with dots on B mode, which is named DEMO Line. Press 5◀ and ▶4 keys to move this line to the wanted position. Then, press BM/9 again to have clearly M track shown on.

---- Press BM/9 repeatedly to switch the screen between B+M and M mode.

---- DEMO line also can be moved by the trackball when it is connected with the scanner. Trackball is the optional accessory of this device.

Measure ⊖   **Measure Reference** (when scanner is frozen)

----- When the scanner is in frozen, this key is for function of Measure Reference.

---- Reference Article 2.7for more details.

---- Press [Clear] to exit.

Reference   **Reference Key** (when scanner is frozen)

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

following chapter for further details. Press [Clear ABC] to exit.

Clear Key

Press it to clean marks, comments and measure, even empty the report when scanner is in annotation.

Press it to exit the current program when scanner is menu operation.

Reference difference operation carefully.

Esc ⤵ **Reset**

Press it when the device crashes by accidents or operation mistakes, then the device can return to normal.

3.3 Power on

The power switch is located at right side of the scanner marked as ⏻

Press down the switch, the indicator on and the interface [Welcome] appears on the scanner.

Press any key (except [FREEZE] and [Esc]) to enter scanning state.

You can modify the parameters by selecting the items on the right side of screen to meet your requirement. All the setting will be saved automatically for future use.

You are suggested to keep the "default" setting if you are lack of experience.

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

3.4 Diagnose

Spread medical coupling agent (ultrasonic gel) 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.

3.5 Parameters Setting

The operator could set all the parameters listed on the right side of the screen.

PROB:	Probe Model which is connected with the scanner
FREQ: 3.5MHz	Probe frequency which the system is under working
FPIN: 2 D5	Focus points which are selected currently
FAVG: 0.45	Frame correlation in 8 steps: 0.25/ 0.35/0.45/0.55/0.50/0.65/0.75/0.85/0.95
GAIN: 27/40	
NG: 08 FG:08	
☼:51 ◐:50	Brightness and Contract of LCD
GM0/IM1/FR14	

No matter the scanner is in real-time or in frozen, press direction key 5◀ or ▶4 to light the item you want to do modification. Then, press ▲3 and ▼6 to set the wanted parameters.

3.5.1 Probe Frequency (MHz)

Press 5◀ or ▶4 to light FREQ, use ▲3 and ▼6 to make the selection.

Frequency varies by probe:

Probe Model	Frequency 1	Frequency 2	Frequency 3	Remarks
LNV-60	5.5	6.5	7.5	Vet Rectal
CXA50R	2.5	3.5	5.0	Convex
CXA20R	4.5	5.0	5.5	Micro-convex
LNA40	6.5	7.5	8.5	HF Linear

3.5.2   Focus Points

Press 5◀ or ▶4 to light FPIN, use ▲3 and ▼6 to make the selection.

There are "1" and "2" selections.

3.5.3 Frame Correlation

Press 5◀ or ▶4 to light FAVG, use ▲3 and ▼6 to make the selection.

There are 8 indexes for you choosing, such as 0.25, 0.35,0.45,0.55-0.50,0.65,0.75,0.85,0.95.

3.5.4 Image Smoothen

Press 5◀ or ▶4 to light IM, use ▲3 and ▼6 to make the selection.

There are 3 presetting for your choosing: IM0, IM1, IM2

Normal   Smooth

3.5.5 Gamma Correction

Press 5◀ or ▶4 to light GM, use ▲3 and ▼6 to make the selection.

There are 4 levels for your choice: GM0, GM1, GM2, GM3.

3.5.6 Gain Setting

Press 5◀ or ▶4 to light GAIN/NG/FG, use ▲3 and ▼6 to make the selection.

3.5.7 Brightness & Contrast

Press 5◄ or ►4 to light ☼ and ◑ use ▲3 and ▼6 to make the selection.

You are suggested not to make modification frequently if you are not with rich experience.

3.5.8 Probe Identification

The probe identification will be done automatically, and its probe model will be shown on the right side.

Warning :

You are asked to turn off the scanner before replacing the probe then restart the scanner.

3.6 Annotation Operation

Press [FREEZE] to have the scanner in frozen statue，then, press the key of [MENU]，the following menu will be displayed on the screen:

```
            V1.20
        0.NAME
        1.AGE
        2.SEX
        3.COMMENT
        4.TIME
        5.HOSP
        6.LANGUAGE
        7.BODYMARK
        8.REPORT
        9.NEWPATIENT
```

◆ V1.20：the current Software Version Number.

◆ Select "0.NAME" by pressing the key M/0, a sub-menu shown at the bottom of the screen:

```
    PLEASE ENTER NAME:

    _
```
0-A   1-B   2-C   7-D   8-E   9-F

---- The 26 capital letters and the "space" key are all preset in difference pages. You can choice among them by pressing ▲3 and ▼6 to turn page up and down.

Page 1:	0-A	1-B	2-C	7-D	8-E	9-F
Page 2:	0-G	1-H	2-I	7-J	8-K	9-L
Page 3:	0-M	1-N	2-O	7-P	8-Q	9-R
Page 4:	0-S	1-T	2-U	7-V	8-W	9-X
Page 5:	0-7	1-Z	2-Space			

---- Press [Clear] key to erase the wrong letter(s).

---- Press [Reference] to exit.

◆ Select "1.AGE" by press the key of ⊕/1 , the following sub-menu shown on the screen:

> PLEASE ENTER AGE:
>
> ■

---- The maximum is by 3 bits here only.

---- Press [Clear] key to erase the wrong letter(s).

---- Press [Reference] to confirm and exit.

◆ Select "2.SEX" by pressing the key of +/2 , the sub-menu displayed :

> PLEASE ENTER SEX:

---- Press ⊕/1 to choose "1" and +/2 to choose "2". Then "M" or "F" will be shown as the suffix of "SEX: " on the top of screen.
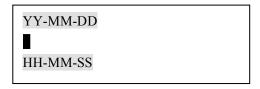---- The sub-menu will be kept on the screen if there is no correct choice done.

◆ Select "3. COMMENT" by pressing the key of ▲3 , there is a cursor appeared on the screen. At the meantime, 1st page of characters is shown on the bottom.

Page 1:	0-A	1-B	2-C	7-D	8-E	9-F

---- Move the cursor to the wanted place before input the comment on.

---- Input the needed letters by selecting the character among the 5 pages. Don't be confused when you want to turn the pages up and down by pressing the keys of [MENU] and [Measure] on the step.

---- This scanner is designed for full-screen edition.

---- Press [Clear] key to erase the wrong letter(s).

---- Press [Reference] to confirm and exit.

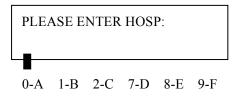◆ Select "4.TIME" by pressing the key of ▶4, the sub-menu generated on the screen:

```
YY-MM-DD
█
HH-MM-SS
```

---- Press the number keys needed

For example：2006-9-22 9:35:30 are input as：

```
YY-MM-DD
060922
HH-MM-SS
093530
```

---- Press [Clear] key to erase the wrong number.

---- Press [Reference] key to confirm and exit. The resetting DATE and Clock will be displayed on the top right of the screen automatically.

◆ Select "5.HOSP" by pressing the key of 5◀, there is a sub-menu displayed at the bottom of the screen:

```
PLEASE ENTER HOSP:


█
```
0-A   1-B   2-C   7-D   8-E   9-F

---- Choose the needed letters among the pages by pressing ▲3 and ▼6 for turning up and down.

---- Press [Clear] key to erase the wrong letter(s).
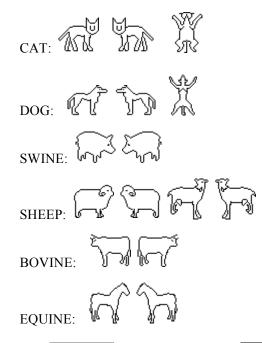
---- Press [Reference] to confirm and exit.

---- Maxi 18 bits allowed.

◆ Select "6.LANGUAGE" by pressing the key of ▼6 , the sub-menu appears:

---- Press +/2 to select English.

---- This sub-menu will not appear if your scanner is in latest version.

◆ Select "Bodymark" by pressing the key of B/7 . The one mark appears at the left bottom of the

screen.

---- Press ▲3 and ▼6 up and down to choose the right one.

---- There are 16 difference body marks preset in this scanner.

---- Repeat pressing to have these marks shown circularly.

CAT:

DOG:

SWINE:

SHEEP:

BOVINE:

EQUINE:

◆ Select "8.REPORT" by pressing key of BB/8 , the following Report Page displayed on the screen:

Picture 2-6. Report page

---- You are asked to finish all the setting, including the measurements, comment, diagnosis and others.
   Then, all the setting and checking results will saved and shown on the page.

---- Press [Freeze] to exit.

◆ Select "9.NEWPATIENT" by pressing the key of **BM/9** , a sub-menu appears on the screen:

```
ERASE REPORT ?

1.YES   2.NO
```

---- Press ⊕/**1** key to empty the table, and +/**2** to exit.

Notes :

When the system is in "0. NAME", "3.COMMENT" or "5. HOSP" inputting, number keys are not available. Press [Reference] to confirm the inputting and exit the program.

3.7 Functions Menu Operation

No matter the scanner is in real-time or frozen, press **M/0** to display FUNCTION MENU on the screen. Under this menu, the functions in accordance with the menu will be done.

```
        V1.20
0. CINE LOOP
1.SAVE
2.SVLOAD
3.UP-DOWN
4.LEFT-RIGHT
5.COLOR
6.AREA-VOLM
7.HISTOGRAM
```

V1.20:   Software version number

3.7.1 Cine Loop

---- [Freeze] the image first, then **M/0**   key to display FUNCTION MENU on the screen.

---- Repeat **M/0** key, start playback.

---- Stop the film by pressing any direction key. Press **▲3** and **▼6** up and down to choose the one you like best shown on the screen.

---- It is about 30 seconds when the first capture is done.

---- There are up to 400 images saved in Cine Loop.

---- When in B+B mode, Cine Loop can be displayed in difference sectors switching by pressing [BB/B] key.

---- Press [Freeze] to exit.

3.7.2 Image Save

---- [Freeze] the needed image first, press **M/0** to generate FUNCTION MENU on the screen.
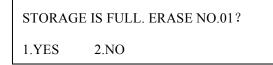
---- Select "1.SAVE' by pressing the key of ⊕/**1**. There is sentence showing on the left top of screen "SAVING …. 5".   This sentence will be disappeared when the image is saved properly.

---- There are up to 64 images can be saved permanently in the built-in memory. They are recorded in 2 bit numbers from "01" to "64" in turn.

For example:

If there are 23 images previously saved already, the next one only can be saved as 24.

---- A Questioning Window will be shown on the screen if the memory is full.

STORAGE IS FULL. ERASE NO.01？

1.YES   2.NO

* Choose "1" by pressing ⊕/**1**. The current image will be saved as No.01. The previous one is erased automatically.

* Choose "2" by pressing +/**2**. The current saving is stop. Then the system will ask you for "ERASE NO.02", if not, again asking for NO. 03…., and so on.

Notes：

You are suggested to pick out some images when the memory is full, otherwise the questioning window will be generated on the screen from time to time.

3.7.3 Image Unload

---- Press **M/0** to have FUNCTION MENU displayed on the screen.

---- Select "2. UNLOAD" by pressing the key of +/**2**, the sub-menu appeared on the screen:

PLEASE ENTER STORAGE NO.:

▉

---- In put the number, 2 bits as one group. The maxi records in the memory is from 01~64.

---- Press [Clear] to erase the wrong number(s).

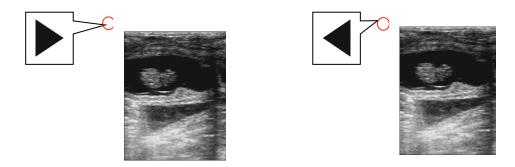---- Press [Freeze] to exit and the system is back to real-time statue.

3.7.4 Image Up/Down

---- Press **M/0** to have FUNCTION MENU displayed on the screen.

---- Select "3. UP-DOWN" by pressing the key of ▲**3**.

---- Repeat ▲**3** key and back to normal.

3.7.5 Left/Right

---- Press M/0 to have FUNCTION MENU displayed on the screen.

---- Select "4. LEFT-RIGHT" by pressing the key of ▶4

---- Repeat ▶4 key and back to normal.

---- The triangle mark on the left top of screen gives the direction of the probe. The default direction is given left.

Picture 3-3. Image left /right

3.7.6 Color

In this program, you can have the echoes, characters on the screen, even the background of the interface set in difference.

---- Press M/0 to have FUNCTION MENU displayed on the screen.

---- Select "5. COLOR" by pressing the key of 5◀, the following sub-menu appears on the screen:

```
PLEASE ENTER COLOR:

1.IMAGE    2.CHAR    3.BACKGROUND
```

---- Press ⊕/1, the echo will be coded in difference colors. Repeat it for loop setting among Grey, Red and Yellow.

---- Press +/2, the characters on the screen will be coded in color in White and Yellow. Repeat it for switching them.

---- Press ▲3 to set the background color between Grey and Blue color.

---- Press [Clear] to exit.

3.7.7 Area/ Volume Measurement

---- Press M/0 to have FUNCTION MENU displayed on the screen.

```
PLEASE ENTER:

1.FREEHAND    2.ELLIPSE
```

---- Select " 6.AREA-VOLM" by pressing the key of ▼6. The below sub-menu will be displayed on screen:

---- There are 2 ways available for your choice to do Area/Volume Measurement: by freehand or by Ellipse

By Freehand:

---- Press ⊕/1 to select the way by **Freehand**:

    * A caliper will be shown on the screen.

    * Move the caliper to the starting point first with the direction keys ▲3, ▶4, 5◀, ▼6.

    * Press [Measure] and then direction keys ▲3, ▶4, 5◀, ▼6. There will be a trace along the focus edge.

    * Press [Measure] again to end this measurement.

    * Back to Function MENU and choose "6. ARE-VOLM" again, another measurement can be done.

    * The measure result(s) will be shown automatically at the left side of screen.

> C1 & A1: perimeters of 1st group；
>
> C2 & A2: perimeters of 2nd group；
>
> C1/C2:　ratio of two perimeters；
>
> A1/A2:　ratio of two areas.

By Ellipse:

---- Press +/2 to select the way by **Ellipse**:

    * A caliper will be shown on the screen.

    * Move this ellipse to the focus with the direction keys ▲3, ▶4, 5◀, ▼6.

    * Press [Measure], the direction keys are activating to adjust the ellipse size. To enlarge it by pressing ▲3 and ▼6 keys in vertically, and to narrow it by pressing ▶4 and 5◀ keys in horizontally.

    * One more pressing of [Measure], the direction keys are activating to adjust the ellipse angle. To turn its angle anticlockwise by 5◀, and clockwise by ▶4 .

    * Third pressing of [Measure], the direction keys are back to move the ellipse up/down/left/right again.

    * Adjust the ellipse till it matches the focus.

    * Back to Function MENU and choose "6. ARE-VOLM" again, another measurement can be done.

    * The measure result(s) will be shown automatically at the left side of screen.

3.7.8 Histogram

---- [Freeze] the image first and then press **M/0** to have FUNCTION MENU displayed on the screen.

---- Select "7.HISTOGRAM" by pressing the key of **B/7**, a sampling window displayed:

---- Press the direction keys to move this window to the area where needed for checking.

---- Press [Reference] on keyboard of scanner

X axis stands for grey scale, and Y axis stands for number.

PT stands for the total number of pixels in the rectangular window.

Gm stands for the grey scale of the curve at the peak of the Y axis.

Pm stands for the number of pixels in Gm grey scale.

From the above figure, in the rectangular area, the total number of pixel dots is 10000. At dray scale 52, there are 327 dots, the most image pixel dots.

---- Press **⊕/1** or **+/2** key to enlarge or narrow this window.

---- Press [Clear] to exit.

3.7.9 Image Erase

---- Press **M/0** to have FUNCTION MENU displayed on the screen.

---- Select "8. ERASE" by pressing the key of **BB/8**. A sub-menu appears on the screen:

ERASE ALL STORAGE?

1.YES   2.NO

---- Choose "1" by pressing key of **⊕/1** to confirm. A sign "ERASE…" appears on the left top of screen for about 1 minute or longer time. The memory is empty completely when this sign is disappeared.   Any other operation is invalid when the sign is on the screen.

---- Choose "2" by pressing key of **+/2**, also exit this program.

3.7.10   Output

The outputting format of this system can be changed manually.

---- Select "9.PALD-NTSC" by pressing the key of **BM/9**, a Dialog Box shown on the screen:

> PLEASE ENTER VIDEO：
> 1.PALD   2.NTSC

---- Choose "1" by pressing $\oplus$/**1** key.
---- Choose "2" by pressing +/**2** key.

3.8 Distance Measurement

---- [Freeze] the image first.
---- Press +/**2** to generate a caliper displayed on the screen.
---- Move the caliper to the start point with the direction keys ▲3, ►4, 5◄, ▼6.
---- Press [Measure] to confirm the starting point of Measurement.
---- Press the direction keys ▲3, ►4, 5◄, ▼6 to move the caliper. There is a line with dots while moving the caliper.
---- Press again [Measure] key to switch the Starting and Ending point.
---- Press the key of $\oplus$/1 to end this measuring. Then, the distance result will be displayed on the right side of screen.
---- Repeat the above steps to have another caliper showing on the screen. The 2nd measurement can be done.
---- There are maxi 4 groups measurement can be done under this program. Each measurement will be marked D1, D2, D3 and D4.

Notes：

There would be limitations in this measurement with direction keys. You can to buy the optional trackball for easy and simple operation.

3.9 Volume Measurement

Two B mode images must be obtained and frozen on difference B+B. One image must be in cross section and another one must be in longitudinal section.

There are 2 ways to do Volume measurement. One is by 3-axis and another is by ellipse method.

By 3-Axis Method:

---- Two Distance Measurements (X and Y) to must be done on cross section along the focus, and one Distance Measurement (Z) must be done on another longitudinal-section image, along the focus too.

---- These three group results will be displayed automatically at the left side of screen marked as D1, D2, and D3.

---- Press M/0 to active the system to do Volume Calculation automatically and showing its result in "Vm1: " at the left side of screen.

---- Of course, three group measurements allowed to be done for this focus.

---- Volume calculation will not be available if three distance-measurements are not done.

By Ellipse Method:

---- Press M/0 to have Function Measurement shown on and select ▼ 6 to active Volume Measurement. An ellipse displayed on. Move it to be on the cross-section image.
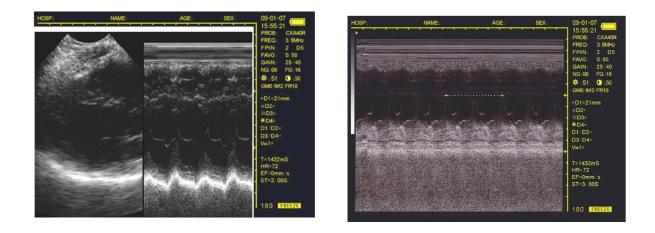
---- Reference Article 3.77 to the measurement of focus.

---- Then another ellipse on and move to the longitudinal-section image.

---- Same measurement done on n section according to Article 3.7.7.

---- Then, the Volume Result will be calculated automatically and shown in "Vm1: "at right side of screen.

---- Of course, three group measurements allowed to be done for this focus.

---- Volume calculation will not be available if two ellipse-measurements are not done.

3.10 Heart Rate Measurement

（only available in "B/M" and "M" Modes）

---- On B/M or M mode, a satisfying cardiograph frozen.

----- 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 (unit:s).

B/M Mode   Single M Mode

Picture 3-4 Illustration of Heart Rate Measurement

3.11 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.

----- [Freeze] the image first and then [Reference] to generate OB Menu shown on the screen.

----- There are two pages in all by repeat [Reference] to be turned up and down.

Page1
```
0.  EQUINE：GSD
1.  BOVINE：BL
2.  BOVINE：SL
3.  BOVINE：HL
4.  SWINE：HL
```

Page2:
```
0.  CAT：HD
1.  CAT：BD
2.  DOG：GSD
3.  DOG：CRL
4.  DOG：HD
```

---- Select the item by pressing its Corresponding number key. A caliper shown on and move it to the start point with the direction keys.
---- The result will be showing automatically in the corresponding item at the side of screen. Such as " GSD: ", or "GA: ", and so on.
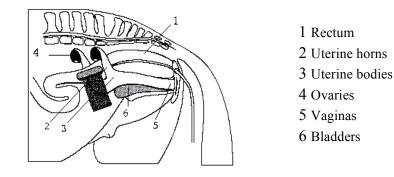---- More details reference below:

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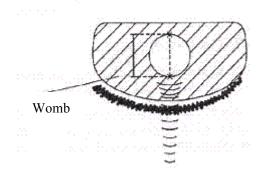
Calculate the gestation age according to horse GS

Steps on equine:

1. Clear off the rectum area.
2. Feel the pregnancy with hand to give a primary estimation then exam the organ with the 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:

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

Picture 3-5. 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.
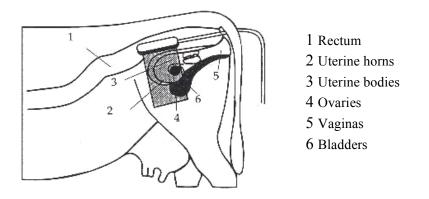

Womb

Picture 3.6 Equine GA measurement

6. Confirm 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.

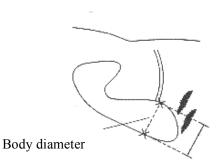◎ **BOVINE-BL：**

Calculate the gestation age according to bovine BL

1. Clear off the rectum area.
2. Feel the pregnancy with hand to a give a primary estimation then exam the 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:

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

Picture 3-7. 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 sides to the neck, chest and abdomen. Body diameter can be acquired when the GA is between 60 to 150 days.

The measurement method of body diameter is given below:

Body diameter

Picture 3-8. BL measurement

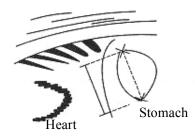6. Confirm the distance value as per distance measurement methods and the corresponding data display behind "G·A".

◎ **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 axial of the stomach should be displayed on the screen. With the time going on, fetus stomach long axial increases regularly. The measurement method is given below:

Picture 3-9. Bovine stomach measurement

4. Confirm the distance value as per distance measurement methods and the corresponding data display behind "G·A".
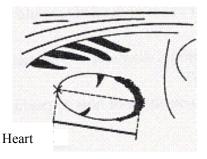
◎ **BOVINE-HL：**

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 axial of the heart should be displayed on the screen. With the time going on, fetus heart long axial increases regularly. The measurement method is given below:

Picture 3-10uvine heart measurement

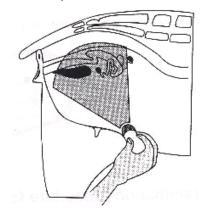5. Confirm the distance value as per distance measurement methods and the corresponding data display behind "G·A".

◎ **SWINE-HL：**
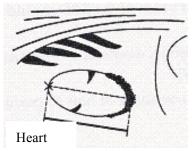
Calculate the gestation age according to SWINE HL

1. Keep the swine standing.
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 3-11wine 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:

Heart

Picture 3-12. Swine Heart measurement

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

Rectum 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 3-13 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 for equine.

◎ **DOG-CRL:**

Calculate the gestation age according to dog CRL

The method is the same as for cow.

◎ **DOG-HD：**

Calculate the gestation age according to dog HD

The method is the same as for cat.

◎ **DOG-BD:**

Calculate the gestation age according to BD

The method is the same as for cat.

Note: After display the OB menu, press [Clear] 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	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 Checking & Maintenance

4.1 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 over the time.

Note：
Discard the device according to local law.

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

4.2 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 immediately.

Check if the probe and main unit are properly connected.

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 any damage or breakage, replace immediately.

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

4.3 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 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.

4.4 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 [Freeze] 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 10-1, 10-2, 10-3, 10-4). Regularly check the probe enclosure to ensure it is good in case liquid spoil the inner components.
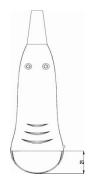

Figure 4-1. R50/3.5MHz Convex probe protection against water ingression sketch map
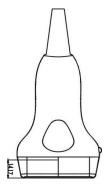

Figure 4-2. R20/5.0MHz Convex probe protection against water ingression sketch map

Figure 4-3. 7.5MHz HF Linear probe protection against water ingression sketch map

Figure 4-4. Rectal probe protection against water ingression sketch map

Note:

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

4.5 Cleansing

The use of ultrasound probes exposed to risks of contamination. Therefore, maintenance of the probe is essential. After using the device, remove the gel from the probe and clean it with a paper soaked in disinfectant detergent solution.

Never use solvents, pure alcohol, bleach for cleaning the probes, which would cause damage.

The surface of the ultrasound should be cleaned with a damp cloth and mild soap.

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 that 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.

4.6 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 then connect or disconnect the probe.
3. Do not drop probe or flint body and never hit the probe acoustic window, otherwise probe could be damaged.
4. Never overheat the probe.
5. Never bend or pull probe cable; otherwise the internal connection could be broken.
6. Use coupling agent (ultrasonic gel) only on probe header and then clean probe after usage.
7. Inspect probe acoustical window, enclosure and cable seriously after probe cleaning. Never use the probe again if any crack or breakage.

Appendix A Acoustic output reporting table

B mode

Frequency: 6.5MHz
Transducer Model: linear

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1cm^2$	$A_{aprt} > 1cm^2$		
Maximum index value			0.507	0.043	-	-	-	Note
Associated acoustic parameters	P_{ra}	(MPa)	1.170					
	P	(mW)		6.8	-		-	#
	Min.of $[P_\alpha(z_s), I_{zpta,\alpha}z_s)]$	(mW)				-		
	Z_s	(cm)				-		
	Z_{bp}	(cm)				-		
	Z_b	(cm)						
	Z at max. $I_{pi,\alpha}$	(cm)	2.30					
	$d_{eq}(Z_b)$	(cm)					-	
	f_{awf}	(MHz)	5.331	5.331	-	-	-	#
	Dim of A_{aprt}	X (cm)		4.00	-	-	-	#
		Y (cm)		0.90	-	-	-	#
Other information	t_d	(µsec)	0.334					
	prr	(Hz)	4800					
	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					
Operating control conditions	Depth		40mm					
	Focal Position		2D3					

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

Transducer Model: convex

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1cm^2$	$A_{aprt} > 1cm^2$		
Maximum index value			0.463	0.063	-	-	-	Note
Associated acoustic parameters	P_{ra}	(MPa)	0.799					
	P	(mW)		27.3	-		-	#
	Min.of $[P_\alpha(z_s), I_{zpta,\alpha}z_s)]$	(mW)				-		
	Z_s	(cm)				-		
	Z_{bp}	(cm)				-		
	Z_b	(cm)						
	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	-	-	-	#
Other information	t_d	(μsec)	0.589					
	prr	(Hz)	6490					
	p_r at max. I_{pi}	(MPa)	1.181					
	d_{eq} at max. I_{pi}	(cm)					-	
	$I_{pa,\alpha}$ at max. MI	(W/cm²)	25.76					
Operating control conditions	Depth							
	Focal Position							

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

Transducer Model: C1-12

Index label			MI	TIS			TIB	TIC
				Scan	Non-scan		Non-scan	
					$A_{aprt} \leq 1cm^2$	$A_{aprt} > 1cm^2$		
Maximum index value			0.349	0.042	-	-	-	Note
Associated acoustic parameters	P_{ra}	(MPa)	0.732					
	P	(mW)		6.3	-		-	#
	Min.of [$P_\alpha(z_s)$, $I_{zpta,\alpha}z_s$)]	(mW)				-		
	Z_s	(cm)				-		
	Z_{bp}	(cm)				-		
	Z_b	(cm)						
	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	-	-	-	#
Other information	t_d	(μsec)	0.312					
	prr	(Hz)	4800					
	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 control conditions	Depth							
	Focal Position							

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) (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

Gestational Table 2: Bovine

Measurement (mm) (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

All measurements +/- 3 days

Gestational Table 3: Sheep

Measurement (mm) (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

All measurements +/- 3 days