

User Manual

Portable Ultrasound Scanner V12



Veterinary Ultrasound Scanner

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Preface

To ensure safe and correct operation of the system, read carefully and understand this operator’s manual before operating the system

1.1 Product Information

Product Name: Veterinary Ultrasound Scanner


Symbols in Operator’s 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 user 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 malfunctions and generates an overcurrent, or when there is an instantaneous current at power ON, the circuit breakers and fuses of the buildings supply circuit may be tripped.
6. No waterproof device is applied to the system. 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 transducers specified in this manual. Using transducers not specified in this manual may damage the system and transducer or even cause an accident such as a fire.
9. Use the transducer carefully. In case that the human body contacts the scratched transducer surface, immediately stop using the transducer and contact our company's Customer Service Department or your local distributor. Using scratched transducer may cause electric shock.
10. If finding any abnormality in the system or transducer 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 transducers and needle-guided brackets as the transducers manuals describe before using them.

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. If the system or other equipment are defective, electric shock may occur.
14. Do not subject transducers to knocks. Using defective transducers may cause electric shock.
15. Do not open the shell or panel. Opening the shell or panel when the system is connected to the receptacle may cause short circuit or electric shock.
16. Before moving the system, power it off, close the control panel and then remove all connections (including connections to transducers). Then hold the system's handle to move the system to a proper location carefully.
17. Before cleaning the system, power it off and remove the power plug from the receptacle to avoid electric shock.
18. To avoid system damage or electric shock, do not remove the power plug before turning off the system.
19. 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 apply the transducer to the same spot on the patient for a long time. Apply the transducer only for as long as required time for diagnosis.
 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. Nerve disorders. Observe the local safety/health regulations.
 5. If the circuit breaker is tripped or the fuse is blown, 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 are 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.

NOTE :

1. Do not use the system in the vicinity of strong electromagnetic field (for example a transformer), 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 no direct sunlight, no sudden changes in temperature, no condensation, few dust, no vibration, and far from heat generators.
4. After turning off the system, wait at least 10 seconds before turning it on again. Otherwise, failure may occur.
5. Before connecting/disconnecting the transducer, turn off the system or stop emitting (freeze the image). Otherwise, the system or transducer may malfunction.
6. After using the transducer, remove the gel on it.
7. If the system is used in a small room, the room temperature may rise. Proper ventilation must be provided.
8. Do not cover radiation holes on the system.
9. Only engineers of our company or authorized by our company can replace the fuses.
10. Only perform operations described in this manual.
11. Do not modify system parameters.
12. Deterioration of electrical and mechanical safety characteristics (such as generation of a leakage current or deformation/abrasion of mechanical parts) and of image sensitivity and precision may occur over a period of time. Check and maintain the system periodically to ensure system performance.
13. To dispose of the system or any parts contact our Customer Care 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.

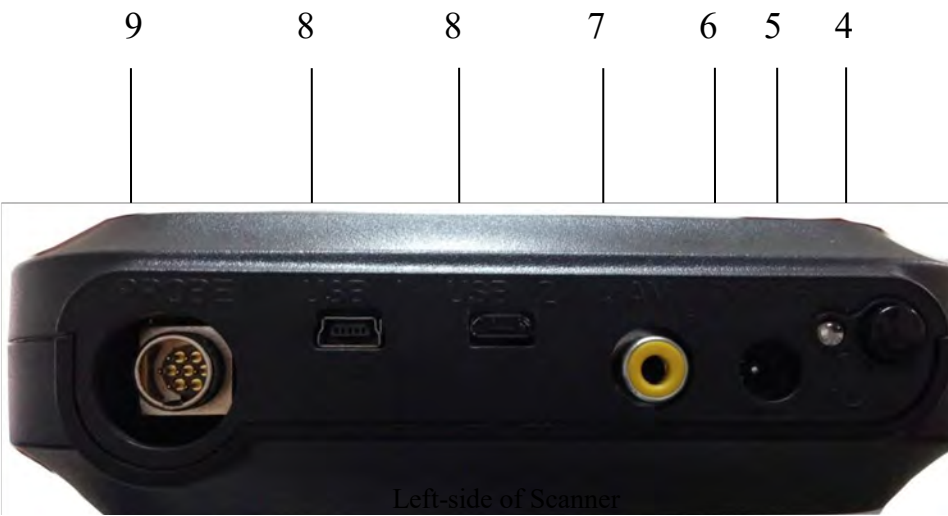
1 System Basics

This ultrasound scanner is suitable for diagnosis on pigs, dogs, cats, sheep and other animals.

1.1 Structure




Front-side of Scanner



Left-side of Scanner



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		Power switch
5	Power Indicator	It will be lighten when the machine is turn on.
6	DC12.6	Connection of AC-adaptor, input power supply is by DC12.6V
7	AV port	Video output to see real time images in your TV or monitor.
8	USB-1, USB-2	The factory uses these USB ports for the main unit maintenance.
9	Probe	Probe connection
10	Nut holes	4 nut holes to install the scanner bracket (optional)
11	Battery Lock	Lock/unlock the battery

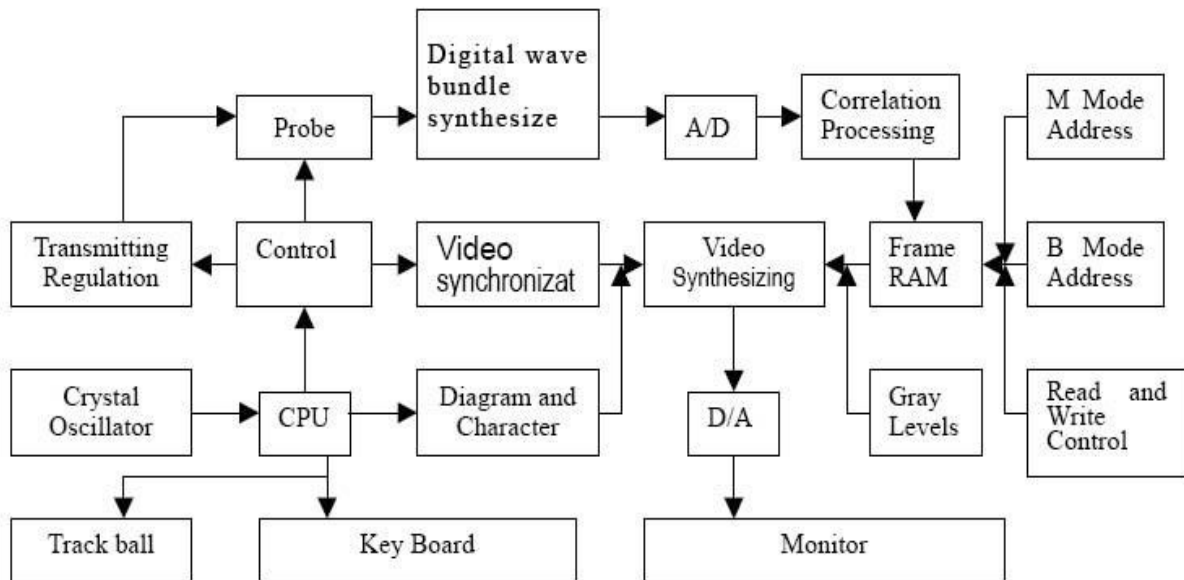
1.2 Main Features

- ◆ Light weight (700g) and portable, perfect for outdoor use and farms.
- ◆ Compact main unit with shoulder & wrist belts 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 V12
Probe		3.5MHz Mechanical Sector Probe (multi-frequency)
Detect Depth (mm)		≥140
Resolution	Lateral	≤4 (Depth≤80)
		≤5 (80<Depth≤130)
(mm)	Axial	≤2 (Depth≤80)
Blind zone (mm)		≤8
Geometric position precision	Horizontal	≤20
	Vertical	≤10
Monitor size		5.5 inch
Display mode		B, B+B, B+M, M
Image gray scale		256
Scan Depth (mm)		120~190, 8 levels adjustable
Measurement		Distance, circumference, area, volume, heart rate. GA, EDD
Annotation		Hospital, name, age and Sex. It is allowed for full screen editor
Battery Capacity		2200mAh
Mainframe power consumption		13W at non-charging/ 25W at charging
Adapter power consumption		45W
Main unit weight		700g

1.4 Principle diagram



Electric principal block diagram

2 System Connection

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

2.1 Environmental Requirements

1. Environment temperature range: +5°C~+40°C
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 "Check 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

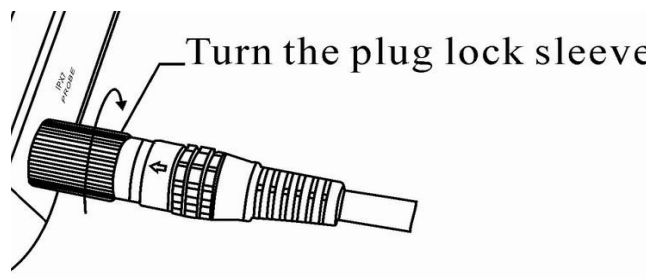
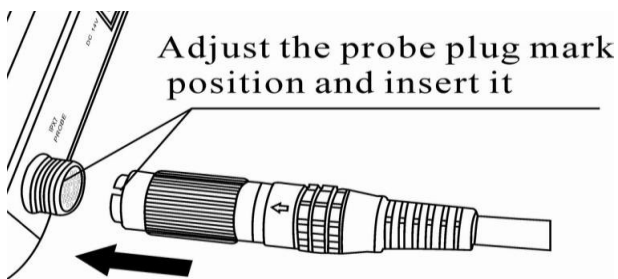
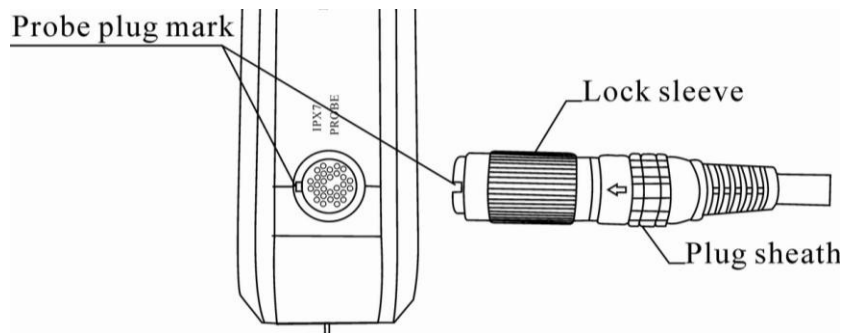
The probe socket lies in the right side of the equipment. There is only one port for the probe.

Probe Connection:

- Step 1: Match the marks of both the probe socket and the plug.
- Step 2: Put the plug into the socket along the marks.
- 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 connection sketch

Warning :

Avoid by all means unplugging or plugging the probe when the main unit is turned on, it can cause permanent damage to the main unit and probe.

Once the probe is connected to the main unit, do not unplug nor plug it unless the main unit is turned off.

Warning :

Do not touch the pins 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.



1. Push the battery into the rabbet like the arrowhead with little force

Attention: Don't Force it.



2. Lock the battery as shown in the photo. The battery is now installed perfectly.

Lock of the battery-box

Battery Disassembly:



1. Put the button to un-lock position along the director as the arrow.



2. Take the battery as shown in the photo.

2.4 Power Supply

2.4.1 Supply via Adapter

1. Plug the power adapter into an outlet.
2. Plug the power cord into the AC input outlet.
3. Turn 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.

Note :

When the main unit “beeps” or chime means that it is running out of battery.

Warning :

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

2.5 Battery Charging

You can recharge the battery using the power adapter:

2.5.1 Charging via Scanner

Plug in the power adapter to the main unit (ultrasound) to recharge the battery. It takes about 3 hours to fully charge the battery, to see if the battery is charging you can turn on the main unit and check the battery icon located in the upper-right of the display.

You can recharge the battery while using your ultrasound.

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. *You can use the ultrasound while recharging the battery.*

2.6 Startup

1. Before the startup, complete the following checks:

- The scanner is placed in a clean location where there is no direct sunlight, no sudden changes in temperature, no condensation, no dust, no vibration, and far from heat generators. Ensure at least 20cm/ 5 inches 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, connector and cable(s) are intact.
- The probe is 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, ensure their power plugs are connected to the main unit meeting requirements.

3. Turn on the scanner. For peripherals to be used turn them on.

4. After the startup, check the system as follows.

WARNING : If you find any abnormality, turn off the system and see if the section lists any solution for the problem. If not, contact Customer Care or your seller.

- 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 Turn off the scanner.
- 2 Disconnect the probe.
- 3 If the scanner will not be used for a period of time, remove power plugs from the scanner.
- 4 Clean and disinfect the probe(s) (see 10.4 probe maintenance and 10.5 cleaning for details)
- 5 Clean main unit.

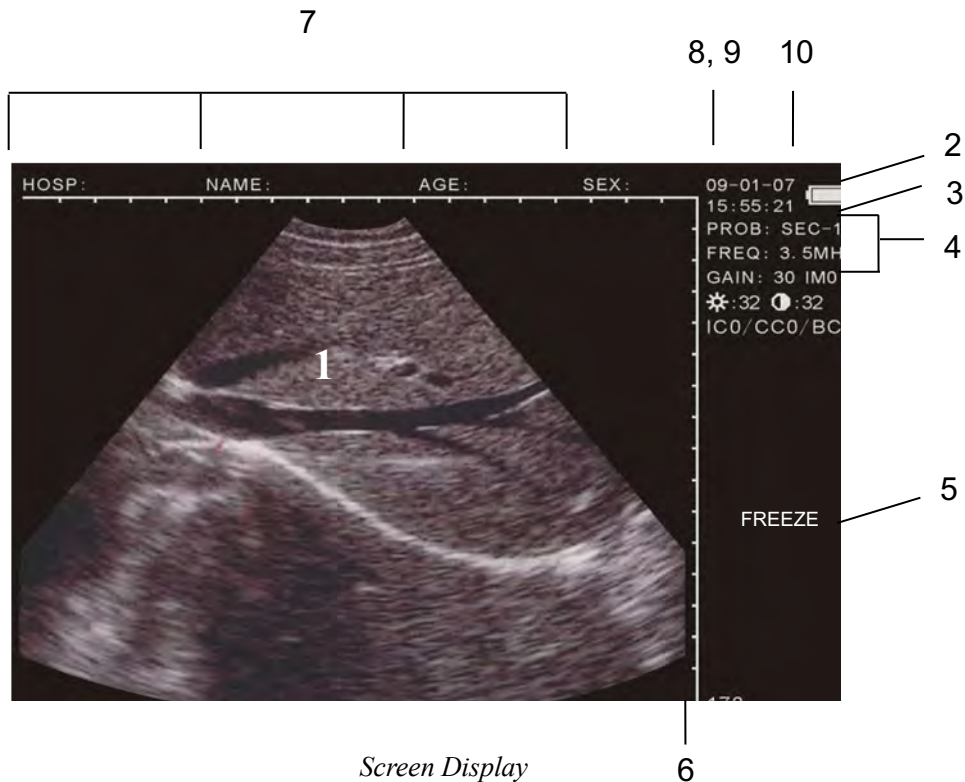
NOTE : The system can be turned on again at least 10 seconds after it is turned off.

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



Screen Display

No.	Part	Description
1	Echo Area	The echo image showing here.
2	PROB	PROB: SEC-18
3	FREQ: 3.5MHz	The current probe's working frequency
4	Current Image Parameters	<ul style="list-style-type: none"> ● GAIN --- The current Over-all Gain setting. ● ☆ --- Set Brightness of the screen. ● ●: --- Set Contract of the screen. ● IC0 --- Image coded-color ● CC0 ---Character color ● BC0 ---Screen background color (see Article 3.8 Parameters Setting)
5	FREEZE	Defining the echoes is in real-time or frozen.
6	DEP: 180	Current Scanning depth

7	Annotations	<ul style="list-style-type: none"> • Hosp: ---- Hospital name. • Name: ---- Patient name • AGE: --- Patient's age. • SEX: --- Patient's sex by F and M defined. (see Article 3.4.5 Annotation Menu)
8	Current Date	Current date of the scanner (The date displayed on the frozen image is the date when the image is frozen)
9	Current Time	Current time of the scanner (The time displayed on the frozen image is the time when the image is frozen)
10	Battery Indicator	Current battery power indicator

3.3 Operating procedure

1. Turn on the scanner by switch on its power-switch on the rear panel.
2. There is a word "welcome" showing on the screen. Then to press any one of key on the keyboard to have the system get into working-ready interface.
3. Press the key of "MENU" to input all the needed information of patient, such as HOSP, NAME, AGE and SEX.
4. Spread ultrasonic coupling agent on the probe acoustic shadow surface, and close to the scanning area, then the real-time image can be observed on the screen.
5. Freeze the image first when the measurement needed to be done on the image

3.4 Power on/off

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 screen.

Press any key (except **FREEZE** and **Esc**) to enter the working statue.

Press it up and off the indicator light. The machine is off power supply.

Attention:

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

3.5 Diagnose


Spread medical coupling agent (ultrasonic gel) on diagnostic area and place the probe's reading area 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.

3.6 General Setting





The parameters at the top right corner of the screen will be changed while you do the setting.

PROB: SEC-18
FREQ: 3.5MHZ
GAIN: 31 IMO
☆: 36  30
IC0/CC0/BC0








3.6.1 How to set probe's working frequency?

- Press  and  to light "FREQ" as showing above first. This movement is loop design.
- Press  and  to select the needed frequency from 2.5/3.5/5.0MHz.

3.6.2 How to adjust the over-all gain?

- Press  and  to light "GAIN" first.
- Press  and  to select the needed frequency from 0~60. The default setting is on 30.

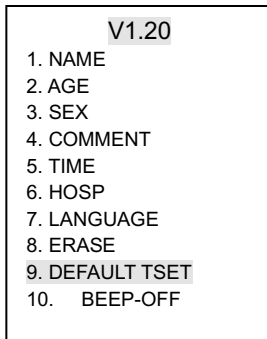
3.6.3 How to adjust the Brightness or Contrast?

- Press  and  to light "☆" or " first.
- Press  and  to select the needed Brightness from 20~46. The default setting is on 32.
- Press  and  to select the needed Contract from 16~48. The default setting is on 32.

Important:

- All above setting can be memorized automatically and the system will be under the previous settings when you turn on the machine again.
- The imaging quality is best when it is under its default setting. You are strongly suggested to not adjust "Brightness" nor "Contrast" if they are hardly needed.
- You can have the system back to DEFAULT setting whenever you are confused with the setting.

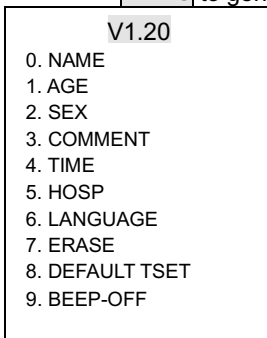
3.6.4 How to back to Default setting?



- Press **FREEZE** first, the signal FREEZE will be shown at the right bottom of the screen.
- Press **MENU** key to generate the main menu displayed on the screen.
- Choose "8. Default Tset" by pressing number **BB/8** key. The system will be back to the default setting.

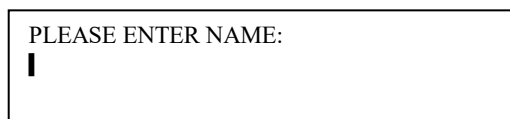
3.6.5 Annotation

- Press **FREEZE** key to have FREEZE lighten at the right bottom screen first.
- Press **MENU** to generate the main menu displayed on the screen.



• Name Input

--- Choose 0. NAME by pressing key **M/0** key. There is sub-menu shown at the bottom of screen.



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

--- Select the number key to choose the needed character to fulfill the name.

--- Press **6 ▼** or **3 ▲** to turn pages for more characters choosing.

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

- Press **Clear** to erase the wrong letter(s) input previously.
- Press **MENU** to confirm the characters chosen and the needed ones will be showing at the top screen in NAME item.

• Age Input

- Choose 1. AGE by pressing key **/1** key. There is sub-menu shown at the bottom of screen.

PLEASE ENTER AGE:
 |

- Press the needed numbers. The maximum 3 numbers.
- Press **Clear** to erase the wrong number(s) input previously.
- Press **MENU** to confirm and the need number will be showing at the top screen in AGT item.

• Sex Input

- Choose 2. SEX by pressing key **+2** key. There is sub-menu shown at the bottom of screen.

PLEASE ENTER SEX
 1.MALE 2. FEMAL

- Choose the related key and the SEX letter will be shown at SEX time on the top of screen.

• Comments input

- Choose 3. COMMNET by pressing key **▲/3** key. The 1st page of character table will be shown at the bottom

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


- Press the arrow keys **3▲**, **6▼**, **5◀**, **▶4** to move the cursor to the wanted position first.

- Press **Reference** or **Measurement** to turn pages for more characters choosing.

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

- Press **Clear** to erase the wrong letter(s) input previously.
- Press **MENU** to confirm the characters chosen and the needed ones will be showing at the top screen in NAME item.

• Current time

--- Select 4. TIME by pressing the key , the following sub-menu appears on the screen:

YY-MM-DD

■

HH-MM-SS

- 2 bytes allowed in each item. Input "13" to indicate the year of 2017.
- 24 hours setting for the current time.
- The cursor will be switched to the next line for real-time clock setting.
- Press **CLEAR** key to erase the previous letter(s) if needed.
- Press **MENU** key to confirm the setting the re-setting the current time will be showing at the left top corner of the screen automatically.

• Hospital Name (Farm Name)

(Same procedure as NAME input)

• Erase saved images

---- Select 7. ERASE by pressing the key of **B+M/9**, the following sub-menu appears on the screen:

ERASE ALL STORAGE?

1.YES 2.NO

- Select 1 or 2 by pressing its related numerical key "1" or "2".
- There is a prompt in words of "ERASING...." appeared on the left top of screen when "1" is selected. Any operation is forbidden when this prompt is on.
This prompt will be disappeared automatically when it is finished.

Attention:

All above setting would be saved automatically and the system will remain the previous setting when you turn on the machine again.

3.7 Keyboard

3.7.1 keyboard

This is an image of the device keyboard:



Keyboard



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.

Function keys are effective when the system is in real-time. The description will be in difference keys below.

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 for functions keys:

- **M 0** when the scanner is in real-time.

--- Press it when the system is in B+M mode, then it will be switch to M mode.

--- Press it when it is in B, B+B mode, the following function menu will be generated on the screen.

V1.2
0: SAVE
1: SVLOAD
2: IMAGEPROC
3: COLOR
4: AREA-VOLM
5: HISTOGARM

--- See Article 3.9 for more details about Function Menu.

- **M 0** under **MENU** key (when the scanner is frozen)

- Press **Freeze** first, then press **MENU**; the main menu will be shown on the screen.
- Reference Article 3.6.5 for more details.

- **/1** **Image Magnification** (available in real-time)

- Press it to have the image magnified at difference depth when the scanner is in real-time status.
- The depth range is between 65~190 mm in 8 difference levels.
- The eight (8) levels are as: 190-180-160-140-120-100-80-65mm.

- **+ /2** **Caliper**

- 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.
- When 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 Mode**

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

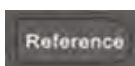
- Press it to have the scanner in B mode whenever it is in real-time or frozen.

- **B+B /8** **B+B Mode**

- 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.

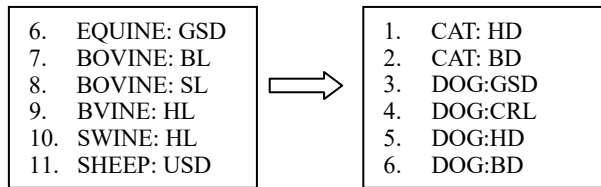
- **B+M / 9** **B+M Mode**

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



Reference Key (when scanner is freeze mode)

- Press “Reference” then the measurement menu is displayed on the screen.
- There are two pages in the menu. Press “Reference” once again to turn to the 2nd.

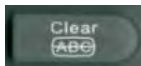


- Select the number you need to choose the right item for the measurement. Reference Article 2.4 for more details about the procedure.
- Press **Clear** to exit.



Measure Reference (when scanner is frozen)

- When the scanner is in frozen, this key is for function of Measure Reference.
- Reference Article 2.7 for more details.
- Press **Clear** 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.

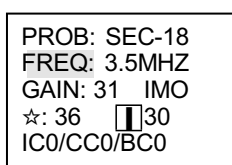


Reset

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

3.8 Parameters Setting

The parameters listed on the right side of the screen are all could be re-set by the operator when the system is in real-time.



- Press key **5** and **4** to light the item you want to do modification. These items are cycle design tube lighten by press these two keys.
- Press key **3** and **6** to set the wanted parameters.
- The re-setting parameters are showing in numbers at the left top corner of the screen automatically.

3.8.1 How to set probe frequency?

- Press **5** or **4** to light FREQ first.
- There are three frequencies 2.5/3.5/5.0 for your choice. Press **3** and **6** to make the selection.

3.8.2 How to set Gain?

- Press **5** or **4** to light FREQ first.
- Press **3** and **6** to make the selection.
- The adjustment range is 00~60.
- The default-set is 30.

3.8.3 How to set Brightness & Contrast?

- Press **5** or **4** to light ☀ or 🌑 first.
- Press **3** and **6** to make the selection.
- You are suggested not to make modification frequently if you are not with rich experience.
- The default-set are all in 32.

3.8.4 How to set the Image coded-color?

- Press key **M / 0** to generate the function menu appeared on the screen.

	V1.2
1.	Save
2.	SVLOAD
3.	IMAGEPROC
4.	COLOR
5.	AREA-VOLM
6.	HISTOGARM

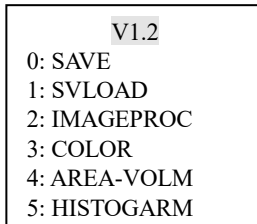
- Press key **3** to light IC0 first. IC is the short for Image Color.
- There are 4 difference coded-color designed in this system. Press **3** and **6** to make the selection

IC0:	black/white
IC1:	red
IC2:	yellow
IC3:	blue

- The default-set is on IC0 (black/white).

3.8.5 How to set the character's color?

--- Press key **M / 0** to generate the function menu appeared on the screen.



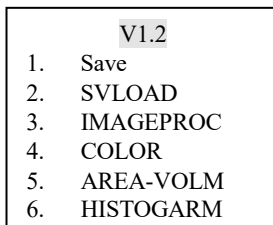
--- Press key **▲3** to light CC0 first. CC is the short for Character Color.

--- There are 2 difference color designed in this system. Press **▲3** and **▼6** to choose "0" for white color and "1" for yellow color

--- The default-set is on CC0 (white).

3.8.6 How to set the color of screen background?

--- Press key **M / 0** to generate the function menu appeared on the screen.



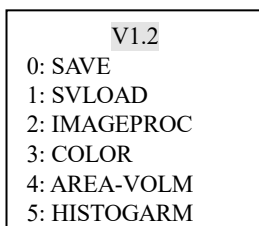
--- Press key **▲3** to light BC0 first. BC is the short for Background Color.

--- There are 2 difference color designed in this system. Press **▲3** and **▼6** to choose "0" for grey color and "1" for deep blue color

--- The default-set is on BC0 (grey).

3.9 Functions Menu

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: Software version number

3.9.1 Image Save

- Press **FREEZE** key first to lighten FREEZE on the bottom right screen.
- Then press **M / 0** key to generate FUNCTION MENU on the screen.
- Select "0.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.
- The max. 128 images can be saved permanently in the built-in memory.
The saved images are recorded in 1~3 bits number from "01" to "127" in turn.

For example:

If there are 128 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.

- Press key **FREEZE** again to have the machine back to real-time.

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.

3.9.2 Mage Review

- Press **M / 0** to have FUNCTION MENU displayed on the screen.
- Select "1. UNLOAD" by pressing the key of **+ / 2**, the sub-menu appeared on the screen:

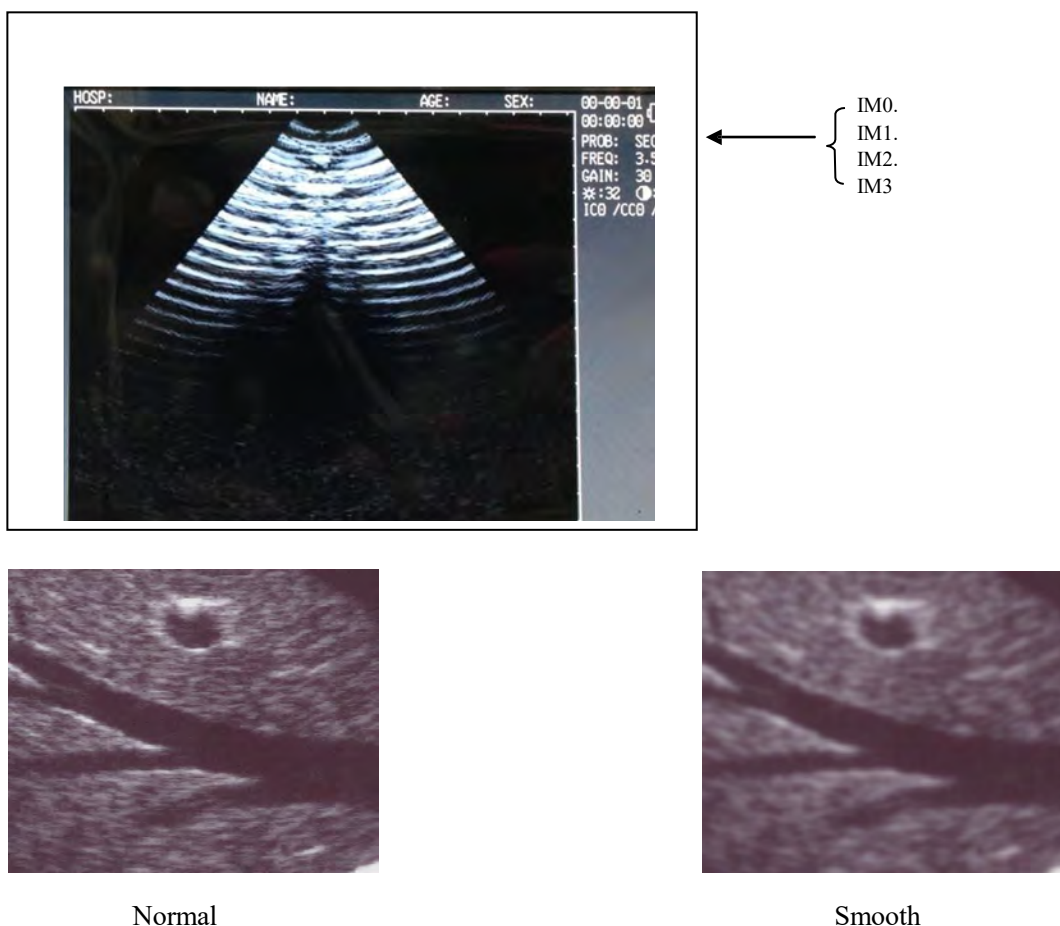
PLEASE ENTER STORAGE NO.:



- Input the number you selected. The maxi records in the memory is from 1~128.
- Press **Clear** to erase the wrong number(s).
- The selected image will be re-shown on the screen and **9/128** will be displayed in the bottom left screen. "9" is saved code for the current image and "128" stands for the storage volume. At this time, press **▲3** or **▼6** to pick up images in the memory one by one.
- Press **Freeze** to exit and the system is back to real-time statue.

3.9.3 Image Procession

- This function is not available when the system is not in real-time.
- Press **[M / 0]** to have FUNCTION MENU displayed on the screen.
- Select "2. IMAGE PROC" by pressing the key of **[+ 2]**
- Repeat **[+ 2]** key to select the 2nd presetting, and the third pressing **[+ 2]** key to choose 3rd presetting
- The signal "IM0" at the right top of the screen will indicate which presetting on the current image.



3.9.4 Color

(see Article 3.8.4, Article 3.8.5 and Article 3.8.6 for more details)

3.9.5 Area-Volm

(see Article 3.10.1, Article 3.10.2 and Article 3.10.3for more details)

3.9.6 Histogram

- Press **FREEZE** key first to lighten FREEZE on the bottom right screen.
- Then press **M / 0** key to generate FUNCTION MENU on the screen.
- Select "5.HISTOGRAM" by pressing the key of **5** . there is a square frame appeared on the screen.
- Move this square frame by press **▲3** or **▼6** ,and **5◀** or **▶4** to the interested position on the image.
- Press **[Measure]** key on the keyboard to dictate the calculation, and its statistics result will be displayed on automatically on the bottom right of screen.

PT ---- the totality pixel in the frame.

GM ---- the gray value at the peak.

PM ---- the number of pixel at peak.

- Press **[CLEAR]** to exit.

3.10 Measurements

3.10.1 Distance Measurement

By ed Operation:

- Press **FREEZE** key to have the image in frozen first.
 - Press **+ / 2** in freeze mode, the caliper "+" is displayed on center of the screen.
 - Press the arrow keys **▲3** , **▼6** , **5◀** or **▶4** to move this caliper to the wanted position to be the starting point
 - Press **Measure** to confirm this spot for distance measurement.
 - Again press the arrow keys **▲3** , **▼6** , **5◀** or **▶4** to move the caliper to the ending point. There is a line with dots along moving of the caliper. The distance between two dots is 10mm.
 - Press **/ 1** to finish this measurement. Then the distance measurement result between the starting and ending point will be shown at the right-side of the screen "+D1= 45mm".
- You are allowed to do maximum 4 group measurements on the same image with difference calipers as "+", "X", "●" and "#". The measuring results will be shown at its related items. Such as:

+ D1 = 45mm"
x D2 = 35mm
#D3 = 20mm
* D4 = 33mm

- Press **Measure** key to switch the starting and ending point each other.



--- The ratio between these four distances will be shown on its items when the measurements are done.

--- Press **Clear** key to clear the measuring marks and lines on the screen. The echo image will be kept on there.

● **Mouse Operation:**

--- Press Left Button and the caliper displayed on the screen.

--- Move the ball to have the caliper to be the starting point.

--- Press Right Button to set the starting point.

--- Move the ball to have the caliper to be the ending point. There is a line with dots along moving the ball.

--- Press **/ 1** to finish this measurement.

The distance result between the starting and ending point will be shown at the right-side of the screen "+D1= 45mm".

--- Repeat pressing Right Button can shift between the beginning and ending points.

--- Maximum 4 group distance measurements allowed to be done on the image with difference marks as "+", "x", "●" and "#". The measuring results will be shown at its related items. Such as:

+ D1 = 45mm"
x D2 = 35mm
#D3 = 20mm
* D4 = 33mm

--- The ratio between these four distances will be shown on its items when the measurements are done.

--- Press **Clear** key to clear the measuring marks and lines except the echo image on the screen.

3.10.2 Area/ Volume Measurement

--- Freeze the image first.

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

---- Select "4.AREA-VOLM" by pressing the key of **▶ 4.** The below sub-menu will be displayed on screen:

PLEASE ENTER:
1.FREEHAND 2.ELLIPSE

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

● **By Free hand:**

---- 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 arrow keys **▲3**, **▶4**, **◀5**, **▼6**.

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

* Press **Measure** again to end this measurement.

* Press **M / 0** key to be back to Function MENU and choose "4. ARE-VOLM" again, another measurement can be done.

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

● **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 arrow keys **▲3**, **▶4**, **◀5**, **▼6**.

* Press **Measure**, the arrow keys are activating to adjust the ellipse size.

To enlarge it by pressing **▲3** and **▼6** keys in vertically.

To narrow it by pressing **▶4** and **◀5** keys in horizontally.

* One more pressing of **Measure**, the arrow keys are activating to adjust the ellipse angle.

To turn its angle anticlockwise by **◀5** and clockwise by **▶4**.

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

* Adjust the ellipse till it matches the focus.

* Press **M / 0** key to be back to Function MENU and choose "4. ARE-VOLM" again, another measurement can be done.

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

---- The ratio between these four groups will be shown on its items when the measurements are done.

C1 perimeters of 1st group
A1:
C2 perimeters of 2nd group;
A2:

C1/C2: ratio of two perimeters;
A1/A2: ratio of two areas.

Notes :

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

3.10.3 Volume Measurement

Two methods are available in this machine for measuring the volume.

By 3 axis method

--- The distance should be measured for three times before the volume measuring, and then press **M/0** to obtain the value.

--- If the data are less than three groups, there will be no value displaying when you press **M/0**; If you input four groups of data and then press **M/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 **M/0** to complete the measuring, with the value of volume in "Vm1" on the right side, as follow:

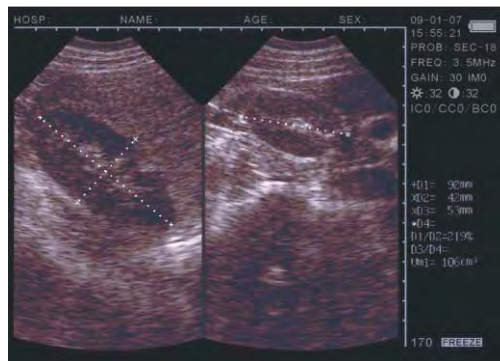


Illustration of volume measuring (3 Axis Method)

By Ellipse Method

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:

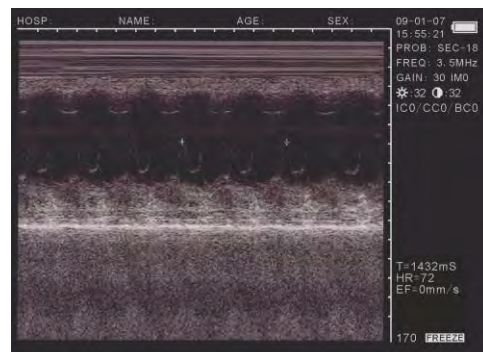
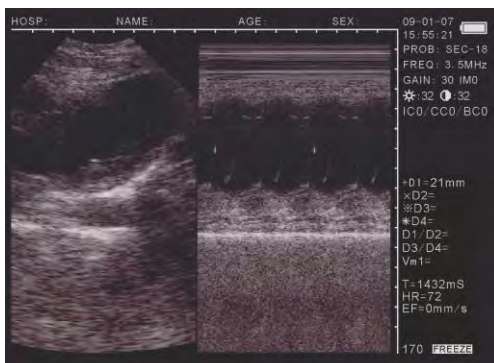


Illustration of Volume Measuring (Ellipse Method)

3.10.4 Heart Rate Measuring

(Only available in “B/M”, “M” Modes)

- In B/M mode, freeze a satisfying cardiograph.
- Measure the distance between wave crests of two periods by means of distance measuring method, and 3 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)



3.11 Histogram

- Press **Freeze** the image first.
- Press **M/0** to have FUNCTION MENU displayed on the screen.
- Select "5.HISTOGRAM" by pressing the key of **◀/5**, a sampling window displayed:
- Press the arrow keys to move this window to the area where needed for checking.
- Press **Measure** on keyboard of scanner
- Press **/ 1** or **+ / 2** key to enlarge or narrow this window.
- Press **Clear** to exit.
- Press



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

- X axis stands for grey scale, and y axis stands for number.
- From the above figure, in the rectangular area, the total number of pixel dots is 10000. At gray scale 52, there are 327 dots, the most image pixel dots.

3.12 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:

- Press **Freeze** the image first.
- Press **Reference** key to generate VET OB menu shown on the screen. There are two pages for this menu to be selected. Pressing **Reference** key to switch these two pages displaying on the screen.

1st Page:

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

2nd Page:

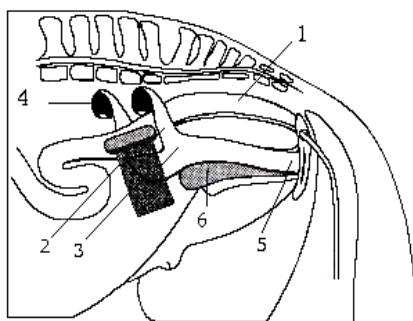
0. CAT: HD
1. CAT: BD
2. DOG: GSD
3. DOG: CRL
4. DOG: HD
5. DOG: BD

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

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

Examination steps on equine:

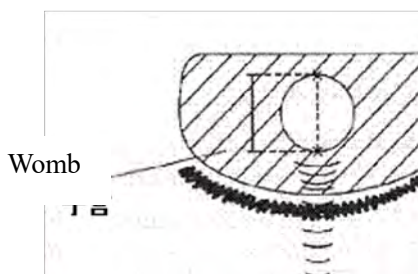
1. Clear off the rectum area.
2. Feel the pregnancy with hand and give a primary estimation and confirm using the ultrasound.
3. Hold the probe closely and put it into rectum and ensure that your hand can feel the coming change inside rectum. Keep hand closing to the back and between the probe and recta 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

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.



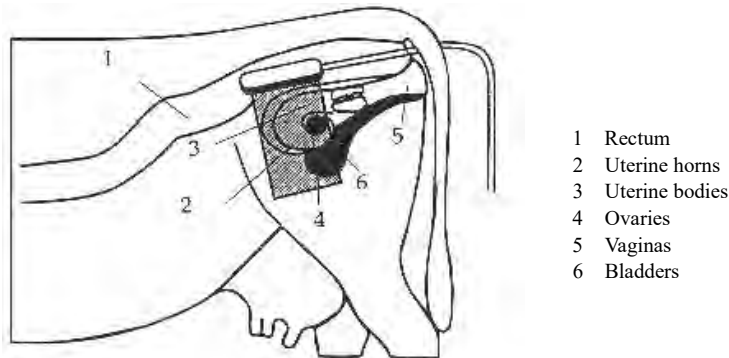
Equine GA measurement

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

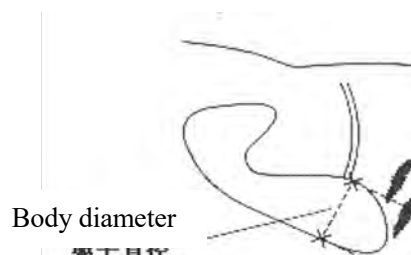
1. Clear off the rectum area.
2. Feel the pregnancy with hand and give a primary estimation and confirm using the ultrasound.
3. Hold the probe closely and put it into rectum and ensure that your hand can feel the coming change inside. Keep hand closing to the back and between the probe and recta wall.
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 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:

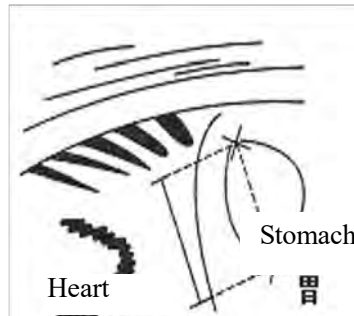


BL measurement

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. The measurement method is given below.

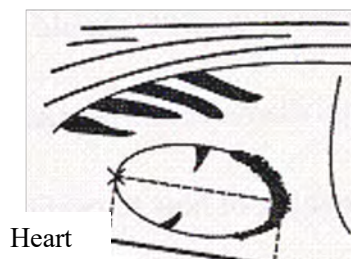


Bovine stomach measurement

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:



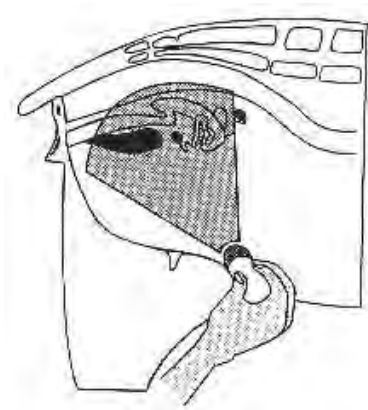
. Bovine heart measurement

4. 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 bovine HL

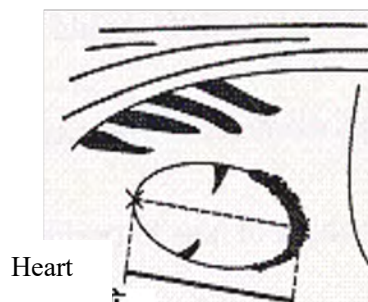
Check routine on pigs:

1. Keep the cow 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 there is mud on this part, clean with water first in case the abdominal pelvic structure could not be displayed accurately.



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:



Swine Heart measurement

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

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

There are two methods to examine 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 proved according to some publication that these two methods are the same effective in pregnancy examination.

- ó Rectum examination is more exact than abdomen examination within first 35 days pregnancy;
- ó The two methods are the same effective between 35 to 70 days pregnancy;
- ó 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:



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 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

3.13 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:

Unplugging and plugging is not allowed when the power is still on. If you need to turn it on again then wait 10 seconds.

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 aging, if the product continually use over the designed use life, it may bring the problem of the performance reduced and fault rate rise.

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.

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 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.

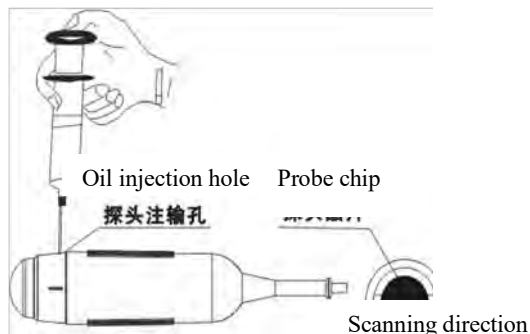
Adapter is the dedicated power of the device, it adopts omniseal insulation design, do not replace it with other adapters or attempt to open it in case there be any hazard.

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. The storage environment should accord with "5.1 Transportation and storage environmental requirements".

4.4 Probe maintenance

- ▶ Probe is an expensive part and frangible. Never hit it or drop it on floor.
- ▶ Please use medical ultrasound gel during diagnoses. Do daily inspection on the probe enclosure to see if it is cracked and avoid liquid leakage to spoil the built-in components
- ▶ Check the probe regularly to see if it is filled with clean medical castor oil lest the existing air bubbles influence the image quality. If air bubbles appear, turn the probe oil filler hole up and screw off the sealing screw, turn the probe slowly to drive the air bubbles to the screw hole, infuse a little bit of castor oil into the screw hole with syringe with a needle (refer to Picture 6-1), vent the air bubbles and fasten the sealing screw and finally clean the oil stain on the probe surface.



Mechanical sector scan probe oil injection, and scanning direction

4.5 Cleansing

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 soaking.

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.

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. Shut down 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 should be damaged.
4. Never heat the probe.
5. Never bend or pull probe cable, otherwise the internal connection should be broken.
6. Use gel 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.

4.7 Battery information

1. The equipment is fitted with rechargeable li-ion battery.
2. For optimum efficiency, the new battery must be charged and discharged.
3. The battery can be charged and discharged for several times but it will be worn-out. When the work time shortens, please replace it with a new one.
4. Be sure to use electricity charger appointed by manufacturer 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.
6. Extreme environment temperature (overcooling or overheating) will influence battery life. 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, remove the battery immediately.
7. Don't go on using non-serviceable battery and electricity charger (AC adapter).
8. Don't try demounting battery.
9. Do not throw the battery into the fire or heat it, otherwise it would trigger an explosion.
10. Do not sousse or wet the battery.
11. Do not incorrectly connect the positive and negative polarity.
12. Do not directly connect the battery to wall outlet or car-lit socket.
13. 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, hairpin or other metal objects.
14. Must not pierce battery shell with nail or other sharp objects, must not hammer nor step on the battery.
15. Must not hit, cast the battery and avoid mechanical shock on it.

16. Must not bead the battery terminals.
17. Must not decompound the battery in any way.
18. Must not place the battery in microwave oven or pressure vessels.
19. Must not combine the battery with primary battery (such as dry battery) or battery with different capacity, models and types.
20. Do not use the battery if it is smelling, hot, straining, discolored or with other abnormal phenomena and remove it from the current consumer or electricity charger immediately and stop using it any longer.
21. Do deal carefully with the discarded battery according to local related waste handling regulations.

4.8 Instrument test and calibration

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

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

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

Appendix B Acoustic output reporting table

Index	MI	TIS	TIS	TIS	TIB	TIB	TIC
Mode	—	Scanning	Non-scanning Aaprt \leq 1 cm ²	Non-scanning Aaprt $>$ 1 cm ²	Scanning	Non-scanning	—
Acoustic working frequency (MHz)	3.69	3.69	3.60	-	3.69	3.60	
Output power (mw)			0.03	-		0.03	-
Bounded output Power (mw)		24.7			24.7		
Attenuated output power (mw)				-		0.01	
Spatial-peak temporal-average intensity (mw/cm ²)				-		3.03	
Attenuated spatial-peak temporal-average intensity (mw/cm ²)				-		1.04	
Pulse-intensity integral (μ j/cm ²)	59.02					48.62	
Attenuated Pulse-intensity integral (μ j/cm ²)	20.23					16.67	
Peak-rarefactional acoustic pressure (MPa)	1.36						
Attenuated peak-rarefactional acoustic pressure (MPa)	0.79						
-1 2dB output beam area (cm ²)			0.91	-			
Equivalent aperture diameter (cm)				-			
Depth for TIS (cm)				-			
Depth for TIB (cm)						4.3	
Depth at max. attenuated pulse-intensity integral (cm)	4.2						
Supplementary information: (a) Transducer Model: S2-3.5MHz; (b) Transducer serial No.: AP0530546.							

Index	MI	TIS	TIS	TIS	TIB	TIB	TIC
Mode	—	Scanning	Non-scanning	Non-scanning	Scanning	Non-scanning	—
			$A_{aprt} \leq 1 \text{ cm}^2$	$A_{aprt} > 1 \text{ cm}^2$			
Acoustic working frequency (MHz)	4.11	4.11	-	4.02	4.11	4.02	
Output power (mw)			-	0.02		0.02	-
Bounded output Power (mw)		23.7			23.7		
Attenuated output power (mw)				0.009		0.01	
Spatial-peak temporal-average intensity (mw/cm ²)				0.28		0.97	
Attenuated spatial-peak temporal-average intensity (mw/cm ²)				0.12		0.68	
Pulse-intensity integral (μj/cm ²)	66.87					14.52	
Attenuated Pulse-intensity integral (μj/cm ²)	16.63					10.99	
Peak-rarefactional acoustic pressure (MPa)	1.50						
Attenuated peak-rarefactional acoustic pressure (MPa)	0.74						
-1 2dB output beam area (cm ²)			-	2.76			-
Equivalent aperture diameter (cm)				1.875			-
Depth for TIS (cm)				2.8			
Depth for TIB (cm)						1.0	
Depth at max. attenuated pulse-intensity integral (cm)	4.9						
Supplementary information: (a) Transducer Model: S2-5.0MHz; (b) Transducer serial No.: AP0570204.							

Appendix C Obstetrics

Gestational Table 1: Equine

All measurements +/- 3 days

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

Gestational Table 2: Bovine

All measurements +/- 3 days

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

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