

ANIQUIP™

MPUS300

Portable Laptop Ultrasound Scanner

*Dear Client,
Thank you and congratulations on the
purchase of, your new ANIQUIP MPUS300
Portable Laptop Ultrasound Scanner.*

The following instructions explain the installation and technical specifications, in order for you to gain the most effective use from your new scanner.

Also enclosed are the Health and Safety instructions for your guidance.

Safety Note:

To ensure operational safety and long-term stable equipment performance, please read this operation manual closely in order to understand how to operate this device correctly



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Contents

INTRODUCTION

SUMMARY

- 1.1 Brief Introduction
- 1.2 Range of application
- 1.3 Technical specifications
- 1.4 Electrical principal Block diagram
- 1.5 Basic principal
- 1.6 Device Constituent
- 1.7 Appearance
- 1.8 EMC statement

INSTALLATION

- 2.1 Operating environmental requirements
- 2.2 Unpacking inspection
- 2.3 Installation and disassembly
 - 2.3.1 *Connection between probe and main unit*
 - 2.3.2 *Installing and disassembling battery*
- 2.4 Power supply
 - 2.4.1 *Power supply with adapter*
 - 2.4.2 *Battery operation*
- 2.5 Battery charging
 - 2.5.1 *Charging through main unit*
 - 2.5.2 *Charging through adaptive line (optional)*
 - 2.5.3 *Charging through auto-charger (optional)*

OPERATING INSTRUCTIONS

- 3.1 Keyboard functions
- 3.2 Mouse
- 3.3 Start the device
- 3.4 Diagnosis
- 3.5 Measurement
 - 3.5.1 *Distance measurement*
 - 3.5.2 *Circumference and area measurement*
 - 3.5.3 *Heart rate measurement*
- 3.6 Obstetrics calculation
- 3.7 Notation
 - 3.7.1 *Note case history number (ID)*
 - 3.7.2 *Note patient age (AGE)*
 - 3.7.3 *Note patient sex (SEX)*
- 3.8 Image print
- 3.9 Shut down the device

TRANSPORTATION AND STORAGE

- 4.1 Environment requirements on transportation and storage
- 4.2 Transportation
- 4.3 Storage

CHECK AND MAINTENANCE

- 5.1 Service life
- 5.2 Check
- 5.3 Main unit maintenance
- 5.4 Probe maintenance
- 5.5 Cleansing
- 5.6 Correct usage of probe
- 5.7 Battery information
- 5.8 Instrument test and calibration

TROUBLE SHOOTING

- 6.1 Device board principle and hardware pictures
 - 6.1.1 *LCD TFT display*
 - 6.1.2 *Motherboard*
 - 6.1.3 *Power board*
 - 6.1.4 *Key plate*
 - 6.1.5 *Probes*
 - 6.1.6 *Battery*
- 6.2 Installation and disassembly of MPUS300,
 - 6.2.1 *Disassembly of MPUS300*
 - 6.2.2 *Disassembly of MPUS300*
 - 6.2.3 *Installation of MPUS300*
- 6.3 Typical failures removal of MPUS300,
 - 6.3.1 *PFR*
 - 6.3.2 *Battery can not be charged*
 - 6.3.3 *Motherboard failure removal*

APPENDIX A

- Gestational Tables

Introduction



To ensure operational safety and long-term stable equipment performance, please read this operation manual closely in order to understand how to operate this unit correctly.

Failure to observe the instructions given by the supplier may result in damage to the device or personal injury.

The following words are used throughout this manual to lay special emphasis on safety important information.

“Warning”: Failure to take note of this instruction may cause severe personal injury, death or property loss.










“Caution”: Failure to take note of this instruction may cause slight personal injury or property damage.

“Note”: A reminder to the installer/operator of operational or maintenance information. This information is significant but is no risk to the user.


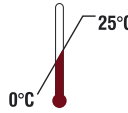




NOTE:

- MPUS300 should not be used in close proximity to flammable Anaesthetic gases, Oxygen or Nitrous Oxide
- MPUS 300 should not be used or stored near to harmful chemicals
- MPUS should never be immersed in water or any other liquid substances
- MPUS300 is powered by an exterior adaptor, which, is a type II device.
- MPUS300 is a type B piece of equipment.

SAFETY LABELS

-  Type B device
-  Note! Refer to accompanying documents
-  Turn-on (general supply)
-  Disconnect (general supply)
-  Signal output
-  USB port
-  RS-232
-  IPX7 Watertight-proof
-  II type equipment

PACKAGING AND TRANSPORTATION LABELS

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

Introduction

GENERAL SAFETY TIPS

In operation:

- 1 Heat radiation holes should never be covered.
- 2 After switching off the MPUS300, do not restart the device within 3 minutes.
- 3 Whilst in operation if any abnormality that may affect the unit is noticed, stop scanning and switch off immediately.
- 4 The patient should only come into contact with the probe.
- 5 If the keyboard fails to respond switch off the unit and contact our service department immediately.

After operation:

- 1 Power off the device.
- 2 Remove the plug from the mains power supply. Do not tug the power cable.
- 3 Clean off any gel residue on the probe with a soft sterile gauze swab.
- 4 Remove the probe and store in the box provided.

GENERAL SAFETY MESSAGE

Safety of the operator and patients and the reliability of the device are taken into consideration during the design and production of the MPUS300. The following safety precautions should be adhered to:

- 1 This device should only be operated by a qualified operator.
- 2 Never open the device and change the parameters without permission of Millpledge Aniquip. If in any doubt as to the performance of the MPUS300 contact the service department for advice.
- 3 The unit is set up for optimal performance. Do not adjust any preset controls or switches unless otherwise advised in accordance with the instructions in this manual.
- 4 If the MPUS 300 fails for any reason, switch off the unit immediately and contact the service department for advice.

Device operation, storage and transportation environment:

Environmental requirements on normal operation:

- a) Environment temperature range: +10°C +40°C
- b) Relative humidity range: 30% ~ 75%
- c) Atmosphere pressure range: 70KPa ~ 106Kpa

Environmental requirements on unit storage and transportation:

- a) Environment temperature range: - 40°C +55°C
- b) Relative humidity range: 10°C ~ 100°C
- c) Atmosphere pressure range: 50KPa ~ 106Kpa

- If the display screen is damaged or broken please contact the service department for advice immediately. Avoid spilling the liquid into the eyes or mouth,
- The MPUS300 is powered by Electric mains supply or Lithium Ion rechargeable battery, If the battery fails to respond to recharging contact the service department for advice on disposal and for a replacement battery. DO NOT put the battery on to a fire, as it may explode.
- Never attempt to disassemble the Power adaptor. If a fault occurs switch off the unit immediately and contact the service department for advice.
- Always use the power cable supplied in order to reduce the risk of damage to the unit.
- Millpledge AniQuip take no responsibility for the risk caused by any unauthorised adjustments made to this equipment.
- Long term use of this equipment may cause harm.

The MPUS300 should not be used in the following conditions.

- *The patient has an open wound or inflammation as this may Cause cross infection.*
- *The rectal probe should not be used when the patient has severe rectal bleeding.*
- *High blood pressure, coronary heart disease, cruor obstacle and severe haemorrhaging*

Introduction (continued)



SAFETY CRITERIA:

Europe:

Standard No.	Standard Name
IEC60601-1: 1988+A1: 1991+A2: 1995	<i>Medical Electrical Equipment Part I: Safety General Requirement</i>
IEC60601-1-2: 2004	<i>Medical Electrical Equipment Part I-II: Safety application Requirement --- Parallel Standard: EMC Requirement and Test</i>
IEC60601-1-4: 2000	<i>Medical Electrical Equipment Part I-IV: Programmable Medical Electrical Equipment</i>
IEC60601-2-37: 2001	<i>Medical Electrical Equipment Special Requirement for Medical B-ultrasound Diagnosis and Monitor Equipment</i>
IEC61157: 1992	<i>Publication Requirement for Medical B-ultrasound Diagnosis Equipment Sound Output</i>

Supplementary criteria — EMC

Standard No.	Standard Name
IEC60601-1-2: 2004 IEC61000-4-2: 2001 IEC61000-4-3: 2002 IEC61000-4-4: A2/2001 IEC61000-4-5: 2001 IEC61000-4-6: 2001 IEC61000-4-8: 2001 IEC61000-4-11: 2001	<i>Electromagnetic Compatibility for Medical Systems, comprised of: Electrostatic Discharge Immunity Radiated Field Immunity Electrical Fast Transient/Burst Immunity Voltage Surge Immunity Immunity to Conducted Disturbance, Induced by Radio-frequency Fields Power Frequency Magnetic Fields Voltage Dips, Shorts and Variations</i>

GUIDANCE AND MANUFACTURE'S DECLARATION – ELECTROMAGNETIC EMISSIONS- FOR ALL EQUIPMENT AND SYSTEMS

The MPUS300 Ultrasonic Diagnostic Equipment is intended for use in the electromagnetic environment specified below. The customer of the user of the MPUS300 Ultrasonic Diagnostic Equipment should assure that it is used in such and environment.

Emission test	Compliance	Electromagnetic environment - guidance
RF emissions CLSPR 11	Group 1	The MPUS300 Ultrasonic Diagnostic Equipment uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CLSPR 11	Class B	The sample MPUS300 is suitable for usage in any facility including household and the public low voltage supply network connecting to residence.
Harmonic emissions IEC61000-3-2	Class B	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Introduction (continued)

GUIDANCE AND MANUFACTURE'S DECLARATION – ELECTROMAGNETIC IMMUNITY- FOR EQUIPMENT AND SYSTEMS THAT ARE NOT LIFE-SUPPORTING

The MPUS300 Ultrasonic Diagnostic Equipment is intended for use in the electromagnetic environment specified below. The customer or the user of MPUS300 Ultrasonic Diagnostic Equipment should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment-guidance
Conducted RFIEC 61000-4-6 Radiated RFIEC 61000-4-3	3 V/m150kHz to 80 MHz3 V/m80 MHz to 2.5 GHz	1 V 1 V/m	Portable and mobile RF communications equipment should not be used close to any part of the MPUS300 Ultrasound Scanner. Or it's cables. Other than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: $d = \left[\frac{3.5}{V1} \right] \sqrt{P}$ $d = \left[\frac{3.5}{E1} \right] \sqrt{P} \quad d = 80 \text{ MHz to } 800 \text{ MHz}$ $d = \left[\frac{7}{E1} \right] \sqrt{P} \quad d = 800 \text{ MHz to } 2.5 \text{ GHz}$

Where p is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitter as determined by an electromagnetic site survey a should be less than the compliance level in each frequency range .Interference may occur in the vicinity of equipment marked with the following symbol:



NOTE 1 At 80 MHz. The higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

A: Field strength from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters. An electromagnetic site survey should be considered. If the measured field strength in the location in which the MPUS300 Ultrasound Scanner is used exceeds the applicable RF compliance level above, the MPUS300 Ultrasound Scanner should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re orientating or relocating the MPUS300 Ultrasound Scanner. Over the frequency range 150 kHz to 80MHz. Field strengths should be less than 1 V/m.

B: Over the frequency range 150 kHz to 80 MHz ,field strengths should be less than 0.5V/m

Summary



Recommended separation distances between portable and mobile RF communications equipment and the EQUIPMENT or SYSTEMS -
For EQUIPMENT or SYSTEMS that are not **LIFE-SUPPORTING**

Recommended separation distances between portable and mobile RF communications equipment and the MPUS300 Ultrasonic Diagnostic Equipment

The MPUS300 Ultrasonic Diagnostic Equipment is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the MPUS300 Ultrasonic Diagnostic Equipment can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the MPUS300 Ultrasonic Diagnostic Equipment as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $\left[\frac{3.5}{V1} \right] \sqrt{P}$	80 MHz to 800 MHz $\left[\frac{3.5}{E1} \right] \sqrt{P}$	800 MHz to 2.5 GHz $\left[\frac{7}{E1} \right] \sqrt{P}$
0.01	0.35	0.35	0.70
0.1	1.11	1.11	2.21
1	3.5	3.5	7.0
10	11.1	11.1	22.1
100	35	35	70

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter. Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Summary (continued)

GUIDANCE AND MANUFACTURER'S DECLARATION-ELECTROMAGNETIC IMMUNITY

The MPOX100 Pulse Oximeter is intended for use in the electromagnetic environment specified below.
The Operator should ensure that the MPOX100 always used in this environment

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment-guidance
Electrostatic Discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be constructed of wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycle 70% UT (30% dip in UT) for 25 cycle <5% UT (>95% dip in UT)for 5 sec	<5% UT (>95% dip in UT) 40% UT (60% dip in UT) for 5 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of the MPUS300 Ultrasonic Diagnostic Equipment requires continued operation during power mains interruptions, it is recommended that the MPUS300 Ultrasonic Diagnostic Equipment be powered from an uninterruptible power supply or a battery.
Power frequency (50Hz) magnetic field IEC 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a location within a typical Medical/ Veterinary environment.

NOTE UT is the a.c. mains voltage prior to application of the test level.



Contraindication:

Do not allow the probe to come into contact with wound or acute inflammation to avoid cross infection.



1.1 FEATURES

This equipment is a high-resolution linear/convex ultrasound scanning diagnostic device. It adopts micro-computer control and digital scan conversion (DSC), digital beam-forming (DBF), real time dynamic aperture (RDA), real time dynamic receiving apodization, real time Dynamic receiving focus (DRF), Digital frequency Scan (DFS), 8 segments TGC, frame correlation technology to enhance the image clarity, stability and high resolution.

There are four display modes: B, B+B, B+M, M; which work on a 256 grey scale.

The system can process:

- Real time image display
- Freeze,
- Save, load
- Zoom, up and down flip,
- Left and right flip,
- Black and white flip,
- Capacity cine loop
- Multi-level scanning depth and angle
- Dynamic range
- Acoustic power
- Frame correlation factor regulation and focus number
- Focal space
- Focus position,
- More than 40 body marks.
- Date,
- Clock display
- Name, sex, age
- Clinical annotation
- Distance, circumference, area, volume,
- Heart rate measurement
- Optional probes to meet clinical diagnosis demands.
- PAL-D video output offers connection to external video image printer and large display
- High speed USB port provides real time image transfer to the PC

Using the touch keyboard and trackball makes operation of the MPUS300 fast, convenient and easy for the operator.

The equipment is a jet moulded portable structure. The use of a non-industrial frequency transformer switching power supply, programmable parts (FPGA) and surface mounting technology (SMT) make the whole unit highly compact.

Summary (continued)

1.3 TECHNICAL SPECIFICATION

MODEL		MPUS300	
Probes		Probe in standard	Optional probes
		C1-9/60R/3.5MHz convex array	L1-4/7.5MHz HF linear probe EL1-4/7.5MHz endo-rectal
Displayed Depth (mm)		240 (max), 16 levels adjustable	
Maximal detect depth		≥140	≥80
Resolution (mm)	Lateral	≤4 (depth≤80) ≤5 (80 depth≤130)	≤3 (depth≤60)
	Axial	≤2 (depth≤80)	≤1 (depth≤60)
Blind Area (mm)		≤8	≤8
Geometric position Precision (%)	Horizontal	≤20	≤15
	Vertical	≤10	≤10
Monitor size (inch)		5.0 TFT-LCD	
Display modes		B B+B B+M M	
Image grey scale		256 levels	
Image multiplying factor		×1.0, ×1.2, ×1.5, ×2.0	
Measure functions		Distance, circumference, area, heart rate, gestation age	
Character display		Case history no., age, sex	
Battery capacity		2200mAh	
Mainframe power consumption		13W at non-charging operation / 25W at charging operation	
Adapter power consumption		45W	
Mainframe weight (Excl.probe)		800g	

Installation



2.1 Operating environmental requirements

1. Environment temperature range +10C~+40C
2. Relative humidity range 30%~75%
3. Atmosphere pressure range 70KPa~106Kpa

When using, avoid strenuous vibration, keep the unit away from devices with an intense magnetic field or high voltage; avoid strong sunlight. Keep the device well ventilated, dry and dust free.

2.2 Unpacking:

After unpacking, check the device according to the Packing List. If any items are missing or damaged contact the service department for advice.

Make sure that the MPUS300 is installed in accordance with the requirements and methods described in the Installation section.

It is advisable to retain the packaging in case the unit needs to be returned for any reason.

Warning

If damage is found during unpacking DO NOT use the Unit. Contact the servicing department immediately for advice.

2.3 Installation and disassembly

2.3.1 Connection between probe and main unit

The Probe jack is situated on the top right hand side of the unit. Insert the probe connector into the jack and turn it clockwise and until “finger” tight. There is only one probe jack, which can connected to all of the optional probes.

To remove the probe turn the jack anti-clockwise until is released from the jack. Always store the probe in its box.



Warning

Do not attempt to disconnect the probe once the unit is logged on as this may cause severe damage.

Warning

The probe should be protected from falling or sudden impact and the manufacturer assumes no responsibility for this kind of damage.

Warning

Do not touch the contact pins in the probe connector.

Warning

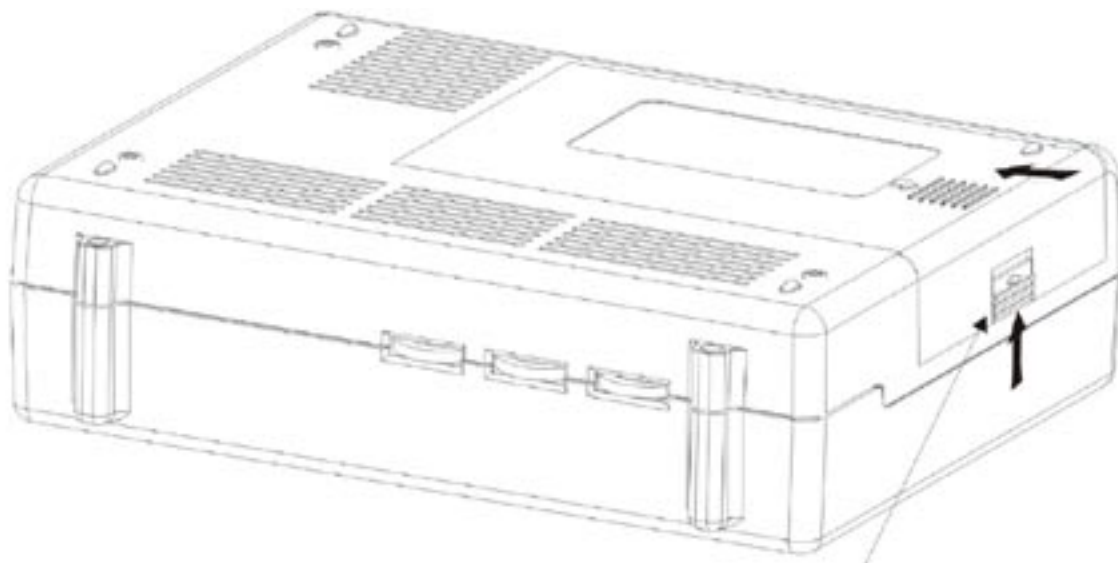
Please handle the equipment carefully.

2.3.2 Installation and removal of the battery

Insert the battery into the battery slot making sure that it is placed in the correct way (+ to + and - to -). Move the battery release key over the top of the battery until it is completely in place. Release the key (refer to figure 2-2).

FIGURE 2.2 BATTERY INSTALLATION

To remove the battery move the battery release key until it completely exposes the battery. Remove the battery.



BATTERY RELEASE

Installation (continued)

2.5.2 Charging through adaptor line (Optional)

1. Remove the battery from the main unit or take out the spare battery.
2. Connect the “Charging DC12.6V/1A” terminal of the adaptor to the charging terminal of the battery with charging adaptor line.
3. Connect the power cable of the “Input AC220V, 50Hz” terminal of the adaptor to the EPS.
4. When the “Charging” indicator light on the adaptor turns red, the battery is charging; When the “Charging” indicator light turns to green the battery is fully charged.(Refer to figure 2-8, 2-9).



FIGURE 2-8. MPUS 300 CHARGING ADAPTOR CABLE

2.5.3 Charging through auto-charger (Optional)

1. Remove 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 adaptor turns red, the battery is charging. When the “Charging” indicator light turns to green, the battery is fully charged(Refer to figure 2-10,2-11).



FIGURE 2-10. MPUS 300 CHARGING THROUGH AUTO-CHARGER

Tips:

1. The input voltage of the auto-charger is DC9~14V/1.5A
2. The output voltage of the auto-charger is DC12.6V/1A;
3. The operations and storage environment are the same as those of the main unit.

Operating Instructions



3.1 Keyboard functions

FREEZE Image hold

Image hold or return to real time image.

RESET Reset the Unit

If the MPUS 300 does not work when you press any key, press this key to restore to normal function.

NOTE Note key

Press this key to note the case history number, age, sex whilst in freeze mode

Tip: This function is only available in “Freeze” mode and the numeric characters are available.

CLS Clear the screen

Remove the measured marks, results and so on displayed on the screen whilst in freeze mode.

B/O B display mode key

During non-note mode, press this key to enter the device into B mode (the default mode when the power is switched on is B).

When in note mode, press this key to note the case history number, age, and sex.

M/3 Double B display mode key

During non-note mode, press this key to enter double B mode. Two B mode images are displayed on screen. One of them is a “Frozen” image and the other is a “real-time” image. Depress this key to change the two images between “Freeze” or “real-time”. Press the “Freeze” key to freeze both images.

In note state, press this key to note the case history number, age, sex.

BB/1 B mode and M mode display key

Whilst in non-note state, press this key to enter B/M mode.

Pressing this key will change B mode and M mode images on the screen (“BM” or “B+M” for short). On the B mode image, there is a vertical bright line or a vertical line formed by equidistant dots, which is named the sampling line.

In note state, press this key to note the case history number, age, sex.

BM/2 Single M display mode key

In non-note state, press this key to enter M mode.

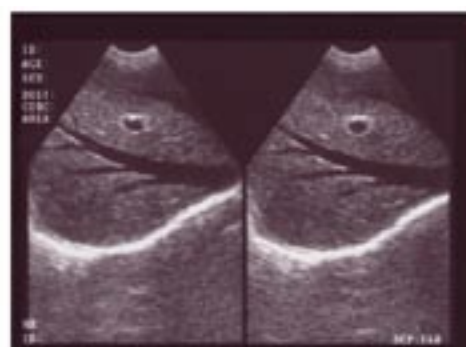
In note state, press this key to note the case history number, age and sex.

Tip: You must always enter B/M mode first before entering M mode. The M mode image is in real time.

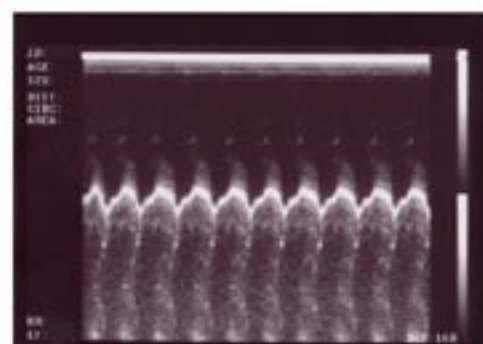
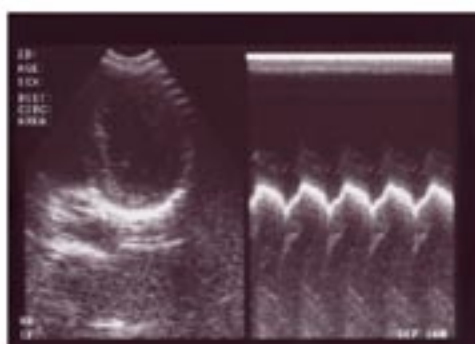
FIGURE 3-2. FOUR DISPLAY MODES



SINGLE B MODE



BB MODE



Operating Instructions (cont.)

MAGNIFY Image magnification select key

In note state, press this key to note the case history number, age, sex.

In real time scanning mode, this key is used for image magnification. There are 4 image magnifications. Press the key continuously to enlarge the image to different rates. The penetration depth is displayed at the bottom.

MAGNIFICATION	Display depth (mm)	
	S2/3.5MHz mechanical sector probe	S2/5.0MHz mechanical sector probe
1.0	192	192
1.2	160	160
1.5	130	130
2.0	096	096

FIGURE 3-3. FOUR MAGNIFICATIONS



Depth 192mm (×1.0)



Depth 160mm (×1.2)



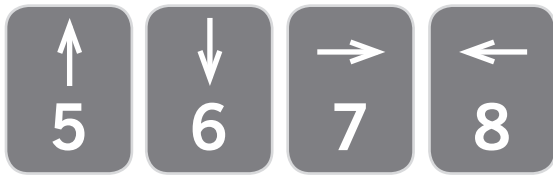
Depth 130mm (×1.5)



Depth 096mm (×2.0)



Numeric characters and direction keys



In freeze mode, press these keys to move the measuring mark up and down, left and right.

In note state, press this key to note the case history number, age, sex.

+ / 9

Measuring mark key

In freeze mode, press this key to display mark “+” This can be moved with the “Direction keys” or the mouse.

In note state, press this key to note the case history number, age and sex.

DIST

Distance measuring mark, positioning key

When the measuring mark “+” is moved to the required position, press this key to locate the cursor on “+” to set the start point of measurement.

O.B.

Obstetrics table menu key

In freeze mode, press this key to display the obstetrics menu on the lower left of the screen (figure 3-4). The current active obstetrics table is high press this key repeatedly to select the item required.

FIGURE 3-4. FOUR MAGNIFICATIONS

SWINE - HL
EQUINE - GS
BOVINE - BL
BOVINE - SL
BOVINE - HL
SHEEP - USD
CAT - HD
CAT - BD
DOG - GSD
DOG - CRL
DOG - HD
DOG - BD

Key:

1. **SWINE-HL:** to calculate G. A. of pigs In accordance with heart length.
2. **EQUINE-GS:** to calculate G. A. of horses/ ponies in accordance with gestational sac diameter.
3. **BOVINE-BL:** to calculate G. A. of cattle in accordance with body length.

4. **BOVINE-SL:** to calculate G. A. of cattle in accordance with stomach length.
5. **BOVINE-HL:** to calculate G. A. of cattle in accordance with heart length.
6. **SHEEP-USD:** to calculate G. A. of sheep in accordance with umbilicus to spine distance.
7. **CAT-HD:** to calculate G. A. of cats in accordance with head diameter;
8. **CAT-BD:** to calculate G. A. of cats in accordance with body diameter.
9. **DOG-GSD:** to calculate G. A. of dogs in accordance with gestational sac diameter.
10. **DOG-CRL:** to calculate G. A. of dogs in accordance with crown rump length.
11. **DOG-HD:** to calculate G. A. of dogs in accordance with head diameter.
12. **DOG-BD:** to calculate G. A. of dogs in accordance with body diameter.

G. A.: gestational week (unit: weekday)

EDD: expected date of birth

Press the O. B. key to select the correct item, then measure the distance of the correlative region in the image, the result of G. A. will be displayed automatically at “G. A.” and the result of EDD will be displayed at “EDD”.

3.2 Mouse

As a supplementary means to keyboard operation, the mouse allows the measurement to be taken faster more easily.. The mouse has three keys. The leave, middle and right buttons which fulfil specific functions:

LEAVE KEY: Press this key at any time to display measuring mark “+”; during distance measurement, continuous pressing of this key will shift between the start and end point.

MIDDLE KEY: When “+” is displayed on the screen, press this key to determine the start point and end point in circumference and area measurement.

RIGHT KEY: When “+” is displayed on the screen, press this key to confirm the end point cursor in distance measurement.

3.3 Switching on the MPUS 300

Switch on the power switch, the power indicator on the panel will light up, and the start interface is displayed.

Press any key (except **RESET** Key) to start scanning.

Adjust the display brightness, contrast and overall gain knobs to acquire a the strongest image.

Tip: The display quality is related to viewing angle of the LCD, operator should adjust it accordingly.

Operating Instructions (cont.)

3.4 Diagnosis

Apply a reasonable amount Ultrasound gel (supplied) to the area of the patients body that you wish to examine. Press the acoustic window of the probe on to the examination area. The cross-section acoustic image of tissues will be displayed on the screen, move the probe slowly to locate the optimum display. Adjust the overall gain knob to acquire an optimal cross-section acoustic image of the diagnostic area..

Note


1. Do not press the probe too hard to avoid causing discomfort to the patient.
2. Use the correct probe and frequency in order to gain the optimum clarity of the investigation area.

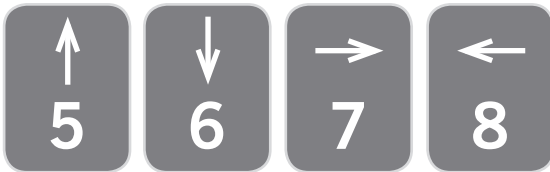
3.5 Measurement

Distance, circumference, area and gestation age can be measured using the keyboard or mouse. Unit of distance and circumference is in mm, unit of area is mm² and unit of gestation age is Week Day



3.5.1 Distance measurement

Using the Keyboard:

1. At freeze mode, press  key to display cursor “+”, press



keys to move the “+” onto the required point.

2. Press  key to mark the “+” point as the start point of measurement.
3. Press any direction key to display another cursor “+” and move it to the end point of the measurement (Note: pressing the “DIST” key continuously will shift the cursor between the start and end points).
4. If several measurements, are needed repeat step 1-3. The current measurement data will be displayed on the left of the screen next to 

Using the Mouse:

1. Single click on the left key of the mouse will display the cursor “+”.
2. Move the “+” cursor to the start point of measurement with the mouse then single click the left key to confirm the start point.
3. Move the mouse to call out another cursor “+” and move this cursor to the end point of measurement, single click on the left key to display this measurement. All results will be displayed next to “DIST” on the left of the screen.
4. If several measurements are needed repeat step 2-3.

Tip: Pressing the left key of the mouse during measurement will shift the cursor “+” between the start and end point.



3.5.2 Circumference and area measurement

Circumference and area measurement can only be carried out using mouse.

Mouse operating method:

1. Single click on the left key of the mouse will display the cursor“+”.
2. Move the cursor“+” to the start point of measurement with the mouse and single click on middle key to confirm the start point.
3. Move the mouse to call out another cursor “+”. Move this cursor to the end point of measurement along the edge of the measured area (Note the following diagram), single click on the middle key to end the measurement. The results will be displayed next to “CIRC” and “AREA” on the left of the screen.
5. If another measurement is required, repeat the above steps.



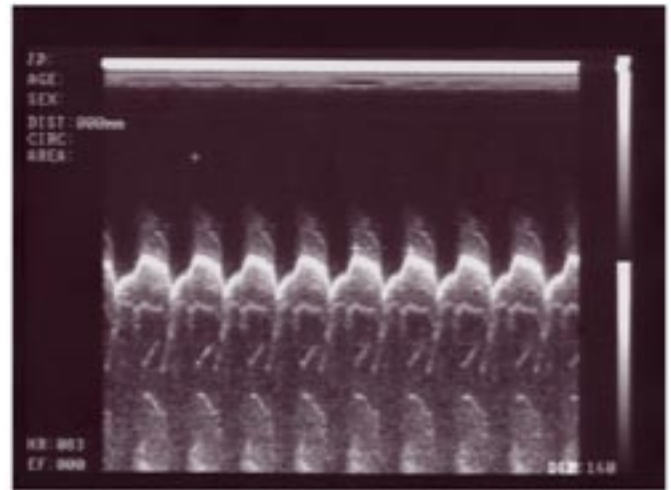
FIGURE 3-7. CIRCUMFERENCE AND AREA MEASUREMENT

Tips:

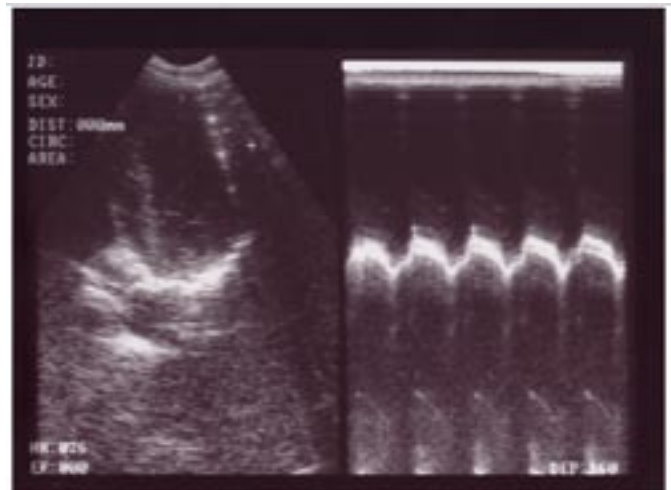
If you single click on the middle key of the mouse during measurement line the start and end points will connect over the shortest distance and form a closed measuring line. It is much easier to use the mouse to measure distance than to operate the keyboard.

3.5.3 Heart rate measurement (only under B/M mode and M mode)

In M or B/M mode, find the heart beat waveform oscillogram. Freeze the image and measure the distance between two adjacent wave peaks. Two value groups may be acquired which are the HR (heart rate, unit: times/min) and EF (inclination, unit: mm/s), as shown in the following figure:



Single M mode



B/M mode

FIGURE 3-8. HEART RATE MEASUREMENT

Operating Instructions (cont.)

3.6 Obstetrics calculation

Operating steps

The MPUS 300 allows gestation age measurement for horse, cows, sheep, pigs, cats, dogs and other animals through parameters such as **GS, BL, HL, SL, USD, HD, BD, CRL**, etc. to automatically display the relevant gestation age (gestation weeks).

Press **O.B.** key to display menu

SWINE - HL
 EQUINE - GS
 BOVINE - BL
 BOVINE - SL
 BOVINE - HL
 SHEEP - USD
 CAT - HD
 CAT - BD
 DOG - GSD
 DOG - CRL
 DOG - HD
 DOG - BD

Continue to press

O.B.

until the required animal is selected.

Select the distance parameter according to the distance measurement method. The corresponding gestation age data will be automatically displayed below "WEEK·DAY".

1) EQUINE

Estimation of horse gestation age according to GS

1. Clean out the excreta from the horse's rectum.
2. Palpate by hand to estimate the gestation state and determine the germinal tissue for B ultrasonic scanning.
3. Insert the probe into the rectum with the hand close to the probe to ensure that your hand will feel any obstructions. Position your hand in the dorsal position between the rectum wall and the transducer.
4. The internal structure of horse will be displayed on the screen. The Bladder lies vertically to the cross section. Other areas that can be seen are cervix tissue and the uterine body. The Uterine horn (seen horizontally) is normally round in shape. Move the probe inside the rectum until the coupling section of uterine horn and uterine body is displayed, then divert the transducer in the direction of the uterine horn as shown in the following figure :

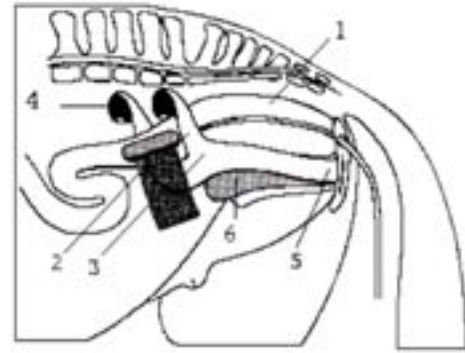


FIGURE 3-9. PROBE POSITION IN WOMB AND OVARY SKETCH

5. The measuring method of GS diameter is given in the following figure. This can be measured in either the horizontal or vertical direction.

WOMB:

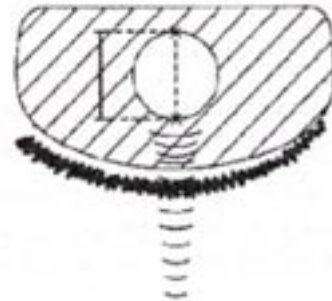


FIGURE 3-10. HORSE'S GESTATION AGE MEASUREMENT

6. Measure the selected parameter distance according to the distance measurement method. The corresponding gestation age data will be automatically displayed next to "WEEK·DAY". Through measurement, a chart can be made to determine the growth curve and can judge the gestation age corresponding to the embryo size. Gestation age calculation begins from the copulation day instead of the impregnation day.

2) BOVINE - BL

Estimate gestation age according to the cow's body length.

1. Clean out any excreta from the cow's rectum.
2. Palpate by hand to make a preliminary estimate of the gestation state to determine the germinal tissue for B ultrasonic scanning.
3. Hold the probe, and insert it into the rectum with the hand close to the probe to feel for any obstructions.. Position your hand in the dorsal position between the rectum wall and the transducer.
4. The internal structure of cow will be displayed on the screen. The Bladder lies in vertically, cervical tissue and uterine body will also be seen.. Note the uterine horn which is displayed horizontally and is normally round in shape. Move the probe inside the rectum until the uterine horn and uterine body is displayed. Move the transducer in the direction of uterine horn as the following figure shows:

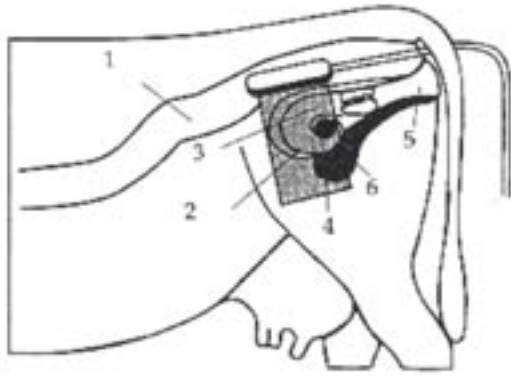


FIGURE 3-11. PROBE POSITION IN WOMB AND OVARY .

6. To measure the foetal body diameter a vertical section should be selected; that is a plane which covers from both sides through the foetal neck, chest cavity and abdomen. The body diameter can be measured within 60 to 150 days of gestation.

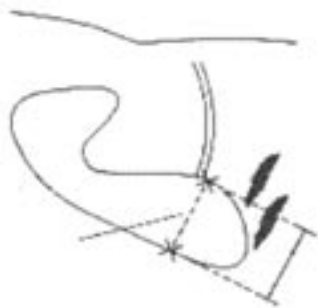


FIGURE 3-12. COW'S BODY LENGTH MEASUREMENT SKETCH

7. Measure selected parameter distance according to the distance measurement method. The corresponding gestation age data will automatically displayed next to "WEEK·DAY".

3) BOVINE – SL: Estimate gestation age according to the cows stomach length.

1. Ensure that the animal is in a standing position.
2. Place the probe, a little to the left or right of the centre, close to the ventral abdominal wall. Make sure that the area is clean so that the abdominal pelvic structure can be displayed clearly
3. The screen should be big enough to display the maximum stomach length longitudinally. As the foetus grows, the fetal stomach macro-axis increases. Please not the diagram shown below:



FIGURE 3-13. COW'S CARDIAC MEASUREMENT

4. Measure the selected parameter distance according to the distance measurement method, the corresponding gestation age data will automatically be displayed next to "WEEK·DAY".

4) BOVINE - HL

Estimate gestation age according to the cows heart length.

1. Ensure that the animal is in a standing position.
2. Place the probe, a little to the left or right of the centre, close to the ventral abdominal wall. Make sure that the area is clean so that the abdominal pelvic structure can be displayed clearly
3. To measure the heart macro-axis, display the maximal longitudinal axis of the heart should be displayed on the screen.. With the growth in gestation age, the foetal heart macro-axis increases. Please note the following diagram.



FIGURE 3-14. COW'S HEART MACRO-AXIS MEASUREMENT SKETCH

4. Measure the selected parameter distance according to the distance measurement method, the corresponding gestation age data will automatically displayed next to "WEEK·DAY".

5) SHEEP

Estimation of gestation age according to hilum-spine length of the animal

There are two methods to check pregnant ewes with B ultrasound:

- Convex or linear probe to examine the abdomen,;
- Rectal probe

These two methods are both quite useful in the diagnosis of pregnancy.

- Up to 35 days pregnancy, rectal examination seems to be more precise
- 35 to 70 days pregnancy, both are equally effective.
- Over 70 days pregnancy abdominal seems to gain better results. This is also more practical for those animals with a large womb.

Abdominal examination:

Operating Instructions (cont..)

1. Abdominal examination may be carried when the ewe is standing, lying or squatting. Place the probe on the middle abdomen under the coat.
2. Ensure the area for examination is clean in order to gain a clear, accurate display of the abdominal pelvic structure.
3. Measure the hilum-spine length.
4. Measure the selected parameter distance according to the distance measurement method. The corresponding gestation age data will automatically be displayed next to "WEEK·DAY".

6) SWINE

Estimate the gestation age according to the pigs heart length

1. Ensure the pig is in a standing position.
2. Place the probe, a little to the left or right of the centre, close to the ventral abdominal wall along the side of the teats and the rear leg. Make sure that the area is clean in order to gain a more accurate display of the abdominal pelvic structure.

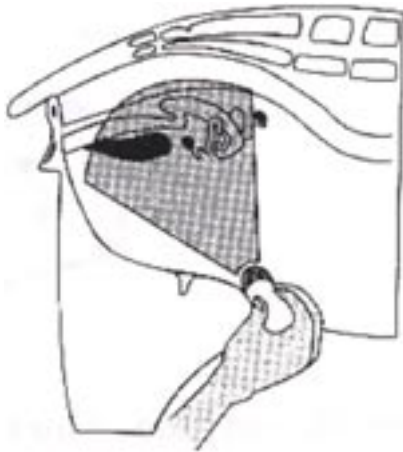


FIGURE 3-15. PIG'S GESTATION AGE MEASUREMENT POSITION

3. To measure the heart macro-axis, the screen should display the maximal longitudinal axis of the heart. With the growth of gestation age, the fetal heart macro-axis increase. Please note the following diagram:



FIGURE 3-16. PIGS HEART MACRO-AXIS MEASUREMENT

5. Measure the selected parameter distance according to the distance measurement method. The corresponding gestation age data will be automatically displayed next to "WEEK·DAY".

7) CAT - HD

Estimate the gestation age according to the Cats skull diameter

To measure the skull diameter measure the interior maximum diameter of the skull between ventral and dorsal area. This can be measured during 7 months of pregnancy.

Please note the following diagram.



FIGURE 3-17. CATS SKULL MEASUREMENT

8) CAT-BD

Calculate the gestation age according to cat BD

After the foetal head is formed, the binary diameter measurement becomes routine in ultrasonic examination.

1. Foetal head axial plane scanning. Look for the BPD measuring standard plane from top to bottom.
2. Use the distance measurement method to measure the distance of the selected parameters. The corresponding gestation age data will automatically displayed next to "WEEK·DAY".

9) DOG-GSD

Calculate the gestation age according to a dogs gestation saccus diameter

This method is the same as that for a horse.

10) DOG-CRL

Calculate the gestation age according to dog CRL

This method is the same as that for a cow.

11) DOG-HD

Calculate the gestation age according to dog HD

This method is the same as that for a cat.

12) DOG-BD

Calculate the gestation age according to BD

This method is the same as that for a cat.



3.7 Notation

3.7.1 Noting the case history number (ID)

In freeze mode, press the **NOTE** key

to display the cursor behind "ID".

The default for case history is 6 bits.

3.7.2 Noting the patients age (AGE)

After input of the case history number (6 bits), the cursor moves down to "AGE", the default for age is 3 bits.

3.7.3 Noting the patients sex (SEX)

After input of the patients age (3 bits), the cursor moves down to "SEX".

Press **B/O** key,

and the screen will display "F" (Female).

Press any key from **BB/1** to **9/+** and the screen will display "M" (Male).

Press the **NOTE** key

at any time for the cursor will return to the first character next to "ID" to restart notation.

3.8 Image Print

Connect the VIDEO IN port of the printer with the VIDEO OUT port of the MPUS 300 and operate in accordance with the Instruction manual of the printer.

3.9 Switch Off the MPUS 300

Switch off the main unit first, then the power supply outlet and unplug the adaptor.

Tips: It is advised that the AC (mains) supply plug of the adaptor should always be removed from the socket when the unit is not in use.

Note: DO NOT attempt to plug or unplug the power cable of the adaptor when the Unit is switched on; Once the unit is switched off wait for three or four minutes before restarting in order to prevent any damage that may be caused.

Transportation and Storage

4.1 Environmental Requirements for Transportation and Storage

Environmental temperature: $-40^{\circ}\text{C} \sim +55^{\circ}\text{C}$;

Relative humidity: 10% \sim 100%;

Atmospheric pressure: 50KPa \sim 106KPa;

4.2 Transportation

All marks printed on the packing box are in accordance with the requirements of GB191-2000 (Packing, Storage and Transportation Marks). Simple shockproof installations are made in the packing box, which adapt to railway and road transportation. Avoid rain, inversion and sudden impact.

4.3 Storage

- If the unit is stored for more than 6 months, remove it from the packing box. Charge the unit for 4 hours, and return it to the packing box according to the instructions on the packing box.
- The box should be stored in a well ventilated area. Avoid direct sunshine and noxious gases..

Checks and Maintenance



5.1 Check

Check the equipment's power line and probe cable regularly. If any damage is found replace it immediately. Contact our service department to purchase a replacement.

5.2 Maintenance of the main unit

The recording environment should be in accordance with "2.1 operation environmental requirement".

If the outside of the unit requires cleaning switch it off and clean with a soft dry cloth. If required wipe with 75% alcohol swabs.

The internal area of the unit should be cleaned with a damp cloth. Avoid any spillage into the unit.

When not in use the MPUS300 should be stored in a dry well ventilated dust free environment. It should not be store with chemicals or flammable gases.

5.3 Probe maintenance

The probe is a very fragile. Avoid any sudden impact. When not in use press the key to set the probe at freeze state and place in carefully in a box.

Before use, inspect the probe to make sure that it is intact. If in any doubt contact our service department immediately for advice.

Always use medical ultrasound gel during diagnosis.

Do not attempt to remove the probe from the MPUS300 when the power is switched on.

Note: Do not press the probe to hard when attached to the patient in order to avoid discomfort.



Warning

When cleaning the unit or the probe ensure that the power is switched off.

Caution

Please refer to instructions from the manufacturer closely when using detergents. Be careful with cleaning of the display. It is very easy to scratch. Please wipe with dry soft cloth. Do not attempt to clean the internal part of the unit. Do not immerse the unit in liquid. Do not leave any detergent on the unit surface.

Warning

Do not use, ethylene oxide or any other organic solvent, which tend to deface the probe's protective foil. Do not immerse the probe into liquid or detergent.

5.4 Probe maintenance

The Probe is an expensive part of the unit and very fragile. Avoid sudden impacts.

Always use medical ultrasound gel during examination.

Check the probe on a daily basis. To see if it is cracked and avoid liquid leakage to spoil the built-Make sure there is no damage to it's outer shell. If you are unsure contact our service department for advice.

Check the probe regularly to see if it is filled with clean medical castor oil. Air in the oil chamber can influence the clarity of the image. If air bubbles appear, turn the probe oil filler hole

upwards and screw off the sealing screw. Turn the probe slowly to push the air bubbles out of the screw hole. Infuse a small amount of castor oil into the screw hole with a syringe and needle (refer to figure 6-1). Vent the air bubbles and fasten the sealing screw and clean off any oil spillage that may have occurred.

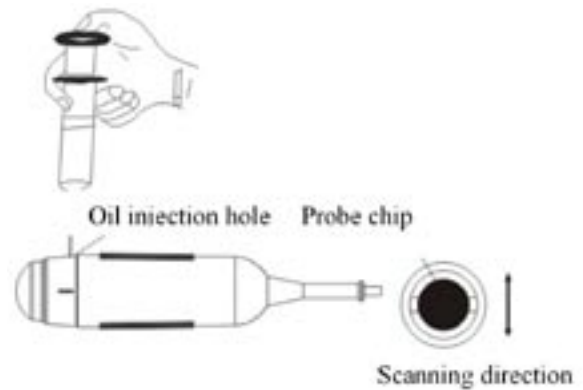


FIGURE 6-1 MECHANICAL SECTOR SCAN PROBE OIL INJECTION, AND SCANNING DIRECTION

6.5 Cleaning

If the unit requires cleaning firstly wipe with a soft dry cloth. Clean carefully with a damp cloth containing 75% medical alcohol .



Warning! To prevent accidents, remove the battery and separate from the mains power supply network before cleaning the main unit DO NOT immerse in water

DO NOT use ethylene oxide or any other organic solvent which tend to deface the probe's protective foil. Keep device or probe free from any type of liquid infiltration. DO NOT clean the unit or probe by airing or heating.

Caution! Please refer to instructions prescribed by the manufacturer closely when using detergents. Be careful when cleaning the display screen, as is very easy to mark. Please wipe wit a dry soft cloth. Do not clean the inner base of the device. Do not immerse the unit or probe in any form of liquid Do not leave any residue on the unit surface.

Checks and Maintenance (cont.)

6.6 Correct use of probe

In order to extend the probe's service life and obtain optimum performance please follow the instructions as below:

1. Regular inspection of probe cable, socket and acoustic window.
2. Switch off the unit first and disconnect the probe before inspection.
3. Do not drop the probe and avoid sudden impact and never tap the probe acoustic window.
4. Always store the probe in the probe box when it is not in use.
5. Never heat the probe.
6. Never bend or tug at the probe cable, This could cause damage to the internal connection.
7. Only use Ultrasound coupling gel and clean the probe after every examination.
8. Inspect probe acoustic window, enclosure and cable carefully after cleaning. Do not use the probe if any cracks or breakages are found.
9. To clean the probe wipe gently with a clean dry cloth. If required wipe with a small amount of alcohol. Avoid any leakage of cleaning agent into the probe.



Warning

The MPUS 300 should not be used in close proximity to high frequency surgery equipment.

6.7 Battery information

1. The equipment is fitted with rechargeable li-ion battery.
2. For optimum efficiency, the new battery must be charged and discharged two or three times.
3. The battery can be charged more than a hundred times. When the charge time of the battery becomes short please contact the service department for a replacement.

4. Only use the charging appointed by Millpledge AniQuip (i.e. AC adapter) to charge the battery. Do not connect the battery to the charger (AC adapter) unless charging is required. Do not connect the battery to the charger (AC adapter) for longer than 10 hours; as this will shorten the battery life. The fully charged battery will gradually discharge when it is not used for some time.
5. Extreme environmental temperatures will influence the battery charging effect. DO not charge the battery to extreme heat. Do not use or store the battery near to a source of heat (such as a fire or heater)!. If you find the battery is leaking or smelling, remove and dispose in a safe place.
6. Do not throw the battery into the fire or heat it in any way as this may cause it to explode.
7. Ensure the battery is kept dry at all times..
8. Ensure that the battery is connected properly (+ to + and - to -).
9. Do not directly connect the battery to the mains or car power adaptor. .
10. Avoid sudden impact to the battery.
11. Must not place the battery in a microwave oven or any pressure vessels.
12. Must not place the battery in microwave oven or pressure vessels.
13. Must not combine the battery with primary battery (such as dry battery) or battery with different capacity, models and types.
14. Do not use the battery if it is smelling, heating, straining, discoloured or with other abnormal phenomena and remove it from the current consumer or electricity charger immediately and stop using it any longer.
15. Do deal carefully with the discarded battery according to local related waste handling regulations.

6.8 Instrument test and calibration

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- a2	4000V/1min No flashover No

Troubleshooting



7.1 Examination

Make sure the mains power is in correct working order
Check that the power cable is correctly inserted into the mains power socket before switching on the mains power.
Check that the probe has been connected to the unit correctly.

7.2 Troubleshooting)

No.	MALFUNCTION	CORRECTIVE ACTION
1	Power adapter indicator light does not work.	Check the supply power. Check the adaptor power cable and connector plug.
2	Main unit power light does not work.	Check the main unit supply power cable and the connection is working.
3	NO screen display stripe or there is snowflake shape disturbance.	Check the adaptor supply power. Environment check - make sure the unit is not affected by magnetic field disturbance. Check the probe connector plugs, and connector jack
4	Screen image display not clear.	Adjust overall gain Adjust fake colour control key.

Appendix A GESTATIONAL TABLES

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



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

Appendix A GESTATIONAL TABLES

SHEEP

MEASUREMENT (mm) (Umbilicus to Spine)	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

Guarantee



The company guarantees the MPUS300 Portable Ultrasound Scanner for a period of twelve months from the date of purchase.

The company guarantees the Probe free of defects for a period of three months from the date of purchase.

The warranty does not cover the following.

- The Portable Ultrasound Scanner series number label has been removed or is unrecognisable.
- Damage to the Portable Ultrasound Scanner resulting from incorrect connection with other devices.
- Damage to the Portable Ultrasound Scanner resulting from accidents.
- Changes performed by users without the prior written authorization of the company.



For Further Information Please Contact:

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