Service Manual

MySono U6

SAMSUNG

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WARRANTY

Samsung Medison provides the following warranty to the purchaser of this unit. This warranty is valid for a period of one year from the date of installation and covers all problems caused by faulty workmanship or faulty material. Samsung Medison will, as sole and exclusive remedy and at no charge, replace any such defective unit returned to Samsung Medison within the designated warranty period.

The warranty does not cover damages and loss caused by outside factors including, but not limited to, fire, flood, storm, tidal wave, lightning, earthquake, theft, abnormal conditions of operation, and intentional destruction of the equipment. Damage caused by equipment relocation is not covered.

The warranty is void in cases where the equipment has been damaged as a result of an accident, misuse, abuse, dropping, or when attempts to modify or alter any part or assembly of the equipment have taken place.

Parts with cosmetic defects or deterioration will not be replaced. Replacement of batteries, training materials, and supplies are not covered.

Samsung Medison will not be responsible for incidental or consequential damages of any kind arising from or connected with the use of the equipment.

Samsung Medison will not be responsible for any loss, damage, or injury resulting from a delay in services rendered under the warranty

This limited warranty is in lieu of all other warranties expressed or implied, including warranties of merchant ability or fitness for any particular use. No representative or other person is authorized to represent or assume for Samsung Medison any warranty liability beyond that set forth herein.

Defective equipment shipped from you to Samsung Medison must be packed in the replacement cartons. Shipping and insurance costs are the responsibility of the customer. To return defective material to Samsung Medison contact the Samsung Medison Customer Service Department.

Samsung Medison or a local distributor will make available, upon request, circuit diagrams, a component parts list, descriptions, calibration instructions and other information which will assist your appropriately qualified technical personnel to repair those parts of the equipment which are designed by Samsung Medison as repairable.

CAUTION: United State federal law restricts this device to sale by or on the order of physicians.

SAMSUNG MEDISON

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MySono U6

Service Manual

Version 1.00.00
English

CSD-SMDU6

Safety Classifications

Classifications:

- Type of protection against electrical shock: Class I
- Degree of protection against electrical shock (Patient connection):Type BF equipment
- Degree of protection against harmful ingress of water: Ordinary equipment
- Degree of safety of application in the presence of a flammable anesthetic material with air or with oxygen or nitrous oxide: Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
- Mode of operation: Continuous operation

Electromechanical safety standards met:

- IEC/EN 60601-1 Medical Electrical Equipment, Part 1General Requirements for Safety.
- IEC/EN 60601-1-1 Safety requirements for medical electrical systems.
- IEC/EN 60601-1-2 Electromagnetic compatibility -Requirements and tests.
- IEC/EN 60601-2-37 Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment.
- IEC 61157 Declaration of acoustic output parameters.
- ISO 10993-1 Biological evaluation of medical devices.
- UL 60601-1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
- CSA 22.2, 601.1 Medical Electrical Equipment, Part 1 General Requirements for Safety.

Declarations

This is CSA symbol for Canada and United States of America

This is manufacturer's declaration of product compliance with applicable EEC directive(s) and the European notified body.

This is manufacturer's declaration of product compliance with applicable EEC directive(s).

This is GMP symbol for Good Manufacturing Practice of Korea quality system regulation.

Certificate of Excellent Service Quality is to certify that the above company has served customers with excellent services by the Ministry of Knowledge Economy Republic of Korea.

Before Using This Product

Read this service manual to familiarize yourself thoroughly with repair procedures and important safety information before attempting to service the product.

Failure to follow this information may cause an accident such as electric shock, as well as mechanical or other hazards to the service engineer, product operator, and/or patient.

1. Refer to the service manual when you service the product.
2. You are strongly urged to familiarize yourself with the operational safety information contained in 'Chapter 2 Safety'.
3. This product is an ultrasound diagnosis device and cannot be used from the user's PC. We are not responsible for errors that occur when the system is run on the user's PC.
4. This product may only be serviced by the Global Service Group of Samsung Medison or an authorized engineer.
5. Samsung Medison is not responsible for any problems caused by an unauthorized person servicing the product.
6. The manufacturer is not responsible for any damage to this product caused by user carelessness and/or neglect.
7. The content of this manual may be changed without prior notice.
8. The following terms are used to highlight safety precautions that the user must be aware of:

DANGER: Disregarding this instruction may result in death, serious injury, or other dangerous situations.

WARNING: Follow this information to prevent a serious accident or damage to property.

CAUTION: Hazards or unsafe practices that may result in minor personal injury or property damage.

NOTE: The accompanying information covers an installation, operation, or maintenance procedure that requires careful attention from the user, but has little chance of leading directly to a dangerous situation.

If You Need Help

If you need help regarding the product, please contact the Samsung Medison Global Service Group in charge of servicing this product.

Revision History

The revision history of this manual is as the follows.

Document No.	Date	REASON FOR CHANGE
CSD-SMDU6	2011-12-28	Initial Release

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Chapter 1

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1.1 Overview

Chapter 1 describes important information about MySono U6 that you must know before servicing the product. The product's main features, configuration, and specification are explained.

MySono U6 is a high-resolution, deep-penetration color diagnostic ultrasound system that offers a wide variety of convenient exam options.

1.2 Main Features of MySono U6

- Cutting-edge Digital Beamforming technology: Utilizes proprietary technology developed by Samsung Medison.
- Diverse applications: Can be used for such diverse applications as general, obstetrics, gynecology, abdomen, vascular, extremities, cardiac, urology, and chest
- Diverse diagnosis modes: Features an array of diagnosis modes including 2D mode, M mode, Color Doppler mode (C mode), Power Doppler mode (PD mode), and PW Spectral Doppler mode (D mode).
- 3D image feature: Provides detailed three-dimensional images in 3D and 4D Image modes.
- Measurement and report features: In addition to measurements of distance, area, circumference, and volume, various measurement features for each application are provided. A report feature for utilizing the measurements is also provided.
- Scan image review feature: Up to 2621-frame Cine images and 4086-line Loop images are provided.
- SONOVIEW feature: An integrated image management system facilitates storage and accessing of images and ensures compatibility of data.
- Digital Imaging and Communication in Medicine (DICOM) feature: Save, transfer, or print images over the network.
- Ease of connecting peripherals: Various peripherals can be connected and used with ease.

1.3 Product Configuration

MySono U6 consists of the main console, probes, and an optional cart.

1.3.1 Console

The inside of the console contains ultrasound imaging components, and the outside features various connectors and a handle.

[Figure 1.1 MySono U6 Console]

Probe Connector
USB Port

DVI-I Port
LAN Port
DC Power Port

Security
MIC Port
Audio Port
USB Port

[Figure 1.2 MySono U6 Side View]

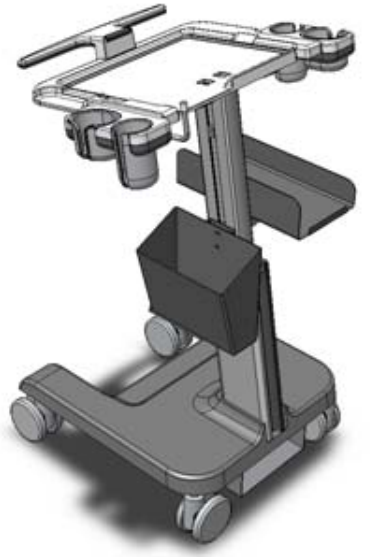
1.3.2 Probes

Probes are devices that generate ultrasound waves and then process the reflected wave data to form images.

NOTE: For detailed information, refer to 'Chapter 9. Probes'.

1.3.3 Dedicated Cart (Optional)

The MySono U6 cart can be used as a base station for your MySono U6, or to move it around. For more information on using and setting up the MySono U6 Cart, refer to the accompanying manual.



[Figure 1.3 MySono U6 Cart]

1.4 Product Specifications

Physical Dimensions	Height: 75.4mm Width: 360mm Depth: 291mm Weight: more than 4.8kg (without battery)
Battery Pack	Hight: 23.5mm Width: 224.5mm Depth: 78.5mm Weight: less than 700g
Monitor	15 inch LCD monitor
Probe connections	One probe port Two probe ports for option
Probes (Type BF / IPX7)	Curved Linear Array: C2-5, C2-8, C4-9 Linear Array: LN5-12 Phased Array: P2-4 Endocavity Curved Linear Array: EVN4-9 Volume Probe: 3DC2-6, 3D4-9 CW Probe: CW2.0
Electrical Parameters	Input: 100-240VAC, 0.7-1.63A, 47-63Hz Output: 19VDC, 7.9A, 150W Max
Pressure Limits	Operating: 700hPa - 1060hPa Storage: 700hPa - 1060hPa
Humidity Limits	Operating: 30% - 75% Storage & Shipping: 20% - 90%
Temperature Limits	Operating: 10°C - 35°C Storage & Shipping: -25°C - 60°C
Input / Output Connections	Video (DVI-I) port Network port USB port Microphone port Audio port
Auxiliary	USB ECG USB Foot Switch(IPX1) External DVD Multi USB Video Printer USB Laser Printer USB Hard Disk Drive USB Flash Memory Media
Application	Abdomen, Obstetrics, Gynecology, Musculoskeletal, Small Parts, Vascular, Cardiac, Pediatric Cardiology, TCD, Urology

Imaging modes	2D imaging mode M imaging mode Color Doppler Imaging (CDI) mode Power Doppler Imaging (PDI) mode Directional Power Doppler Imaging (DPDI) mode Power Pulse Inversion Imaging (PPII) mode Pulse Wave (PW) Spectral Doppler imaging mode Tissue Doppler Imaging (TDI) mode Tissue Doppler Wave mode 3D imaging mode 4D imaging mode Dual modes Combined modes Simultaneous mode Zoom mode
Focusing	Transmit focusing, maximum of eight points (four points simultaneously selectable) Digital dynamic receive focusing (continuous)
Gray Scale	256 (8 bits)
Measurement Packages	Obstetrics, Gynecology, Cardiac, Carotid, Urology, Fetal Echo, LE Artery, UE Artery, LE Vein, UE Vein, Radiology, TCD, Thyroid, Breast, Testicle, Superficial, Pediatric Hips, MSK * Refer to the Chapter 5 for additional information.
Measurement	Trackball operation of multiple cursors 2D mode: Linear measurements and area measurements using elliptical approximation or trace M mode: Continuous readout of distance, time and slope rate Doppler mode: Velocity and trace
Image Storage	Maximum 2,621 frames for CINE memory Maximum 8,192 Lines for LOOP memory Image filing system
Signal processing (Pre-processing)	TGC control Mode-independent gain control Acoustic power control (adjustable) Dynamic aperture Dynamic apodization Dynamic range control (adjustable) Image view area control M-mode sweep speed control
Signal processing (Post-processing)	Frame average Edge Enhancement / Blurring Gamma-scale windowing Image orientation (left/right and up/down, rotation) White on black/black on white Zoom

Chapter 2

Safety

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2.1 Overview

Chapter 2 contains important information for servicing MySono U6 safely.

It is relevant to the ultrasound system, the probes, the recording devices, and any of the optional equipment.

MySono U6 is intended for use by, or by the order of, and under the supervision of, a licensed physician who is qualified for direct use of the medical device.

This equipment should not be used by any healthcare professional or individual who is not properly qualified to operate it. Prolonged use of three-dimensional ultrasound (3D, 4D) by an unqualified individual, such as to produce a commemorative photograph or video of the fetus, may have an adverse effect on the fetus.

Be sure to use the three-dimensional ultrasound diagnostic imaging system only for its intended purposes, since using it for purposes other than diagnosing the fetus may have an adverse effect on the fetus.

2.2 Safety Information

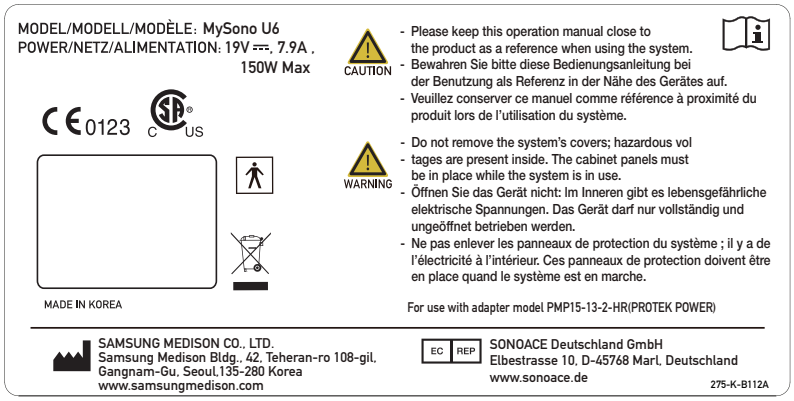
2.2.1 Safety Symbols

The International Electro Technical Commission (IEC) has established a set of symbols for medical electronic equipment, which classify a connection or warn of potential hazards. The classifications and symbols are shown below.

Symbol	Description	Symbol	Description
	DC (direct current) voltage source		Left and right Audio / Video output
	Isolated patient connection (Type BF applied part)		Remote print output
	Power switch (Supplies/cuts the power for product)		Foot switch connector
	Caution: Electric shock risk, electricity		ECG connector
	Indicates dangerous voltages over 1,000V AC or over 1,500V DC.		USB connector
	Danger, warning, caution		MIC input port
	Protective grounding terminal		Audio Port
	ESD (electrostatic discharge) warning		Protection against the effects of immersion
	DATA output port		Protection against dripping water
	DATA input port		Probe connector
	DATA input/output port		Network port
	Left and right Audio / Video input		

2.2.2 Location of Labels

Warning and caution labels that contain information and instructions concerning the protection of the product can be found on the exterior of the product.



[Figure 2.1 Safety Precaution Affixed below the Product]

2.3 Electrical Safety

This equipment has been verified as a Class I device with Type BF applied parts.

2.3.1 Prevention of Electric Shock

WARNING:

- There is a risk of electric shock if an externally mounted recording or monitoring device is not properly grounded.
- Never open the cover of the product. This product uses levels of voltage that are potentially dangerous. Servicing the interior or replacing a part of the product must be performed by the Global Service Group of Samsung Medison.
- Always check the product's casing, cables, cords, and plugs for damage before using the product. Stop using the product if the exterior surface is cracked, broken, or otherwise damaged, or if the cable is worn.
- Always disconnect the system from the wall outlet prior to cleaning the system.
- All patient contact devices, such as probes and ECG leads, must be removed from the patient prior to application of a high voltage defibrillation pulse.
- Do not touch the signal input/output port of the product and the patient at the same time. Leakage current that exceeds the allowed maximum may occur.
- Never use the product in the presence of flammable gas or anesthetic gas. There is a risk of explosion.
- If using an AC adaptor, make sure to use a designated adapter only.

CAUTION:

- An isolation transformer protects the system from power surges. The isolation transformer continues to operate when the system is in standby.
- Do not immerse the power cable in liquids. The power cable is not waterproof.
- Do not touch the SIP/SOP terminal on the rear of the product while diagnosing the patient. There is a risk of electric shock from leakage current.

Additional equipment connected to medical electrical equipment must comply with the respective IEC standards (e.g. IEC 60950/EN60950 for data processing equipment, IEC60601-1/EN60601-1 for medical devices). Furthermore, all configurations must comply with the requirements for medical electrical systems (IEC60601-1-1/EN60601-1-1). When connecting a peripheral to the signal input or output port of medical equipment, you must make sure that the peripheral complies with the IEC60601-1-1/EN60601-1-1 specification.

2.3.2 ESD

Electrostatic discharge (ESD) is a naturally occurring phenomenon that is caused by friction. Low humidity and use of heaters or air conditioners cause ESD to occur frequently. The static shock or ESD occurs because an electrically charged object tends to transfer some of its electrical charge to another object that is not charged or less charged than itself. An ESD occurs when an individual with an electrical energy build-up comes into contact with conductive objects such as metal doorknobs, file cabinets, computer equipment, and even other individuals.

CAUTION:

- The level of electrical energy discharged from a system user or patient to an ultrasound system can be significant enough to cause damage to the system or probes.
- To prevent damage from being caused by ESD, you may wish to take the following precautions:

  Apply anti-static spray to carpets or linoleum.

  Use an anti-static floor mat

  Ground the product to the patient's table or bed.
- It is highly recommended that the user be given training on ESD-related warning symbols and preventive procedures.

2.3.3 EMI

This product has been manufactured in compliance with the EMI (Electro-Magnetic Interference) specification.

However, use of this system in the presence of an electromagnetic field can cause degradation of the ultrasound image or damage to the product.

If this occurs often, Samsung Medison suggests a review of the environment in which the system is being used, to identify possible sources of radiated emissions. These emissions could be from other electrical devices used within the same room or an adjacent room. Communication devices such as cellular phones and pagers can cause these emissions. The existence of radios, TVs, or microwave transmission equipment nearby can also cause interference.

CAUTION: If electromagnetic emissions are interfering with the proper operation of the system, remove the product from the presence of EMI.

2.3.4 EMC

The testing for EMC (Electro-Magnetic Compatibility) of this system has been performed according to the international standard for EMC with medical devices (IEC60601-1-2). In Europe, the IEC standard was adopted as the European norm (EN60601-1-2).

2.3.4.1 Guidance and Manufacturer's Declaration - Electromagnetic Emission

This product is intended for use in the electromagnetic environment specified below. The customer or the user of this product should assure that it is used in such an environment.

Emission test	Compliance	Electromagnetic environment -guidance
RF Emission (Radiation) CISPR 11	Group 1 Class B	The Ultrasound System 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. The Ultrasound System is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies building used for domestic purpose.
RF Emission (Radiation) CISPR 11	Group 1 Class B	
Harmonic Emission IEC 61000-3-2	Class A	
Flicker Emission IEC 61000-3-3	Complies	

2.3.4.2 Approved Cables, Transducers and Accessories for EMC

1. Cables

Cables used with this product can affect the emission levels. Accordingly, only use cables of the types and lengths specified below:

Cable	Type	Length
DVI	Shielded	Normal
USB	Shielded	Normal
LAN(RJ45)	Twisted pair	Any
MIC	Unshielded	Any
Printer Remote	Unshielded	Any
Audio R.L	Shielded	Normal

2. Probes

The probes used with this product may affect the electromagnetic emissions of the product.

Probes listed in 'Chapter 9. Probes' of this service manual meet the Group 1 Class B requirements of the CISPR 11 standard.

3. Peripherals

Accessories used with this product may affect its emissions.

CAUTION: It is the responsibility of the user to verify the electromagnetic emission compatibility between the product and a user-supplied peripheral when connecting the peripheral. Use only CISPR 11 or CISPR 22, CLASS B compliant devices.

WARNING: The use of cables, transducers, and accessories other than those specified may result in increased emission or decreased Immunity of the Ultrasound System.

Immunity test	IEC 60601 Test level	Compliance level	Electromagnetic environment -guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6KV Contact ±8KV air	±6KV Contact ±8KV air	Floors should be 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	±2KV for power supply lines ±1KV for input/output lines	±2KV for power supply lines ±1KV for input/ output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1KV differential mode ±2KV common mode	±1KV differential mode ±2KV common 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% U_T (>95% dip in U_T) for 0.5cycle 40% U_T (60% dip in U_T) for 5 cycle 70% U_T (30% dip in U_T) for 25 cycle <5% U_T (<95% dip in U_T) for 5 s	<5% U_T (>95% dip in U_T) for 0.5cycle 40% U_T (60% dip in U_T) for 5 cycle 70% U_T (30% dip in U_T) for 25 cycle <5% U_T (<95% dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of this product requires continued operation during power mains interruptions, it is recommended that this product be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80MHz	0.01V	Portable and mobile RF communications equipment should be used no closer to any part of the Ultrasound System, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = [\frac{3,5}{V_1}]\sqrt{p}$ $d = [\frac{3,5}{E_1}]\sqrt{p}$ 80MHz to 800MHZ $d = [\frac{7}{E_1}]\sqrt{p}$ 800MHz to 2.5GHz
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5GHz	3V/m	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 meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1: At 80MHz and 800MHz, 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 strengths 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 Ultrasound System is used exceeds the applicable RF compliance level above, the Ultrasound System should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Ultrasound System or using a shielded location with a higher RF shielding effectiveness and filter attenuation.

[b] Over the frequency range 150kHz to 80MHz, field strengths should be less than [V_1] V/m.

2.3.4.3 Recommended separation distances between portable and mobile RF communications equipment and MySono U6

This product is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The user can help to prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and this product, and by controlling the maximum output of communication equipment as recommended below:

Rated maximum output power of transmitter [W]	Separation distance according to frequency of transmitter [m]		
	150kHz to 80MHz $d = [\frac{3,5}{V_1}]\sqrt{p}$	80MHz to 800MHz $d = [\frac{3,5}{E_1}]\sqrt{p}$	800MHz to 2.5GHz $d = [\frac{7}{E_1}]\sqrt{p}$
	V1=0.01Vrms	E1=3V/m	E1=3V/m
0.01	35.00	0.11	0.23
0.1	110.68	0.36	0.73
1	350.00	1.16	2.33
10	1106.80	3.68	7.37
100	3500.00	11.66	23.33

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (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 80MHz and 800MHz, 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.

2.3.4.4 Electromagnetic Emission Environment – Guidance

Ultrasound systems must be used only in shielded locations offering at least the minimal level of RF shielding effectiveness, and where all the cables are also shielded. Field strengths outside the shielded location from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than 3V/m.

It is essential to verify that the actual shielding effectiveness and filter attenuation of the shielded location meet the minimum specifications.

CAUTION: If the system is connected to other customer-supplied equipment, such as a local area network (LAN) or a remote printer, Samsung Medison cannot guarantee that the remote equipment will work correctly in the presence of electromagnetic emission phenomena.

2.3.4.5 Avoiding Electromagnetic Interference

A medical device can either generate or receive electromagnetic interference. The EMC standards describe tests for both emitted and received interference.

Samsung Medison's ultrasound systems do not generate electromagnetic interference in excess of the referenced standards.

An ultrasound system is designed to receive signals at radio frequency, and is therefore susceptible to interference generated by RF energy sources. Examples of other sources of interference are medical devices, information technology products, and radio and television transmission towers. Tracing the source of radiated interference can be a difficult task. Users should consider the following when attempting to locate the source:

- Is the interference intermittent or constant?
- Does the interference show up only with one probe, or with several probes?
- Do two different transducers operating at the same frequency have the same problem?
- Is the interference present if the system is moved to a different location in the facility?

The answers to these questions will help to determine if the problem resides with the system or the scanning environment. Please contact your local Samsung Medison Global Service Group or an authorized engineer after answering the above questions.

2.4 Mechanical Safety

2.4.1 Safety Notes

CAUTION:

- Do not apply excessive force to the product.
- Install and use the product at a stable location. Use of the dedicated cart (optional) is recommended.
- Do not use the product with it placed on your lap. You might get burned.
- Never attempt to modify the product in any way.
- Read the instructions on safe operation of the product if using the product after a prolonged period of non-use.
- Make sure that other objects, such as metal pieces, do not enter the system.
- Do not block the ventilation slots.
- Do not store the product inside a bag or any other enclosed space while it is powered on.
- Do not pull on the power cord to unplug the product. Doing so might damage the cord and cause the product to short-circuit, or the cord itself to break. Unplug the cord by pulling on the plug.
- Excessive bending or twisting of cables on patient-applied parts may cause failure or intermittent operation of the system.
- Improper cleaning or sterilization of a patient-applied part may cause permanent damage.

2.4.2 Moving the Equipment

Firmly grip the handle on the rear of the product and move the product slowly. Alternatively, you can use the Samsung Medison cart (sold separately).

CAUTION: Power off the product and disconnect all cables before moving it.

NOTE: If using the recommended cart, avoid leaving the cart unattended on an uneven surface. If you must leave the cart on an uneven surface, engage the brakes attached to the casters.

2.5 Biological Safety

Refer to 'Chapter 9. Probes' for safety information regarding the probes.

WARNING:

- Ultrasound waves may have damaging effects on cells, and therefore may be harmful to the patient. If there is no medical benefit, minimize the exposure time and maintain the ultrasound wave output level at low. Please refer to the ALARA principle.
- Do not use the product if an error message or a warning message about a dangerous situation is displayed on screen. Write down the message displayed on screen, turn the power off, and contact your local Samsung Medison Global Service Group.
- Do not use a system that exhibits erratic or inconsistent updating. Discontinuities in the scanning sequence are an indication of a hardware failure that should be corrected before use.
- The system limits the maximum contact temperature to 43 degrees Celsius, and the ultrasonic waves output observes American FDA regulations.

2.5.1 ALARA Principle

Performing diagnoses using an ultrasound device is defined by the "As Low As Reasonably Achievable" (ALARA) principle. The decision as to what is reasonable should be left to the judgment and insight of qualified personnel. No set of rules can be formulated that would be sufficiently complete to dictate the correct response for every circumstance. By keeping ultrasound exposure as low as possible, while obtaining diagnostic images, users can minimize ultrasonic bioeffects.

Since the threshold for diagnostic ultrasound bioeffects is undetermined, it is the sonographer's responsibility to control the total energy transmitted into the patient. The sonographer must reconcile exposure time with diagnostic image quality. To ensure diagnostic image quality and limit exposure time, the ultrasound system provides controls that can be manipulated during the exam to optimize the results of the exam.

The ability of the user to abide by the ALARA principle is important. Advances in diagnostic ultrasound not only in the technology but also in the applications of the technology, have resulted in the need for more and better information to guide the user. This important information is based on various output data of ultrasound, and plays an important role in putting the ALARA principle into effect.

Numerous variables affect the output data that forms the basis of the provided information. Such variables include mass, size, location of the bone relevant to focusing, debility of the body, and duration of exposure to ultrasound. The most significant of these variables is the duration of exposure. This is because the duration of the exposure is determined by the user of the ultrasound equipment.

2.5.1.1 Applying ALARA

The system-imaging mode used depends upon the information needed. 2D-mode and M-mode imaging provide anatomical information, while Doppler, Power, and Color imaging provide information about blood flow. Scanned modes like 2D-mode, Power, or Color, disperse or scatter the ultrasonic energy over an area, while unscanned modes like M-mode or Doppler concentrate ultrasonic energy. Understanding the nature of the imaging mode being used allows the sonographer to apply the ALARA principle with informed judgment. The probe frequency, system set-up values, scanning techniques, and operator experience aid the sonographer in meeting the definition of the ALARA principle. The decision as to the amount of acoustic output is, in the final analysis, up to the system operator. This decision must be based on the following factors: type of patient, type of exam, patient history, ease or difficulty of obtaining diagnostically useful information, and the potential localized heating of the patient due to probe surface temperatures. Prudent use of the system occurs when patient exposure is limited to the lowest index reading for the shortest amount of time necessary to achieve acceptable diagnostic results.

Although a high index reading does not mean that a bioeffect is actually occurring, a high index reading should be taken seriously. Every effort should be made to reduce the possible effects of a high index reading. Limiting exposure time is an effective way to accomplish this goal.

There are several system controls that the operator can use to adjust the image quality and limit the acoustic intensity. These controls are related to the techniques that an operator might use to implement ALARA. These controls can be divided into three categories: Direct, indirect, and receiver controls.

2.5.1.2 Direct Controls

Application selection and the output intensity control directly affect acoustic intensity. There are different ranges of allowable intensity or output based on your selection. Selecting the correct range of acoustic intensity for the application is one of the priorities required during any exam. For example, peripheral vascular intensity levels are not recommended for fetal

exams. Some systems automatically select the proper range for a particular procedure, while others require manual selection. Ultimately, the user bears the responsibility for proper clinical use. This Samsung Medison system provides both automatic and user-definable settings.

Output has a direct impact on acoustic intensity. Once the application has been established, the output control can be used to increase or decrease the intensity output. The output control allows you to select intensity levels less than the defined maximum. Prudent use ensures good image quality while employing the lowest output intensity.

2.5.1.3 Indirect Controls

The indirect controls are those that have an indirect effect on acoustic intensity. These controls affect imaging mode, pulse repetition frequency, focus depth, pulse length, and probe selection.

The choice of imaging mode determines the nature of the ultrasound beam. 2D-mode is a scanning mode, Doppler is a stationary or unscanned mode. A stationary ultrasound beam concentrates energy on a single location. A moving or scanned ultrasound beam disperses the energy over a wide area and the beam is only concentrated on a given area for a fraction of the time necessary in an unscanned mode.

Pulse repetition frequency or rate refers to the number of ultrasound bursts of energy over a specific period of time. The higher the pulse repetition frequency, the more pulses of energy in a given period of time. Several controls affect pulse repetition frequency: Focal depth, display depth, sample volume depth, color sensitivity, number of focal zones, and sector width controls affect the resolution of the image. Maintaining or increasing the resolution at a different focal zone involves the adjustment of numerous outputs from the focal zone. This output adjustment is one of the system's optimization features. Different exams require different focal depths. Setting the focus to the proper depth improves the resolution of the structure of interest.

Pulse length is the time during which the ultrasonic burst is turned on. The longer the pulse, the greater the time-average intensity value. The greater the time-average intensity, the greater the likelihood of temperature increase and cavitations. Pulse length, burst length, or pulse duration is the output pulse duration in pulsed Doppler. Increasing the Doppler sample volume increases the pulse length.

Probe selection affects intensity indirectly. Tissue attenuation changes with frequency. The higher the probe operating frequency, the greater the attenuation of the ultrasonic energy. Higher probe operating frequencies require higher output intensity to scan at a deeper

depth. To scan deeper at the same output intensity, a lower probe frequency is required. Therefore, using more gain and output than required means a lower frequency probe is needed without corresponding increases in image quality.

2.5.1.4 Receiver Controls

Receiver controls are used by the operator to improve image quality. These controls have no effect on output. Receiver controls only affect how the ultrasound echo is received. These controls include gain, TGC, dynamic range, and image processing. The important thing to remember concerning output is that the receiver controls must be optimized before output is increased. For example; before increasing output, optimize gain to improve image quality.

2.5.1.5 Additional Considerations

Ensure that scanning time is kept to a minimum, and ensure that only medically required scanning is performed. Never compromise quality by rushing through an exam. A poor exam will require a follow-up, which ultimately increases the time. Diagnostic ultrasound is an important tool in medicine, and, like any tool, should be used efficiently and effectively.

2.5.1.6 Output Display Features

The system output display comprises two basic indices: a mechanical index and a thermal index. The thermal index consists of the following indices: soft tissue (TIs), bone (TIb) and cranial bone (TIc). One of these three thermal indices will be displayed at all times. One of the indices will be displayed according to the application currently in use, depending on the system settings or user choice.

The mechanical index is continuously displayed over the range of 0.0 to 1.9, in increments of 0.1. Each probe application has a default selection that is appropriate for that combination. The Tib or Tis is contiguously displayed over the range of 0.0 to maximum output, based on the probe and application, in increments of 0.1.

The application-specific nature of the default setting is also an important factor of index behavior. The default setting is the system control state, which is preset by the manufacturer or the operator. The system has default index settings for the probe application. The default settings are invoked automatically by the ultrasound system when power is turned on, new patient data is entered into the system database, or a change of application takes place. The decision as to which of the three thermal indices is displayed is based on the following criteria:

Appropriate index for the application: Tis is used for imaging soft tissue, and Tib for a focus at or near a bone. Certain factors such as the presence of fluid or bone, or the flow of blood, might create artificially high or low thermal index readings. A highly attenuating tissue path, for example, will cause the potential for local zone heating to be less than the thermal index displays.

Scanned modes versus unscanned modes of operation affect the thermal index. For scanned modes, heating tends to be near the surface; for unscanned modes, the potential for heating tends to be deeper in the focal zone.

Always limit ultrasound exposure time. Do not rush the exam. Ensure that the indices are kept to a minimum and that exposure time is limited without compromising diagnostic sensitivity.

1. **Mechanical Index (MI) Display**

   Mechanical bioeffects are threshold phenomena that occur when a certain level of output is exceeded.

   The threshold level varies, however, with the type of tissue. The potential for mechanical bioeffects varies with peak pressure and ultrasound frequency. The MI accounts for these two factors. The higher the MI value, the greater the likelihood of mechanical bioeffects occurring. However, there is no specific MI value that means that a mechanical effect will actually occur. The MI should be used as a guide for implementing the ALARA principle.

2. **Thermal Index (TI) Display**

   The TI informs the user about the potential for temperature increase occurring at the body surface, within body tissue, or at the point of focus of the ultrasound beam on bone. The TI is an estimate of the temperature increase in specific body tissues. The actual amount of increase in temperature is influenced by factors such as tissue type, vascularity, and mode of operation. The TI should be used as a guide for implementing the ALARA principle.

   The bone thermal index (TIb) informs the user about potential heating at or near the focus after the ultrasound beam has passed through soft tissue or fluid, such as the skeletal structure of a 2~3 months old fetus. The cranial bone thermal index (TIc) informs the user about the potential heating of bone at or near the surface, for example, cranial bone. The soft tissue thermal index (TIs) informs the user about the potential for heating within soft homogeneous tissue.

   You can select either TIs or TIb by using the TIs/TIb selection in Miscellaneous System Settings. TIc is displayed when you select a trans-cranial application.

3. Mechanical and Thermal indices Display Precision and Accuracy

The Mechanical and Thermal Indices on the system are precise to 0.1 units.

The MI and TI display accuracy estimates for the system are given in the Acoustic Output Tables manual. These accuracy estimates are based on the variability range of probes and systems, inherent acoustic output modeling errors and measurement variability, as described below.

The displayed values should be interpreted as relative information to help the system operator achieve the ALARA principle through prudent use of the system. The values should not be interpreted as actual physical values of the investigated tissue or organs. The initial data that is used to support the output display is derived from laboratory measurements based on the AIUM measurement standard. These measurements are applied to algorithms to calculate the displayed output values.

Many of the assumptions used in the process of measurement and calculation are conservative in nature. Over-estimation of actual in situ exposure, for the vast majority of tissue paths, is built into the measurement and calculation process. For example, the measured water tank values are derated using the conservative industry-standard attenuation coefficient of 0.3dB/cm-MHz.

Conservative values for tissue characteristics were selected for use in the TI models. Conservative values for tissue or bone absorption rates, blood perfusion rates, blood heat capacity, and tissue thermal conductivity were selected.

Steady state temperature rise is an assumption inherent in the industry standard TI model, which assumes that the ultrasound probe has been in one location for a long enough duration for it to be considered to be in a steady state.

A number of factors are considered when estimating the accuracy of display values: hardware variations, algorithm accuracy estimation, measurement variability and variability among probes and systems are significant factors. Probe variability results from piezoelectric crystal efficiencies, process-related impedance differences, and sensitive lens focusing parameter variations. Differences in the system pulse voltage control and efficiencies are also a contributor to variability. There are inherent uncertainties in the algorithms used for estimating acoustic output values over the range of possible system operating conditions and pulse voltages. Inaccuracies in laboratory measurements are related to differences in hydrophone calibration and performance, positioning, alignment and digitization tolerances, and variability among test operators.

The conservative assumptions of the output estimation algorithms of linear propagation, at all depths, through a 0.3dB/cm-MHz attenuated medium are not taken into account

in calculation of the accuracy estimate displayed. Neither linear propagation nor uniform attenuation at the 0.3dB/cm-MHz rate occurs in water tank measurements, or in most tissue paths in the body. In the body, different tissues and organs have dissimilar attenuation characteristics. In water, there is almost no attenuation. In the body, and particularly in water tank measurements, non-linear propagation and saturation losses occur as pulse voltages increase.

The display accuracy estimates take into account the variability ranges of probes and systems, inherent acoustic output modeling errors, and measurement variability. Display accuracy estimates are measured according to AIUM measurement standards but not based on errors caused during the measurement. They are also independent of the effects of non-linear loss on the measured values.

2.5.1.7 Control Effects - Control Affecting the Indices

As various system controls are adjusted, the TI and MI values may change. This will be most apparent as the POWER control is adjusted; however, other system controls will affect the on-screen output values.

1. **Power**

   Power controls the system acoustic output. Two real-time output values are on the screen: a TI and a MI. They change as the system responds to POWER adjustments.

   In combined modes, such as simultaneous Color, 2D-mode and pulsed Doppler, the individual modes each add to the total TI. Each mode is a major contributing factor to this total TI, and the displayed MI will be from the mode with the highest peak pressure.

2.5.1.8 2D Mode Controls

1. **2D Mode Size**

   Narrowing the sector angle may increase the frame rate. This will increase the TI. Pulse voltage may be automatically adjusted down with software controls to keep the TI below the system maximums. A decrease in pulse voltage will decrease MI.

2. **Zoom**

   Increasing the zoom magnification may increase frame rate. This will increase the TI. The number of focal zones may also increase automatically to improve resolution. This action may change MI since the peak intensity can occur at a different depth.

3. **Persistence**

   A lower persistence will decrease the TI. Pulse voltage may be automatically increased. An increase in pulse voltage will increase MI.

4. **Focal No.**

   More focal zones may change both the TI and MI by changing frame rate or focal depth automatically. Lower frame rates decrease the TI. MI displayed will correspond to the zone with the largest peak intensity.

5. **Focus**

   Changing the focal depth will change the MI. Generally, higher MI values will occur when the focal depth is near the natural focus of the transducer.

2.5.1.9 Color and Power Controls

1. **Color Sensitivity**

   Increasing the color sensitivity increases TI and the time spent for scanning color images. Color pulses are the dominant pulse type in this mode.

2. **Color Sector Width**

   Narrower color sector width will increase color frame rate and the TI will increase. The system may automatically decrease pulse voltage to stay below the system maximum. A decrease in pulse voltage will decrease the MI. If pulsed Doppler is also enabled, then pulsed Doppler will remain as the primary mode and the TI change will be small.

3. **Color Sector Depth**

   Deeper color sector depth may automatically decrease color frame rate or select a new color focal zone or color pulse length. The TI will change due to the combination of these effects. Generally, the TI will decrease with increased color sector depth. MI will correspond to the peak intensity of the dominant pulse type, which is a color pulse. However, if pulsed Doppler is also enabled, then pulsed Doppler will remain the dominant mode and the TI change will be small.

4. **Scale**

   Using the scale control to increase the color velocity range may increase the TI. The system will be automatically adjusted to maintain pulse voltage below the system maximum. A decrease in pulse voltage will also decrease MI.

5. **Sector Width**

   A narrower 2D-mode sector width in Color imaging will increase color frame rate. The TI will increase. MI will not change. If pulsed Doppler is also enabled, then pulsed Doppler will remain as the primary mode and the TI change will be small.

2.5.1.10 M Mode and Doppler Controls

1. **Speed**

   M-Mode and Doppler sweep speed adjustments will not affect the MI. When M-Mode sweep speed changes, TI changes.

2. **Simultaneous and Update Methods**

   Use of combination modes affects both the TI and MI through the combination of pulse types. During simultaneous mode, the TI is additive. During auto-update and duplex, the TI will display the dominant pulse type. The displayed MI will be from the mode with the largest peak pressure.

3. **Sample Volume Depth**

   When Doppler sample volume depth is increased the Doppler PRF may automatically decrease. A decrease in PRF will decrease the TI. The system may also automatically decrease the pulse voltage to remain below the system maximum. A decrease in pulse voltage will decrease MI.

2.5.1.11 Doppler, CW, M Mode, and Color Imaging Controls

When a new imaging mode is selected, both TI and MI will change to default settings. Each mode has a corresponding pulse repetition frequency and maximum intensity point. In combined or simultaneous modes, the TI is the sum of the contributions from the modes enabled, and MI is the MI for the focal zone and mode with the largest derated intensity. If a mode is turned off and then reselected, the system will return to the previously selected settings.

1. **Probe**

   Each probe model available has unique specifications for contact area, beam shape, and center frequency. Settings are initialized when you select a probe. Samsung Medison's factory default values vary with probe, application and mode. Default values have been chosen that are below the FDA limits for their intended use.

2. **Depth**

   An increase in 2D mode depth will automatically decrease the 2D mode frame rate. This would decrease the TI. The system may also automatically choose a deeper 2D-mode focal depth. A change of focal depth may change the MI. The MI displayed is that of the zone with the largest peak intensity.

3. **Application**

   Acoustic output default values are set when you select an application. Samsung Medison's factory default values vary with probe, application and mode. Default values have been chosen that are below the FDA limits for their intended use.

2.5.1.12 Related Guidance Documents

For more information about ultrasonic bioeffects and related topics refer to the following;

- AIUM Report, January 28, 1993, "Bioeffects and Safety of Diagnostic Ultrasound"
- Bioeffects Considerations for the Safety of Diagnostic Ultrasound, J Ultrasound Med., Sept. 1998: 1998: Vol. 7, No. 9 Supplement
- Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment. (AIUM, NEMA. 1998)
- Acoustic Output Labeling Standard for Diagnostic Ultrasound Equipment (AIUM, 1998)
- Second Edition of the AIUM Output Display Standard Brochure, Dated March 10, 1994. (A copy of this document is shipped with each system.)
- Information for Manufacturer Seeking Marketing Clearance of Diagnostic Ultrasound Systems and Transducers. FDA. September 1997. FDA.
- Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment. (Revision 1, AIUM, NEMA. 1998)
- WFUMB. Symposium on Safety of Ultrasound in Medicine: Conclusions and Recommendations on Thermal and Non-Thermal Mechanisms for Biological Effects of Ultrasound, Ultrasound in Medicine and Biology, 1998: Vol. 24, Supplement1.

2.5.1.13 Acoustic Output and Measurement

Since the first usage of diagnostic ultrasound, the possible human biological effects (bioeffects) of ultrasound exposure have been studied by various scientific and medical institutions. In October 1987, the American Institute of Ultrasound in Medicine(AIUM) ratified a report prepared by its Bioeffects Committee (Bioeffects Considerations for the Safety of Diagnostic Ultrasound, J Ultrasound Med., Sept. 1988: 1988: Vol.7, No.9 Supplement), sometimes referred to as the Stowe Report, which reviewed available data on possible effects of ultrasound exposure. Another report, "Bioeffects and Safety of Diagnostic Ultrasound", dated January 28, 1993, provides more up-to-date information. The acoustic output for this system has been measured and calculated in accordance with the December 1985 "510(K) Guide for Measuring and Reporting Acoustic Output of Diagnostic Ultrasound Medical Devices", except for the hydrophone, which meets the requirements of "Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment"(NEMA UD 2-1992).

2.5.1.14 In Situ, Derated, and Water Value Intensities

All intensity parameters are measured in water. Since water does not absorb acoustic energy, these water measurements represent a worst case value. Biological tissue does not absorb acoustic energy. The true value of the intensity at any point depends on the amount and type of tissue and the frequency of the ultrasound that passes through the tissue. The intensity values in tissue, and in situ have been measured by using the following formula:

In Situ = Water [$e^{-(0,23\ alf)}$]

where: In Situ = In Situ Intensity Value

Water = Water Value Intensity

e = 2.7183

a = Attenuation Factor

Tissue a(dB/cm-MHz)

Brain .53

Heart .66

Kidney .79

Liver .43

Muscle .55

l = skin line to measurement depth (cm)

f = Center frequency of the transducer/system/mode combination(MHz)

Since the ultrasonic path during an examination is likely to pass through varying lengths and types of tissue, it is difficult to estimate the true in situ intensity. An attenuation factor of 0.3 is used for general reporting purposes.

Therefore, the commonly reported in situ value uses the following formula:

In Situ (derated) = Water [$e^{-(0,069\ lf)}$]

Since this value is not the true in situ intensity, the term "derated" is used.

The maximum derated and the maximum water values do not always occur under the same operating conditions. Therefore, the reported maximum water and derated values may not be related to the In Situ (derated) formula. Take a multi-zone array transducer that has maximum

water value intensities in its deepest zone as an example. The same transducer may have its largest derated intensity in one of its shallowest focal zones.

2.5.1.15 Acoustic Output and Measurement

The terms and symbols used in the acoustic output tables are defined in the following paragraphs.

ISPTA.3	Derated spatial-peak temporal-average intensity (milliwatts per square centimeter).
ISPPA.3	Derated spatial-peak pulse-average intensity (watts per square centimeter). The value of IPA.3 at the position of global maximum MI (IPA.3@MI) may be reported instead of ISPPA.3 if the global maximum MI is reported.
MI	Mechanical Index. The value of MI at the position of ISPPA.3, (MI@ISPPA.3) may be reported instead of MI (global maximum value) if ISPPA.3 is 190W/cm^2.
Pr.3	The derated peak rarefactional pressure (megapascals) associated with the transmit pattern giving rise to the reported MI value.

WO	The ultrasonic power (milliwatts). For the operational condition giving rise to ISPTA.3, WO is the total time-average power. For operational condition to be reported as ISPPA.3 or less, WO is the ultrasonic power associated with the transmit pattern that gives rise to value that is reported as ISPPA.3 or less.
fc	The center frequency (MHz). For MI and ISPPA.3, fc is the center frequency associated with the transmit pattern giving rise to the global maximum value of the respective parameter. For ISPTA.3, for combined modes involving beam types of unequal center frequency, Fc is defined as the overall ranges of center frequencies of the respective transmit patterns.
ZSP	The axial distance at which the reported parameter is measured (centimeters).
x-6,y-6	are respectively the in-plane (azimuth) and out-of-plane (elevation) -6 dimensions in the x-y plane where ZSP is found (centimeters).
PD	The pulse duration (in microsecond) associated with the transmit pattern giving rise to the reported value of the respective parameter.
PRF	The pulse repetition frequency (Hz) associated with the transmit pattern giving rise to the reported value of the respective parameter.
EBD	The entrance beam dimensions for the azimuth and elevation planes (centimeters).
EDS	The entrance dimensions of the scan for the azimuth and elevation planes (centimeters).

2.5.1.16 Acoustic Measurement Precision and Uncertainty

The Acoustic Measurement Precision and Acoustic Measurement Uncertainty are described below.

Quantity	Precision	Total Uncertainty
PII.3(derated pulse intensity integral)	3.2 %	+21 % to - 24 %
Wo(acoustic power)	6.2 %	+/- 19 %
Pr.3(derated rarefaction pressure)	5.4 %	+/- 15 %
Fc(center frequency)	< 1 %	+/- 4.5 %

1. **Systematic Uncertainties**

   For the pulse intensity integral, derated rarefaction pressure Pr.3, center frequency and pulse duration, the analysis includes considerations of the effects on accuracy of:

   Hydrophone calibration drift or errors

   Hydrophone / Amp frequency response

   Spatial averaging

   Alignment errors

   Voltage measurement accuracy, including

   - Oscilloscope vertical accuracy
   - Oscilloscope offset accuracy
   - Oscilloscope clock accuracy
   - Oscilloscope Digitization rates
   - Noise.

The systematic uncertainties Acoustic power measurements using a Radiation Force are measured through the use of calibrated NIST acoustic power sources.

We also refer to a September 1993 analysis carried out by a working group of the IEC technical committee 87 and prepared by K. Beissner, as a first supplement to IEC publication 1161.

The document includes analysis and discussion of the sources of error / measurement effects due to:

- Balance system calibration
- Absorbing (or reflecting) target suspension mechanisms
- Linearity of the balance system
- Extrapolation to the moment of switching the ultrasonic transducer (compensation for ringing and thermal drift)
- Target imperfections
- Absorbing (reflecting) target geometry and finite target size
- Target misalignment
- Ultrasonic transducer misalignment
- Water temperature
- Ultrasonic attenuation and acoustic streaming
- Coupling or shielding foil properties
- Plane-wave assumption
- Environmental influences
- Excitation voltage measurement
- Ultrasonic transducer temperature
- Effects due to nonlinear propagation and saturation loss

The overall findings of the analysis give a rough acoustic power accuracy figure of +/- 10% for the frequency range of 1 - 10 MHz.

2.6 Protecting the Environment

CAUTION:

- You must consult the manufacturer or follow a proper procedure for disposal to safely dispose of the console and/or peripherals whose service lifespan has expired.
- You are responsible for complying with the relevant regulations for waste disposal.
- The product's battery must be replaced by Samsung Medison's Global Service Group or an authorized dealer.

2.7 Battery

Familiarize yourself with the instructions below before using the battery pack:

WARNING:

- Comply with all instructions concerning charging, discharging, and storage temperatures of the battery. For more information on the recommended temperature range, refer to 'Chapter 10. Maintenance'.
- When connecting the battery, pay attention to the polarity of the electrodes. Mixing up the polarity can cause the battery pack to short-circuit.
- Do not disassemble or modify the battery.
- Do not expose the battery to heat or set it on fire.
- Do not store or use the battery pack in the vicinity of a heat-generating device or an open flame.
- Do not leave the battery in direct sunlight.
- Do not handle the battery using sharp objects.
- Do not subject the battery to impact or step on the battery.
- If the battery has been damaged, do not use it.
- Do not attempt to solder or repair the battery.
- Do not connect the battery directly to an electrical outlet.
- If MySono U6 is not in use for a month or longer, be sure to remove the battery from the product and store it separately.

CAUTION:

The battery can damage the product if it explodes, catches on fire, or starts to produce smoke. See below for more information.

- Do not submerge the battery in water or allow it to get wet.
- Do not place the battery in a microwave oven, electric oven, or pressurized container.
- If the battery begins to leak, produce an odor, or generate heat, do not store or use it in the vicinity of an inflammable material.
- Do not use the battery if you notice suspicious signs such as an odor, heat, or deformation.

Chapter 3

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3.1 Overview

Chapter 3 describes the information needed to plan and carry out the installation of MySono U6.

The transportation and installation environments required to ensure the optimal installation conditions for the product are explained.

The product's Installation procedure and the method of setting up the product are included, and electrical safety inspection is explained. In addition, the methods of connecting the probe and peripherals are also included.

3.2 Transporting

MySono U6 is a finely tuned piece of medical electronic equipment; careful attention is required when transporting it.

3.7.1 Caution on Transporting

The box packaging is designed to reduce impact. However, take care to prevent any external impact from reaching the product.

3.7.2 Humidity and Temperature

[Table 3-1] Product's Humidity and Temperature shown below illustrates the temperature and humidity ranges for transporting, storing, and operating the product.

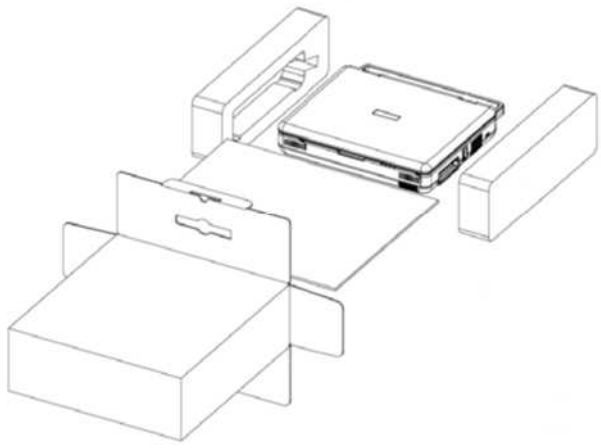
Category	Temperature [°C]	Humidity [%]
Transporting	-25 ~ 60	20 ~ 90
Storing	-10 ~ 50	20 ~ 90
Operating	10 ~ 35	30 ~ 75

[Table 3.1 Product's Humidity and Temperature]

3.3 Unpacking

3.7.3 Dismantling the Product Box

1. Dismantle the box.
2. Remove the product and the component box from the packaging, and store them in a safe location.



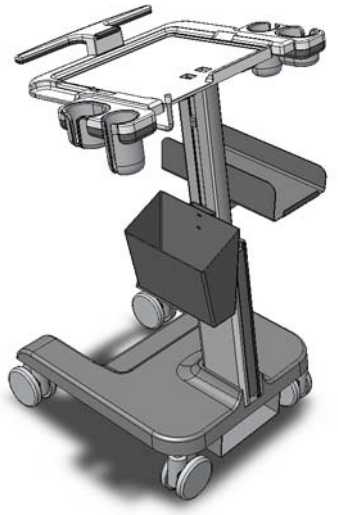
[Figure 3.1 Dismantling the Product Box]

3.7.4 Product Components

A box containing various accessories is supplied with the product.

3.7.5 MySono U6 Cart (sold separately)

For more information on using and setting up the MySono U6 Cart, refer to the accompanying manual.



[Figure 3.2 MySono U6 Cart]

3.7.6 MySono U6 Cart (Optional), 2 Probe Connector

MySono U6 is designed to provide one probe port, but the system can be expanded to use two probes by adding a separate kit.

NOTE: The 2 Probe Connector is an optional item, and must be purchased separately. For more information, please refer to the U6 CART User Manual.

3.4 Installation Environment

3.7.7 Caution

Pay attention to the following instructions:

1. Ensure that the environment is moisture free.
2. Avoid direct sunlight.
3. Avoid excessive fluctuations in temperature.
4. To ensure proper operation, a temperature of 10˚C ~ 35˚C and humidity of 30% ~ 75% must be maintained.
5. Avoid installing the product near a heating appliance.
6. Avoid dusty and/or poorly ventilated locations.
7. Avoid locations that frequently vibrate.
8. Ensure that the environment is free of harmful chemical substances or gasses.

3.5 Installing the Product

3.7.8 Installation Safety

DANGER: Placing the system near generators, X-ray machines or broadcast cables may result in screen noise and abnormal visual images. Sharing the power source with other electrical devices may also cause noise.

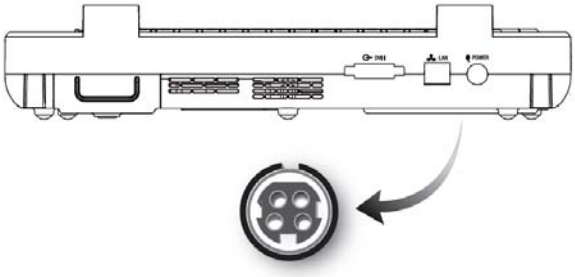
CAUTION: If the product needs to be transported or stored for an extended duration, the temperature and humidity of the environment must be checked. Refer to '[Table 3-2] Operational Temperature of Product' before turning the product on. A sudden change in temperature may cause condensation and lead to product failure.

Temperature	-20	-15	-10	-5	0	5	10 ~ 35	45	50	55	60
Waiting time	16	10	8	6	4	2	Use immediately	2	4	6	10

[Table 3.2 Operational Temperature of Product]

3.7.9 AC Adapter Connection

Use the power port located on the rear of the product. Connecting the AC adapter automatically begins to recharge the battery pack.



[Figure 3.3 Power Cord Receptacle]

CAUTION: When connecting, pay attention to the direction of the AC adapter pins. Connecting the adapter in the wrong direction may bend or break the adapter pins.

NOTE:

- If powering the product with a battery pack, do not connect the AC adapter.
- For more information on battery pack replacement and maintenance, refer to 'Chapter 8. Maintenance'.

3.7.10 Probe Connection

Be sure to connect or disconnect probes when the power is off to ensure the safety of the system and the probes.

CAUTION: To prevent damage to the probe's connecting pins and the connector PCB, do not use excessive force when connecting a probe.

1. Lift the probe lockdown switch to disconnect the probe.
2. Connect the probe to the probe port located on the right side of the console.
3. Push the probe lockdown switch down to lock the probe in place.

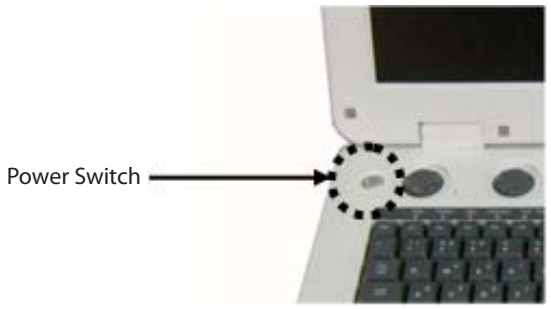
Unlocked Locked

[Figure 3.4 Connecting a Probe]

CAUTION: You can connect a probe while the power is on, but you must not connect or disconnect a probe while the product is booting.

3.6 Turning the Product On

Pressing the On/Off switch located on the left side of MySono U6's control panel (keyboard) initiates the booting process.

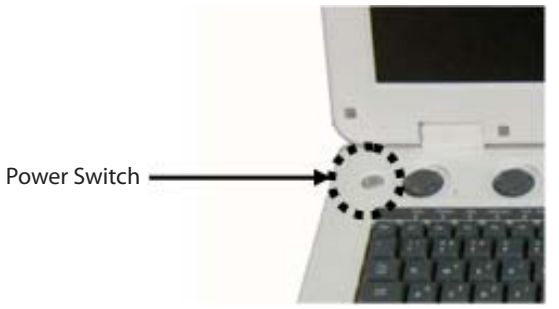


[Figure 3.5 Power Switch]

1. You can view the booting process on the LCD monitor screen. The Windows XP logo will fade away, to be replaced with MySono U6 logo and a loading bar.
2. The loading bar will gradually be filled with color, which represents the process of the software moving data to the system's front end part and back end part.
3. Once the software finishes moving data, the ultrasound screen appears; MySono U6 is now ready to be used.

3.7 Shutting Down the Product

Press and hold the power switch button on the left side of the control panel (keyboard) for about two seconds.



[Figure 3.6 Power Switch]

NOTE: Holding down the **On/Off** button for four seconds or longer forces the product to power off immediately, but doing so may damage the hard disk.

CAUTION:

- Do not press keyboard keys or buttons while booting is in progress.
  Doing so may cause the system to malfunction.
- If you turn the power on after a forced shutdown, the system might turn on and then immediately turn off. This is one of the characteristics of the Intel® PC main board, and not a system error.

3.8 Connecting Peripherals

MySono U6 provides various methods of connecting peripherals. Peripherals can be connected as needed by connecting them to the appropriate ports, which are usually located on the rear panel.

CAUTION: When using a peripheral device via a USB port, always turn the power off before connecting/disconnecting the device. Connection/disconnection of USB devices while the power is on may lead to malfunction of the system and the USB devices.

NOTE: For instructions on using a particular peripheral, please refer to its user manual.

The following products are recommended:

1. DVD-multi: DVD+R, DVD-R, DVD+RW, DVD-RW, CD-R, CD-RW
2. USB video printer
   - ▶ Color: Mitsubishi CP30DW, SONY UP-D23MD
   - ▶ Black and White: Mitsubishi P93DW, SONY UP-D897
3. USB Magnetic Optical (MO) Disk Drive: 1.4G External USB Optical Drive
4. USB to serial (RS-232C) converter: USB to serial (RS-232C) converter that uses the FTDI chipset (FTDI FT232BM compatible)
5. Miscellaneous: USB flash memory media

NOTE:

- ▶ If the system cannot recognize USB 1.1 flash memory. Remove the flash memory from the console and equip again with an appropriate device.
- ▶ To remove a USB storage device from the system, go to **Utility** > **Storage Manager**.
- ▶ When using a **flash Memory** device which supports functions other than saving files, please check first to see if it is possible to save the file from the device to a desktop PC before connecting it to MySono U6.

3.9 Connecting the Battery

MySono U6 uses battery power when the AC adaptor is not connected or reliable power is not being supplied through the AC adaptor.

CAUTION:

- It is recommended that you use 3D/4D mode only when the AC adaptor is connected.
- Use only the battery power if the AC adaptor is not providing reliable power or if proper external grounding is not available.
- The battery has been designed to be used only with MySono U6. Never use batteries that have not been recommended by Samsung Medison.

The number of hours that the battery can power MySono U6 for varies depending on the diagnosis mode selected and the peripherals connected.

If the battery level runs low while using the product, connect it to an AC power source to recharge the battery. If you want to replace the battery with a spare battery, shut down the system before replacing the battery.

NOTE:

- Before using the battery, make sure to read the battery safety information in 'Chapter 2. Safety'.
- For more information on battery care, refer to 'Chapter 10. Maintenance'.

3.7.11 Battery Icons

Battery icons indicate the status of the battery and are shown in the user information area on the monitor.

If you are using the product with battery only, you can check the remaining power by viewing the battery icon on the monitor.

See below for more information on battery icons:

Icon	State	Note
	AC adaptor is connected	Battery is being recharged.
	Battery level is between 75% and 100%.	AC adapter is not connected.
	Battery level is between 50% and 75%.	
	Battery level is between 25% and 50%.	
	Battery level is below 25%.	
	Neither the AC adaptor nor the battery is connected, or there is a battery error.	

[Table 3.3 Battery Icons]

3.10 System Settings

System settings that are not directly related to imaging are explained. These settings may be changed as needed.

1. Select **Setup** from the Utility menu.
2. The Setup screen will be displayed. Select a tab that has items that you can adjust.
3. Configure the settings for each item.
4. Press **Exit** to complete setup.

Tips!

Selecting a tab

You can select a desired tab in either one of two ways. Use the method that best suits your needs.

1. Use the trackball and the **Set** button to select a tab on the monitor screen.
2. Rotate the **Ext. Menu** dial-button to select the tab you want.

3.7.12 General System Settings (Setup-General)

Select the **General** tab on the *Setup* screen. You can specify general settings such as title settings.

[Figure 3.7 Setup - General]

3.7.12.1 Scan Mode

1. **Simultaneous Mode**

   You can decide whether to enable Simultaneous Mode in Spectral Doppler Mode, using the following three options:

   - **Off:** Select this option if you do not wish to use Simultaneous Mode.
   - **Allow B/PW:** Select this option if you wish to use Simultaneous mode in 2D/PW, but not in 2D/C/PW.
   - **Allow B/C/PW:** Select this option if you wish to use simultaneous mode in both 2D/PW and 2D/C/PW.

2. **Freeze Action**

   Select a function to execute when the **Freeze** button on the control panel is pressed. Available options are BodyMarker, Caliper, Measure and None.

3. **End Exam Action**

   Select a function to execute when the **End Exam** button on the control panel is pressed.

   - **End Exam Only:** Pressing the **End Exam** button exits Exam mode and switches to the B Mode Scan screen.
   - **End Exam + Patient:** Pressing the **End Exam** button switches to the *Patient Information* screen.

4. **Dual Operation**

   Select whether to activate the selected area in Dual mode. When you select **Auto Unfreeze**, the selected screen is always activated in Dual mode.

5. **2D/C Live**

   Select the position of the Color Doppler Mode in 2D/C Live Mode.

   - **Left:** Color Doppler mode is positioned on the left.
   - **Right:** Color Doppler mode is positioned on the right.

6. **Option**

Used to determine which options will be used in scan mode. Use the trackball and the **Set** button to select and check or uncheck an item.

- **Auto Freeze:** Scan mode is frozen automatically when the product is not used for 10 minutes.

NOTE: In Live 3D mode, Auto Freeze is activated when the product is not used for 20 minutes.

- **HPRF:** Select whether or not to activate HPRF (High Pulse Repetition Frequency), which is supported in PW Spectral Doppler Mode. Check the checkbox to use the HPRF function.
- **Color Map Auto invert:** Check this checkbox to automatically highlight the Color Map. This option is only applied when you change Steer in 2D/C/D Mode, C Mode, or DPDI Mode in PD Mode.
- **Width Rescale:** Automatically fit the image size to the screen size when the depth of a 2D image is adjusted. Please note that this can be only used with linear probes.

3.7.12.2 Clip store Setting

1. **Store Clip Method**

Specify the method and range in which an image is acquired and saved.

You can select ECG Beat, Time or Manual. Note that ECG Beat can only be selected when ECG is on.

- **ECG Beat:** Specify the heart beat as 1 – 8 beats.
- **Time:** Specify the time period as 1 – 4 seconds.
- **Manual:** Automatically saves four additional seconds of images following the press of the **Save** button.

2. **Cine Loop Period**

Prospective: When the button which was selected to save clip on the control panel is pressed during a scan, the images displayed afterwards will be saved.

Retrospective: When **Save** button on the control panel is pressed during a scan, images displayed up to that point will be saved.

3.7.13 Display

Select the **Display** tab on the *Setup* screen to specify display-related options.

[Figure 3.8 Setup-Display]

3.7.13.1 Display

1. Option

You can select multiple items. Use the trackball and the **Set** button to check or uncheck an item.

- **Auto Freeze:** The Scan Mode is frozen automatically when the product is not used for 10 minutes.

NOTE: In 3D mode, Auto Freeze is activated when the product is not used for 20 minutes.

- **TGC Line:** Select whether or not to display the TGC Line.
- **Image Info:** Show or hide the image information. If the image information hides the image, turn off this function.
- **Name + Age:** Select whether to display the patient ID, name, and age.

- **TI (Thermal Index) Display:** Select which TI to display on screen, among TIs (soft tissue thermal Index), TIb (bone thermal index), and TIc (cranial bone thermal index).

2. Freeze Action

Select a function to execute when the **Freeze** button on the control panel is pressed. Available options are BodyMarker, Caliper, Measure and None.

3. 2D/C Dual Live

Select the position of the Color Doppler Mode in 2D/C Live Mode. If Horizontal Dual in 2D menu is set to on, select between Up/Down; if set to off, select between Left/Right.

- Left/Up: Color Doppler Mode is located in the left or upper part of the screen.
- Right/Down: Color Doppler Mode is located in the right or lower part of the screen.
- Disable Horizontal Format: Turns off Horizontal Dual function in 2D/C Live mode.

4. LMP / GA Display

Specify how the LMP and GA entered on the *Patient Information* screen will be displayed on the monitor screen.

- Information Bar (Replace ID): LMP and GA will be displayed at the ID location in the title area.
- Information Bar (Replace Name): LMP and GA will be displayed at the Name location in the title area.
- Measure Result: When taking measurements, LMP and GA will be displayed together with the measurement result.
- None: LMP and GA will not be displayed on screen.

3.7.13.2 Font

1. **Font**

   Specify the target for which you want to set the font. Choose from **Document Font** and **Measure Result Font**.

2. **Font Name**

   Select the font type to use.

3. **Font Size**

   Select the font size to use.

4. **Font Color**

   Select the font color to use.

5. **Preview**

   The Preview window displays the font that you have selected.

6. **Default**

   Uses the system's default fonts. The default settings are as follows:

	Document Font	Measure Result Font
Font Name	Helvetica	Verdana
Font Size	11	11
Font Color	White	Yellow

[Table 3.4 Default Default Settings]

3.7.13.3 Title

You can specify the information that is displayed in the title area on the screen.

1. **Institute**

   Enter the name of the hospital/institution where the product is installed.

NOTE: These special characters cannot be entered: # [" : ? | ₩]

2. **Date**

   The current date is displayed. To change the date, press  .

NOTE:

- You cannot change the date and time when a patient ID has been registered. To change the date and time, you should finish the current diagnosis by pressing the **End Exam** button on the control panel.
- You can select a year from 2006 to 2027.

- Set the date and time by using the trackball and the **Set** button on the control panel.
- When the date and time have been properly set, click **Apply** to apply changes. Click **OK** to close the Date and Time window. To cancel, click **Cancel** or press the **Exit** button on the control panel.

3.7.14 Annotate

Select the **Annotate** tab in the *Setup* screen. Specify display-related options.

[Figure 3.9 Setup - Annotate]

3.7.14.1 BodyMarker

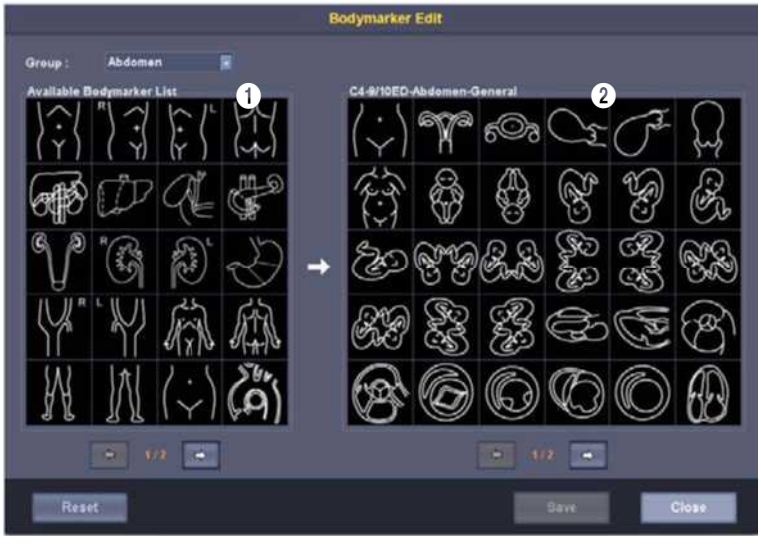
1. **Size**

   Used to specify the BodyMarker picture size. Select **Small**, **Medium**, or **Large**.

2. **Option**

   BodyMarker Auto Active: Select whether to activate the BodyMarker mode automatically when the active image area is changed.

3.7.14.2 BodyMarker Edit



[Figure 3.10 BodyMarker Edit]

1. **BodyMarker list**

   The list varies depending on the group selected from Group. 'Current page/Total pages' is displayed below. If there is a total of two or more pages, you can move to other pages by using ⇨ or ⇦.

2. **BodyMarker list for the probe or preset currently being used**

   'Current page/Total pages' is displayed below. If there is a total of two or more pages, you can move to other pages by using ⇨ or ⇦.

NOTE: You can add or save between 1 and 100 BodyMarkers in each list.

3. **Adding a BodyMarker**

   Select and double-click a BodyMarker in the list on the left (❶). The selected BodyMarker is added to the list on the right (❷). The right list cannot have duplicated BodyMarkers. If this occurs, a warning message will pop-up.

4. **Removing a BodyMarker**

   Select and double-click a BodyMarker in the list (❷) on the right.

5. **Saving and Canceling the BodyMarker list**

   Click **Save** to save the list. Click **Close** to cancel.

6. **Resetting the BodyMarker list**

   Click **Reset**. This restores the system's default settings.

3.7.14.3 Text Set up

Used to configure text input-related options.

1. **Quick Text**

   If the checkbox is selected, the Quick Text function is enabled. With Quick Text enabled, pressing any keyboard key immediately activates text input mode.

2. **Auto Text Erase**

   If this checkbox is checked, all of the text that has been entered is deleted at once when you return to scan mode by pressing the **Freeze** button.

3. **Boot up Caps Lock on**

   If this checkbox is checked, Boot up Caps Lock On is turned on. This means that when text is entered, it is entered in capital letters.

4. **Autotext**

   If an abbreviation is entered, the system retrieves and enters a full word automatically. When this option is selected, you can enter text more easily and quickly.

3.7.15 Peripherals

Select the **Peripherals** tab on the *Setup* screen. You can configure keys, buttons, and the peripheral devices connected to the product.

3.7.15.1 Print Setup

1. **Printer Orientation**

   Selects the type and print direction (horizontal or vertical) of the echo printer.

NOTE: This option is available only for an Echo printer that uses roll paper.

2. **Print Key**

   Used to assign printers to the control panel's **Print 1** and **Print 2** buttons.

3. **Measure Report print**

   Select the relevant check box to print the measurement report in an A4/ Letter format.

4. **Local Printing Area**

   Set the area that will be printed.

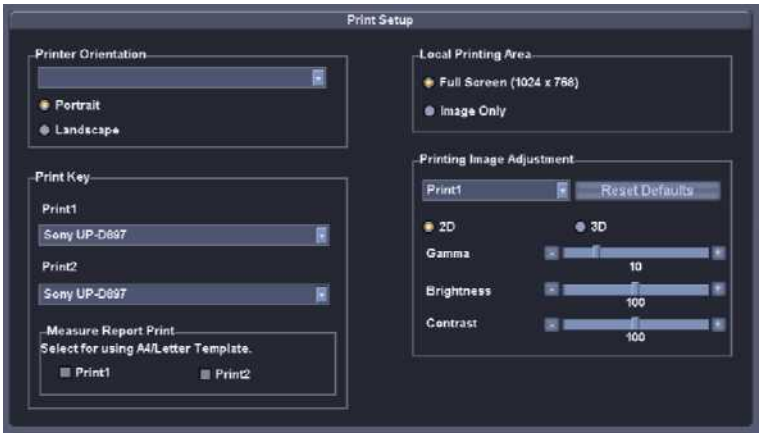
   ❶ Full Screen (1024*768): Print the full monitor screen (1024*768).

   ❷ Image Only: Prints the image area only.

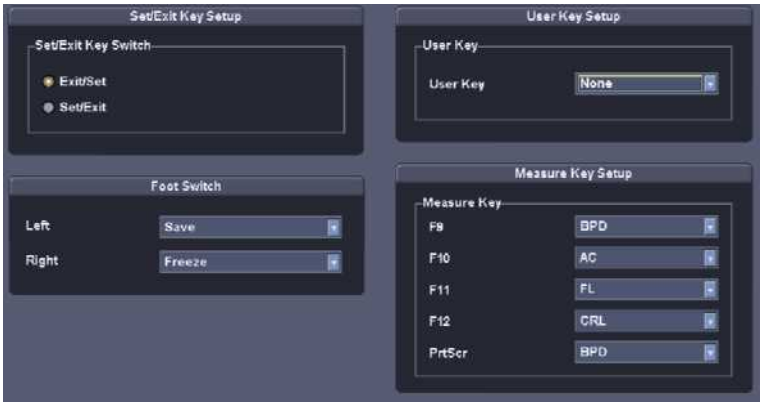
5. **Printing Image Adjustment**

   Used to adjust the image print quality. Select the type of the printer and image, and adjust the **Gamma**, **Brightness**, and **Contrast**.

NOTE: This is only supported by some digital printers.



[Figure 3.11 Setup - Peripherals



[Figure 3.12 Setup - User Defined Key]

3.7.16 User Defined Key

Select the **User Defined Key** tab on the *Setup* screen. You can set the functions of several of the keys and buttons on the product.

3.7.16.1 Set / Exit Key Setup

Selects the positions of **Exit** button and **Set** button on the control panel. Select the checkbox to assign the Set function to the left **Set/Exit**, and the Exit function to the right button.

3.7.16.2 Foot Switch

Set the functions of the left and right pedals of the foot switch. The functions that can be set are shown below. Freeze, Update, Print1, Print2, Save, Store Clip, Volume Start

3.7.16.3 User Key Setup

Used to assign a function to the keyboard's **User** button. The functions that can be set are shown below: None, Update, EFW Measure, EFW Result, BPD, HC, AC, FL, APTD, TTD, FTA, GS, CRL, TDI, Probe Change, Application Change, Simultaneous, 2D/C Live, Biopsy, Change Window

3.7.16.4 Measure Key Setup

Used to assign a function to the keyboard's **User** button. The functions that can be set are shown below: None, Update, EFW Measure, EFW Result, BPD, HC, AC, FL, APTD, TTD, FTA, GS, CRL, TDI, Probe Change, Application Change, Simultaneous, 2D/C Live, Biopsy, Change Window

3.7.17 Miscellaneous

Select the **Miscellaneous** tab on the *Setup* screen. You can set E-mail, Text, Network Status, etc.

[Figure 3.13 Setup - Miscellaneous]

3.7.17.1 E-Mail

Enter the details of the server that this product should use to send/receive e-mails.

3.7.17.2 Buzzer Control

Generate a buzzer sound when a button or dial-button is used. Use the trackball to set this to on or off. When this is set to on, the buzzer sounds each time a button or dial-button is used.

3.7.17.3 Control

Used to specify the trackball's speed in scan mode. Select from **Slow**, **Normal**, and **Fast**. Used to specify the trackball's speed during measurement. Select from **Slow**, **Normal**, and **Fast**. Slower speeds allow more precise measurements.

3.7.17.4 Export Image Compensation

Used to set the Post Curve of the image to use the DICOM service. Click the **Compensation** button to display the Compensation window.

Adjust **Gamma**, **Brightness**, and **Contrast** by using the slider for each option. If **Default** is clicked, the system's default settings will be restored.

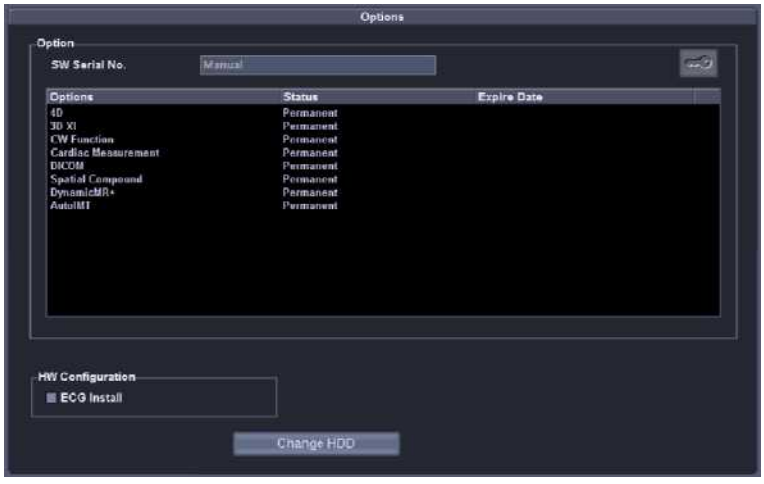
3.7.18 Option

Select the **Option** tab on the *Setup* screen. Enables or disables the use of optional software or hardware.

3.7.18.1 Option

The list of optional software will appear.

NOTE: To purchase optional software, please contact the vendor who supplied the product.



[Figure 3.14 Setup - Option]

1. **Option**

   This shows the types of optional software that can be installed on the product.

2. **Status**

   This shows the current status of optional software.

   ❶ Not Installed: Hardware is not connected.

   ❷ Unregistered: The software license has not been registered yet.

   ❸ Installed: Hardware is installed but cannot be used yet.

   ❹ Permanent: The hardware or software can be used for an unlimited period.

❺ Restricted: The hardware or software can be used only for a certain period of time.

❻ Expired: Use of the software is restricted, and it cannot be used because the specified period of use has expired.

3. **HW Configuration**

   The list of optional hardware will appear. Currently, only ECG is supported.

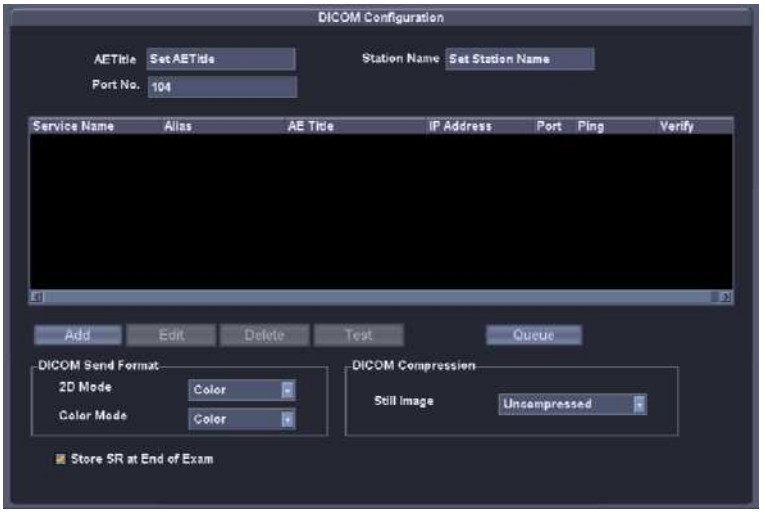
   Select a hardware item to use by using the checkbox. Reboot the system to complete the settings.

3.7.19 DICOM

Select the **DICOM** tab on the *Setup* screen. Used to configure DICOM (Digital Imaging and Communication in Medicine) operation and server.

NOTE:

- DICOM is an optional feature in this product.
- For more information, please refer to the server's user manual or the DICOM Conformance Statement.



[Figure 3.15 Setup - DICOM]

3.7.19.1 DICOM Configuration

Information about the DICOM server used by the system is displayed.

You can change the information, or add or delete a server. The server information is used to identify DICOM for the system within a network. It is also used to transfer data to other DICOM servers.

NOTE: Please consult your network administrator to set IP Address, AE Title, and Port No.

1. **AE Title**

   Enter the name of the DICOM AE (Application Entity). Used for identifying the equipment that uses DICOM on the network (example: US1, US2, etc.).

2. **Station Name**

   Enter the name of the system. Along with **AE Title**, it is often used to identify the system on the DICOM network (example: Q31, Q32, etc.).

3. **Port No**

   Enter the port number on the server being used.

3.7.19.2 DICOM Send Format

Specify the storage format for the 2D or Color Mode images for which the DICOM services will be used. Select either **Color** or **Gray** by using the combo button. If you select **Gray**, images are saved in grayscale format.

NOTE: DICOM Send Format settings are applied when an image is saved. For example, if it is set to **Gray**, saving an image will save it in grayscale format.

3.7.19.3 DICOM Compression

Select whether to compress the still images for the DICOM service. Select **Uncompressed** or **JPEG Baseline** by using the combo button. When you select **Uncompressed**, the images are saved without compression.

NOTE: DICOM Compression settings are applied when an image is saved. For example, if it is set to **JPEG Baseline**, saving an image will compress it.

3.7.19.4 Store SR at END of Exam

Click **Add** on the screen. A screen is displayed where you can enter a DICOM service to add. After adding a service, click **Save** to save the information. Click **Cancel** to cancel.

3.7.19.5 Store SR at END of Exam

Click **Add** on the screen. A screen is displayed where you can enter a DICOM service to add. After adding a service, click **Save** to save the information. Click **Cancel** to cancel.

1. **Services**

   Select the type of service to use via DICOM. The supported DICOM servers are Storage, Print, Worklist, PPS, SC and Storage SR.

2. **Alias**

   Enter the name of the DICOM server.

3. **AE Title**

   Enter the AE title of the DICOM server. Consult your network administrator before specifying this option.

4. **Transfer Mode**

   Select a transfer method:

   ❶ Batch: Send all saved images when you press the **End Exam** key.

   ❷ Send As You Go: Send an image whenever you press the **Save** button to save it.

   ❸ Manual: Send an image selected from the Exam List or in SONOVIEW.

5. **Connect Timeout**

   The connection will time out if there is no response within the configured time period. You can specify this time period in seconds.

6. **IP Address**

   Enter the IP address of the server being used. Consult your network administrator before specifying this option.

7. **Port No.**

   Enter the port number on the server being used. Consult your network administrator before specifying this option.

8. **Retry Interval**

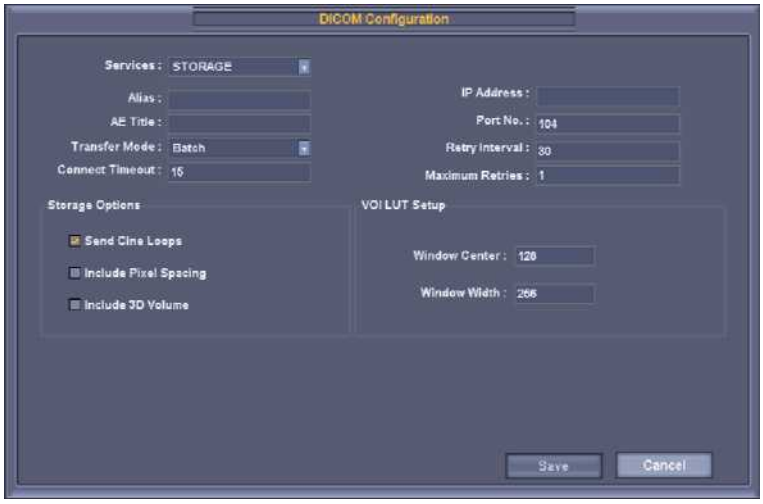
   Specify how many seconds the system will wait before it retries a failed transmission. You can specify this time period in seconds.

9. **Maximum Retries**

   Specify how many times a failed transmission will be retried.

3.7.19.6 Storage Server Information

Select **STORAGE** under **Services**. Configure the Image Storage Service using DICOM.



[Figure 3.16 DICOM Configuration - Storage]

1. **Storage Option**

   ❶ Send Cine Loops: Select this checkbox to transfer Cine Loops.

   ❷ Include Pixel Spacing: In addition to the area information used in ultrasound exams, the area information used in CT or X-Ray exams will be included. Measurements can be taken from a PACS system that does not support ultrasonic area information.

NOTE: However, only 2D and 2D Color Mode images are supported. In Dual and Quad Mode, the depths of the included images must be identical.

   ❸ Include 3D Volume: Select whether to send 3D volume data together with the 3D images.

NOTE: Only select this option if you use a storage service that supports the 3D volume data format used by Samsung Medison.

2. **VOI LUT Setup**

   Configure VOI LUT (Value Of Interest, Look Up Table). Adjust the brightness and contrast of a DICOM image when saving it. The saved image can be viewed with any PACS device that has DICOM VOI LUT implemented.

   ❶ Window Center: Enter a value for the DICOM Tag (0028, 1050) setting. The setting value indicates the brightness of the image that is displayed by the storage service. Relative to 128, a higher value results in a darker image. Note that this function can be used only when it is supported by the storage service.

   ❷ Window Width: Enter a value for the DICOM Tag (0028, 1051) setting. The setting value indicates the contrast of the image displayed by the storage service. Relative to 256, higher values result in lower contrast. Note that this function is available only when it is supported by the storage service.

3.7.19.7 Print Server Information

Select **PRINT** under **Services**. Configure the Print Service using DICOM.

NOTE:

- You can configure a printer connected to the DICOM network only.
- Depending on the printer, some of the following functions may not be available. Before configuring the printer service, refer to the printer's user manual, or the DICOM Conformance Statement.

1. **Color**

   Specify whether to use colors. Select **Grayscale** or **RGB**.

2. **Format**

   Specify the paper layout. Select from 1x1, 1x2, 2x2, 2x3, 3x3, 3x4, 3x5, 4x4, 4x5, and 4x6.

3. **Orientation**

   Specify the paper orientation. Select **Landscape** or **Portrait**.

4. **Magnification**

   When resizing an image to print, specify the interpolation. Select **Replicate**, **Bilinear**, **Cubic**, or **None**.

5. **Border Density**

   Specify the border color of an image to print. Choose between black and white.

6. **Empty Density**

   When resizing an image to print, specify the interpolation. Select **Replicate**, **Bilinear**, **Cubic**, or **None**.

7. **Min Density**

   Specify the minimum brightness of an image to print. If this option is not specified, the default value is applied.

8. **Max Density**

   Specify the maximum brightness of an image to print. If no value is entered, the printer's default value will be used.

9. **Medium Type**

   Specify the material type for the printout. Select from **Paper**, **Clear Film**, **Blue Film**, **Mammo Clear Film** and **Mammo Blue Film**.

10. **Film Size**

    Specify the paper size. Select from **8inchx10inch**, **5inchx11inch**, **10inchx12inch**, **10inchx14inch**, **11inchx14inch**, **11inchx17inch**, **14inchx14inch**, **14inchx17inch**, **24cmx24cm**, **24cmx30cm**, **A4**, and **A3**.

11. **Destination**

    Specify the paper pathway. Select **Magazine** or **Processor**.

12. **Smoothing Type**

    This option is available only when **Magnification** is set to **CUBIC**. Enter a value for the printer which is specified in the DICOM Conformance Statement.

13. **Priority**

    Specify a priority for the print command. Select from **High**, **Med** and **Low**.

14. **Copies**

    Enter the number of copies between 1 and 99.

15. **Configuration Info**

    Enter the printer's information. Please refer to the DICOM Conformance Statement for the printer value.

3.7.19.8 Worklist Server Information

Select **WORKLIST** under **Services**. Configure the Modality Worklist Service using DICOM.

1. **Show Worklist first when the patient screen opens**

   When you check this checkbox, the Worklist window appears when you press the control panel's **Patient** button. Otherwise, the Study Information window appears.

2. **Update Method**

   Specify the update method for Worklist.

   ❶ Only on user Request: Update the worklist only when the user wishes to.

   ❷ On Startup and Every: Update the worklist when the system boots up, and then automatically update it at specified intervals.

Tips!

To update a worklist, set **Search Source** to **Worklist** in the **Search** tab on the Patient Information screen, and then click **Search**.

3. **Scheduled Station AE Title**

   Specify the range of AE Titles to retrieve from the Worklist server in a hospital.

   ❶ Any: Retrieve the patient list stored in all AE Titles on the server.

   ❷ This System: Retrieve the patient list in the **AE Title** specified under the **DICOM** tab

   ❸ Another: Retrieve the patient list stored in the AE Title specified by the user.

NOTE: This option is available only when the Worklist server is enabled.

4. **Start Date**

   Specify the range of dates to search.

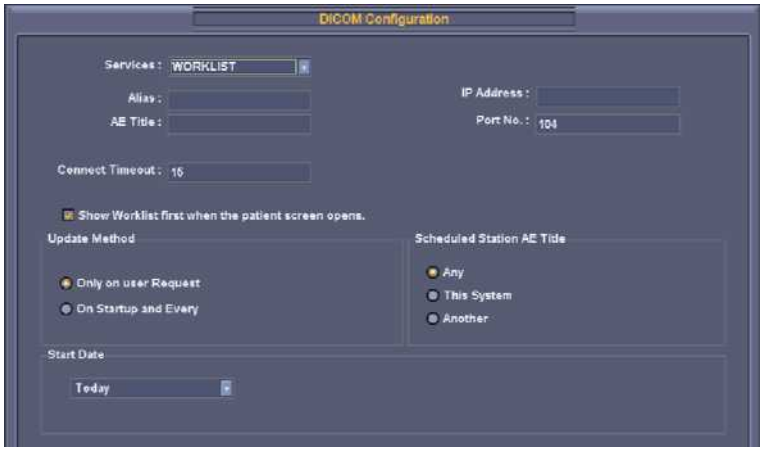
   ❶ Today: Retrieve the patient list for the current date.

   ❷ Range: Retrieve the patient list for 'n' days before and 'n' days after the current date.

   ❸ Past Week: Retrieve the patient list for 7 days before the current date.

   ❹ Past Month: Retrieve the patient list for a month before the current date.

   ❺ Custom Date: Specify a certain date and retrieve the patient list for that date.



[Figure 3.17 Dicom Configuration - Worklist]

3.7.19.9 PPS Server Information

Select **PPS (Performed Procedure Step)** under **Services**.

Configure the Modality Performed Procedure Step Service using DICOM.

The configuration options are the same as those for the storage server.

1. **Always complete exams**

   When you check this checkbox, exams are always reported in complete condition.

   If you press the **Cancel** button without selecting a checkbox, a cancellation message will be sent to the RIS server.

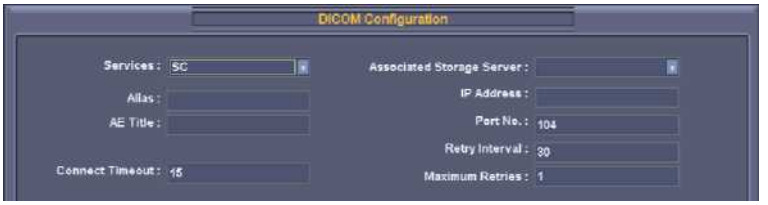
[Figure 3.18 DICOM Configuration - PPS]

3.7.19.10 SC Server Information

Select **SC (Storage Commitment)** under **Services**. Configure the Storage Commitment Service using DICOM. The Storage Commitment Service is used after a diagnosis is finished and all saved images and reports are transferred.

1. **Associated Storage Server**

   Select an Image Storage server to connect to.



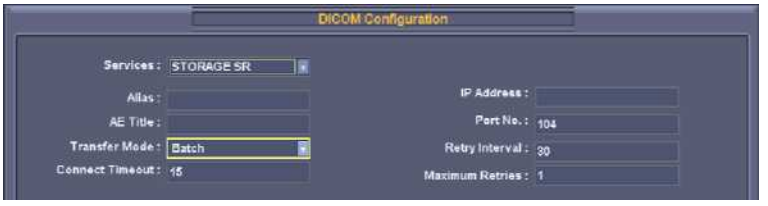
[Figure 3.19 DICOM Configuration - SC]

3.7.19.11 Storage SR Server Information

Select **Storage SR (Storage Structured Report)** under **Services**.

Configure the Report Storage Service using DICOM.

The configuration options are the same as those for the storage server.



[Figure 3.20 DICOM Configuration – Storage SR]

3.7.19.12 Changing DICOM Information

Select a service and click **Edit** on the screen. The information on the selected service will appear.

After changing the information, click **Save** to save the changes. Click **Cancel** to cancel.

3.7.19.13 Deleting a DICOM Service

Select a service and click **Delete** on the screen. You will be prompted with a confirmation message. Click **Ok** to delete the selected service. Click **Cancel** to cancel.

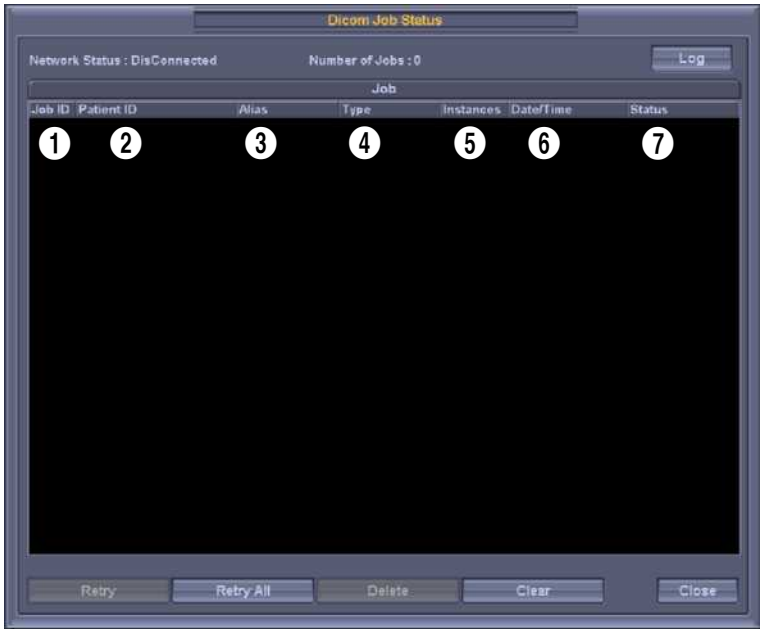
3.7.19.14 Testing DICOM Server

Select a service and click **Test** on the screen. The connection with the selected service is tested and the results are shown under the **Ping** and **Verify** items. If the result is Normal, it indicates that the connection is functioning as it should do.

3.7.19.15 Managing DICOM

Click **Queue** on the screen to switch to the DICOM Job Status screen. You can review the current job status using the **Job ID**, **Patient ID**, etc.

The following describes the elements of the *DICOM Job Status* screen.



[Figure 3.21 DICOM Job Status]

❶ Job ID: Displays the job ID.

❷ Patient ID: Displays the patient ID.

❸ Alias: Displays the alias set in the DICOM Configuration screen.

❹ Type: Displays the job type. Job types include Storage, Print, Storage SR, MPPS Start, MPPS End, and Storage CMT.

❺ Instances: Displays the number of instances. Different job types have different meanings for instances. For Storage and Print, instance means the number of images; for Storage SR, it means Measure Data. For PPS Start, Instances is always displayed as 0.

❻ Data/Time: Displays the date and time when the job was created.

❼ Status: Displays the current status of the job.

Status	Description
Fail	The job failed.
Transfer	The job is in progress.
Imperfect	Job suspended while being processed. The status will be switched to the Ready state immediately.
Wait	The job is waiting for execution.
Wait Resp	The job is waiting for a response.
Hold	The job is waiting for a retry. This occurs when the job has failed, but the maximum retry count has not yet been reached.
Ready	The job is waiting for execution. This occurs when the network is not connected.
Not Ready	The Ready state is not complete. This occurs when MPPS (Modality Performed Procedure Step) End occurs before MPPS Start has been completed. Or when a Storage or Print batch job has not completed.

■ Network Status

Displays the network connection status. When connected, **Connected** is displayed. When disconnected, **Disconnected** is displayed.

■ Number of jobs

Displays the number of jobs listed in the *DICOM* Job Status screen.

Log

Displays the *DICOM* Log window.

Retry

Retries the selected job; this button is enabled only when the status of the selected job is either Fail or Wait Resp.

Retry All

Retries all jobs for which the status is Fail.

Delete

Deletes the selected job. This button is enabled only when the status of the selected job is **Fail**, **Imperfect**, **Wait Resp**, or **Not Ready**.

Clear

Deletes all jobs.

3.7.19.16 DICOM Log

Click **Log** on the *DICOM* Job Status window to display the *DICOM* Log window. This is used to manage the history of all DICOM services performed on this product.

1. **Log Setting**

❶ Delete Archived Log Afterwards: Used to specify how long to keep the log file. Enter a number of days. If the specified time has elapsed after the log file was created, the file is deleted from the system.

❷ Log File Maximum Size
Specify the maximum size of a log file that can be archived. The entered value must be a number in units of Kilobytes. A log file that is larger than the specified size is not archived on the system and is deleted immediately.

2. DICOM Log

Displays information for log files.

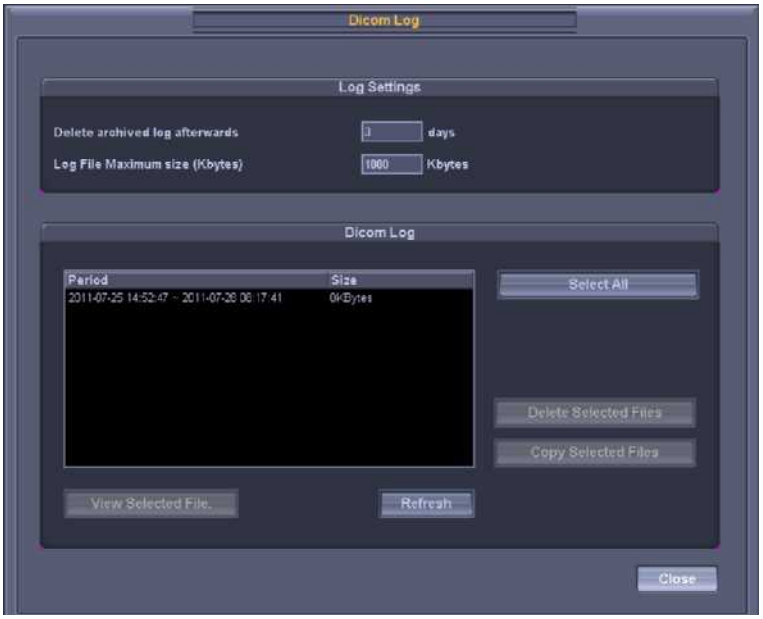
❶ Select All: Selects all log files.

❷ Delete Selected Files: Deletes the selected log files.

❸ Copy Selected Files: Copies the selected log file to external storage media.

❹ View Selected File: Displays the details of the selected log file on the screen.

❺ Refresh: Updates the information of a log file.



[Figure 3.22 DICOM Log]

3.7.20 Auto Calc

Select the **AutoCalc** tab on the *Setup* screen. AutoCalc is a Spectral Doppler mode feature that automatically performs specific calculations based on measured values.

NOTE: The specified items will appear on the screen only when the **AutoCalc** button on the soft menu is pressed in Spectral Doppler Mode.

[Figure 3.23 Setup - AutoCalc]

3.7.20.1 AutoCalc Setting

Enable or disable items from the list of options for automatic calculation by selecting their checkboxes. You can select up to six values.

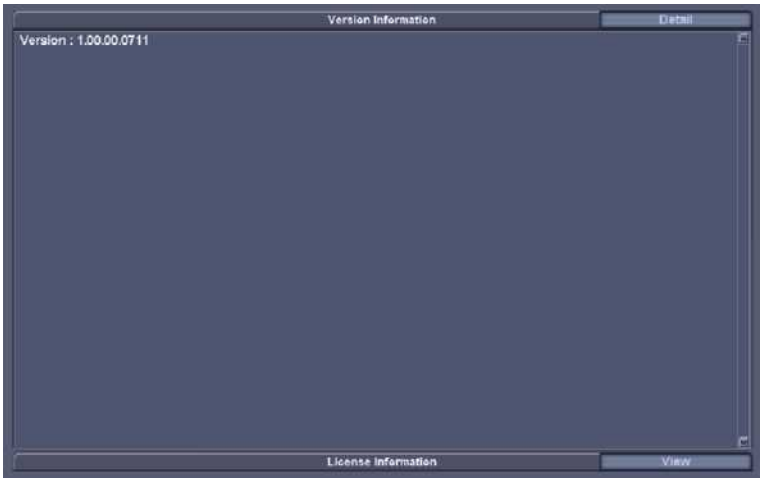
When the **Peak Systolic Velocity** and **End Diastolic Velocity** values are 0, not all of the results are displayed on the screen. In addition, the result value for **Timed Averaged Mean Velocity** is only displayed when **Mean Trace** is set to on.

3.7.21 About

Select the **About** tab in the *Setup* screen. Information about the system software version will be displayed.

Click **Detail** to view more detailed information on the product version.

Click **View** to display license information.



[Figure 3.24 Setup - Information]

Chapter 4

Inspecting the Product

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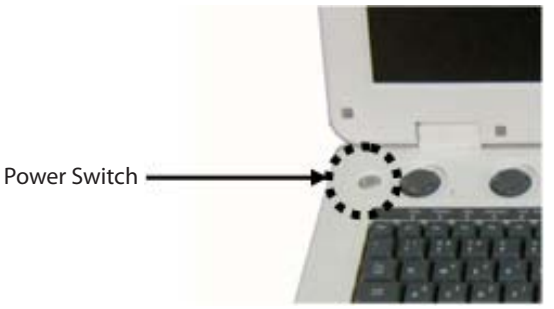
4.1 Overview

Chapter 4 describes how to inspect MySono U6 after installation to verify that its major functions and power work properly.

4.2 Turning On the Product

Pressing the **On**/**Off** switch located on the left side of MySono U6's control panel (keyboard) initiates the booting process.



[Figure 4.1 Power Switch]

❶ You can view the booting process on the LCD monitor screen. The Windows XP logo will fade away, to be replaced with MySono U6 logo and a loading bar.

❷ The loading bar will gradually be filled with color, which represents the process of the software moving data to the system's front end part and back end part.

❸ Once the software finishes moving data, the ultrasound screen appears; MySono U6 is now ready to be used.

4.3 Monitor

Ultrasound images and other information are displayed on the color LCD monitor.

4.3.1 Screen Layout

The monitor displays ultrasound images, operation menus and a variety of other information. The screen is divided into five areas: ❶ Title area, ❷ Image area, ❸ Thumbnail area, ❹ User information area, and ❺ Soft menu.

[Figure 4.2 Screen Layout]

❶ Title Area

Displays patient information, hospital name, application, frame rate and depth, probe information, acoustic output information, and the current date and time.

❷ Image Area

This is where the ultrasound image is displayed. Annotations and various measurement information are also displayed.

❸ Thumbnail Area

The images saved by pressing the **Save** button will be displayed in a preview format.

Click a thumbnail to enlarge. Up to 5 images are displayed.

In BodyMarker mode, the BodyMarkers are displayed.

❹ User Information Area

The user information area provides a variety of information necessary for system use. The current status of the system and information about the current image are displayed.

❺ Soft Menu

The menu options that are displayed change depending on the status of the system. To add or remove a soft menu item, press the corresponding dial-button on the control panel.

Tips!

Current System Status


Displays the battery level. For more information, refer to the 'Battery' section in this chapter.


Displays the network status.


Displays USB device connection status. Double-click on the icon to load the Storage Manager screen.


Shows the system's total hard disk space and the available disk space.

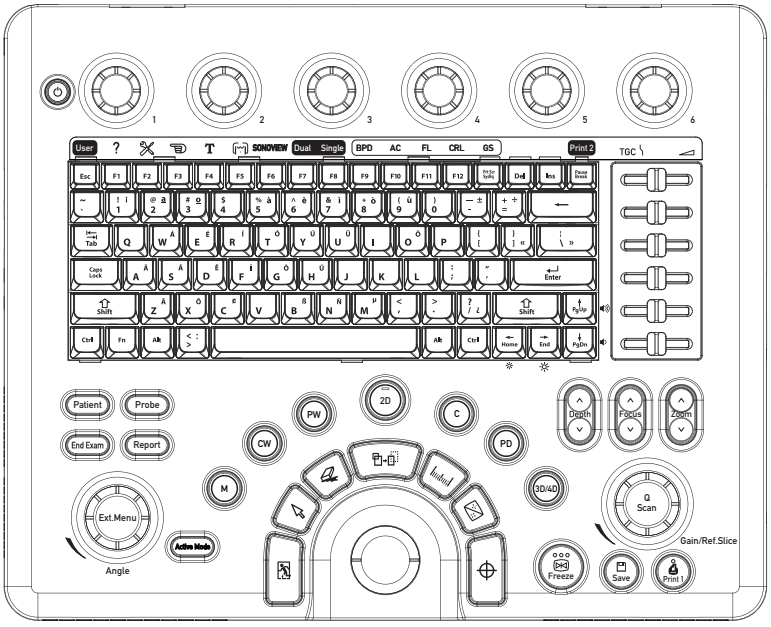

Shows the wireless LAN connection status.

4.3.2 Screen Brightness Adjustment

Use the left and right arrow keys on the keyboard. However, you cannot adjust the screen brightness in text mode.

4.4 Control Panel

The control panel enables you to use the various functions of MySono U6.



[Figure 4.3 Control Panel]

4.4.1 Functions of the Control Panel

The following are the descriptions and instructions for the controls on the control panel. Controls with multiple functions are covered in detail in the user manual.

On/Off	Turns the system on/off.
Soft Menu Dial-button (1~6)	Use the corresponding function of the soft menu displayed on screen. The menu options that are displayed change depending on the status of the system. Press the dial-button or change the option.

Tips!

Using the Soft Menu Dial-Button

The soft menu consists of a top menu at the top of the screen and a sub menu at the bottom of the screen.

▶ Top Menu (❶): Rotate the dial-button left and right to select an option.

▶ Sub Menu (❷): Press the dial-button to select an option.

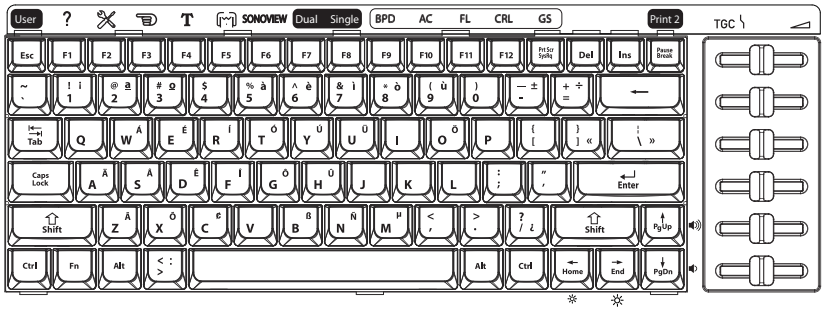
[Figure 4.4 Top / Sub Menu]

TGC	Allows you to adjust TGC values for each depth by using six sliders. TGC stands for Time Gain Control.
Zoom	Used to zoom in on or out from the image. The Zoom Navigation Box is displayed in the User Information area on screen. Press **Exit** to exit the function.
Focus	Adjusts the position of the focus. The position of the focus on the grid of the screen changes according to the user's adjustment.
Depth	Adjusts the scanning depth of the image. The depth information in the screen's Title area changes according to the user's adjustment.
Ext. Menu / Angle	Ext. Menu: Pressing the dial-button changes the soft menu page. Ext. Menu stands for Extension Menu. Angle: Rotate the dial-button to adjust the angle. In Spectral Doppler mode, this adjusts the angle of sample volume by 1°; in 2D mode, this adjusts the image left and right unless **View Area** is 100%. In BodyMarker mode and Indicator mode, this adjusts the angle of the probe cursor and indicator.
Clear	Deletes text, indicators, BodyMarkers, measurement results, etc. entered over the image.
Menu Change	Changes the menu or soft menu on the screen.
Trackball	Moves the cursor on the screen. In addition, it can be used for browsing Cine or Loop images while in Freeze state.
Set / Exit	There are two buttons, located to the right and left of the trackball. You can assign the desired functions to the buttons in **Utility** > **Setup** > **Peripherals** > **Key Setup**. ▶ Set: Selects the specified item or value. ▶ Exit: Exits the currently used function and returns to the previous function.
Update	Switches the image to panning state. Pressing this button in PW Spectral Doppler mode enters D Only mode.

Pointer	When this is pressed, an arrow marker appears to point to parts of the displayed image. Pressing the button again hides the pointer.
Change	Changes the current function of the trackball.
Calc.	Starts measurements by application.
Caliper	Initiates basic measurement mode to take measurements such as distance, circumference, area, and volume. Pressing the button again exits basic measurement mode.
2D / Single	▶ 2D: Used for 2D mode. Pressing this button again when in the On state does not switch to Off. Pressing in Combined mode switches to 2D mode. ▶ Single: Pressing in Dual mode switches to 2D mode. In 3D View, used for adjusting the image's reference slice.
Dual	Used for Dual mode.
M	Used for turning M mode on/off.
C / x	Used for turning Color Doppler mode on/off. In 3D View, rotates the image along the X-axis.
PD / y	Used for turning Power Doppler mode on/off. In 3D View, rotates the image along the Y-axis.
PW / z	Used for turning PW Spectral Doppler mode on/off. In 3D View, rotates the image along the Z-axis.
Q Scan / Gain	▶ Q Scan: Pressing the dial-button applies the Quick Scan function. While the Quick Scan function is applied, the 'Q Scan' mark will be displayed on the right side of screen. ▶ Gain: Rotate the dial-button to adjust gain in each mode. In 3D View, this moves the reference image.
Clip Store	Saves Cine image. The saved images can be played in SONOVIEW or scan mode.
Print	Prints the image displayed on screen using the selected printer.
3D / 4D	Press this button to turn 3D / 4D Mode on / off.
Save	Saves an image or a report displayed on the screen in the system database.
Freeze	Freezes the image currently being scanned. Pressing the button again in freeze state switches to scan mode.

4.4.2 Alphanumeric Keyboard

Located below the control panel. Used for carrying out specific functions or entering text.



[Figure 4.5 Alphanumeric Keyboard]

Help	Displays the Help Manual on the screen.
Patient	Displays the Patient Information screen for patient selection and information entry.
App.	Displays the Applications screen, where you can select or change application.
Indicator	Displays an arrow-shaped indicator over the image.
Text	Allows the user to directly enter text over an image. However, if you select the checkbox under **Utility** > **Setup** > **Utility** > **Text Setup**, you can enter text right away using keyboard without pressing this button.
BodyMarker	Displays the BodyMarker list. Displays the desired BodyMarker over the image. Each time you press this button, the BodyMarker list will be changed.
SRF / DMR Lite	Used for turning SRF or DynamicMR Lite on/off. If set to on, SRF or DMR mark will be displayed on the right side of the image area.
Report	Displays the *Ultrasound Report* screen that shows the measurement results for the current application and other information.
SONOVIEW	Runs SONOVIEW, the image filing program.
End Exam.	Finishes the exam of the currently selected patient and resets the related data.
Utility	Displays **Utility** menu.
Space bar	Each press of the space bar hides Image Information → Post Map → TGC from the screen, in that order. When all of the items have been removed from the screen, pressing the space bar once more reloads all the items back onto the screen.
←, →	Used to adjust the monitor's brightness level.
←, →	Used to adjust the volume while in spectral Doppler mode.

Tips!

Adjusting Keyboard Brightness

Hold down **Fn** key and press number **[1]** key to decrease the brightness of the keyboard. Pressing number **[2]** key in the same manner increases the brightness of the keyboard.

4.5 Inspecting Functions

4.5.1 Basic Inspections

1. **Monitor**

   Check the screen for color, focus, dots, afterimage, stain, and blurriness.

   Check the screen while impacting the monitor, and check the signal while shaking the cable to the left and right.

2. **Control Panel and LED Status**

   Press any keys on the control panel and see if text appears or breaks.

   Check that the keyboard LED comes on.

3. **BodyMarker Key**

   Check if BodyMarker image appears correctly, and whether selection works properly.

4. **Indicator Key**

   Check that the trackball works properly by rolling it up, down, left, and right.

5. **Clear Key**

   Check that all text and measurements are cleared properly.

6. **Zoom Action Check**

   Check the zoom function for proper action and ensure that there are no errors.

7. **SONOVIEW Inspection**

   Save Images and Cine Images in each mode.

   Check for errors in saved images.

   Check whether Backup & Restore function properly.

8. **Measure**

   Check the operation of Distance, Caliper, Calc, etc.

9. Patient

Enter information in Patient, and see whether the same Patient information is displayed in Report, SONOVIEW, etc.

10. End Exam

Make an arbitrary measurement in New Patient, and see whether the measurement is erased when you press End Exam.

11. Probe Key

Perform a Probe Change, and check for correct operation.

4.5.2 Detailed Inspections

1. B Mode

❶ Perform a Knife Test to check for missing lines in image.

❷ Perform Phantom to check for errors in image.

❸ Check Freeze Cine actions (broken image, Auto Run, Auto Run Speed, Trackball Cine).

❹ Check for changes in image brightness when you adjust Gain.

❺ Check the proper operation of TGC Gain by adjusting it and checking for changes in image brightness in accordance with depth.

❻ Perform Left/Right Flip, Up/Down Direction, and Rotation to check whether the image changes its orientation correctly.

❼ Check the proper operation of Select Image menus (EE, DR, View Area, Tissue, Frame Rate).

❽ Check for errors in frequency (Phantom, Res, Pen, Gen).

❾ Check for changes in image in accordance with changes in depth.

❿ Check for changes in image by depth when you change the focus.

⓫ Check the proper operation of image compensation mode (FSI, Harmonic, DMR, SRF, Quick Scan, Spatial Compound Imaging).

2. Dual Mode

❶ Perform Phantom to check for errors in image.

❷ Perform Left/Right Flip, Up/Down Direction, and Rotation to check whether the image changes its orientation correctly.

❸ Check the proper operation of Select Image menus (EE, DR, View Area, Tissue, Frame Rate, Power).

❹ Check for errors in frequency (Phantom, res, pen, gen).

❺ Check for changes in image in accordance with changes in depth.

❻ Check for changes in image by depth when you change the focus.

❼ Check for errors in operations related to left and right image Cine (number of pages, Cine progression order, broken image, Auto Run, Auto Run Speed, Track Ball Cine).

3. M Mode

❶ Perform Phantom to check for errors in image.

❷ Check whether the M-Line's information is displayed in the Image area.

❸ Check for changes in image brightness when you adjust Gain.

❹ Perform Left/Right Flip, Up/Down Direction, and Rotation to check whether the image changes its orientation correctly.

❺ Check the proper operation of Select Image menus (EE, DR, View Area, Tissue, Frame Rate, Sane angle, Power).

❻ Check for changes in image in accordance with changes in depth.

❼ Check for changes in image by depth when you change the focus.

❽ Check for changes in speed when you change Speed gradually, and for errors in the information.

❾ Check whether the image becomes inverted when Negative is performed.

❿ Check for errors in Top Down Format and Side by Side Format images when Loop Format is selected.

⓫ Check for changes in Format B-Mode and M Line area sizes.

⓬ Check Freeze Cine actions (broken image, Auto Run, Auto Run Speed, Trackball Cine).

4. C Mode & PD Mode

❶ Perform Phantom to check for errors in image.

❷ Check the operations related to Select Image menus (Balance, Sensitivity, Color Mode, Display, CFR).

❸ Check for changes in image in accordance with changes in depth.

❹ Check Freeze Cine actions (broken image, Auto Run, Auto Run Speed, Trackball Cine).

❺ Check for changes in image brightness when you adjust Color Gain.

❻ Check for noises and breaks in the image (B or C Mode Noise) when you move the ROI Box.

❼ Check for noises and breaks in the image (B or C Mode Noise) when you resize the ROI Box.

❽ Adjust Scale up and down to check whether the frequency is changed and speed range of blood flow is adjusted. (Check with a direct scan)

❾ Operate Filter to check whether small signals are removed by stage.

❿ Check whether the Color Bar is inverted when you operate the Invert key.

⓫ Operate Baseline up and down to check whether the speed range of blood flow moves to "+" or "-".

5. D Mode

❶ Perform Phantom to check for errors in image.

❷ Check whether Doppler's PRF value changes when you set Simultaneous to on/off.

❸ Check for errors in the Doppler spectrum.

❹ Change Scale to check for changes in speed range.

❺ Operate Baseline up and down to check whether the spectrum range moves to "+" or "-".

❻ Check whether changing Filter removes low signals from the Spectrum.

❼ Check whether the Doppler wave form is inverted when you operate Invert.

❽ Perform Angle action.

❾ Change the position and size of SV, and check for errors.

❿ Check whether Spectrum's image changes when you change Spectrum's Type.

⓫ Check for errors in Sound Volume.

⓬ Perform Auto Calc, and check whether the line is displayed without breaks; check whether the calculated results are automatically carried out.

⓭ Check for errors in Top Down Format and Side by Side Format images when Loop Format is selected.

⓮ Check Cine/Loop actions (broken image, Auto Run, Auto Run Speed, Trackball Cine).

6. 3D Mode

❶ Check whether loading is performed correctly when you proceed with Free Hand 3D SCAN and when you skip to Freeze; check for broken images and noise while you are proceeding.

❷ Check whether loading is performed correctly when you proceed with Static 3D Scan, and check for broken images and noise while you are proceeding. Check the probe for noise, and check whether the probe's motor works normally.

❸ Check whether loading is performed correctly when you proceed with Live 3D Scan, and check for broken images and noise while you are proceeding. Check the probe for noise, and check whether the motor works normally.

❹ Check for errors in ROI 3D, ABC 3D, and Full images.

❺ Check whether the 3D image changes to the selected angle.

❻ Check whether the 3D image's contrast changes to the selected value.

❼ Check for errors in the image when you change the size of the image.

❽ Check the Display Format Image (ACB, Volume CT Image).

❾ Select Step Angle, Rotation Angle, Rot. Axis and then proceed with Cine; check whether Cine Loading works in accordance with the Setting items, and check for breaks and errors in the image.

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5.1 Overview

Chapter 5 describes the internal structure and operational principles of MySono U6.

You must read this chapter in order to service or upgrade the product.

MySono U6 is an ultrasound diagnostic imaging system utilizing software DSC.

It features a 15-inch LCD monitor, provides high-resolution ultrasound images, and includes premium-grade features. Samsung Medison's new proprietary technology is incorporated into the latest spec PC and ultrasound system interface to enhance processing speed. Enhanced processor speed results in faster processing speed of the product, which in turn reduces exam time.

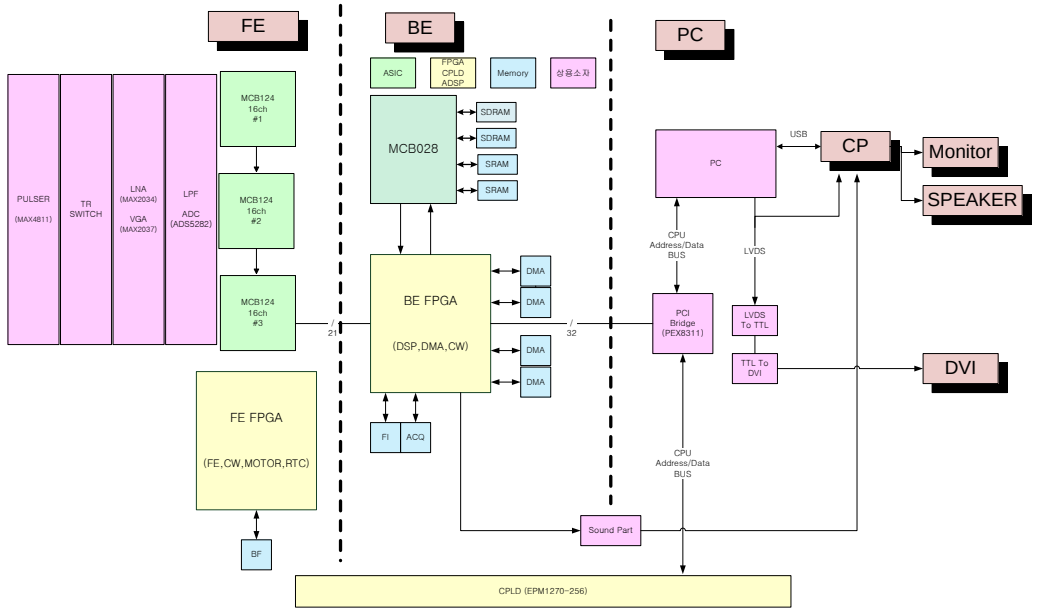
MySono U6 can use up to 128 Element Probes, and utilizes Digital 6912 Channel Digital Beamforming method. The ultrasound signal displays ultrasound images on the LCD monitor through Front End Part and Back End Part (including PC Part).

The resolution of the LCD monitor is 1024 X 768, which offers image formats in various shapes. The LCD panel's wide viewing angle allows comfortable imaging exam sessions. In addition, you can position the arm-shaped monitor adjustment unit to optimize your viewing environment.

The major structure of MySono U6 includes the following:

- Ultrasound System Part
  PSA, Main Board, PC Mother Board, DC to DC Power Module
- User Interface Part
  LCD Monitor, Control Panel, Alphanumeric Keyboard, Trackball
- Miscellaneous Part
  HDD Board, Battery Sub Board

5.2 System Block Diagram



[Figure 5.1 System Block Diagram]

5.2.1 System Overview

MySono U6 system consists of the following structures:

❶ Main Module (Front-End, Back-End, CW, Motor ,PC, Video/Sound Out)

❷ Peripheral/PSA/POWER Connector and ETC Cable Connector

❸ PSA Module (1 Port, Pencil CW)

❹ Control Panel Module (System Key & Alphanumeric,TGC Slide)

❺ Power Module (DDM)

❻ Adaptor

❼ LCD Module (15" LED Back Light LCD)

5.3 Basic Structure of MySono U6

5.3.1 Overview

MySono U6 consists of the Ultrasound System Part and the User Interface Part. However, when considered as an electronic structure, it consists of a Front End Part, a Back End Part, a User Interface Part, and a Power Part.

A description of MySono U6 as an electronic structure is as follows:

Front End Part refers to the PSA (Probe Select Assembly) and the BF (Beamformer). The main functions of the Front End Part are to deliver High Voltage Pulse to the probe, thereby generating ultrasonic waves, and to amplify the returning echo signal to process Digital Beamforming. The RF signal generated here is sent to the Back End Part.

Back End Part refers to the BE (Back End) of the Ultrasound System Part as well as the PC Module. It generates various diagnostic images such as BW, Color Doppler, PW Doppler, Power Doppler, etc. from the RF signal generated by the BF (Beamformer), and displays the images on the monitor so that the user can view them. In addition, it incorporates new technologies such as Q-SCAN and DMR to facilitate a wide variety of diagnostic exams.

User Interface Part refers to the LCD and the control panel.

5.3.2 Ultrasound System Part

This detects probes and sends system information and application information in accordance with user environment to each Board. it performs TX Focusing and RX Focusing based on such information. When high voltage Pulse is sent to the probe according to TX Focusing, ultrasonic waves are generated; echo signals returning from the body go through an amplification circuit to undergo Digital Beamforming processing. The RF signal obtained here goes through various filtering and processing to generate image signals such as BW, Color Doppler, PW Doppler, CW Doppler, Power Doppler, etc., which are sent to the PC Module to be implemented on the monitor.

The PC Module consists of the Scan Converter and image output circuits for displaying the ultrasound information generated by the Ultrasound System Part on the monitor. It also performs control panel and interface functions.

The ultrasound image information sent from the Ultrasound System Part is connected to the PC Module at the PCI via DMA method, and goes through software DSC and VGA to implement the ultrasound image.

While other ultrasound diagnostic imaging systems use Hardware DSC methods, MySono U6 uses Software DSC, and displays ultrasound images on an LCD monitor.

The DC to DC Power Module supplies power to the Ultrasound System Part.

The Ultrasound System Part consists of the following:

- PSA (Probe Select Assembly)
- Main Board (BF, BE)
- PC Module
- DDM (DC to DC Power Module)

[Figure 5.2 Ultrasound System Part]

5.3.3 User Interface Part

This part allows the user to view ultrasound images on the LCD monitor to make a diagnosis, and to control MySono U6 by using controls.

Images are sent by the Ultrasound Part to the LCD monitor and peripherals. Image output includes DVI and VGA. In addition, the control panel consists of various interfaces to allow the user to operate the system conveniently.

The User Interface Part consists of the following:

- LCD Monitor (LCD Inverter Board, LCD Control Volume)
- Control Panel Board
- Trackball
- Alpha-Numeric Keyboard

5.3.4 Miscellaneous Part

HDD Board, Battery Sub Board, Power Adapter

5.4 PSA

5.4.1 Main Functions

The PSA (Probe Select Assembly) serves as the connection between the system and the probes.

It also acts as a High Voltage Switch.

It has one 260-Pin Array Probe Connector; the pins of the Probe Connector are defined to perform Probe ID and HV-MUX control functions. High Voltage Switching is utilized to facilitate switching of the Digital 6912 Channel Signal from the BF (Beamformer) and the 128 Elements of the probe.

[Figure 5.3 PSA]

5.4.2 Specification

- Digital 6912 Channel BF Support
- 260 Pin Array Probe Connector 1 ea
- High Voltage Switching 8 ea
- Probe ID Reader
- 3D Probe Data Path

5.4.3 Operational Principles of the High Voltage Switching Process

MySono U6 supports Digital 6912 Channel, and uses up to 128-Element Probes.

Since the Beamformer's Pulser and Receiver circuit structure has only 48 Channels, additional Element Selection is required. Element Selection uses eight High Voltage Switches, and performs switching with the control signal sent from the Main Board's Control Logic (CPLD).

The inner structure of the High Voltage Switch consists of Shift Register and High Voltage FET.

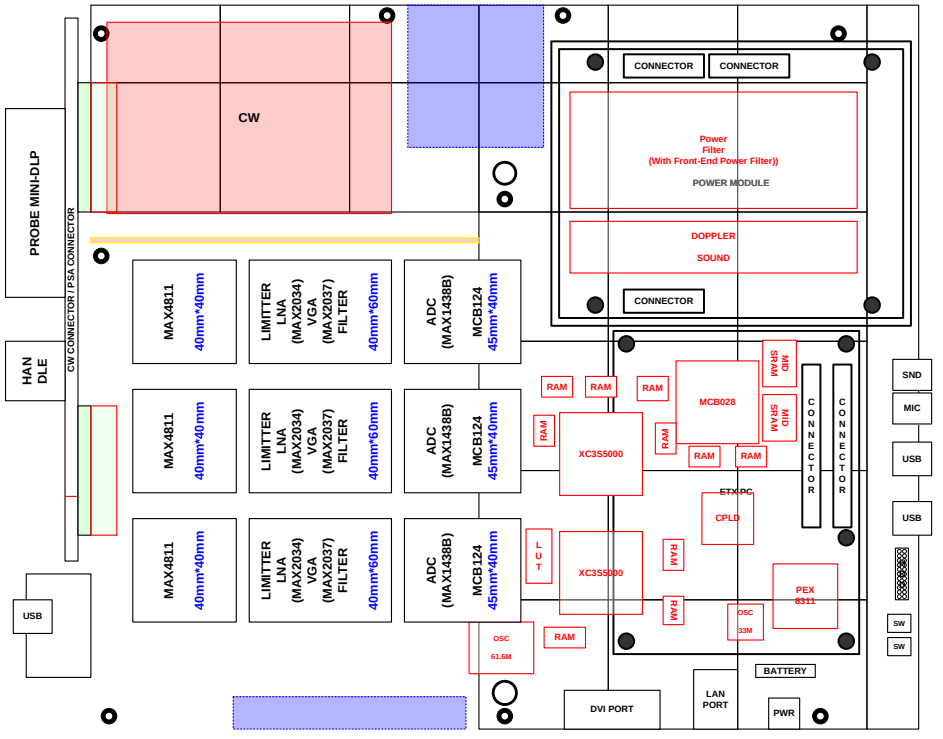
5.5 Main Board

5.5.1 Main Functions

The main function of the Main Board is to implement the ultrasound data up to the stage before Scan Converter.

It performs Front End Part and Back End Part (partial) functions.

The Main Board consists of a BF (Beamformer) Part, a DSP (Digital Signal Processing) & DMA Part, a PCI Part, an MTR (Motor Control) Part, an Analog Sound Part, and a CW Part.



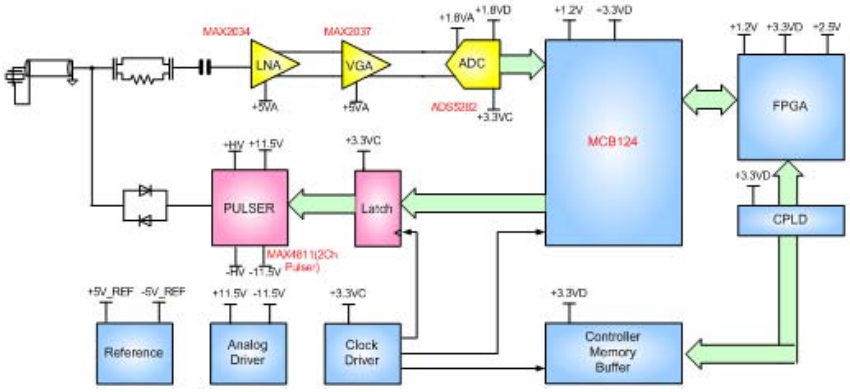
[Figure 5.4 System Level Block Diagram(Main B/D)

5.5.2 Beamformer Part

The BF Board delivers High Voltage Pulse to the probe to generate ultrasonic waves, and amplifies the returning echo signal to perform Digital Beamforming.

The Active aperture is in charge of 48 Channels, and supports up to 128 Element Probes. It consists of a TX Pulser circuit, a Receiving circuit, and a Beamformer ASIC (MCB124) for forming active aperture 128 channels; it performs Dynamic Apodization, Multi Beam Receiving, and TGC functions to enhance ultrasound images.

Mysono U6 Front – End Flow Path Diagram



[Figure 5.5 Front End Flow Diagram]

5.5.2.1 Specification

- TX Pulser 24ea(2 channel)
- Limiter 48ea
- TGC Amp 6ea(8 channel)
- AD converter 6ea(8 channel)
- BF ASIC 3ea(MCB124)
- RX Dynamic Aperture
- RX Apodization
- Trapezoidal Imaging
- Multi-line receiving
- TX Focal point

5.5.2.2 Operational Principles

1. TX Pulser

Exciting pulse data provided by the BF ASIC (MCB124) go through the TX Pulse Buffer and are provided to the TX Pulser. The TX Pulser uses the high voltage provided by the DC-DC Power Module and exciting pulse data to generate Bipolar Pulser. Bipolar Pulser uses PSA (Probe Select Assembly) to send to the Probe Element, thereby generating ultrasonic waves.

Supports up to 128 Elements with Active aperture 48 Channels, and therefore requires additional Element Selection; for this, High Voltage Switch is used. High Voltage Switch is configured at the PSA (Probe Select Assembly).

2. Receive Channel

The Receive Channel serves the function of an Analog Digital Converter, which enables Beamforming by amplifying the echo propagated through, and reflected from, the media of human body. It consists of a Limiter, a Pre-Amp, a TGC-Amp, a Low-Pass Filter, and an A/D Converter.

Limiter

This removes unnecessary signals from the echo signals returned through the PSA (Probe Select Assembly)'s High Voltage Switch. Tx Pulse up to 180 Vpp and echo signals of a few mV are mixed together, but since the RX data actually needed are echo signals of extremely small magnitude in mV range, the Tx Pulse must be eliminated before they are sent to the Pre-Amp. The Limiter removes signal over approximately 0.6V before sending the echo signal to the Pre-Amp.

Pre-Amp

The Pre-Amp amplifies the unprocessed small-magnitude echo signal in mV range.

TGC-Amp

The TGC (Time Gain Compensation) Amp consists of eight channels per one unit.

It compensates for the time or distance-dependent reduction characteristics of echo signals that have been propagated through, or reflected from, media

Anti-aliasing Filter (Low Pass Filter)

The Low-Pass Filter filters the noise out of Stop Band, which is not the band of ultrasound signals. It also serves as an anti-aliasing filter, minimizing the aliasing phenomena that may occur with high frequency probes such as the 7.5MHz probe. Aliasing phenomena of high-frequency probes are caused by the restriction of the sampling clock in BF ASIC.

A/D Converter

Digital Beamforming converts a received analog signal into a digital signal.

3. Digital Beamforming

Ultrasonic waves generated by a probe use a Channel method that utilizes multiple Elements to perform TX Focusing. Ultrasonic waves generated from each channel are reflected by media and return as reflected echo signals. However, the echoes do not return to the Probe Element simultaneously; they return to each Element at different times, which necessitates a way to compensate for this time difference. It is required to perform RX Focusing; it is also very important for generating ultrasound images.

Digital Beamforming takes the echo signals entering the Probe Element and samples the data at the junction of the time axis and the curve, which is then stored in the memory. When sampling is complete, the data accumulated in the memory have been time-compensated when they were stored; time compensation is performed by the Sampling

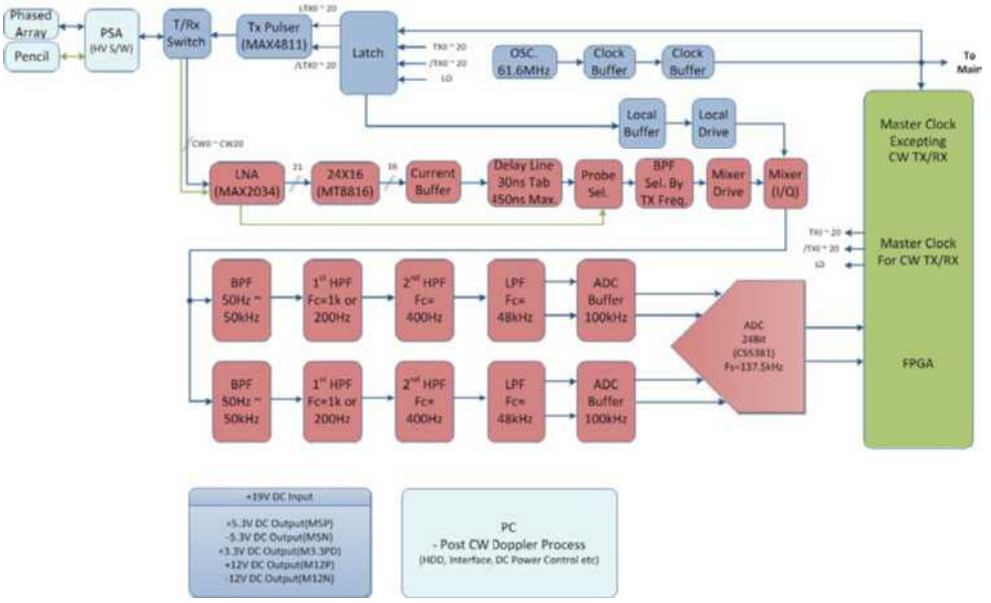
Clock itself. RX Focusing is completed by simply reading the data stored in the memory and adding them. Since this method requires different Sampling Clocks for each Element, the VSCG (Variable Sampling Clock Generator) is necessary. The VSCG (Variable Sampling Clock Generator) uses 61.6Mhz, which is same as the A/D Sampling Clock; necessary data is generated within BF ASIC (MCB124A).

5.5.3 CW Part

MySono U6 is a one-board type portable diagnostic ultrasound system, and the Main Board includes a CW Part. MySono U6 has 21ch Tx and 21ch Rx channels, as shown in the below block diagram. In addition, it has separate Tx (1ch) and Rx (1ch) for applying Pencil Probe.

MySono U6 has the following features:

- ▶ One-Board Architecture
- ▶ Uses common BCD Mode Pulser (MAX4811CTN)
- ▶ Uses common BCD Mode LNA (MAX2034CTM)
- ▶ Uses common BCD Mode Tx/Rx Switch (FET method)
- ▶ Uses common BCD PSA Analog Switch (MAX14803CCM)



[Figure 5.6 CW Part Block Diagram]

5.5.3.1 CW Specification

- Input noise: 3nV/SqRtHz
- Input signal level: ~250mVpp
- Usable frequency: 1.5~6MHz
- Input impedance: 1Kohm
- Gain: 60dB
- PRF: ~ 43KHz
- Number of channels: TX/RX 21 channels each
- Transmit delay tab: 32.5MHz
- Receive delay tab: Min. 30ns, Max.100ns
- Power noise: Less than 100nV/SqRtHz
- Pulser output impedance: 12ohm (including influence from output protection diode)

5.5.3.2 Operational Principles

1. Master Clock

The Ultrasound System Part's Master Clock. 61.6Mhz, is provided to both the FE Part and the BE Part to synchronize each board.

2. Beamformer Sensing

Beamformer Sensing controls the BF (Beamforming Board)'s TX voltage and TX current; this function is handled by CPLD.

If the TX Pulser voltage used by Beamformer High Voltage (+) Sense, Beamformer High Voltage (-) Sense, and the BF (Beamformer Board) does not meet specific standards, the system stops with an error message.

If the TX Pulser current used by Beamformer High Current (+) Sense, Beamformer High Current (-) Sense, and the BF (Beamformer Board) does not meet specific standards, the system stops with an error message.

3. Beamformer TX Control

Controls the magnitude of voltage of TX Pulser of the BF (Beamformer Board); this function is handled by CPLD.

4. PSA-Related

CPLD handles control functions related to PSA.

❶ Probe ID Read

Reads Probe ID from the PSA (Probe Select Assembly) to identify the information about the probe.

❷ Probe Inset Check

Queries the PSA (Probe Select Assembly) to check whether the probe is connected.

❸ Probe Port Select

When a command is given to the PSA (Probe Select Assembly) to select a connected probe, the probe is selected with the Probe Select signal.

5. 3D Probe Path

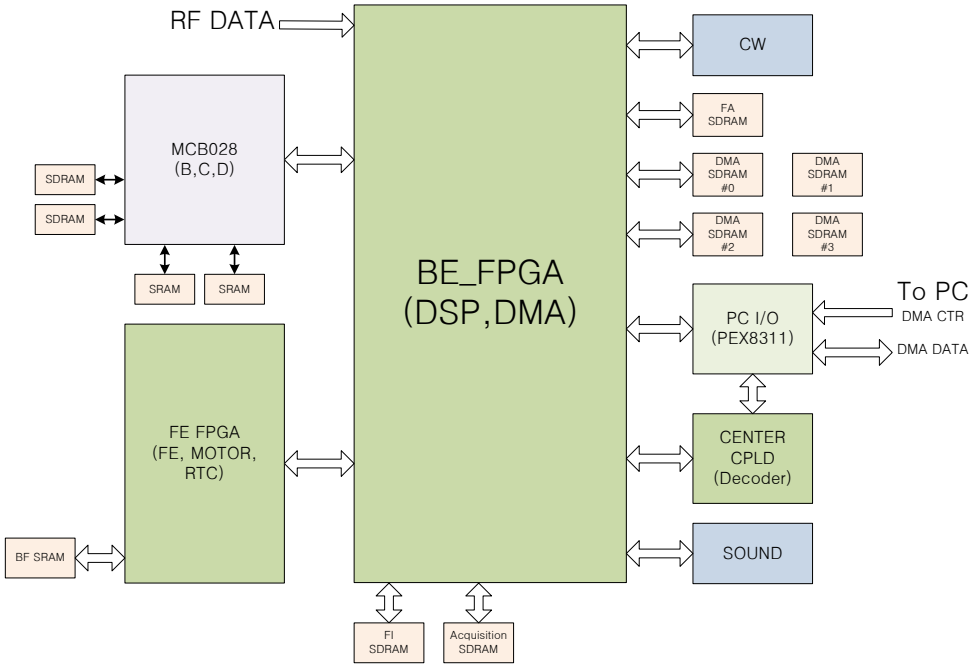
While the 3D Probe and the CW (Continuous Wave Board) are not related, the information needed for operating the 3D Probe passes through the CW (Continuous Wave Board).

The 3D Probe Path is connected in the order of Motor Board, System Mother Board, CW, PSA, and 3D Probe.

5.5.4 Back End Part

The Back End Part (hereafter referred to as the BE Part) consists of a DSP (Digital Signal Processing) & DMA Part and an Analog Sound Part.

The DSP Part receives RF data from the BF Part and processes the data into image data such as BW Image, PW Doppler, Color Doppler, Power Doppler, etc. The created image data is processed by the DSP & DMA Part for Frame Average, etc., and then sent to the PC Part through PCI BUS to be calculated by Software DSC. The Analog Sound Part receives Doppler sound data from the DSP Part, processes the data with the Digital Analog Converter, amplifies and sends them to the speaker.



[Figure 5.7 Back End Part Block Diagram]

5.5.4.1 Specification

- BW mode(B-Mode) Image Data processing
- Motion mode(M-mode) Image Data processing
- Color Motion mode(CM-mode) Image Data processing
- Directional Power Doppler Image Data processing
- Pulsed Wave(PW) Spectral Doppler Image Data processing
- Multi frequency Doppler Image Data processing
- DMA Interface between Ultrasound System Part and PC Part Frame Average
- Real Time Controller(RTC)
- Analog Sound Part

5.5.4.2 Operational Principles of DSP Part

1. Image Data Processing in BW Mode and M Mode

The focused RF data sent from the BF (FE) Part go through the BE FPGA RF data pre-processing process and are entered as input RF data into ASIC MCB028. MCB028 performs a series of signal processing processes to give BW data and Color, Doppler data as BE FPGA input.

The BE FPGA processes BW, Color, Doppler post processing and sends to PC.

MCB028 not only generates BW Data but also performs such functions as **Trapezoidal Imaging and Synthetic Aperture**.

2. Doppler Image Data Processing

RF Data generated by the BF Part is entered as BF FPGA Input.

The entered RF Data is converted into computable RF Data at the BE FPGA, and then entered as the input for MCB028

MCB028 receives RF Data and performs processes of **DTGC (Digital Time Gain Compensation)**, Decimation, Quadrature Mixer, etc. to generate I/Q data (In-phase & Quadrature Data). I/Q Data in turn is entered to BE FPGA, goes through a Clutter Filter to remove Wall (blood vessel walls) Noise, and turns into Doppler sound by undergoing Hilbert transform process to separate sound directions.

In addition, I/Q Data go through a Clutter Filter and are sent to a FFT (Fast Fourier Transform) circuit for generating Doppler Spectrum, which isolates the basic elements of Doppler, i.e. power, velocity, and variance, to generate Spectral Doppler Data.

3. Color Image Data Processing

RF Data generated by the BF Part is entered as BE FPGA Input.

The entered RF Data is converted into computable RF Data at BE FPGA, and then entered as the input for MCB028. MCB028 generates Clutter, color data such as Doppler color data; these signals are then entered into BF FPGA. BF FPGA performs Flash Rejection, Axial median filter, Smooth Filter, and Vertical Interpolation processes before finally transferring to the DMA part. Color data estimation is performed by ASIC, and FPGA performs Flash reject and post smoothing functions.

Both Clutter and Doppler MCB028 color output signals are 24bit data, each consisting of velocity, power, and variance, each of which is 8 bits.

4. Operational Principles of Analog Sound Part

The Analog Sound Part processes Doppler Sound and sends it to the speaker.

Doppler Sound is generated in the Doppler Part, and sent to the Analog Sound Part.

Doppler Sound goes through the Audio Digital Analog Converter, because the speaker only receives analog sound waves. In addition, the control of the Audio Digital Analog Converter is supported by FPGA.

Next, noise removal and Doppler Sound amplification are performed before sending to the speaker.

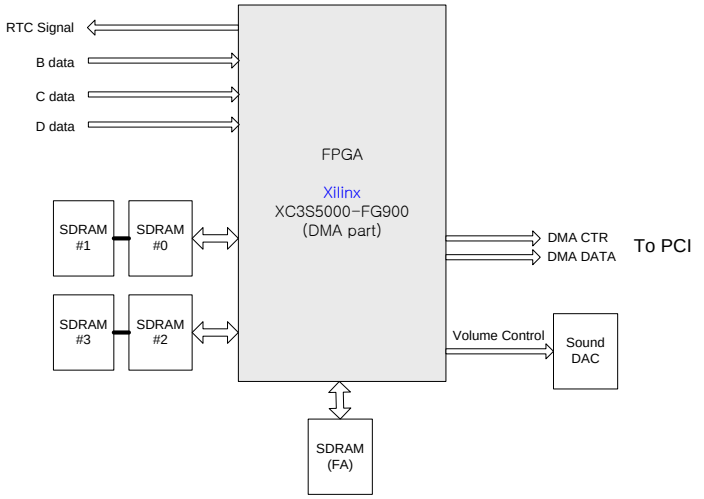
5. Operational Principles of DMA & RTC

DMA (Direct Memory Access) consists of FA (Frame Average) and DMA.

FA (Frame Average) processes BW, Doppler, and Color Data by averaging the current frame's scan line data and the previous frame's scan line data. DMA temporarily stores the BW, Doppler, and Color Data that have been Frame Averaged, to send them through PCI BUS when requested by the PC Part. Since DMA uses the PC Part and the DMA Path for processing, it plays a very important role in enhancing the performance of the product.

The RTC (Real Time Controller) controls the operation of the system by generating the standard signals that are needed for the operation of the entire system in real time. It generates and controls such signals as PRF (Pulse Repeat Frequency), OF (One Frame), RP (Rate Pulse), Linotype, and Scan Line, which are needed by the BF Part and the DSP Part of the BE Part.

FPGA and five SDRAM memories are used for controlling DMA.



[Figure 5.8 DMA PART]

5.6 PCI Part

5.6.1 Main Functions

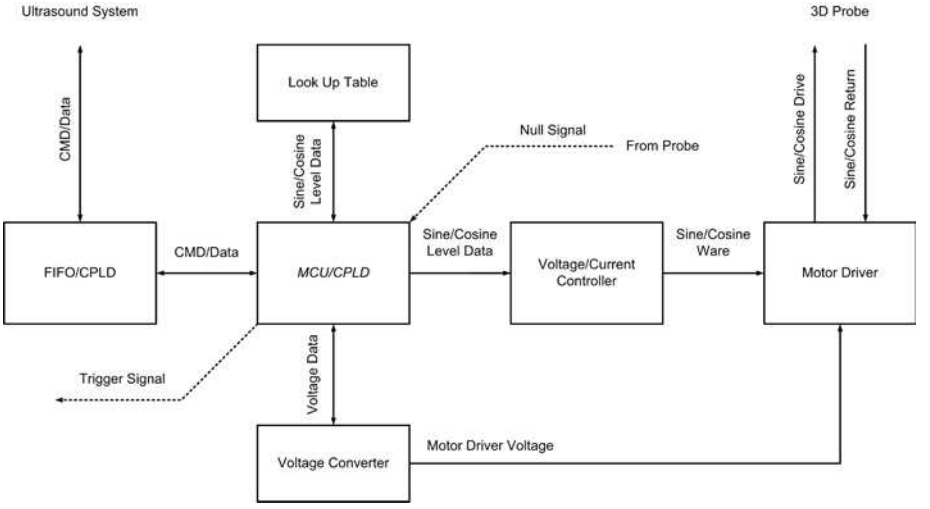
The Peripheral Component Interconnect Part (PCI Part) connects the Ultrasound System Part and the PC Part. It is used for control and initialization of the Ultrasound System Part, and as the DMA path for processing BW, Color, and Doppler Data with Software DSC (Software Digital Scan Conversion).

5.7 Motor Control Part

5.7.1 Main Functions

The Motor Control Part (MTR Part) is the motor drive for actuating the 3D Probe.

5.7.2 Block Diagram



[Figure 5.9 Motor Control Board Block Diagram]

5.7.3 Specification

- ▶ 3D Probe Motor Drive
- ▶ Voltage & Current Control Controller
- ▶ Null Position Signal Sensing
- ▶ The Motor Control Part (MTR Part) is the motor drive for actuating the 3D Probe.

5.7.4 Operational Principles

The operational principle of the 3D Probe is the implementation of 3D mode through the actuation of Stepping Motor. The Motor Part performs feedback control with SIN and COS waveforms that have a 90o-phase difference with the 3D Probe. Here, the 3D Probe provides a Null Position signal to the Motor Board, and the Motor Board provides One Frame signal, which is the standard signal for obtaining 3D images, to DMA.

5.8 PC Module

5.8.1 Main Functions

Existing Hardware DSC Board and Video Manager Board are implemented in the PC Part. Since the DSC Part is implemented through software programs, the capability of the PC Module is very important.

The PC Module consists of the following:

1. CPU: Celeron 1.06GHz
2. RAM: DDR2 2GB Memory
3. HDD: 160GB
4. OS: Windows XP Emb
5. Display: 1024 X 768

[Figure 5.10 PC Module]

6. I/O Port

Video cassette recorder	VHS(DSUB Gender)
	S-VHS(DSUB Gender)
External monitor	DVI
	RGB(DSUB Gender)
Thermal Printer	VCR Type
	USB(Digital) Type - Recommended
External DVD multi recordable driver	-R/+R/-RW/+RW/CDR/CDRW
USB	USB 2.0(Port 3EA)
	USB Flash Memory, USB MO, USB HDD

5.9 Software DSC

5.9.1 Main Functions

MySono U6 replaces the previous Hardware DSC with Software DSC, which consists of software programs.

Image signals generated by the Main Board are copied directly to PC Memory by using DMA, where they are processed by Software DSC and the programs needed for ultrasound images, to be implemented as images on the monitor.

5.9.2 Operational Principles

The Image Data generated by the Main Board is copied directly into PC Memory via MA method.

They are stored into Cine Memory through UCAgency Buffer, in which they are processed with Software DSC and Image Save.

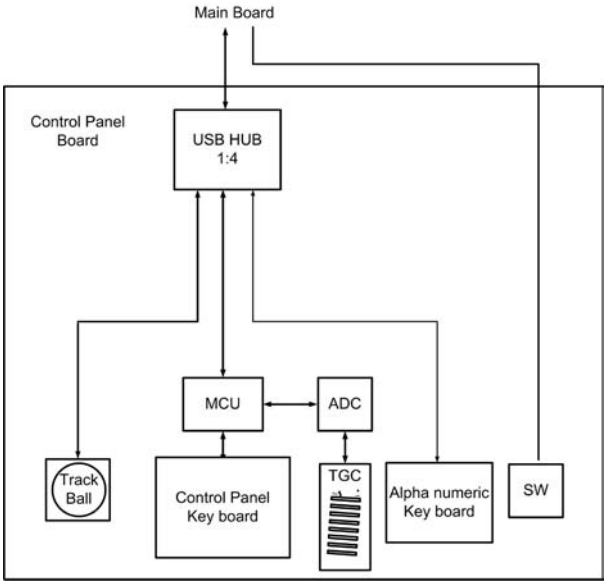
Software DSC processes all functions that can be handled by Hardware DSC with Program; Filter and Rendering handle DSC, and sends data to VGA. In addition, when Image Save is performed, it saves directly from Cine Memory to the HDD to resolve the inconvenience of slow save.

5.10 Control Panel

5.10.1 Main Functions

The Control Panel serves as the interface between the user and the system.

It connects to the Key Matrix Board, Alpha Numeric Board, and Trackball via USB, and operates by following the user's commands.



[Figure 5.11 Control Panel Block Diagram]

5.11 Power Supply

5.11.1 Power adapter

1. Input Power

Power supply is designed to operate in 100V ~ 240V input voltage range.

Input voltage	Input frequency	Input current
100 ~ 240 V	47 ~ 63 Hz	1.63 ~ 0.7A

2. Output Power

Power supply is designed to provide output voltage of 19V and maximum output current of 150W.

Output voltage	Minimum current	Maximum current
19 V	0 A	7.9 A

5.11.2 DC to DC Power Module

Output voltage	Minimum current	Maximum current
+3.3Vdo	1.2A	12A
+5Vdo	0.37A	3.7A
+12Vdo	0.35A	3.5A
-5Vdo	0.05A	0.5A
-12Vdo	0.02A	0.2A
+5Vdo	0.02A	0.1A
0 ~ +80Vdo	-	0.02A
0 ~ -80Vdo	-	0.02A
0 ~ +10Vdo	0.1A	1A
+97Vdo		0.02A
-97Vdo	-	0.02A

1. **OCP: Over-Current Protection**

   In the occurrence of electrical current that exceeds rated input current or maximum output voltage and lies within over-current range, a protection circuit kicks in to stop all power from the DDM.

2. **OVP: Over-Voltage Protection**

   In the occurrence of electrical current that exceeds rated input voltage or maximum output voltage and lies within over-voltage range, a protection circuit kicks in to stop all power from the DDM.

3. **Over-Temperature Protection (OTP)**

   If DDM CASE reaches a temperature of 80℃ or higher, all power output from the DDM is stopped.

Chapter 6

Basic Maintenance

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6.1 Overview

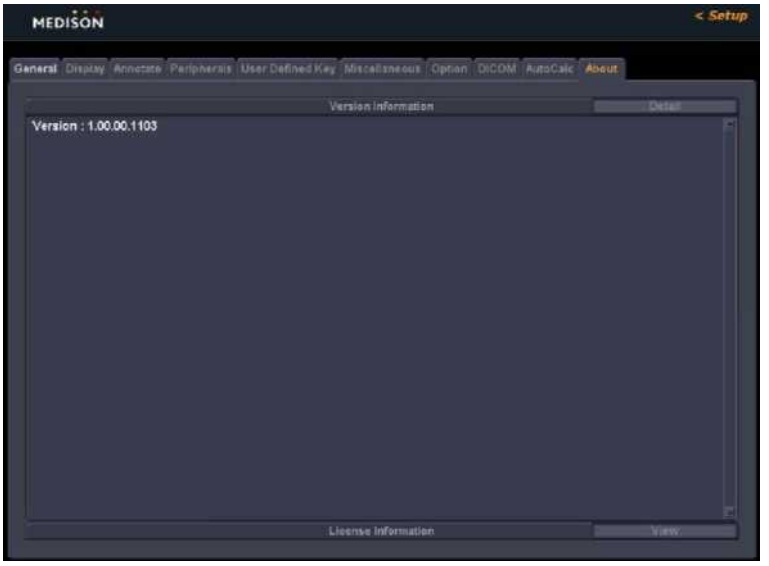
Chapter 6 describes basic maintenance methods for MySono U6.

The methods of applying a version update and using Admin Mode (Service Mode) are explained.

6.2 System Information

For system information, select the **Information** tab on the Setting screen. The product's software version information will be displayed.

Click **Detail** to view more detailed information about the product version.



[Figure 6.1 Setup - Information]

NOTE: The actual system version may differ from the software version shown in the above image.

6.3 Windows Mode

Windows mode allows you to switch from the ultrasound system to a generic Windows XP desktop; this mode is necessary for applying software version updates.

1. On your keyboard, simultaneously press *** + *** + ***.
2. When the Windows Password window opens, enter ********** and press **Enter**.
3. When you see the **Start** button at the bottom of the monitor screen, you have successfully entered Windows mode.

6.4 Version Updates

MySono U6 allows you to apply version updates to software and hardware.

Version updates enhance the performance of the product by adding new features or improving existing ones.

NOTE:

- Certain hardware is only compatible with certain pieces of software; a compatibility conflict results in poor performance or errors.
- A separate compatibility table is provided by the Samsung Medison Global Service Group.

6.4.1 Software Version Updates

The method of applying software version updates is as follows:

1. Prepare the software provided by the Samsung Medison Global Service Group.
2. Turn on the power of MySono U6.
3. When the system has booted completely, go to Windows mode. For instructions, refer to '6.3 Windows Mode'.
4. Connect a flash memory stick or USB CD/DVD ROM to the USB Port.
5. Select Explorer in Windows mode.
6. Within Explorer, click on the version update file.

6.4.2 Hardware Version Updates

This refers to acts of replacing or adding hardware.

NOTE: For further information on hardware version updates, refer to 'Chapter 8. Disassembly and Reassembly' of this service manual.

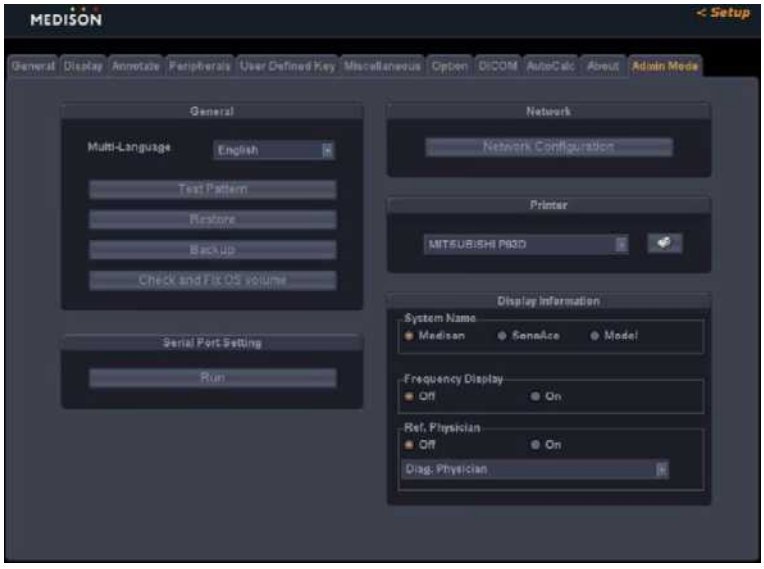
6.5 Admin Mode

Admin mode, also called Service mode, provides various functions, which are explained here.

These functions are needed for configuring important settings and adding or removing options.

6.5.1 Entering Admin Mode

1. On the keyboard, press ***.
2. Enter **********, and press **Enter**.
3. If the password is correct, the 'Admin Mode' tab will be created in Setup mode.
4. Select 'Admin Mode' to enter Admin mode, as shown in [Figure 6-2].



[Figure 6.2 Admin Mode]

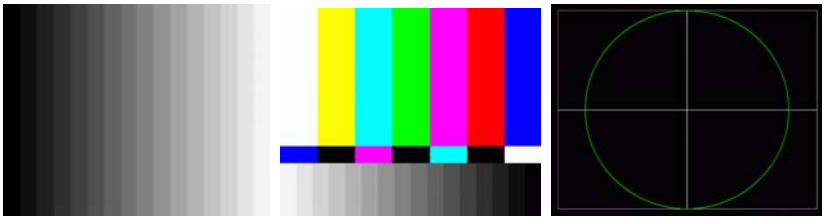
6.5.2 Admin Mode Functions

6.5.2.1 Language

Select the language to be used by the product. You can select by using the filter; you can select one of the five languages of English, German, French, Spanish, and Italian.

6.5.2.2 Test Pattern

Select the language to be used by the product. You can select by using the filter; you can select one of the five languages of English, German, French, Spanish, and Italian.

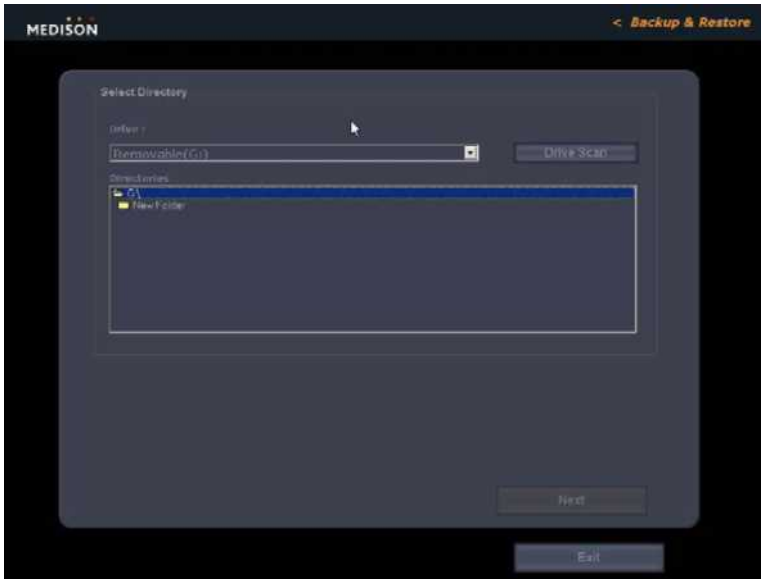


[Figure 6.3 Test Pattern]

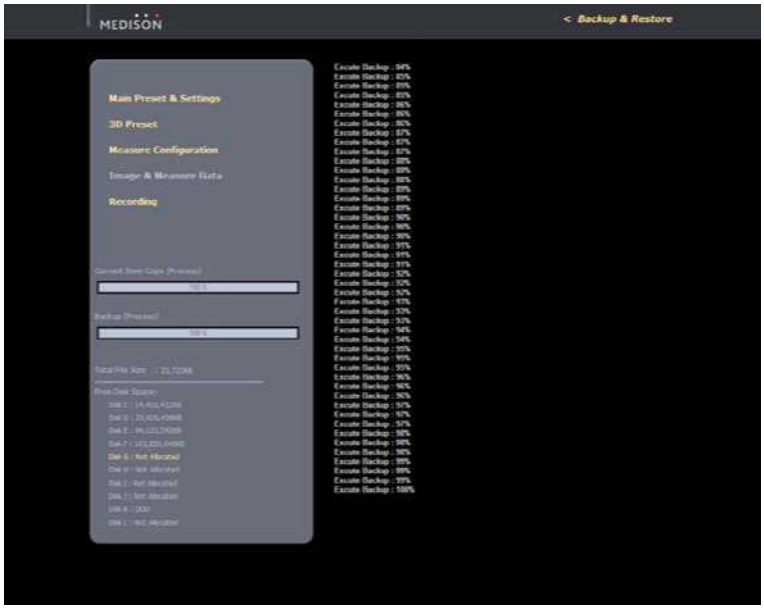
6.5.2.3 Restore

This function restores the product with backed-up user settings, and can only be performed in Admin mode.

1. When you click **Restore**, the ultrasound program will close, and the Restore function will be initiated. Select **OK** when you are asked whether you want to exit the ultrasound program before starting Restore.
2. In the **Restore** screen, you can select a user settings item and backup media.
3. Press **Next** to perform the Restore function.
4. The system will reboot when the restoration is complete.



[Figure 6.4 Restore]

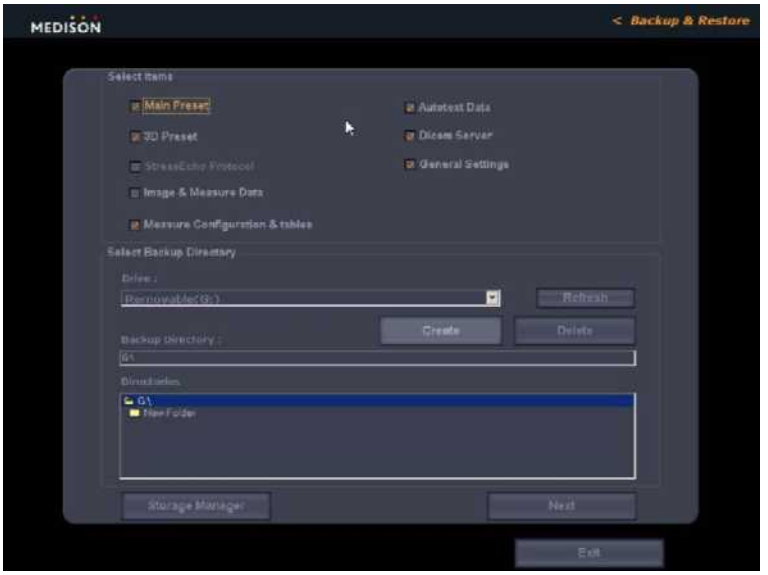


[Figure 6.5 Performing Restore]

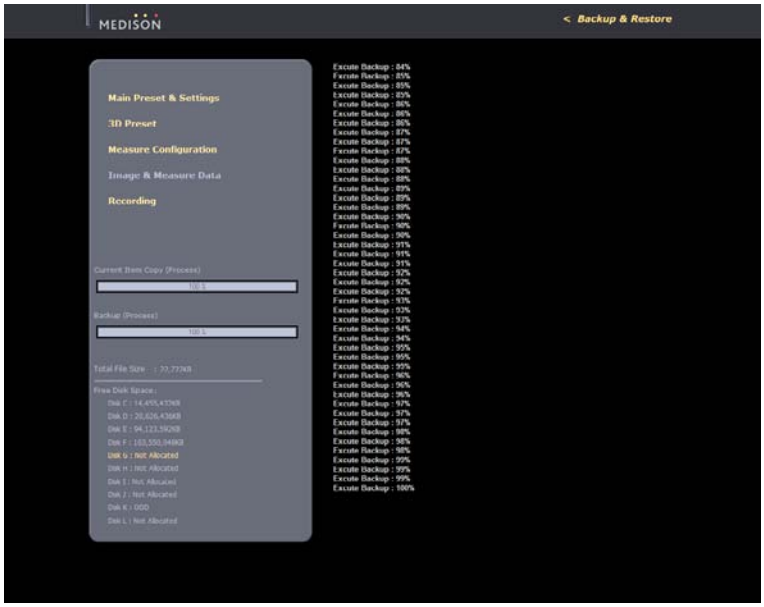
6.5.2.4 Backup

This function backs up the user settings to external media, and can only be performed in Admin mode.

1. When you press **Backup**, the ultrasound program will close, and the Backup function will be initiated. Select OK when you are asked whether you want to exit the ultrasound program before starting Backup.
2. In **Backup** screen, you can select a user settings item and backup media.
3. Press **Next** to perform the Backup function.
4. The system will reboot when the backup is complete.



[Figure 6.6 Backup]



[Figure 6.7 Performing Backup]

6.5.2.5 VGA

1. Video Out Format

   You can select a scanning method for Video Out. You can select by using the filter; choose between the two scanning methods of NTSC and PAL.

2. Set Graphic Card

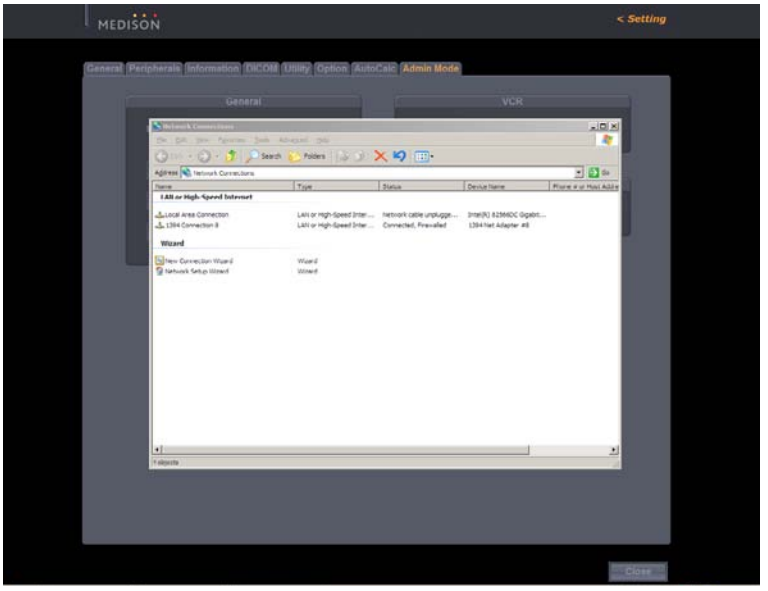
   When the VGA Card setting has been changed to the default setting, press **Set Graphic Card** button to automatically configure the VGA settings.

   Do not press any button while **Set Graphic Card** is being used.

6.5.2.6 Network Configuration

Selecting this option will take you to the Network Configuration screen of Windows XP.

You can configure networks such as DICOM.



[Figure 6.8 Network Configuration]

6.6 Adding and Deleting Options

The process of adding and deleting options from MySono U6 is described.

Options are added and deleted by using the Unlock/Lock method; Unlock means that an option can be used, while Lock means that the option cannot be used.

6.6.1 Types of Option

The list of optional software will appear.

Options: This shows the types of optional software that can be installed on the product. Optional software for MySono U6 includes the following:

4D	DICOM SR
3D XI	Dynamic MR+
Cardiac Measurement	Auto IMT
DICOM	

Status: This shows the current status of optional software.

Lock_Not Installed: The hardware is not connected.

Lock_Unregistered: The software license has not been registered yet.

Lock_Installed: The hardware has been completely installed, but it cannot be used.

Unlock_Permanent: The hardware or software can be used for an unlimited period.

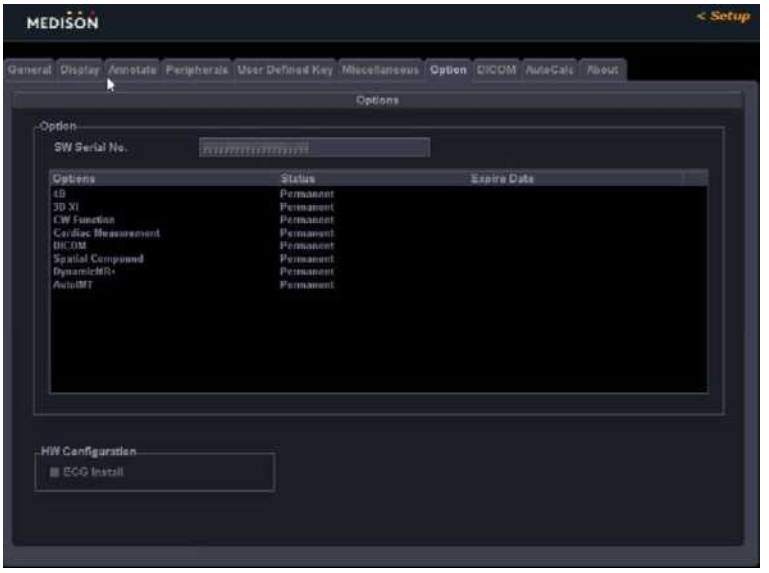
UnlLock_Restricted: The hardware or software can be used only for a certain period of time.

6.6.2 Adding an Option

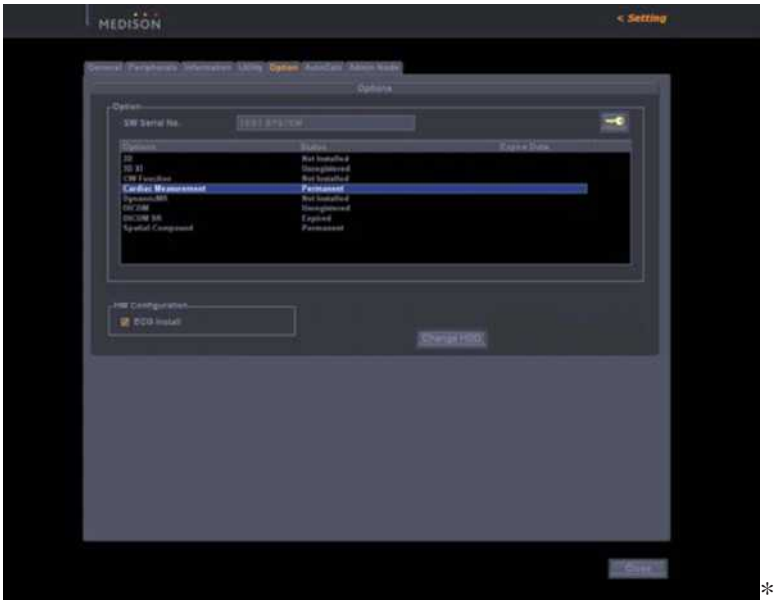
6.6.2.1 Entering Option Password

The method of entering a password to add an option (Unlocking) is described.

1. Switch to Admin mode. See '6.5.1. Entering Admin Mode' for details of how to do this.
2. A key-shaped button will be enabled at the upper right corner of the Option tab. You can only enter the option password if this button is enabled.
3. Select the option that you want to add, and press the key-shaped button to enter the password.
4. If the password is correct, press **OK** button and reboot the system.

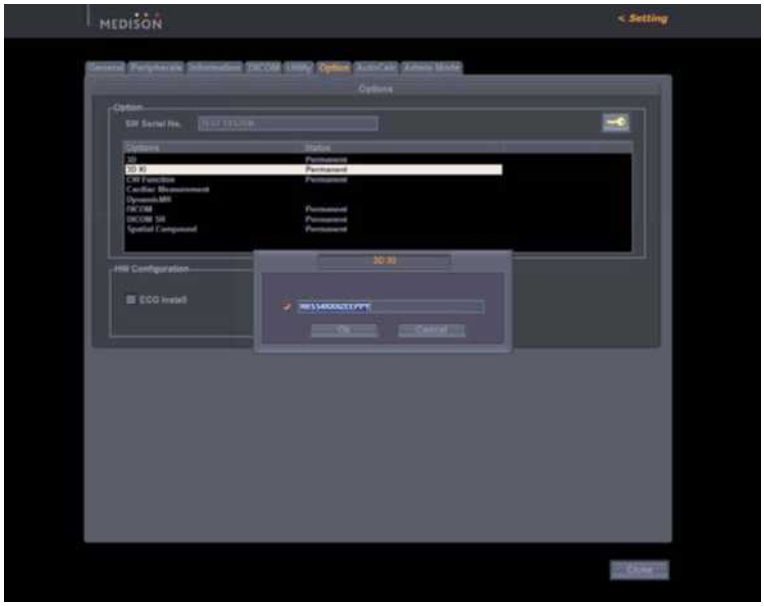


[Figure 6.9 Option Tab Disabled]



*

[Figure 6.10 Option Tab Enabled]



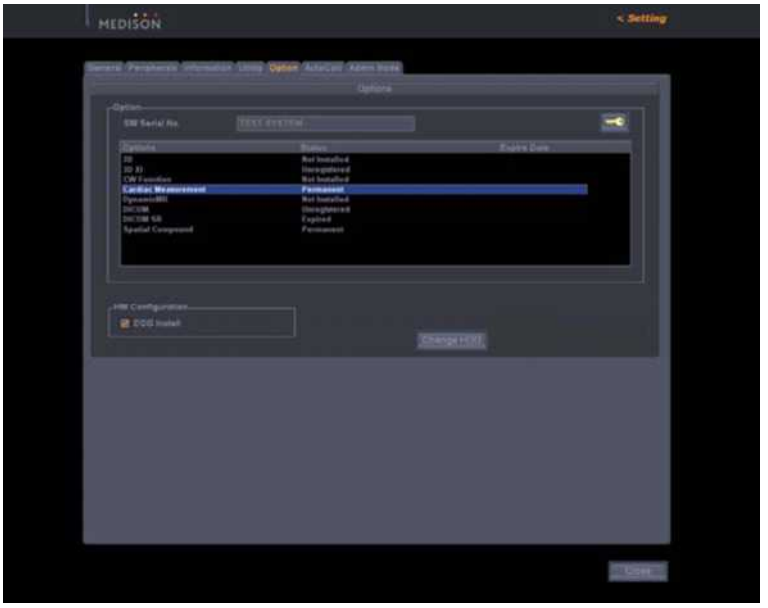
[Figure 6.11 Entering Option Password]

6.6.2.2 Adding Option Password after Replacing HDD

MySono U6 is designed to preserve the option password even if the HDD fails and is replaced.

The method of entering the option password (Unlocking) after replacing the HDD is described.

1. Switch to Admin mode. See '6.5.1. Entering Admin Mode' for details of how to do this.
2. A **Change HDD** button will be created in the middle of the Option tab.
3. When you press the **Change HDD** button, the option password for the product will be entered (Unlocked).
4. Check if the option is unlocked and reboot the system.



[Figure 6.12 Change HDD]

6.6.3 Removing an Option

The method of removing (locking) an option is described.

1. Switch to Admin mode. See '6.5.1. Entering Admin Mode' for details of how to do this.
2. A key-shaped button will be enabled at the upper right corner of the Option tab. You can only delete an option password if this button is enabled.
3. Select the option that you want to delete, and press the key-shaped button to delete the password.
4. Once the password has been deleted, press **OK** button and reboot the system.

Chapter 7

Troubleshooting

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7.1 Overview

Chapter 7 describes basic level diagnosis of problems with the product.

NOTE:

- While this chapter describes anticipated troubles, unexpected situations may arise.
- Only general troubles are described.

7.2 Power

7.2.1 Power Fails to Turn On

The AC power cord may not be connected, or the DDM (DC to DC Power Module) may have failed.

1. Check the status of the AC power cable.
2. Connect a different appliance to the power outlet to see whether it works.
   If the appliance works, the DDM (DC to DC Power Module) has failed.
   If the appliance doesn't work, the power outlet has failed.
3. Check whether the system's fan works.
4. If the fan works, the problem is likely to be caused by some reason other than the DDM (DC to DC Power Module).
   If the fan does not work, it is likely that the DDM has failed.
5. Check the DDM (DC to DC Power Module) and the AC power cable.

7.2.2 Power Fails to Turn Off

A software error may have occurred, or the PC Motherboard and/or Main Board may have failed.

1. Press and hold the Power Switch for at least 3 seconds, and the power will turn off automatically. The power will not turn off if hardware such as the printer hasn't stopped working yet, or if an OS error has occurred.
2. If the method in '1)' fails to turn off the power, it is likely that the PC Motherboard and/or Main Board have failed.

7.2.3 Power Turns Off Spontaneously

The power cable, PC Motherboard, and/or Main Board may have failed.

1. Check the connection status of the power cable, and check whether ADM's breaker switch is on.
2. Connect a different appliance to the power outlet to see whether it works.
   If the appliance works, the DDM (DC to DC Power Module) has failed.
   If the appliance doesn't work, the power outlet has failed.
3. If the problem is not solved by the methods in '1)' and '2)', it is likely that the PC Motherboard, PCI Board, DVI Board, and/or LCD IF Board have failed.

7.3 Monitor

7.3.1 Nothing is Displayed on Screen

The DVI Cable, the monitor, or the PC part may have failed.

1. Check the status of the product with the printer output. If the printer prints normally, the monitor or PC part has likely failed.
2. Check the status of the monitor connection cable.
3. If the methods in '1)' and '2)' fail to solve the problem, it is likely that the monitor and/or PC part have failed.

7.3.2 Screen is Discolored

Either the DVI Cable between the monitor and the PC part may have failed, or the monitor or PC Parts themselves may have failed.

1. Check the status of the monitor connection cable.
2. If the method in '1)' fails to solve the problem, it is likely that the monitor and/or the PC Part have failed.

7.4 Error Messages

7.4.1 Error Occurs and Product Stops while Booting

A temporary error in the software or a temporary failure of the product may have occurred.

1. Force the power to turn off, and turn the power back on in 1~2 minutes.
2. If the method in '1)' does not solve the problem, identify when the error message is shown. If the error occurs while WINDOWS XP is initiating, it is likely that the OS and/or PC part have failed. If the error occurs after the MySono U6 logo is displayed, it is likely that the System Software or Ultrasound System part has failed.

7.4.2 Error Occurs but Product Works

A temporary error in the software or a temporary failure of the product may have occurred.

1. Force the power to turn off, and turn the power back on in 1~2 minutes.
2. If the method in "1)" does not solve the problem, identify when the error message is shown. If the error occurs while WINDOWS XP is initiating, it is likely that the OS and/or PC part have failed.
   If the error occurs after the MySono U6 logo is displayed, it is likely that the System Software or Ultrasound System part has failed.

7.5 Image

7.5.1 No BW Mode Image Echo; No BW Mode Image Format

Contact between the probe and the product may be poor, or the Main Board or DDM may have failed.

1. Check whether the contact between the probe and the system is poor.
2. Check the probe for vibrating sound. If you can hear the sound, it is likely that DDM has failed.
3. If the methods in '1)' and '2)' fail to solve the problem, it is likely that the Main Board has failed.

7.5.2 Rain-like Streaking in BW Mode Image (Noise)

Power noise and/or Main Board failure may have occurred.

1. Check whether the product is sharing its power outlet with another appliance. Sharing a power outlet with a motor or other appliance that consumes large amount of power may cause noise.
2. Check whether the symptom persists when you plug the system into an outlet in a different room. If the noise occurs, it is caused by power noise.
3. If the methods in '1)' and '2)' fail to solve the problem, it is likely that the Main Board has failed.

7.5.3 PW Doppler Mode, CW Doppler Mode, Color Doppler Mode, M Mode Trouble

It is likely that Main Board has failed.

Chapter 8

Disassembly and Reassembly

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8.1 Overview

Chapter 8 describes the disassembly and reassembly procedure for MySono U6.

Refer to this chapter when you are upgrading the hardware or repairing a failure.

WARNING:

- The interior of this product contains dangerous high-voltage electricity. Never disassemble the product. Disassembling the product may cause electrical shock and physical injury.
- Only Samsung Medison Global Service Group or an authorized engineer may service the product or replace its parts.
- The manufacturer is not responsible for any physical or material damage caused by ignoring this warning.

DANGER:

- Do not wear an antistatic wrist strap while you are working with the product powered on.
- You may receive an electric shock and physical injury.

NOTE:

- Wear antistatic gloves and wrist strap when you are disassembling or reassembling the product.
- They help to prevent accidents to the engineer and product failure caused by static electricity.

[Figure 8.1 Antistatic Gloves and Wrist Strap]

8.2 Basic Disassembly and Reassembly

8.2.1 Preparation

Ensure that you have a small cross screwdriver and a pair of antistatic gloves.

Shut down the product. Refer to '3.7 Shutting Down the Product'.

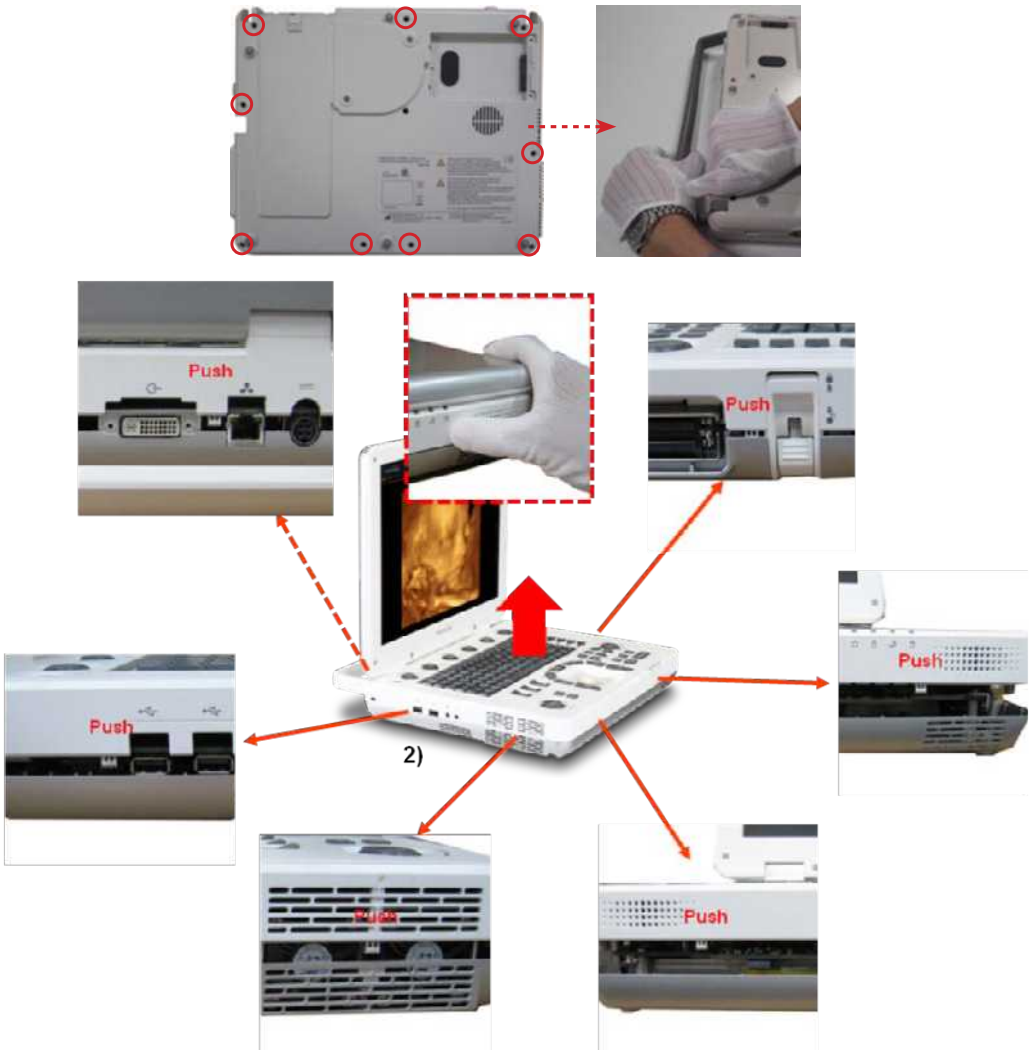
8.2.2 HDD & Battery Pack

1. Unscrew the two screws from the Docking B/D Cover with a small cross screwdriver, remove the cover, and remove the Docking B/D.
2. Unscrew the two screws from the HDD Cover with a small cross screwdriver, and remove the cover.
3. Firmly grip and pull the HDD to remove it.
4. Remove the Battery Cover.
5. Hold and pull the ribbon of the Battery Pack to remove it.

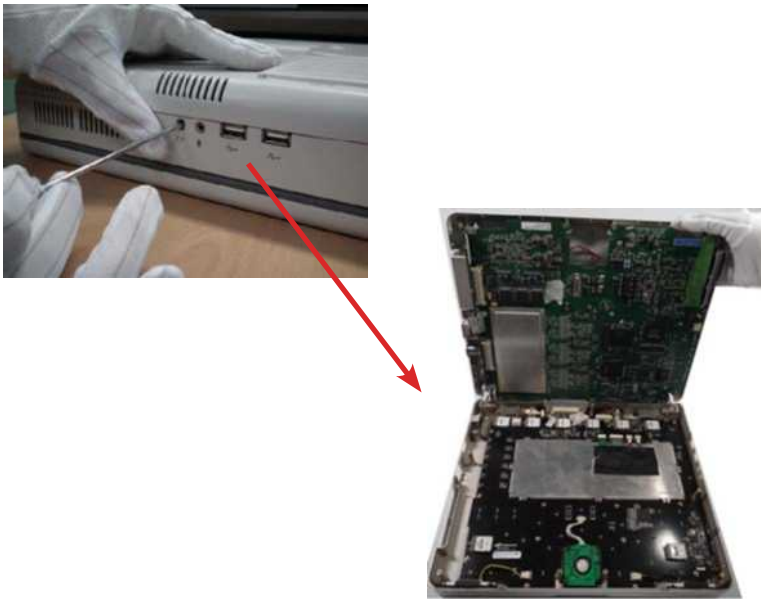
[Figure 8.2 HDD & Battery Pack]

8.2.3 Middle of System Disassembly and Reassembly

1. Unscrew ten screws from the Bottom Cover with a small cross screwdriver.
2. Hold the handle with your left hand, hold the Battery Case with your right hand, and carefully lift with both hands. When you see the gap between the cases, press the Hook part with your hand to release the lock.
3. After releasing the Hook, use a precision flat-head screwdriver to completely disconnect the Audio Jack from the Case. Failing to connect or disconnect the Audio Jack to/from the Case may damage the Case.



[Figure 8.3 Middle of Product Disassembly and Reassembly]



[Figure 8.4 Middle of Product Disassembly and Reassembly]

8.3 Ultrasound System Part Disassembly and Reassembly

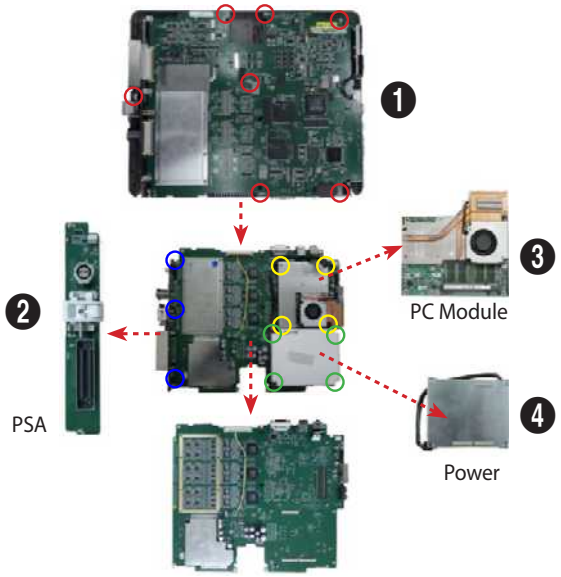
8.3.1 Preparation

Ensure that you have a small cross screwdriver and a pair of antistatic gloves.

Shut down the product. Refer to '3.7 Shutting Down the Product'.

8.3.2 MAIN ASSY

1. Disassemble the middle of the product as shown in figure 8.4, and remove the seven screws marked with red circles on the Main Board diagram; remove the Power Connector and the Fan Connector from the back of the board before removing the Main Board.
2. Remove the three screws marked with blue circles in the diagram, and remove the PSA Board.
3. Remove the four screws marked with yellow circles in the diagram, and remove the PC Module.

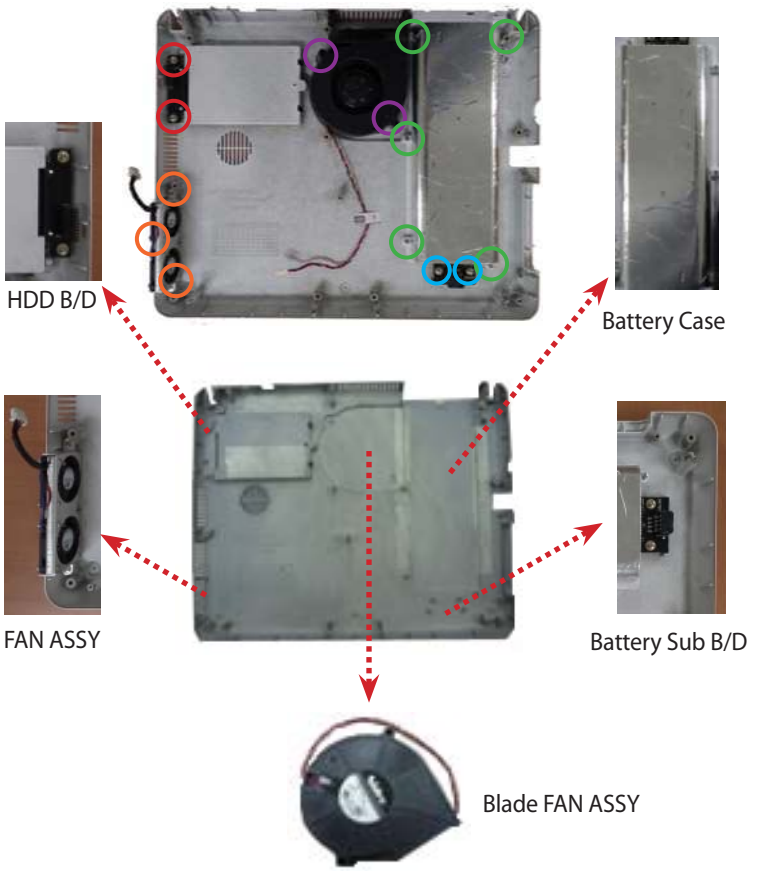


[Figure 8.5 MAIN ASSY]

4. Remove the four screws marked with green circles in the diagram and remove Power.

8.3.3 Sub Board Disassembly and Reassembly

1. Remove MAIN ASSY. Refer to '8.4 MAIN ASSY Disassembly and Reassembly'.
2. Remove the two screws marked with red circles in the diagram and remove the HDD Board.
3. Remove the two screws marked with blue circles in the diagram and remove the Battery Sub Board.
4. Remove the three screws marked with orange circles in the diagram and remove the FAN ASSY.
5. Remove the five screws marked with green circles in the diagram and remove the BATTERY CASE.
6. Remove the two screws marked with purple circles in the diagram and remove the Blade Fan Assy.



[Figure 8.6 Sub Board]

8.4 Control Panel Disassembly and Reassembly

8.4.1 Preparation

Ensure that you have a small cross screwdriver and a pair of antistatic gloves.

Shut down the product. Refer to '3.7 Shutting Down the Product'.

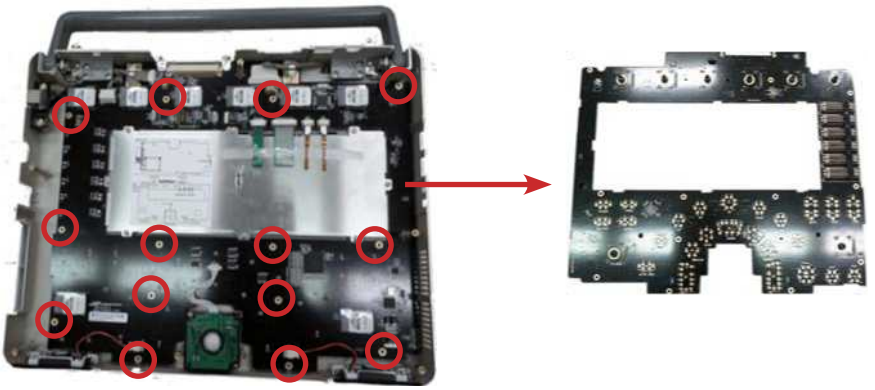
8.4.2 Trackball

1. Disassemble the middle of the product. Refer to '8.2.3 Middle of Product Disassembly and Assembly'.
2. Disconnect the trackball's cable that is connected to the CP Board.
3. Remove the two screws marked with red circles in the diagram and remove the trackball.

[Figure 8.7 Track Ball]

8.4.3 Control Panel Board

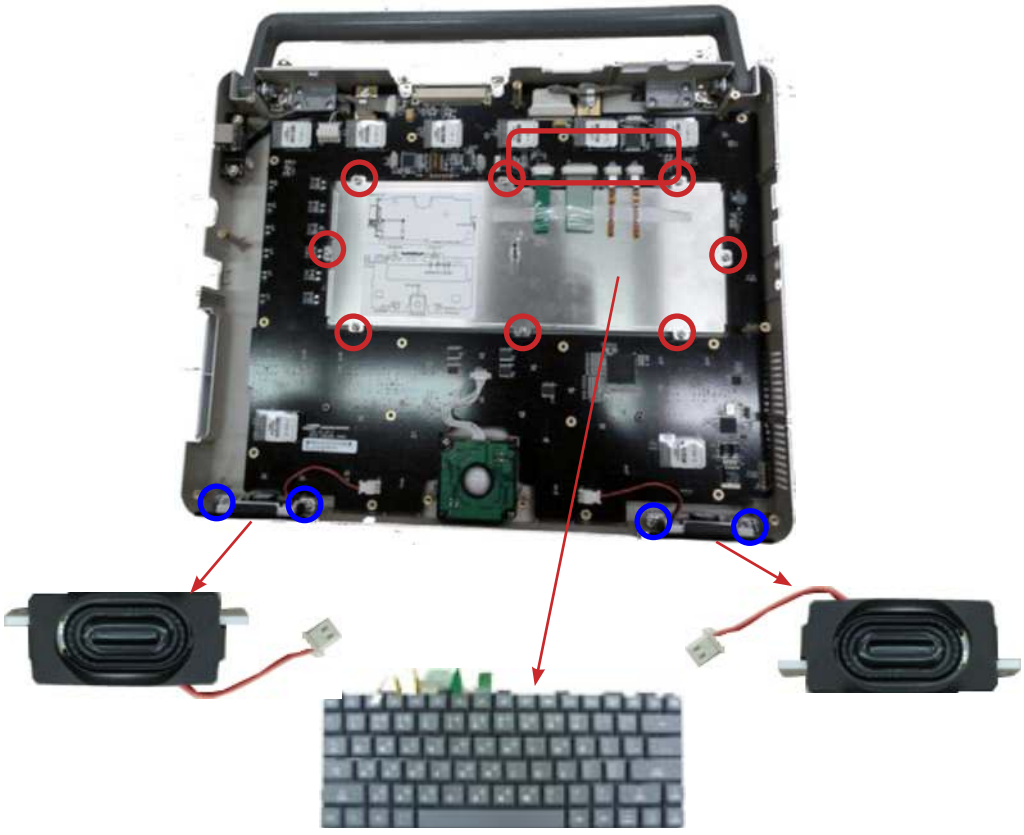
1. Disassemble the middle of the product. Refer to '8.2.3 Middle of Product Disassembly and Assembly'.
2. Remove knobs such as TGC and MENU.
3. Remove all four cables connected to the CP Board.
4. Remove fourteen screws marked with red circles in the diagram and remove the CP Board.



[Figure 8.8 Control Panel Part]

8.4.4 Alpha numeric Keyboard & Speaker ASSY

1. Disassemble the middle of the product. Refer to '8.2.3 Middle of Product Disassembly and Assembly'.
2. Release the four connectors inside the red square box in the diagram, and disconnect the cable.
3. Remove the eight screws marked with red circles in the diagram and remove the cover.
4. Remove the Alpha-numeric Keyboard.
5. Remove the four screws marked with blue circles in the diagram and remove the Speaker ASSY on both sides.



[Figure 8.9 Alpha numeric Keyboard & Speaker ASSY]

8.5 LCD Part Disassembly and Reassembly

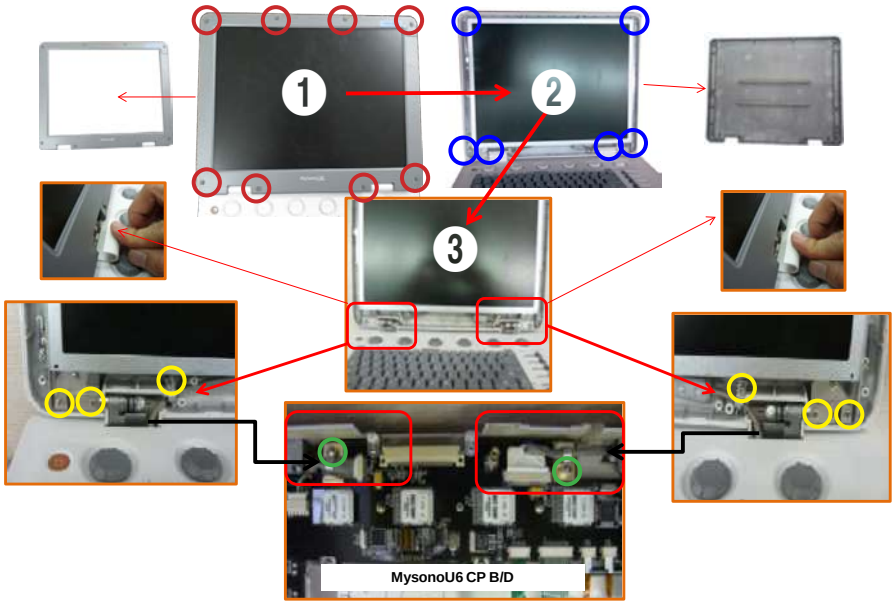
8.5.1 Preparation

Ensure that you have a small cross screwdriver and a pair of antistatic gloves.

Shut down the product. Refer to '3.7 Shutting Down the Product'.

8.5.2 LCD Module

1. Disassemble the middle of the product. Refer to '8.2.3 Middle of Product Disassembly and Assembly'.
2. Refer to the disassembly diagram below to remove the eight screws highlighted by red circles in step ❶, and remove the LCD Front Cover.
3. As shown in step ❷, remove the six screws highlighted with blue circles to remove the LCD Back Cover.
4. As shown in step ❸, use a precision screwdriver to remove the Hinge Cap.
5. As shown in step ❸, remove the six screws highlighted with yellow circles and the two screws highlighted with green circles on the CP B/D, and then completely remove the LCD Cable and LCD Module.



[Figure 8.10 LCD Module]

Chapter 9

Probes

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9.1 Overview

Chapter 9 describes the correct usage of probes.

A probe is a device that sends and receives ultrasound for acquiring image data. It is also called a Transducer or a Scanhead.

The system limits patient contact temperature to 43 degrees Celsius, and acoustic output values to their respective U.S. FDA limits. The power protection fuse protects the product from over-current. If the power monitor protection circuit senses an over-current condition, then the drive current to the probe is shut off immediately, preventing the probe surfaces from overheating and limiting acoustic output.

9.2 Probe List

The ultrasound image scanner uses probes to obtain graphic data of the human body, and then displays it on the screen. Always use application-specific probes in order to obtain the best quality images.

It is also important to configure the probe with the best settings for the particular organ being scanned.

9.2.1 Probe Application and Preset

Probes, applications and presets available for this product are as follows:

Probes	Application	Preset
C2-5	Abdomen	General, Renal
	Gynecology	General
	OB	General, FetalHeart, Early
C2-8	Abdomen	General, Renal
	Gynecology	General
	OB	General, FetalHeart, Early
C4-9	Pediatric	General, NeoHead
	Abdomen	General
	Vascular	General
LN5-12	Musculoskeletal	General
	Small Parts	General, Breast
	Vascular	General
P2-4	Abdomen	General
	Cardiac	General
	TCD	General

Probes	Application	Preset
EVN4-9	Gynecology	Adnexa, Uterus
	OB	1st Trimester
	Urology	Prostate
3DC2-6	Abdomen	General, Renal
	Gynecology	General
	OB	General, Early, Fetal Heart
3D4-9	Urology	General
	OB	General, Early
	Gynecology	General
CW2.0	Cardiac	General

9.2.2 Function list

Available functions based on the type of probe and application being used in MySono U6 are as follows:

Probes	Application	HAR	PI	SCI	DMR+	Q-SCAN	ECG	Biopsy
C2-5	Abdomen	O	O	X	O	O	X	O
	Gynecology	O	O	X	O	O	X	O
	OB	O	O	X	O	O	X	O
C2-8	Abdomen	O	O	X	O	O	X	O
	Gynecology	O	O	X	O	O	X	O
	OB	O	O	X	O	O	X	O
C4-9	Pediatric	X	X	X	O	O	X	X
	Abdomen	X	X	X	O	O	X	X
	Vascular	X	X	X	O	O	O	X

Probes	Application	HAR	PI	SCI	DMR+	Q-SCAN	ECG	Biopsy
LN5-12	Musculoskeletal	O	X	O	O	O	X	O
	Small Parts	O	X	O	O	O	X	O
	Vascular	O	X	O	O	O	O	O
P2-4	Abdomen	O	O	X	O	O	X	X
	Cardiac	O	O	X	O	O	O	X
	TCD	O	O	X	O	O	X	X
EVN4-9	Gynecology	X	X	X	O	O	X	O
	OB	X	X	X	O	O	X	O
	Urology	X	X	X	O	O	X	O
3DC2-6	Abdomen	O	O	X	O	O	X	O
	Gynecology	O	O	X	O	O	X	O
	OB	O	O	X	O	O	X	O
3D4-9	Urology	O	X	X	O	O	X	O
	OB	O	X	X	O	O	X	O
	Gynecology	O	X	X	O	O	X	O
CW2.0	Cardiac	X	X	X	X	X	O	X

NOTE: Legend

- Q Scan: Quick Scan
- Har: Harmonic imaging
- PI: Pulse Inversion
- PPI: Power Pulse Inversion
- TDI: Tissue Doppler Imaging
- CM: Color M mode

Probes	Application	CM	TDI	PD	DPDI	TDW	CW	3D/4D
C2-5	Abdomen	X	X	O	O	X	X	X
	Gynecology	X	X	O	O	X	X	X
	OB	X (Except Fetal Heart)	X	O	O (Except Fetal Heart)	X	X	X
C2-8	Abdomen	X	X	O		X	X	X
	Gynecology	X	X	O		X	X	X
	OB	X (Except Fetal Heart)	X	O	O (Except Fetal Heart)	X	X	X
C4-9	Pediatric	X	X	O	O	X	X	X
	Abdomen	X	X	O	O	X	X	X
	Vascular	X	X	O	O	X	X	X
LN5-12	Musculoskeletal	X	X	O	O	X	X	X
	Small Parts	X	X	O	O	X	X	X
	Vascular	X	X	O	O	X	X	X
P2-4	Abdomen	X	X	O	O	X	O	X
	Cardiac	O	O	X	X	O	O	X
	TCD	X	X	O	O	X	O	X
EVN4-9	Gynecology	X	X	O	O	X	X	X
	OB	X	X	O	O	X	X	X
	Urology	X	X	O	O	X	X	X
3DC2-6	Abdomen	X	X	O	O	X	X	O
	Gynecology	X	X	O	O	X	X	O
	OB	O	X	O	X	X	X	O
3D4-9	Urology	X	X	O	O	X	X	O
	OB	X	X	O	O	X	X	O
	Gynecology	X	X	O	O	X	X	O
CW2.0	Cardiac	X	X	X	X	X	O	X

NOTE: Legend

Har: Harmonic imaging

PI: Pulse Inversion

SCI: Spatial Compound Imaging

Q Scan: Quick Scan

ECG: Electro Cardio Graph Imaging

CM: Color M

TDI: Tissue Doppler

PD: Power Doppler

DPDI: Directional Power Doppler Imaging

TDW: Tissue Doppler Wave

CW: Continuous Wave

9.3 Thermal Index (TI) Table

Thermal Index (TI) is displayed in the Title area of the screen, and represents the probability of temperature rise in a particular area of the body. Depending on body parts, thermal indices are categorized as soft tissue thermal index (TIs), bone thermal index (TIb), and cranial bone thermal index (TIc). This product has been configured to display the appropriate thermal index based on the probe and application being used. Refer to the following table:

Probes	Application									
	Obstetrics	Gynecology	Abdomen	Cardiac	Pediatric	Urology	Vascular	Small Parts	Musculoskeletal	TCD
C2-5	TIB	TIS	TIS							
C2-8	TIB	TIS	TIS							
C4-9			TIS		TIS		TIS			
LN5-12							TIS	TIS	TIS	
P2-4			TIS	TIS						TIS
EVN4-9	TIB	TIS				TIS				
3DC2-6	TIB	TIS	TIS							
3D4-9	TIS	TIS				TIS				
CW2.0				TIS						

9.4 Ultrasound transmission Gel

Using an inappropriate ultrasound gel may damage the probe. For proper transmission of the acoustic signal, only use ultrasound transmission gel recommended by Samsung Medison.

WARNING:

- Do not use mineral oil, oil-based solutions, or other non-approved materials, as they may cause damage to the probe.
- Do not use gels that contain any of the following agents:
  - Acetone
  - Methanol
  - Denatured alcohol
  - Mineral oil
  - Iodine
  - Lanoline
  - Aromatic substances

9.5 Sheaths

Sheaths are recommended for clinical applications of an invasive nature, including intraoperative, transrectal, transvaginal, and biopsy procedures. Using probes prevents contamination from blood or other bodily fluids during operations or biopsy.

Samsung Medison does not supply sheaths; users are to supply their own suitable sheaths.

9.5.1 Applying Sheath

1. Remove the sheath from the packaging, and fill it with ultrasound gel. Be sure to use sterile gloves.
2. Insert the probe into the sheath and pull the latex tip down to cover the probe completely. If possible, cover the probe cable as well.
3. Ensure that there are no air bubbles trapped within the ultrasound gel. If necessary, secure the sheath to the probe and the probe cable.
4. Dispose of the sheath when the exam is complete.

WARNING:

- Keep sheaths sterile.
- Sheaths are disposable, and should not be reused.
- If sheaths are torn or soiled after use, clean and disinfect the probe.
- For neurosurgical application, sterilized gel and a non-pyrogenic sheath must be used along with sterilized probe.
- If a sheath is used on a patient with Creutzfeldt-Jakob disease during a neurosurgical treatment, the probe cannot be sterilized by any means.
- Some sheaths contain natural rubber latex and talc, which may cause allergic reactions. Please refer to the FDA Medical Alert released on March 29, 1991.

9.6 Probe Safety Precautions

The probe can easily be damaged by improper use or by coming into contact with certain chemical substances. Always follow the instructions in the user manual to inspect the probe cable, case, and lens before and after each use.

Check the probe for cracks, broken parts, leaks and sharp edges. If there is any damage, stop using the probe immediately and contact the Samsung Medison Customer Support Department. Using damaged probes may result in electric shocks and other hazards to the patients and/or users.

CAUTION:

- Do not apply mechanical shock to the probe.
- Do not place the probe cable on the floor where the cable can be run over by equipment wheels, etc. Do not apply excessive force to bend or pull the cable.
- Do not immerse the probe into any inappropriate substances such as alcohol, bleach, ammonium chloride, and hydrogen peroxide.
- Do not expose the probe to temperatures of +50°C or higher.

9.6.1 Use and Infection Control of the Probe

The ultrasonographic image scanner uses ultrasound, and makes direct contact with the patient when in use.

Depending on the types of examinations, such contact can be made to a wide variety of locations, including the ordinary skin or the location of blood transfusion during a surgical procedure.

The most effective method of preventing infection among patients is to use each probe only once. However, probes may need to be reused, as they are complex in design and expensive. Accordingly, use sheaths and other protective equipment and follow all safety instructions in order to minimize the risk of infection among patients.

WARNING: No neurosurgical treatments or examinations should be performed on a patient with Creutzfeldt-Jakob disease (a lethal brain disease caused by a virus). If the probe has been used on such a patient, it cannot be sterilized by any method.

CAUTION: Sufficient washing and disinfecting must be carried out to prevent infection. This is the responsibility of the user who manages and maintains the disinfection procedures for the equipment. Always use legally approved detergents and sheaths.

9.6.2 Electric Shocks

The probe uses electrical energy. If it touches conductive materials, there are risks of electric shocks to the patient or the user.

WARNING:

- The product should regularly be checked for short-circuit from the Samsung Medison Customer Support Department.
- Do not immerse the probe into liquid.
- Do not drop the probe or apply mechanical shocks.
- Inspect the housing, strain relief, lens and seal for damage, and check for any functional problems before and after each use.
- Do not apply excessive force to twist, pull or bend the probe cable.
- The power protection fuse protects the probe and the product from excess current. If the power monitoring protection circuit detects excess current, it immediately shuts off the current to the probe in order to prevent the probe surface from overheating and to restrict the ultrasound power output.
- The system limits the maximum contact temperature to 43 degrees Celsius, and the ultrasonic waves output (AP&I) observes American FDA regulations.

9.7 Cleaning and Disinfecting the Probe

Using an inappropriate cleaning or sterilizing agent may damage the product.

WARNING: Using an inappropriate cleaning or sterilizing agent may damage the product.

9.7.1 Information on Detergent, Disinfectant, and Ultrasound Gel

An appropriate detergent, disinfectant or ultrasound gel should be selected based on the following tables. All probes are under tested in IPX 7 Criteria.

Names	Disinfectants																
	T-Spray II	T-Spray	Sani-Cloth HB	Sani-Cloth Plus	Sani-Cloth Active	Setptiwipes	Cleanisept Wipes	Ster-Bac Blu	Trasneptic Spray	Incidin Foam	Super Sani-Cloth	Sani-Cloth Germicidal	Asepti-Wipes	Asepti-Wipes II	CaviWipes	MetriWipes	Cidex 2%
Type	S	S	W	W	W	W	W	L	S	S	W	W	W	W	W	W	L
Active Ingredient	Quaternary Ammonium (N-Alkyl)											IPA					NA
C2-5		•	•														•
C2-8		•	•														
C4-9		•	•														
LN5-12		•	•														•
P2-4	•	★	•														
EVN4-9	•	•	•														•
3DC2-6																	

Names	Disinfectants																
	T-Spray II	T-Spray	Sani-Cloth HB	Sani-Cloth Plus	Sani-Cloth Active	Setptiwipes	Cleanisept Wipes	Ster-Bac Blu	Trasneptic Spray	Incidin Foam	Super Sani-Cloth	Sani-Cloth Germicidal	Asepti-Wipes	Asepti-Wipes II	CaviWipes	MetriWipes	Cidex 2%
Type	S	S	W	W	W	W	W	L	S	S	W	W	W	W	W	W	L
Active Ingredient				Quaternary Ammonium (N-Alkyl)								IPA					NA
3D4-9		•							•		•						
CW2.0	•	•	•														

[Table 9.1 Detergent, Disinfectant, and Ultrasound Gel Information 1]

Names	Disinfectants															
	Cidex OPA [2,3]	Cidex Plus [2]	Metricide [2]	Omnicide (28)	Omnicide 14NS	Omnicide - FG2	Nuclean	Wavicide-01 [3]	Sekusept Extra	Salvanios pH 7	Salvanios pH10	Steranios 2%	Surfaces Hautes	Sekusept Plus	Milton	Bleach 5.25%
Type	L	L	L	L	L	L	L	L	L	L	L	L	S	L	L	L
Active Ingredient	Glutaraldehyde													Nonionic surfactant	Sodium Hypochlorite	
C2-5	•	•				•	•								•	
C2-8	•					•	•	•							•	
C4-9	•	•		•			•									
LN5-12	•	•				•	•	•							•	
P2-4	•	•						•					•			
EVN4-9	•	•				•	•								•	
3DC2-6	•	•						•								
3D4-9	•	•														
CW2.0	•	•						•							•	

[Table 9.2 Detergent, Disinfectant, and Ultrasound Gel Information 2]

Names	Disinfectants								Cleaner					
	Virkon	Sporox	Sporox II	Gigasept	Gigasept AF [3]	Gigasept FF	Hibitane	PeraSafe	Enzol	Alkazyme	Cidezyme	Klenzyme	Isopropyl alcohol(70%)	Isopropyl alcohol(80%)
Type	L	L	L	L	L	L	L	P			L	L	L	L
Active Ingredient	NA	Hydrogen Peroxide		Succindialdehyde, formaldehyde		Bersteinsaure	Chlorhexidine gluconate solution	Peracetic Acid	Dodecylphenolethoxylate, Sodium Xylene Sulfonate	NA	Proteolytic Enzymes		Alcohol	
C2-5		●									●	●	●	
C2-8		●											●	
C4-9		×							●			●	×	
LN5-12		●									●	●	●	
P2-4			★						●			●		
EVN4-9											●	●	●	
3DC2-6												●		
3D4-9			●											
CW2.0	●		×		×	●			●			●	×	

[Table 9.3 Detergent, Disinfectant, and Ultrasound Gel Information 3]

Names	Cleaner			Gel							
	Ethanol 75%	Metrizyme	McKesson	Natural Image	Aquasonics 100 [3]	GE Ultrasound Contact Gel	Clear Image	Kendall	Scan	Wavelength	Sonogel
Type	L	L	L	G	G	G	G	G	G	G	G
Active Ingredient	Alcohol	Propylene Glycol	PCMX (Chloroxylenol)	Ammonium Chlorides	NA						
C2-5		•			•						
C2-8			•		•						
C4-9		•			•						
LN5-12		•	•		•						
P2-4		•		•	•						
EVN4-9		•	•		•						
3DC2-6					•						
3D4-9					•						
CW2.0		•			•						

[Table 9.4 Detergent, Disinfectant, and Ultrasound Gel Information 4]

Tips!

Symbols

Legend

(1)	Compatible but no EPA Registration
(2)	FDA 510(k) qualified
(3)	Has CE mark
(4)	Discontinued
(5)	Under Development
S	Spray
W	Wipe
L	Liquid
P	Powder
G	Gel
×	Not compatible (DO NOT USE)
•	Compatible
★	Staining may occur on housing parts; however, the acoustic performance and image quality are not affected.
■	Must not be used for longer than 5 minutes.
◐	Must not be used for longer than 10 minutes.
▲	Must not be used for longer than 15 minutes.
◆	Must not be used for longer than 20 minutes.
◇	Must not be used for longer than 25 minutes.
◎	Must not be used for longer than 30 minutes.
▣	Must not be used for longer than 50 minutes.
Blank	Untested (DO NOT USE)

The following is information about the manufacturers (or Distributors) of detergents, disinfectants, and ultrasound gels.

Product	Manufacturer or Distributor	Telephone number
Aquasonics	Parker Co.	+1-800-631-8888(USA)
Cidex	CIVCO Co.	+1-800-445-6741(USA) +1-319-656-4447(Worldwide)
Enzol	CIVCO Co.	+1-800-445-6741(USA) +1-319-656-4447(Worldwide)
GIgasept AF	S&M(Schulke&Mayr) Co.	+44-114-254-3500(UK)
Gigasept FF	S&M(Schulke&Mayr) Co.	+44-114-254-3500(UK)
Isopropyl alcohol (70%)	Local drugstore	None
Klenzyme	Steris Co.	+1-800-548-4873(USA)
Metricide	CIVCO Co.	+1-800-445-6741(USA) +1-319-656-4447(Worldwide)
Metrizyme	Metrex Research Corp.	+1-800-841-1428(USA)
Milton	Procter & Gamble Australia Pty. Ltd.	+61-1800-028-280(Australia)
Nuclean	National Diagnostics Co.	+1-800-526-3867(USA) +44(0)-148-264-6020(UK)
Omnicide	Cottrell Ltd.	+1-800-843-3343 (USA)
Sani-cloth	PDI/Nice-Pak Products Co.	+1-914-365-1602(USA)
Sekusept Extra	Henkel Hygiene GmbH.	+49-0211-797-0(Germany)
Sporox II	Sultan Chemist Inc.	+1-800-637-8582(USA)
T-Spray	CIVCO Co.	+1-800-445-6741(USA) +1-319-656-4447(Worldwide)
Virkon	Antec International LTD.	+1-403-286-1771(USA)
Wavicide	Wave Energy System Inc.	+1-800-252-1125(USA)

9.7.2 Cleaning

CAUTION:

- Do not use a surgical brush when cleaning probes. Even the use of soft brushes can damage the probe.
- During cleaning and disinfection, keep the parts of the probe that must remain dry higher than the other parts during wetting, until all parts are dry.

Cleaning of probes is an important stage before disinfection; always clean probes after using them.

1. Disconnect the probe from the system.
2. Remove any biopsy adapters or needle guides. (Adapter may be reused after disinfection.)
3. Remove sheath. Sheaths are disposable.
4. Use a soft cloth, lightly dampened with mild soap or compatible cleaning solution, to remove any particulate matter and bodily fluids that remain on the probe or cable.
5. To remove remaining particulates, rinse with water up to the immersion point.
6. Wipe with a dry cloth.
7. If necessary, wipe first with a water-dampened cloth to remove soap residue, and wipe with a dry cloth again.

9.7.3 Disinfection

Disinfect the probe using a disinfectant solution recommended by Samsung Medison to reduce pathogens to the level of 10-6. The disinfection method applies to the vaginal and rectal probes only.

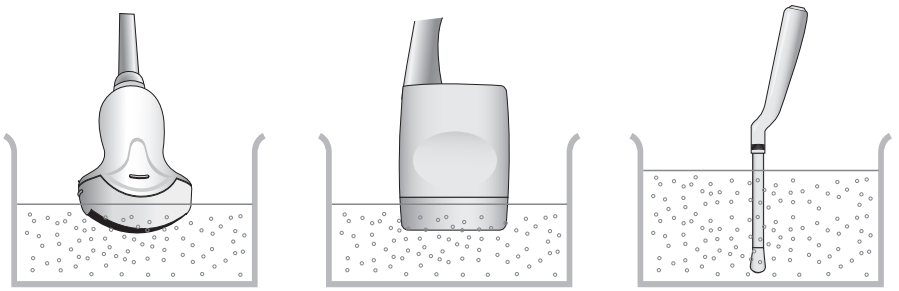
WARNING:

- If a pre-mixed solution is used, be sure to observe the solution expiration date.
- The type of tissue it will contact during use dictates the level of disinfection required for a device. Ensure that the solution strength and duration of contact are appropriate for disinfection.

CAUTION:

- Using a non-recommended disinfectant or not following the recommended disinfection method can damage and/or discolor the probe. This could also void the probe warranty.
- Do not immerse probes for longer than one hour, unless they are sterilizable.
- Only use liquid solutions to sterilize probes. Avoid using autoclave, gas (EtO), or other non-MEDISON-approved methods.

1. Please refer to the user manual of the disinfectant for instructions on the storage, use, and disposal of the disinfectant.
2. 2Mix the disinfectant compatible with your probe according to the instructions for solution strength provided in its user manual.
3. 3Immerse the probe into the disinfectant as shown in the illustration below.
4. 4Using the instructions on the disinfectant, rinse the probe when the immersion process is complete.
5. Allow the probe to air dry or wipe it with a dry cloth.



[Figure 9.1 Disinfecting a Probe]

Chapter 10

Maintenance

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10.1 Overview

Chapter 10 describes the maintenance processes that can be used to increase the lifespan of MySono U6.

Tips on how to store the product and how to back up data are provided.
Be sure to read this chapter to understand how to maintain the MySono U6 properly.

10.2 Operational Environment

10.2.1 Installing and Storing the Product

Pay attention to the following instructions:

- Avoid excess humidity.
- Avoid direct sunlight.
- Avoid excessive fluctuation in temperature.
- To ensure proper operation, a temperature of 10-35°C and humidity of 30-75% must be maintained.
- Avoid installing the product near a heating appliance.
- Avoid dusty and/or poorly ventilated locations.
- Avoid locations that frequently vibrate.
- Avoid a location where chemical substances or harmful gases are present.

NOTE: It is recommended that an AC adapter is used to ensure a steady power supply.

CAUTION:

- Placing the system near generators, X-ray machines or broadcast cables may result in screen noise and abnormal visual images. Sharing the power source with other electrical devices may also cause noise.
- If an AC source is used to power the system, make sure to use a designated adapter only.

10.3 Product Maintenance

Using an inappropriate cleaning or sterilizing agent may damage the product. Pay attention to the following:

WARNING:

- Turn off the system and disconnect the power cord from the wall outlet before cleaning and disinfecting the product, or there will be a risk of electric shock or fire.
- Always use protective eyewear and gloves when cleaning and disinfecting the product.

10.3.1 Cleaning

1. Console: Use a soft cloth lightly dampened with a mild soap or detergent solution to clean the exterior surfaces of the system.
2. Monitor: Wipe the LCD surface with a soft dry cloth. If the LCD panel has dirt on it, wipe it two to three times or more in one direction.

CAUTION:

- Do not spray detergent directly onto the product's exterior. Doing so may discolor or crack the surface.
- Do not use chemical substances such as wax, benzene, alcohol, paint thinner, insecticide, aerosol deodorant, lubricant, and detergent

NOTE: For information on cleaning and disinfecting the probe and the biopsy kit, please refer to 'Chapter 9. Probes'.

10.3.2 Disinfection

CAUTION: When disinfecting the surface, be sure to use disinfectants recommended by Samsung Medison.

A disinfectant qualified by the FDA 510(k) process is recommended. The following FDA 510 (k) – approved disinfectants are compatible with this product:

Solutions	Country	Type	Active ingredient	FDA 510(k)
Cidex	USA	Liquid	Gluter-aldehyde	K934434
Cidex Plus	USA	Liquid	Gluter-aldehyde	K923744

[Table 10.1 Disinfectants]

1. Turn off the system and disconnect the power cord from the wall outlet.
2. Mix the disinfectant solution to the solution strength specified in the user manual.
3. Wipe the system surfaces with the disinfectant solution according to the instructions given in disinfectant's user manual.
4. Allow the product to air-dry indoors or wipe with a dry cloth as instructed in the disinfectant's user manual.

10.3.3 Accuracy Check

The product's maintenance status may affect the measurements obtained when using the product. The product should be maintained in an optimal state to ensure reliable measurements.

To ensure optimal operation of the product, perform an accuracy check every year. The equations and table related to measurement accuracy are included in 'Chapter 5: Measurements and Calculations' in operation manual.

NOTE: The user must ensure that safety inspections are performed every 2 years according to the requirements of safety standard EN 60601-1. Only trained personnel are allowed to perform these safety inspections.

10.4 Battery Pack Management

The battery pack is a consumable, and will lose performance over time. If the battery life becomes less than half of what it was when first purchased, it is time for it to be replaced.

CAUTION:

- The basic warranty period for battery packs is six months.
- Samsung Medison recommends that you replace the battery pack once a year.

NOTE: To purchase a battery pack, please contact Samsung Medison or your local dealer.

10.4.1 Battery Pack Removal

Remove the battery pack as follows:

1. Turn off the system and disconnect the system power cord from the wall outlet.
2. Open the battery cover at the bottom of the product and remove the battery.

WARNING: Remove the battery pack if you are not planning to use the product for a month or longer. Leaving the product unused and not plugged into a power outlet for an extended period of time may deplete the battery pack completely, making it impossible to recharge the battery. In addition, allowing the battery pack to become completely depleted may cause communication problems for the product.

10.4.2 Battery Pack Installation

Remove the battery pack as follows:

1. Turn off the system and disconnect the system power cord from the wall outlet.
2. Open the battery cover at the bottom of the product and remove the battery pack.

CAUTION: When connecting the battery pack, make sure not to reverse the polarity of the electrodes.

3. Once the battery pack has been inserted, wait ten seconds before powering on the product.

10.4.3 Recharging the Battery Pack

Connecting the AC adapter automatically begins to recharge the battery pack. The battery pack will be recharged faster if MySono U6 is powered off or in power saving mode.

WARNING:

- If the low battery message appears while you are using the product, immediately save the diagnosis information and connect the AC adapter.
- Do not recharge the battery pack using a method not described in this manual. Doing so may lead to a fire or an explosion.

The battery pack must be charged and discharged within the following temperature ranges:

State	Ambient Temperature
Charge	0 ~ 45°C
Discharge	-10 ~ 50°C

CAUTION: The ideal charging temperature is between 0°C and 40°C. Charging the battery in an excessively hot location may cause the battery to overheat; charging the battery in an excessively cold location may increase the amount of time needed for recharging.

NOTE: If you are using the product with battery pack only, you can check the remaining power by viewing the battery icon on the monitor. For more information on battery icons, please refer to the section 'Battery' in 'Chapter 3. Installing the Product'.

10.4.4 Storing the Battery Pack

If you are not planning on using your MySono U6 unit for more than a month, remove the battery from the unit and store it separately. Storage temperature ranges are as follows:

Duration of Storage	Ambient Temperature
Less than 1 month	-10-60℃
1 - 3 months	-10-45℃
4 – 12 months	-10-30℃

For more information on storing and using the battery pack, refer to the 'Operational Environment' section in this chapter.

CAUTION: If you are using your battery pack for the first time, or using a battery pack that has not been used for more than three months, completely charge and discharge the battery pack a few times before using it.

Tips!

Complete Charge and Discharge

1. Insert a fully charged battery pack into MySono U6 and wait until the batteries completely discharge and shut down the system.
   - A fully charged battery pack will take about an hour to fully discharge.
   - As the battery discharges, the battery status indicator lamp changes color in the order of green → orange → blinking red.
2. Connect the AC adapter and fully recharge the battery pack. Once fully recharged, the battery status indicator will turn green.
3. Discharge the battery pack once more until the system shuts down.

10.4.5 Disposing of the Battery Pack

A service representative of Samsung Medison or an authorized dealer must replace and dispose of the battery pack.

WARNING: Do not dispose of the battery pack carelessly. Do not incinerate the battery pack as this may cause an explosion or a fire.

10.5 Information Maintenance

CAUTION: You may lose information files on user settings or patients, because of physical shocks to the product or internal errors. Therefore, you should back up information on a regular basis.

10.5.1 User Setting Back-up

Always keep a backup copy of all information related to the user settings in case of data loss. Users cannot back up the user settings of the product; backup must be performed by a member of the Samsung Medison Global Service Group. However, clients can back up user settings of the GA table used in OB measurements. For a more detailed description, go to 'Chapter 3. Settings' in operation manual and read the 'Obstetrics Measurement Setup' section.

10.5.2 Patient Information Restore

The SONOVIEW program can be used to back up patients' basic information and scanned images. The data is saved in the system by default, and the user can also choose to save the data to a specific location. If the system needs to be reinstalled because of a problem with the product, a member of the Samsung Medison Global Service Group will restore the basic information and images of the patients. For a more detailed description, see 'Chapter 6. Image Management' in operation manual, specifically the 'Saving and Transferring Images' section.

10.5.3 Software

The software may be changed to improve the product's performance. Software may not be altered by the user; any alterations to the software must be made with the help of a member of the Samsung Medison Global Service Group.

CAUTION: Minor software updates may be carried out without prior notice from the manufacturer.

If the operating system (Windows XP Embedded) develops a problem or needs to be upgraded, please follow the instructions given by the operating system's manufacturer.

Chapter 11

Spare Part List

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11.1 Overview

Chapter 11 provides information on service parts for MySono U6.

You must check whether a service part is compatible with the software version before ordering the service part. To check the compatibility, please refer to MySono U6 Part Catalog, provided by Samsung Medison Global Service Group.

11.2 Cover

213-M-145B

213-D-069B

215-M-535B

213-134A-00

213-D-072

215-M-537B

215-M-648A

215-M-647A

213-M-172B

[Figure 11.1 MySono U6 Cover]

PART NAME	PART NUMBER	DESCRIPTION
CASE A	213-D-069B	CASE A MYSONOU6 (LCD back cover)
CASE D	213-D-072	CASE D MYSONOU6 (Bottom cover)
CASE B	213-M-145B	CASEB MYSONOU6 (LCD front cover)
CASE C	213-134-00	CASE C AY MYSONOU6
COVER HINGE	215-M-535B	COVER HINGE MYSONOU6
COVER BATTERY	215-M-647A	COVER BATTERY MYSONOU6
COVER HDD	215-M-537B	COVER HDD MYSONOU6
COVER DOCKING	215-M-648A	COVER DOKING MYSONOU6
CASE BATTERY	213-M-172B	CASE BATTERY MYSONOU6

[Table 11.1 MySono U6 Cover]

11.3 System

AY-359-Main

BD-359-Main

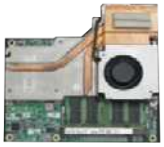
BD-359-CP-0A

BD-359-PSA

A235-152A-00

AY-FAN-359-BLADE294

BD-359-DOCKING



PC-MOTH-B945/423

A231-026A-00

AY-350-PWR-DDM

BT-14.4V-7.8A

BD-350-HDD

HDD-500G-ST9500325AS

BD-359-USB

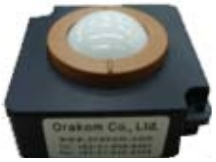
ADAPTER-PMP150-13

[Figure 11.2 System]

PART NAME	PART NUMBER	DESCRIPTION
SPEAKER AY	A231-026A	HOLDER SPEAKERAY MYSONOU6
FAN AY	A235-152A	BRACKET FAN AY MYSONOU6
ADAPTER	ADAPTER-PMP150-13	MYSONOU6 ADAPTER 19V/7.9A PMP150-13-2
MAIN AY	AY-359-MAIN	MYSONOU6 MAIN BD,PSA BD, DDM PWR ASSY
DDM POWER	AY-359-PWR-DDM	MYSONOU6 POWER AY DC-DC MODULE
BATTERY BD	BD-359-BATTERY	MYSONOU6 SUB BATTERY BD
CP BD	BD-359-CP	MYSONOU6 CONTROL PANEL BD
HDD BD	BD-359-HDD	MYSONOU6 SUB HDD BD
MAIN BD	BD-359-MAIN	MYSONOU6 MAIN BD
PSA BD	BD-359-PSA	MYSONOU6 PSA BD
BATTERY	BT-14.4V-7.8A	MYSONOU6 BATTERY 14.4V 7800mA LMP1508AS
HDD	HDD-500G-ST9500325A8	SEAGATE 500G HDD
DOCKING BD	BD-359-DOCKING-0A	DOCKING BD MYSONOU6
BLADE FAN ASSY	AY-FAN-359-BLADE294	U6 BLADE FAN ASSY

[Table 11.2 System]

11.4 Control Panel



AY-TB254A-U6-00

311-R-284A-00

A260-139B-2-00

267-M-111A

267-M-116A

267-M-104A

267-M-102-00

264-M-001B-00

311-R-255B

[Figure 11.3 Control Panel]

PART NAME	PART NUMBER	DESCRIPTION
PWR	264-M-001B	BUTTON POWER MYSONOU6
KEY PAD	311-R-284A	RUBBER KEY PAD MYSONOU6
TRACK BALL	AY-TB254A-U6	ORACOM T/B COPPER UNIT 1INCH MYSONOU6
KBD	A260-139B-2	BACKLIT KBD MYSONOU5 EXP
ENCORDER	267-M-111A	KNOB ENCODER MYSONOU6
ENCORDER EXT	264-M-006A	KNOB ENCODER EXT.MENU MYSONOU6
ENCODER QSCAN	267-M-104B	KNOB ENCODER QSCAN MYSONOU6
TGC KNOB	267-M-084B	KNOB TGC U6
RUBBER OAP LOD	311-R-255B	RUBBER OAP LOD MYSONOU6

[Table 11.3 Control Panel]

11.5 LCD

AY-359-LCD-15

MNT–LCD.M150XN07

INVERT-LCD.KT2150M

[Figure 11.4 Monitor]

PART NAME	PART NUMBER	DESCRIPTION
LCD AY	AY-359-LCD-15	LCD15 MNT AY MYSONOU6
LCD MNT	MNT-LCD/G150XG01	U6 LCD MNT G150XG01
LCD MNT INVERTER	INVERT-LCD/KT2150MD	U6 LCD MNT INVERTER KT-2150MD

[Table 11.4 Monitor]

11.6 Mechanism & Chassis

[Figure 11.5 Mechanism & Chassis]

PART NAME	PART NUMBER	DESCRIPTION
GUIDE CABLE	227-P-116A	GUIDE CABLE MYSONOU6
BRACKET LCD LEFT	235-P-574A	BRACKET LCD LEFT MYSONOU6
BRACKET LCD RIGHT	235-P-575A	BRACKET LCD RIGHT MYSONOU6
HANDLE	252-M-041B	HANDLE MYSONOU6
LOCK CATCH MAGNET	254-Z-006A	LOCK CATCH MAGNET MYSONOU6
HINGE HANDLE LEFT	A257-010A	HINGE HANDLE LEFT MYSONOU6
HINGE HANDLE RIGH	A257-011A	HINGE HANDLE RIGHT MYSONOU6
HINGE LCD LEFT	A257-012A	HINGE LCD LEFT MYSONOU6
HINGE LCD RIGHT	A257-013A	HINGE LCD RIGHT MYSONOU6

[Table 11.5 Mechanism & Chassis]

11.7 Option

PART NAME	PART NUMBER	DESCRIPTION
AUTOIMT	OPT-350-AUTOIMT	MYSONOU6 AUTOIMT S/W
4D	OPT-350-4D	MYSONOU6 4D S/W
3DXI	OPT-350-3DXI	MYSONOU6 3DXI S/W
CARDICAC	OPT-350-CARDICAC	MYSONOU6 CARDICA S/W C
DICOM	OPT-350-DICOM	MYSONOU6 DICOM S/W
DICOMSR	DICOM-350-DICOMSR	MYSONOU6 DICOMSR S/W
DMR-LITE	DICOM-350-DMR-LITE	MYSONOU6 DMR-LITE S/W
COLOR3D	OPT-350-COLOR3D	MYSONOU6 COLOR3D S/W
CART	OPT-350-CART	MYSONOU6 CART

[Table 11.6 Option]

11.8 Probe

LN5-12

C4-9

P2-4

C2-5

C2-8

3DC2-6

EVN4-9

3D4-9

[Figure 11.6 Probe]

PART NAME	PART NUMBER	DESCRIPTION
Probe	PB-TZLN5-12	LN5-12
Probe	PB-TZC2-8	C2-8
Probe	PB-TZC2-5	C2-5
Probe	PB-TZP2-4	PA2-4
Probe	PB-TZ3DC2-6	3DC2-6
Probe	PB-TZ3DEC4-9	3DEC4-9
Probe	PB-TZC4-9	C4-9
Probe	PCW-20-EGG/3B-03	PCW-20

[Table 11.7 Probe]

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