UGEO H60

Service Manual

Version 1.00.00

SAMSUNG MEDISON

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 the CSA symbol for Canada and United States of America

CE 0123

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

CE

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

This is the GMP symbol that shows that the product complies with the Korean Good Manufacturing Practice quality regulation system.

Attention

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 Team 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 Team in charge of servicing this product.

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Samsung UGEO H60 Service Manual

1 Introduction to Products

SAMSUNG MEDISON

1 Introduction to Products

1.1 Overview

Chapter 1 describes the basic important information you need to know before repairing UGEO H60. It describes the main features and configuration and the product specification.

UGEO H60, a color ultrasound diagnostor with high resolution and deep penetration, is convenient and offers variety of measurement functions

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1.2 Main Features of UGEO H60

- Digital Beam forming technology, self-developed at Samsung Medison Co., Ltd. Is applied.
- Various Application: Can be applied to various fields such as General, Obstetrics, Gynecology, Abdomen, Vascular, Extremity, Cardiac, Urology, Breast
- Various Diagnostic Modes: Various types of modes are available such as 2D mode, M mode, Color Doppler Mode (C mode), Power Doppler Mode (PD mode), PW Spectral Doppler Mode (D mode)
- Stereoscopic Feature: Implements solid and detailed visuals with 3D and 4D imaging mode.
- Measuring and Reporting Feature: Offers various measurement functions for each specific area besides measurement functions for distance, area, volume and perimeter. In addition, there is a report function using this measurement result.
- Reviewing Scan Video Feature: Provides 2621 frames of Cine video and 4086 lines of Loop video at maximum.
- SonoView™ Feature: Available on storing, querying and compatible data with integrated video management system.
- Digital Imaging and Communication in Medicine (DICOM) Feature: Can store, transfer, and print video using network.
- Ease of Connection to Peripheral Devices: Can connect to various peripheral devices and use it.

1.3 Components

UGEO H60 is composed of console, probe and cart (option).

1.3.1 Console

The internal part of console is composed of devices mainly implementing ultrasound image, while the external part is composed of various connected devices and handle.

[Figure 1-1] H60 Front Figure

[Figure 1-2] H60 Side Figure

[Figure 1-3] H60 Rear Figure

1.3.2 Probe

Probe is a device collecting data for ultrasound image by using ultrasound.

NOTE	Refer to "Chapter 9 Probe" in service manual for more detail.

1.3.3 Product Specification

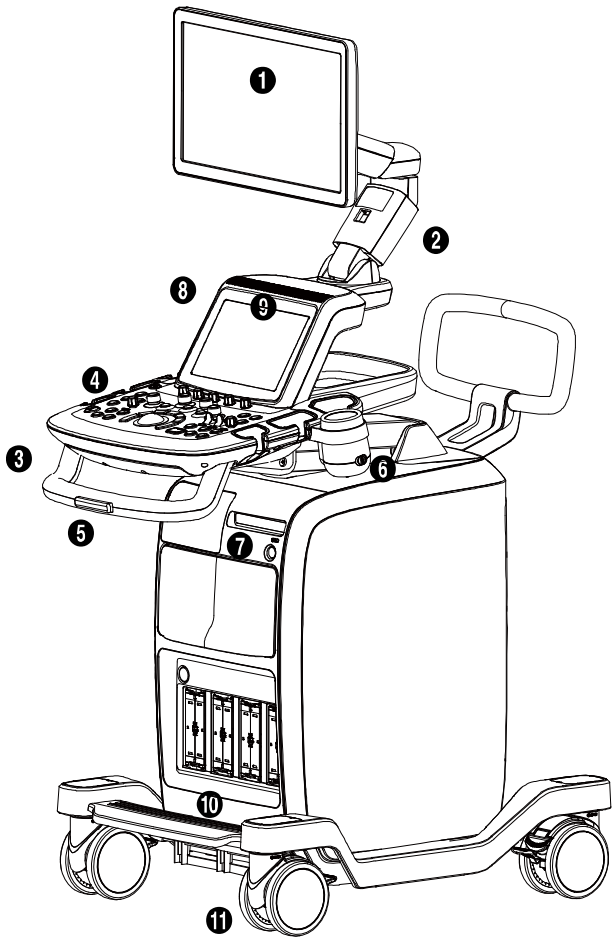
Physical Dimensions	Height: 1660 mm (with Monitor) Width: 550 mm Depth: 980 mm(with Keyboard) Weight: 105kg (without accessories)
Imaging modes	2D-Mode M-Mode Color Doppler Pulsed Wave (PW) Spectral Doppler Power Doppler (PD) 3D/ 4D imaging mode Dual modes Quad modes Combined modes Simultaneous mode Zoom Mode S-Flow
Gray Scale	256 (8 bits)
Focusing	Transmit focusing, maximum of eight points (four points simultaneously selectable) Digital dynamic receive focusing (continuous)
Probes **(Type BF / IPX7)**	**Linear Array** L5-13 **Curved Array** CS1-4, C2-8, CF4-9, ER4-9,EVN4-9 **3D** 3D2-6, 3D4-9, VE4-8
Probe connections	3 Probe Connectors 4 Probe Connectors for option
Monitor	**Main Monitor** Display area : 18.5 inch Number of Pixel : 1366 x 768 **Touch Screen Monitor** Display area : 10.1 inch Number of Pixel : 1280 x 800

Rear Panel Input / Output Connections	Audio Output Port(Right/Left) VGA monitor LAN USB Port HDMI output HDMI Input (HDMI Input is currently not supported.)
Image Storage	Maximum 45000 frames for CINE memory Maximum 14000 Lines for LOOP memory Image filing system
Application	Obstetrics, Gynecology, Urology, Abdomen, Vascular, Small Part, MSK Pediatric
Electrical Parameters	100~240VAC, 620VA, 50/60Hz
Measurement Packages	Abdomen, Obstetrics, Fetal Echo, Gynecology, MSK, Pediatric Hips, Small Part, Urology, Vascular * Refer the Chapter 5 for additional information
Signal processing (Pre-processing)	Acoustic Power Control Analog TGC Control Dynamic Aperture Control Dynamic Apodization Control Dynamic LPF Control
Signal processing (Post-processing)	Digital TGC Control Slider TGC Control Mode-Independent Gain Control Black Hole/Noise Spike Filtering 1D Lateral/Axial Filtering 2D Edge/Blurring Filtering Frame average M/D Mode Sweep Speed Control Zoom Image View Area Control Image Orientation (left/right and up/down)

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
Auxiliary	DVD Multi-Drive Digital B/W Video Printer Digital Color Video Printer USB Printer DVD Recorder Foot switch (IPX8) e-Motion Marker (IPX 7) USB Flash Memory Media USB HDD Monitor
User Interface	English, German, French, Spanish, Italian, Russian, Chinese
Pressure Limits	Operating: 700hPa to 1060hPa Storage: 700hPa to 1060hPa
Humidity Limits	Operating: 30% to 75% Storage & Shipping: 20% to 90%
Temperature Limits	Operating: 10 °C ~ 35°C Storage & Shipping: -25°C ~ 60°C

1.3.4 Product Components

This product is composed of monitor, control panel, console, peripheral devices and probe.



① Monitor
② Monitor Arm
③ Keyboard
④ Control Panel
⑤ Lift
⑥ Probe Holder
⑦ DVD Drive
⑧ USB Port
⑨ Speaker
⑩ Probe Port
⑪ Wheel

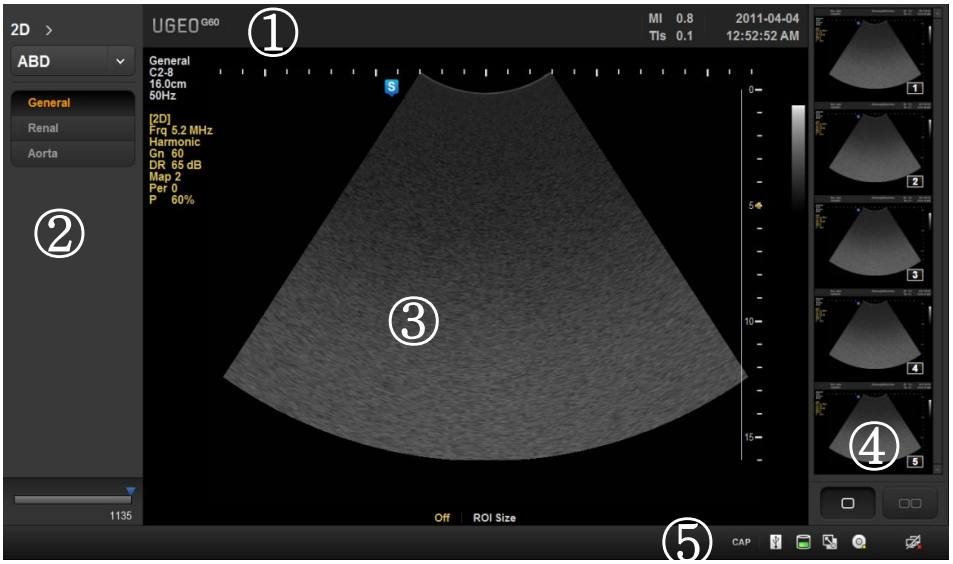
[Figure 1-4] The front of the product

1.3.4.1 Monitor

Color LCD flat monitors displays ultrasound image and extra information.

1) Screen Configuration

The screen of this product has contents such as ultrasound image and extra information, and necessary menu for users to operate the system. The screen configuration is composed of ①Title area, ②Measurement menu area, ③ Imaging area, ④ Thumbnail area, ⑤User Information as the figure below.



[Figure1-5] Screen Configuration

① Title area

Displays patient information (name, ID, GA), name of hospital and operator, acoustic output information, date and time, etc.

② Measurement menu area

Displays measurement menu while measuring each subject diagnosis.

③ Imaging area

Displays ultrasound image. Displays video information, annotation and various measuring information.

④ Thumbnail area

Displays stored video by clicking [Store] button. Clicking by pointer will display enlarge image on imaging area. Display up to 17 images.

Displays Body Marker in BodyMarker Mode.

⑤ User Information Status Information area

Displays various information needed for users while operating this system. Displays condition of the storage media (HDD, USB, CD), Caps Lock condition, DICOM, etc.

※Tips! Displays of current condition of system.

CAP: Shows On condition of Caps Lock

: Shows that there is CD/DVD storage media

: Shows that there is no CD/DVD storage media.

: Shows that there is no USB storage media.

: Shows that there is more than 10% of HDD storage.

: Shows that there is less than 10% of HDD storage.

: Shows that DICOM Spooler is empty.

: Shows that DICOM Spooler is in operation.

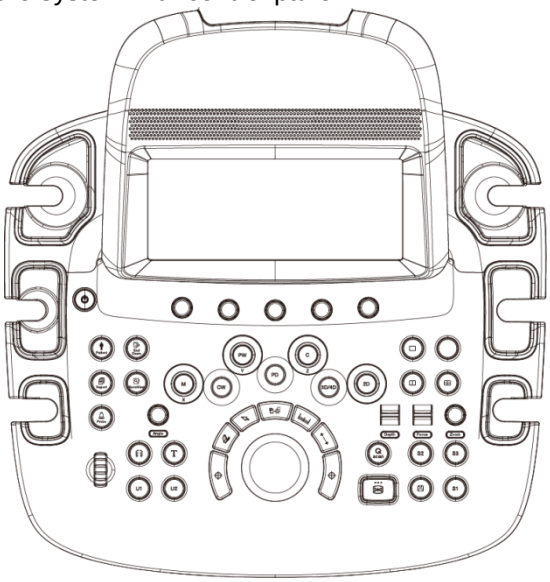
: Shows that DICOM Spooler has failed in its operation.

: Shows that LAN is connected.

: Shows that LAN is not connected.

1.3.4.2 Control Panel

Users operate the system with control panel.



[Figure 1-6] Control Panel

Control panel is composed of keyboard, soft menu, button, dial, dial-button, slide and track.

Dial-button is a operating tool, combination of dial and button.

1) Detailed Features of Control Panel

Following are the description and the use of each control on control panel. Controls with various different features are described in more detail after Chapter 3 of this manual.

On/Off	Button	Turns On/Off the product
Patient	Button	Displays Patient Information screen where you can select the patient ID on the list or input new patient information
Probe	Button	Displays Probe Selection screen where you can select and change the probe and diagnostic subject
SonoView	Button	Displays a screen where you can review or manage stored images
End Exam	Button	Reset the related data after finishing the examination on the diagnosed patients
Report	Button	Displays the report screen which shows measurement result of corresponding diagnostic subject
	Button	Inputs BodyMarker on the video
T	Button	Inputs texts on the video
U1	Button	This button can be set to user's preference. Features of each button can be set from Setup > Peripherals > Customize Key
U2	Button	This button can be set to user's preference. Features of each button can be set from Setup > Peripherals > Customize Key
	Button	Displays exclusive videos on the screen
	Button	Compares two separate videos

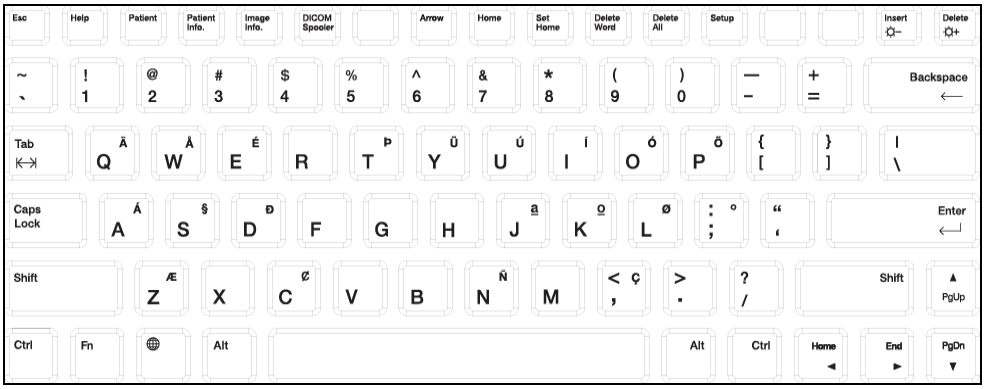
	Button	Compare four separate videos
Depth	Dial-Button	Adjusts the depth of the image which can be observed
Focus	Dial-Button	Moves the position of the focus to the desired target area
Zoom	Dial-Button	Zoom Box appears. Press [Exit] button to exit Zoom mode.
Angle	Dial-Button	Adjusts the angle of sample volume in spectral doppler mode. Also used for adjusting the angle of arrow and adjusting probe angle of Body marker. Moves Reference Slice to the left and right using [Angle] Dial-Button in 3D View
Q Scan	Button	Uses Quick Scan feature
 Store, S1, S2, S3	Button	Stores, prints and sends to DICOM Server with having settings of each feature for each. Features of each Button can be set from Setup > Peripherals > Customize Keys
 Freeze	Button	Stops the video which is being scanned or reactivates the stopped video
M	Dial-Button	Starts or exits the M mode. Adjusts gain by turning Dial-Button. Rotates the image in the direction of the x-axis in 3D View
PD	Button	Starts or exits power doppler mode
Color	Dial-Button	Starts or exits color doppler mode. Adjusts gain by turning Dial-Button. Rotates the image in the direction of the x-axis in 3D View
2D	Dial-Button	Starts 2D mode. Adjusts gain by turning Dial-Button.

PW	Dial-Button	Starts or exits PW spectral doppler mode. Adjusts gain by turning Dial-Button. Rotates the image in the direction of the y-axis in 3D View
CW	Button	This button is currently not supported
3D / 4D	Button	Used for On / Off on 3D/4D mode.
 Set / Exit	Button	[Uses by setting the [Set] or [Exit] feature. Features of each Button can be set from Setup > Peripherals > Customize Keys - Set: Selects desireditem or value using trackball, or changes the feature of trackball. - Exit: Exists the current feature and returns to the previous state
 Pointer	Button	The arrow pointer appears on the screen in the scan mode
 Clear	Button	Deletes text, arrow, body marker, measurement result, etc displayed on the screen
 Change	Button	Changes to other feature which is supported in the current trackball feature
 Calculator	Button	Starts measuring on each diagnostic subject
 Caliper	Button	Starts basic measurement such as distance, volume, circumference and area
Trackball	Trackball	Moves the cursor on the screen. There are video search feature in Cine footage.

 **CAUTION**	Bands might appear on the image if adjusting gain value of adjacent TGC slide with large difference

2) Keybard

Used to input texts



[Figure 1-7] Keyboard

Help	Help Manual appears on the screen
Patient	General Information appears on the screen
Patient info.	Shows or hides patient information on the screen
Image Info.	Shows or hides Image Parameter on the screen
DICOM Spooler	DICOM Spooler appears on the screen
Arrow	Starts Arrow mode
Home	Moves cursor to the Home position in Annotation mode
Set Home	Sets the Home position in Annotation mode
Delete Word	Deletes last inputted text in Annotation mode

Delete All	Deletes all inputted text in Annotation mode
Setup	Setup screen appears
Insert	Select the input method Decrease the brightness of the monitor by pressing the Fn key
Delete	Deletes Text Increase the brightness of the monitor by pressing the Fn key

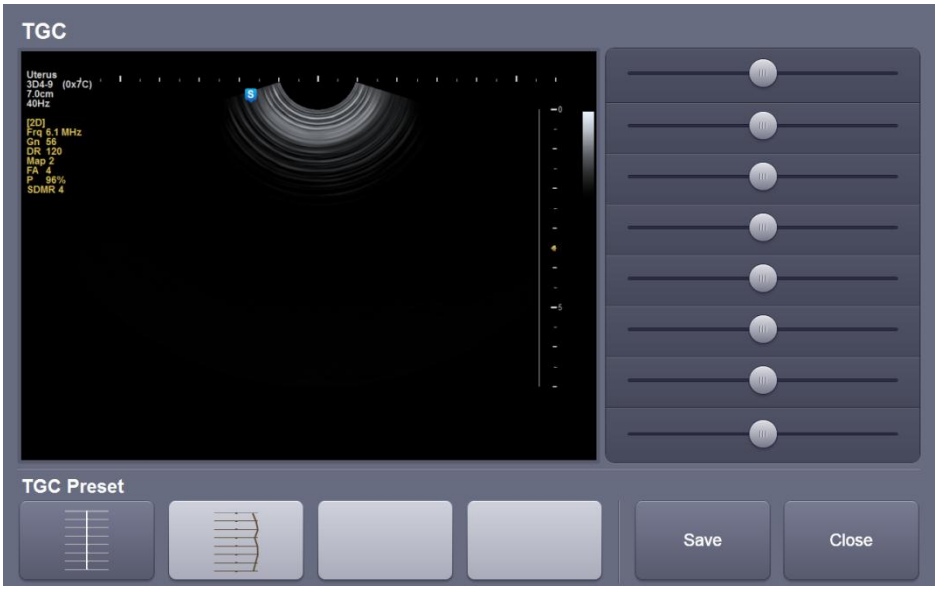
3) Touch-Screen

It is an operating tool which users directly touch. The available features are shown as Button or Dial Button in the current mode.

Screen configuration of touch-screen

① Information area: shows the title of touch screen currently used.

② TGC: adjusts TGC slide when TGC curve settings on the touch screen is active.



[Figure 1-8] TGC

③ Menu area: The available menu in the current input mode is shown as Button. Use by pressing the Button itself, and menus which are being used are shown as yellow.

④ Soft menu area: shows soft menu available in current input mode. Use by pressing Dial-Button right below the menu or turning it to left or right.

> **※ Tip! When there are two menu for touch screen**
>
> In case there are 2 menus on the top and bottom, press corresponding Dial-Button and select the desired menu. Use Dial-Button after pressing the Button on the menu that you wish to use on the touch screen.

[Figure 1-9] Display of touch-screen

4) Adjustment of the Control Panel

⚠ CAUTION	■ Do not move the control panel with excessive force. ■ Use the rear handle to move the product

① Horizontal Adjustment

Move the product carefully side to side by holding the handle.

② Vertical Adjustment

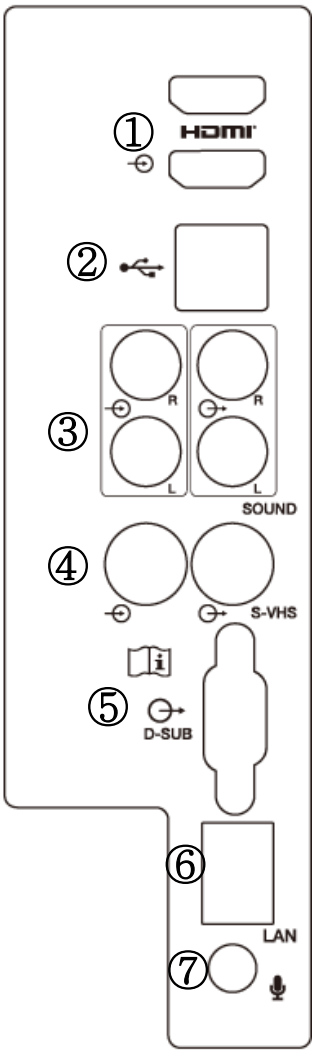
Move the product carefully up and down by pressing the lever on the handle of control panel.

1.3.4.3 Console

Console is divided into two main parts of the internal and external. The internal of the console is consisted of the devices for implementing ultrasound image. The external of the console is composed of various connected devices, probe holder, storage space, handle, wheel, etc.

1) Rear Panel

Located on the back of the product, it connects various peripheral devices such as monitor, printer, etc..



① HDMI: delivers digital type image and audio signals in one cable simultaneously

② USB port: connects peripheral devices for USB

③ Audio Output (input): is used for output of audio signal

④ S-VHS port (I/O): connects VCR in S-VHS method

⑤ D-SUB port: outputs analog signals to monitor

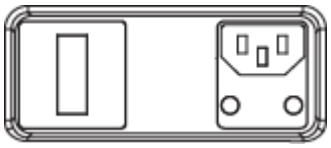
⑥ Network port: connects network

⑦ Mic port (input): connects microphone

[Figure 1-10] Rear panel

2) Power connector

Located at the bottom of the rear panel



[Figure 1-11] Power connector

① Power Inlet: a connected part of power cord connecting external power source

② Power Outlet: supplies power for peripheral devices or external devices, and capacity is MAX150VA. Outlet terminal is located on DC power assy.

③ Power switch / circuit breaker: supplies power for the entire product or cut the power supply in case of overvoltage or overcurrent.

3) Probe Holder

Holder is located on the left and right of the control panel for storing Probe.

1.3.4.4 Peripheral Devices

NOTE	Refer to the user's manual of corresponding product for the use of peripheral device.

1) Internal peripheral devices

These are the peripheral devices located inside of the console.

DVD-Multi

DVD-R, DVD+R, DVD-RW, DVD+RW, DVD-ROM, CD-R, CD-RW, CD-ROM

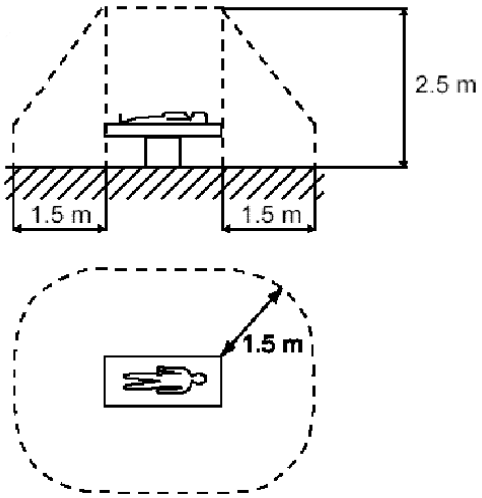
Hard Disc Drive

Min. 500GB SATA-2 2.5” HDD

2) External peripheral devices

Connect it upon the user's need. The connection is usually made through the corresponding port on the rear panel.

⚠ **CAUTION**	Do not install peripheral devices not mentioned in this manual to the patient environment. There is a risk of electric shock when you install peripheral devices in the patient environment.



[Figure 1-12] Patient Environment

⚠ **CAUTION**	For peripheral devices using USB port, make sure you turn the power off before equipping or removing the device to the console. Malfunction of peripheral devices for system or USB can be occurred when the power is not completely off.

※ Tip!

USB port of the console is located on both side panel and rear panel of the control panel.

It is convenient to connect USB storage devices (flash memory media, etc) on the side panel of the port, and other USB peripheral devices on the rear panel.

The following products are recommended.

Digital Video Printer

- BW: Sony UP-D897, Mitsubishi P95DE
- Color: Sony UP-D25MD, Mitsubishi CP30DW

USB Printer

HP Officejet 4500, Samsung ML-2950ND, Samsung CLP-620NDK

DVD Recorder

Sony DVO-1000MD

⚠ **CAUTION**	■ Must install printer and driver compatible with English Microsoft Windows XP™. Contact Samsung Medison customer service for details of installing printer driver. ■ Check to make sure the printer is same as the one in Windows XP™ or Setup, when connecting to the printer. ■ Please note that the connecting port is different depending on the printer. General printer is connected to the printer port while USB printer to the USB port.

Foot Switch

Foot Switch feature can be enabled on Setup > Peripherals > Customize Keys > Foot Switch. You can choose options from Exit, Freeze, Store, S1, S2, S3 and Update.

1.3.4.5 Probe

Probe is a device collecting data for the ultrasound imaging configuration using ultrasound.

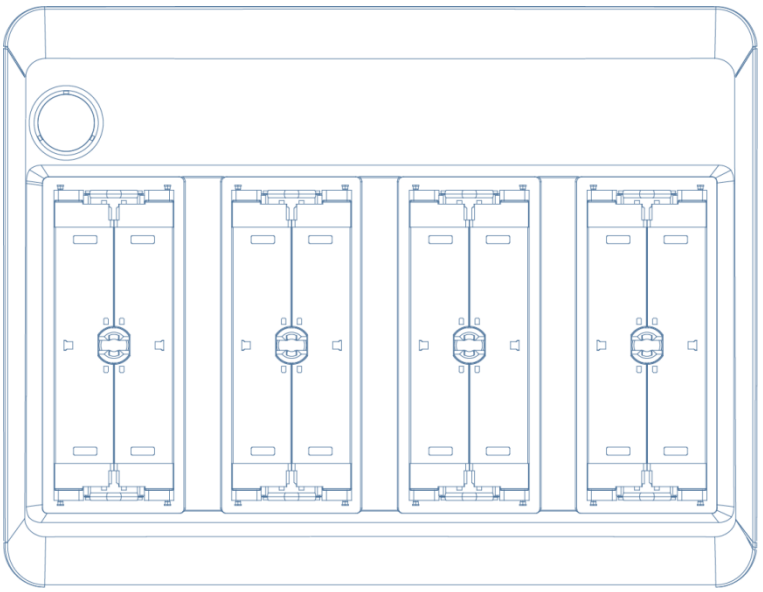
NOTE	Refer to 'Chapter 5 Probe' for more detail.

1) How to connect the probe

Turn the power off before equipping or removing probe from probe connector for the safety of product and probe.

① Connect probe to the probe connector on the front panel of the console. It can connect up to maximum of 4 probes (including option).

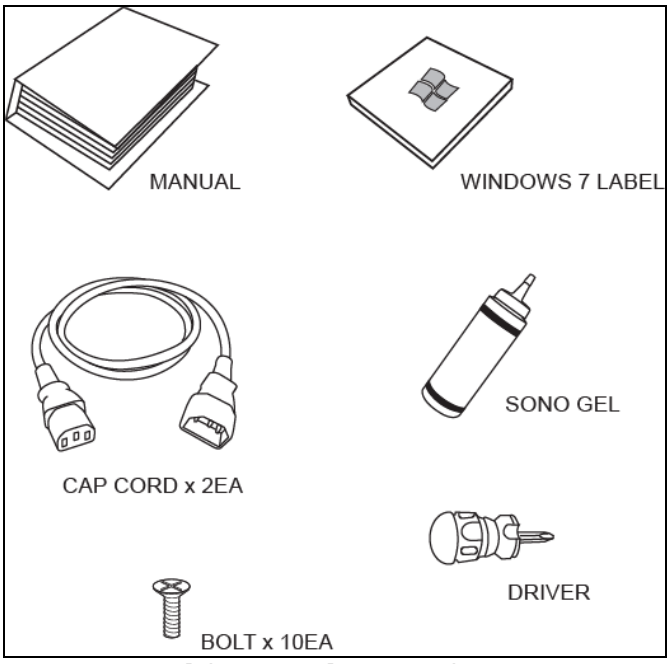
② Equip it by turning the handle of the connector clockwise.



[Figure 1-13] Probe connectors

1.3.4.6 Accessory

This product includes a box containing various accessories.



[Figure 1-14] Accessories

1.3.4.7 List of Options

This product has following list of options.

SDMR	Gel warmer
Spatial Compound Imaging™ (SCI™)	Foot switch
DICOM	4 probe ports
4D	e-Motion Marker
3D XI	Network Isolator
Volume NT / IT	

Refer to the corresponding content of this manual for more details of options above.

Samsung UGEO H60
Service Manual

2 Safety

SAMSUNG MEDISON

2 Safety

2.1 Overview

Chapter 2 describes the important considerations for safely repairing UGEO H60.

There are details of other additional equipment such as ultrasound system, probe, recording device.

This product should only be used by the qualified doctors who are authorized to use medical devices or the persons who are authorized by doctors.

It can adversely affect the fetus if unqualified medical personnel or regular personnel use the solid ultrasound (3D, 4D) for a long period for taking commemorative photos or video.

In case of solid ultrasound imaging device, please comply with the intended use because it can adversely affect the fetus when taking videos for other than the purpose of prenatal diagnosis.

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2.2 Safety Precautions

2.2.1 Safety Symbols

IEC (International Electrotechnical Commission) has enacted safety and safety symbols for medical electronic devices. Enacted symbols are as following.

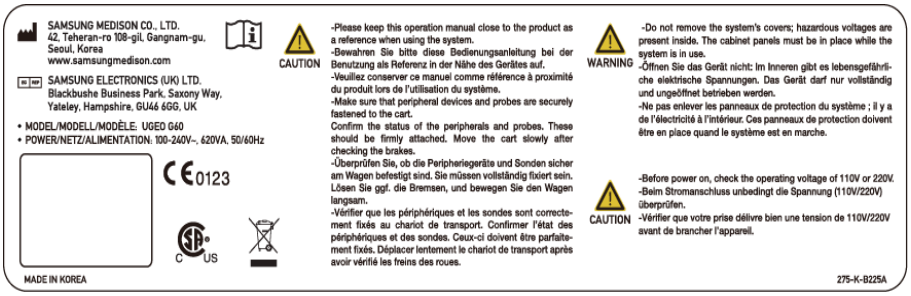
Symbol	Meaning
	AC power
	Warning about the risk of electric shock
	Classification according to the degree of protection against electrical hazards (Type BF)
	Classification according to the degree of protection against electrical hazards (Type CF)
	Power switch (supplies/cuts off the power)
	OFF (cuts off the power on parts of the product)
	Warning: to prevent serious accidents or property damage
	Caution: to prevent minor accidents or property damage
	Refer to the user's manual
	ON (supply the power on parts of the product)
	Equipotential terminal

Symbol	Meaning
	High-voltage beyond AC 1000V or DC 1500V
	Protective ground terminal
	Data output port
	Data input port
	Data input/output port
	Left and right audio / video input port
	Left and right audio / video output port
	Print remote output
	Foot switch connector
	USB connector
	Watertight device
	Underwater device
	Probe connector
	ESD-related warning symbol

Symbol	Meaning
	Do not sit on the control panel
	Do not push
	Do not lean on it
	Follow the user's manual

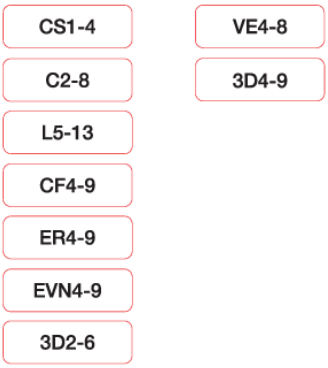
2.2.2 Location of Label

Labels of 'Warning' and 'Caution' are attached on the product for protecting the product.

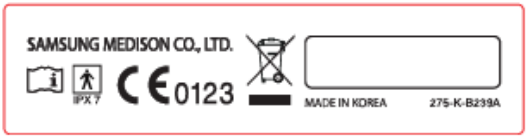


[Figure 2-1] ID label

[Figure 2-2] TIP-OVER related precautions



[Figure 2-3] Probe ID label



[Figure 2-4] Probe label

2.3 Electrical Safety

This product is classified as Class I, Type BF.

2.3.1 Prevention of Electric Shock

⚠ **WARNING**	• There is a risk of electric shock when external recording device or monitoring device is not properly grounded. • Do not open the cover of the product for any reason. Dangerous voltages are present inside the product. Internal repairs or component replacement should be conducted by Samsung Medison global technology support group. • Always inspect external, cable, cord, plug, etc of the product before using. Stop using it when the external is damaged like being cracked or broken, or the cable is worn out. • Plug off the power plug when cleaning the product. • All equipments (probe, ECG lead) that have contact with patients should be isolated from the patients before the use of heart massager of high pressure. • Do not have a contact with patients and signal input/output terminal of product simultaneously. There is a risk of leakage current exceeding maximum limit. • Do not use the product in the environment of flammable gas or anesthetic gas. There is a risk of explosion. • Use only the designated adapter when using AC adapter.

⚠ **CAUTION**	• Installation of isolating transformer protects the product from surge voltage. Isolating transformer is in continuous operation even in standby. • Do not immerse the power cord in liquid. Power cord is not waterproof. • Do not operate SIP/SOP of product while diagnosing patients. There is a risk of electric shock from leakage current.

Only the products in accordance with IEC standard should be used for connected peripheral devices (IEC60950/EN60950 for data processing device, IEC60601-1/EN60601-1 for medical devices). All components of the product should comply with IEC60601-1-1/EN60601-1-1, the system standard. The personnel who is in charge for adding peripheral devices on signal input/output of medical devices

should make sure that all peripheral devices are in accordance with IEC60601-1-1/EN60601-1-1 standard.

2.3.2 ESD

ESD(Electro Static Discharge) is a phenomenon typically caused by friction in the natural state. ESD happens the most when the air is dry such as an environment under heater or air conditioner. Static or ESD happens when electricity from fully charge object charges not fully charged object. In other words, it can happen when a person makes a contact with handle made of metal, file cabinet, computer or even other person.

⚠ **CAUTION**	• The static caused from the user or the patient can sometimes damage ultrasound system or probe. • Refer to the following in order to prevent damage caused by ESD – Use antistatic spray on carpet or linoleum. – Use antistatic mat. – Ground the product between patient tables or beds. • The personnel in association with the use of the product is recommended to be trained with ESD-related warning symbols and precautionary procedure.

2.3.3 EMI

This product has passed the standard by EMI (Electro Magnetic Interference).

Using the product under the environment of electromagnetic field can degrade the quality of ultrasound image or damage the product itself.

When the ultrasound image has a poor quality of has failed, check to make sure if there is no device causing electromagnetic field nearby. Electromagnetic field can be caused from the same place or adjacent place, and usually cell phone, pager, radio, TV, microwave, etc are the cause of electromagnetic field.

⚠ **CAUTION**	Move the product far away from EMI when the system does not operate properly by electromagnetic field.

2.3.4 EMC

EMC(Electro Magnetic Compatibility) inspection of this product is conducted in accordance with medical device international standard IEC60601-1-2. European standard is IEC standard (EN60601-1-2).

2.3.4.1 Guidance and manufacturers declaration – Electromagnetic Emission

This product is used under the following electromagnetic environment. Users should make sure the product is used under the following 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 EMC approval cable, probe and peripheral devices

1) Cable

Cables connected to this product can affect the electromagnetic emission.

Only use the appropriate cables with type and length listed 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) Probe

Probes connected to this product can affect the electromagnetic emission.

Probes listed in 'Chapter 9 Probe' of this service manual have passed the inspection in accordance with Group1 Class B required by CISPR 11.

3) Peripheral devices

Peripheral devices used with this product can affect the electromagnetic emission.

⚠ **CAUTION**	It is the duty of the user to ensure the electromagnetic compatibility of the product if the user connects the peripheral devices. Only use the devices appropriate with CISPR 11 or CISPR 22, CLASS B.

⚠ **WARNING**	Unapproved use of cable, probe and peripheral devices can increase the electromagnetic emission and reduce the tolerance of ultrasound product.

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.			
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	3 V/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 deter-mined 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 interval between radio frequency communication device and UGEO H60

This product is used under the electromagnetic environment where emitted radio frequency disturbance is controlled. Users can maintain a minimum distance with portable radio frequency communication device (transmitter) and prevent electromagnetic interference by adjusting the maximum output of communication device as 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=3 V/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 Environment – Guidance

Ultrasound product should have minimum of blocking radio frequency feature and should be used in the isolated space where cable is connected. The strength of field of fixed radio frequency transmitter should be less than 3V/m in isolated

space as determined by electromagnetic test.

Inspection should be necessarily conducted in order to prove that the actual blocking effect and reduced filter of isolated space is in accordance with the minimum standard.

⚠ **CAUTION**	Samsung Medison Co., Ltd. is not responsible for any problem caused in electromagnetic environment from connecting remote devices such as remote printer or LAN which users have.

2.3.4.5 Avoiding electromagnetic interference

Medical devices can cause electromagnetic interference or be affected by electromagnetic interference. EMC standard lists the inspections of electromagnetic interference which is caused or is affected.

Electromagnetic interference caused from ultrasound product of Samsung Medison Co., Ltd. Does not exceed the standard.

Ultrasound product is designed to receive radio frequency which makes it easy to be interfered by energy sources of radio frequency. Medical devices, IT products, transmission tower of Radio and TV are other cause of the interference. If there is a difficulty locating the interference, consider the following.

- Is the electromagnetic interference intermittent or continuous?
- Is the electromagnetic interference occurred in only one probe at the same frequency or in many probes?
- Is there a problem when two different probes are used at the same frequency?
- Is there electromagnetic interference even after moving the ultrasound product to the other place?

The answers to the above will tell you whether there is a problem in the ultrasound system or the product environment. Please contact Samsung Medison Co., Ltd. global technical support group or the engineer with authorization after answering all questions above.

2.4 Mechanical Safety

2.4.1 Precautions during Operation

⚠ **CAUTION**	• Do not apply excessive force to the product. • Place the product on stable place. Use of exclusive cart (option) is recommended. • Do not use the product with placing it on the lap. There is a risk of burns. • Do not modify the product in any reason. • Conduct safe operation before the use if it hasn't been used for a while. • Be careful not to let a foreign substance, especially ironware in the product. • Do not block the vents of the product. • Do not store the product in a closed space such as a bag with the power on. • Do not hold the cord when plugging the power off. The cord can be damaged, which would yield a risk of short-circuiting or disconnecting. Make sure you hold the plug when plugging the power off. • The product can stop operating or can cause malfunction when excessively twisting the cable connected to the patient. • Inappropriate cleansing or disinfecting on connecting area with patient can be a cause of product failure.

2.4.2 Precautions during Movement

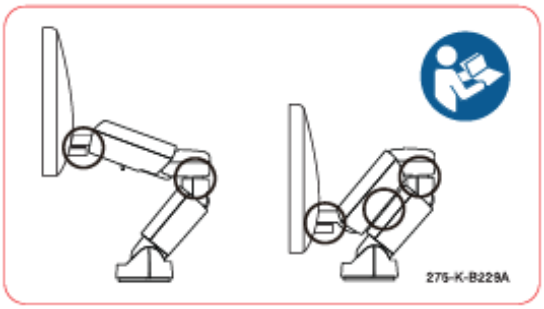
Carefully move the product by holding the rear handle of the product. This product can be moved by using the exclusive cart (option).

⚠ **CAUTION**	Make sure to turn the power off and remove the connected cable before the movement.

NOTE	Try not to stand it on the inclined place when using the exclusive cart. When placing it on the inclined place, enable the locks on the wheel.

2.4.3 Precautions during Monitor Operation

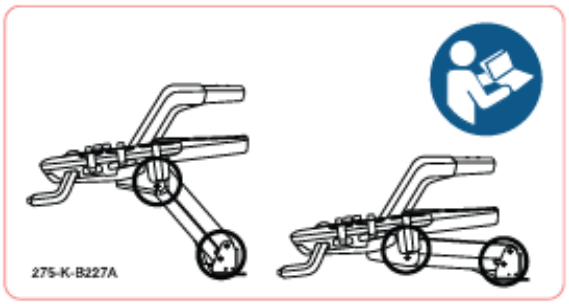
Pay attention to the space between monitor arms when adjusting the height or position of monitor. There is a risk of finger injury.



[Figure2-5] Precautions during monitor operation

CAUTION	■ Do not push or lean on the control panel with excessive force. ■ Do not sit on the control panel or apply excessive force on it.

Pay attention to the space between control panel and lift when adjusting the height or position of monitor. There is a risk of finger injury.



[Figure2-6] Precautions on using control panel

2.5 Biological Safety

Refer to 'Chapter 9 Probe' in this manual for the safety precautions about probe.

⚠ **WARNING**	• Ultrasound can have harmful effects within the cell and can be a potential harm to the patient. Try to minimize the exposure time and maintain the output of ultrasound to the minimum when there is no medically special purpose. Refer to the ALARA principles. • Do not use the product when there is a warning message or error message about dangerous situation on the screen. Write down the message on the screen, turn the product off, and contact Samsung Medison Co., Ltd. Global technical support group. • Do not use the product with unusual and strange behavior. Unusual operation of continuous scanning is caused from the failure of hardware, and should be repaired before the use. • The product limits the temperature that patient can make contact with to 45 degrees Celsius, and ultrasound power output value (AP&I) complies with standard of U.S. FDA.

2.5.1 ALARA Principles

Diagnostic with ultrasound equipment can be conducted with the principle of "As Low As Reasonably Achievable". What is 'reasonable' has been looked with insights and defined by many people. There is, however, no standard such as a perfect formula that can be appropriate for every environment and that can control every situation. The damage from ultrasound can be reduced by minimizing the exposure to the ultrasound during the diagnosis.

Because there is no clear investigation of the damage cause from the ultrasound, it is very important to adjust the amount of ultrasound penetrated on patients. Thus, not only it is important to get the accurate image from ultrasound diagnosis, but also it is important to minimize the exposure time of patient. To balance between the acquisition of accurate image and the exposure time of patient, ultrasound system offers the feature that can optimally adjust the test result during the diagnosis.

It is important to be well-informed of ALARA principle and to implement it. The development of ultrasound diagnosis is possible with the development of not only the ultrasound device itself but also the technique which delivers fine information to the users. This major information, based on various output data of ultrasound,

plays an important role in implementing ALRA principle.

There are many variables affecting the output data which is the fundamental data of provided information. Location of bone which is related with mass, size and focus, debilitation of the body, exposure time to the ultrasound are the variables, and exposure time is the most significant variable. The reason for that is that exposure time, unlike other variables, is the variable determined by the users of ultrasound device.

2.5.1.1 Applying ALARA

Video mode of the used system is different by the required information. While 2D mode and M mode imaging provides anatomical information, power or color mode imaging provides the blood flow information. While scanned mode such as 2D mode, power or color scatters ultrasound energy throughout the area, unscanned mode such as M mode and doppler concentrates ultrasound energy. By understanding the features of imaging mode used, ultrasound device users make a judgment based on the information by applying ALARA principle. Ultrasound device users can comply with the ALARA principle with probe frequency, system settings, scanning technology and operator's experience. The amount of acoustic output is determined by the system operator in the final analysis. This decision should be based on the facts such as type of patients, experiment type, patient history, easy access to the useful information for diagnosis and potential heat applied on patient's local from surface temperature. In order to produce the correct diagnosis result, exposure time of patient should be limited to the minimum and make use of the system.

Even though numerical value of high index does not actually mean the occurrence of Bioeffect, if the numerical value is high, it should be handled carefully, which means that every effort should be made to reduce the negative effect that high index value may have. One effective way is to limit the exposure time.

There are a few controls that operator can use to adjust the image quality and limit the acoustic intensity. These controls are associated with the required technology for operator to implement ALARA principle, and they are divided into three categories which are direct, indirect and control of the recipient.

2.5.1.2 Direct Controls

Selecting diagnosis subject or output intensity control has direct effect on acoustic intensity. The choice of acceptable range of intensity or output varies depending on the selection. Selecting the range of acoustic intensity is considered to be one of the main priorities in any type of experiment. For example, peripheral vascular intensity level is not recommended in fetal experiments. Some systems automatically select the optimal range for specific diagnosis, while users

themselves have to make selection for other diagnosis subject. Ultimately, the responsibility of the clinical use of the product lies on the users. The system of Samsung Medison Co., Ltd. offers both auto-selection set by default and manual selection.

Output has direct effect on acoustic intensity. After diagnosis subject has been set, output control can be used to raise or drop down the intensity output. Intensity level can be set lower than the highest level setting through output control. With careful use, the lowest output intensity along with excellent quality can always be selected.

2.5.1.3 Indirect Controls

Indirect control has indirect effect on acoustic intensity and usually affects the imaging mode, the pulse repetition frequency, focus depth, pulse length, probe selection, etc.

Features of ultrasound beam are determined by the selection of imaging mode. 2D mode is a scanned mode, while doppler mode is stopped or unscanned mode. Stopped ultrasound beam concentrates energy to one place. Moving or scanned ultrasound beam scatters the energy throughout the area and concentrates on one place only for a few minutes of unscanned mode.

Pulse repetition frequency or repetition rate shows the number of ultrasound explosion times of energy over a period of time. The higher the pulse repetition frequency, the longer the energy pulse over a period. The following types of controls have effect on pulse repetition frequency: focus depth, display depth, sample volume depth, color sensitivity, number of focal zones, sector width controls and ultrasound beam focus have effect on the resolution of the image. Various experiments require various focus depth. The resolution can be enhanced with the appropriate depth of focus.

Pulse length is the time during the occurrence of ultrasound. The longer the pulse the greater the average intensity value. The greater the time-average intensity, the bigger the temperature increase and cavitation possibility. Pulse length, ultrasound occurrence length or pulse lasting period is the output pulse lasting period of pulsed doppler. Pulse length becomes greater with the increase of doppler sample volume.

Probe selection also has indirect effect on intensity. Tissue attenuation varies depending on the frequency control. The greater the probe operating frequency, the greater the decrease of ultrasound energy. The greater the probe operating frequency, the stronger output intensity is required in the deeper area while scanning. Lower probe frequency is required for the deeper scanning in the identical output intensity. Therefore, using more gain and output than the required value means that it requires lower probe frequency without the enhancement of

image quality.

2.5.1.4 Receiver Controls

Users use receiver control to improve the quality of the video. These controls have no effect on output. Receiver control only affects the method which ultrasound echo is transmitted. These controls include gain, TGC, dynamic range and image processing. One thing to consider about output is that receiver control should be optimized before the increase of output. For example, image quality should be enhanced with maximizing gain before increasing output.

2.5.1.5 Additional Considerations

Scanning time should be minimized and scanning should be only used for medical purpose. Do not ever rush the experiment, compromising the quality. Insufficient experiment requires future reinforcement, which results in the delay of time. Diagnostic ultrasound, considered to be one of the important tools in medical field, should be used efficiently and effectively used just like any other tool.

2.5.1.6 Output Display Features

System output display is divided into two major index which are mechanical index and temperature index. Temperature index is again divided into Tis, Tib and tic. One of these 3 temperature index is always displayed on the screen. The item displayed on the screen depends on the diagnostic subject, system setting or user's choice.

Mechanical index varies from 0.0 to 1.9 in increments by 0.1 and displayed continuously. Temperature index is composed of 3 indexes and only one of them is always displayed. Each probe diagnostic subject has its appropriate default selection corresponding to its combination. Based on the probe and diagnostic subject, Tib or Tis is continuously displayed from 0.0 to the maximum output, and the increment is by 0.1.

Features depending on the diagnostic subject of default setting are an important factor of index respond. Default setting, a system control state, is preset by manufacturer or operator. System has the default index setting for probe diagnostic subject. This default setting is automatically read by the ultrasound system when the power is turned on, when a new patient data is read through system database or when there is a change in diagnostic subject. Among the 3 temperature indexes, the one displayed on the screen determined by the following categories.

Appropriate index for diagnostic subject: Tis is used in soft tissue imaging, while Tib is used in adjacent focus on bones. They relax the factors which artificially

raise or lower the temperature index record such as fluid, location of bone or flow of blood. For example, the case where the actual possibility for local heating is lower than the temperature index display because of there is a tissue pathway that rapidly attenuates.

Operating unscanned mode affects temperature index compare to probe mode. For the case of scanned mode, heating possibility is greater as it is closer to the surface, while heating possibility is greater as it is closer to the focal zone for the case of unscanned mode.

Always limit the ultrasound exposure time. Do not make haste in experiment. Maintain index to the lowest, and always put a limit on the exposure time without compromising with diagnostic sensitivity.

1) Mechanical Index (MI) Display

Mechanical biological effect is the dawn phenomenon when the output has exceeded a certain level of output.

The beginning standard, however, varies by the type of tissue. Possibility of mechanical biological effect varies by the peak pressure and ultrasound index. MI explains these 2 indexes. With great MI value, there is a greater possibility of occurrence of mechanical biological effect. There is no specific MI value which states that the mechanical effect is actually in effect. MI is only used a guide for implementing ALARA principle.

2) Thermal Index (TI) Display

For the users, TI describes the possibility of temperature increase of the focus on the bone of body surface, body tissue or ultrasound beam. TI is the possibility of a temperature rise on distinctive body tissue. Actual temperature rise is affected by indexes such as type of tissue, vascularity and operation mode. TI is only used as a guide for implementing ALARA principle.

Temperature index of bones (TIb) describes soft tissue such as 2-3 months old fetal skeleton and potential heating possible to occur near the focus or nearby the fluid after the ultrasound beam has passed. Skulls temperature index (Tic) describes the potential heating which can occur on or near the surface of the skull. Body tissue temperature index (TIs) describes the potential heating which can occur inside of soft homogeneous tissue.

TIs or TIb can be selected using TIs/TIb selection in miscellaneous system setting. Tic can be displayed if transcranial application has been selected.

3) Mechanical and Thermal indices Display Precision and Accuracy

MI and TI precision appear on system by units of 0.1.

Estimated accuracy of MI and TI display of system is shown in the manual of Acoustic Output Tables. This estimated accuracy is based on the possible change range of probe and system, indigenous Acoustic output modeling error or

Measurement variability and they are as follows.

Displayed values should be interpreted as a reference which helps implementing ALRA principle for system operators by carefully using the system. These values should not be interpreted as an actual physical value for the tissue or tissue. The initial data used for supporting output display originated from the experimental measurement standard based on the AIUM measurement standard, and these measurement standards are applied in the algorithm in order to compute the displayed output.

Many assumptions used in measurement and calculation are essentially conservative. Over-estimation of actual in-situation exposure about various tissue paths are in the process of measurement and calculation. For example, calculated water tank value is depreciated by considering the interactive effects of attenuation of a conservative industry standard 0.3dB/cm-MHz.

Conservative value of tissue features are selected for the purpose of TI model. Conservative values for the absorption of bone or tissue, blood perfusion rates, blood temperature ability or tissue thermal conductivity are the conservative values of tissue features.

Steady state temperature rise is intended to be used in the TI model selection, and it assumes that the ultrasound probe has been placed in one place for sufficient period of time which can be considered steady.

When evaluating the accuracy of display value, many indexes should be considered. Hardware changes, evaluation algorithm accuracy and measurement variability, variability between probe and system are the important indexes. Probe variability appears as a result of crystal efficiencies of piezoelectric, process-related impedance difference and sensitive lens focusing parameter change. System pulse voltage control and efficiency difference also affects the change. When estimating possible system operating condition and acoustic output value exceeding pulser voltage range, there is the characteristic of uncertainty in algorithm. Inaccuracies of laboratory measurement standard are related with hydrophone calibration and specification, location, alignment and permissible digitalization error and difference in test operator.

Conservative assumptions about output estimated algorithm of linear propagation through attenuated medium of 0.3dB/cm-MHz is not considered in accuracy measurement of the display disregarding the depth of it. Identical attenuation of linear transfer or 0.3dB/cm-MHz also does not occur in the most of tissue pathways of water tank measurement or inside of the body. In the body, many tissues and organs have different attenuation features. Water, however, has almost no attenuation. In internal and water tank measurement, nonlinear transfer and saturation losses occurs when pulser voltages rises.

Accuracy estimation of display is based on probe, system, unique acoustic output

modeling error and change range of measurement variability. Accuracy estimation of display is calculated by AIUM measurement standard, but it is not based on nonlinear loss effect about errors or measured value occurred by the measurement.

2.5.1.7 Control Affecting the indices

TI and MI value may change when various system controls are in operation. This happens the most when the power control is in operation, while other system controls affect on-screen output value.

1) POWER

Power controls the system acoustic output. 2 real-time output values of TI and MI are shown on the screen. These change when the system reacts to the power control.

Each mode is added to the integrated TI in combined mode such as simultaneous color, 2D mode and pulsed dopper. Each mode becomes the major factors of this integrated TI and displayed MI is shown from the mode with the biggest peak pressure.

2.5.1.8 2D mode Controls)

1) 2D mode size

The narrower the sector angle, the bigger the frame rate. This will also increase TI. Pulser voltage is automatically set low with the software control, maintaining TI below the value of system maximum. Decrease in pulser voltage also decreases MI.

2) ZOOM

Zooming the image will raise the frame rate. This will also increase TI. The number of focal zone will also automatically increase in order to enhance the resolution. This will bring changes in MI in case of maximum intensity happening at different depth.

3) Persistence

Lower persistence will decrease TI. Pulser voltage will automatically increase. Increase in pulser voltage will raise MI.

4) Focal no.

When there are numerous focal zones, frame depth and focal depth are automatically changed, which change both TI and MI. Lower frame rates will decrease TI. Displayed MI will react to the area of maximum intensity.

5) FOCUS

MI changes if focal depth changes. Generally, MI value is high when the focal depth is close to the nature focus of transducer.

2.5.1.9 Color and Power Controls

1) Color Sensitivity

Increasing color sensitivity raises TI and it takes more time to scan color images. Color pulses are the major pulse type in this mode.

2) Color Sector Width

Narrowing color sector width increases color frame rate and TI. System automatically lowers the pulser voltage, maintaining it below the system maximum. Decreasing pulser voltage decrease MI. Pulsed doppler will maintain the major mode if pulsed doppler is also in operation, and change in TI will be small.

3) Color Sector Depth

If color sector depth deepens, color frame rates automatically decrease or it selects the new color focal range or color pulse length. TI varies by the combination of these effects. Generally, TI decreases with the raise in color sector depth. MI will react to the maximum intensity of major pulse type which is the color pulse. If pulsed doppler is also in operation, however, pulsed doppler will maintain the major mode and the change in Ti will be small.

4) Scale

TI can be increased when enlarging color velocity range using scale control. System will be automatically set to maintain pulsed voltage lower than the system maximum. Decrease in pulser voltage also decreases MI.

5) Sector Width

Narrowing 2D mode sector width in color image increases color frame rate. TI will increase and MI will have no change. If pulsed doppler is also in operation, pulsed doppler will maintain major mode and the change in TI will be small.

2.5.1.10 M mode and Doppler Controls

1) Speed

M mode or dopper sweep speed adjustments will have no effect on MI. TI varies when the operation speed of M mode changes.

2) Simultaneous and Update Methods

Using combination mode will have effect on both TI and MI through the combination of pulse type. During simultaneous feature, Ti becomes additive. During auto-update and duplex, TI will display major pulse type. Displayed MI will come from the mode with the highest pressure.

3) Sample Volume Depth

Doppler PRF automatically decreases when doppler sample volume depth becomes larger. System automatically lowers the pulser voltage, maintaining it below the system maximum. Decrease in pulser voltage will decrease MI.

2.5.1.11 DOPPLER, CW, M Mode, and COLOR Imaging Controls

When new imaging mode is selected, TI and MI will change to its default. Each mode has its corresponding pulse repetition frequency and intensity point. In combined or simultaneous mode, TI becomes the sum of contribution from the operated mode, and MI, the MI about focal range, becomes the mode with high intensity in length reduction. When it is re-selected after it has been turned off, system should be rolled back to the previous mode.

1) Probe

Each valuable probe model has unique specifications on contact area, beam shape and center frequency. Default values are initiated when selecting probe. The factory default of Samsung Medison Co., Ltd. varies depending on probe, diagnostic subject and selected mode. Defaults are selected lower than the standard of FDA depending on the purpose of use.

2) Depth

Increase in depth of 2D mode automatically lowers 2D mode frame rate. This will also decrease TI. System automatically selects the deeper focal depth of 2D mode. Change of focal depth will have change on MI. displayed MI is the MI in the area with the highest intensity.

3) Application

Default of acoustic output is set when selecting the diagnostic subject. The factory default of Samsung Medison Co., Ltd varies depending on probe, diagnostic subject and selected mode. Defaults are selected lower than the standard of FDA depending on the purpose of use.

2.5.1.12 Related Guidance Documents

Refer to the following if you need more information about ultrasound biological effect or related subject;

- AIUM Report, January 28, 1993, “Bioeffects and Safety of Diagnostic Ultrasound”
- Bioeffects Considerations for the Safety of Diagnostic Ultrasound, *J Ultrasound Med.*, Sept. 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 use of diagnostic ultrasound, in many science and medical laboratory, there has been many studies about human bioeffects which can be occurred from the exposure of ultrasound. In October 1987, the American Institute of Ultrasound in Medicine(AIUM) approved the report prepared by Bioeffects Committee (Bioeffects Considerations for the Safety of Diagnostic Ultrasound, J Ultrasound Med., Sept. 1988: Vol.7, No.9 Supplement), which is sometimes called Stowe Report, and this is a report of useful data about possible effects of ultrasound exposure. Another report, “Bioeffects and Safety of Diagnostic Ultrasound”, describes more recent data, written in January 1993. Acoustic output of this system is measured and calculated in accordance with December 1985 “510(K) Guided for Measuring and Reporting Acoustic Output of Diagnostic Ultrasound Medical Devices. Only hydrophone is in compliance with 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 calculated underwater. Since water does not absorb acoustic energy, this water measurement shows the worst figure. Biological tissue does not absorb acoustic energy. In every respect, the true value of intensity varies depending on the amount and type of tissue and the frequency of ultrasound which penetrates the tissue. Intensity value and In Situ have been calculated with the following formula.

$$\text{In Situ} = \text{Water}\,[e^{-(0.23alf)}]$$

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 (cm) to the measurement depth

f = major frequency (MHz) of converter/system/mode combination

During the experiment, it is difficult to estimate true In Situ intensity because ultrasound is easy to penetrate the tissues of which length and type varies. If the attenuation index is 0.3, it is used for general report purpose.

Therefore, reported In Situ values are calculated using the following formula.

In Situ (derated) = Water [$e^{-(0.069lf)}$]

Since this value is not true In Situ intensity, the word "Derated" is used.

Even with the identical condition, maximum derated or maximum water values does not always occur. Therefore, reported maximum water value or derated values may not be associated with In Situ (Derated) formula. A good example is the multi-zone array transducer which has maximum water value intensities of the deepest area. Same converter may have the biggest derated intensity in one of the lightest focal area.

2.5.1.15 Acoustic Output and Measurement

Terminology and symbols used in acoustic output table are defined in the following paragraph.

ISPTA.3 Derated spatial-peak temporal-average intensity (Mill watts per square centimeter).

ISPPA.3 The derated spartial-peak pulse-average intensity (Watts per square centimeter). If Global maximum MI is reported, IPA3 value can be reported instead of ISSPPA.3 in the location of Global maximum MI(IPA.3@MI)

MI The Mechanical Index. If ISPPA.3 is 190W/cm2, the MI value (MI@ISPPA.3) can be reported instead of MI(Global maximum value) in the location of ISPPA.3

Pr.3 Derated peak rarefactional pressure integrated with Transmit pattern, the origin of value reported below MI (Megapascals).

WO Ultrasonic power (Milliwatts). About operating condition based on ISPTA.3, WO is Time-average power; in operating condition where it is reported lower than ISPPA.3, WO is ultrasonic power integrated with Transmit pattern based on the reported value of ISPPA.3.

fc Center frequency (MHz). About MI and ISPPA.3, fc is the center frequency, integrated with transmit pattern which is the origin of global maximum value of each parameter. About ISPTA.3 and about combined modes accompanied with other center frequency, fc is defined as the whole range of center frequency of transmit pattern.

ZSP Axis distance measured in reported parameter (Centimeters).

x-6,y-6 In each X-Y plane where ZSP is found, In-plane (Azimuthal) and Out-of-plane (Elevational) are -6 dimensions

PD Pulse duration integrated with Transmit pattern, based on the reported value of each parameter (microsecond).

PRF Pulse repetition frequency integrated with Transmit pattern, based on the reported value of each parameter (Hz).

EBD Entrance beam dimensions (Centimeters) about Azimuthal and Elevational Planes

EDS Entrance beam dimensions (Centimeters) about Azimuthal and Elevational Planes

2.5.1.16 Acoustic Measurement Precision and Uncertainty

Acoustic measurement precision and uncertainty are as follows.

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

Pulse intensity integral, Derated rarefaction pressure Pr.3, Center frequency 및 Pulse duration에 대해, effect screening about accuracy by the following categories is included in the analysis.

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.

Acoustic power measurements using Systematic uncertainty radiation force is measured with calibrated NIST acoustic power sources.

As the first supplement by IEC publication 1161, we recommend the analysis data of September 1993, prepared by K. Beissner and conducted by working group of IEC technical committee 87.

This document includes the analysis and discussion about source/measurement effect of error, and the causes are as following:

- 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.

In the overall findings of this analysis, the rough acoustic power accuracy figure is reported as +/- 10% for frequency range of 1 - 10 MHz .

2.5.1.17 Training

The user of this ultrasound system should be familiar with the ultrasound system in order to optimize the performance of the equipment and to detect the possible errors. All users are recommended to take appropriate training before making use of the equipment. The training can be provided from Samsung Medison global technical support group or any customer support center throughout the world.

2.6 Protecting Environment

⚠ **CAUTION**	• Depleted console and peripheral devices should be handled by the manufacturer or properly and safely disposed with the appropriate disposal procedure. • Waste should be treated in compliance with the relevant laws and regulations. • The battery of the product should be replaced by Samsung Medison Co., Ltd. global technical support group or by the authorized dealer.

Samsung UGEO H60 Service Manual

3 Installing Product

SAMSUNG MEDISON

3 Installing Products

3.1 Overview

Chapter 3 plans the installation of UGEO H60 and describes the information required for installation of UGEO H60.

It describes the information about delivery and installation environment for the installation in the best condition.

It includes the procedure and settings for the installation and inspection for the electrical safety. It also includes the method of connecting probe and other external peripheral devices.

Table of Contents

3.2 Delivery

UGEO H60 is a fine electronic medical device which requires to be handled carefully when delivering

3.2.1 Precautions when Delivering

Packaging boxes are designed to reduce the shock. However, be careful not to deliver external shock to the product.

3.2.2 Temperature and Humidity

"[Table 3-1] Temperature and Humidity of Product" below describes the range of temperature and humidity when delivering, storing and operating the product.

Division	Temperature [^{O}C]	Humidity [%]
Delivering	-25 ~ 60	20 ~ 90
Storing	-10 ~ 50	20 ~ 90
Operating	10 ~ 35	30 ~ 75

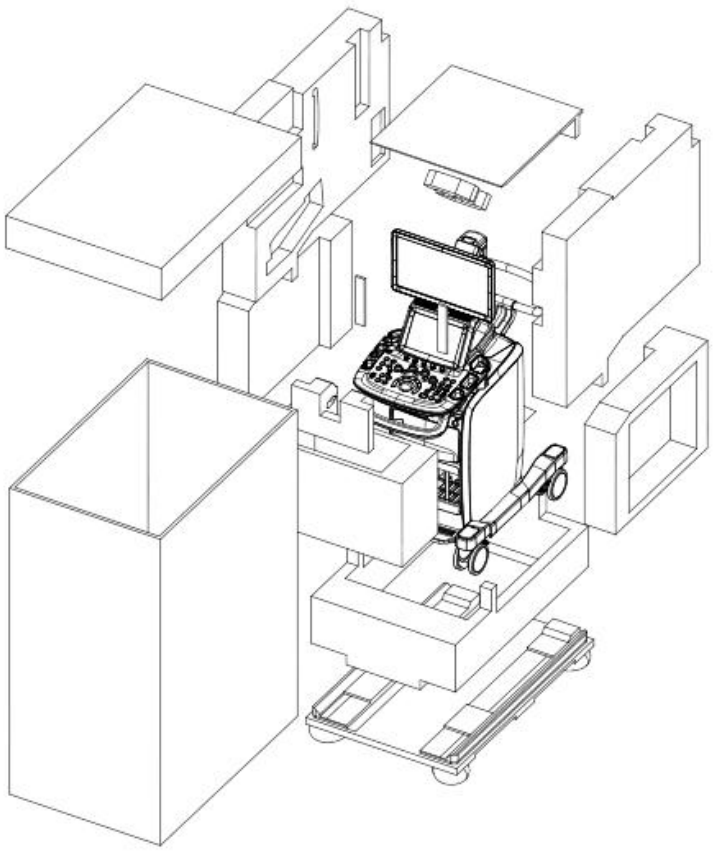
[Table 3-1] Temperature and Humidity of Product

3.3 Unpacking

3.3.1 Disassembling Product Box

1) Disassemble the box.

2) After taking out the product and component boxes, store them in a safe place.



[Figure 3-1] Disassembling Product Box

3.4 Installation Condition

3.4.1 Precautions

Consider the following for the management.

1) Avoid wet places.

2) Avoid a place exposed to direct sunlight.

3) Avoid a place with drastic temperature change.

4) For normal operation, temperature of 10°C ~ 35°C and humidity of 30% ~ 75% should be maintained.

5) Avoid installing near heaters.

6) Avoid dusty or poorly ventilated places.

7) Avoid a place with frequent vibration.

8) Avoid chemicals or gases.

3.5 How to Install

3.5.1 Installation Safety

⚠ **DANGER**	Using the product near generator, X-ray equipment, transmission device near a broadcasting station may cause irregular screen such as noise. Sharing the power with other electronic devices may be a cause of noise phenomenon.

⚠ **CAUTION**	When delivering or storing the product for a long period, temperature and humidity of the environment should be checked beforehand. Turn on the product by referring to "[Table 3-2] Usage Temperature of Product" below. Drastic change of temperature may be the cause of product defect from the possibility of condensation.

Temperature	-20	-15	-10	-5	0	5	10 ~ 35	45	50	55	60
Waiting Time	16	10	8	6	4	2	Ready-to-use	2	4	6	10

[Table 3-2] Usage Tempe Ready-to-use rature of Product

3.5.2 Connecting the Power Cable

You should measure the output voltage of the electrical outlet in the place of installation.

For safe usage of power outlet of H60, use the product within the range of “[Table 3-3] Usage Voltage of Product” below.

Connect the power cable in the rear panel of H60.

NOTE	Product may be delivered with the power cable connected.

[Figure 3-2] Connecting Power Cable

3.5.3 Connecting Probe

The connecting or disconnecting probe on probe connector should be conducted with the power turned off for the safety of the product.

CAUTION	When connecting connector PCB and connecting pin of probe, do not use excessive force in order to prevent damage.

1) Connect probe to the probe port on the console.

2) Equip probe by turning the probe locking lever to the right.

[Figure 3-3] Connecting Probe

CAUTION	You can connect probe while it is turned on, but you should not connect or disconnect probe while the product is booting.

3.6 Turning on the Product

Pressing On/Off switch on the left of the control panel (keyboard) of UGEO H60 turns on the product.

[Figure 3-4] Power Switch

1) The procedure of booting can be checked on the LCD monitor. With the logo disappearing, UGEO H60 logo and loading bar appear.
2) The time that takes to fill the loading bar with color means the time that the software moves data to the Front End Part and Back End Part.
3) When moving software data is completed, ultrasound image appears and preparation of UGEO H60 is ready.

3.7 Turning of f the Product

Press the power switch on the left of control panel (keyboard) for 2 seconds.

[Figure 3-5] Power Switch

NOTE	Pressing [On/Off] switch for more than 4 seconds forces the product to turn off, which is the reason for causing damage of hard disk of the product.

⚠ CAUTION	• Try not to press keyboard or buttons while booting. This could be a cause of system malfunction. • When forcibly turning off the product and turning it back on, system may turn on and off instantly. This is one of the features of Intel® PC Main Board and is not a system error.

3.8 Connecting Peripheral Devices

UGEO H60 is composed of various types of connections which enable it to connect to external devices. It can be used depending on the users need, and the connection is usually made through the port on the rear panel.

⚠ **CAUTION**	For peripheral devices using USB port, you must turn off the product before connecting or disconnecting them to or from it. Malfunction of system or peripheral devices for USB may happen, when the power is not completely off.

NOTE	Refer to the manual of the corresponding product for using peripheral devices.

Following products are recommended.

1) DVD-multi : DVD+R, DVD-R, DVD+RW, DVD-RW, CD-R, CD-RW

2) USB Video Printer

   ① Color : Mitsubishi CP30DW, SONY UP-D23MD

   ② 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, using FTDI Chipset (FTDI FT232BM Compatible)

5) Other : USB Flash Memory media

NOTE	• When using USB 1.1 Flash Memory, system may not be able to recognize the device. In this case, remove Flash Memory from the system and insert it again. • In order to remove USB storage device, use Utility > Storage Manager. • For Flash Memory which supports features other than general data storage, use it after checking if data storage feature works properly on desktop PC.

3.9 Settings

This describes all settings of system which has no influence on video. It can be modified according to the user's need and taste.

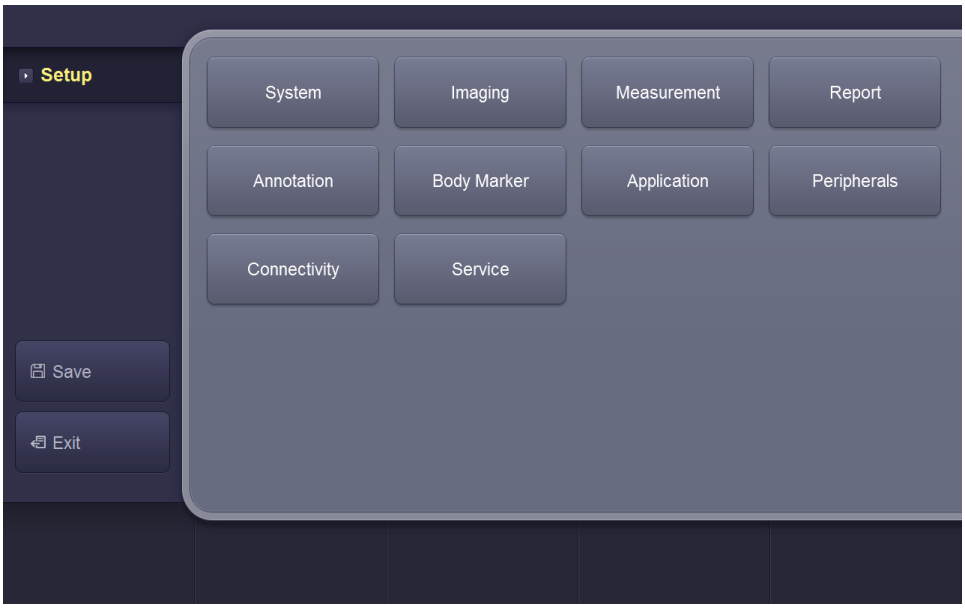
1) Press [Setup] button on keyboard.

2) *Setup* screen appears on monitor and touch screen. Select the tab which you wish to make changes in settings.

> ※ **Tips! – How to select tab**
>
> You can select the tab in the following two methods. Select the method to the user's taste.
>
> - Select the tab on the monitor screen using trackball and [Set] button.
> - Press the button on touch screen.

3) Make settings appropriate for each item.

4) Complete after saving the settings. Pressing [Exit] on monitor screen, [Exit] on touch screen or [Exit] on control panel will switch to the scan mode.



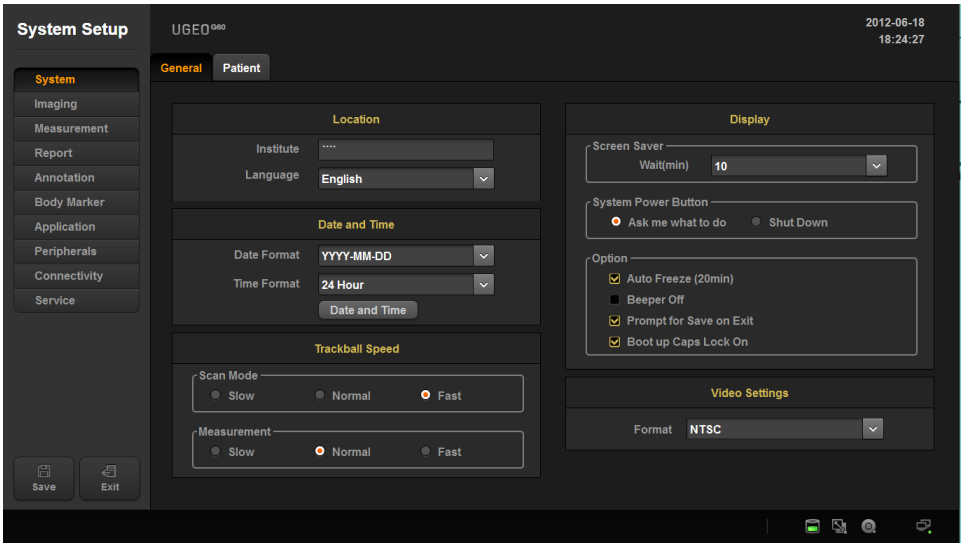
[Figure 3-6] Setup - Touch Screen

3.9.1 System General Settings

Select [System] tab in *Setup* screen, or press [System] of touch screen. Make settings on overall system such as title.

3.9.1.1 General

Select [General] tab in [System] category in *Setup* screen.



[Figure 3-7] Setup-System- General

1) Location

Change settings on Table of title area of screen.

① Institute

Insert hospital/institution which the product is installed in.

② Language

Select the system language.

(Supporting language: English, German, French, Spanish, Italian, Russian, Simplified Chinese)

2) Date and Time

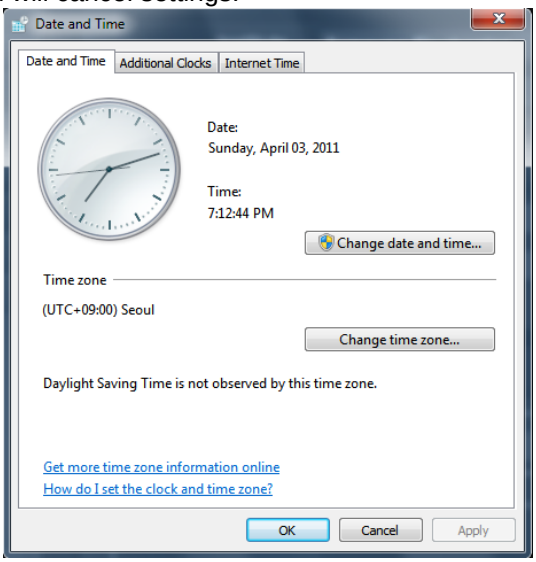
Current weather is in table. Pressing 

will change the date.

NOTE	Date and time cannot be changed when patient ID is registered. By pressing [End Exam] of control panel, exit the current diagnosis and make changes.

※Tip! How to set the date (or time)

1. Press Date and Time in date (or Time).
2. Press [Change date and time settings]. Set the date and time using [Set] button. Press [change time zone settings] to change the time zone.
3. If the settings are correct, apply the settings by pressing [Apply]. Pressing [Ok] will close all settings of date and time. Pressing [Cancel] or [Exit] of control panel will cancel settings.



[Figure 3-8] Date & Time

① Date Format

Set the Table display for the date. By pressing combo button, select the Table display. Table display settings are applied in the various date input of *Patient Information* as well.

② Time Format

Set the Table display for the time. By pressing combo button, select the Table display (12 Hour, 24 Hour).

3) Trackball Speed

① Scan Mode

Set the speed of trackball in scan mode (Slow, Normal, Fast).

② Measurement

Set the trackball speed when measuring (Slow, Normal, Fast).

If the speed is slow, it is a good use for precise measurement.

4) Display

① Screen Saver

Set Wait (Min) time of Screen Saver.

② System Power Button

- Select among Ask me what to do: Shut Down, Restart, Cancel.
- Shut Down: Turns the power off.

③ Option

- Auto Freeze (20min):Change to auto Freeze status after 20 minutes.
- Beeper Off: Set Beeper Off.
- Prompt for Save on Exit: Determine whether to save the settings using checkbox.
- Boot up Caps Lock On: Set whether to enter using uppercase using checkbox.

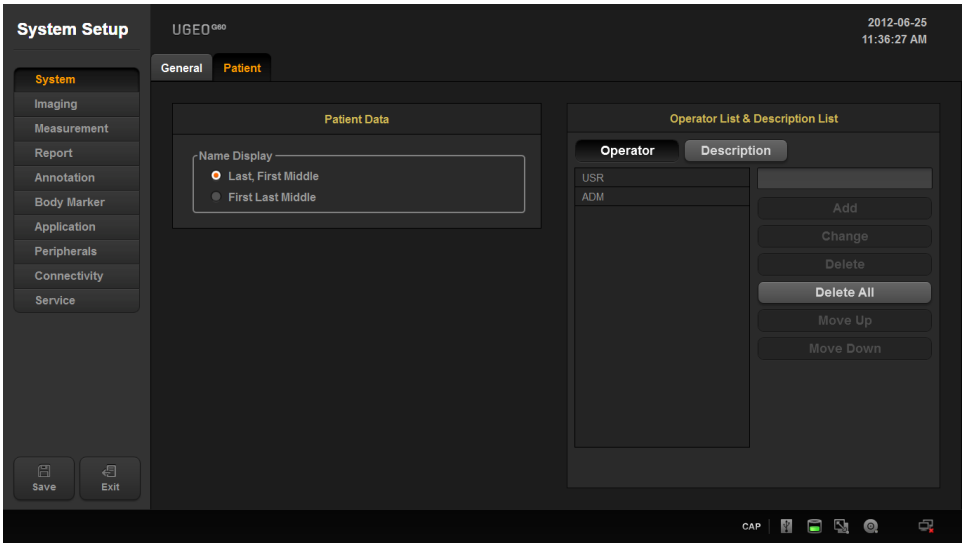
5) Video Settings

① Format

Select between NTSC, PAL.

3.9.1.2 Patient

Select [Patient] tab in [System] category in *Setup* screen.



[Figure 3-9] Setup-System-Patient

1) Patient Data

① Name Display

- Last, First Middle: Setting in the order of patient's last name, first name and middle name.
- First Last Middle: Setting in the order of patient's first name, last name and middle name.

2) Operator List & Description List

① Operator List

It can add, modify, delete or change location of up to 20 names of sonographers who scan patients.

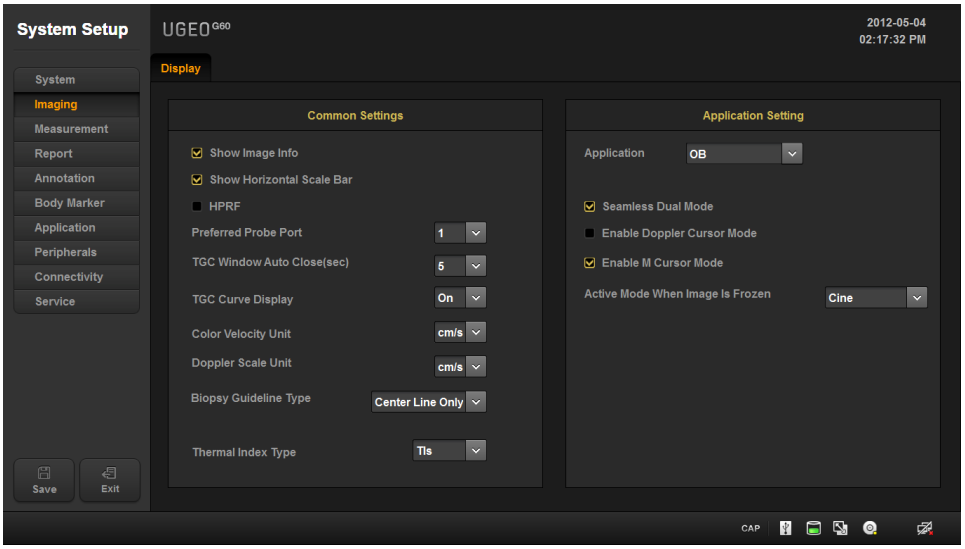
② Description List

It saves up to 20 memos for diagnostic according to each diagnostic subject. Using the button on the right, add, modify, delete or change locations.

3.9.2 Monitor Display Settings

Select [Imaging] tab in *Setup* screen or press [Imaging] on touch screen. Change settings for displaying video Table.

3.9.2.1 Display



[Figure 3-10] Setup - Imaging- Display

1) Common Setting

This commonly applies to all applications.

You can select multiple items. Select an item using trackball and [Set] button, and check or uncheck Table display.

① Show Image Info

Sets weather to display Table of video information. When video information obstruct the video, turning off this feature will help.

② Show Horizontal Scale Bar

Sets weather to display Table of Horizontal Scale Bar of Scan UI.

③ HPRF

Bloodstream exceeding the limit speed can be checked in depth acquiring Sample Volume when in PW spectral doppler mode.

④ Prefered Probe Port

When starting the system or when selecting probe, set Probe Port which is the major priority.

⑤ Touch window Auto Close (sec)

When operating TGC Control Windows of Touch Screen, set the automatic shut-off time when there is no input. If you do not want this feature, select OFF.

⑥ TGC Curve Display

Set the time for Table display of TGC Curve in Scan UI (On: always display, Off: never display, Auto: displays for certain period and disappear).

⑦ Color Velocity Unit

Select the unit of speed in color mode.

⑧ Doppler Scale Unit

Select the scale unit of Axis in spectral doppler mode.

⑨ Biopsy Guideline Type

Change settings for Table display of Biopsy Guide Line.

⑩ Thermal Index Type

Change settings for displaying TI among TIs(Soft tissue thermal Index), TIb(Bone thermal index), TIc(Cranial bone thermal index)..

2) Application Setting

This applies only to the selected Application

You can select multiple items. Select an item using trackball and [Set] button, and check or uncheck Table display.

① Application

Change settings for diagnostic subject.

② Seamless Dual Mode

Change settings for Seamless Dual Mode in Dual Mode.

③ Enable Doppler Cursor Mode

Change settings for entering into Cursor Mode before Doppler Mode.

④ Enable M Cursor Mode

Change settings for entering into Cursor Mode before M mode.

⑤ Activated Mode When Image Is Frozen

Change settings for activation mode when in freeze.

You can select among Cine, Measurement, Annotation, Body Marker.

3.9.3 Measurement related Settings

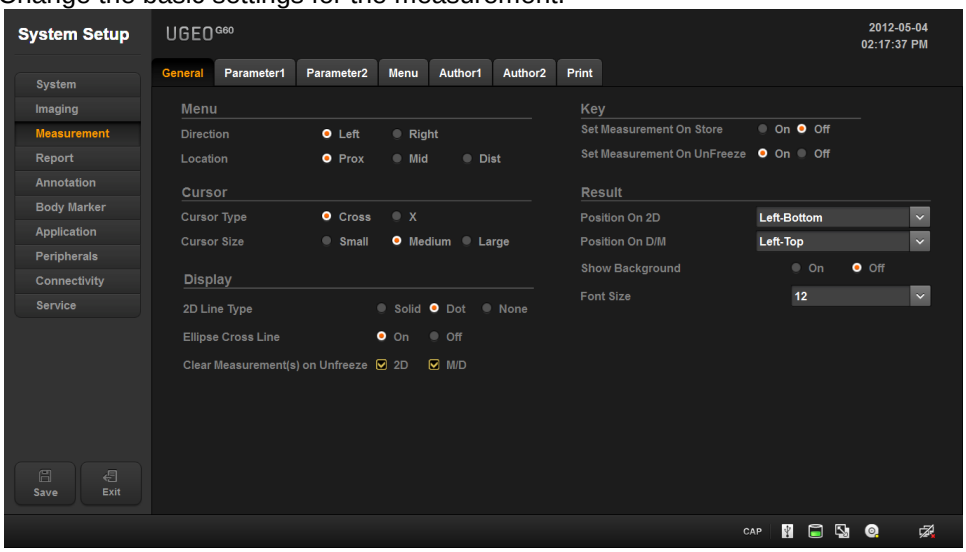
Change settings for various items related with measurement. It can be changed according to the user's need or taste.

1. Press [Setup] in keyboard. Select [Measurement] tab when *Setup* screen is Table displayed.
2. When *Measurement* screen appears, select the tab for the designated settings.
3. Change settings according to each item.
4. Save the settings by pressing [Save] button. Pressing [Exit] on monitor screen or [Exit] of touch screen will change to Scan mode from *Setup* screen.

3.9.3.1 General Settings

Select [General] tab in [Measurement] category in Setup screen.

Change the basic settings for the measurement.



[Figure 3-11] Setup- Measurement- General

1) Menu

① **Direction:** Select either left or right for Direction Type applying to the measurement target in the initial system state.

② **Location:** Select among Prox, Mid, Dist for Location Type applying to the measurement target in the initial system state.

2) Cursor

① Cursor Type

Select among (+), 'Cross' and 'X' for the default shape of Caliper Cursor which

appears on the screen.

② Cursor Size

Select among small, medium and large for the default size of Caliper Cursor which appears on the screen.

3) Display

① 2D Line Type

You can select the type of line (Solid: solid, Dot: dotted line, None: starting point and finishing point) for measurement in 2D mode.

② Ellipse Cross Line

You can choose to display the Table (on) or not display (off) of long axis and short axis of ellipse when measuring ellipse.

③ Clear Measurement(s) On Unfreeze

When image switches to scan mode, you can choose to display the Table (on) or not display (off) by selecting 2D mode or M/D mode for displaying measurement result table.

4) Key

① Set Measurement on Store

You can enable (on) or disable (off) the feature for completing the measurement when pressing [Store] of control panel while measuring.

② Set Measurement on Unfreeze

You can enable (on) or disable (off) the feature for completing the measurement when image switches to scan mode while measuring.

5) Result

You can select the display method of measurement result Table.

① Position On 2D:

In 2D mode, it changes the location of measurement result Table.

- Left-Top: Display the Table on the left-top of the screen.
- Left-Bottom: Display the Table on the left-bottom of the screen.
- Right-Bottom: Display the Table on the right- bottom of the screen.
- Right-Top: Display the Table on the right -top of the screen.
- Custom: Display the Table on the desired location of the screen.

② Position On D/M

Move the Table display of measurement result.

- Left-Top: Move the Table to the left-top of the screen.
- Left-Bottom: Move the Table to the left-bottom of the screen.

- Right-Bottom: Move the Table to the right- bottom of the screen.
- Right-Top: Move the Table to the right -top of the screen.
- Custom: Move the Table to the desired location of the screen.

③ Show Background

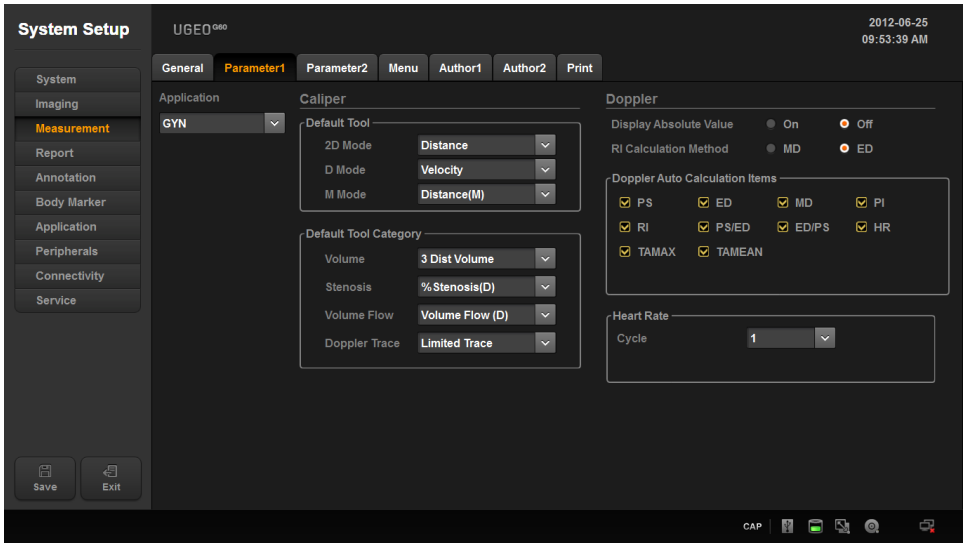
You can display measurement result Table with transparent setting (on) or opaque setting (off).

④ Font Size

You can choose the size of font when displaying Table.

3.9.3.2 Parameter1 (Tool & Calculation Settings)

Select [parameter1] tab in [Measurement] category in *Setup* screen.



[Figure 3-12] Setup- Measurement- Parameter1

1) Application

Choose the diagnostic subject.

2) Caliper

① Default Tool

You can choose the Default Tool operating in measurement cursor state for each Image Mode.

- 2D Mode : Distance, Trace Length, Open Spline, Ellipse, Trace, Closed Spline, Angle, Distance Steno(D),Trace Steno(D), Ellipse Steno(A), Trace Steno(A), Spline Steno(A), 1 Dist Volume, 2 Dist Volume, 3 Dist Volume, Ellipse Volume, Ellipse+ Dist Vol
- D Mode : Velocity, Acc, Manual Trace, Limited Trace, HR, RI, Dist Vol.Flow(D), Trace

Vol. Flow(D), Spline Vol. Flow(D), Ellipse Vol. Flow(A), Trace Vol. Flow(A), Spline Vol.Flow(A),Time

- M Mode : Distance(M),Slope, HR,Time(M)

② Default Tool Category

You can choose Default Tool for each category of measurement value.

- Volume :1 Dist Volume, 2 Dist Volume, 3 Dist Volume, Ellipse Volume, Ellipse + Dist Vol
- Stenosis : %Stenosis(D), %Stenosis(A)
- Volume Flow : Volume Flow(D), Volume Flow(A)
- Doppler Trace : Manual Trace, Limited Trace

3) Doppler

① Display Absolute Value

Doppler measurement value is displayed as Table of absolute value.

② RI Calculation Method

Determine to use either ED or MD when calculating RI value.

③ Doppler Auto Calc— ulation Items

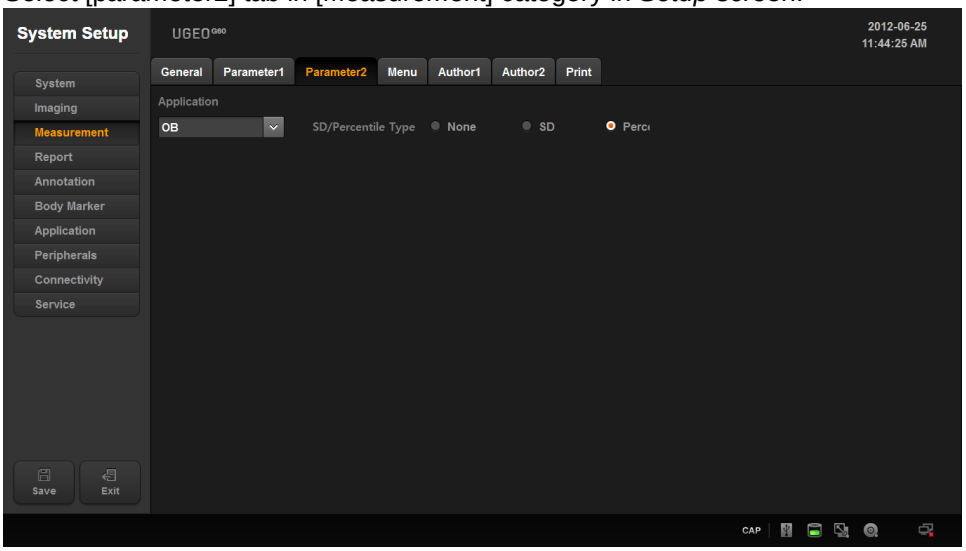
In measurement mode using Auto Doppler Trace Tool, you can choose which value would be measured and displayed on Table.

④ Heart Rate

- Cycle: Set the frequency of heart rate (HR)

3.9.3.3 Parameter2

Select [parameter2] tab in [Measurement] category in *Setup* screen.



[Figure 3-13] Setup- Measurement- Parameter2

1) Application

Select the diagnostic subject.

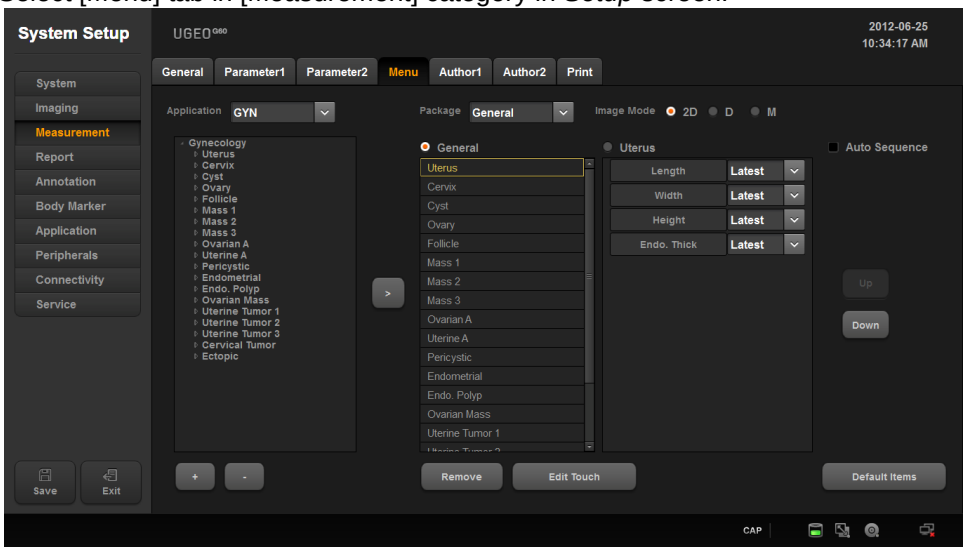
2) SD/Percentile Type

Select among None, SD and Percentile.

NOTE	You can make selections only when the diagnostic subject is OB.

3.9.3.4 Menu

Select [Menu] tab in [Measurement] category in *Setup* screen.



[Figure 3-14] Setup- Measurement- Menu

1) Available Menu List

① Application

You can select the diagnostic subject for desired Available Menu List. Available Menu List on the bottom of the screen changes.

② Available Menu View

Available Menu View can display Label which can be measured in the selected diagnostic subject to the Table of Tree. You can add or delete Group, Measurement, Calculation using the [+] and [-] button on the bottom.

③ Add Item

After selecting Group or Item in Available Menu View, pressing [>] button will enter the selected Group or Item in the Available List Box on the right.

Entered Group or Item can be saved by pressing [Save] button on the left and displayed as Table on Menu.

- Entered on Label Menu and Touch Menu simultaneously. At this time, the added Group or Item are entered after the last Group or Item in the displayed Table.

④ Group View

Group View lists all the Groups in displayed Table of Menu. Enabling Group View can delete Groups in displayed Table and switch the location of Groups in displayed Table of Menu and Touch Menu.

⑤ Item View

Item View lists all the Items in displayed Table of Menu. Enabling Item View can delete Items in displayed Table and switch the location of Items in displayed Table of Menu and Touch Menu. You can select among Average, Max and Min for each Item.

⑥ Package

You can select Package for each diagnostic subject.

⑦ Image Mode

You can check Menu and Touch Menu for each Image Mode.

⑧ Remove

You can delete Group or Item in Group View or Item View.

⑨ Edit Touch

You can place Group and Item displayed in Group View or Item View on Touch Screen.

- Clicking [Edit Touch] will display the dialog box displayed in Touch Button.
- Clear All: delete all Group and Item
- Add Page: add pages
- Remove Page: delete pages
- Clicking each Touch Button displays assigned Troup and Item.
- When you select Empty for displayed Group or Item, it deletes the assigned Group or Item in the corresponding Touch Button.
- Deleted Group and Item in Touch is deleted in Group View and Item View when exiting the dialog box by clicking [Save] button.

⑩ Auto Sequence

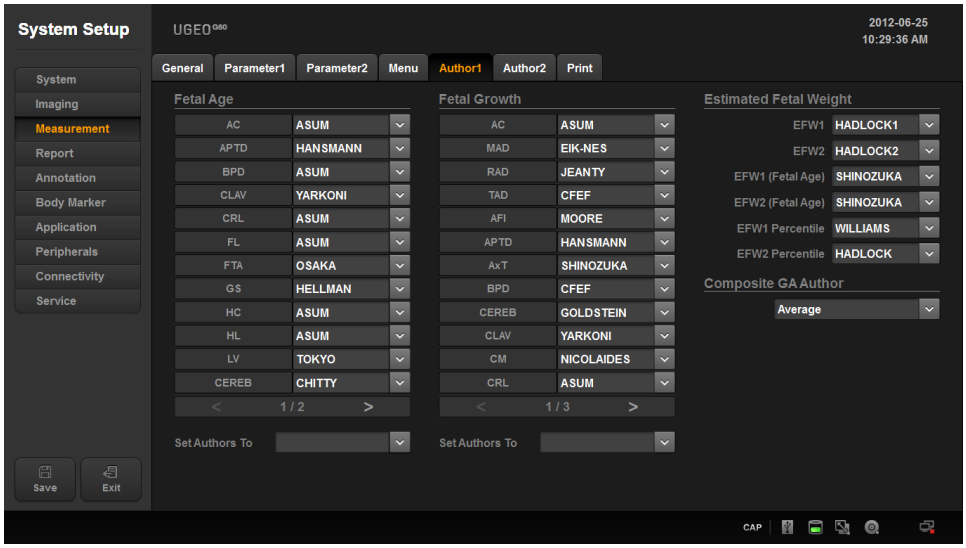
Checking Auto Sequence enables it. This supports the feature of sequentially operating items in Group. When measuring AFI and Volume of OB, this supports the feature of sequentially measuring.

⑪ Default Items

Selecting [OK] after pressing [Default Items] returns to the initial state.

3.9.3.5 Author1Setting

Select [Author1] tab in [Measurement] category in *Setup* screen.



[Figure 3-15] Setup- Measurement- Author1

1) **Fetal Age**

Sets Fetal Age Author for each Label.

2) **Fetal Growth**

Sets Fetal Growth Authorfor each Label.

3) **Estimated Fetal Weight**

Sets EFW or EFW percentile Author.

4) **Composite GA Author**

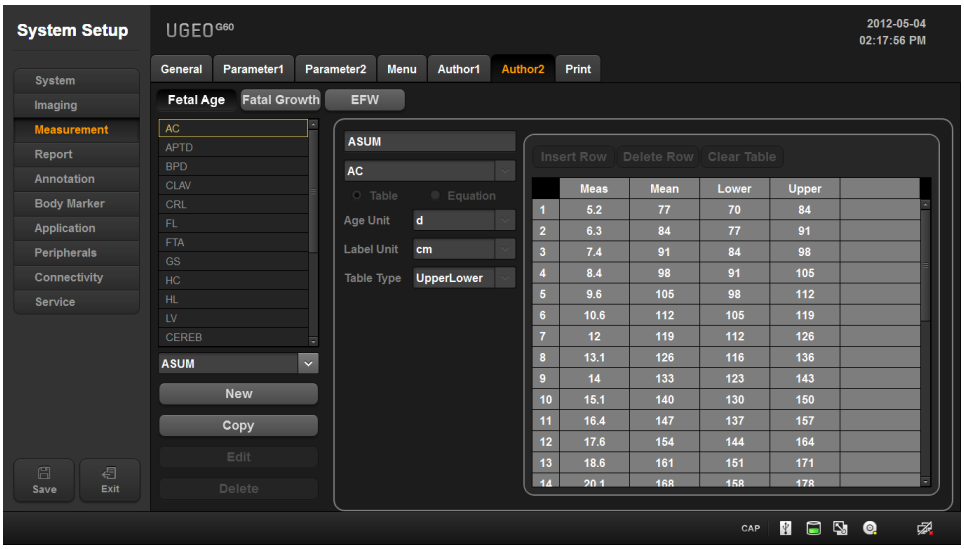
Sets Author used for calculating Composit GA.

5) **Set Authors To**

Sets all authors to be the same for all Label.

3.9.3.6 Author2(Tables & Equations) Settings

Select [Author2] tab in [Measurement] category in *Setup* screen. Make query and modification on Table and Equation used in each measurement item of OB.



[Figure 3-16] Setup- Measurement- Author2

1) Selecting Category

When selecting among Fetal Age, Fetal Growth, EFW(Estimated Fetal Weight), you can make query or modification of Table in the corresponding category.

2) Selecting Label

When selecting Label in list box, Author List of corresponding Label is filled in combo box, and the first Author data is displayed on the screen.

3) Selecting Author

When selecting Author in combo box, corresponding Author data is displayed in screen.

4) New

It creates the new Author data.

5) Copy

It creates the new Author data by copying the currently selected Author data.

NOTE	When selecting the Author data created by users, Copy button is disabled and cannot be selected.

6) Delete

It deletes the currently selected Author data.

NOTE	It can delete only the Author data created by users.

7) Author Name

It means the currently selected Author name. When creating a new Author data, you can enter Author name.

NOTE	When creating a new Author data, you cannot save the data unless you enter the Author name.

8) Author Data Label

It means the Label which the currently selected Author data is in. When creating a new Author data, you can change the Label.

9) Author Data Type

It means the data type of currently selected Author data.

NOTE	When creating a new Author data by using New button, you can change the Author data type. However, EFW cannot create Table-typed data.

10) Age Unit

It means the Fetal Age unit of currently selected Author data. When creating a new Author data, you can change the Age Unit.

11) Valid GA Range

It means the effective Gestational Age (GA) range of currently selected Author data. When creating a new Author data, you can change the effective GA range.

12) Label Unit

It means the Label unit of currently selected Author data. When creating a new Author data, you can change Label Unit.

13) Valid Label Value Range

It means the effective Label value range of currently selected Author data. When creating a new Author data, you can change the effective Label value range.

14) Table Type

It means the Table deviation type of currently selected Fetal Age Author data. When creating a new Author data, you can change the Table deviation type.

15) SD Type

It means the Table deviation type of currently selected Fetal Growth Author data. When creating a new Author data, you can change the Table deviation type.

16) EFW Unit

It means the EFW Unit of currently selected EFW Author data. When creating a new Author data, you can change the EFW Unit.

17) Equation

It means the currently selected Author Equation data. When creating a new Author data, you can change the Equation by using Input Parameter list box or Calculator buttons.

NOTE	• When there is formula error in Equation, you cannot save the data. • When entering Label not in the Input Parameter list box, you cannot save the data.

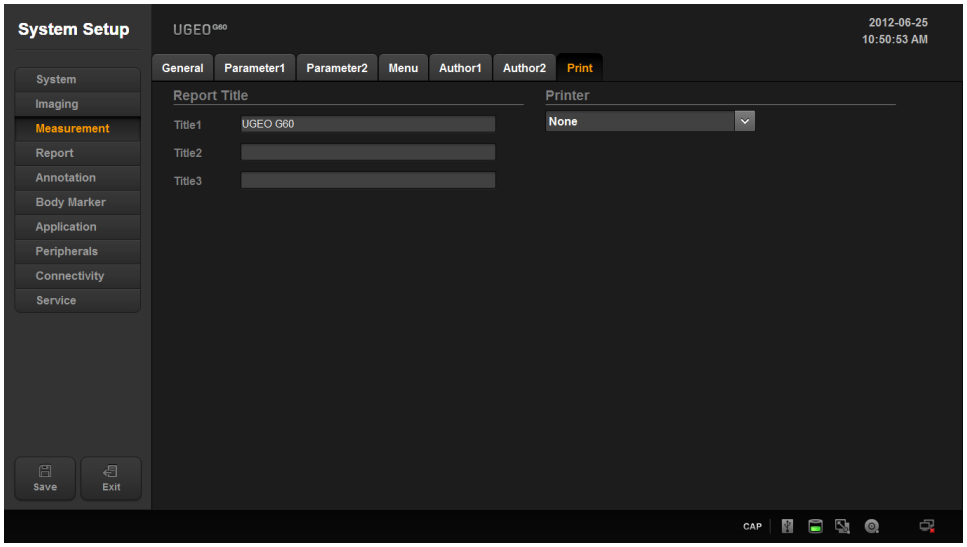
18) Table

It means the currently selected Author Table data. When creating a new Author data, you can change the Table by using Insert Row, Delete Row, Clear Table buttons.

NOTE	Minimum of 1 Row of data should be entered in Table, in order to save the data.

3.9.3.7 Print Settings

Select [Print] tab in [Measurement] category in *Setup* screen. Change settings by selecting Printer.



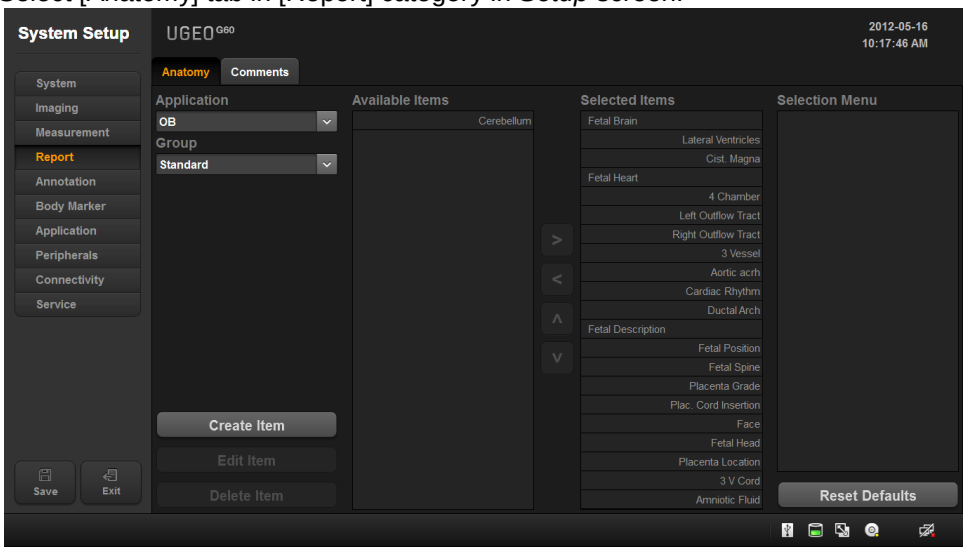
[Figure 3-17] Setup- Measurement- Print

3.9.4 Report

Select [Report] tab in *Setup* screen or press [Report] in touch screen. Change settings of information related with video input.

3.9.4.1 Anatomy

Select [Anatomy] tab in [Report] category in *Setup* screen.



[Figure 3-18] Setup- Report- Anatomy

You can add new items by pressing [Create Item] , edit items by pressing [Edit Item] and delete items by pressing [Delete Item]. Pressing [Reset Default] will return back to the initial settings.

1) Application: change settings for measurement diagnostic subject.

2) Group: change settings for preset of measurement diagnostic subject.

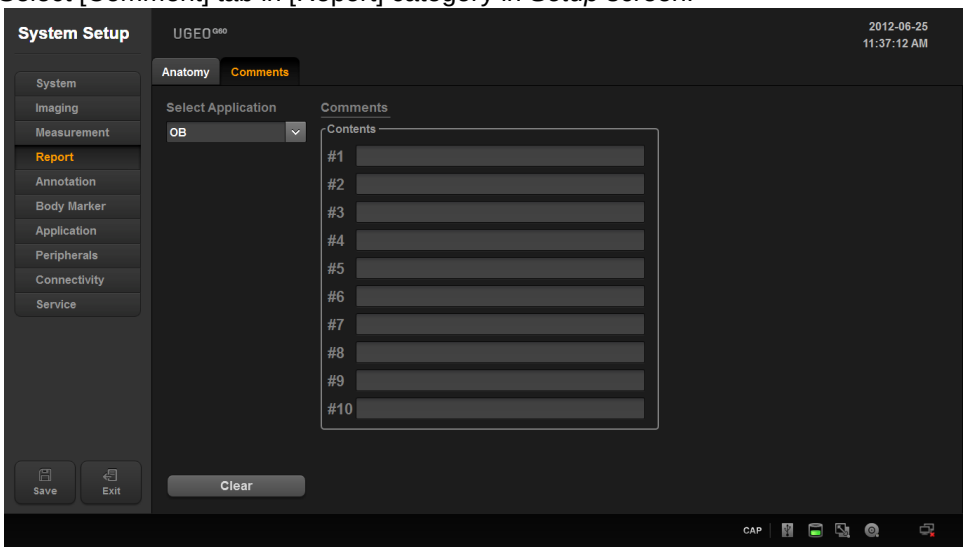
3) Available Items: it is the category or item list to be added on Anatomy page.

4) Selected Items: it is the category or item list added on Anatomy page.

5) Selection Menu: it is the sub-item list of selected items when selecting added items in Anatomy page.

3.9.4.2 Comments

Select [Comment] tab in [Report] category in *Setup* screen.



[Figure 3-19] Setup- Report- Comments

1) Select Application

Display all measured diagnostic subject and select the diagnostic subject for diaplaying in Report.

2) Comments

Users themselves can enter Comments.

3) Clear

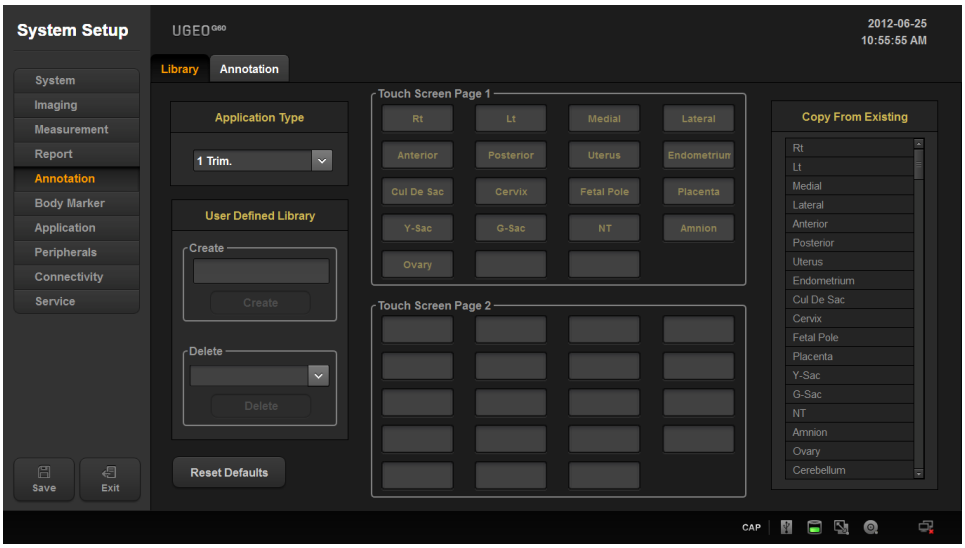
Delete the saved Comments.

3.9.5 Annotation

Select [Annotation] tab in *Setup* screen or select [Annotation] of touch screen. Change settings for entering opnions.

3.9.5.1 Library

Select [Library] tab in [Annotation] category in *Setup* screen. You can create, modify or delete Annotation library.



[Figure 3-20] Setup – Annotation- Library

1) Application Type

Select the diagnostic subject type.

2) User Defined Library

Users can create or delete the text.

① Create

Create the text.

② Delete

Delete the text.

③ Reset Default

Return back to the default setting.

3) Touch Screen Page1

Change settings for the Table display in the first page of touch screen.

4) Touch Screen Page2

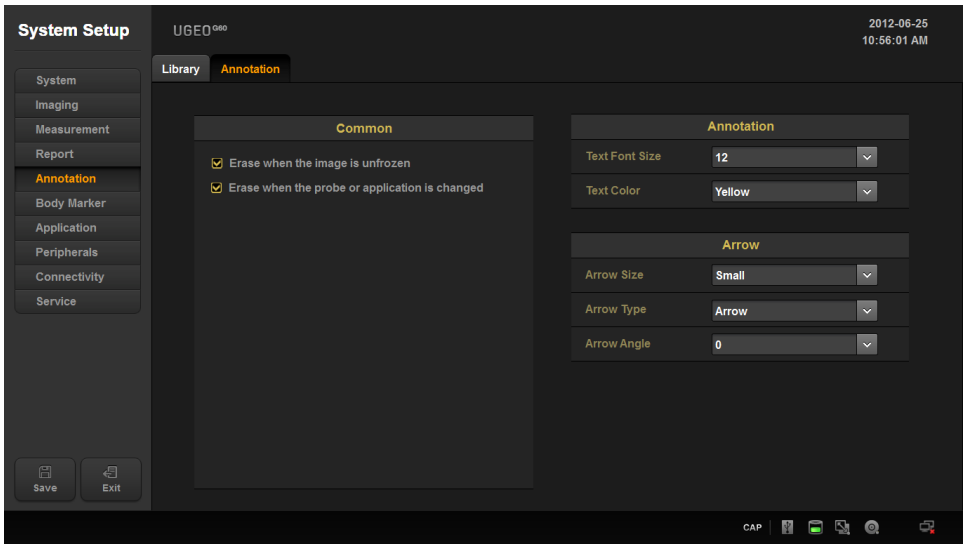
Change settings for the Table display in the second page of touch screen.

5) Copy From Existing

You can change settings by selecting the Items provided by the system.

3.9.5.2 Annotation

Select [Annotation] tab in [Annotation] category in *Setup* screen. You can change the settings for deleting Annotation of screen when switching scan mode, probe or diagnostic subject.



[Figure 3-21] Setup – Annotation- Annotation

1) Common

① Erase When the Image is Unfrozen

Settings for deletion in image scan mode

② Erase When the probe or application is changed

Settings for deletion when changing probe or diagnostic subject

2) Annotation

① Text Font Size

Settings for the size of text

② Text Color

Settings for the color of text

③ Arrow Size

Settings for the size of Arrow

④ Arrow Type

Settings for the shape of Arrow

⑤ Arrow angle

Settings for the angle of Arrow

3.9.6 Body Marker

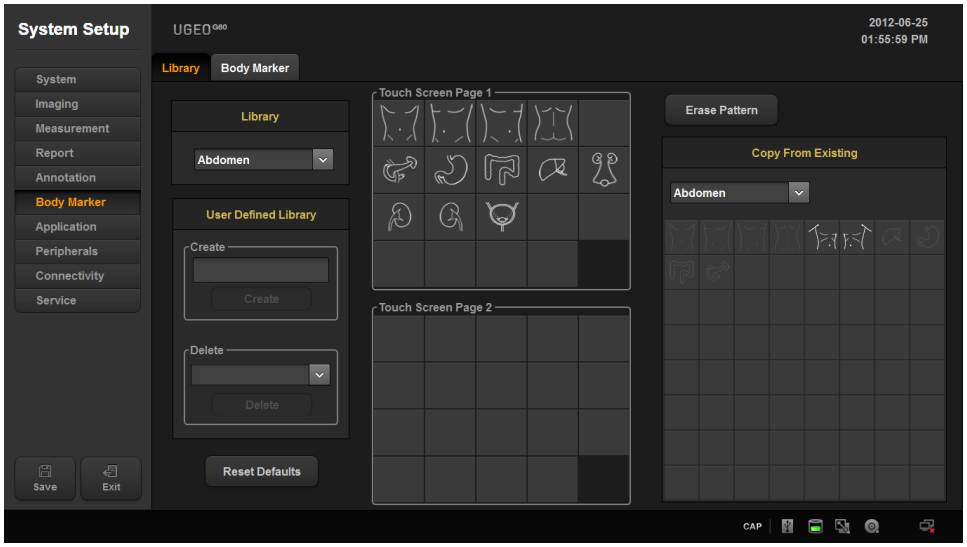
Select [Body Marker] tab in *Setup* screen or [Body Marker] of touch screen.

3.9.6.1 Library

Select [Library] tab in [Body Marker] category in *Setup* screen.

You can create, modify or delete Body Marker library.

1. Selecting the desired location using the trackballs on Touch Screen Page1 or Touch Screen Page2 will Tabld display yellow.
2. Selecting Body Marker in copy From Existing will create Body Marker in yellow Table displayed location.
3. Selecting the Body Marker using the trackballs on Touch Screen Page1 or Touch Screen Page2 will Tabld display yellow and pressing [Erase Pattern] will erase Body Marker.



[Figure 3-22] Setup – Bard Marker- Library

1) Library

Select the diagnostic subject.

2) User Defined Library

Users can create or delete the Library.

① Create

Create a new Body Marker

② Delete

Delete a Body Marker

③ Reset Defalut

Return to the default settings

3) Touch Screen Page1

Change settings for the Table display in the first page of touch screen.

4) Touch Screen Page2

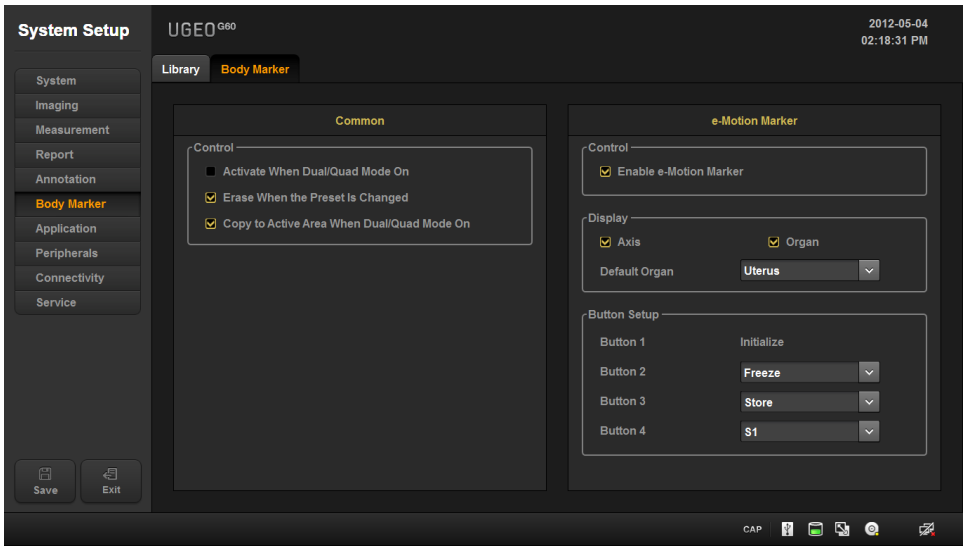
Change settings for the Table display in the second page of touch screen.

5) Copy From Existing

Change settings by selecting Body Marker provided by the system.

3.9.6.2 Body Marker

Select [Body Marker] tab in [Body Marker] category in *Setup* screen.



[Figure 3-23] Setup – Body Marker- Body Marker

1) Common

① Activate When Dual/Quad Mode On

Settings for displaying Table when enabling Dual or Quad Mode

② Erase When the Preset Is Changed

Settings for deletion when changing Preset

③ Copy to Active Side When Dual/Quad Mode On

Settings for copying to the active area when in Dual or Quad Mode

2) e-Motion Marker

Setting for using e-Motion Marker, the optional item for the product

NOTE	• e-Motion Marker is only used under following conditions. - Probe: EVN4-9 - Diagnostic Subject: Gynecology - Preset: Uterus • When using e-Motion Marker, normal Body Marker cannot be used. • Refer to the installation guided provided in the e-Motion Marker package for installing e-Motion Marker.

① Control

- e-Motion Marker Enable: checking the check box runs e-Motion Marker when pressing [Body Marker] button.

② Display

- Axis: checking the check box enables the Table display of axis direction in monitor.
- Organ: checking the check box enables the Table display of organs in monitor.
- Default Organ: select the types of organ to use by pressing combo button.

③ Button Setup

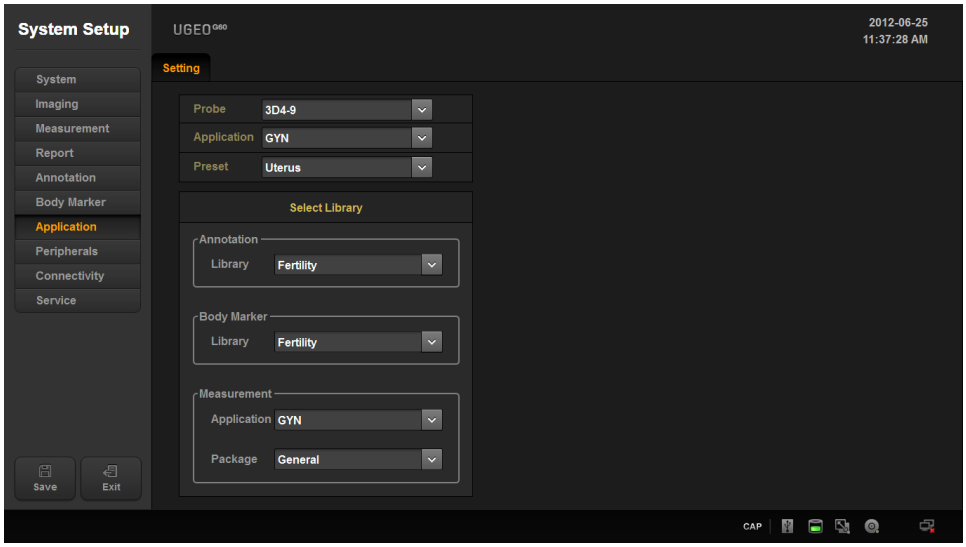
Change settings for features of buttons on e-Motion Marker console.

- Button 1: initialize the e-Motion Marker sensor. Users cannot change the button to other feature.
- Button 2~4: change settings for features to use by pressing combo button. Select among Freeze, Store, S1, S2 and S3.

3.9.7 Application

Select [Application] tab in *Setup* screen or [Application] in touch screen.

3.9.7.1 Setting



[Figure 3-24] Setup – Application- Setting

1) Probe

Select probe

2) Application

Select diagnostic subject

3) Preset

Select Preset supported by the selected diagnostic subject

4) Select Library

① Annotation

Change settings for text library

② Body Marker

Change settings for Body Marker library

③ Measurement

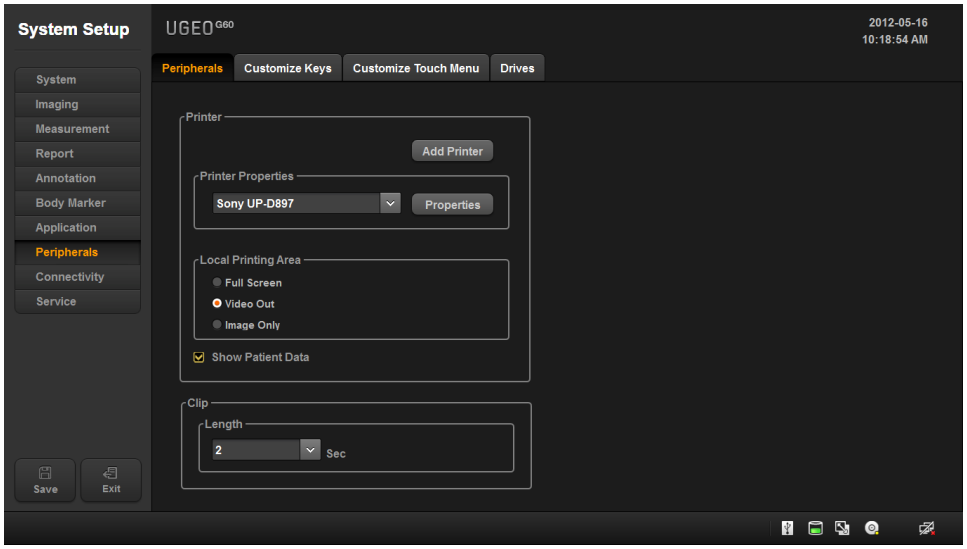
- Application: settings for measurement diagnostic subject
- Package: settings for preset of measurement diagnostic subject

3.9.8 Settings for Peripherals

Select [Peripherals] tab in *Setup* screen or [Peripherals] of touch screen. You can change settings for peripherals, key and buttons that are connected to the device.

3.9.8.1 Peripherals

Select [Peripherals] tab in [Peripherals] category in *Setup* screen. You can change settings for peripherals that are connected to the device.



[Figure 3-25] Setup – Peripherals- Peripherals

1) Printer

Start the additional installation of printer by pressing [Add Printer]. Reboot the system in order to use the additional printer.

① Printer Properties

You can change settings for types of printers and properties of printers by pressing [Properties] button. Change settings for the size and direction of the paper. Choose between Landscape and Portrait. Select the printer to use by pressing combo button.

② Local Printing Area

Settings for printing area

- Full Screen: prints the whole monitor screen
- Video Out: prints some part of monitor screen including imaging area
- Image Only: prints only the imaging area

③ Show Patient Data

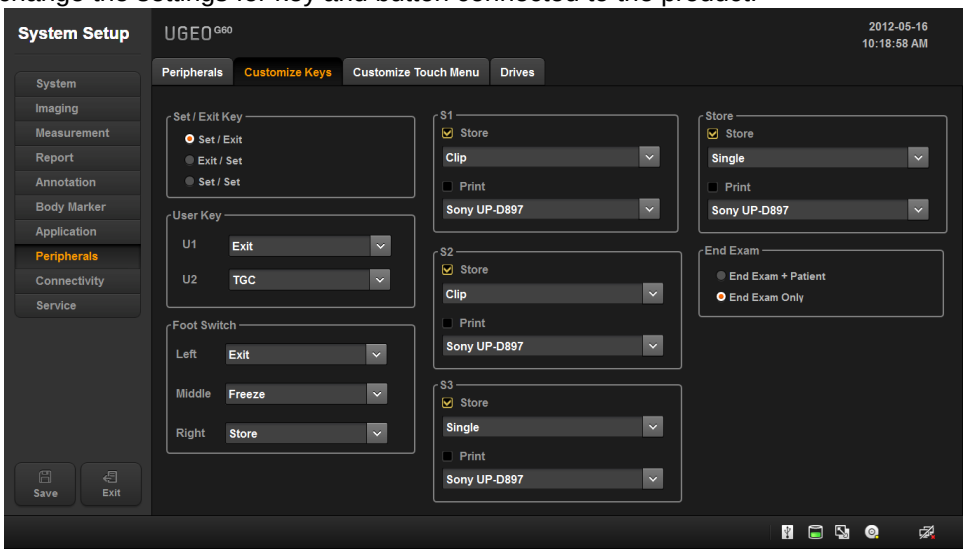
Settings for displaying Table of patient information

④ Clip

Settings for saving time

3.9.8.2 Customize Keys

Select [Customize Keys] tab in [Peripherals] category in *Setup* screen. You can change the settings for key and button connected to the product.



[Figure 3-26] Setup –peripherals- Customize Keys

1) Set / Exit Key

Settings for features of buttons on the left and right of trackball in control panel

① Set / Exit: set left button to [Set] and right button to [Exit]

② Exit / Set: set left button to [Exit] and right button to [Set]

③ Set / Set: set both buttons to [Set]

2) User Key

Settings for [U1] and [U2] button of control panel. The features are as follows.

User Key 1, 2	
Exit	TGC
Q Scan	Harmonic
Dual	Quad
Dual Live	Biopsy
Simultaneous	EFW Measure

3) Foot Switch

Settings for Left, Middle and Right pedal of Foot Switch. The features are as follows.

Foot Switch 기능	
Exit	Freeze
Store	S1
S2	S3
Update	

4) S1, S2, S3, Store Key

① Settings for features related with Store(Single, Clip), Print

② If you choose both Store and Print, it saves the image and prints.

5) End Exam

① End Exam + Patient

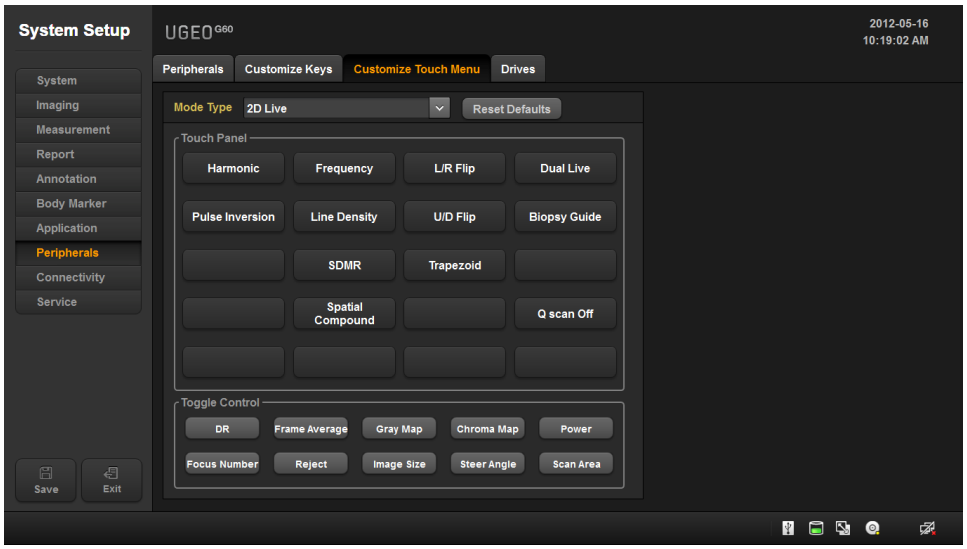
Pressing [End Exam] of control panel switches to Patient Information screen..

② End Exam Only

Pressing [End Exam] of control panel exists the Exam and switches to B mode scan screen.

3.9.8.3 Customize Touch Menu

Select [Customize Touch Menu] tab in [Peripherals] category in *Setup* screen. You can change settings for touch screen and Toggle Control buttons.



[Figure 3-27] Setup –peripherals- Customize Touch Menu

1) Mode Type

Select among 2D Live, 2D Freeze, C Live, C Freeze, D Live, D Freeze, M Live, M Freeze

2) Touch Panel

Settings for item and location for touch screen

3) Toggle Control

Settings for item and location for the bottom menu of touch screen operated by dial button

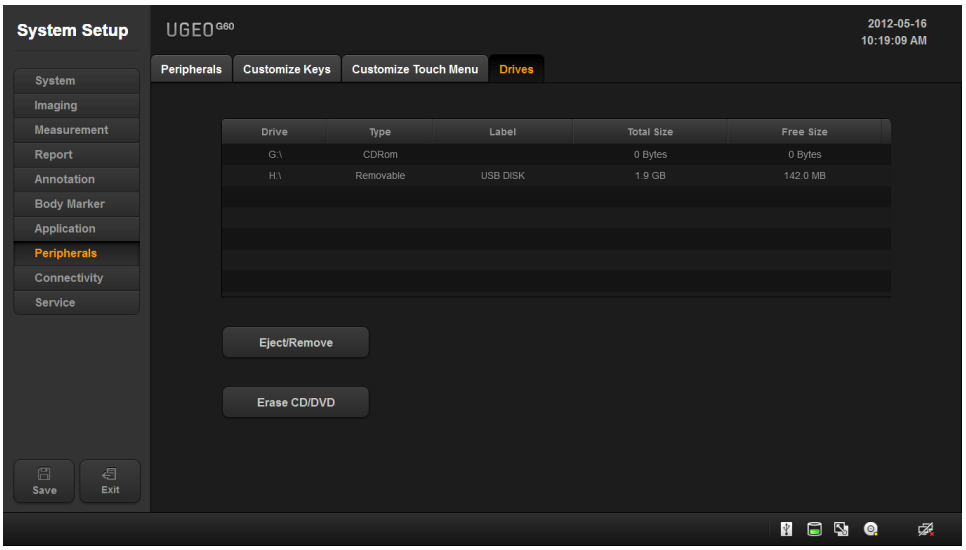
4) Reset Defaults

Returns to the initial settings

3.9.8.4 Drives

Select [Drives] tab in [Peripherals] category in *Setup* screen.

Pressing [Eject/Remove] button ejects or rmoves the disk from the device. [Erase CD/DVD] button deletes CD/DVD.

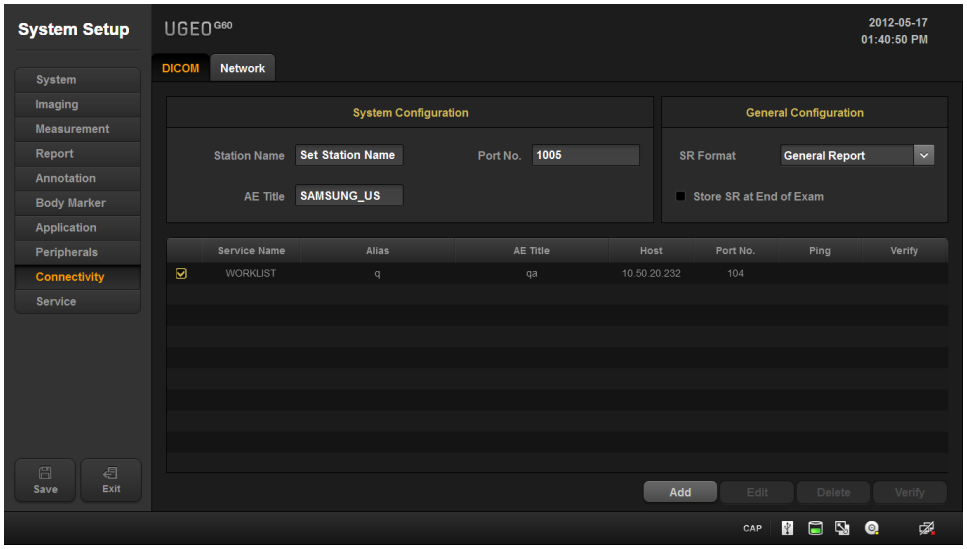


[Figure 3-28] Setup –peripherals- Drives

3.9.9 Connectivity Settings

Select [DICOM] tab in [Connectivity] category in *Setup* screen or [Connectivity] of touch screen.

NOTE	Refer to the user's manual or DICOM Conformance Statement of the corresponding server for more details.



[Figure 3-29] Setup –Connectivity-DICOM

3.9.9.1 DICOM Settings

Information of currently being used DICOM server in this system is displayed as Table. You can modify the information or add or delete servers. Information about server is used for distinguishing DICOM of the system on network, and it is also used for transmitting data with other DICOM server.

NOTE	For 'IP Address', 'AE Title', 'Port No', contacting the network representative of the institution where this device is installed.

1) System Configuration

① Station Name

Enter the name of this system. In some cases, it is used on the DICOM network to distinguish with 'AE Title'.

② AE Title

Enter the name for DICOM AE (Application Entity). It is used on the network to distinguish the devices using DICOM.

③ Port No.

Enter the Port Number for using server.

2) General Configuration

① SR Format

Select between General Report and Viewpoint when saving SR.

② Store SR at End of Exam

Select option for saving SR when performing End Exam. Checking the check box will auto-save when performing End Exam, while unchecking the check box will not save.

3) Adding DICOM Service

Press [Add] on the screen. It switches to the screen where you can enter the adding DICOM service. After adding the service, pressing [Apply] saves the input. Press [Cancel] in order to cancel.

① DICOM Services Options

Select the type of service to be used through DICOM. DICOM server for settings are Storage, SC, Worklist, Print, PPS, Storage SR.

② Alias

Enter the name for DICOM server.

③ AE Title

Enter the AE Title of DICOM server, by contacting the network representative of the institution where this device is installed.

④ IP Address

Enter the IP Address of using server, by contacting the network representative of the institution where this device is installed.

⑤ Port No.

Enter the Port Number of using server, by contacting the network representative of the institution where this device is installed.

⑥ Connect Timeout

The connection will be terminated if there is no response from DICOM server for a set time. Enter in seconds (s).

⑦ Read Timeout

Sets the read timeout of the server you want to add.

⑧ Retry Interval

Sets the time for retry when in transmission failure. Enter in seconds (s).

⑨ Maximum Retries

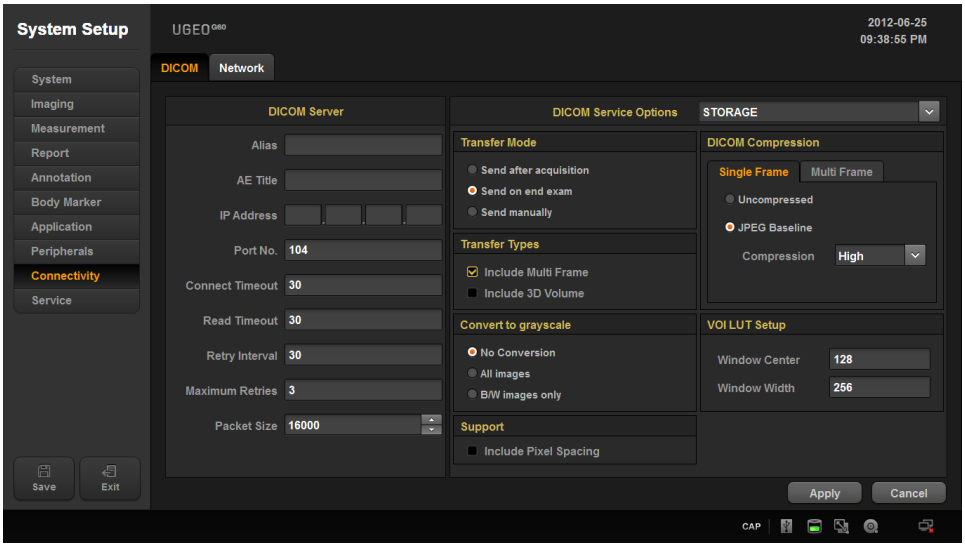
Sets the number for retries when in transmission failure.

⑩ Packet Size

Settings for transmission Packet size

4) Storage Server Information

Select 'STORAGE' for [DICOM Service Option] item. It sets the imaging storage service using DICOM.



[Figure 3-30] DICOM Configuration -Storage

① Transfer Mode

Settings for transmission method

- Send after acquisition: transmit image whenever it saves image using [Store] button.
- Send on end exam: transmit all images when pressing [End Exam].
- Send manually: transmit desired images in Exam List, Review

② Transfer Types

- Include Multi Frame: selecting the check box can transmit Cine Loops.
- Include 3D Volume: settings for sending 3D volume data when transmitting 3D image.

NOTE	Select this option only when using Storage service supplying 3D volume data of Samsung Medison.

③ Convert to Grayscale

Settings for Grayscale conversion method of image using DICOM service

- No Conversion: transmit the original image without conversion
- All Images: transmit all images converting them to Grayscale
-B/W Image only: transmit only the colorless images converting them to Grayscale

④ Support

- Include Pixel Spacing: in addition to the area information used in ultrasound examination, it includes the area information used in CT or x-Ray examination. Measure cannot be checked in PACS system where it does not support ultrasound area information.

NOTE	Supported image types are 2D and 2D color mode. All depths of included image must be identical for Dual and Quad mode.

⑤ DICOM Compression

Settings for compressing image which would use DICOM service. Select the types and compression method (Uncompressed, JPEG Baseline) of image by using combo button. Choosing Uncompressed saves the image without compressing it.

- Single Frame: sets the compression method of still image
- Multi Frame: sets the compression method of Cine image
- Sets among Low, Medium, High when selecting JPEG Baseline. You can choose the priority for either quality or compression rate. You can change settings for compression method, compression rate and Frame Rate. When selecting Multi Frame, you can choose among Full, 10, 20, 30 for Frame Rate.

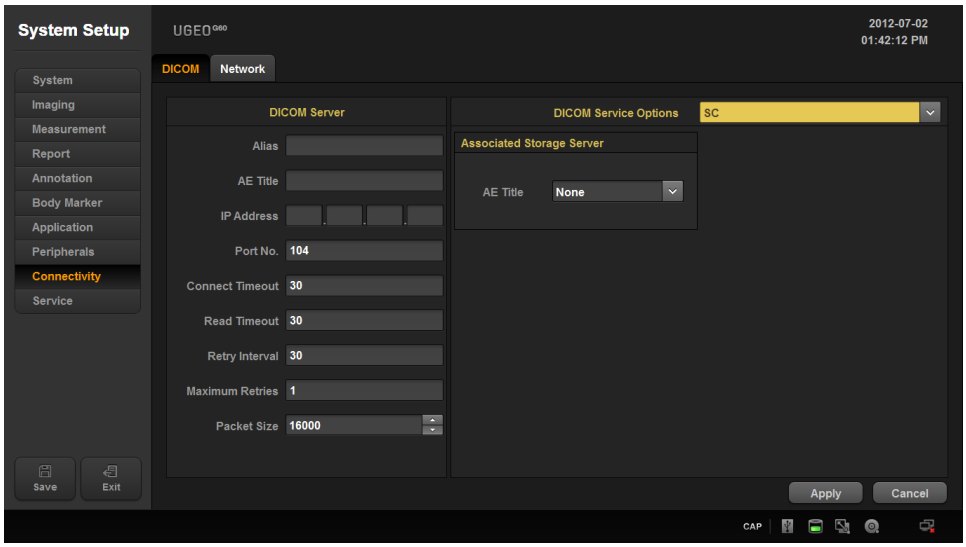
⑥ VOI LUT Setup

Settings for VOI LUT(Value Of Interest Look Up Table). It saves brightness and contrast of DICOM image by adjusting them. Saved image can be checked in PACS devices using VOI LUT table standard of DICOM.

- Window Width: Enter the value for settings in DICOM Tag (0028,1050). The set value means the brightness of image displayed in table in Storage service. Having 128 as the standard, bigger set value yields darker image. You can use this feature only when the Storage service provides this service.
- Window Width: Enter the value for settings in DICOM Tag (0028,1051). The set value means the contrast of image displayed in table in Storage service. Having 256 as the standard, bigger set value yields smaller contrast. You can use this feature only when the Storage service provides this service.

5) SC Server Information

Select ‘SC(Storage Commitment) for [DICOM Service Options]. Set Storage Commitment service using DICOM. Storage Commitment service is used after transmitting all saved images and reports after diagnostics.



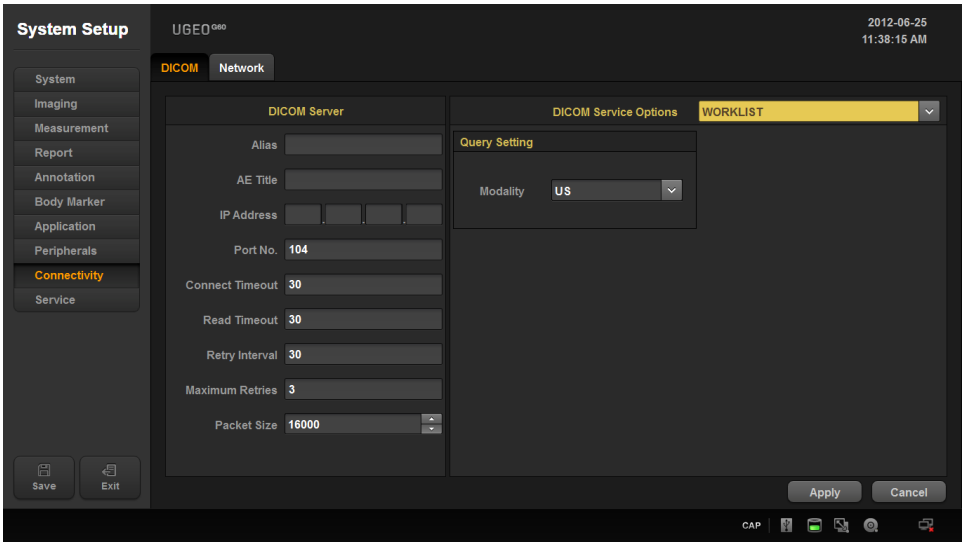
[Figure 3-31] DICOM Service Options –SC

① Associated Storage Server

Select image storage server to connect with.

6) Worklist Server Information

Select 'WORKLIST' for [DICOM Service Options]. Set Modality Worklist service using DICOM.



[Figure 3-32] DICOM Service Options -Worklist

① Query Setting

Select the types of Modality to receive when updating Worklist.

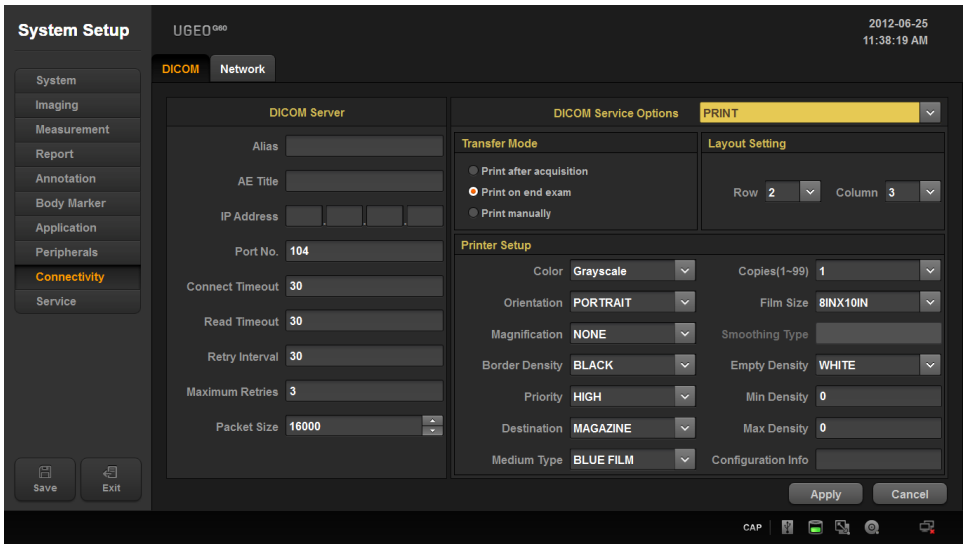
- Modality: select between ultrasound image (US) or all images (All)

※Tip!

Pressing [Patient] of control panel after settings for Worklist service will move to Worklist page.

7) Print Server Information

Select 'PRINT' for [DICOM Service Options]. Change settings for printing service using DICOM.



[Figure 3-33] DICOM Configuration –Print

NOTE	• It can use only the printers that are connected to DICOM network. • Depending on the features of the printer, you may not be able to use the features below. Change settings for printer service after carefully reading the user's manual or DICOM Conformance Statement.

① Transfer Mode

Change settings for printing method

- Print after acquisition: print the image every time it saves by using [Store] button.
- Print on end exam: print saved images at once by pressing [End Exam] button.
- Print manually: print only desired images in Exam List, Review.

② Layout Setting

Change settings for the layout. Row is available 1~6, Column 1~4.

③ Color

Change settings for using color of the printer you want to use. Select between Grayscale and Color.

④ Orientation

Change settings for the orientation. Select between Landscape and Portrait.

⑤ Magnification Type

Change settings for Interpolation when resizing the printing image. Select among Replicate, Bilinear, Cubic and None.

⑥ Border Density

Change settings for border color of printing image. Select between Black and White.

⑦ Print Priority

Change settings for the priority of printing. Select among High, Med and Low.

⑧ Film Destination

Change settings for paper exit. Select between Magazine and Processor.

⑨ Medium Type

Change settings for types of paper. Select among Paper, Clear Film, Blue Film, Mammo Clear Film, Mammo Blue Film.

⑩ Number of Copies

Enter the number of copies from 1~99.

⑪ Film Size ID

Select among 8inch x 10 inch, 5 inch x 11 inch, 10 inch x 12 inch, 10 inch x 14 inch, 11inch x 14 inch, 11inch x 17 inch, 14inch x 14 inch, 14inch x 17 inch, 24cm x 24cm, 24cm x 30cm for the size of paper.

⑫ Smoothing Type

Use this feature only when 'Magnification' is set to 'CUBIC'. Enter the value of DICOM Conformance Statement of printer.

⑬ Empty Image Density

Change settings for the background color of printing area. Select between Black and White.

⑭ Min Density

Change settings for the minimum brightness of printing image. It will be replaced with the default value when there is no input.

⑮ Max Density

Change settings for the maximum brightness of printing image. It will be replaced

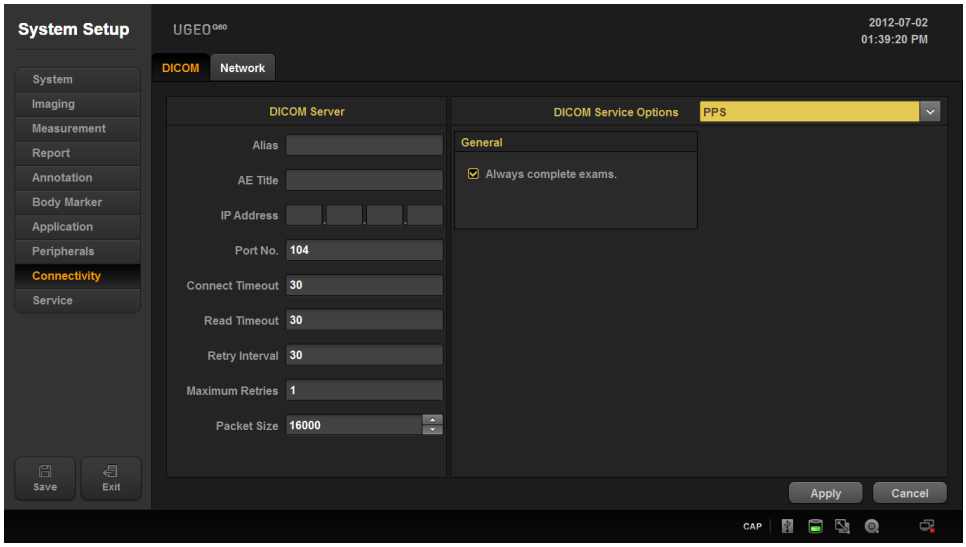
with the default value when there is no input.

⑯ **Configuration Info**

Change settings for the characteristic value of printer. Refer to DICOM Conformance Statement of printer.

8) PPS Server Information

Select ‘PPS’(Performed Procedure Step) for [DICOM Service Options]. Change settings for Modality Performed Procedure Step service using DICOM.



[Figure 3-34] DICOM Service Options -PPS

① **Always complete exams**

Checking the check box will always report the exam in completed state. Pressing [End Exam] with unchecking the check box will send the selected cancelled messages to RIS server.

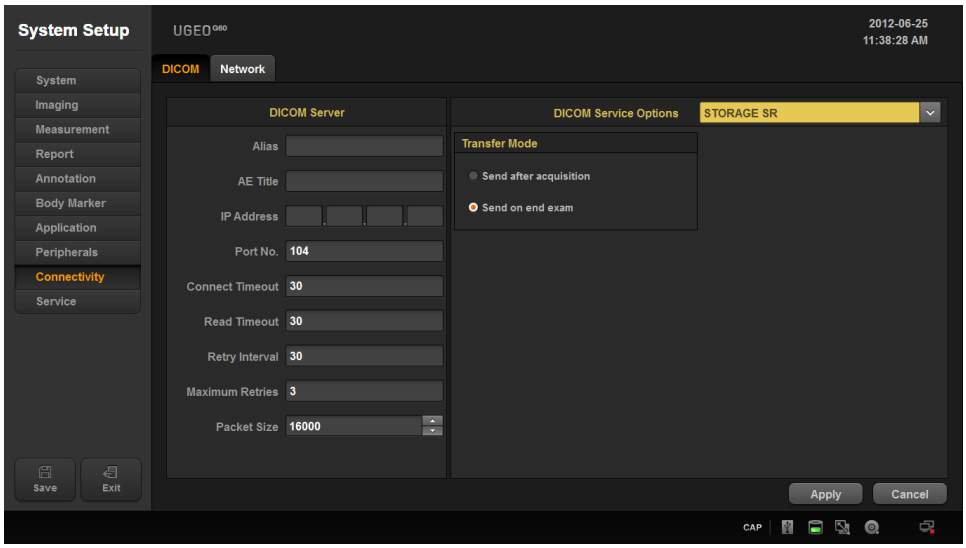
9) Storage SR server Information

Select 'Storage SR’(Storage Structured Report) for [DICOM Service Options]. Change settings for report storage service using DICOM.

① **Transfer Mode**

Change settings for printing method.

- Send after acquisition: SR transmit measurement data in Report whenever [Store] button is pressed.
- Send on end exam: Measurement data in Report is transmitted whenever [End Exam] button is pressed.



[Figure 3-35] DICOM Service Options –Storage SR

10) Changing DICOM Inforation

After selecting the service on the screen, press [Edit]. It displays the information of selected service.

Pressing [Apply] will save the information after modifying it. Press [Cancel] in order to cancel.

11) Deleting DICOM Service

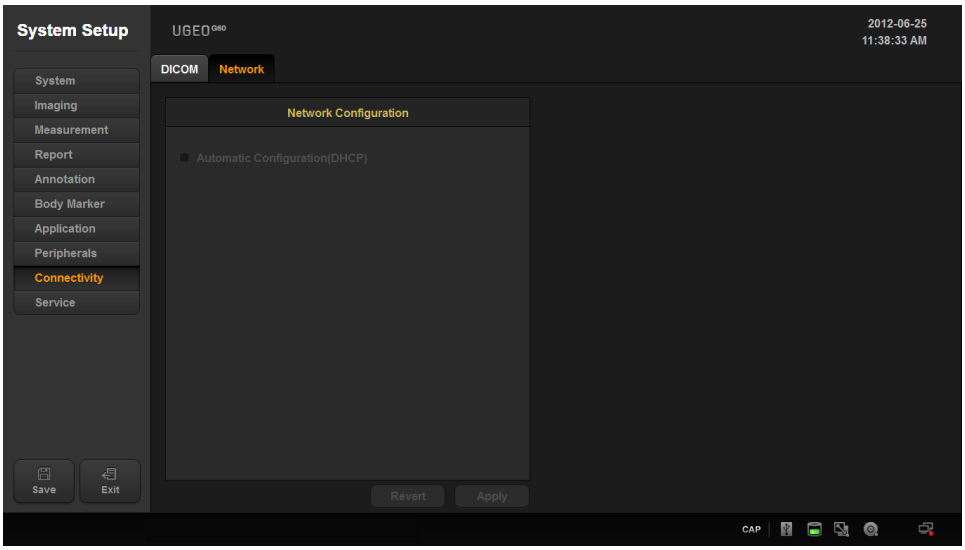
Press [Delete] after selecting the service on the screen.

12) DICOM Server Test

Press [Verify] after selecting the service. It displays the result in Verify item through the test of connection status with selected service. Success means the successful connection.

3.9.9.2 Network Settings

Select [Network] tab in [Connectivity] category in *Setup* screen or [Connectivity] of touch screen. It manages the Network information of current device.



[Figure 3-36] Setup –Connectivity-Network

1) Network Configuration

Settings for the Network information of current device

① Automatic Configuration (DHCP)

Checking the check box automatically sets the IP address.

② Static Configuration

Unchecking the check box (Automatic Configuration) can enter the fixed IP information.

Settings for IP Address, Subnet Mask, Gateway, DNS

③ Revert

Cancel the currently entered information and return back to the default value.

④ Apply

Sets IP with the currently entered information.

3.9.10 Service

NOTE	• Users cannot perform directly. It must be performed by through the staff of Samsung Medison customer support by the customer's request. • It performs the restore of basic information and image of save patient or the change of software. • Settings for using option software of hardware. - Name: displays the types of option software which can be

	installed in this product - Status: displays the current status of option software. Registered means available and it displays the expiration date on Expired Date. Unregistered means that it is unavailable. • It displays S/W version information of the product. • It provides the Built in self test feature.

3.9.11 Help

Press [Clinical Help] button. It displays electronic manual on the monitor screen.

NOTE	[Return] key is not provided in Help screen.

3.10 Printer Installation

3.10.1 BW Printer Installation

1. Open the cabinet of UGEO H60 to the front.

[Figure 3-37] Removing Front Cabinet

2. Remove 4 screws on the Table

[Figure 3-38] Removing Front Cabinet

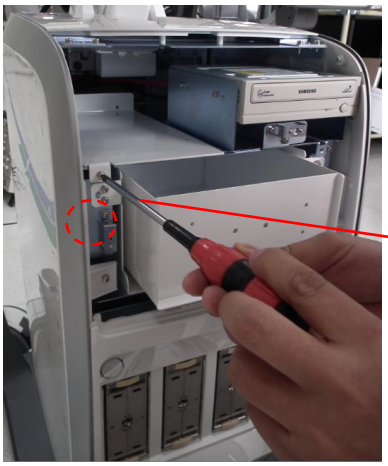
3. After removing the screws, remove the front cover.

[Figure 3-39] Front Cabinet Removing

[Figure 3-40] Removing Front Cabinet

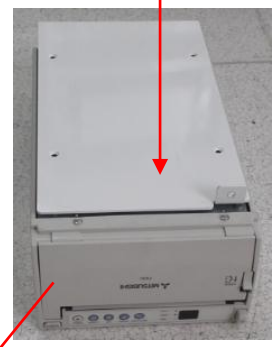
4. Remove the Front Cover to the front by hard-pressing the part locked with hook.

[Figure 3-41] Removing Front Cabinet



[Figure 3-42] Removing B/W Printer fixing plate

5. Remove fixing plate for B/W Printer



6. Attach the fixing plate to the bottom of B/W Printer as shown in the figure.

[Figure 3-43] Bottom of B/W Printer

[Figure 3-44] B/W Printer Cord & Cable

[Figure 3-45] Inserting B/W Printer

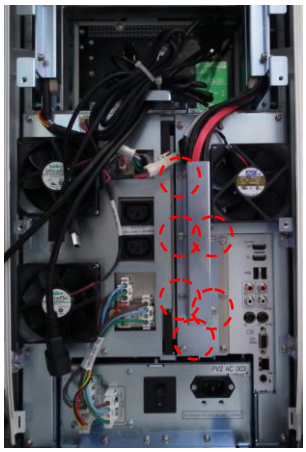
7. Insert assembled BW Printer to the consol as shown in the figure.

[Figure 3-46] Installing B/W Printer

8. After installing B/W Printer attached with the fixing plate, fix it with screws.

[Figure 3-47] Rear Cover Open

9. Remove 8 screws and open Rear Cover..

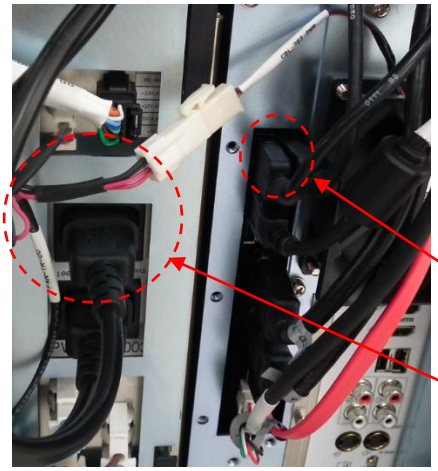


10. Remove 6 screws and separate USB PORT protection cover.

.

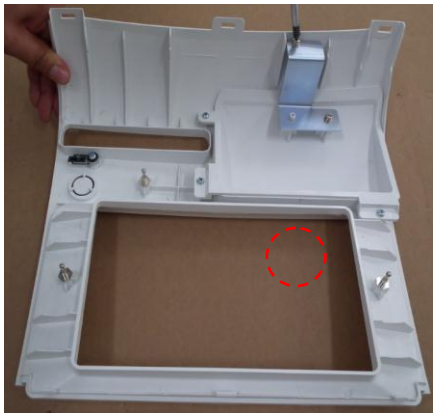
[Figure 3-48] Separating USB PORT protection cover

[Figure 3-49] Separating USB PORT protection cover 2



11. Remove 5 screws and separate USB PORT protection cover. Insert Power Cord and Signal Cable of BW PRINTER to the USB port as shown in the figure.

[Figure 3-50] Connecting BW PRINTER POWER & Signal cable



[Figure 3-51] Removing BW Printer Cover

12. Remove 1 screw from the Front Cover and remove BW Printer Cover as shown in the figure

[Figure 3-52] Removing BW Printer Cover

[Figure 3-53] Assembling Front Cover

13. After aligning 3 hooks on the top of Front Cover, carefully re-assemble.

14. Complete Re-assemble of Front Cover

[Figure 3-54] Complete Re-assemble of Front Cover

15. Complete Re-assemble of Rear Cover

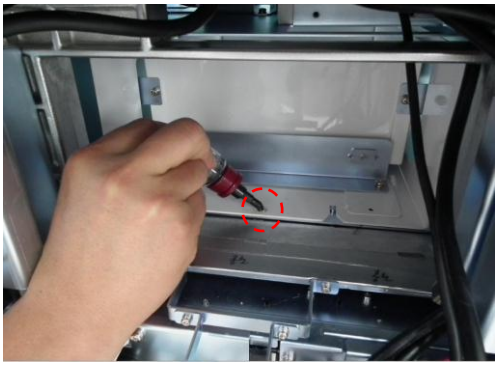
16. Assemble power cord fixing screw

[Figure 3-55] Complete Re-assemble of Rear Cover

3.10.2 Color Printer Installation

[Figure 3-56] Removing Front Cabinet screw

1. Remove 5 cabinet fixing screws as shown in the figure, in order to install Color Printer.

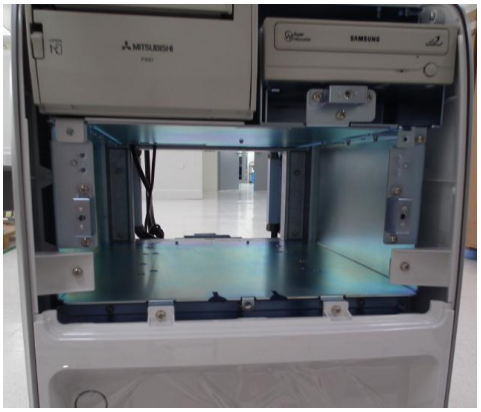


[Figure 3-57] Removing rear fixing screws

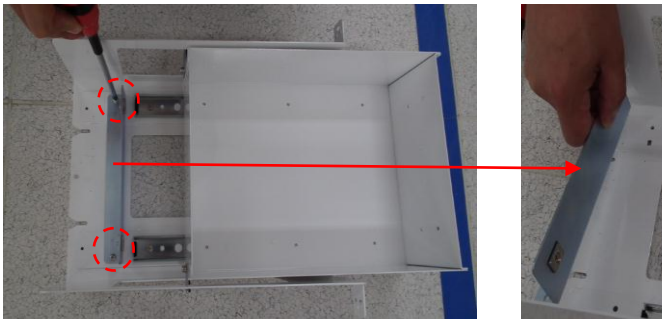
2. Remove 1 fixing screw in the figure after opening the rear cover

[Figure 3-58] Removing Front Cabinet

3. Remove the cabinet installed in the location of Color Printer by pulling it front.

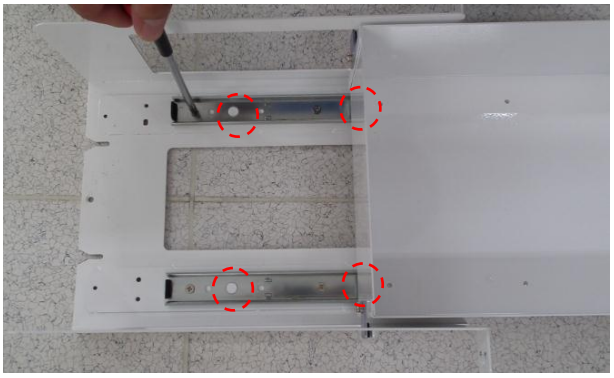


[Figure 3-59] Removing Front Cabinet



[Figure 3-60] Removing Front Cabinet

4. Remove 2 screws and remove rail guard

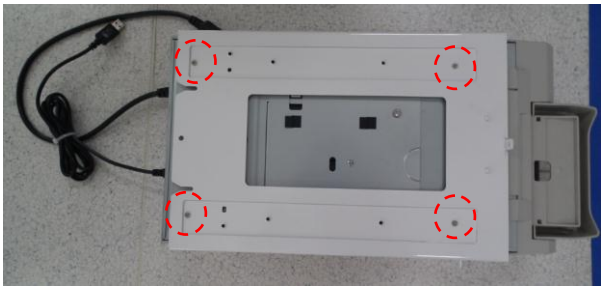


[Figure 3-61] Removing Front Cabinet

5. Remove 4 screws and remove rail and cabinet.

6. Fix the cabinet fixing plate by using the screws pulled out from the bottom of the Color printer.

[Figure 3-62] Installing Cabinet Fixing Plate



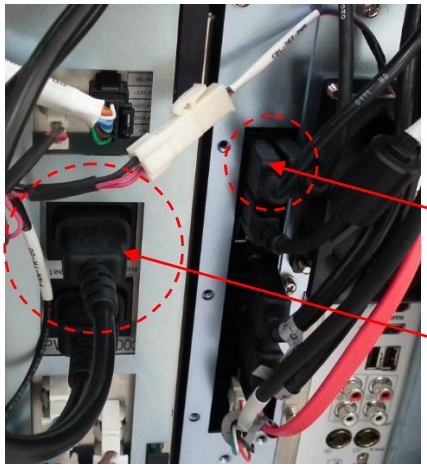
[Figure 3-63] Installing Cabinet Fixing Plate

7. After inserting the color printer with fixing plate, fix it with screws.

[Figure 3-64] Inserting Color Printer Console

8. When installing color printer, make sure that the fixing plate of rear part properly fits both sides.

[Figure 3-65] Inserting Color Printer Console



9. Connect Power Cord and image cable as in the figure after installing color printer.

[Figure 3-66] Connecting Printer Cable

10. After completing the installation of color printer, fix it with 5 screws so that it would not move.

[Figure 3-67] Fixing Color Printer

11. After aligning 3 hooks on the top of Front Cover, carefully re-assemble.

[Figure 3-68] Assembling Front Cover

12. Complete

[Figure 3-69] Assembling Front Cover

Samsung UGEO H60 Service Manual

4 Product Inspection

SAMSUNG MEDISON

4 Product Inspection

4.1 Overview

Chapter 4 describes the proper operation of important feature and power after the installation of UGEO H60.

Table of Contents

4.2 Performance Inspection

4.2.1 Basic Inspection

1) Monitor

Check the color of screen, focus, dot, ghosting, stains, spread, etc.

Check the screen condition when monitor is bumped, and the signal when shaking the cable to left and right.

2) Control Panel and LED Condition

Check if letters appear or are broken when pressing the control panel.

Check if keyboard LED is on.

3) Body Mark Key

Check if body mark is broken or operating normally.

4) Indicator Key

Check if the trackball operates normally when pitching and rolling.

5) Clear Key

Check if text or measure is erased properly.

6) Zoom 동작 검사

Check zoom behavior and abnormalities.

7) Sono view 검사

Save image and cine image of each mode.

Check if saving image operates properly.

Check if Backup & restore works.

8) Measure

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

9) Patient

Check if identical patient value appears on Report or SonoView after putting the value in Patient.

10) End Exam

Check if the measurement has been cleared when performing End Exam after measurement in New Patient.

11) Probe Key

Check the operation when performing probe change.

4.2.2 Detailed Inspection

1) B Mode

① Check the lines on image with using Knife Test.

② Check the presence of image using Phantom.

③ Check Freeze Cine related operation (Image corruption, Auto run, Auto run Speed, Track ball Cine).

④ Check the change of brightness in image when adjusting Gain.

⑤ Check the change of brightness on depth in image when adjusting TGC gain.

⑥ Check if the direction of image changes when operating Left/Right Flip, Up/Down Direction, and Rotation.

⑦ Check abnormalities in operating image selection menu (EE, DR, View Area, Tissue, and Frame Rate).

⑧ Check abnormalities in frequency (Phantom, Res, Pen, and Gen).

⑨ Check abnormalities in change of image when changing the depth.

⑩ Check abnormalities in change of image for depth change when changing the focus

⑪ Check abnormalities of image compensation mode (FSI, Harmonic, DMR, SRF, Quick Scan, and Spatial Compound Imaging).

2) Dual Mode

① Check abnormalities of image using Phantom.

② Check the presence of image using Phantom.

③ Check if the direction of image changes when operating Left/Right Flip, Up/Down Direction, and Rotation.

④ Check abnormalities in operating image selection menu (EE, DR, View Area, Tissue, and Frame Rate).

⑤ Check abnormalities in frequency (Phantom, Res, Pen, and Gen).

⑥ Check abnormalities in change of image when changing the depth.

⑦ Check abnormalities in change of image for depth change when changing the focus

⑧ Check abnormalities in operating left-right image Cine(number of page, Cine procedure order, Image corruption, Auto run, Auto run Speed, Track ball Cine).

3) M Mode

① Check abnormalities of image using Phantom.

② Check if information of M-line is shown on image section.

③ Check the change of brightness in image when adjusting Gain.

④ Check if the direction of image changes when operating Left/Right Flip, Up/Down Direction, and Rotation.

⑤ Check abnormalities in operating image selection menu (EE, DR, View Area, Tissue, Frame Rate, Sane angle, Power).

⑥ Check abnormalities in change of image when changing the depth.

⑦ Check abnormalities in change of image for depth change when changing the focus.

⑧ Check speed change and information abnormalities according to the speed conversion.

⑨ Check if image is reversed when operating negative.

⑩ Check abnormalities in Top Down Format and Side by Side Format Image when selecting Loop Format.

⑪ Check abnormalities in size change of Format B-Mode and M Line.

⑫ Check Freeze Cine related operation (Image corruption, Auto run, Auto run Speed, Track ball Cine).

4) C Mode & PD Mode

① Check abnormalities of image using Phantom.

② Check abnormalities in operating image selection menu (Balance, Sensitivity, Color Mode, Display, CFR).

③ Check abnormalities in change of image when changing the depth.

④ Check Freeze Cine related operation (Image corruption, Auto run, Auto run Speed, Track ball Cine).

⑤ Check the change of brightness in image when adjusting Color Gain.

⑥ Check abnormalities in noise or corruption (B or C Mode Noise) of image when moving ROI Box.

⑦ Check abnormalities in noise or corruption (B or C Mode Noise) of image when resizing ROI Box.

⑧ Check if the frequency converting and speed range of blood flow is adjusted by adjusting scale up and down (check by direct scan)

⑨ Check if the small signals are removed step by step by using filter.

⑩ Check if color bar is reverted by operating Invert key.

⑪ Check if speed range of blood flow changes to "+" or "-" by moving Baseline up and down.

5) D Mode

① Check abnormalities of image using Phantom.

② Check the abnormalities in PRF value change in Doppler according to

Simultaneous on/off.

③ Check the abnormalities in Doppler spectrum.

④ Check the change in speed range by changing Scale.

⑤ Check if spectrum range changes to "+" or "-" by moving Baseline up and down.

⑥ Check if low signal of Spectrum is removed when changing Filter

⑦ Check if Doppler waveform is reversed when operating Invert.

⑧ Operate Angle.

⑨ Check the abnormalities after changing the location and size of SV.

⑩ Check if the image of spectrum changes with the change of spectrum type.

⑪ Check the abnormalities in Sound Volume.

⑫ Check if calculated values are automatically operated after checking if the lines are shown without disconnection when operating Auto Calc.

⑬ Check the abnormalities in Top Down Format and Side by Side Format Image when selecting Loop Format.

⑭ Check Cine/Loop related operation (Image corruption, Auto run, Auto run Speed, Track ball Cine).

6) 3D Mode

① Check the abnormalities of image corruption or noise while proceeding, after checking if the proper loading has been conducted in case of Free Hand 3D SCAN procedure and Skip by Freeze.

② Check the abnormalities of image corruption or noise while proceeding, in case of Static 3D Scan. Check the abnormalities in probe noise or motor operation of probe.

③ Check the abnormalities of image corruption or noise while proceeding, in case of Live 3D SCAN. Check abnormalities in probe noise and motor operation.

④ Check abnormalities in ROI 3D, ABC 3D, Full image.

⑤ Check if 3D image changes to the designated angle.

⑥ Check if the contrast of 3D image changes according to the designated value.

⑦ Check abnormalities in image when changing the size of image.

⑧ Check Display Format Image (ACB, Volume CT Image).

⑨ After selecting Step Angle, Rotation Angle, Rot. Axis, Cine check if Cine Loading is conducted as in setting, and check abnormalities in image corruption when operating Cine.

Samsung UGEO H60 Service Manual

5 Product Structure

SAMSUNG MEDISON

5 Product Structure

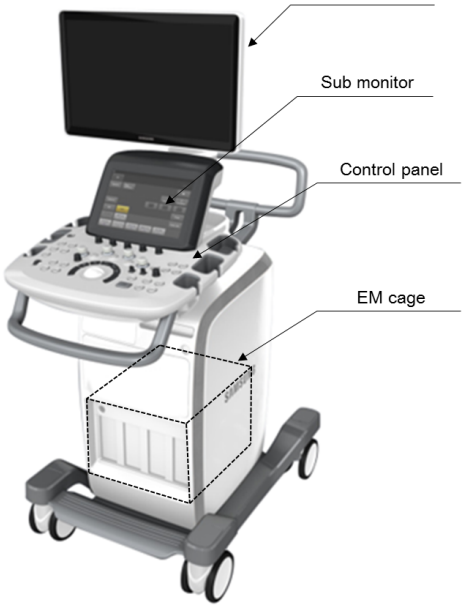
5.1 Overview

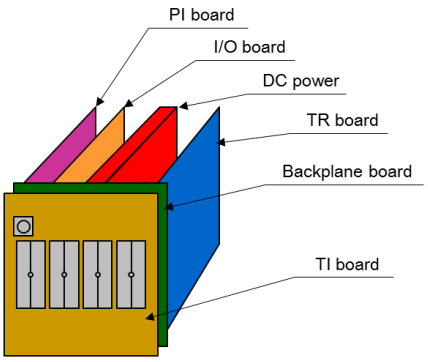
Chapter 5 describes the internal structure and operating principles of UGEO H60.

This chapter must be studied in order to conduct maintenance and upgrade for the product.

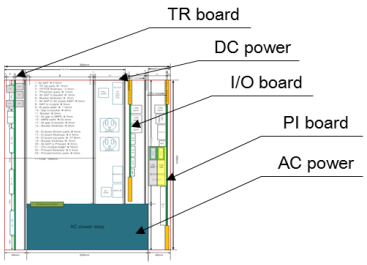
UGEO H60 is a ultrasound imaging tester, applying Software DSC.

This adopted a 18.5-inch LCD monitor, provides high-quality ultrasound image and includes premium features. In order to enhance the processing speed, this is implemented with PC with the latest specifications and interface of ultrasound system by Samsung Medison Co., Ltd.





[EM cage front view]



[EM cage rear view]

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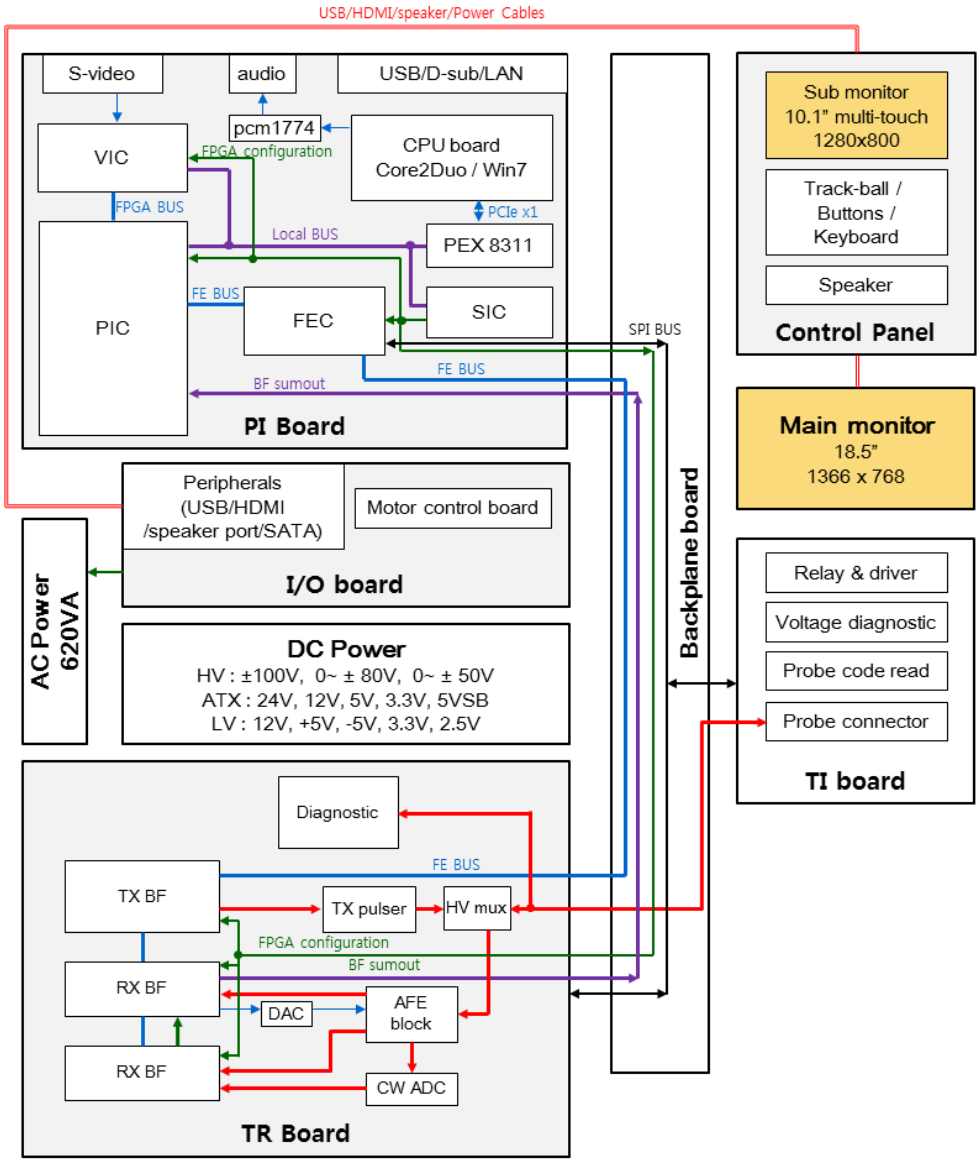
5.2 System Block Diagram



[Figure 5-1] System Block Diagram

Major structure of UGEO H60 is as follows:

- **Ultrasound System Part**

  TI Board, TR Board, PI Board , I/O Board, DC to DC Power Module

- **User Interface Part**

  LCD Monitor, Touch Screen, Control Panel, Alphanumeric Keyboard, Track Ball

- **ETC. Part**

  HDD Board, ODD

5.3 TI (Transducer Interface) Board

5.3.1 TI board layout

[Figure 5-2] TI board layout

5.3.2 Description

As seen in the Figure 5-1 block diagram, UGEO H60 is composed of TI(Transducer Interface) board, TR(Transmit and Receive) board, PI(PC Interface) board, I/O board and SMPS, and AC power.

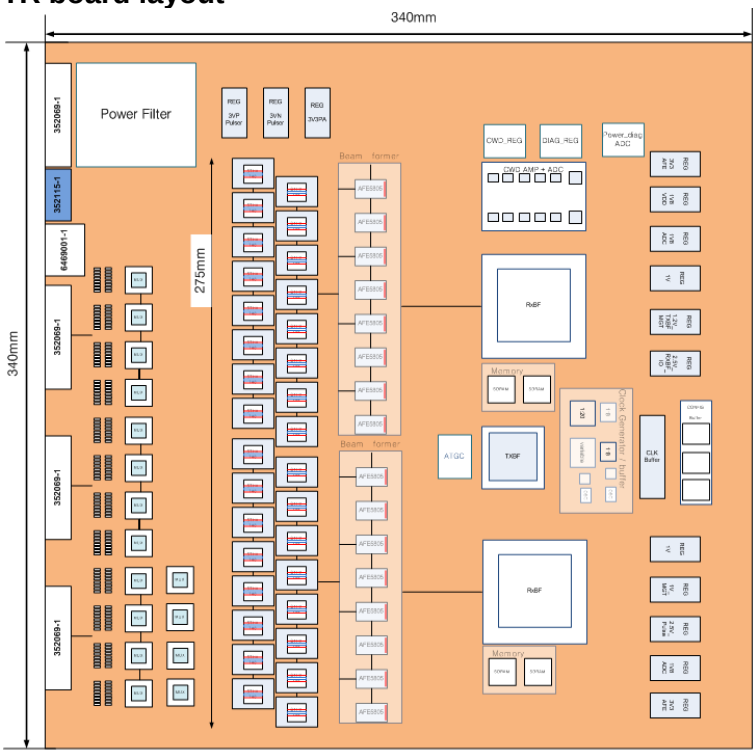
TI board is composed of connector and relay in order to connect 4 array transducers and 1 pencil probe.

5.3.3 Functional Specifications

- Local Power distribution
- LV/HV Power Switching
- 4 Probe Port Support
- Pencil Probe Support
- Probe type reading
- UX Interface support
- Mechanical 4D Support
- TEE Probe Support
- Diagnostic function support
- Probe Temperature monitoring

5.4 TR (Transmit and Receive) Board

5.4.1 TR board layout

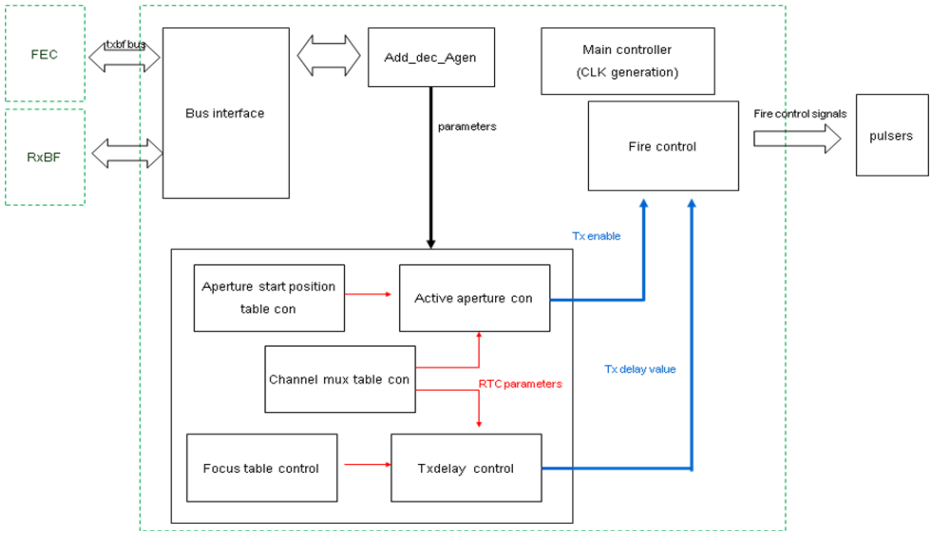


[Figure 5-3] TR board layout

5.4.2 Description

TR board is primarily responsible for receiving and sending ultrasound and is composed of diagnostic circuit, HV mux, pulser, AFE(analog front-end) IC, TxBF and RxBF. Diagnostic circuit is used for verifying receiving and sending signals and HV mux operates transducer of max 192 elements. It is composed of 128 channel pulser for transmitting ultrasound and 128-channel TxBF IC controls TX focusing. AEF amplifies received ultrasound signal and performs to receive in RxBF by AD converting. At this time, AEF is composed of LNA which amplifies signal by fixed rate and PGA which has the amplified value of variables and VCA AMP which is responsible for attenuation and ADC for 12bit AD conversion. Rx focusing is processed with two RxBFIC. Each RxBF handles 64-channel 2 multi-beam, in total of 128-channel 2 multi-beam focusing.

• TXBF FPGA (Spartan6 SLX 150)



[Figure 5-4] TXBF Block Diagram

TxBF is located on TR board and is implemented using Spartan6 SLX 150 FPGA of Xilinx.

The function of this block selects elements which would fire pulse, calculates firing delay and implements pulse for firing according to the delay. This is designed so that it could control maximum of 256 elements.

• Pulser(HV748)

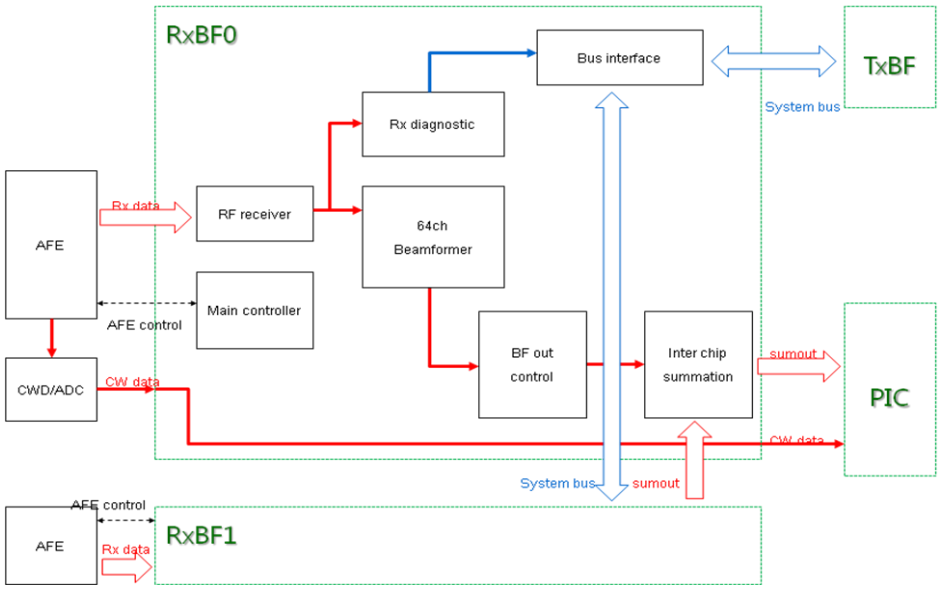
It amplifies fire control signal received from TxBF for operating Probe to maximum of ±100V and sends to probe. Through HV switch, it adjusts Tx, Rx time and also performs the feature of limiter. Especially, Europa has multi-purpose pulser which can support both PW, CW mode and is designed to support maximum 64ch.

• AFE(Analog Front End) IC (AFE5808)

Received ultrasound signal is automatically amplified to 12,18,24dB at low noise amplifier (LNA).

Amplified signal is entered as VCA attenuator and is attenuated according to each depth by referencing ATGC curve, and attenuated signal according to each depth is entered into PGA and is re-amplified to 24,30dB. Amplified, attenuated, amplified signal is entered into AD convertor and is converted to digital value. Also, it creates IQ signal for doppler and outputs CW I/Q Out by analog summing in CW mixer.

• RXBF FPGA (XC6VLX130T)



[Figure 5-5] RxBF Block Diagram

Main controller creates clock needed for various blocks of internal RxBF, by receiving the input of 40Mhz Clock.

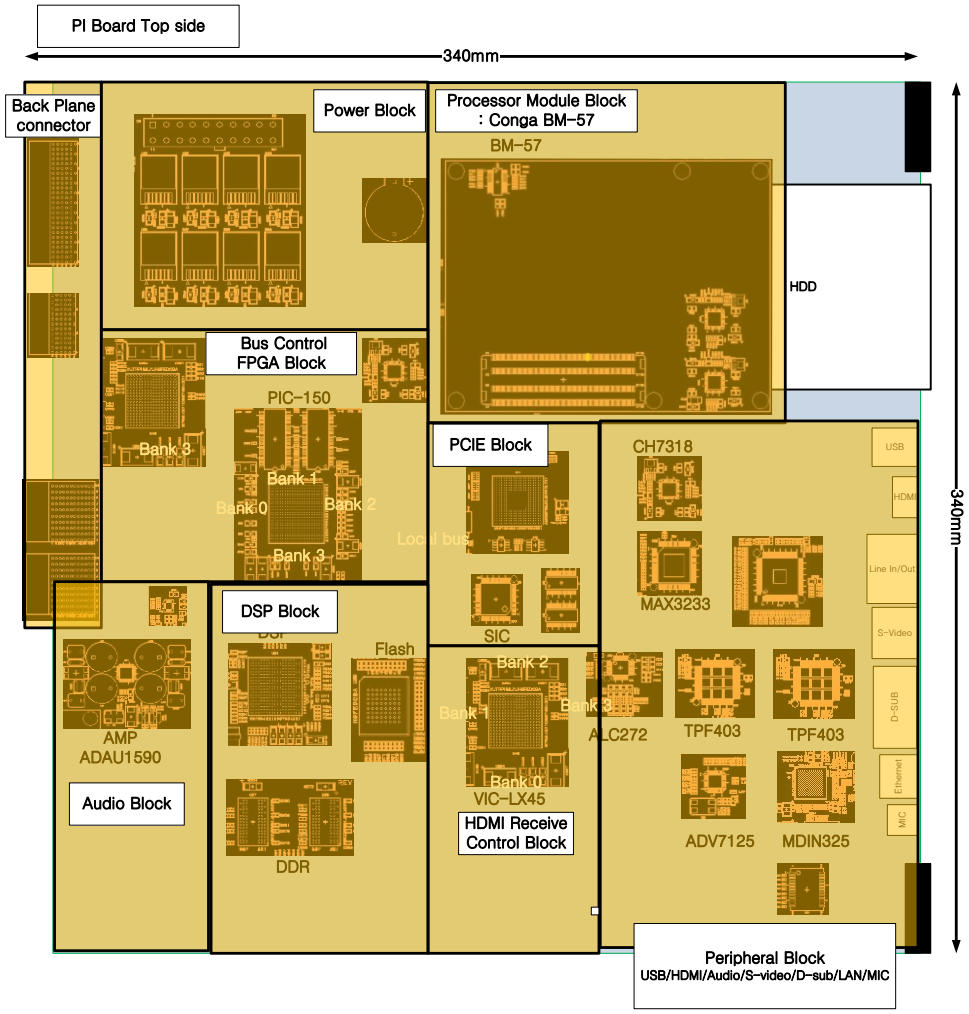
RF receiver receives the 128-channel receiver signal from 8 AFE.

Beamfomer, a core part of RxBF, serves the feature of Receive Dynamic Focusing and Apodization.

BF out control helps selectively outputting beamformed result, test pattern and ADC data.

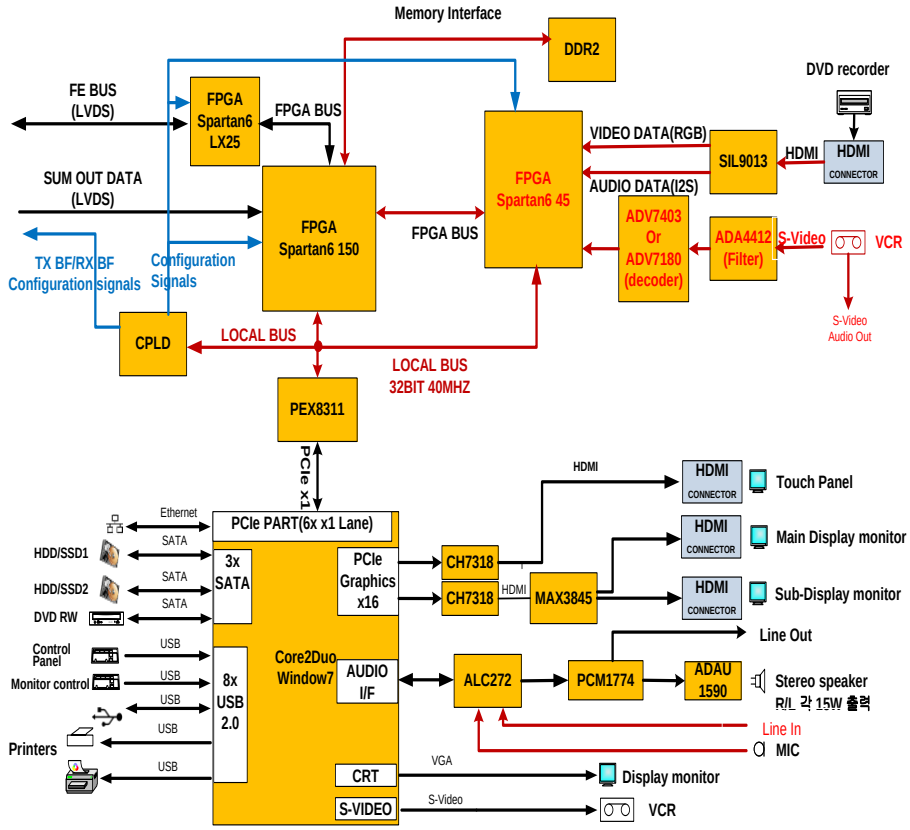
5.5 PI (PC Interface) Board

5.5.1 PI board Layout



[Figure 5-6] PI board Layout

5.5.2 PI Board Block Diagram



[Figure 5-7] PI board Block Diagram

5.5.3 Description

PI board is composed of Intel® Core™ i5-520M, 2.4 GHz CPU module, FEC(front-end controller), PIC(PC interface controller) and SIC(system interface controller), which can operate Windows 7 of Microsoft.

Peripheral of PC system is implemented on PI board and separate I/O board.

FEC controls receiving and sending FPGA and element of TR board and TI board and delivers system bus data to TR board.

PIC communicates PCI-express bus with PC using PLX local bus and PEX chip, receives beam-focused signal from RXBF and delivers it to PC after processing signals.

SIC manages configuration and board ID of FPGA.

5.5.4 Processor Module

- CPU : Intel® Core™ i5-520M, 2.4 GHz (32 nm process, 3MB cache,1066 MHz)
- DRAM : 2 Sockets, SO-DIMM DDR3 1066 MHz, up to 8 GByte
- Chipset : Intel® 5 Series Chipset: Intel® HM55
- Sound : Digital High Definition Audio Interface with support for
- multiple audio codecs
- Graphics : Processor integrated Mobile Intel® 5 Series HD graphics

5.5.5 CPLD (SIC CPLD XC2C256-7VQG100C)

- FPGA Program download
- Audio and Display device control
- Manages System Board ID

5.5.6 PIC (PC interface controller, PIC FPGA XC6SLX150-2FGG484)

- Back End Processing
- System Real Time Control
- PC Interface (PCI-Express)

5.5.7 FEC (PC interface controller, FEC FPGA XC6SLX25-2CSG324C)

- Manages System Board Temperature
- TX/RX Path Diagnosis
- Supports Auto Time Gain Compensation

5.5.8 HDD

- Model : HM321HI
- Specification : 320GB / 5400rpm / 8M

5.5.9 Peripheral

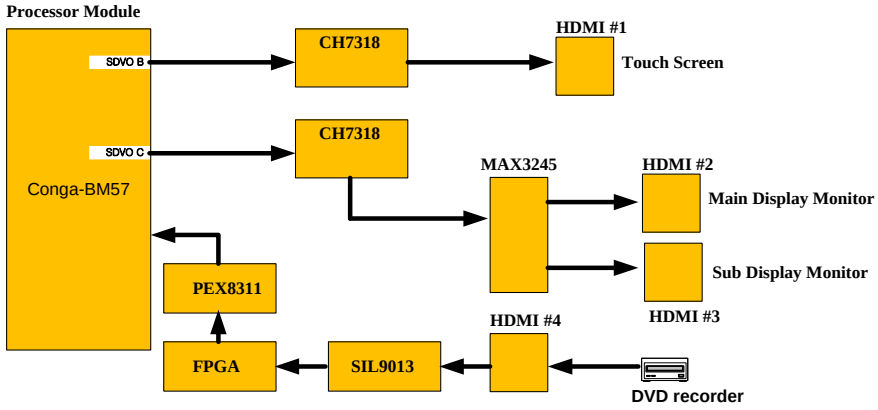
- S-VHS OUT

- Audio R/L OUT
- Audio Line OUT
- LAN
- USB 8 Port
- HDMI OUT 3 Port
- RGB 1 port
- SATA 2 port
- HDMI Line IN
- S-VHS IN
- MIC
- Audio Line IN

5.5.10 PEX8311

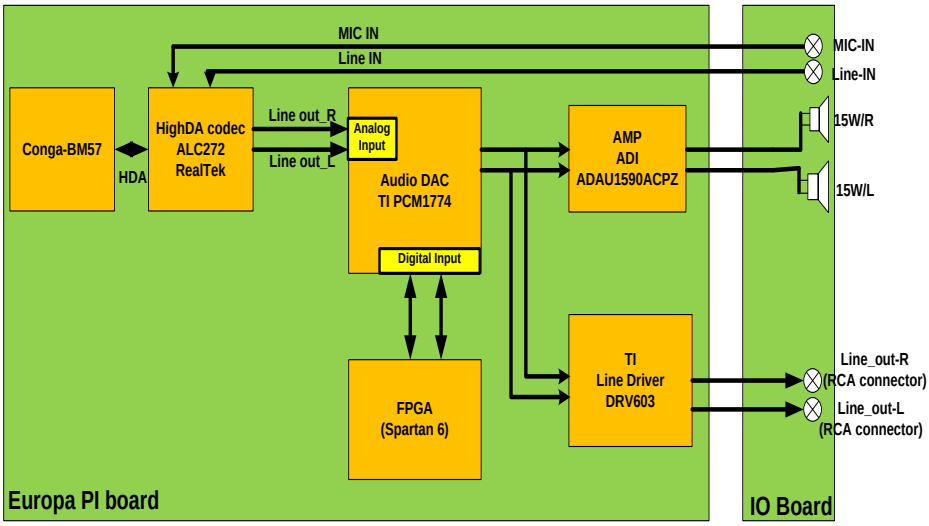
- PC interface : PCI-Express to Local bus

5.5.11 HDMI Port Block



[Figure 5-8] HDMI Port Block Diagram

5.5.12 Sound Block



[Figure 5-9] Sound Block Diagram

5.6 Main Monitor

5.6.1 Main Monitor Specification

Item	SPECIFICATION	UNIT
Display area	18.5 inches	inch
Number of Pixels	1366 x 768	pixels
Pixel Pitch	0.100 x RGB(H)mm ×0.300(V)mm	mm
Pixel arrangements	1366 hor. by 768 vert. Pixels RGB stripe	
Display colors	8bit, 16,7 M colors	
Viewing angle	Viewing Angle Free [R/L 178(typ.), U/D 178(Typ.)]	
Display mode	Transmissive mode, Normally black	

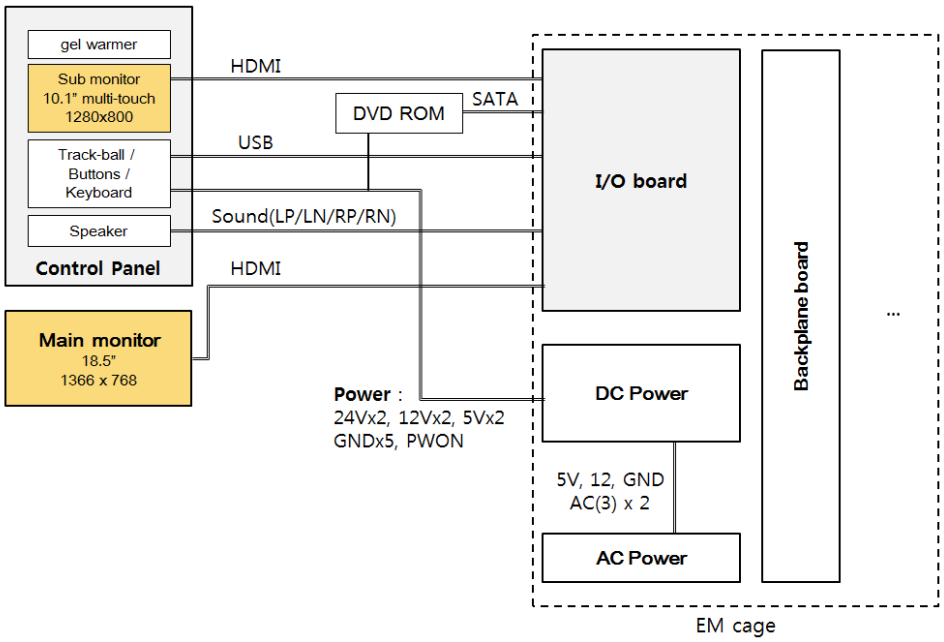
5.7 Touch Screen

5.7.1 Touch Screen Specification

Item	SPECIFICATION	UNIT
Display area	216.96 (H) x 135.60 (V) (10.1”diagonal)	mm
Driver element	a-Si TFT active matrix	
Display colors	16.2M	colors
Number of pixel	1280 x 800	pixel
Pixel arrangements	RGB vertical stripe	
Pixel pitch	0.1695(H) x 0.1695 (V) (TYP.)	mm
Display Mode	Normally Black	
Surface treatment	Hardness 3H	

5.8 I/O Board

5.8.1 I/O Board cable Diagram



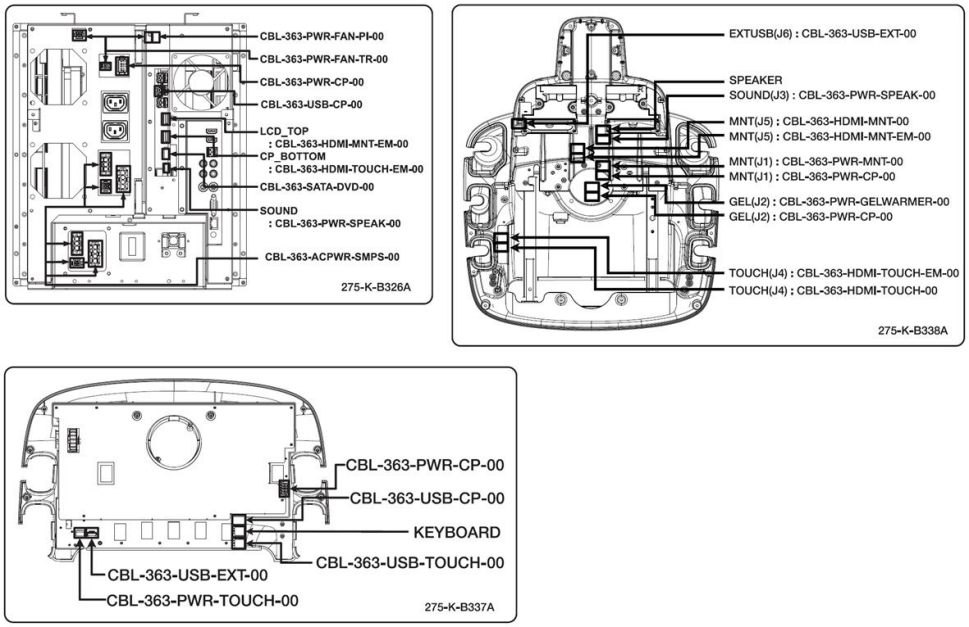
[Figure 5-10] I/O Board cable Diagram

5.8.2 Description

Internal system body, control panel and monitor are connected through cable and the items are as in [5-10]. USB is connected to touch controller and USB expansion port of keyboard, trackball and sub-monitor through internal hub of control panel.

- Output printer image signal of BW printer, Color Printer or Laser Printer
- Output Main Monitor, Touch Panel, DVD Driver, SPK signal
- Connects Track Ball
- Motor Control Part

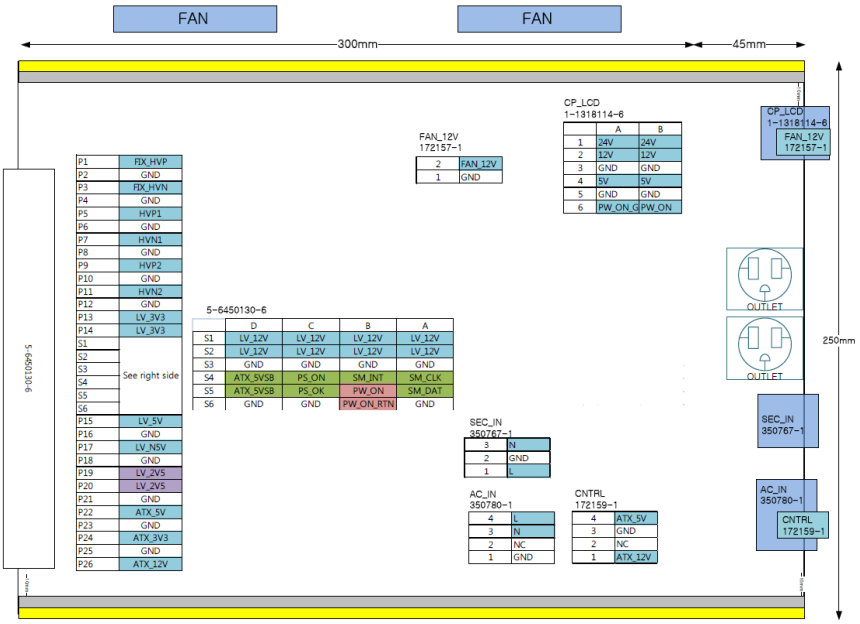
5.8.3 system grappling



[Figure 5-11] system grappling

5.9 DC POWER

5.9.1 DC Power Layout



[Figure 5-12] DC POWER layout

5.9.2 Description

Dual DC POEWR assy is supported with Isolated Ac power from AC power assy and generates Hi voltage and Low voltage which Europa system needs.

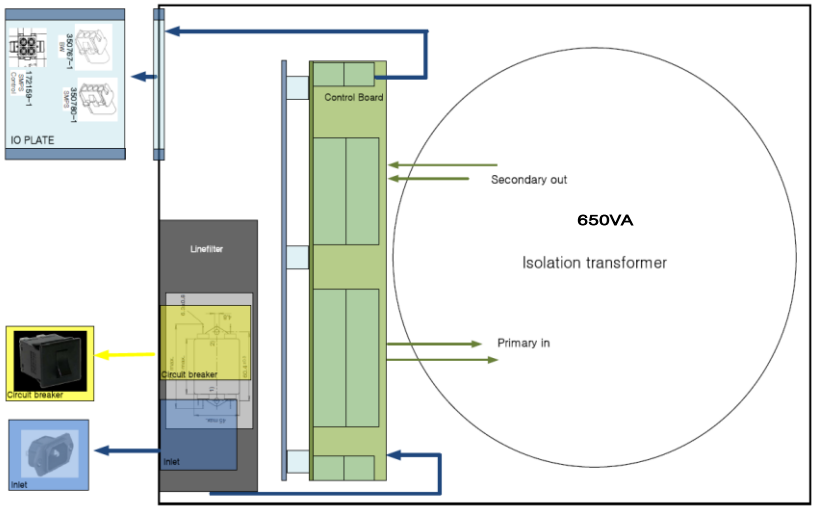
It also outputs secondary AC power supplied from AC power assy to OUTLET port for peripheral.

DC Power assy is composed of 6 high voltage modules and 2 low voltage modules. Hi voltage module is composed of +- 100V, +-80V, +-50V, while 2 low voltage modules are composed of ATX module for digital component, such as PI board, and LV power module which is analog front end type, such as TR, TI

In order to adjust amplitude of TX pulse, HV can generate variable HV out from receiving control of system by using serial interface.

5.10 AC POWER

5.10.1 AC Power Layout



[Figure 5-13] AC POWER layout

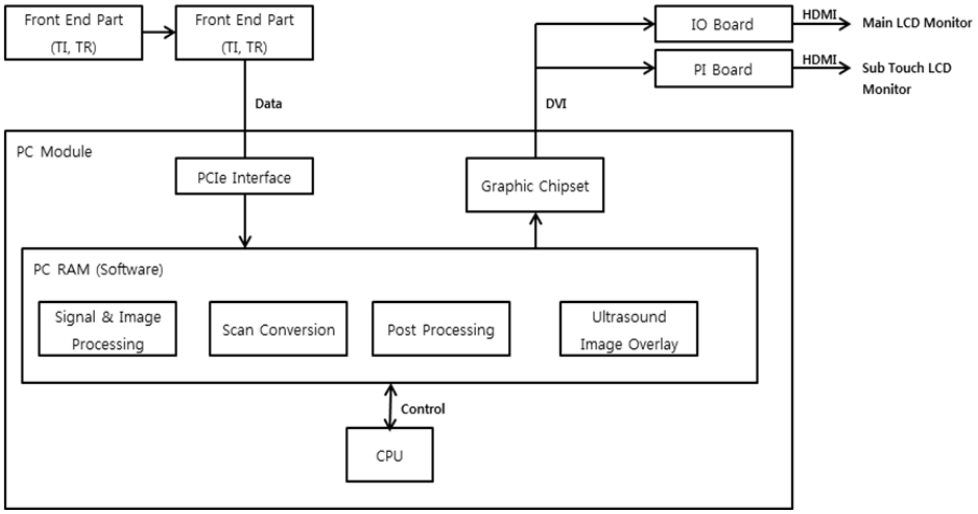
5.10.2 Description

Dual AC POWER physically and electrically isolates 1st phase AC power supplied by wall power, using isolated transformer. With ACPC ASSY which controls inrush current, it can effectively reduce initial inverted current and raise stability and reliability while operating the system.

AC power ASSY is composed of Circuit breaker which controls input over current, line filter for maneuvers EMC conduction, ACPC board which controls AC power distribution and inrush current and OUTLET port which supplies AC power on 600VA isolated transformer and system peripheral..

5.11 Soft ware DSC

5.11.1 Soft ware DSC Block Diagram



[Figure 5-14] Software DSC Block Diagram

5.11.2 Description

UGEO H60 outputs ultrasound receiving EQ Data through software scan conversion through signal processing and image processing with software.

Data received from Front End are copied to PC memory through DMA, are processed with program required for signal processing, image processing (including Scan Conversion) and ultrasound imaging, and are implemented to monitor image through output DVI (Digital Video Interface) through Graphic chipset.

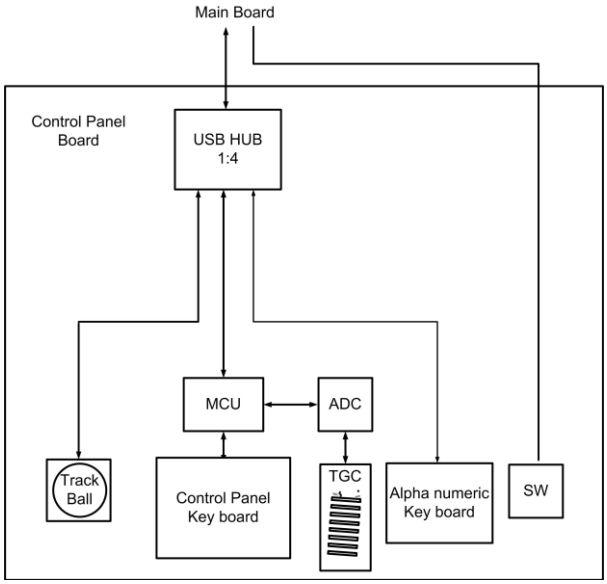
5.11.3 Specification

- IQ Signal and Image Processing
- Cine up to 45,000 frames
- Loop up to 14,000 lines
- Write Zoom
- SDMR (Optional)
- Spatial Compound Imaging™ (Optional)

- S-Flow
- Quick Scan
- Doppler Auto Trace and real-time Auto Calculation
- Post image optimization – Post Gain, Image Flip, Read Zoom, Map, Image Size
- Post measurement

5.12 Control Panel

5.12.1 Control Panel Block Diagram



[Figure 5-15] Control Panel Block Diagram

5.12.2 Description

Control Panel serves feature of interface between the users and system

Key Matrix Board, Touch Panel, Alpha-Numeric Keyboard, Track Ball serves the feature of User Interface. It is connected to Key Matrix Board, Alpha Numeric Board and Track Ball through USB HUB, and they operate upon user's command.

5.12.3 Specification

- USB Host Support
- USB Alpha Numeric Board
- USB Track Ball
- USB Key Matrix Board
- TGC Control
- Lamp Board
- Power Control Support

- Printer Remote Support
- Foot Switch Support

Samsung UGEO H60 Service Manual

6 Service Mode

SAMSUNG MEDISON

6 Service Mode

6.1 Overview

Chapter 6 describes the service mode for repairing UGEO H60.

It describes the means of version up, back up and entering service mode.

Table of Contents

6.2 Service Mode

This chapter describes the main features offered in Service mode.

These are the features for settings and adding and deleting options.

6.2.1 Entering Service Mode

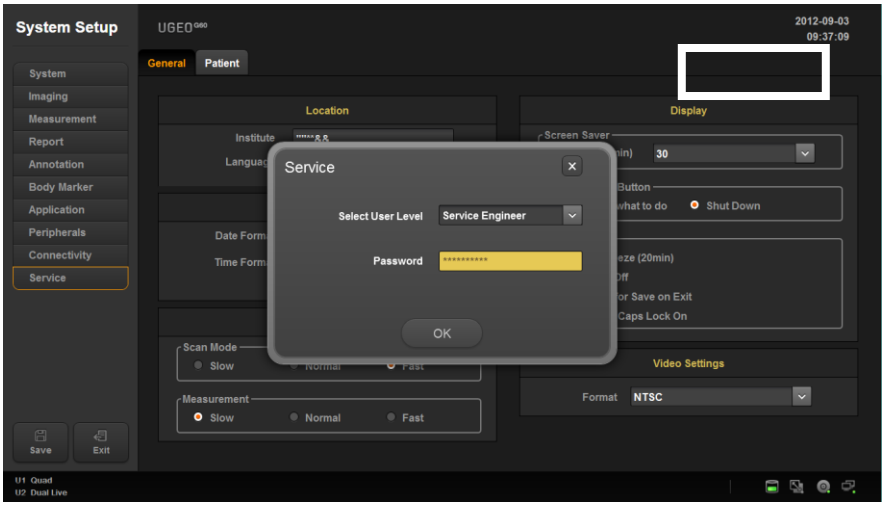
1) Press Setup button on alpha numeric keyboard.

2) Click Service Mode on the left bottom.

3) Set service Engineer for Select User Level.

4) Type " **********" in the Password Box.

3) It enters into Service Mode when the password is correct.

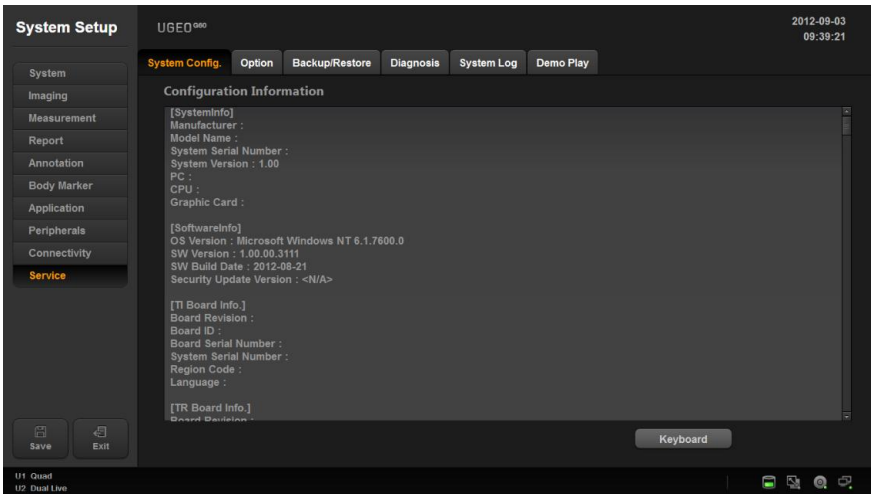


[Figure 6-1] Admin Mode

6.3 System Information

Select [System Config] tab in Setting screen for system information.

Detailed information about H/W version, S/W version and each Version of Board.



[Figure 6-2] Setup-Information

NOTE	The S/W version of figure above may differ from the actual system.

6.4 Adding and Deleting Options

This describes the procedure of adding and deleting option in UGEO H60.

Adding and deleting procedure of option means the method of Unlock / Lock, where Unlock refers to the state where Option is enabled and Lock refers to the state where Option is disabled.

6.4.1 Types of Option

This lists the option software.

Options : lists the option software which can be installed on this product. The option software for UGEO H60 is as follows.

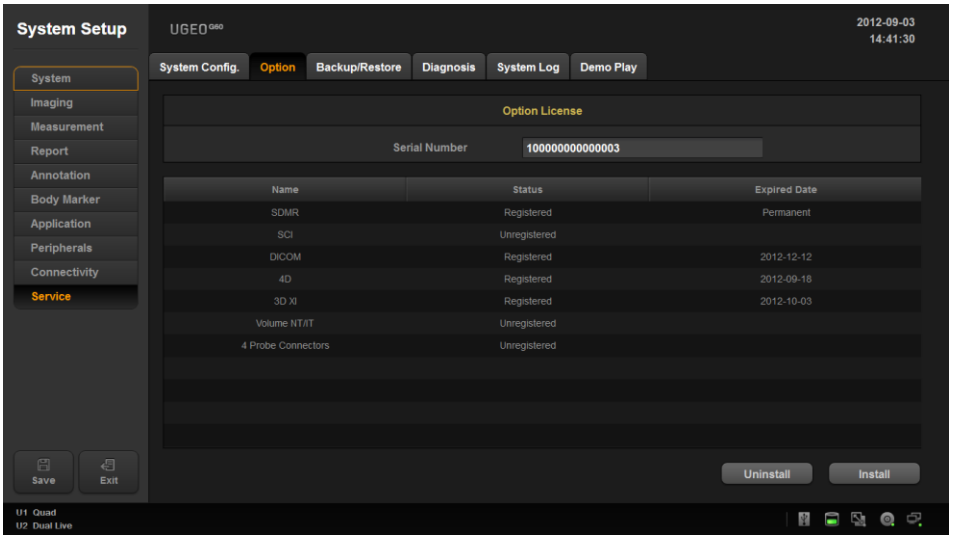
4D	SDMR
3D XI	
Volume NT & IT	
DICOM	

6.4.2 Registration of Option

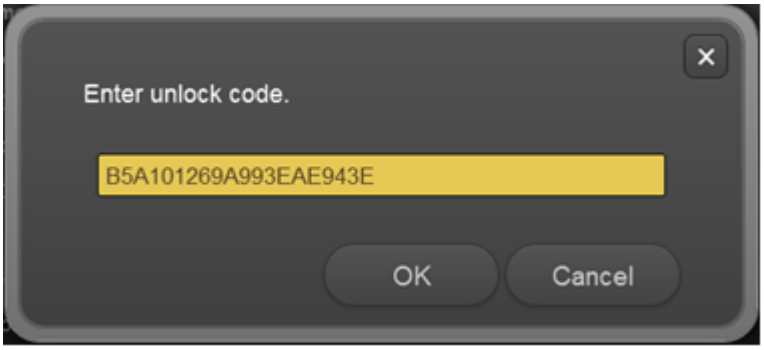
6.4.2.1 Entering Option Password

This describes the procedure of unlocking option by typing password.

1) Switch to Service Mode. Refer to 6.1.1 Entering Service mode.
2) Select the Option to add, click install button on the bottom right and enter password.
3) When the password is correct, press [OK] and reboot the product.



[Figure 6-3] Disabled Option Tab



[Figure 6-4] Input Option Password

6.4.3 Deletion of Option

This describes the locking of option.

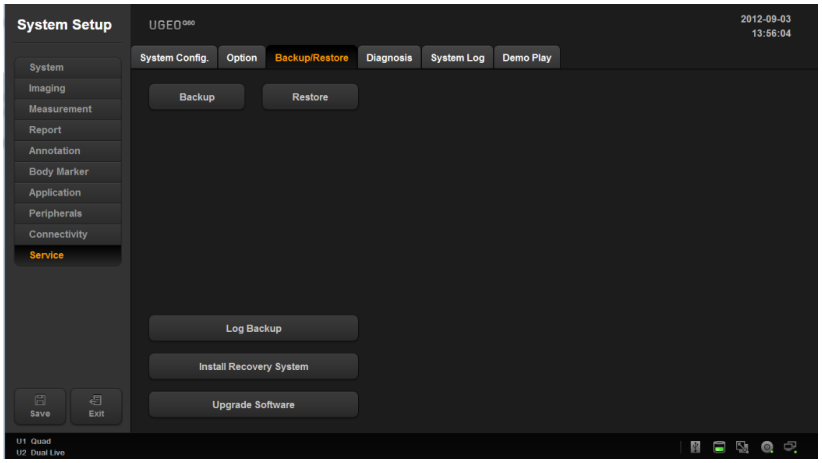
1) Switch to Service Mode. Refer to 6.1.1. Entering Service mode.
2) After selecting the option to delete and clicking Uninstall button on the bottom right, delete Password in Password Box.
3) If the Password has been deleted, click [OK] and reboot the product.

6.5 Back Up & Restore

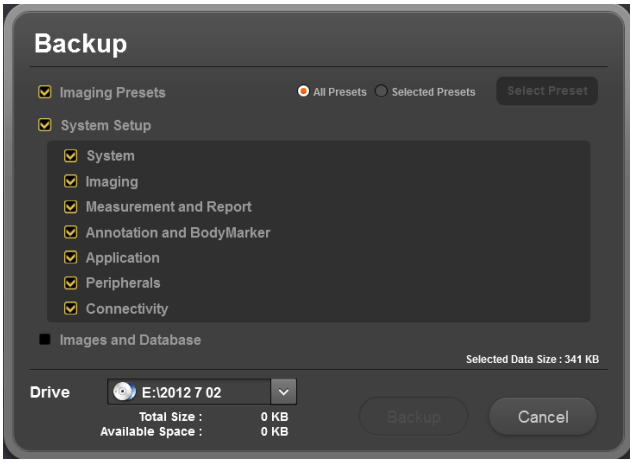
6.5.1 Backup

This is a feature which backs-up the user setting to the external media, which is only available in Service Mode.

1) Switch to Service Mode. Refer to 6.1.1. Entering Service mode.
2) Back up window pops up when clicking [Backup] and User settings Item and Backup Media can be selected.
3) Conduct Backup when clicking [Next].
4) When Backup is complete, reboot the system.



[Figure 6-5] Back up & Option



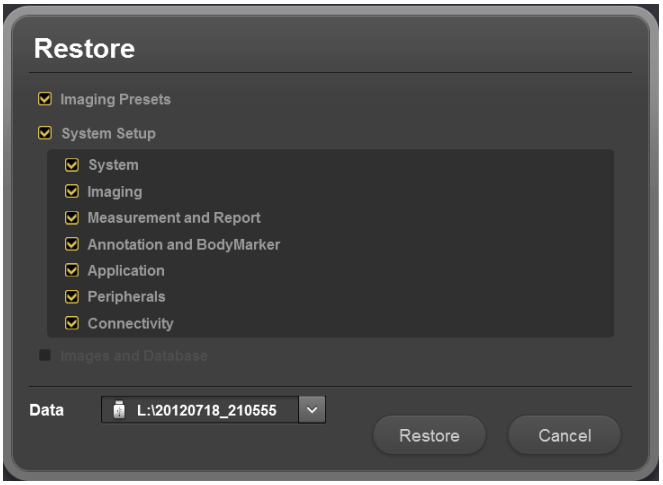
[Figure 6-6] Conducting Back UP

6.5.2 Restore

This is a feature which re-install backed-up user settings to the product, which is only available in Service Mode.

1) User setting Item and Backup Media can be selected in [Restore] screen.

2) The feature is operated when clicking [Restore].



[Figure 6-7] Restore

6.5.3 Log Backup

After inserting USB to the USB Port located in the upper left of touch screen, click Log Backup and it will save all log files of system in USB memory.

6.5.4 Install Recovery System

Recovery files built into system for repairing or installing OS

1) Pressing Install Recover System button will initialize everything on the system to the factory default.

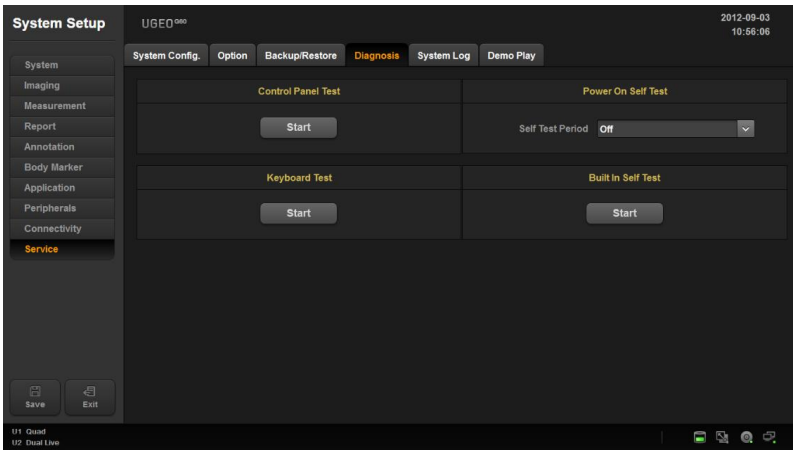
6.5.5 Up − Grade SoftWare

1) After inserting CD or USB, which has upgrade files, into CD drive or USB port and pressing Up-grade Software button will automatically proceed to the upgrade.

6.6 Diagnosis

UGEO H60 has self-diagnostic program which autonomously check the abnormality of the system. System engineer can easily find the detective part through this feature.

.

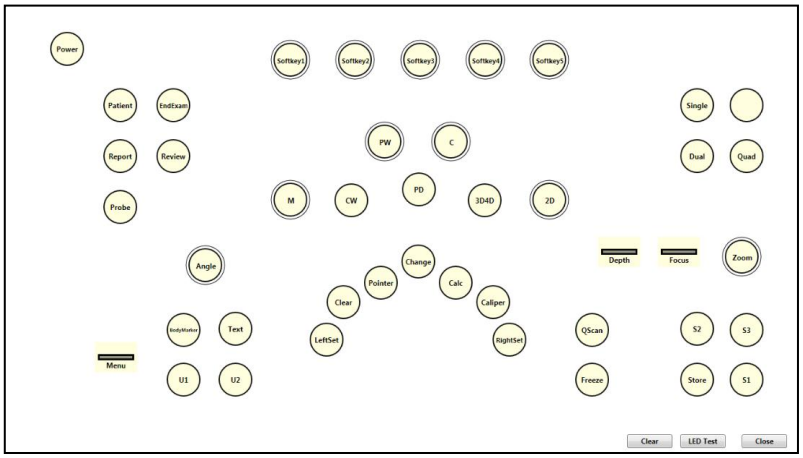


[Figure 6-8] Diagnosis

6.6.1 Control Panel Test

Clicking Start button will show the Key layout of control Panel.

With red mapping, you can check abnormalities every time you press each key.



[Figure 6-9] Control Panel Key Layout

6.6.2 Power On Self Test

Power On Self Test feature can perform self-diagnosis on Power every time you turn it on, weekly or monthly. Test result can be found in the system log.

6.6.3 Keyboard Test

Pressing Start button will show the Keyboard layout.

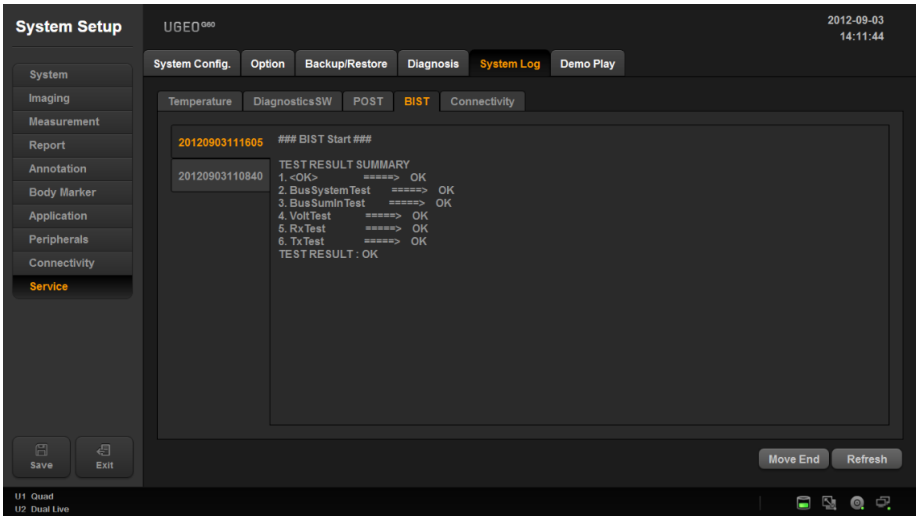
With red mapping, you can check abnormalities every time you press each key.

[Figure 6-10] Alpha Keyboard Layout

6.6.4 Built In Self Test

Built In Self Test feature performs self-diagnosis throughout the whole system and record abnormalities for each system log.

You must remove Probe before the test.



[Figure 6-11] Self Test Result Report

6.7 DICOM

6.7.1 Network Settings

- Pathway : Setup > Connectivity > Network Tab
- Settings

Automatic IP (default)

1. Check DHCP
2. Click Apply button

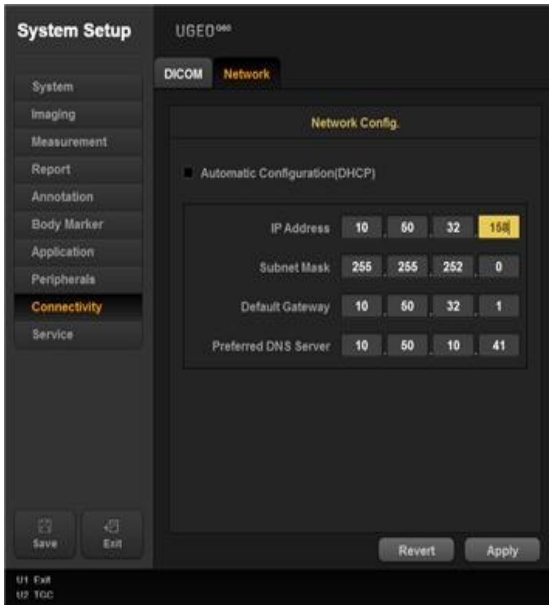
※ Revert button (identical fixed IP)

- Undo feature for the current input. When clicked, set the input as the past setting input.

※ Enabling button (identical fixed IP)

- Revert, Apply buttons are enabled only when the new input exists.

Fixed IP



1. Uncheck DHCP
   (text box appears)
2. Input IP ,Subnet,Gateway, DNS
3. Click Apply button

6.7.2 Network Status Notification

- Location of Notification: Status Bar at the bottom of the screen
- Condition of Notification: Status available for using network (ex. LAN cable connection
- Content

Classification	Network is available	Network is unavailable
Message (Bottom Left)		
Icon (Bottom Right)		

※ Irrelevant to the available status of the network and IP connection result.

6.7.3 Network /DICOM Test

- Pathway : Setup > Connectivity > DICOM
- Method : Clicking Verify button after clicking the server list in input.
- Content

Classification	Ping	Verify
Success	• No abnormalities in IP connection of the device • Success in Ping with external network	•Availability in connection with DICOM server
Failed	• Need to check the contents with data processing team [Expected Case] • Fail in network IP connection of device - IP conflict - Wrong IP address, etc * Server connection firewall issues - External Ping Block, etc	• Need to check the contents with data processing team [Expected Case] • Input error of DICOM server - IP, AE Title, Port • Security settings of DICOM Server - Check the information registration of the equipment (AE Title, Port, IP, etc) - Check the server allowed IP registration (firewall) - Others
Screen		

Samsung UGEO H60 Service Manual

7 Diagnosis

SAMSUNG MEDISON

7 Diagnosis

7.1 Overview

Chapter 7 describes the cause of product failure which can be diagnosed at the basic level.

NOTE	Exceptional circumstances may occur because only the parts with possibility of defect are described. This describes about the general defects.

Table of Contents

7.2 Power

7.2.1 Power does not turn on

AC power cord is not plugged or defect of DDM (DC to DC Power Module) is expected.

1) Check the upper body of AC power cable.

2) Check if the power outlet operates by connecting it with other devices.

If other devices work, it is the DDM (DC to DC Power Module) defect.

If other devices do not work, it is the power outlet defect.

3) Check if System FAN works.

If FAN works there is a bigger possibility of other type of defect than DDM (DC to DC Power Module) defect.

If FAN does not work, DDM defect is expected.

4) Connect DDM (DC to DC Power Module) and AC power cable.

7.2.2 Power does not turn off

There is a defect in operation of software or PC Mother Board or Main Board defect is expected.

1) Pressing Power Switch for more than 3 seconds will turn it off.

When the operation of software such as printer or when OS error occurs, power does not turn off.

2) If it does not turn off with "1)" method, PC Mother Board or Main Board defect is expected.

7.2.3 Power turns off automatically

Power cable, PC Mother Board or Main Board defect is expected.

1) Check the connection status of power cable and check if block switch of ADM is turned on.

2) Check if the power outlet works by connecting other devices.

If other devices operate, it is DDM (DC to DC Power Module) defect.

If other devices do not operate, it is the power outlet defect.

3) If it turns off automatically even with "1), 2)", defect of PC Mother Board, PCI Board, DVI Board and LCD IF Board is expected.

7.3 Monitor

7.3.1 Nothing is shown on the screen

This is the DVI Cable defect, or defect of monitor or PC Part is expected.

1) Check the status by printing.

If printing normally, defect of monitor or PC Part is expected.

2) Check cable status of monitor connection.

3) If the problem does not solve even with “1), 2)”, defect of monitor or PC Part is expected.

7.3.2 Screen color changes

This is DVI Cable defect of the monitor and PC Part, or defect of monitor or PC Part is expected.

1) Check cable status of monitor connection.

2) If the problem does not solve even with “1)”, defect of monitor or PC Part is expected.

7.4 Error Message

7.4.1 Product stops after error while booting

Temporary software error or product defect is expected.

1) Turn the product back on after 1~2 minutes after turning it off by force.

2) If the problem does not solve even with "1)", check when the error message occurred. If it occurred during WINDOWS 7 operation, defect of OS and PC Part is expected. If it occurred after UGEO H60 logo, defect of System Software and Ultrasound System Part is expected.

7.4.2 Product operates while having error

Temporary software error or product defect is expected.

1) Turn the product back on after 1~2 minutes after turning it off by force.

2) If the problem does not solve even with "1)", check when the error message occurred. If it occurred during WINDOWS 7 operation, defect of OS and PC Part is expected. If it occurred after UGEO H60 logo, defect of System Software and Ultrasound System Part is expected.

7.5 Image

7.5.1 No BW Mode Image Echo & No BW Mode Image Format

The poor contact of probe and the product or defect of Main Board of DDM is expected.

1) Check if there is a poor contact of the probe and the product.

2) Check if there is a probe operating noise.

If there is a probe operating noise, defect of DDM is highly expected.

3) If the problem does not solve even with “1), 2)”, defect of Main Board is expected.

7.5.2 Lining Phenomenon on BW Mode Image (Noise)

Power noise or defect of Main Board is expected.

1) Check if it is sharing the power outlet with other devices.

Noise can occur if it shares the power outlet with electric motor or other devices which use large amount of electricity.

2) Check if the symptom happens in the other room with power outlet.

If it happens, the symptom is determined to be from the power noise.

3) If the problem does not solve even with “1), 2)”, defect of Main Board is expected.

7.5.3 PW Mode, Color Mode, M Mode Failure

Defect of Main Board is expected.

7.6 Error Code

Error Code	Defect Component	Remarks
2F100001	PC Part	
2F110001 ~ 2F110002	BE Board	
2F110003 ~ 2F110004	BE/TI/TR Board	Check error log for details
2F110005	BE Board	

[Table 7-1] Error Code Table

Samsung UGEO H60 Service Manual

8 Assemble and Disassemble

SAMSUNG MEDISON

8 Assemble and Disassemble

8.1 Overview

Chapter 8 describes the assembling and disassembling of UGEO H60.

Refer to it when upgrading the hardware of repairing the breakdown.

⚠ **WARNING**	A dangerous high voltage is flowing inside the product. Do not disassemble the product. There is a risk of electric shock which can cause physical disability. Repair or replacing parts of the product should be conducted only by Samsung Medison Co., Ltd. Global technology support group or the authorized engineers. Manufacturer shall not be responsible for any physical disability or material damage, caused from ignoring this warning.

⚠ **WARNING**	Do not wear antistatic bracelet when operating with the product turned on. There is a risk of electric shock which can cause physical disability.

NOTE	Wear antistatic gloves and bracelet when disassembling and assembling product. This could prevent accident of engineers and reduce the static defect of product.

[Figure 8-1] Antistatic gloves and bracelets

Table of Contents

8.2 Disassembling Front Panel

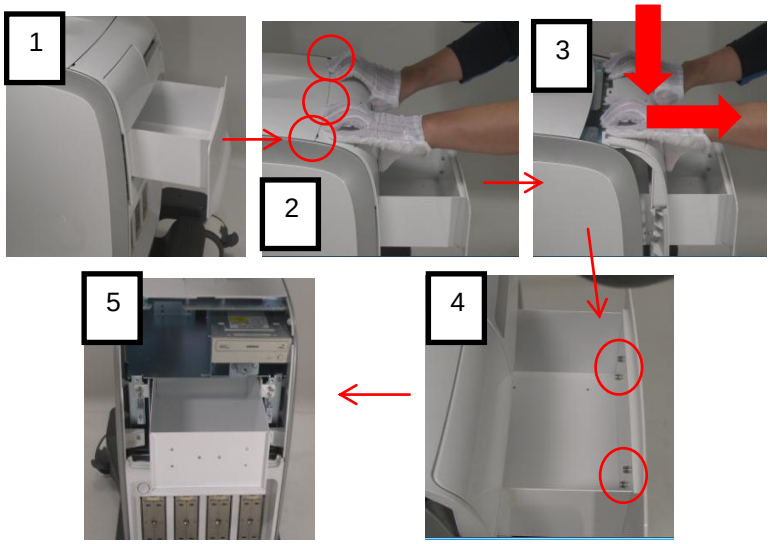
8.2.1 Preparation

Prepare a Phillips screwdriver and antistatic gloves.

Turn off the product.

8.2.2 Disassembling Front Cover

1) Open the cabinet of the top of the front panel.
2) Separate cover by pulling the top front cover with both hands with holding it down as the Figure below.
3) The 3 parts marked with red circles are made of hooks, so front cover can be opened by loosening the hook and pushing it down before pulling it.
4) Unscrew 4 screws of front cabinet and remove the cover.
5) Finally, completely remove front cover.

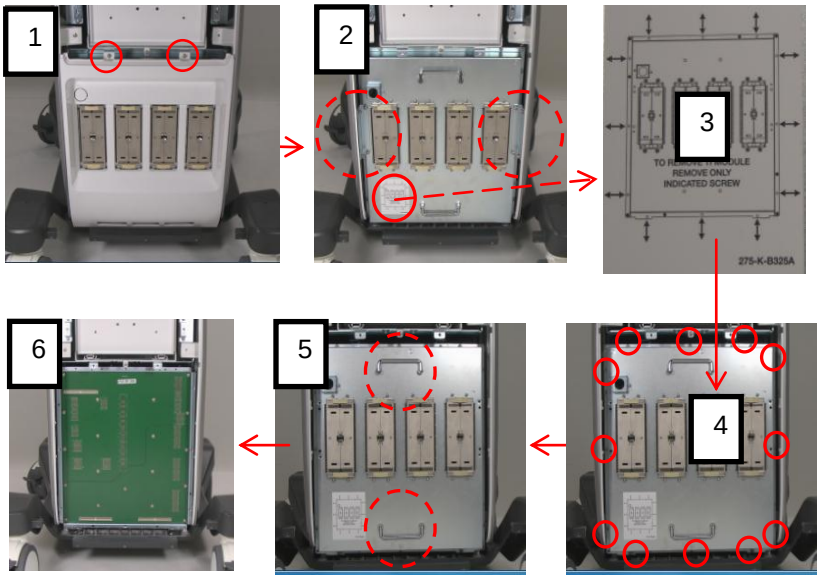


[Figure 8-2] Front Cover Open

8.2.3 Disassembling Transducer Interface Board

1) Remove 2 screws and separate TI cover.
2) Remove 8 screws and remove hinges on both sides (2).
3) After removing hinges, remove 12 screws marked with stickers on the bottom left of TI Board.

4) Finally, separate TI Board by carefully pulling it to the front with holding two handles.



[Figure 8-3] Disassembling TI Board

8.3 Disassembling Rear Side

8.3.1 Preparation

Prepare a Phillips screwdriver and antistatic gloves.

Turn off the product.

8.3.2 Disassembling Rear Side

1) Remove 10 marked screws and separate rear cover.

2) Remove 5 marked screws and remove protection cover of I/O cable.

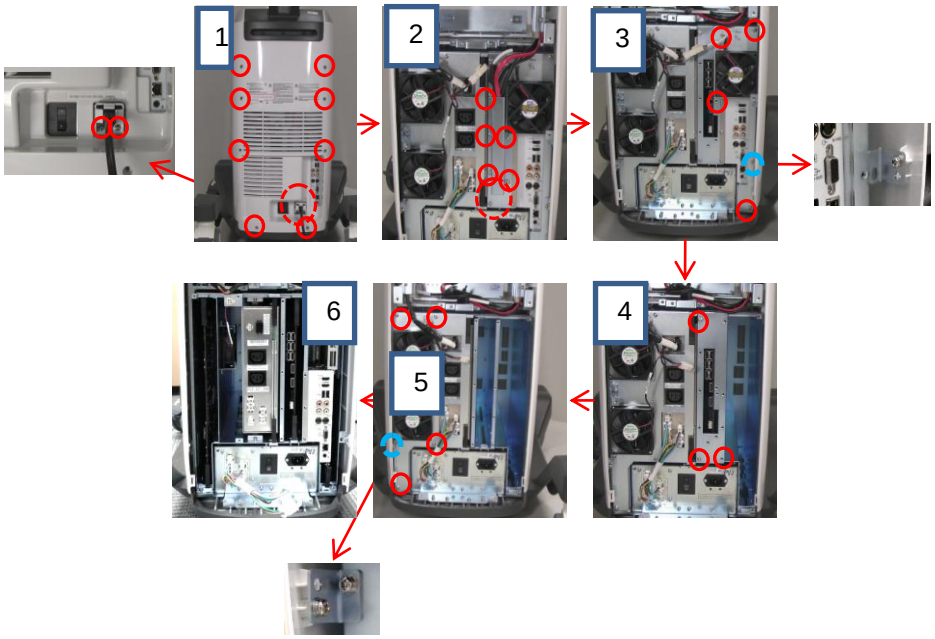
3) Remove 7 marked screws and remove PI Board Fan block.

At this point, remove hinges marked with blue for the first.

4) Remove 3 marked screws and separate I/O Board Panel.

5) Finally, remove 7 screws and separate TR Board Fan Block.

At this point, remove hinges marked with blue for the first.



[Figure 8-4] Disassembling Rear Side

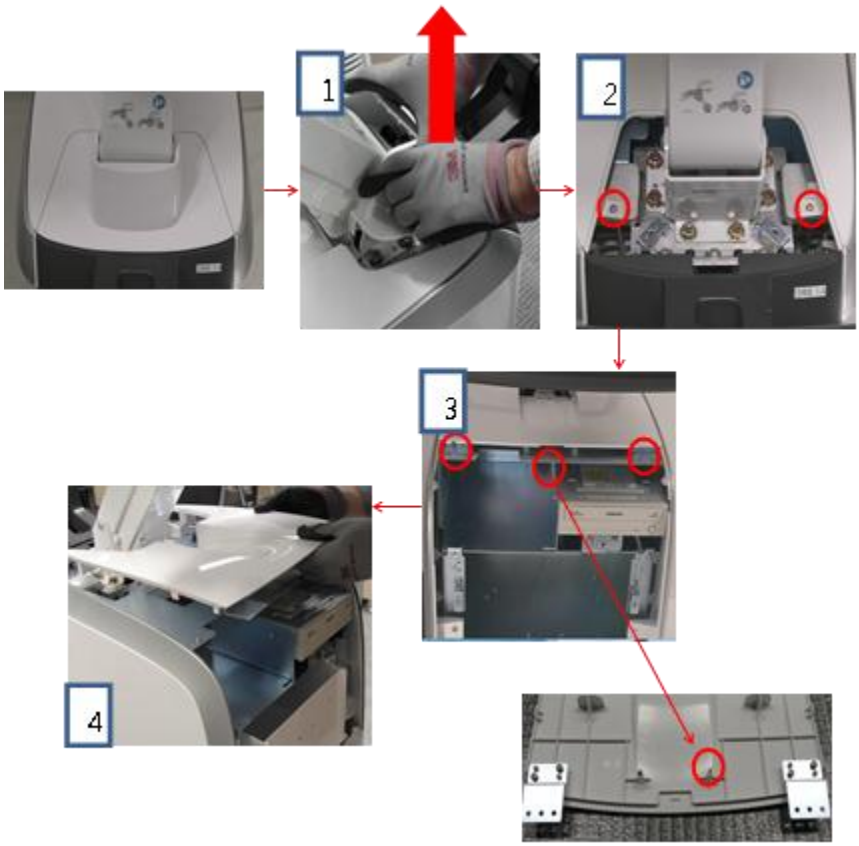
8.4 Disassembling Upper Panel

8.4.1 Preparation

Prepare a Phillips screwdriver and antistatic gloves.

8.4.2 Disassembling Upper Panel

1) Holding the neck cover of Europa tops as in the Figure, carefully pull it upwards. The bottom is fixed with hooks, so they are easily loosened when pulling it upwards.
2) Remove 2 screws that are securing the tops.
3) Remove 3 screws that are securing the tops.
4) Finally, separate it by carefully lifting the tops.



[Figure 8-5] Disassembling Upper Panel

8.5 Disassembling Side Panel

8.5.1 Preparation

Prepare a Phillips screwdriver and antistatic gloves.

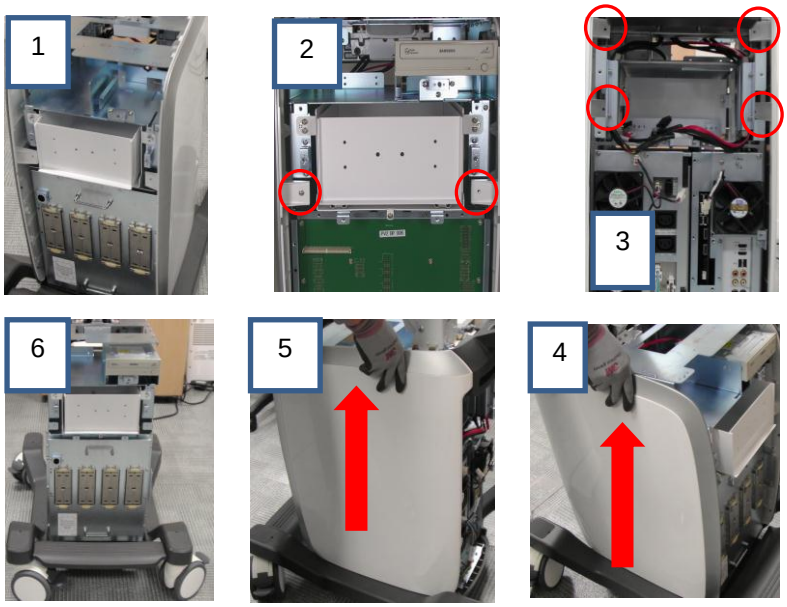
8.5.2 Disassembling Side Panel

1) Remove 2 screws on the front of the body.

2) Remove 4 screws on the back of the body.

3) Separate it by lifting the left-side case upwards.

4) Separate it by lifting the right-side case upwards.



[Figure 8-6] Disassembling Side Panel

8.6 Disassembling Control Panel

8.6.1 Preparation

Prepare a Phillips screwdriver and antistatic gloves.

8.6.2 Disassembling Control Panel

1) Adjust control panel to the appropriate height for easier work.

2) Remove 6 screws on the bottom left as in the figure.

3) Remove 6 screws on the bottom right as in the figure.

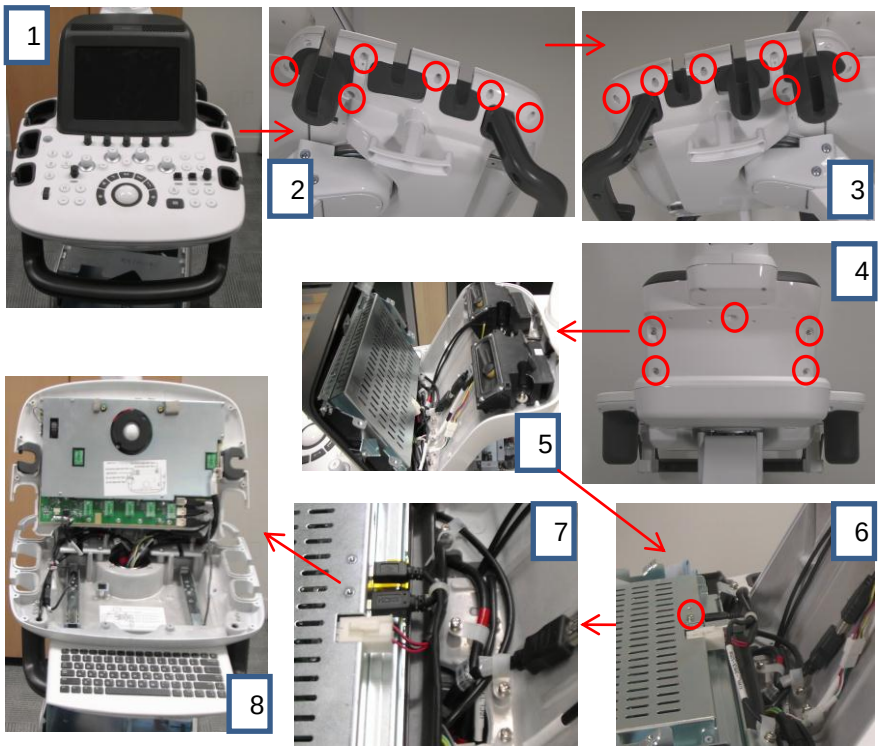
4) Remove 5 screws on the back of Touch Panel.

5) Separate Touch Panel by pulling it front as in the figure.

6) Remove protection cover for monitor connector on the back of Touch Panel.

7) Separate Touch Panel by unplugging connector on the back of Touch Panel.

8) Finally, separate Control Panel by lifting it upwards.



[Figure 8-7] Disassembling Control Panel

8.7 Disassembling LCD Monitor

8.7.1 Preparation

Remove Phillips screwdriver and antistatic gloves.

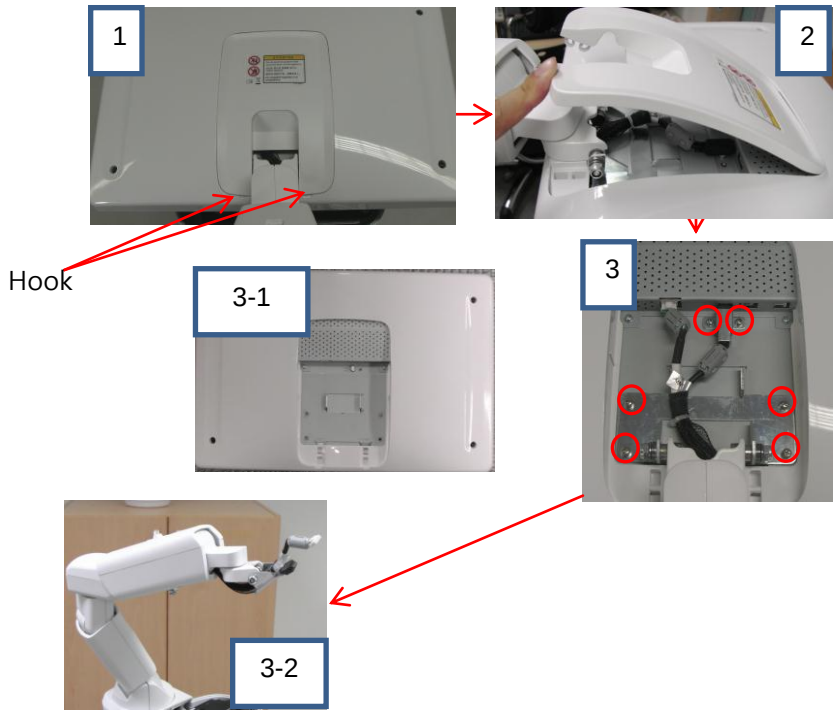
8.7.2 Disassembling LCD Monitor

1) Disable by pressing the hook on the back of monitor.

2) Remove cover by lifting it upwards.

3) Remove 6 screws on the back of monitor and separate cable.

4) Finally, completely separate Monitor ARM and LCD Module.



[Figure 8-8] Disassembling LCD Module

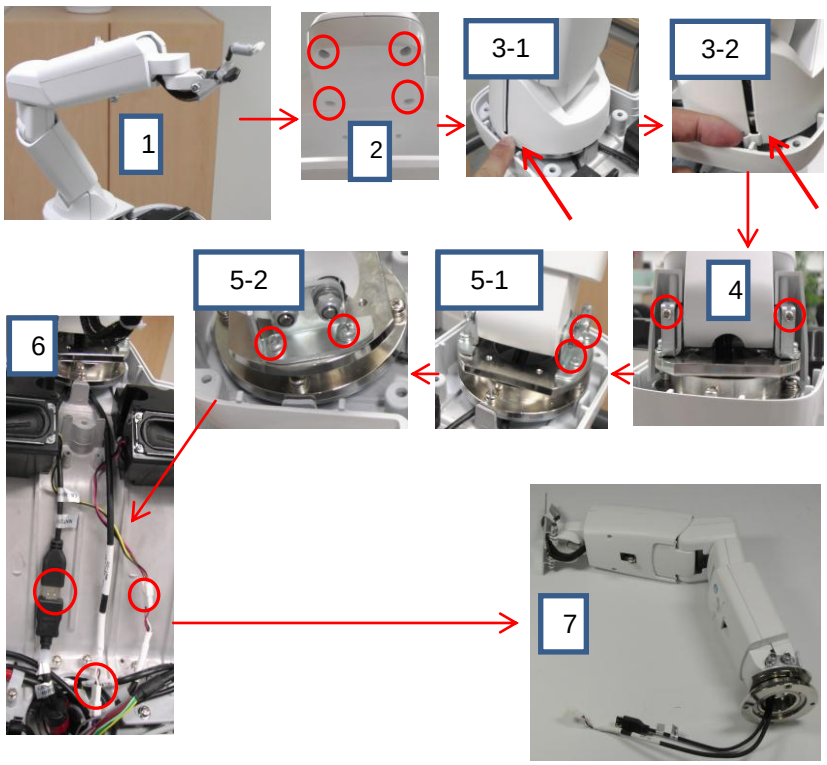
8.8 Disassembling Monitor ARM

8.8.1 Preparation

Remove Phillips screwdriver and antistatic gloves.

8.8.2 Disassembling LCD Monitor

1) Adjust Monitor Neck to the appropriate height for easy work.
2) Remove 4 screws using short driver.
3) Remove rear cover by loosening hooks on both sides.
4) Separate front Cap by loosening 2 screws.
5) Remove 4 ARM-fixing large screws.
6) Remove monitor power and signal connector as in the figure.
7) Finally, separate ARM.



[Figure 8-9] Disassembling Monitor Arm

Samsung UGEO H60 Service Manual

9 Probe

SAMSUNG MEDISON

9 Probe

9.1 Overview

Probe is a device transmitting ultrasound and receiving image data, and it is called Transducer or Scanhead.

This product limits the temperature that patients can handle to 43 degree Celsius, and the ultrasound output value complies with U.S. FDA restriction. Power protection fuse of this product protects itself from the overcurrent. If the power monitoring protection circuit detects the overcurrent, it immediately cuts off the current connected to the probe, so that it can protect itself from probe surface being overheated and limit the ultrasound output.

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9.2 Probe List

Ultrasound imaging device displays the imaging data of internal by using probe. Use appropriate probe for the corresponding diagnostic subject in order to obtain the best image.

In addition, it is recommended to set up the probe according to the characteristics of the body parts that you want to scan.

9.2.1 Diagnostic Subject and Settings for Probe

Types of probe and settings for diagnostic subject, available in this product, are as follows.

Probe	Diagnostic Subject	Settings
CS1-4	Abdomen	General, Aorta, Renal
	OB	1st Trimester, 2nd -3rd Trimester, Fetal Heart
	Gynecology	Uterus, Pelvis
C2-8	Abdomen	General, Aorta, Renal
	OB	1st Trimester, 2nd -3rd Trimester, Fetal Heart
	Gynecology	Uterus, Pelvis
CF4-9	Pediatric	Abdomen, Neohead
	Vascular	Carotid, Arterial, Venous
L5-13	Small Parts	Thyroid, Testicle, Breast
	Vascular	Arterial, Carotid, Venous
	Musculoskeletal	Shoulder, Hand/Foot, Knee/Elbow
ER4-9	OB	1st Trimester, 2nd -3rd Trimester
	Gynecology	Uterus, Pelvis
	Urology	Prostate
EVN4-9	OB	1st Trimester, 2nd -3rd Trimester
	Gynecology	Uterus, Pelvis
	Urology	Prostate
VE4-8	Abdomen	General, Aorta, Renal
	OB	1st Trimester, 2nd -3rd Trimester, Fetal Heart
	Gynecology	Uterus, Pelvis
3D2-6	Abdomen	General, Aorta, Renal
	OB	1st Trimester, 2nd -3rd Trimester, Fetal Heart
	Gynecology	Uterus, Pelvis
3D4-9	OB	1st Trimester, 2nd -3rd Trimester
	Gynecology	Uterus, Pelvis
	Urology	Prostate

NOTE	In addition to the pre-optimized settings in the system, users can select the settings from User 1~5 which they may prefer.

9.2.2 List of Features

Available features in this product according to the probe and diagnostic subject are as follows.

Probe	Diagnostic Subject	Q Scan	Har	PI	SCI	SDMR	Biopsy
CS1-4	Abdomen	O	O	O	X	O	O
	OB	O	O	O	X	O	O
	Gynecology	O	O	O	X	O	O
C2-8	Abdomen	O	O	O	X	O	O
	OB	O	O	O	X	O	O
	Gynecology	O	O	O	X	O	O
CF4-9	Pediatric	O	X	X	X	O	X
	Vascular	O	X	X	X	O	X
L5-13	Small Parts	O	O	X	O	O	O
	Vascular	O	O	X	O	O	O
	Musculoskeletal	O	O	X	O	O	O
ER4-9	Abdomen	O	X	X	X	O	O
	OB	O	X	X	X	O	O
	Gynecology	O	X	X	X	O	O
EVN4-9	Abdomen	O	X	X	X	O	O
	OB	O	X	X	X	O	O
	Gynecology	O	X	X	X	O	O
VE4-8	Abdomen	O	O	O	X	O	O
	OB	O	O	O	X	O	O
	Gynecology	O	O	O	X	O	O
3D2-6	Abdomen	O	O	O	X	O	O
	OB	O	O	O	X	O	O
	Gynecology	O	O	O	X	O	O
3D4-9	OB	O	O	X	X	O	O
	Gynecology	O	O	X	X	O	O
	Urology	O	O	X	X	O	O

NOTE	Meanings of the symbols in the table are as follows. - Q Scan: Quick Scan - Har: Harmonic imaging - PI: PuIse Inversion - PPI: Power Pulse Inversion - TDI: Tissue Doppler Imaging - CM: Color M mode - ECG: Electro Cardio Graph - SCI: Spatial Compound Imaging - SRI(SDMR): Speckle Reduction Imaging

9.3 TI Table

Thermal Index is displayed on the title area of the screen, and this indicates the possibility of temperature rise in certain parts of body. Body tissue thermal index (TIs), bond thermal index (TIb) and skull thermal index (Tic) are divided according to the parts of the body. This product is set to automatically display thermal index according to the probe and diagnostic subject. Refer to the following table.

Probe	Diagnostic Subject											
	Abdomen	Obstetrics	Gynecology	Cardiac	Vascular	Urology	Musculoskeletal	Pediatric	Small Parts	TCD	Contrast	Intraoperative
CS1-4	TIb	TIs	TIs									
C2-8	TIb	TIs	TIs									
CF4-9					TIs			TIs				
L5-13					TIs		TIs		TIs			
ER4-9		TIs	TIs			TIs						
EVN4-9		TIs	TIs			TIs						
VE4-8	TIb	TIs	TIs									
3D2-6	TIb	TIs	TIs									
3D4-9		TIs	TIs			TIs						

9.4 Using Ultrasound Gel

Inappropriate ultrasound gel can result in damage to the probe. For delivery of appropriate sound signal, only use the ultrasound gel recommended by Samsung Medison.

⚠ **WARNING**	Do not use mineral oil, medium containing oil or unauthorized substances, for they may result in damage to the probe. Do not use the ultrasound gel which consists of the following chemicals. - Acetone - Methanol - Denatured alcohol - Mineral oil - Iodine - Lanolin - All types of lotion or gel containing aroma

9.5 Probe Safety Precautions

Probe can be easily damaged by improper use or in contact with certain chemicals. According to the manual, users must inspect probe cable, case, lens, etc before and after using probe.

Check to see if there is any damage such as crack, cleavage, leakage of the solution, sharp edges, etc on probe, and if found any, stop the use immediately and contact Samsung Medison service team. Using damaged probe may result in injury such as electric shock to the patient or the user.

⚠ **CAUTION**	Do not apply mechanical shock to the probe. Do not forcefully bend or pull the probe cable and avoid the probe cable from being trampled by the wheel. Do not immerse the probe in the improper substances such as alcohol, bleach, ammonium chloride and hydrogen peroxide. Do not expose the product to temperature above 50℃.

9.5.1 Operation and Infection Control of Probe

Probes used in the ultrasound imaging tester has direct contact with patients. Depending on the type of the inspection, these contacts occur in a wide range from general skin contact inspection to re-transfusion of surgical situation.

The most effective way to prevent disinfection among patients is the use of disposable probes. Probes are, however, difficult to manufacturer and expensive equipment, which result in reuse. Thus, the risk of infection can be minimized by complying with the given instruction.

⚠ **WARNING**	Patients with Creutzfeldt-Jakob disease (a fatal brain disease caused by a virus) should not have any neurological treatment or inspection. If probe has been used, there is no way to disinfect.

⚠ **CAUTION**	Adequate cleaning and disinfection is required in order to prevent infection. It is the responsibility of the users to maintain and manage disinfecting procedure of the equipment. Always use the cleaners legally allowed.

9.5.2 Risk of Electric Shock

Probe may result in damage such as electric shock to the patient or the user when having contact with conductive materials because it uses electrical energy.

⚠ **WARNING**	Have the product inspected of short circuit regularly by Samsung Medison service team. Do not immerse the probe, which would be submerged in the liquid. Do not drop the probe or do not give a mechanical shock to the probe. Check the damage or malfunction of housing, strain relief, lens or seal before and after the use. Forcefully twisting, pulling or bending the probe cable may result in disconnection. Power protection fuse protects probe from overcurrent. If power monitoring protection circuit detects overcurrent, it immediately cuts the power off from the probe, prevent probe surface from being overheated and limit the ultrasound power output. The product limits the temperature which patients can handle to the 45 degrees Celsius, and each ultrasound power output value (AP&I) complies with U.S. FDA requirement.

9.6 Using Sheaths

Sheath is used in inspection where probe is inserted into the body such as suffocation or rectum examination. Be careful not to have foreign substances from the body touch the probe using sheath when performing surgery or biopsy examination.

Medison does not provide sheaths, so users can choose appropriate sheath to use.

⚠ **CAUTION**	Maintain Sheath in sterilized state. Sheath is disposable. Do not reuse it. If sheath used in the probe is cut or contaminated, cleanse and disinfect the probe. For the case of neurosurgery, disinfected probe must be used with disinfected gel and non-heating sheath. If sheath was used on a patient with Creutzfeldt-Jakob disease during neurological treatment, probe cannot be disinfected in any way. Some sheaths consist of natural rubber latex and talc which may cause allergic reactions. Refer to the FDA Medical Alert reported on March 29, 1991.

9.6.1 Applying Sheath

1. Remove sheath from the package and fill it with ultrasound gel. At this time, you must wear disinfected glove.
2. After putting probe in sheath, cover the probe completely by pulling latex tip. Cover the cable of probe, if possible.
3. Be careful not to make air bubbles in the ultrasound gel. Fasten sheath to the probe or probe cable if necessary.
4. Dispose sheath after the examination.

9.7 Cleansing and Disinfection of Probe

Inappropriate pre-cleaners, disinfectants, etc may result in damage to the probe.

⚠ **WARNING**	Wear face-saver and gloves when cleaning or disinfecting probe.

9.7.1 Information of Cleaners, Disinfectants and Ultrasound Gel

Use the appropriate cleaners, disinfectants and ultrasound gel referring to the following table. All probes were inspected under the IPX 7 condition.

Names	Disinfectants																
	T-Spray II	T-Spray	Sani-Cloth HB	Sani-Cloth Plus	Sani-Cloth Active	Setptiwipes	Cleanisept Wipes	Ster-Bac Blu	Transeptic 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
CS1-4								●									●
C2-8		●	●														
CF4-9																	
L5-13		●							●		●						
ER4-9		●	●														●
EVN4-9		●	●														●
VE4-8	◆	◆	◎			▲	▲	▣									▣
3D2-6	●	●	x														
3D4-9		●							●		●						

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	
CS1-4	●	●	●					●								
C2-8	●					●	●	●							●	
CF4-9																
L5-13	●	●													●	
ER4-9	●	●				●	●								●	
EVN4-9	●	●				●	●								●	
VE4-8	▲		▣					▣								
3D2-6	●	●	●					●								
3D4-9	●	●														

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	Dodecylphenoxyethoxyl ate, Sodium Xylene Sulfonate	NA	Proteolytic Enzymes		Alcohol	
CS1-4														
C2-8		●											●	
CF4-9														
L5-13	●		●											
ER4-9											●	●	●	
EVN4-9											●	●	●	
VE4-8						◎		▲						
3D2-6			X			●						●		
3D4-9			●											

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						
CS1-4					●				●		●
C2-8			●		●						
CF4-9											
L5-13					●						
ER4-9		●	●		●						
EVN4-9		●	●		●						
VE4-8					●	●			●		●
3D2-6		●			●						
3D4-9					●						

※ Meaning of Symbols

Meaning of symbols in the table is as follows.

(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
x	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 longer than 5 minutes.
◐	Must not be used longer than 10 minutes.
▲	Must not be used longer than 15 minutes.
◆	Must not be used longer than 20 minutes.
◇	Must not be used longer than 25 minutes.
◎	Must not be used longer than 30 minutes.
▣	Must not be used longer than 50minutes.
Blank	Untested (DO NOT USE)

Manufacturer information of cleansers, disinfectants and ultrasound gel is as follows.

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)
Isoproppyl 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 Cleansing

Cleansing of probe, performed before disinfection, is an important step. Probe must be cleansed after use.

⚠ **CAUTION**	Do not use surgical brush for cleansing probe. Even soft brushes may result in damage to the probe. When cleansing or disinfecting, dry the products by having the wet area face down so that liquid ingredients would not go into probe.

1. Separate probe from the system
2. Separate Biopsy adapter and Needle guide. (Adapter can be used by disinfecting)
3. Separate sheath. (Sheath is disposable)
4. Wipe out the contaminants on probe and cable with soap or soft cloth dampened with washing liquid.
5. For contaminants left, clean the product by putting the waterproof part in the water.
6. Wipe the product with dry cloth.
7. When the soap remained, clean t he product with watered cloth and dry it with dry cloth.

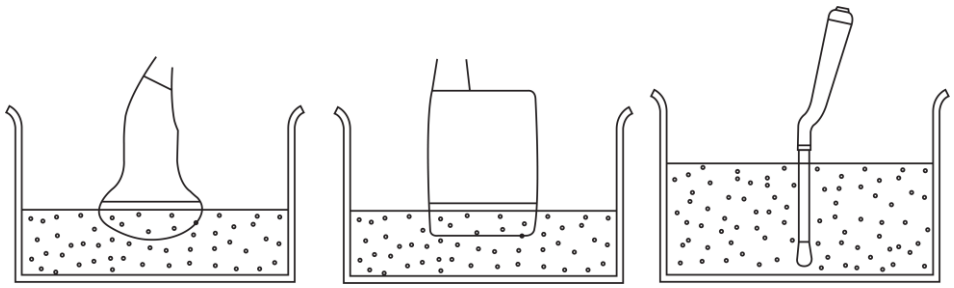
9.7.3 Disinfection

Disinfect the probe by using the disinfectant recommended by Medison in order to reduce Pathogens to 10-6.

⚠ **WARNING**	• Check the expiration date of the liquid when using mixed liquid. • The level of disinfectant varies depending on the body tissue which probe has contact with. Pay attention to the strength of disinfectant and disinfecting time.

⚠ **CAUTION**	• Using un-recommended disinfectant or disinfecting not using the proper method would result in damage or discolor of probe. You will also not receive the product warranty. • Do not immerse the probe, which cannot be decontaminated, in disinfectant more than an hour. Use only liquid solution. Disinfecting by Autoclave or EtO gas is prohibited.

1) Refer to the manual of disinfectant for storing, using and disposing of disinfectant.
2) Mix the disinfectant, appropriate for the corresponding probe, depending on the strength of disinfectant solution as mentioned in the manual of disinfectant.
3) Immerse probe in disinfecting solution as in the Figure.
4) Cleanse probe after immersing operation as indicated in the instruction of disinfectant.
5) Dry probe in the air or wipe it with dry cloth.



[Figure 9-1] Disinfecting Probe

Samsung UGEO H60 Service Manual

10 Maintenance and Management

SAMSUNG MEDISON

10 Maintenance and Management

10.1 Overview

Chapter 10 describes the means to enhance the life of UGEO H60.

This provides the way to store product and to back up data.

You must read this for proper maintenance and management.

Table of Contents

10.2 Operating Environment

10.2.1 Product Installation and Storage

Consider the following for the management..

- Avoid the wet area
- Avoid exposed to direct sunlight
- Avoid sever temperature changers
- Temperature of 10°C ~ 35°C and humidity of 30% ~ 75% should be maintained for normal operation
- Avoid installing near heaters
- Avoid dusty or poorly ventilated places
- Avoid frequently vibrating places
- Avoid chemicals or gases

⚠ **CAUTION**	Using product near generator, X-rays equipment and transmission lines may result in abnormal screen behavior such as noise. Sharing power outlet with other electronic devices can be a cause of noise phenomenon.

10.3 Product Management

Improper detergents or disinfectants may result in damage to the product. Be sure to read the following.

⚠ **WARNING**	• Turn off the product and plug the power cord off before cleaning or disinfecting the product. This may cause electric shock or fire. • Wear facial protector and gloves when cleaning or disinfecting the product.

10.3.1 Cleaning

1) Console: Wipe the external table of the product with soft cloth with mild soap or detergent.

2) Monitor: Wipe LCD table with dry cloth. If there is foreign substance on LCD panel, rub gently more than 2~3 times in the same way.

⚠ **CAUTION**	■ Do not spray the cleaner directly onto the surface of the product. The product may be discolored or cracked. ■ Do not use chemicals such as wax, benzene, alcohol, thinners, insecticide, air freshener, lubricant or detergent.

NOTE	Refer to 'Chapter 5 Probe' in this manual for cleaning and disinfecting probe.

10.3.2 Disinfecting

⚠ **CAUTION**	Disinfect the table with the disinfectants stated by Samsung Medison Co., Ltd..

Recommended use of the disinfectants approved by U.S. FDA 510(k) when disinfecting.

Following are the disinfectants approved by U.S. FDA 510(k), which are appropriate for this product.

Disinfectants	Manufacturer	Type	Solution	FDA 510(k)
Cidex	USA	Liquid	Gluter Aldehyde	K934434
Cidex Plus	USA	Liquid	Gluter Aldehyde	K923744

[Table 10-1] Disinfectants

1) Turn off the product and plug the power cord off.
2) Mix the disinfectants according to the ratio stated in the table of the manual.
3) Wipe the table of the product according to the instruction given in the table of the manual.
4) Dry or wipe the product with dry cloth according to the instruction given in the table of the manual.

NOTE	Users must enforce safety inspection once every two years in accordance with EN60601-1, the safety standard requirement. Only the professionals can perform this safety inspection.

10.3.3 Replacing Fuse

Power protection fuse protects the product from being overcurrent. If the power monitoring protection circuit detects overcurrent, it immediately cuts off the power so that it can prevent the product from being overcurrent and limit the ultrasound power output. When the fuse is blow, replace the fuse using the method described below.

⚠ **DANGER**	You must plug off the power before replacing the fuse, because there is a risk of electric shock.

1) Disconnect the power cord from the back of the product.
2) Pull it out by holding down the middle portion of the used fuse.
3) Insert the new fuse into the fuse holder.
4) After replacing the fuse, use the product by connecting the power cord again.

The rating and manufacturing companies of the fuse used in this product are as below.

Rated Input	Fuse Rating	Manufacturer	Order No.	Description
100-240VAC	6.3AH/250V	Littelfuse	021506.3P	F1 for DC power assy
100-240VAC	4A/H250V	Littelfuse	0215004P	F2 for AUX Outlet

※ **Tips!**

- The fuse for this product is for the outlet
- Fuse is located in the control board of AC Power Assembly
- Fuse is stated in the Table as F1 and F2

10.3.4 Managing Air Filter

Air filters minimize the amount of dust inflowing into the product. Filter fully filled with dust may cause overheating of the product and may cause noise. This may be the cause of reducing the performance and reliability of the system.

Maintain the optimized state of the system by clearing filter once every 3 months.

⚠ **CAUTION**	Check the moving lock before the separation of installation of filter. This may cause injury due to unexpected movement of the product.

1) Remove the filter by pulling it from the bottom front panel of the product.
2) Clean the filter using mild detergent after removing dust.
3) Dry the filter in a shady and well-ventilated place after wiping out with dry cloth.
4) Complete the installation by pushing the filter completely.

NOTE	Installing filter with moisture may result in malfunction of the product. Be sure to install completely dry filters

10.3.5 Accuracy Inspection

The measurement value from the product is affected by the maintenance of the product. You should manage products in optimum condition to obtain reliable measurements.

In order to maintain the optimum condition of the product, perform annual measurement accuracy inspection. Formulas and tables associated with measurement accuracy is stated in 'Chapter 5 Measurement' of OP manual.

NOTE	Users must enforce safety inspection once every two years in accordance with EN60601-1, the safety standard requirement. Only the professionals can perform this safety inspection

10.4 Information Management

⚠ CAUTION	Stored data may be lost by external shocks and errors of its own. Back-up regularly.

10.4.1 User Setting Back-up

Record related information in User Setting in case of loss of data. Users themselves cannot perform back-up User Setting, but Samsung Medison global technology support group can proceed the procedure of back-up by the customer's request. User Setting of GA Table used in obstetric measurement, however, can be backed-up. Refer to 'Obstetric Measurement Settings' in 'Chapter 3 Settings' of user's manual for more details.

10.4.2 Patient Information Back up

You can back-up basic information or scanned image of patient through SonoView program. Users can save it on their own, and by default, they are stored in the system. If you have to reinstall System for the product problem, restore the basic information and image of patient which staff from Samsung Medison global technology support group has saved. Refer to 'Saving and transferring Image' of 'Chapter 9 Image Management' of the user's manual for more details.

10.4.3 Software

Software may be subject to change in order to improve the functionality of the product. Change of software cannot be done along by users. You will need to change it with the cooperation of employees of Samsung Medison Co., Ltd global technical support group.

⚠ CAUTION	When there is a change in the software, for minimal changes, they are subject to change without manufacturer's notice.

When there is a problem with the operating system (Windows^{TM}) or when it needs to be upgraded, follow the standard of operating system manufacturer.

Samsung UGEO H60
Service Manual

11 Service Component List

SAMSUNG MEDISON

11 Service Component List

11.1 Overview

Chapter 11 describes the information about service parts of UGEO H60.

You must check the compatibility of service parts and software version before placing order for service part. Refer to UGEO H60 Part Catalogue supported by Samsung Medison Co., Ltd. Global technology support group.

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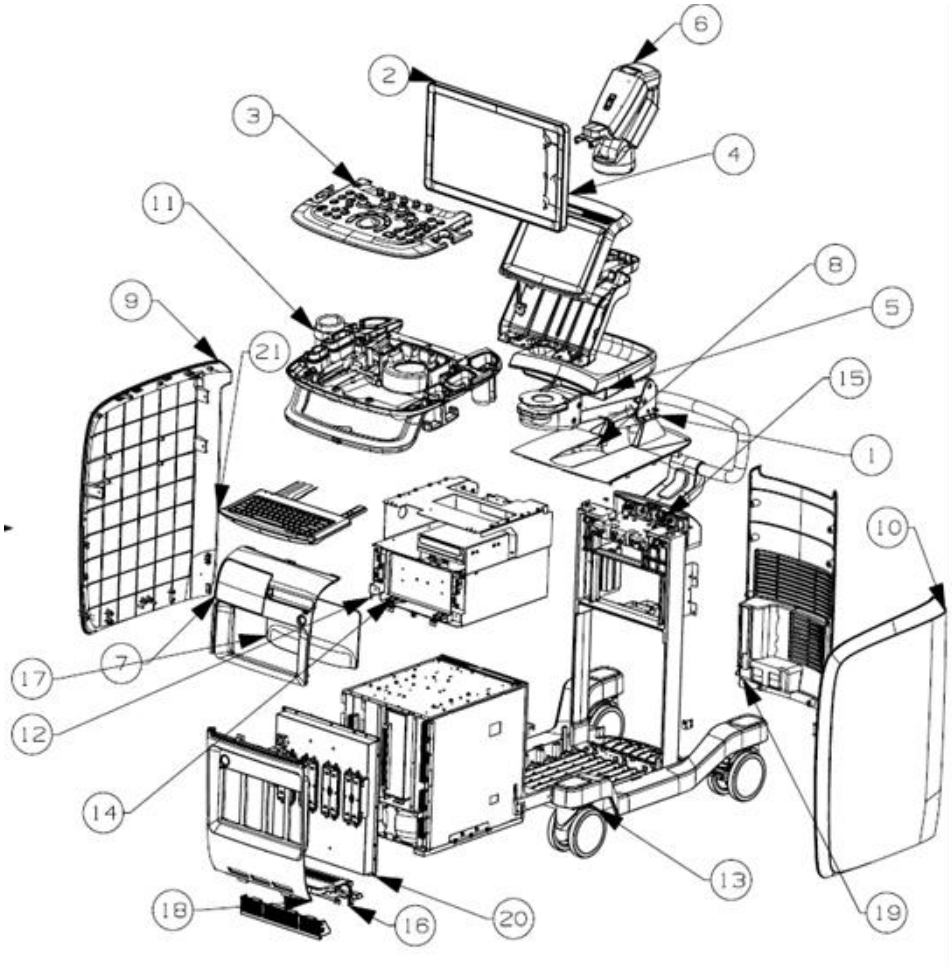
11.2 Body Cover

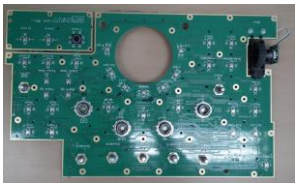


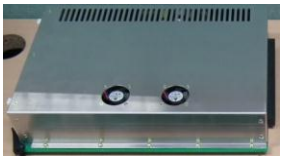
[Figure 11-1] UGEO H60 Body Cover

	Part name	Material code	Description
1	LIFT ASSY	MI97-02014A	LIFT AY H60
2	MAIN MONITOR	MI96-01181A	LCD AY H60
3	ASSY COVER CP TOP	MI97-01994A	COVER CP TOP AY H60
4	TOUCH PANEL	MI96-01243A	TOUCH PANEL AY H60
5	CASE GEL	MI61-01926A	CASE GEL AY H60
6	ARM	MI97-02099A	ARM AY H60
7	COVER FRONT TOP	MI63-01721A	COVER FRONT TOP AY H60
8	COVER TOP FRONT	MI63-01652A	COVER TOP FRONT AY H60
9	COVER LIFT	MI63-01649A	COVER LIFT AY H60
10	COVER RIGHT	MI63-01717A	COVER RIGHT AY H60
11	COVER CP LOWER	MI97-02062A	COVER CP LOWER AY H60
12	FRAME	MI97-02005A	FRAME AY H60
13	BASE	MI97-02003A	BASE AY H60
14	FRAME DRAWER	MI97-02007A	FRAME DRAWER AY H60
15	COVER TOP REAR	MI63-01653A	COVER TOP REAR AY H60
16	COVER FOOTREST	MI63-01686	COVER FOOTREST AY H60
17	COVER DRAWER	MI63-01667A	COVER DRAWER H60
18	FRONT BOTTOM	MI63-01655A	COVER FRONT BOTTOM H60
19	COVER REAR	MI63-01656A	COVER REAR H60
20	EM CAGE	MI-02013A	EM CAGE AY H60
21	ALPHA KBD	MI95-01255A	H60 ALPHA KBD ASSY EXP

[Table 11-1] UGEO H60 Body Cover

11.3 Ultrasound System Parts

		
MI92-01641A	MI92-01644A	MI41-01301A
		
MI92-01643A	MI41-01298A	MI92-01645A
		
MI41-01300A	MI59-01074A	5903-004247
		
5903-001892	MI96-01181A	MI96-01243A

		
MI96-01187A	MI96-01186A	MI97-02059A

[Figure 11-2] UGEO H60 Ultrasound Parts

PART NAME	Material Code	DESCRIPTION
Main Monitor	MI96-01181A	ASSY MONITOR;H60,LCD
Touch Panel	MI96-01243A	ASSY TOUCH PANEL-AY-EUROPA
CP	MI59-01074A	BOARD;H60,BD-363-CP-0A,CONTROL PANEL
TI	MI92-01641A	ASSY BOARD;H60,TRANSCUCER INTERFACE,0A
PI Assy	MI92-01644A	ASSY BOARD;H60,PC INTERFACE,0A
IO	MI92-01645A	ASSY BOARD;H60,INPUT-OUTPUT,0A
TR	MI92-01643A	ASSY BOARD;H60,TRANSMIT RECEIVE,0A
DDM	MI96-01186A	ASSY DDM;H60,SMPS
ADM	MI96-01187A	ASSY ADM;H60,AC
HDD	5903-001892	HDD;ST9500325AS,Momentus,500G,
BP	MI41-01298A	PCB;H60,1,BACKPLANE,PCB-363-BP-LF-00-00
MC	MI41-01300A	PCB;H60,1,MOTOR CONTROL,PCB-363-MC-LF-00
PI BD	MI41-01301A	PCB;H60,1,PC INTERFACE,PCB-363-PI-LF-00-
CPU	5903-004247	CPU;Intel Core i5-520M,I5,2.4GB,3MB
ARM	MI97-02059A	ASSY ARM;H60

[Table 11-2] UGEO H60 Ultrasound Parts

11.4 Control Panel parts

		
MI96-01180A	MI59-01071A	MI67-01046A
		
MI64-01783A	MI64-01814A	MI64-01815
		
MI64-01782A	MI64-01816A	MI64-01780A
		
MI64-01775A	MI64-01773A	MI64-01781A
		
MI64-01776A	MI64-01777A	MI64-01779A

		
MI64-01778A	MI64-01785A	MI64-01802A
		
NC	MI64-01813A	MI64-01808A
		
MI64-01771A	MI64-01803A	MI64-01800A
		
MI64-01807A	MI64-01804A	MI64-01811A
		
MI64-01805A	MI64-01810A	DUAL

		
MI64-01796A	MI64-01809A	MI64-01797A
		
MI64-01772A	MI64-01799A	MI64-01798A
		
MI64-01812A	MI64-01806A	MI64-01774A

[Figure 11-3] UGEO H60 Control Panel Parts

PART NAME	Material Code	DESCRIPTION
ASSY SPEAKER	MI96-01180A	ASSY SPEAKER;H60
TRACK BALL	MI59-01071A	TRACK BALL;335-C-012A,2inch,X150
KNOB MODE	MI64-01784A	KNOB;H60,267-M-121A,KNOB MODE
KNOB ENCODER SOFT	MI64-01783A	KNOB;H60,267-M-120A,KNOB ENCODER SOFT
KNOB TOGGLE	MI64-01785A	KNOB;H60,267-M-122A,KNOB TOGGLE
ENCODER ZOOM	MI64-01786A	KNOB;H60,267-M-124A,KNOB ENCODER ZOOM
RUBBER CP	MI67-01046A	RUBBER;H60,311-R-296A,RUBBER CP
FREEZE	MI64-01773A	BUTTON;H60,FREEZE
PATIENT	MI64-01771A	BUTTON;H60,PATIENT
POWER	MI64-01774A	BUTTON;H60,POWER
CW	MI64-01772A	BUTTON;H60,CW

LEFT SET	MI64-01775A	BUTTON;H60,LEFT SET,264-M-076A
CALIPER	MI64-01776A	BUTTON;H60,CALIPER,264-M-077A
CALC	MI64-01777A	BUTTON;H60,CALC,264-M-078A
CHANGE	MI64-01778A	BUTTON;H60,CHANGE,264-M-079A
POINTER	MI64-01779A	BUTTON;H60,POINTER,264-M-080A
CLEAR	MI64-01780A	BUTTON;H60,CLEAR,264-M-081A
RIGHT SET	MI64-01781A	BUTTON;H60,RIGHT SET,264-M-082A
M MODE	MI64-01782A	BUTTON;H60,M MODE
END EXAM	MI64-01796A	BUTTON;H60,END EXAM
REPORT	MI64-01797A	BUTTON;H60,REPORT
SONOVIEW	MI64-01798A	BUTTON;H60,SONOVIEW
PROBE	MI64-01799A	BUTTON;H60,PROBE
SINGLE	MI64-01800A	BUTTON;H60,SINGLE
DUAL	MI64-01801A	BUTTON;H60,DUAL
QUAD	MI64-01802A	BUTTON;H60,QUAD
BODY MARKER	MI64-01803A	BUTTON;H60,BODY MARKER
ANNOTATION	MI64-01804A	BUTTON;H60,ANNOTATION
QUICK SCAN	MI64-01805A	BUTTON;H60,QUICK SCAN
PERIPHERAL1	MI64-01806A	BUTTON;H60,PERIPHERAL1
PERIPHERAL2	MI64-01807A	BUTTON;H60,PERIPHERAL2
PERIPHERAL3	MI64-01808	BUTTON;H60,PERIPHERAL3
SHOT CUT1	MI64-01809A	BUTTON;H60,SHOT CUT1
SHOT CUT2	MI64-01810A	BUTTON;H60,SHOT CUT2
STORE	MI64-01811A	BUTTON;H60,STORE
PD	MI64-01812A	BUTTON;H60,PD
3D4D	MI64-01813A	BUTTON;H60,3D4D
PW	MI64-01814A	BUTTON;H60,PW MODE
COLOR	MI64-01815	BUTTON;H60,COLOR MODE
2D	MI64-01816A	BUTTON;H60,2D MODE

[Table 11-3] UGEO H60 Control Panel Parts

11.5 Probe

		
FSCS1-4	FSCF4-9	FSER4-9
		
FSL5-13	FSVE4-8	FSC2-8
		
FS3D2-6	FSEVN4-9	FS3D4-9

[Figure 11-4] Probe

PART NAME	Material Code	DESCRIPTION
FSCS1-4 Probe	USP-CS14F70/KR	CS1-4/60R 128E GE
FSC2-8 Probe	USP-C028F70/KR	C2-8/60R 128EL PRO
PB-FSCF4-9	USP-CF49F20/KR	CF4-9/128EL GE-PDI
PB-FSEVN4-9	USP-G049F10/WR	EVN4-9/10R 128EL PRO
PB-FSER4-9	USP-U049F10/WR	ER4-9/10R 128EL PRO
PB-FSL5-13	USP-L05DF30/KR	L5-13/38.4MM.192EL STI
PB-FSVE4-8	USP-VE48F50/KR	VE4-8/40R 128EL GE
PB-FS3D2-6	USP-V026F50/WR	3D2-6/40R 128EL WL GORE
PB-FS3D4-9	USP-049F10/WR	3D4-9/10R 128EL WL GORE

[Table 11-4] Probe

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