Technical Publication

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Rev. 1

CE 0197

Versana Active Basic User Manual

R1.X.X

Operating Documentation

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Regulatory Requirement

This product complies with regulatory requirements of the following European Directive 93/42/EEC concerning medical devices.

CE 0197

First CE Marked in 2019.

This manual is a reference for the Versana Active. It applies to all versions of the R1.x.x for the Versana Active ultrasound system.

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Revision History

Reason for Change

REV	DATE (YYYY/MM/DD)	REASON FOR CHANGE
Rev. 1	2019/03/20	Initial Release

List of Effective Pages

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Please verify that you are using the latest revision of this document. Information pertaining to this document is maintained on MyWorkshop/ePDM (GE Electronic Product Data Management). If you need to know the latest revision, contact your distributor, local GE Sales Representative or in the USA call the GE Ultrasound Clinical Answer Center at 1 800 682 5327 or 1 262 524 5698.

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Regulatory Requirements

Conformance Standards

- According to 93/42/EEC Medical Device Directive, this is Class IIa Medical Device.
- According to IEC/EN 60601-1,
  - Equipment is Class I, Type BF Applied Part for probes, DEFIBRILLATION-PROOF Type CF Applied Part for ECG.
- According to CISPR 11,
  - Equipment is Group 1, Class A ISM Equipment.
  - Continuous Operation.
- According to IEC 60529,
  - The footswitch rate IPx8 is suitable for use in surgical rooms.
  - Probe head (immersible portion) and cable are IPX7

    Probe connector is not waterproof.

This product complies with the regulatory requirement of the following:

- Council Directive 93/42/EEC concerning medical devices: the CE label affixed to the product testifies compliance to the Directive.

  The location of the CE marking is shown in Chapter 2 of this manual.

Authorized EU Representative

EC REP

GE Medical Systems SCS
283 rue de la Minière 78530 BUC, France

Conformance Standards (continued)

- International Electrotechnical Commission (IEC).
  - IEC/EN 60601-1 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance.
  - IEC/EN 60601-1-2 Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral Standard: Electromagnetic disturbances- Requirements and tests.
  - IEC/EN 62366(Usability), EN 1041 (Information supplied with medical devices).
  - IEC/EN 60601-2-37 Medical electrical equipment - Part 2-37: Particular requirements for the basic safety and essential performance of ultrasonic medical diagnostic monitoring equipment.
- International Organization of Standards (ISO)
  - ISO 10993-1 Biological evaluation of medical devices.
- ANSI/AAMI ES60601-1 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance.
- Canadian Standards Association (CSA).
  - CAN/CSA-22.2, NO. 60601-1 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance.
- CSA 22.2, 601.1 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance.
- NEMA/AIUM Acoustic Output Display Standard (NEMA UD3).
- Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment NEMA UD2.
- Medical Device Good Manufacturing Practice Manual issued by the FDA (Food and Drug Administration, Department of Health, USA).

Certifications

- GE Medical Systems (China) Co., Ltd. is ISO 13485 certified.

Original Documentation

- The original document was written in English.

Country-Specific Approval

- Japan
  MHLW Certificated Number: XXXXXXXXXXXXXXXX
- Brazil
  Registro ANVISA Nº: XXXXXXXXXXXXXXXX

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Chapter 1

Introduction

This chapter consists of information concerning indications for use/contraindications, and how this documentation is organized.

Overview

Attention

This manual is for Versana Active.

This manual contains necessary and sufficient information to operate the system safely. Advanced equipment training may be provided by a factory trained Applications Specialist for the agreed-upon time period.

Read and understand all instructions in all manuals supplied with the system before attempting to use the Versana Active system.

Keep this manual with the equipment at all times. Periodically review the procedures for operation and safety precautions.

NOTE: The Online Help offers a quick way for the user to access the manual.

Disregarding information on safety is considered abnormal use.

Not all features, products, probes or peripherals described in this document may be available or cleared for sale in all markets. Please contact your local GE Ultrasound representative to get the latest information.

NOTE: Please note that orders are based on the individually agreed upon specifications and may not contain all features listed in this manual.

NOTE: All references to standards / regulations and their revisions are valid for the time of publication of the user manual.



CAUTION Safety instructions must be reviewed before operating the unit.

The Versana Active manuals are written for users who are familiar with basic ultrasound principles and techniques. They do not include sonographic training or detailed clinical procedures.

NOTE: The screen graphics in this manual are only for illustrational purposes. Actual screen output may differ with the different software version.

Documentation

Versana Active documentation consists of various manuals:

- The Basic User Manual (ENGLISH ONLY), and Online Help (TRANSLATED) provides information needed by the user to operate the system safely. It describes the basic functions of the system, safety features, operating modes, measurements/calculations, probes, user care and maintenance.
- The User Guide (TRANSLATED) is a condensed user instruction guide.
- The Release Notes (TRNASLATED) provide precautions and instructions that supplement the Basic User Manual.
- The Advanced Reference Manual (ENGLISH ONLY) contains data tables, such as OB and Acoustic Output tables.
- The Basic Service Manual (ENGLISH ONLY) supplies block diagrams, lists of spare parts, descriptions, adjustment instructions or similar information which help adequately qualified technical personnel in repairing those parts of the instrument which have been defined repairable by the manufacturer.

The Versana Active manuals are written for users who are familiar with basic ultrasound principles and techniques. They do not include sonographic training or detailed clinical procedures.

NOTE: The Electronic Documentation CD includes English and all translations.

Principles of Operation

Medical ultrasound images are created by computer and digital memory from the transmission and reception of mechanical high-frequency waves applied through a transducer. The mechanical ultrasound waves spread through the body, producing an echo where density changes occur. For example, in the case of human tissue, an echo is created where a signal passes from an adipose tissue (fat) region to a muscular tissue region. The echoes return to the transducer where they are converted back into electrical signals.

These echo signals are highly amplified and processed by several analog and digital circuits having filters with many frequency and time response options, transforming the high-frequency electrical signals into a series of digital image signals which are stored in memory. Once in memory, the image can be displayed in real-time on the image monitor. All signal transmission, reception and processing characteristics are controlled by the main computer. By selection from the system control panel, the user can alter the characteristics and features of the system, allowing a wide range of uses, from obstetrics to peripheral vascular examinations.

Transducers are accurate, solid-state devices, providing multiple image formats. The digital design and use of solid-state components provides highly stable and consistent imaging performance with minimal required maintenance. Sophisticated design with computer control offers a system with extensive features and functions which is user-friendly and easy to use.

Contraindications

The Versana Active ultrasound system is not intended for ophthalmic use or any use causing the acoustic beam to pass through the eye.

Intended Use

The Versana Active is intended for use by a qualified physician for ultrasound evaluation.

Indications for Use

The Versana Active are general purposed ultrasound imaging and analysis systems providing digital acquisition, processing and display capability and clinical applications including: Fetal/ Obstetrics, Abdominal (includes GYN and Urological/Prostate), Pediatric, Small Organ (includes breast, testes, thyroid), Neonatal Cephalic, Adult Cephalic, Cardiac (includes Adult and Pediatric), Peripheral Vascular, Musculos-keletal Conventional, Musculos-keletal Superficial, Thoracic/Pleural, Transcranial, Transrectal, Transvaginal, Tissue Biopsy/Fluid Drainage.

Frequency of Use

Daily (Typically 8 hours)

Operator Profile

- Qualified and trained physicians or sonographers with at least basic ultrasound knowledge.
- The operator must have read and understood the user manual.

NOTE: *Only qualified physicians or sonographers should perform ultrasound scanning on human subjects for medical diagnostic reasons. Request training, if needed.*

Clinical Applications

Specific clinical applications and exam types include:

- Abdominal
- Obstetrical
- Gynecological
- Small parts
- Vascular/Peripheral Vascular
- Transcranial
- Pediatric/Neonatal
- Musculoskeletal
- Urological
- Cardiac
- Thoracic/Pleural
- Transvaginal
- Transrectal
- Biopsy

Image Acquisition is for diagnostic purposes including measurements on acquired image.



This machine should be used in compliance with law. Some jurisdictions restrict certain uses, such as gender determination.

Prescription Device



CAUTION: United States law restricts this device to sale or use by, or on the order of a physician.

Contact Information

Contacting GE Ultrasound

	For additional information or assistance, please contact your local distributor or the appropriate support resource listed on the following pages:
INTERNET	http://www.gehealthcare.com http://www.gehealthcare.com/usen/ultrasound/products/probe_care.html
Clinical Questions	For information in the United States, Canada, Mexico and parts of the Caribbean, call the Customer Answer Center. TEL: (1) 800-682-5327 or (1) 262-524-5698 In other locations, contact your local Applications, Sales, or Service Representative.
Service Questions	For service in the United States, call GE CARES. TEL: (1) 800-437-1171 In other locations, contact your local Service Representative.
Information Requests	To request technical product information in the United States, call GE Healthcare. TEL: (1) 800-643-6439 In other locations, contact your local Applications, Sales, or Service Representative.
Placing an Order	To order accessories, supplies, or service parts in the United States, call the GE Healthcare Technologies Contact Center. TEL: (1) 800-558-5102 In other locations, contact your local Applications, Sales, or Service Representative.

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Chapter 2

Safety

Describes the safety and regulatory information pertinent for operating this ultrasound system.

Owner Responsibility

Owner requirements

It is the responsibility of the owner to ensure that anyone operating the system reads and understands this section of the manual. However, there is no representation that the act of reading this manual renders the reader qualified to operate, inspect, test, align, calibrate, troubleshoot, repair or modify the system. The owner should make certain that only properly trained, fully-qualified service personnel undertake the installation, maintenance, troubleshooting, calibration and repair of the equipment.

The owner of the ultrasound unit should ensure that only properly trained, fully qualified personnel are authorized to operate the system. Before authorizing anyone to operate the system, it should be verified that the person has read, and fully understands, the operating instructions contained in this manual. It is advisable to maintain a list of authorized operators.

Should the system fail to operate correctly, or if the unit does not respond to the commands described in this manual, the operator should contact the nearest field GE Ultrasound Service Office.

For information about specific requirements and regulations applicable to the use of electronic medical equipment, consult the local, state and federal agencies.

Notice against user modification

Never modify this product, including system components, software, cables, and so on. User modification may cause safety hazards and degradation in system performance. All modification must be done by a GE qualified person.

Safety Precautions

Precaution Levels

Icon description

Various levels of safety precautions may be found on the equipment and different levels of concern are identified by one of the following flag words and icons which precede the precautionary statement.


DANGER

Indicates that a specific hazard is known to exist which through inappropriate conditions or actions will cause:

- Severe or fatal personal injury
- Substantial property damage.


WARNING

Indicates that a specific hazard is known to exist which through inappropriate conditions or actions may cause:

- Severe personal injury
- Substantial property damage.


CAUTION

Indicates that a potential hazard may exist which through inappropriate conditions or actions will or can cause:

- Minor injury
- Property damage.

NOTE: *Indicates precautions or recommendations that should be used in the operation of the ultrasound system, specifically:*

- *Maintaining an optimum system environment*
- *Using this Manual*
- *Notes to emphasize or clarify a point.*

Hazard Symbols

Icon Description

Potential hazards are indicated by the following icons:

Table 2-1: Potential Hazards

Icon	Potential Hazard	Usage	Source
	**Biological Hazard** Describes precautions necessary to prevent the risk of disease transmission or infections. • Patient/user infection due to contaminated equipment.	• Cleaning and care instructions • Sheath and glove guidelines	ISO 7000 No. 0659
	**Electrical Hazard** Describes precautions necessary to prevent the risk of injury through electric hazards. • Electrical micro-shock to patient, e.g., ventricular	• Probes • ECG,if applicable • Connections to back panel	
	**Moving Hazard** Describes precautions necessary to prevent the risk of injury through moving or tipping hazard! • Console, accessories or optional storage devices that can fall on patient, user, or others. • Collision with persons or objects may result in injury while maneuvering or during system transport. • Injury to user from moving the console.	• Moving • Using brakes • Transporting	
	**Acoustic Output Hazard** • Patient injury or tissue damage from ultrasound radiation.	• ALARA, the use of Power Output following the ‘as low as reasonably achievable’ principle	
	**Explosion Hazard** Describes precautions necessary to prevent the risk of injury through explosion hazard! • Risk of explosion if used in the presence of flammable anesthetics.	• Flammable anesthetic	
	**Fire and Smoke Hazard** • Patient/user injury or adverse reaction from fire or smoke. • Patient/user injury from explosion and fire.	• Replacing fuses • Outlet guidelines	

Important Safety Considerations

The following topic headings (Patient Safety, and Equipment and Personnel Safety) are intended to make the equipment user aware of particular hazards associated with the use of this equipment and the extent to which injury can occur if precautions are not observed. Additional precautions may be provided throughout the manual.



CAUTION

Improper use can result in serious injury. The use of the system outside the described conditions or intended use, and disregarding safety related information is considered abnormal use. The user must be thoroughly familiar with the instructions and potential hazards involving ultrasound examination before attempting to use the device. Training assistance is available from GE if needed.

Disregarding information on safety is considered abnormal use.



CAUTION

The use of the system outside the described conditions or intended use, and disregarding safety related information is considered as abnormal use. The manufacturer is not liable for damage caused by abnormal use of the device.

Patient Safety

Related Hazards



The concerns listed in this section can seriously affect the safety of patients undergoing a diagnostic ultrasound examination.

Patient identification

Always include proper identification with all patient data and verify the accuracy of the patient's name and ID numbers when entering such data. Make sure correct patient ID is provided on all recorded data and hard copy prints. Identification errors could result in an incorrect diagnosis.

The ultrasound system is not meant to be long term storage for patient data or images. The customers are responsible for the data on the system and a regular backup is highly recommended.

It is advisable to back up system data prior to any service repairs to the hard drive. It is always possible during system failure and repair to lose patient data. GE will not be held responsible for the loss of this data.

Diagnostic information

The images and calculations provided by the system are intended for use by competent operators, as a diagnostic tool. They are explicitly not to be regarded as the sole, irrefutable basis for clinical diagnosis. Operators are encouraged to study the literature and reach their own professional conclusions regarding the clinical utility of the system.

The operator should be aware of the product specifications and of the system accuracy and stability limitations. These limitations must be considered before making any decision based on quantitative values. If in doubt, the nearest GE Ultrasound Service Office should be consulted.

Equipment malfunction or incorrect settings can result in measurement errors or failure to detect details within the image. The equipment user must become thoroughly familiar with the equipment operation in order to optimize its performance and recognize possible malfunctions. Applications training is available through the local GE representative. Added confidence in the equipment operation can be gained by establishing a quality assurance program.



CAUTION

The system provides calculations (e.g estimated fetal weight) and charts based on published scientific literature. The selection of the appropriate chart and clinical interpretation of calculations and charts is the sole responsibility of the operator. The operator must consider contraindications for the use of a calculation or chart as described in the scientific literature. The diagnosis, decision for further examinations and medical treatment must be performed by qualified personnel following good clinical practice.



CAUTION

Be certain to ensure privacy data of patient information.

Mechanical hazards

The use of damaged probes or improper use and manipulation of intracavity probes can result in injury or increased risk of infection. Inspect probes often for sharp, pointed, or rough surface damage that could cause injury or tear protective barriers. Become familiar with all instructions and precautions provided with special purpose probes.



Electrical Hazard

A damaged probe can also increase the risk of electric shock if conductive solutions come in contact with internal live parts. Inspect probes often for cracks or openings in the housing and holes in and around the acoustic lens or other damage that could allow liquid entry. Become familiar with the probe's use and care precautions outlined in *Probes and Biopsy*.



CAUTION

Ultrasound transducers are sensitive instruments which can easily be damaged by rough handling. Take extra care not to drop transducers and avoid contact with sharp or abrasive surfaces. A damaged housing, lens or cable can result in patient injury or serious impairment or operation.



WARNING

Observe probe immersion levels (see Figure 17-13 *on page 17-24*).

Inspect probes for sharp edges or rough surfaces that could injure sensitive tissue.

DO NOT bend or pull the cable forcefully, to avoid mechanical shock or impact to the probe.

Scanner and electrosurgical units



This equipment provides no special means of protection from high frequency (HF) burns that may result from using an electrosurgical unit (ESU). To reduce the risk of HF burns, avoid contact between the patient and ultrasound transducer or ECG electrodes while operating the ESU. Where contact cannot be avoided, make sure the transducer or ECG electrodes are not located between the ESU active and dispersive electrodes and keep the ESU cables away from the transducer or ECG cables.

ALARA



Ultrasound can produce harmful effects in tissue and potentially result in patient injury. Always minimize exposure time and keep ultrasound levels low when there is no medical benefit. Use the principle of ALARA (As Low As Reasonably Achievable), increasing output only when needed to obtain diagnostic image quality. Observe the acoustic output display and be familiar with all controls affecting the output level. See the *Bioeffects section* of the *Acoustic Output chapter* in the *Advanced Reference Manual* for more information.



The operator of the device must sufficiently understand the acoustic output and be able to obtain the related thermal index values. The probe with self-heating in the air cannot be used in transvaginal scanning. Always minimize exposure time to the irradiation and keep ultrasound acoustic output level low for embryos or fetuses.

Training

During each ultrasound examination the user is expected to weigh the medical benefit of the diagnostic information that would be obtained against the risk of potentially harmful effects. Once an optimal image is achieved, the need for increasing acoustic output or prolonging the exposure cannot be justified. It is recommended that all users receive proper training in applications before performing them in a clinical setting. Contact the GE sales representative for training assistance.

Equipment and Personnel Safety

The concerns listed below can seriously affect the safety of equipment and personnel during a diagnostic ultrasound examination.

Related Hazards


WARNING

This equipment contains dangerous voltages that are capable of serious injury or death.

If any defects are observed or malfunctions occur, stop operating the equipment and perform the proper action for the patient. Inform a qualified service person and contact a Service Representative for information.

There are no user replaceable or serviceable components inside the console. Refer all servicing to GE qualified service personnel only.

Ensure that unauthorized personnel do not tamper with the unit.


Electrical Hazard

To avoid injury:

- Do not remove protective covers. No user serviceable parts are inside. Refer servicing to qualified service personnel.
- To assure adequate grounding, connect the attachment plug to a reliable (hospital grade) grounding outlet (having equalization conductor ⏚).
- Never use any adaptor or converter of a three-prong-to-two-prong type to connect with a mains power plug. The protective earth connection will loosen.
- Do not place liquids on or above the console. Spilled liquid may contact live parts and increase the risk of shock.

Related Hazards (continued)

 CAUTION	Servicing must be performed by GE qualified service personnel.
 WARNING	The internal circuits of the unit use high voltages, capable of causing serious injury or death by electrical shock.
 WARNING	To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.
 Smoke & Fire Hazard	The system must be supplied from an adequately rated electrical circuit. The capacity of the supply circuit must be as specified.
 WARNING	Only approved and recommended peripherals and accessories should be used. All peripherals and accessories must be securely mounted to the Versana Active.

Related Hazards (continued)


WARNING

The Versana Active is not intended to be used as a data storage device; backup of the Patient and Image Database is your institution's responsibility. GE is NOT responsible for any lost patient information or for lost images.


Explosion Hazard

Risk of explosion if used in the presence of flammable anesthetics.


Explosion Hazard

Never operate the equipment in the presence of flammable or explosive liquids, vapors or gases. Malfunctions in the unit, or sparks generated by fan motors, can electrically ignite these substances. Operators should be aware of the following points to prevent such explosion hazards.

- If flammable substances are detected in the environment, do not plug in or turn on the system.
- If flammable substances are detected after the system has been turned on, do not attempt to turn off the unit, or to unplug it.
- If flammable substances are detected, evacuate and ventilate the area before turning off the unit.


CAUTION

Do not use this equipment if a safety problem is known to exist. Have the unit repaired and performance verified by qualified service personnel before returning to use.

Related Hazards (continued)


Biological Hazard

For patient and personnel safety, be aware of biological hazards while performing invasive procedures. To avoid the risk of disease transmission:

- Use protective barriers (gloves and probe sheaths) whenever possible. Follow sterile procedures when appropriate.
- Thoroughly clean probes and reusable accessories after each patient examination and disinfect as required. Refer to *Probes and Biopsy* for probe use and care instructions.
- Follow all infection control policies established by your office, department or institution as they apply to personnel and equipment.


CAUTION

Contact with natural rubber latex may cause a severe anaphylactic reaction in persons sensitive to the natural latex protein. Sensitive users and patients must avoid contact with these items. Refer to package labeling to determine latex content and FDA's March 29, 1991 Medical Alert on latex products.


CAUTION

To avoid injury or system damage, NEVER place any object or liquid on the operator panel.


CAUTION

Archived data is managed at the individual sites. Performing data backup (to any device) is recommended.


CAUTION

- Make sure to verify the media after writing of data, such as EZBackup, SaveAs or Export.
- Before deleting a patient or image from the patient screen, make sure you have saved the data by EZBackup/Backup or Export and verify that the media transfer of data was successful.

Related Hazards (continued)


CAUTION

Do not unpack the Versana Active. This must be performed by qualified service personnel only.


CAUTION

To avoid skin burns in surgical use, do not place ECG electrodes in the current path between the Electrosurgical Unit (ESU) active and dispersive electrodes. Keep ESU cables away from ECG leads.


CAUTION

DO NOT touch the patient and any of the connectors on the ultrasound unit simultaneously, including ultrasound probe connectors.

DO NOT touch the conducting parts of the USB, Ethernet, Video, Audio cables when connecting equipment to the unit.


CAUTION

To minimize accidental loss of data, perform EZBackup and Backup on a regular basis.

1. First, perform EZBackup to save the images.
2. Next, perform Backup at Utility -> System ->Backup/ Restore. Enable the following checkboxes under Backup:
   - Patient Archive
   - Report Archive
   - User defined configuration
   - Service


CAUTION

DO NOT load non-system software on the system computer.

Material Safe Data

Rubber Part

Material: GFE 15&17

Where Used: Probe holder/Rubber cover for arm stopper/ Rubber plug

Related Hazards (Monitor)



- **DO NOT** place a finger, hand or any object on the joint of the monitor or monitor arm to avoid injury when moving the monitor and monitor arm.
- To avoid result of injury or system damage, **NEVER** place any object or liquid on the monitor, whether in the home or flip down/transport position.
- **DO NOT** scratch or press on the panel with any sharp objects, such as a pencil or pen, as this may result in damage to the panel.
- The monitor screen may have defective pixels. These pixels may appear as a slightly light or dark area on the screen. This is due to the characteristics of the panel itself, and not the product.
- The backlight of the monitor panel has a fixed life span. When the screen becomes dark or begins to flicker, contact a qualified Service Representative for information.
- There is a pinch point on the monitor. Take care to avoid injuring hands or fingers when flipping down the monitor.
- Avoid injuring hands or fingers when adjusting the LCD monitor.

Material Safe Data

Rubber part

Material: Silicon

Where Used: Handle Screw Cap/Monitor Rubber

Allergic reactions to latex-containing medical devices



Due to reports of severe allergic reactions to medical devices containing latex (natural rubber), the FDA advises health-care professionals to identify latex-sensitive patients, and be prepared to treat allergic reactions promptly. Latex is a component of many medical devices, including surgical and examination gloves, catheters, incubation tubes, anesthesia masks and dental dams. Patient reaction to latex has ranged from contact urticaria, to systemic anaphylaxis.

For more details regarding allergic reaction to latex, refer to FDA Medical Alert MDA91-1, March 29.

Use of ECG



Do not use the Versana Active Ultrasound system ECG wave for diagnostic and monitoring.

Electrical safety

Device classifications

The ultrasound unit is a Class I device, type BF, type CF, according to IEC 60601-1.

Internally connected peripheral devices

The system, together with peripheral devices, such as video printer, meets IEC 60601-1 standards for electrical isolation and safety. These standards are applicable only when the specified peripheral devices are plugged into the AC outlets provided on the unit.

External Connection of other peripheral devices



External devices can be used only if CE marked and in compliance with related standards (EN 60601-1 or EN 60950). Conformance to EN 60601-1 must be verified.

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (e.g. IEC 60950 for data processing equipment and IEC 60601-1 for medical equipment). Furthermore all complete configurations shall comply with the valid version of the system standard IEC 60601-1. Anybody connecting additional equipment to the signal input part or signal output part of the ultrasound unit configures a medical system, and is therefore responsible that the system complies with the requirements of the valid version of IEC 60601-1. If in doubt consult the technical service department or your local GE representative.

Other external devices, such as printers, and external monitors, usually exceed allowable leakage limits and, when plugged into separate AC outlets that are then connected to the unit, are in violation of patient safety standards. Suitable electrical isolation of such external AC outlets may be required in order to meet UL60601-1 and IEC 60601-1 standards for electrical leakage.

EMC (Electromagnetic Compatibility)

NOTE: This equipment generates, uses and can radiate radio frequency energy. The equipment may cause radio frequency interference to other medical and non-medical devices and radio communications.This product complies with emissions limits for a Group 1, Class A Medical Devices Directive as stated in EN 60601-1-2. However, there is no guarantee that interference will not occur in a particular installation.

NOTE: If this equipment is found to cause interference (which may be determined by turning the equipment on and off), the user (or qualified service personnel) should attempt to correct the problem by one or more of the following measure(s):

- *reorient or relocate the affected device(s)*
- *increase the separation between the equipment and the affected device*
- *power the equipment from a source different from that of the affected device*
- *consult the point of purchase or service representative for further suggestions.*

NOTE: The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.

NOTE: To comply with the regulations on electromagnetic interference for a Class A FCC Device, all interconnect cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing radio frequency interference in violation of the FCC regulations.

EMC (Electromagnetic Compatibility) (continued)

NOTE: *Do not use devices which intentionally transmit RF Signals (cellular phones, transceivers, or radio controlled products) other than those supplied by GE (wireless microphone, broadband over power lines, for example) in the vicinity of the equipment as it may cause performance outside the published specifications. Keep the power to these type devices turned off when near this equipment.*

The medical staff in charge of this equipment is required to instruct technicians, patients, and other people who maybe around this equipment to fully comply with the above requirement.

All types of electronic equipment may characteristically cause electromagnetic interference with other equipment, either transmitted through air or connecting cables. The term EMC (Electromagnetic Compatibility) indicates the capability of equipment to curb electromagnetic influence from other equipment and at the same time not affect other equipment with similar electromagnetic radiation from itself.

Proper installation following the service manual is required in order to achieve the full EMC performance of the product.

The product must be installed as stipulated in ‘Notice upon Installation of Product’ on *page 2-21*.

In case of issues related to EMC, please call your service personnel.

The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users’ authority to operate the equipment.


WARNING

Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the Versana Active, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

Cable Specification

Table 2-2: Cable specification list

Number	Name	Cable Length	Cable Shielded
1	AC Power Cord	<3m	Unshielded
2	DC input cord of adapter	<3m	Unshielded
3	4C-RS probe	<3m	Shielded
4	L6-12-RS probe	<3m	Shielded
5	3Sc-RS probe	<3m	Shielded
6	E8C-RS probe	<3m	Shielded
7	8C-RS probe	<3m	Shielded
8	6S-RS probe	<3m	Shielded
9	L8-18i-RS probe	< 3m	Shielded
10	E8Cs-RS probe	< 3m	Shielded
11	12S-RS probe	< 3m	Shielded
12	12L-RS probe	< 3m	Shielded
13	9L-RS probe	< 3m	Shielded
14	LK760-RS probe	< 3m	Shielded
15	HDMI cable	<3m	Shielded
16	Ethernet cable	<3m	Shielded/Unshielded
17	ECG USB cable & ECG patient cable	>3m	Shielded
18	Footswitch MKF 2-MED USB GP26 transmission cable	<3m	Shielded
19	Footswitch FSU-1000 transmission cable	<3m	Shielded
20	Western Digital 1TB mobile HDD 4317B, transmission cable	<3m	Shielded
21	Transcend TS8XDVDS-K DVDRW kit transmission cable	<3m	Shielded
22	Netgear wireless adapter A6210 transmission cable	<3m	Shielded
23	SONY UPD25 Color Printer transmission line	<3m	Shielded
24	SONY UP-D898MD printer transmission line	<3m	Shielded
25	Printer OfficeJet 200 Mobile Printer transmission line	<3m	Shielded
26	Printer USB isolator transmission line	<3m	Shielded

Notice upon Installation of Product

Separation distance and effect from fixed radio communications equipment: 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 transmitter 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 as stated in the immunity declaration, the ultrasound system should be observed to verify normal operation. If abnormal operation is observed, additional measures may be necessary, such as re-orienting or relocating the ultrasound system or using an RF shielded examination room may be necessary.

1. Use either power supply cords provided by GE or ones designated by GE. Products equipped with a power source plug should be plugged into the fixed power socket which has the protective grounding conductor. Never use any adaptor or converter to connect with a power source plug (e.g. three-prong-to-two-prong converter).
2. Locate the equipment as far away as possible from other electronic equipment.
3. Be sure to use only the cables provided by or designated by GE. Connect these cables following the installation procedures (e.g. wire power cables separately from signal cables).
4. Lay out the main equipment and other peripherals following the installation procedures described in the service manuals and peripherals manufacture’s manuals.

General Notice

1. Designation of Peripheral Equipment Connectable to This Product.

   The equipment indicated in the Supplies/Accessories section can be hooked up to the product without compromising its EMC performance.

   Avoid using equipment not designated in the list. Failure to comply with this instruction may result in poor EMC performance of the product.

2. Notice against User Modification

   The user should never modify this product. User modifications may cause degradation in EMC performance.

   Modification of the product includes changes in:

   a. Cables (length, material, wiring, etc.)
   b. System installation/layout
   c. System configuration/components
   d. Securing system parts (cover open/close, cover screwing)

3. Operate the system with all covers closed. If a cover is opened for some reason, be sure to shut it before starting/ resuming operation.
4. Operating the system with any cover open may affect EMC performance.

Peripheral Update for EC countries

The following is intended to provide the users in EC countries with updated information concerning the connection of the Versana Active to image recording and other devices or communication networks.

Peripherals used in the patient environment

The Versana Active has been verified for overall safety, compatibility and compliance with the image recording devices listed in Supplies/Accessories section.

The Versana Active has also been verified for compatibility, and compliance for connection to a local area network (LAN) via the rear panel Ethernet connection, provided the LAN components are IEC/EN 60950 compliant.

The Versana Active may also be used safely while connected to devices other than those recommended above if the devices and their specifications, installation, and interconnection with the system conform to the requirements of IEC/EN 60601-1.

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (i.e., IEC60950 for data processing equipment and IEC60601-1 for medical equipment). Furthermore, all complete configurations shall comply with the valid version of the system standard IEC60601-1. Everyone who connects additional equipment to the signal input part or signal output part of the Versana Active system configures a medical system, and is therefore responsible to ensure that the system complies with the requirement of the valid version of IEC60601-1. If in doubt, consult the technical service department or your local GE representative.

Peripherals used in the patient environment (continued)

General precautions for installing an alternate on-board device would include:

1. The added device(s) must have appropriate safety standard conformance and CE Marking.
2. The total power consumption of the added devices, which connect to the Versana Active and are used simultaneously, must be less than or equal to the rated supply of the Versana Active.
3. There must be adequate heat dissipation and ventilation to prevent overheating of the device.
4. There must be adequate mechanical mounting of the device and stability of the combination.
5. Risk and leakage current of the combination must comply with IEC/EN 60601-1.
6. Electromagnetic emissions and immunity of the combination must conform to IEC/EN 60601-1-2.

General precautions for installing an alternate on-board device would include:

1. The added device(s) must have appropriate safety standard conformance and CE Marking.
2. The added device(s) must be used for their intended purpose having a compatible interface.
3. Signal or mains isolation devices and additional protective earth may be needed to assure compliance with IEC/EN 60601-1.



The connection of equipment or transmission networks other than as specified in the user instructions can result in an electric shock hazard or equipment malfunction. Substitute or alternate equipment and connections requires verification of compatibility and conformity to IEC/EN 60601-1 by the installer. Equipment modifications and possible resulting malfunctions and electromagnetic interference are the responsibility of the owner.

Peripheral used in the non-patient environment

The Versana Active has also been verified for compatibility, and compliance for connection to a USB HDD/USB memory via the system USB port, provided the USB HDD/USB memory are IEC/EN 60950 compliant.

Interference caution

Intended healthcare environments: Professional healthcare facility environment



CAUTION Use of devices that transmit radio waves near the unit could cause it to malfunction.

Devices which intrinsically transmit radio waves, such as cellular phones, radio transceivers, mobile radio transmitters, radio-controlled toys, etc., should preferably not be operated near the unit. See page 2-30 about the recommended minimum separation distances between portable and mobile RF communications equipment and the ultrasound unit.

Medical staff in charge of the unit are required to instruct technicians, patients, and other people who may be around the unit to fully comply with the above recommendations.

Any electrical device can unintentionally emit electromagnetic waves. However, minimum device separation distances cannot be calculated for such unspecified radiation. When the ultrasound unit is used adjacent to or in close proximity to other equipment the user should be attentive to unexpected device behavior which may be caused by such radiation.

The ultrasound unit is intended for use in the electromagnetic environment specified in the tables below.

The user of the ultrasound unit should ensure that the device is used in such an environment.

NOTE: The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

Interference caution (continued)



Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.



Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

Declaration of Emissions

This system is suitable for use in the following environment. The user must assure that it is used only in the electromagnetic environment as specified.

Table 2-3: Declaration of Emissions

Guidance and manufacturer's declaration - electromagnetic emissions		
The system is intended for use in the electromagnetic environment specified below. The user of the system should assure that it is used in such an environment.		
Emission Type	**Compliance**	**Electromagnetic Environment**
RF Emissions CISPR 11	Group 1	This 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.
RF Emissions CISPR 11	Class A	This system is suitable for use in all establishments, other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. It provides the following warning is heeded: WARNING: This system is intended for use by healthcare professionals only. This system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the system or shielding the location.
Harmonic Emissions IEC 61000-3-2	Class A	
Voltage Fluctuations/Flicker Emissions IEC 61000-3-3	Complies	

Declaration of Immunity

This system is suitable for use in the following environment. The user must assure that the system is used according to the specified guidance and only in the electromagnetic environment listed.

Table 2-4: Electromagnetic Immunity

Phenomenon	Basic EMC Standard or Test Method	Regulatory Acceptable Level	EMC Environment and Guidance
Electrostatic discharge	IEC 61000-4-2	± 8 kV contact ± 2 kV, ± 4 kV, ± 8 kV, ± 15 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%. Mains power quality should be that of a typical commercial and/or hospital environment. If the user requires continued operation during power mains interruptions, it is recommended that the system be powered from a UPS or a battery. NOTE: U_T is the a.c. mains voltage prior to application of the test level. Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial and/or hospital environment. Separation distance to radio communication equipment must be maintained according to the method below. Interference may occur in the vicinity of equipment marked with the symbol:  Image degradation or interference may occur due to conducted RF noise on the equipment mains power supply or other signal cable. Such interference is easily recognized and distinguishable from patient anatomy and physiological waveforms. Interference of this type may delay the examination without affecting diagnostic accuracy. Additional mains/signal RF isolation or filtering may be needed if this type interference occurs frequently.
Radiated RF EM fields	IEC 61000-4-3	3 V/m 80 MH - 2.7GHz 80%AM at 1kHz	
Proximity fields from RF wireless communications equipment	IEC 61000-4-3	See the RF wireless communication equipment table in “Recommended minimum separation distances”.	
Rated power frequency magnetic fields	IEC 61000-4-8	30 A/m 50 Hz or 60 Hz	
Electric fast transients bursts	IEC 61000-4-4	± 2 kV 100 kHz repetition frequency	
Surges	IEC 61000-4-5	Line to line: ±0.5 kV, ±1 kV Line to earth: ±0.5 kV, ±1 kV, ±2 kV	
Conducted disturbances induced by RF fields	IEC 61000-4-6	3 V in 0.15 MHz - 80 MHz 6 V in ISM and/or amateur radio bands between 0.15 MHz and 80 MHz 80 % AM at 1kHz	
Voltage dips	IEC 61000-4-11	0% U_T: 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315° 0% U_T: 1 cycle and 70% U_T: 25/30 cycles sine phase at 0°	
Voltage interruptions	IEC 61000-4-11	0% U_T: 250/300 cycle	

Table 2-4: Electromagnetic Immunity (Continued)

Phenomenon	Basic EMC Standard or Test Method	Regulatory Acceptable Level	EMC Environment and Guidance
NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people. If noise generated from other electronic equipment is near the probe's center frequency, noise may appear on the image. Good power line isolation is required.			

Minimum distances

Recommended separation distances between portable and mobile RF communications equipment and the ultrasound unit

The ultrasound unit is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the ultrasound unit can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the ultrasound unit as recommended below, according to the maximum output power of the communications equipment. Portable and mobile radio communications equipment (e.g. two-way radio, cellular/ cordless telephones and similar equipment) should be used no closer to any part of this system, including cables, than determined according to the following method:

Test frequency (MHz)	Band (MHz)	Service	Modulation	Maximum power (W)	Distance (m)	Immunity test level (V/m)
385	380 - 390	TETRA 400	Pulse modulation 18Hz	1.8	0.3	27
450	430 -470	GMRS 460 FRS 460	FM ±5 kHz deviation 1 kHz sine	2	0.3	28
710	704 - 787	LTE Band 13, 17	Pulse modulation 217 Hz	0.2	0.3	9
745						
780						
810	800 - 960	GSM 800/900, tetra 800, iDEN 820, CDMA 850, LTE Band 5	Pulse modulation 18 Hz	2	0.3	28
870						
930						
1720	1700 - 1990	GSM 1800, CDMA 1900, GSM 1900, DECT, LTE Band 1, 3, 4, 25, UMTS	Pulse modulation 217 Hz	2	0.3	28
1845						
1970						
2450	2400 - 2570	Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse modulation 217 Hz	2	0.3	28
5240	5100 - 5800	WLAN, 802.11 a/n,	Pulse modulation 217 Hz	0.2	0.3	9
5500						
5785						

Recommended separation distances between portable and mobile RF communications equipment and the ultrasound unit
For transmitters rated at a maximum output power not listed above the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Wireless Adapter Specification

Table 2-5: Wireless Adapter specification

Received frequency (GHz)	Emission frequency (GHz)	Modulation Type	Effective radiation frequency
2.412	2.412	OFDM	<=100mW
2.417	2.417		
2.422	2.422		
2.427	2.427		
2.432	2.432		
2.437	2.437		
2.442	2.442		
2.447	2.447		
2.452	2.452		
2.457	2.457		
2.462	2.462		

Bluetooth Specification

- Frequency Range: 2402 - 2483.5 MHz
- Maximum Output Power: 5 dBm
- Data Transmission Rate: 3 M/s (20 meters on the PC to PC)
- Modulation Type: FSK, GFSK

Basic Safety

1. The creepage distances and air clearance should meet the requirements.
2. The protective earth should meet the requirements.
3. The leakage current should meet the requirements.

Essential performance

The essential performance of the ultrasound unit is:

1. The ability to display physiological images as input for diagnosis by trained physician.
2. The ability to display physiological traces as aid for diagnosis by trained physician.
3. The ability to display quantified data as input for diagnosis by trained physician.
4. The display of ultrasound indexes as aid for safe use of the unit.
5. No component failures.
6. No changes in programmable parameters.
7. No reset to factory defaults (manufacturer’s presets).
8. No change of operating mode.

Patient Environmental Devices

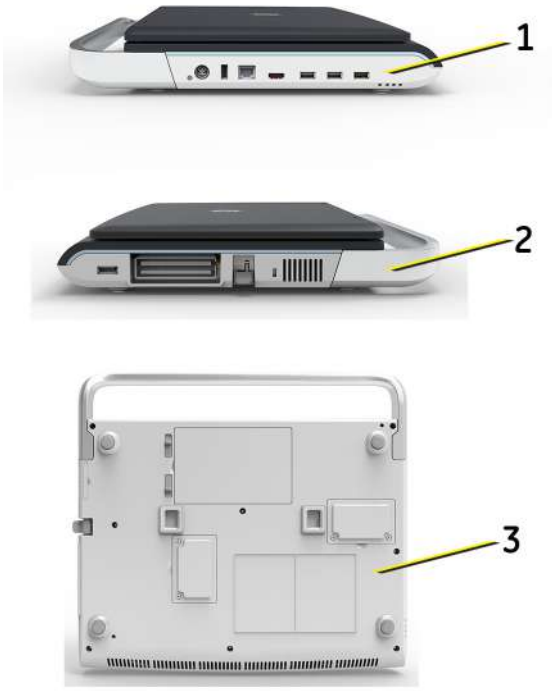


Figure 2-1. Patient Environmental Devices for Versana Active

1. Left side
   - Port for DC In (AC Adapter)
   - 1 Network port
   - 2 general USB 2.0 ports
   - 2 general USB 3.0 ports
   - 1 HDMI port
2. Right side
   - 1 Probe port
   - 1 Security Lock
   - 1 Probe Connector Locking Lever
   - 1 SD Card port
3. Rear panel
   - 1 Lithium-ion battery port
   - 1 CWD option port
   - 1 SSD Card port

Acceptable Devices

The Patient Environmental devices shown on the previous page are specified to be suitable for use within the PATIENT ENVIRONMENT.



DO NOT connect any probes or accessories without approval by GE within the PATIENT ENVIRONMENT.

See ‘Supplies/Accessories’ on *page 18-17 for more information.*

Unapproved Devices



DO NOT use unapproved devices.

If devices are connected without the approval of GE, the warranty will be INVALID.

Any device connected to the Versana Active must conform to the requirements for IEC or equivalent standards appropriate to devices.

Accessories, Options, Supplies



Unsafe operation or malfunction may result. Use only the accessories, options and supplies approved or recommended in these instructions for use.

Acoustic Output



Allowing the machine to transmit acoustic output with the probe not in use (or in its holder) can cause the transducer to build up heat. Always lower the acoustic power or freeze the image when not in use.

When the ‘Auto Freeze’ preset is selected on the Utility -> System ->System Imaging screen, the system auto freezes if it detects no change in the image.

Located on the upper right section of the system display monitor, the acoustic output display provides the operator with real-time indication of acoustic levels being generated by the system. See the *Acoustic Output chapter* in the *Advanced Reference Manual* for more information. This display is based on NEMA/AIUM Standards for Real-time Display of Thermal and Mechanic Acoustic Output Indices on Diagnostic Ultrasound Equipment.

Acoustic Output Display Specifications

The display consists of three parts: Thermal Index (TI), Mechanical Index (MI), and a relative Acoustic Output (AO) value. Although not part of the NEMA/AIUM standard, the AO value informs the user of where the system is operating within the range of available output.

The TI and MI are displayed at all times. The TI and MI display starts at a value of 0 and increments no more than 0.2.

Always be aware of the acoustic output level by observing the Acoustic Output Display. In addition, become thoroughly familiar with the Acoustic Output Display and equipment controls affecting output.

Thermal Index

Depending on the examination and type of tissue involved, the TI parameter will be one of three types:

- **Soft Tissue Thermal Index (TIS)**. Used when imaging soft tissue only, it provides an estimate of potential temperature increase in soft tissue.
- **Bone Thermal Index (TIB)**. Used when bone is near the focus of the image as in the third trimester OB examination, it provides an estimate of potential temperature increase in the bone or adjacent soft tissue.
- **Cranial Bone Thermal Index (TIC)**. Used when bone is near the skin surface as in transcranial examination, it provides an estimate of potential temperature increase in the bone or adjacent soft tissue.

Acoustic Output Display Specifications (continued)

Mechanical Index

MI recognizes the importance of non-thermal processes, cavitation in particular, and the Index is an attempt to indicate the probability that they might occur within the tissue.

Changing the Thermal Index Type

You can select the displayed TI type on Utility -> Imaging -> B-Mode. This preset is application dependent so each application could specify a different TI type.

TI and MI Display Accuracy

When display MI>= 0.6, TI>= 3.6, the displayed values of MI and IT is not lower than 50% or higher than 150% of the measured value.

When display MI < 0.6, TI < 3.6, the absolute error of MI <= 0.3, the absolute error of TI <= 1.8.

Measurement Precision and Uncertainty

Precision and measurement uncertainty of the system used to measure the acoustic output is provided in the following table. These values are determined in accordance with Section 6.4 of the Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment, rev 2 AIUM/NEMA 2004, and the Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment, rev 3 NEMA 2004.

Table 2-6: Measurement Precision and Uncertainty

	MI	Pr.3 (Pressure)	Ispta.3 (Intesnsity)	W0 (Power)	Fc (Frequency)	dT on phantom	dT in still air
Measurement Uncertainty	13.39%	13.61%	26.60%	26.60%	4.00%	1.0 °C	1.0 °C

Ispta

The Ispta is the Spatial Peak Temporal Average Intensity. The absolute maximum regulatory limit of derated Ispta is 720 mW/cm^2 as set by the FDA 510(k) guidance of September 9, 2008.

Controls Affecting Acoustic Output

The potential for producing mechanical bioeffects (MI) or thermal bioeffects (TI) can be influenced by certain controls.

Direct. The Acoustic Output control has the most significant effect on Acoustic Output.

Indirect. Indirect effects may occur when adjusting controls. Controls that can influence MI and TI are detailed under the Bioeffects portion of each control in the Optimizing the Image sections.

Always observe the Acoustic Output display for possible effects.

Best practices while scanning



HINTS

Raise the Acoustic Output only after attempting image optimization with controls that have no effect on Acoustic Output, such as Gain and TGC.

NOTE: Refer to the Optimizing the Image sections for a complete discussion of each control.



WARNING

Be sure to have read and understood control explanations for each mode used before attempting to adjust the Acoustic Output control or any control that can effect Aoustic Output.



Acoustic Output Hazard

Use the minimum necessary acoustic output to get the best diagnostic image or measurement during an examination. Begin the exam with the probe that provides an optimum focal depth and penetration.

Acoustic Output Default Levels

In order to assure that an exam does not start at a high output level, the Versana Active initiates scanning at a reduced default output level. This reduced level is preset programmable and depends upon the exam category and probe selected. It takes effect when the system is powered on or ***Patient*** is selected.

To modify acoustic output, adjust the Power Output level.

Safety statement

GE safety statement

Although no harmful biological effects have been demonstrated for ultrasound frequencies, intensities, or exposure times used in examination with the GE system, GE recommends using the lowest acoustic output settings which will produce diagnostically acceptable information.

General Caution



Standard maintenance must be performed by authorized service personnel for the lifetime of the product (7 years).



Proceed cautiously when crossing door or elevator thresholds. Use the handle to push/pull the system, e.g., do not use the monitor. Failure to do so may cause serious injury or system damage.

RoHS Versana Active Hazardous Substances

The following product pollution control information is provided according to SJ/T11364-2014 Marking for Control of Pollution caused by Electronic Information Products.



This symbol indicates the product contains hazardous materials in excess of the limits established by the Chinese standard GB/T 26572 Requirements for Certain restricted Substances in electrical and electronic Products. The number in the symbol is the Environment-friendly Use Period (EFUP), which indicates the period during which the hazardous substances contained in electrical and electronic products will not leak or mutate under normal operating conditions so that the use of such electronic information products will not result in any severe environmental pollution, any bodily injury or damage to any assets. The unit of the period is "Year".

In order to maintain the declared EFUP, the product shall be operated normally according to the instructions and environmental conditions as defined in the product manual, and periodic maintenance schedules specified in Product Maintenance Procedures shall be followed strictly.

Consumables or certain parts may have their own label with an EFUP value less than the product. Periodic replacement of those consumables or parts to maintain the declared EFUP shall be done in accordance with the Product Maintenance Procedures. This product must not be disposed of as unsorted municipal waste, and must be collected separately and handled properly after decommissioning.

Name and Concentration of Hazardous Substances

Table 2-7: Table of hazardous substances' name and concentration for Versana Active

Component Name	Hazardous substances' name					
	Pb	Hg	Cd	Cr (VI)	PBB	PBDE
LCD Panel	X	O	O	O	O	O
Printed Circuit Board Assemblies	X	O	O	O	O	O
Keyboard Assemblies	X	O	O	O	O	O
Power Assemblies	X	O	O	O	O	O
Battery	X	O	O	O	O	O
Ultrasound Probes	X	O	O	O	O	O

This table is prepared according to SJ/T 11364.
O: Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.
X: Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572.
- Data listed in the table represents best information available at the time of publication.
- Applications of hazardous substances in this medical device are required to achieve its intended clinical uses, and/or to provide better protection to human beings and/or to environment, due to lack of reasonably (economically or technically) available substitutes. For example: Lead is could be used in Printed circuit solder.

Device Labels

Label Icon Description

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

Table 2-8: Label Icons

Label/Icon	Purpose/Meaning	Location
Identification and Rating Plate 	• Manufacture's name and address	Rating Plate, labels
Identification and Rating Plate 	**Date of manufacture:** The date could be a year, year and month, or year, month and day, as appropriate. See ISO 8601 for date formats.	Rating Plate, labels
	Serial Number	Rating Plate, labels
	Catalog Number	Rating Plate, labels
	**Direct Current:** For products to be powered from a DC supply	Rating Plate, labels
INPUT	Input	AC adapter
MADE IN CHINA	Made in China	AC adapter
MODEL	Model	AC adapter
AC adapter for Supra Compact	AC adapter for Supra Compact	AC adapter
NO-LOAD POWER CONSUMPTION	No-Load power consumption	AC adapter

Table 2-8: Label Icons (Continued)

Label/Icon	Purpose/Meaning	Location
AVERAGE ACTIVE EFFICIENCY	Average Active Efficiency	AC adapter
TEST	Test	Battery
Rechargeable Li-ion Battery Pack	Rechargeable Li-ion Battery Pack	Battery
OUTPUT	Output	AC adapter
Type/Class Label	Used to indicate the degree of safety or protection.	
IP Code (IPX8) IPX8: FSU-1000, MKF 2-MED GP26	Indicates the degree of protection provided by the enclosure per IEC60 529.	Bottom of footswitch
EC REP	Authorized European Representative address.	Bottom panel
℞ ONLY U.S.	CAUTION: United States law restricts this device to sale or use by, or on the order of a physician.	Bottom panel
	Type BF Applied Part (man in the box) symbol is in accordance with IEC 60878-02-03.	Beside the probe connector
	General Warning.	Various
	“CAUTION” - Dangerous voltage” (the lightning flash with arrowhead) is used to indicate electric shock hazards.	Various
	Indicates the power on and power off position of the power switch. **CAUTION:** This Power Switch **DOES NOT ISOLATE** Mains Supply.	See the Console Overview section for location information.

Table 2-8: Label Icons (Continued)

Label/Icon	Purpose/Meaning	Location
	“Protective Earth” indicates the protective earth (grounding) terminal.	Inside Power Box and Console
	NRTL Listing and Certification Mark is used to designate conformance to nationally recognized product safety standards. The Mark bears the name and/or logo of the testing laboratory, product category, safety standard to which conformity is assessed and a control number.	Bottom
	Do not use the following devices near this equipment: cellular phone, radio receiver, mobile radio transmitter, radio controlled toy, broadband power lines, etc. Use of these devices near this equipment could cause this equipment to perform outside the published specifications. Keep power to these devices turned off when near this equipment.	Bottom of the system
	Be careful of static	Bottom of the system
	“Consult accompanying documents“ is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.	Various
	The CE Mark of Conformity indicates this equipment conforms with the Council Directive 93/42/EEC	Various
CISPR 11 / EN 55011 CLASS : A GROUP : 1 CLASSE : A GROUPE : 1	CISPR CAUTION: The Versana Active conforms to the CISPR11, Group 1, Class A of the international standard for Electromagnetic disturbance characteristics.	Bottom of the system

Table 2-8: Label Icons (Continued)

Label/Icon	Purpose/Meaning	Location
	This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.	Bottom and probe connector
	The separate collection symbol is affixed to a battery, or its packaging, to advise you that the battery must be recycled or disposed of in accordance with local or country laws. The letters below the separate collection symbol indicate whether certain elements (Pb=Lead,Cd=Cadmium, Hg=Mercury) are contained in the battery. To minimize potential effects on the environment and human health, it is important that all marked batteries that you remove from the product are properly recycled or disposed. For information on how the battery may be safely removed from the device, please consult the service manual or equipment instructions. Information on the potential effects on the environment and human health of the substances used in batteries is available at this url: http://www.gehealthcare.com/euen/weee-recycling/index.html	Battery Pack if contains Pb/Cd/Hg
	This symbol indicates that this electrical and electronic product does not contain any hazardous substances above the maximum concentration value established by the Chinese standard GB/T 26572 , and can be recycled after being discarded, and should not be casually discarded.	

Table 2-8: Label Icons (Continued)

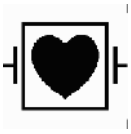
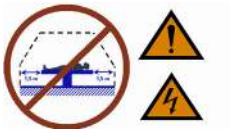
Label/Icon	Purpose/Meaning	Location
	This symbol indicates the product contains hazardous materials in excess of the limits established by the Chinese standard GB/T 26572 Requirements of concentration limits for certain restricted substances in electrical and electronic products. The number in the symbol is the Environment-friendly Use Period (EFUP), which indicates the period during which the hazardous substances contained in electrical and electronic products will not leak or mutate under normal operating conditions so that the use of such electrical and electronic products will not result in any severe environmental pollution, any bodily injury or damage to any assets. The unit of the period is "Year".	Probe and Bottom, China Rating Plate.
	Type CF Defib-Proof Applied Part (heart in the box with paddle) symbol is in accordance with IEC60878-02-06.	ECG module
	When closing the LCD cover, use caution to avoid injuring hands or fingers as there is a closing mechanism which allows the LCD cover to automatically close.	Bottom of the system
	Do not connect the DVD-RW to the system while scanning.	DVD-RW
	GOST symbol: Russia Regulatory Country Clearance.	Rating plate Note: Only after Russian regulatory registration is complete, this label will be located on the console.

Table 2-8: Label Icons (Continued)

Label/Icon	Purpose/Meaning	Location
	INMETRO Certification: TUV Rheinland Brazil	Rating plate Note: Only after Brazilian regulatory registration is complete, this label will be located on the console.
	“Eurasian Conformity” mark; thesingle conformity mark forcirculation of products on themarkets of member-states ofCustoms Union. This product passed allconformity assessment(approval) procedures thatcorrespond to the requirementsof applicable technicalregulations of the CustomsUnion.	Bottom.
	Mark of conformity with the Technical Regulations.	This product meets the requirements of the Technical Regulations on medical devices, approved by Resolution No.753 of the Cabinet of Ministers of Ukraine of 2 October 2013. Note: Only after Ukrainian regulatory registration is complete, this label will be located on the console.
	This machine should be used in compliance with law. Some jurisdictions restrict certain uses, such as gender determination.	Bottom of the system Note: For China, Korea and India only
	Every system has a unique marking for identification, the Unique Device Identification (UDI) Label. The UDI label consists of a series of alpha-numeric characters and barcode which uniquely identify the Versana Active system as a medical device manufactured by General Electric. Scan or enter the UDI information into the patient health record as required by country-specific laws.	Rating plate

Label Locations

Versana Active warning labels are provided in English.

NOTE: The warning labels are on the rear of the system. The label content may be different for different regions. Please refer to the warning labels on the system for the actual content.

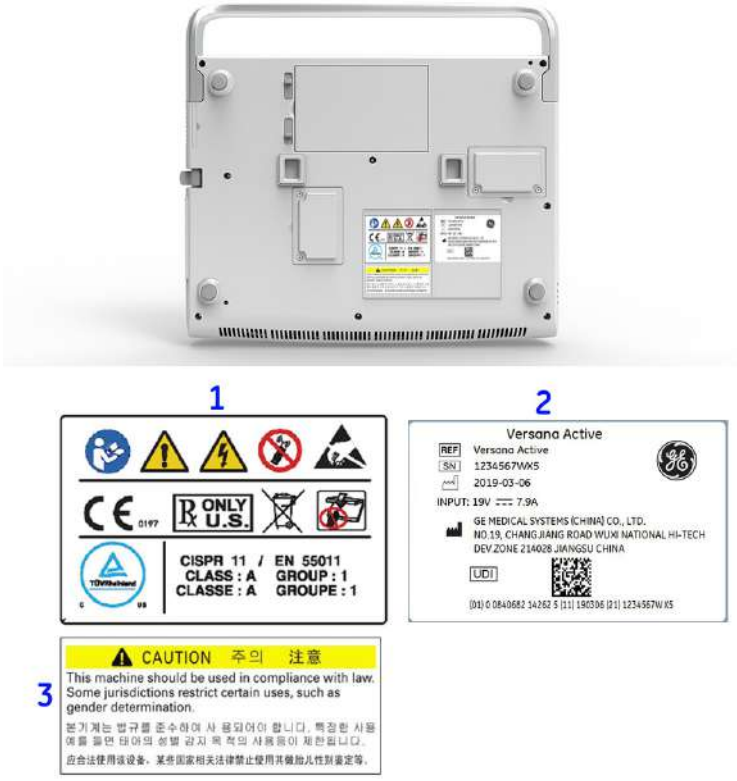


Figure 2-2. Versana Active Rating Plate Label Location

1. Warning label
2. Rating platel
3. Gender Caution (For China, Korea and India only)

Label Locations (continued)

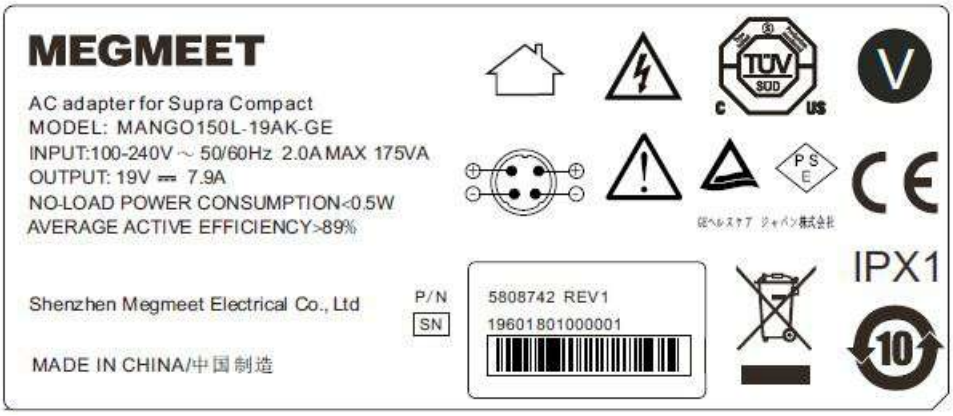


Figure 2-3. AC Adapter label

Label Locations (continued)



Figure 2-4. Battery Label

1. Do not put the battery in fire.
2. Do not disassemble or mistreat the battery.

CAUTION

Do not disassemble or mistreat the battery. Do not put the battery in fire. Replace the battery with the same battery type only. Failure to follow these instructions many present risk of explosion fire or high temperature. See the battery user manual for additional safety instructions.

Probe Label Explanation

The following information appears on all probe labels, regardless of the connector type, except for “IPX7”, “CE Mark”, and “XDclearTM” which only appears on applicable probes.

NOTE: The probe label displayed in this manual is only for illustrational purposes. Refer to the actual probe label for the specific information.

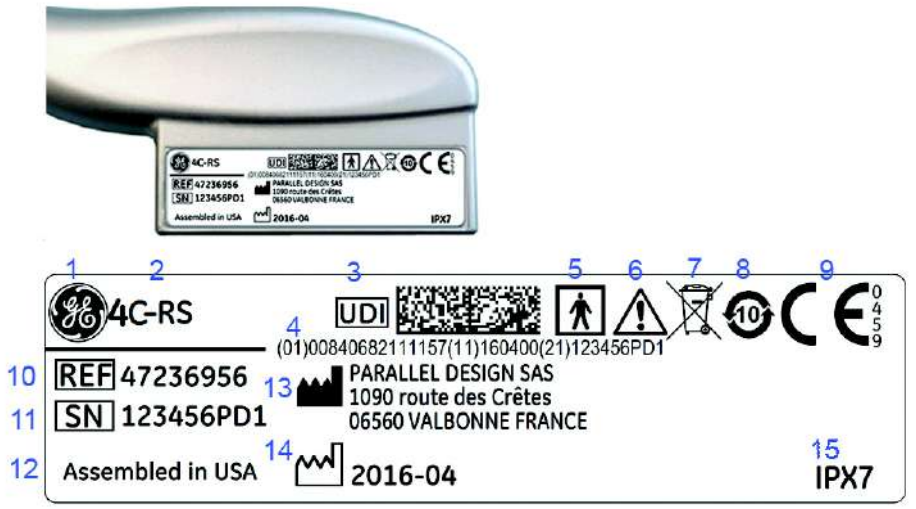


Figure 2-5. Probe label

1. GE Logo
2. Probe Model (Name)
3. UDI Symbol and Data Matrix
4. UDI Human Readable Label Text: Global Trade Item Number, GTIN, (01), Manufacturing Date (11), Serial Number (21)
5. Type BF/CF Applied Part
6. Caution: Consult the Manual
7. WEEE Waste Symbol
8. Chinese RoHS Hazardous Substance Symbol
9. CE Mark and Notified Body Number
10. REF: Catalog/model number
11. Serial Number
12. Customs country of origin
13. Legal Manufacturer’s Name and Address
14. Date of Manufacture, as YYYY-MM
15. IP Classification

NOTE: Non-GE probes will also have a UDI symbol and equivalent information.

Probe Box Label

NOTE: The probe box label displayed in this manual is only for illustrational purposes. Refer to the actual probe box label for the specific information.



Figure 2-6. Probe box label

UDI Global Trade Item Number (GTIN) Label and Probe Box Barcode Locations

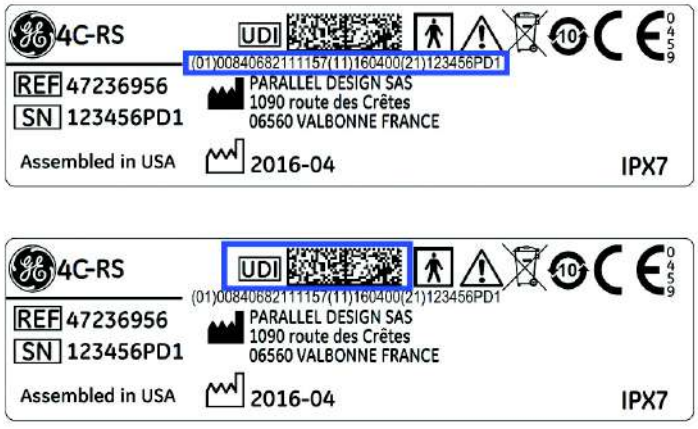


Figure 2-7. Probe Label UDI GTIN and Barcode Locations

UDI Global Trade Item Number (GTIN) Label and Probe Box Barcode Locations (continued)

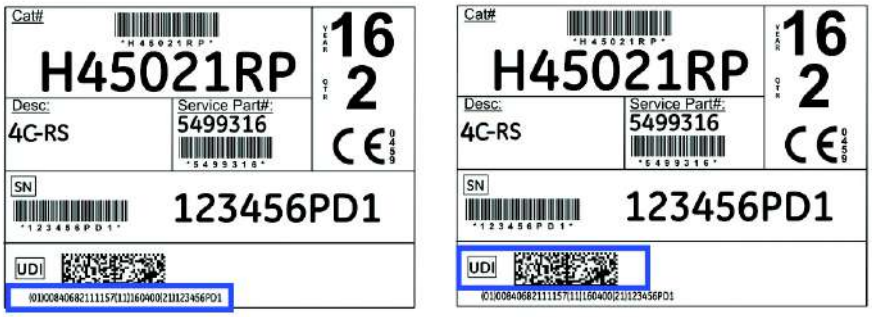


Figure 2-8. Probe Box Label UDI GTIN and Barcode Locations

Chapter 3

Preparing the System for Use

Describes the site requirements, console overview, system positioning/transporting, powering on the system, adjusting the display monitor, probes and operator controls.

Site Requirements

Introduction

Do not attempt to install the system alone. General Electric, Affiliate, or Distributor Field Engineers and Application Specialists will install and setup the system. See ‘Contact Information’ on *page 1-7 for more information.*

The Versana Active does not contain any operator serviceable internal components. Ensure that unauthorized personnel do not tamper with the unit.

Perform regular preventive maintenance. See ‘System Care and Maintenance’ on *page 18-6 for more information.*

Maintain a clean environment. Turn off, and if possible, disconnect the system before cleaning the unit. See ‘Cleaning the system’ on *page 18-9 for more information.*

Never set liquids on the unit to ensure that liquid does not drip into the control panel or unit.

Before the system arrives

The ultrasound unit must operate within the proper environment and in accordance with the requirements described in this section. Before using the system, ensure that the requirements are met.

Power Requirements

- A separate power outlet with a 6.5 amp circuit breaker.
- Frequency: 50/60 Hz
- 100V - 240V AC (+/-10%)

Electromagnetic interferences

This medical equipment is approved, in terms of the prevention of radio wave interference, to be used in hospitals, clinics and other institutions which are environmentally qualified. The use of this equipment in an inappropriate environment may cause some electronic interference to radios and televisions around the equipment.

Ensure that the following is provided for the new system:

- Take precautions to ensure that the console is protected from electromagnetic interference.

  Precautions include:

  - Operate the console at least 15 feet away from motors, typewriters, elevators, and other sources of strong electromagnetic radiation.
  - Operation in an enclosed area (wood, plaster or concrete walls, floors and ceilings) helps prevent electromagnetic interference.
  - Special shielding may be required if the console is to be operated in the vicinity of radio broadcast equipment.



CAUTION

Do not operate the system in the vicinity of a heat source, of strong electric or magnetic fields (close to a transformer), or near instruments generating high-frequency signals, such as HF surgery. These can adversely affect the ultrasound images.

Environmental Requirements

The system should be operated, stored, or transported within the parameters outlined below. Either its operational environment must be constantly maintained or the unit must be turned off.

NOTE: You may get an overheating message with regard to fan speed. Ensure adequate system/room ventilation.

Table 3-1: System Environmental Requirements

	Operational (Versana Active with probe)	Storage (Versana Active)	Transport (Versana Active)
Temperature	10 - 40° C 50 - 104° F	-5 - 50° C 23 - 122° F	-5 - 50° C 23 - 122° F
Humidity	30 - 80% non-condensing	10 - 90% non-condensing	10 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa



The system cannot be used in OXYGEN rich environment.



Ensure that the probe face temperature does not exceed the normal operation temperature range.

Operating Environment

Ensure that there is sufficient air flow around the ultrasound unit when installed in a fixed location.



Do not cover the ventilation holes of the Versana Active.



The Versana Active system and probe connector are not waterproof. Do not expose the device to water or any kind of liquid.

Console Overview

Console Graphics

The following are illustrations of the console:



Figure 3-1. Versana Active System - an example

1. Handle
2. LCD monitor
3. Primary Menu keys
4. Alphanumeric keys
5. Control Panel

NOTE: The console graphics in this manual are only for illustrational purposes. Refer to the system for actual appearance.

Battery

The lithium ion battery provides power when an AC power source is not available. A battery in the battery bay is standard for the Versana Active. Lithium ion batteries last longer than conventional batteries and do not require replacement as often. The system shall be able to work with internal battery power supply (minimum 50 minutes of working time).

NOTE: While scanning with the battery supplying power only, the battery life may be shorter. Always archive the data and keep your attention on the battery status. When the battery power is low, charge by connecting to the power source immediately so that scanning is not interrupted as data could be lost due to the automatic shutdown of the system.

The lithium ion technology used in your system's battery is significantly less hazardous to the environment than the lithium metal technology used in some other batteries (such as watch batteries). Used batteries should not be placed with common household waste products. Contact local authorities for the location of a chemical waste collection program nearest you.

NOTE: The battery is designed to work with Versana Active systems only. Only use the batteries authorized by GE.

Temperature Requirements

The battery should be charged, discharged and stored within the parameters outlined below:

- Operating temperature:
  - Charge: 10 - 30°C (50 - 86°F).
  - Discharge: 10 - 40°C (50 - 104°F)



DO NOT disconnect the system power cord from the AC outlet when the environmental temperature is below 10°C (50°F) or above 30°C (86°F). The battery may not charge properly if the environmental temperature is below 10°C (50°F) or above 30°C(86°F) which may disrupt the power supplied to the system.

- Storage temperature:
  - Storage time < 3 months: -20 - 40°C (-4 - 104°F)
  - Storage time >= 3 months: -20 - 20°C (-4 - 68°F)

Battery (continued)


WARNING

Do not expose the battery to temperature over 60°C (140°F). Keep it away from fire and other heat sources.


WARNING

- The battery has a safety device. Do not disassemble or alter the battery.
- Do not short-circuit the battery by directly connecting the negative terminals with metal objects.
- Do not heat the battery or discard it in a fire.
- Do not charge the battery near a heat source, such as a fire or heater.
- Do not leave the battery in direct sunlight.
- Do not pierce the battery with a sharp object, hit it, or step on it.
- Do not use a damaged battery.
- Do not solder a battery.
- Do not connect the battery to an electrical power outlet.


WARNING

If the Versana Active is not being used on a monthly basis, the battery needs to be removed during the lengthy non-use period.


CAUTION

To avoid the battery bursting, igniting, or fumes from the battery causing equipment damage, observe the following precautions:

- Do not immerse the battery in water or allow it to get wet.
- Do not put the battery into a microwave oven or pressurized container.
- If the battery leaks or emits an odor, remove it from all possible flammable sources.
- If the battery emits an odor or heat, is deformed or discolored, or in a way appears abnormal during use, recharging or storage, immediately remove it and stop using it. If you have any questions about the battery, consult GE or your local representative.

Discharge/Charge Cycle

When the battery is stored for three months or more, the customer should perform one full discharge/charge cycle.

NOTE: A full discharge/charge cycle means the system is turned on using battery power until the battery loses its charge completely and the system shuts down. Plug the Versana Active in until the battery is fully charged as indicated by a green LCD light.

Upon receipt of the Versana Active and before first time usage, it is highly recommended that the customer perform one full discharge/charge cycle.

If the battery has not been used for >2 months, the customer is recommended to perform one full discharge/charge cycle. It is also recommended to store the battery in a shady and cool area with FCC (full current capacity).

One Full Discharge/Charge Cycle Process:

1. Full discharge of battery to let the Versana Active automatically shut down.
2. Charge the Versana Active to 100% FCC (full current capacity).
3. Discharge of Versana Active for complete shut down (takes one hour for discharge).

When storing packs for more than 6 months, charge the pack at least once during the 6 month timeframe to prevent leakage and deterioration in performance.



Use only GE recognized batteries.

Safe Use

Follow below instruction to ensure safe use and adequate maintenance of rechargeable battery.

1. Regularly check the appearance of the cell to see if there is no abnormal deforamtion (bulge) etc.
2. Check the battery interface to see if there is no foreign body and deformation.
3. Regularly charge the battery if the system is not in use.

View current battery status

When the system is running on battery, there is a battery icon in the system status bar.

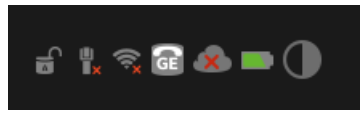


Figure 3-2. Battery icon

Total battery power remaining is shown on the battery icon. When there is no battery, the battery icon is not displayed in the system status bar.

Select the battery icon and the following information window appears:

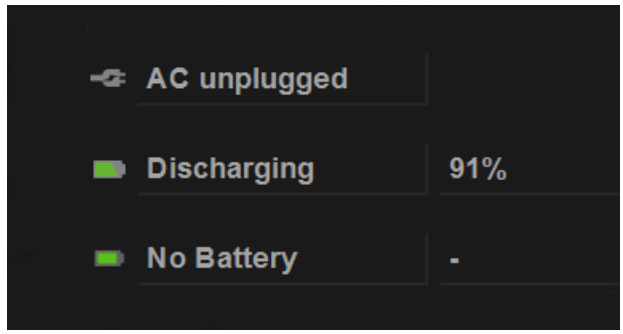


Figure 3-3. Battery Status Message

View current battery status (continued)

- **Current power source**.

  This field displays the current power source: AC power, Battery or Big Battery
- **Remaining battery power**.
  - When the battery is in use, this field displays the current power remaining capacity.
  - When there is no battery, “Battery not present” appears.
  - When the battery is not in use, this field displays current capacity (charging).
- **Remaining big battery power**.
  - When the Extended Life Battery is not in use to supply power to the system, this field displays “No Big Battery”.
  - When Extended Life Battery is in use to supplying power to the system, this field displays the current power remaining capacity.
  - When the Extended Life Battery is being charged, this field displays the current capacity (charging).

If the battery is not in use, the battery icon appears as being charged in the system status bar.

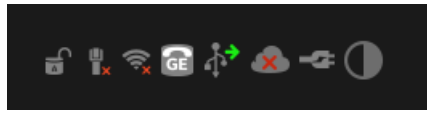


Figure 3-4. Charging Battery

Warning information–displays warning information when battery power is low.

Battery power low warning

If the battery is in use and the battery power is low, a warning message appears to warn the user that the battery power is low and it needs to be charged.

The warning message in red will continually appears on status bar at the bottom of the screen.

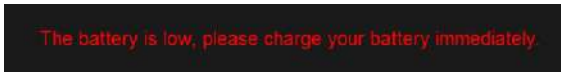


Figure 3-5. Low battery power warning on status bar

When the estimated current power remaining time is 10 seconds, the Error message appears on the screen to warn that the system will be shut down automatically in 10 seconds.

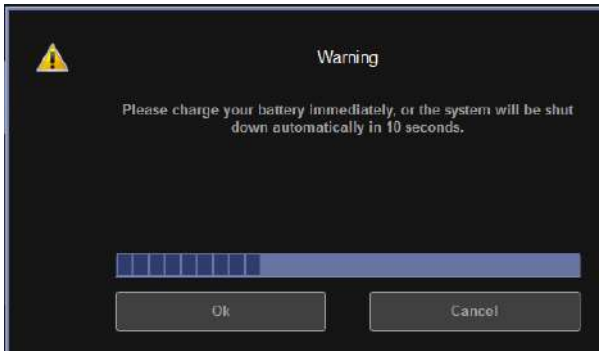


Figure 3-6. System shutdown warning

NOTE: When the battery power is low and the user cannot charge the battery in time, the system automatically shuts down in 1 minute. This protects the whole system. You need to charge the battery by connecting to power source immediately before the system shuts down or you may lose useful information.

Battery Installation

To install the battery to the bottom cover of the system.

1. Shut down the system and disconnect the AC/DC power cord.
2. Put the battery into the battery box.



Figure 3-7. Put the battery into battery box

3. Push down the battery till the battery lock is in the lock position.

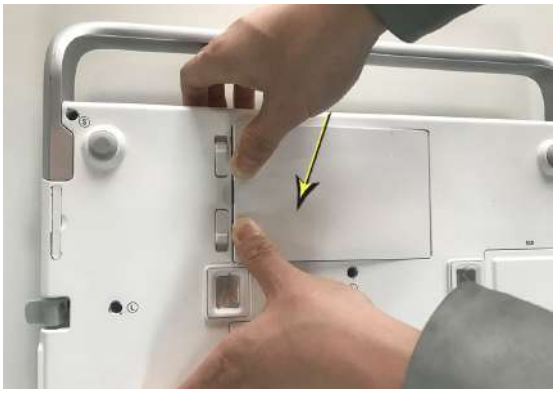


Figure 3-8. Push down the battery

Battery Removal

To remove the battery to the bottom cover of the system.

1. Shut down the system and disconnect the AC/DC power cord.
2. Push up the battery locks to the other end of the slots.

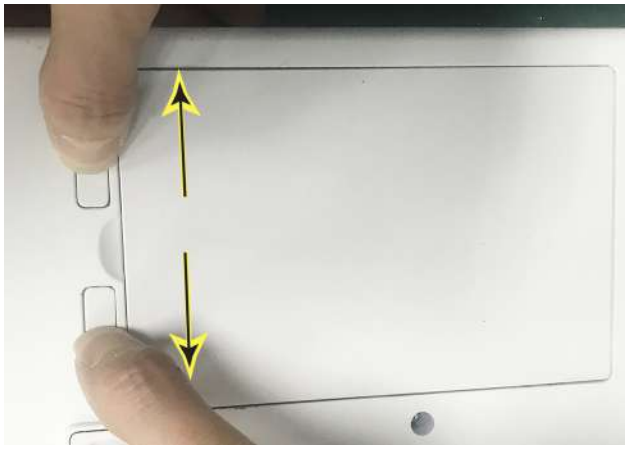


Figure 3-9. Unlock the battery

3. Put the finger in the breach of the battery box to lift up the battery and remove it.

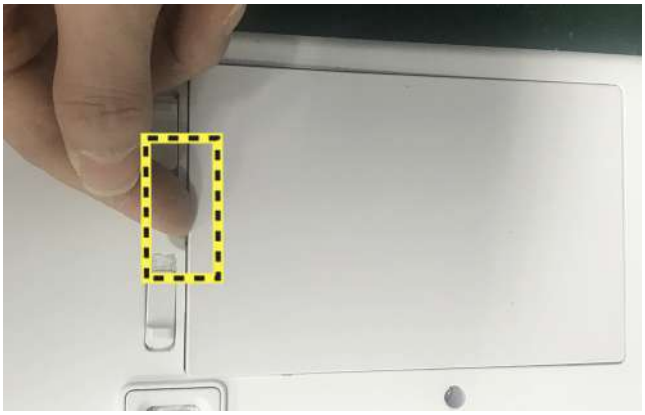


Figure 3-10. Remove the battery

AC Adapter



Do not use an AC adapter without approval by GE.

Be sure that nothing rests on the AC adapter's power cable and that the cable is not located where it can be tripped over or stepped on.

Place the AC adapter in a ventilated area, such as a desk, when you use it to run Versana Active. Do not cover the AC adapter with paper or other items that will reduce cooling; do not use the AC adapter inside a carrying case.

To prevent damage to the power cable of the AC adapter, DO NOT pull excessively on the cable; DO NOT make any sharp bends; DO NOT bend the power cable frequently.

Peripheral/Accessory Connection

Peripheral/Accessory Connector Panel

Versana Active peripherals and accessories can be properly connected using the connector panel.



Each outer (case) ground line of peripheral/accessory connectors are **Earth Grounded**.

Signal ground lines are Not Isolated.



For compatibility reasons, use only GE-approved probes, peripherals, or accessories.

DO NOT connect any probes or accessories without approval by GE.



The connection of equipment or transmission networks other than as specified in these instructions can result in electric shock hazard. Alternate connections will require verification of compatibility and conformity to IEC/EN 60601-1 by the installer.



DO NOT touch the patient and any of the connectors on the ultrasound unit simultaneously, including ultrasound probe connectors.

DO NOT touch the conducting parts of the USB, Ethernet, Video, Audio cables when connecting equipment to the unit.



When using peripheral device, observe all warnings and cautions given in peripheral manufacture’s manuals.



When using external commercial printers, the PUI (Printer USB Isolator) shall be used to provide safety protection.

Peripheral/Accessory Connector Panel (continued)

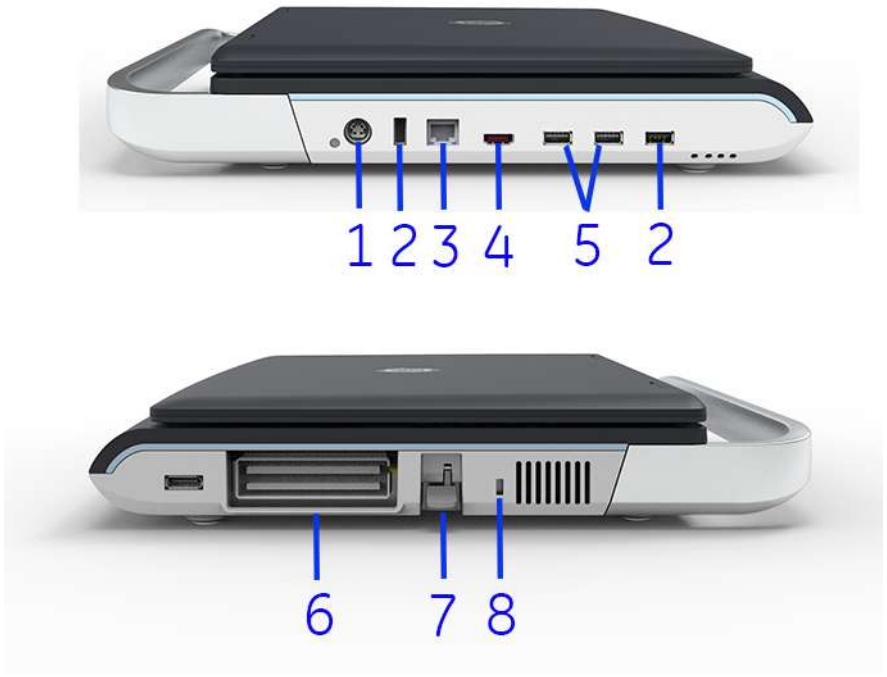


Figure 3-11. Peripheral/Accessory Connector Panel

1.	Port for DC In (AC Adapter)
2.	2 general USB 2.0 ports
3.	Network port
4.	HDMI port
5.	2 general USB 3.0 ports
6.	1 Probe Connector port
7.	Probe Connector Locking Lever
8.	Security Lock

Footswitch (Option)

You can attach the footswitch to the system by connecting it to the USB port on the system.

CAUTION

To avoid damage of the cable, keep the cable away from the wheels. Disconnect the Footswitch before moving the system.



Figure 3-12. Footswitch MKF 2-MED USB GP26

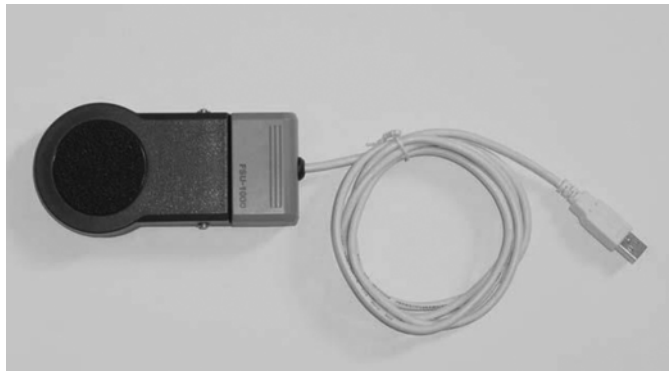


Figure 3-13. 1 Pedal Type Footswitch

You can configure its function of Footswitch from the **Utility -> Application -> Settings -> Footswitch**.

CAUTION

When using the footswitch, DO NOT hold down the footswitch pedal. Press and release the footswitch pedal. Pushing and holding down the pedal behaves the same way as pushing and holding down a key on the keyboard.

Powering the System

Connecting the System

To connect the system to the electrical supply:

1. Ensure that the wall outlet is of the appropriate type.
2. Ensure that the power switch is turned off.
3. Unwrap the power cable. Make sure to allow sufficient slack in the cable so that the plug is not pulled out of the wall if the system is moved slightly.



CAUTION

Use the appropriate power cord provided by or designated by GE.

4. Attach the power plug to the system.
5. Connect the power cable to the adapter, if it is not connected.

NOTE: *Do not use an extension cord or adapter plug.*

6. Push the power plug securely into the wall outlet. The power plug is an isolation means which used to isolate its circuits electrically from the SUPPLY MAINS.

NOTE: *Do not position the Versana Active to make it difficult to operate the mains plug.*

Connecting the System (continued)



To avoid risk of fire, the system power must be supplied from a separate, properly rated outlet. See ‘Before the system arrives’ on *page 3-3 for more information.*

Under no circumstances should the AC power plug be altered, changed, or adapted to a configuration rated less than specified. Never use an extension cord or adapter plug.

To help assure grounding reliability, connect to a “hospital grade” or “hospital only” grounded power outlet.



To ensure that the power cable does not disconnect during system use.

If the system is accidentally unplugged, data may be lost.



Failure to provide an adequate earth ground can cause electrical shock, resulting in serious injury.

Connection of additional protective earth conductors or potential equalization conductors is not necessary in most cases and is only recommended for situations involving multiple equipment in a high-risk patient environment to provide assurance that all equipment is at the same potential and operates within acceptable leakage current limits. An example of a high-risk patient would be a special procedure where the patient has an accessible conductive path to the heart such as exposed cardiac pacing leads.



Only connect Versana Active and mains-operated accessories to the appropriate wall outlet. DO NOT connect them to a single or multiple socket outlets, an extension cord, power strip or an adapter plug.



To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

Connecting the System (continued)

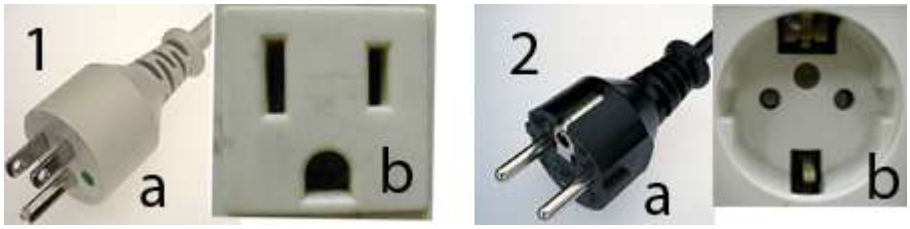


Figure 3-14. Example Plug and Outlet Configurations

1. 100-120 VAC, 10A
   Plug and Outlet Configuration
2. 220-240 VAC, 10A
   Plug and Outlet Configuration

NOTE: Country-specific power cords are currently available for China, India/South Africa, Argentina, Europe, Japan, Switzerland, the United Kingdom, the United States, Israel, Denmark, Brazil and Australia/New Zealand.

Voltage level check

Check the rating label on the bottom of the system. Check the voltage range indicated on the label.

Connecting to the electrical outlet



POWER OUTAGE MAY OCCUR. The ultrasound unit requires a dedicated single branch circuit. To avoid circuit overload and possible loss of critical care equipment, make sure you DO NOT have other equipment operating on the same circuit.



Disconnect the plug from the wall outlet in case an emergency should occur. Ensure easy access to the power outlet.



To avoid leakage current above safety limits as prescribed by IEC 60601-1 and to ensure continuity of protective earth. Only connect Versana Active and mains-operated accessories to the appropriate wall outlet. DO NOT connect them to a single or multiple socket outlets, an extension cord, power strip or an adapter plug.

Acclimation Time

After being transported, the unit requires one hour for each 2.5 degree increment its temperature is below 10 degree C or above 40 degree C.

Table 3-2: System Acclimation Time Chart

Degree C	50	45	40	35	30	25	20	15	10	5	0	-5
Degree F	122	113	104	95	86	77	68	59	50	41	32	23
hours	4	2	0	0	0	0	0	0	0	2	4	6

Power On

To turn on the system

1. Check the rating label at the bottom of the system. Check the voltage range indicated on the label.
2. Momentarily press the On/Off switch to turn the power on.
3. The system should now go through its boot-up process with no further user intervention.



Figure 3-15. Power On/Off Switch Location

Power Up Sequence

The system is initialized. During this time:

- The system boots up and the status is reflected on the monitor.
- Probes are initialized for immediate operation.

NOTE: If no probe is connected, the system goes into freeze mode.

- Peripheral devices are activated on power up.

After initialization is complete, the default B-Mode screen is displayed in the monitor display (if a probe is connected).

LED

Press the On/Off Switch to turn the power on.

After a successful boot-up process, the Power On/Off switch illumination turns to green.

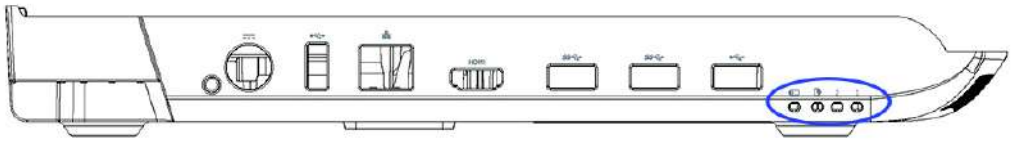


Figure 3-16. LED Indicators

1. Indicates battery status. When the battery is charged, the LED is green. When battery power is low, the LED is orange.

   Color: Green and Orange
2. Indicates hard disk working status. When the LED is flashing, the system is writing or reading from the hard disk.

   Color: Green
3. Diagnostic LED 2.
4. Diagnostic LED 1.

Keyboard Backlight

The keyboard backlight is lit for operation in dimly lit room.

Login

Personal IDs and associated passwords can be preset on the Versana Active.

If the User Auto Logon preset is blank, you are prompted to login.

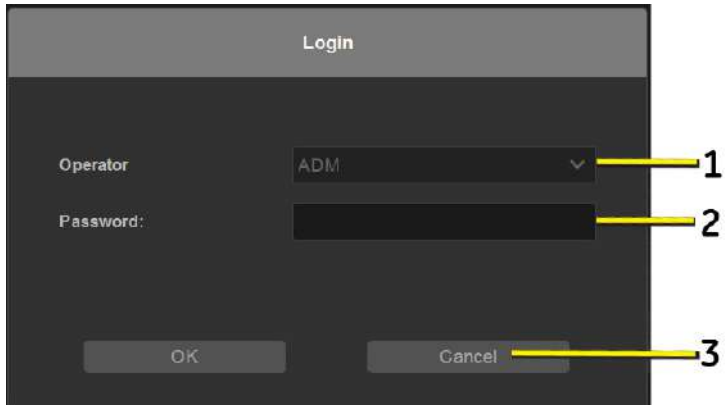


Figure 3-17. Operator Login Window

1. **Operator**: Select the Operator.
2. **Password**: Enter Operator's password (optional).
3. Select type of Logon or Cancel.
   - **OK**: Standard logon
   - **Cancel**: Cancel logon

NOTE: When you login as administrator for the first time you are prompted to set a password.

NOTE: A valid password must be at least 6 characters. A password must contain at least 1 upper-case, 1 lower-case and 1 number.

Logoff

To Logoff, press the On/Off switch momentarily and a SYSTEM-EXIT window appears.

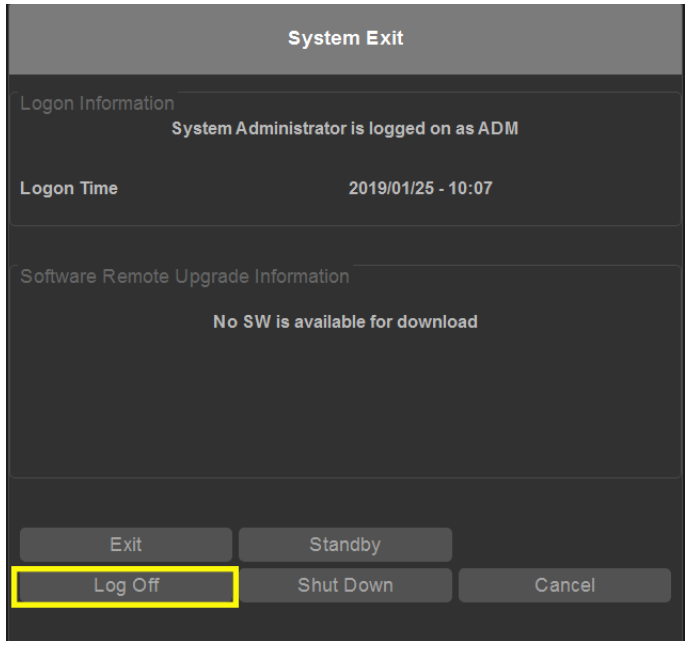


Figure 3-18. System Exit Window

Power Off

For optimum system operation, we recommend that you restart the system at least once every 24-hour period. If you shut down the system at the end of the day, no other action is needed.

To power off the system:

1. When you shutdown the system, enter the scan screen and lightly press the **Power On/Off** switch on the control panel once. The System-Exit window is displayed.

NOTE: DO NOT press and hold down the Power On/Off switch to shutdown the system. Instead, lightly press the Power On/Off switch and select Shutdown.

2. Using the **Trackball**, select ***Shutdown***.

   The shutdown process takes a few seconds and is completed when the Power On/Off switch illumination turnes from green to off.

*NOTE: DO NOT select **Exit** for Shutdown. **Exit** is only available to Service representative.*

NOTE: If the system has not fully shut down in 60 seconds in the power-off sequence, press and hold down the On/Off switch until the system shuts down.

3. Disconnect the probes.

   Clean or disinfect all probes as necessary. Store them in their shipping cases or another appropriate probe storage system to avoid damage.

4. Disconnect the AC adapter mains plug from the power outlet.

NOTE: Disconnect the AC adapter mains plug from the outlet if the system has been fully charged. Connect the AC adapter mains plug to the outlet if the system needs to be charged and then disconnect it when the system has been fully charged.

Standby Mode

To activate Standby Mode:

1. Press the On/Off switch and select ***Standby***.

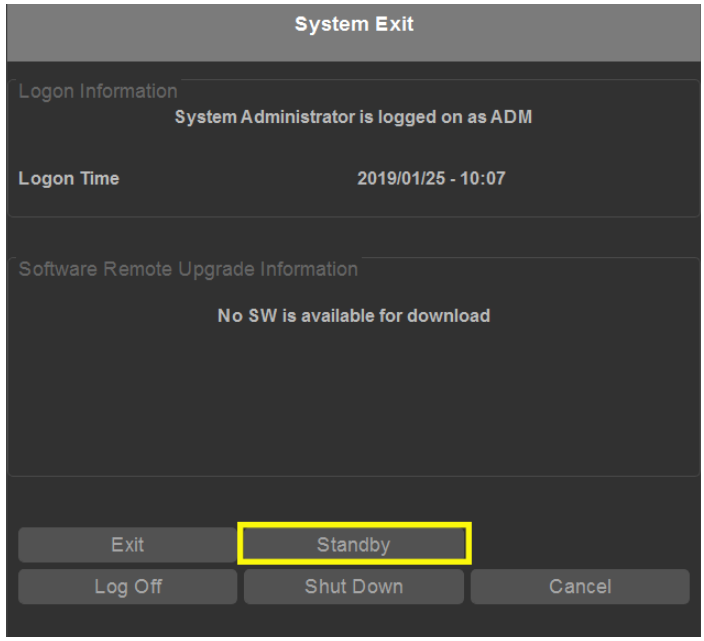


Figure 3-19. System Exit Window

2. The system will turn off the backlight of LCD.
3. The system will freeze Image.
4. The system will disable all keys(Function Keys, A/N keys, Trackball) except On/Off switch.
5. The system will turn off all backlight and active light of keys except On/Off switch.

Press the On/Off Switch to fast boot up.

NOTE: Image is still on freeze mode (Frozen Image).

Check System Date and Time

A warning message “Please check the system date and time are correct” appears on the screen when the system is powered up. This warning message appears for the possible reasons:

- The system is not boot up for over 14 days.
- The system time has been changed by 24 hours earlier than the current system time of last boot-up.

This warning message is to remind the user to check the system date in case the system date and time is incorrect.

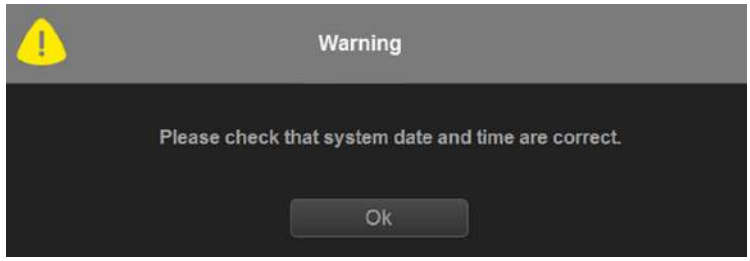


Figure 3-20. Check system date and time message

Move the cursor to **OK** and press **Set** key on the control panel to select **OK**. The system enters scanning mode.

Check the system date and time. If it is incorrect, follow below steps to reset the system date and time.

1. Enter Utility -> System -> General -> Date/Time.
2. Reset the system date and time.
3. Select **Apply** and then select **OK**.
4. Select **Save**.

Crash Recovery Instructions

In cases where the system detects an internal error, the system may reboot on its own. If this happens, the system automatically returns to the start-up screens. All images and measurements, except for generic worksheets, are preserved in the system.

The system automatically ends the current exam and permanently stores all the images and measurements. When the system reboots, check that all images and measurements have been preserved in the system. Then, simply hold down the power switch to initiate a normal power down sequence.

NOTE: If the image is not updated properly when the system is up, shut down the system again.

NOTE: Generic worksheets are not saved if the system crashes before you save it.

WARNING

The system crash may cause the internal HDD corruption. Avoid using the internal HDD as a permanent storage device. Backup data on a regular basis.

Temporary Buffer

When the system shuts down during an exam, the unsaved images and data are stored in temporary buffer. Next time the system starts up, the temporary buffered data is still available. The following dialogue displays.

- **Continue Exam**. Continue the last exam with the temporary images and unsaved data.
- **Delete Exam**. Delete the unsaved images and data of the last exam. Then begin a new exam.

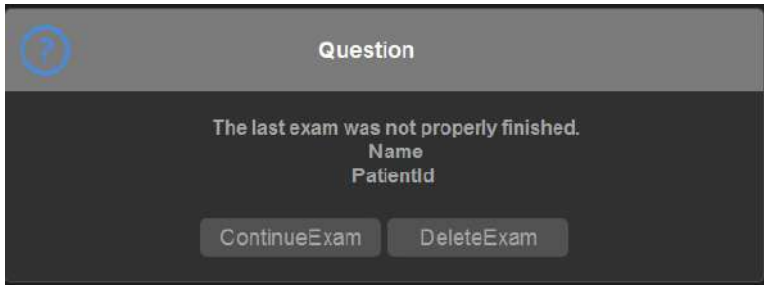


Figure 3-21. Temporary Buffer

Database Protection Mechanism

Abnormal shutdown, such as power outage, has the risk to cause database corruption. Reboot the system after abnormal shutdown. The below dialog box displays when the system visits damaged database. Press OK, then the system restores the database which have been backuped most recently in the normal condition. The data occurred since last time of normal store and normal shutdown may lost.

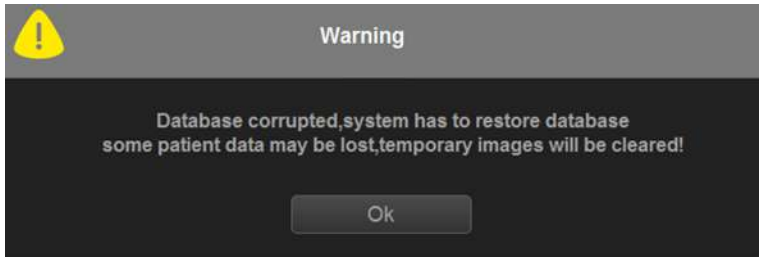


Figure 3-22. Database Protection Mechanism

System Positioning/Transporting

Before moving the system

When moving or transporting the system, follow the precautions below to ensure the maximum safety for personnel, the system, and other equipment.



DO NOT attemp to move the console using any cables or fixtures, such as the probe connectors.



This equipment is not to be used during transportation (e.g. ambulance cars, aircraft).



Handle carefully. A drop of more than 5 cm can cause mechanical damages.

Before moving the system (continued)

1. Press the **Power On/Off** switch to power off the system. See 'Power Off' on *page 3-26 for more information.*
2. Unplug the power cord (if the system is plugged in).
3. Disconnect all cables from off-board peripheral devices(external printer, etc.) and the ethernet connection from the console.

*NOTE: To prevent damage to the Power Cord, **DO NOT** pull excessively on the cord or make sharp bends while wrapping.*

4. Store all probes in their original cases or in soft cloth or foam to prevent damage.
5. Store sufficient gel and other essential accessories in the provided space.

Moving the System

1. Always use the handle to move the system.


CAUTION

The system weighs less than 6kg (13.23 lbs) without any probes or peripherals. To avoid possible injuiry and equipment damage:

- Do not let the system strike walls or door frame.

Transporting the System

Use extra care when transporting the system using vehicles. See 'Before moving the system' on *page 3-31 for more information.* In addition to the instructions used when moving the system, also perform the following:

1. Before transporting, place the system in its storage case.
2. Ensure that the system is firmly secured while inside the vehicle.


CAUTION

Remove all peripherals from the console before transportation.

Probes

Introduction

Only use approved probes.

All approved imaging probes can be connected into the probe port of the Versana Active.

See ‘Probes and Biopsy’ on *page 17-1 for more information.*

Selecting probes

- Always start out with a probe that provides optimum focal depths and penetration for the patient size and exam.
- Begin the scanning session by choosing the correct application and preset for the examination by selecting **Probe**.
- Begin the scan session using the default Power Output setting for the probe and exam.

Connecting the Probe

Inspect the probe before and after each use for damage or degradation to the housing, strain relief, lens, seal, cable and connector. DO NOT use a transducer which appears damaged until functional and safe performance is verified. A thorough inspection should be conducted during the cleaning process.



Remove any dust or foam rests from the probe pins.



Fault conditions can result in electric shock hazard. Do not touch the surface of probe connectors which are exposed when the probe is removed. DO NOT touch the patient when connecting or disconnecting a probe.

Probes can be connected at any time, regardless of whether the console is powered on or off.

To connect a probe:

1. Place the probe's carrying case on a stable surface and open the case.
2. Carefully remove the probe and unwrap the probe cord.



DO NOT allow the probe to hang free. Impact to the probe lens could result in irreparable damage.

Connecting the Probe (continued)

3. Align the connector with the probe port and carefully push into place with the cable facing the front of the system.



Figure 3-23. Probe connection to Versana Active

4. Flip the connector locking lever up.



Figure 3-24. Probe conenctor locking lever

5. Carefully position the probe cord so it is free to move and is not resting on the floor.
6. When the probe is connected, it is automatically activated.

CAUTION

Make sure that the probe and application names displayed on the screen correspond to the actual probe and application selection.

Cable Handling

Take the following precautions with probe cables:

- Do not bend the cable acutely.
- Avoid crossing cables between probes.

Activating/Deactivating the Probe

To activate the probe, select the appropriate probe from the probe indicators in Probe/Preset screen.

To deactivate the probe, select another probe or press **Freeze** key to enter into freeze mode.

The probe's default settings for the mode and selected exam are used automatically.



Make sure that the probe and application names displayed on the screen correspond to the actual probe and application selection.

Deactivating the Probe

When deactivating the probe, the probe is automatically placed in standby mode.

To deactivate a probe:

1. Ensure the selected probe in deselected or Versana Active is in freeze mode. If necessary, press the ***Freeze*** key.
2. Gently wipe the excess gel from the face of the probe.

Disconnecting the Probe

Probes can be disconnected at any time. However, the probe should not be active when disconnecting the probe.

1. Ensure the probe is deactivated. Deactivate by selecting another probe or pressing Freeze.
2. Press the connector locking lever down.



Figure 3-25. Probe connector unlocking lecer

3. Pull the probe connector straight out of the probe port carefully.

CAUTION

DO NOT allow the probe to hang free. Impact to the probe lens could result in irreparable damage. Use the integrated cable management hook to wrap the cord.

4. Ensure the cable is free.
5. Be sure that the probe is clean before placing the probe in its storage box or wall hanging unit.

Transporting Probes

When transporting a probe a long distance, store it in its carrying case.

Storing the Probe

It is recommended that all probes be stored in the provided carrying case for probe storage.

Carrying case:

- First place the probe connector into the carrying case.
- Carefully wind the cable into the carrying case.
- Carefully place the probe into the carrying case. DO NOT use excessive force or impact the probe head.

Operator Controls

Control Panel Map

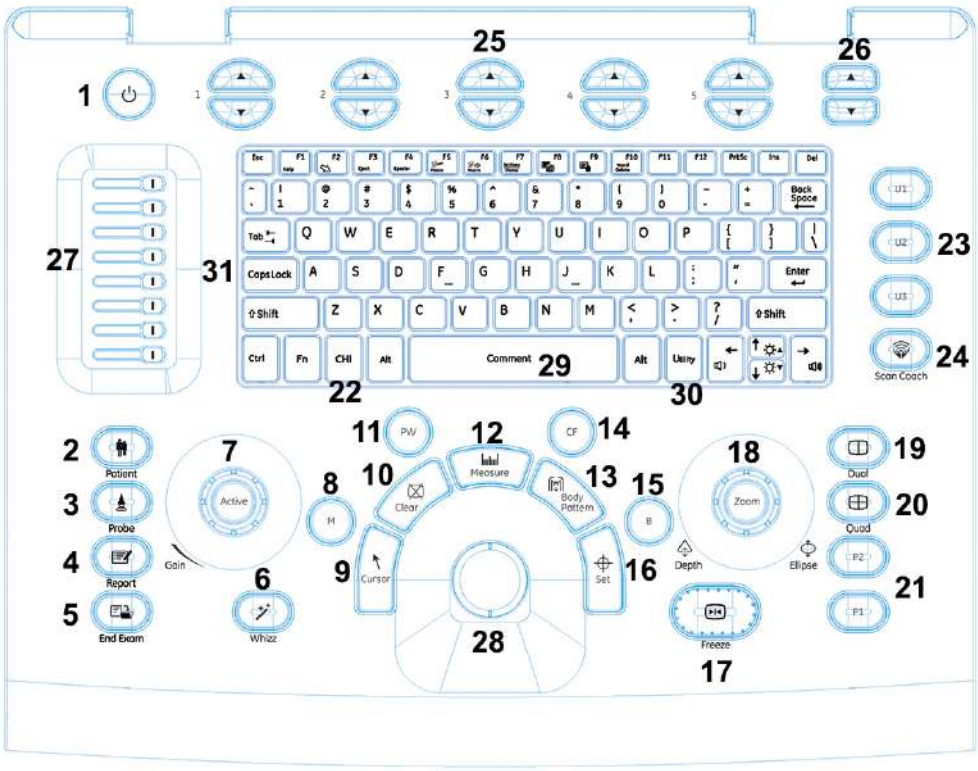


Figure 3-26. Control panel map

1. Power On/Off
2. Patient key
3. Probe key
4. Report key
5. End Exam key
6. Whizz key
7. Active/Gain key
8. M Mode
9. Cursor key
10. Clear key
11. PW Mode
12. Measure key
13. Body Pattern key
14. CF Mode
15. B Mode
16. Set key
17. Freeze key
18. Depth/Ellipse/Zoom key
19. Dual key
20. Quad key
21. Phycial print buttons (Utility -> Connectivity -> Button)
22. CHI key
23. User Configurable Keys
24. Scan Coach key
25. Primary Menu keys
26. Up/Down keys
27. TGC
28. Trackball
29. Comment key
30. Utility
31. Alphanumeric Keyboard

Control Panel Map (continued)

NOTE: The factory default settings for User Defined Keys can be modified in Utility ->System -> User Configurable Key.



CAUTION

Do not apply too much force when adjusting the TGC slide pots as this could damage the slide pots.

Alphanumeric Keyboard

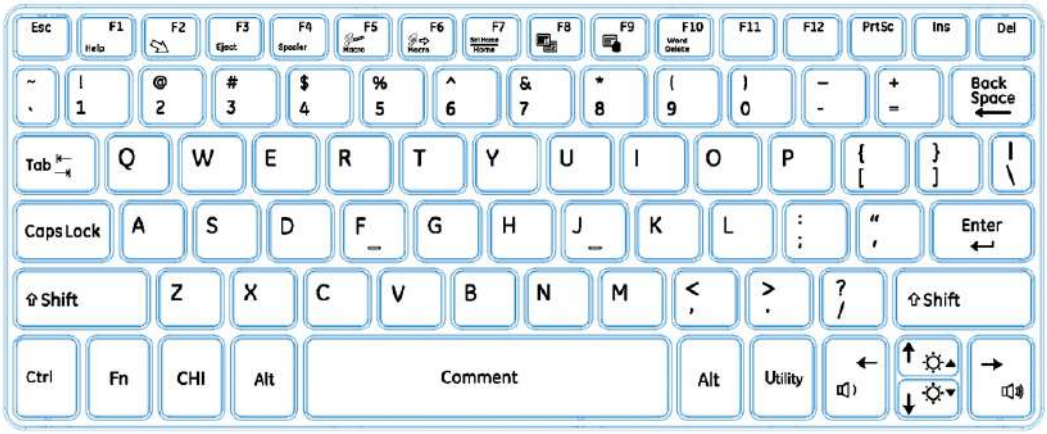


Figure 3-27. Alphanumeric Keyboard

Alphanumeric Keyboard (continued)

	The standard alpha-numeric keyboard has some special functions.
Esc	Exit current display screen.
Help (F1 Key)	Access Online help / user manual.
Arrow (F2 Key)	Annotation arrow.
Eject (F3 Key)	Eject media.
Spooler (F4 Key)	Activates DICOM Job Spooler screen.
Create a Fast Key (F5 Key)	Creates a Fast Key.
Play a Fast Key (F6 Key)	Plays a Fast Key.
Home/Set Home (F7 Key)	Move annotation cursor to home position; shift+key to set current annotation cursor position as the new home position.
Text1/Text2 (F8 Key)	Switch between user text annotation overlays.
Grab Last (F9 Key)	Activate the last selected data for edit.
Word Delete (F10 Key)	Erase word associated with comment cursor.
Fn + Left/Right Keys	Adjust audio volume.
Fn + Up/Down Arrow Keys	Adjust brightness.
Alt+1 or Alt+2	Place a marker in the log.
	If you encounter a problem and cannot collect the logs immediately:
Alt+D	Collect the logs.
	Once the logs are collected, the engineering team would be able to see the marker you added which will help engineering to troubleshoot the problem.
NOTE:	*Logs can be collected by pressing Alt+D, Only when peripheral storage devices are connected.*

Primary Menu Keys

The primary menu keys contain exam function and mode/ function specific controls.

NOTE: Different primary menu are displayed depending on which function is selected.



Figure 3-28. Primary Menu Keys

Press up/down buttons to adjust the value of the softmenu associated with it.

Press up/down buttons to turn the menu page up and down.

The Primary Menu can be configured in **Utility** -> **Application** -> **Image Controls**.

Button description

Mode, Display and Record

This group of controls provides various functions relating to the display mode, display orientation, image recording/saving, freeze, gain and Cine scroll.

The Mode Controls select the desired display mode or combinations of display modes.

- During dual display modes the **Dual** and **Quad** keys activate the Left or Right displayed image. See ‘Split Screen’ on *page 6-4 for more information.*
- **Whizz** is used to:
  - initiate auto optimize
  - turn off auto optimize.

  For more informatio about Whizz, please refer to ‘Whizz’ on *page 5-8*
- **Depth/Zoom/Ellipse** controls the image display depth/width and activates the area/ellipse measurement fuction.
- **P2** key is used to activate/print the designated recording device.
- **P1** key is used to store the images/loops to the defined designation.
- The **Freeze** key is used to stop the acquisition of ultrasound data and freeze the image in system memory. Pressing **Freeze** a second time continues live image data acquisition.
- To activate a specific mode, press the appropriate mode key.

Measurement and Annotation

This group of controls performs various functions related to making measurements, annotating and adjusting the image information.

- The **Comment** key enables the image text editor and displays the annotation library.
- The **Clear** key is generally used to erase functions, such as annotations/comments, body patterns and measurements. Pressing the **Clear** key again exits the selected function.
- Press the **Body Pattern** control, it enables the Body Pattern and displays the default pattern on the screen. When body patterns are active, select Rotate Probe on the primary menu to rotate the probe position indicator.
- Press **Set** to fix the measurement after the ellipse adjustment is complete. The measurement is then displayed in the measurement result window.
- The **Measure** key is used in all types of basic measurements. When the **Measure** key is pressed, the measurement menu is displayed.
- The **Set** key is used for various functions, but is generally used to fix or finish an operation (e.g. to fix a measurement caliper).
- The **Trackball** is used with almost every key function in this group. Trackball control depends on the last key function pressed.

Monitor

Related Hazards- Monitor



- **DO NOT** place a finger, hand or any object on the joint of the monitor or monitor arm to avoid injury when moving the monitor and monitor arm.
- To avoid result of injury or system damage, **NEVER** place any object or liquid on the monitor, whether in the home or flip down/transport position.

  if an object or liquid falls/spills into the monitor or the cabinet, unplug the system immediately. Call the Service Representative for information.
- **DO NOT** scratch or press on the panel with any sharp objects, such as a pencil or pen, as this may result in damage to the panel.
- The monitor screen may have defective pixels. These pixels may appear as a slightly light or dark area on the screen. This is due to the characteristics of the panel itself, and not the product.
- The backlight of the monitor panel has fixed life span. When the screen becomes dark or begins to flicker, contact a qualified Service Representative for information.

NOTE: Bright light could impact readability of screen.

Adjusting the Monitor

The monitor position can be adjusted for easy viewing.

- Tilt the monitor for the optimum viewing angle. The maximum angle is 170.



To avoid damage, DO NOT push the monitor over the maximum opening angle.

Brightness and Contrast

1. Press **Cursor** key on the control panel. Move the trackball to position the cursor over the adjustment icon, then press **Set** to display the setting menu.



Figure 3-29. Setting Menu Icon

2. Follow the procedure below to adjust the Color Temperature, Contrast, Brightness:
   - To adjust the color temperature: press **Standard**, **Brown,** or **Blue** to choose the color temperature. The chosen color temperature displays in the **Color Temp** area.

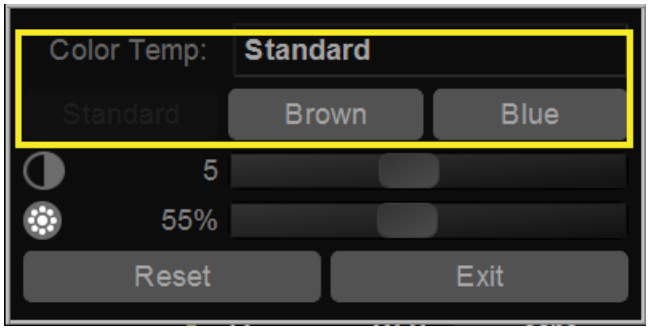


Figure 3-30. Active Color Temperature

   - To adjust the Contrast: Press **Set** to choose the adjustment button, hold down the **Set** key and move the trackball to move the adjustment button. Move the adjustment button to the left to decrease the contrast or move the adjustment button to the right to increase the contrast.

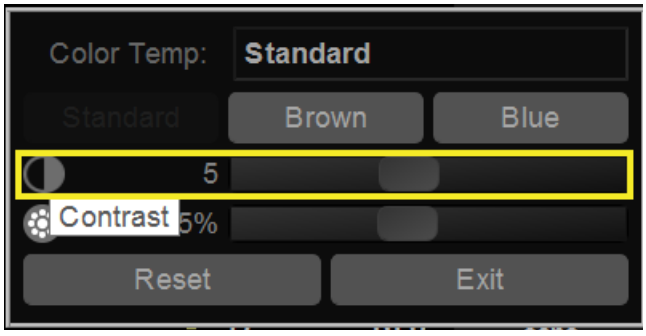


Figure 3-31. Contrast

Brightness and Contrast (continued)

- To adjust the Brightness: Press **Set** to choose the adjustment button, hold down the **Set** key and move the trackball to move the adjustment button. Move the adjustment button to the left to decrease the brightness or move the adjustment button to the right to increase the brightness.

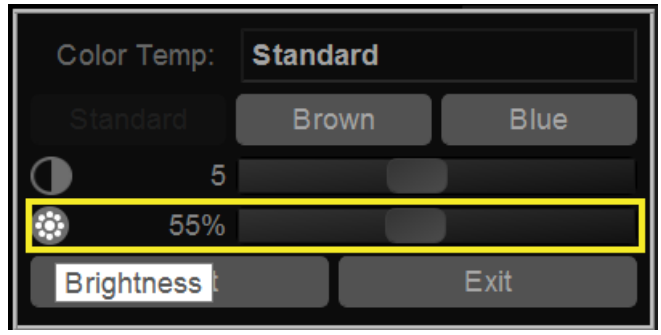


Figure 3-32. Brightness

3. Press **Reset** to return to the default setting; Press Exit to exit the setting menu.

NOTE: Press Reset button and the three color temperature settings will return to the default settings.

Brightness

Adjusting the monitor's brightness is one of the most important factors for proper image quality. If these controls are set incorrectly, the Gain, TGC, Dynamic Range and even Power Output may have to be changed more often than necessary to compensate.

The proper setup displays a complete gray scale. The lowest level of black should just disappear into the background and the highest white should be bright, but not saturated.

To adjust the brightness:

On the alphanumeric keyboard, adjust brightness with the ***Fn*** + ***Up/Down*** keys

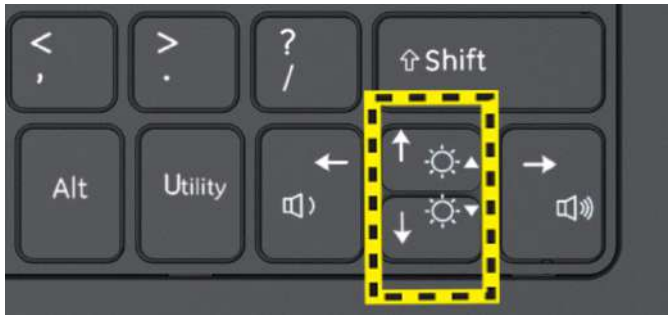


Figure 3-33. Brightness

1. Brightness

NOTE: After readjusting the LCD monitor's Brightness, readjust all preset and peripheral settings.

NOTE: The brightness of the LCD monitor should be set first as it affects the Gain and Dynamic Range settings of your image. Once set, this should not be changed unless the brightness of your scanning environment changes.

Volume

To adjust the volume:

On the alphanumeric keyboard, adjust volume with the ***Fn*** + ***Left/Right*** keys

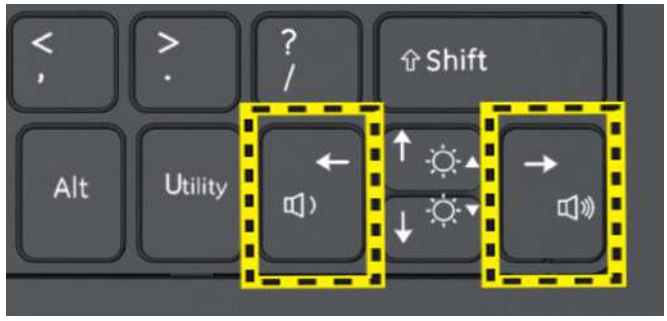


Figure 3-34. Volume

1. Volume

Monitor Display

Monitor Display

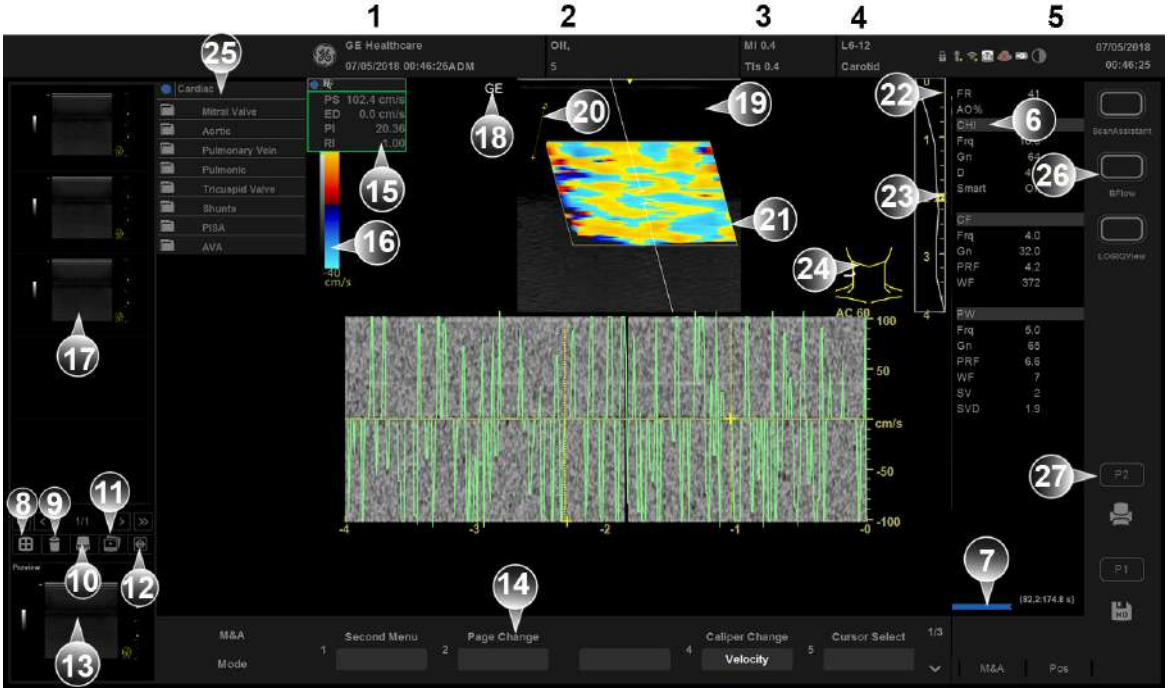


Figure 3-35. Monitor Display Tour

1. Institution/Hospital Name, Date, Time, Operator Identification.
2. Patient Name, Patient Identification.
3. Power Output Readout.
4. Probe Identifier. Exam Preset.
5. Current date and time, Caps Lock: (lit when on), network connection indicator, system messages display, InSite status, InSite controls.
6. Imaging Parameters by Mode.
7. Cine Gauge.
8. Active Images screen.
9. Delete Image.
10. Save As Menu.
11. Slide Show.
12. Follow-up tool.
13. Image Preview.
14. Primary Menu.
15. Measurement Results Window.
16. Gray/Color Bar.
17. Image Clipboard.
18. Probe Orientation Marker.
19. Image.
20. Measurement Calipers.
21. Region of interest.
22. Depth Scale.
23. Focal Zone Indicator.
24. Body Pattern.
25. Measurement Summary Window.
26. User Configurable Key.
27. P1,P2.

Using the Monitor Display Controls to Manage Images

You can manage images from the display via these on-display controls.

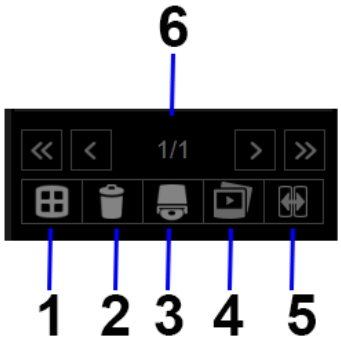


Figure 3-36. Menu Icons

1. Active Images Screen
2. Delete Image
3. Archive Image
4. Slide Show
5. Follow-up tool
6. Page Number

Active Images Page

Press Active Images Page to go to the Patient Active Images page. See ‘Active Images’ on *page 4-33 for more information.*

Delete

You can use this to delete an image from the clipboard.

1. Place the cursor on the clipboard image you want to delete, then press **Set** to select the image.
2. Place the cursor on the ***Delete*** icon and press **Set**.

Archive Image

Activate SaveAs feature. See ‘Save As’ on *page 15-10 for more information.*

Slide Show

The slide show will show the scan images on the clipboard one by one. See ‘Clipboard’ on *page 15-8 for more information.*

Number of Images in Exam

The number of images in an exam is tracked on the bottom of these Monitor Display Controls.

Chapter 4

Preparing for an Exam

Describes how to begin an exam.

Beginning an Exam

Introduction

Begin an exam by entering new patient information.

The operator should enter as much information as possible, such as:

1. Dataflow
2. Exam category
3. Patient ID
4. Patient name
5. Exam Information

The patient's name and ID number is retained with each patient's image and transferred with each image during archiving or hard copy printing.



CAUTION

To avoid patient identification errors, always verify the identification with the patient. Make sure the correct patient identification appears on all screens and hard copy prints.

Patient Screen

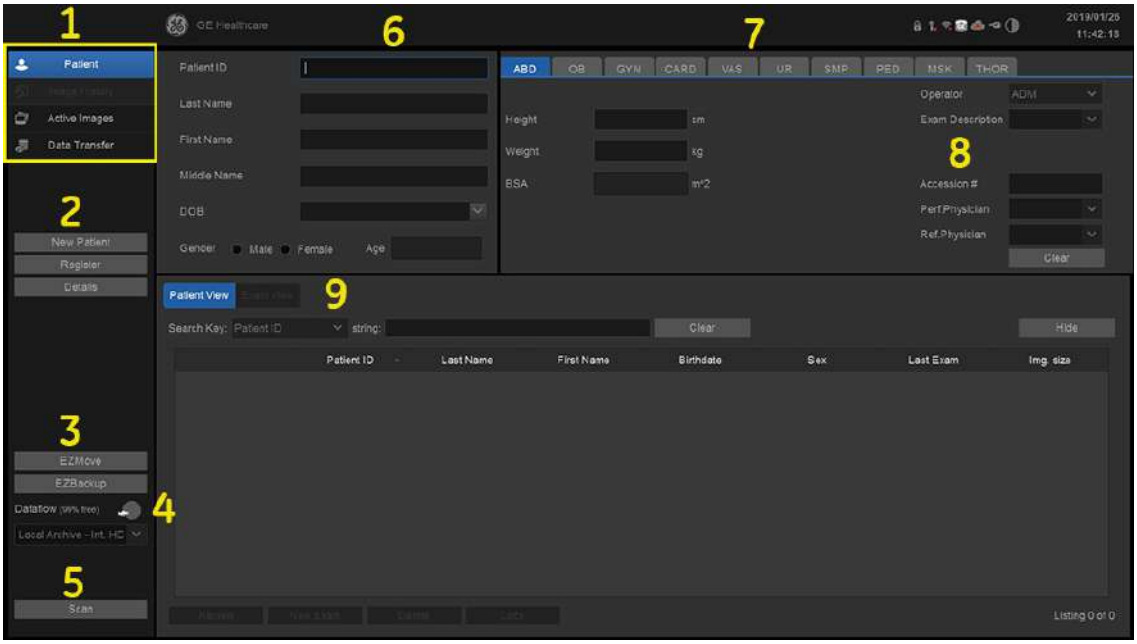


Figure 4-1. Patient Screen

1. Image Management
2. Function Selection
3. EZBackup/EZMove
4. Dataflow Selection
5. Scan
6. Patient Information
7. Category Selection
8. Exam Information
9. Patient View/Exam View

Enter Patient Data with the alphanumeric keyboard.

Image Management

- Patient - Provides a search and creation of patient.
- Image history - Provides a list of images per exam for the currently selected patient.
- Active Images - Provides preview of the currently selected exam.
- Data Transfer - Provides an interface to handle patient data from a remote device.

Function Selection

- New Patient–Used to clear patient entry screen in order to input a new patient's data into the database.
- Register–Used to enter new patient information into the database prior to the exam.

NOTE: If you are using the auto-generate Patient ID feature, do not select Register.

- Details–Select the Details box to activate/deactivate the exam details. Exam details include Indications, Comments, Admission Number, Performing Physician's Telephone Number, Referring Physician's Telephone Number, Operator Telephone Number, and Exam Description.

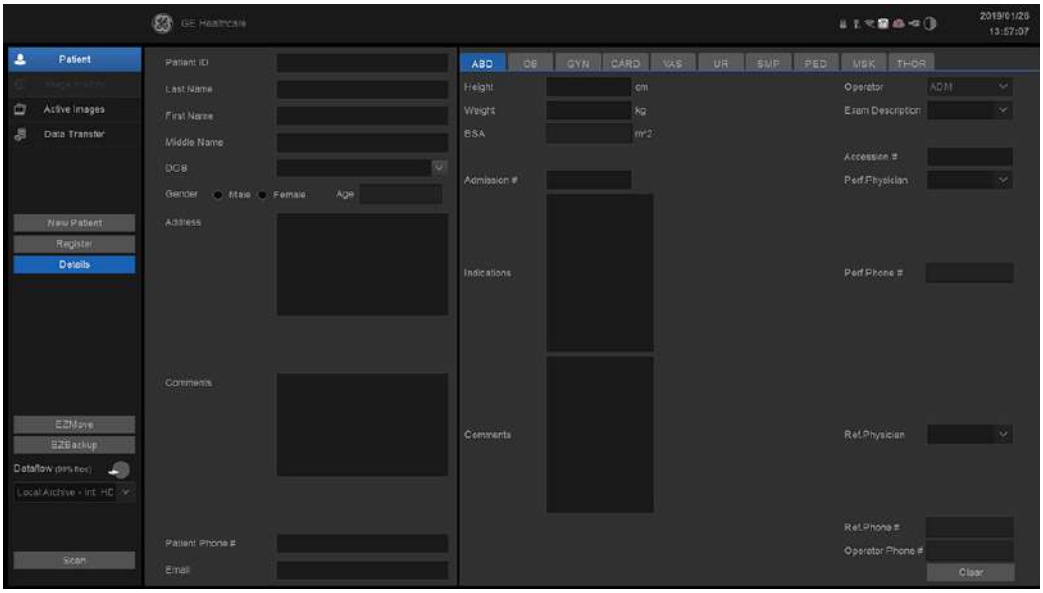


Figure 4-2. Details Window

EZBackup/EZMove

- EZBackup–One-step method to backup patient images to an external media.
- EZMove–Move and delete patient images.

Dataflow Selection

Select the appropriate dataflow.

NOTE: If you use a DVD-R, select DICOM CD Read in Dataflow.

If you place the cursor on the icon, the pop-up menu displays disk capacity.



Figure 4-3. Dataflow location

Scan

Used to exit Patient Menu and enter scanning screen.

Patient Information

- Patient ID Number (Required)
- Other ID Number

  The other ID is used to add additional information of the patient, such as Citizen ID.

NOTE: To enable/disable the other ID field, go to Utility -> Connectivity -> Miscellaneous.

- Patient Name–Last, First and Middle
- DOB (Birthdate)
- Age (automatically calculated when birthdate is input)
- Sex

Category Selection

Select from 10 exam application categories: Abdomen, Obstetrics, Gynecology, Cardiology, Vascular, Urology, Small Parts, Pediatrics, Musculoskeletal Conventional and Thoracic.

When a category is selected, the measurement and category presets are displayed.

Exam Information

Shows the Current/Active Exam information. Information pertinent to the selected exam category appears in the window. All possible information needs to be entered.

- Clear–Clears existing data.
- Past Exam (only for OB)–Input past exam data (register the patient before using).

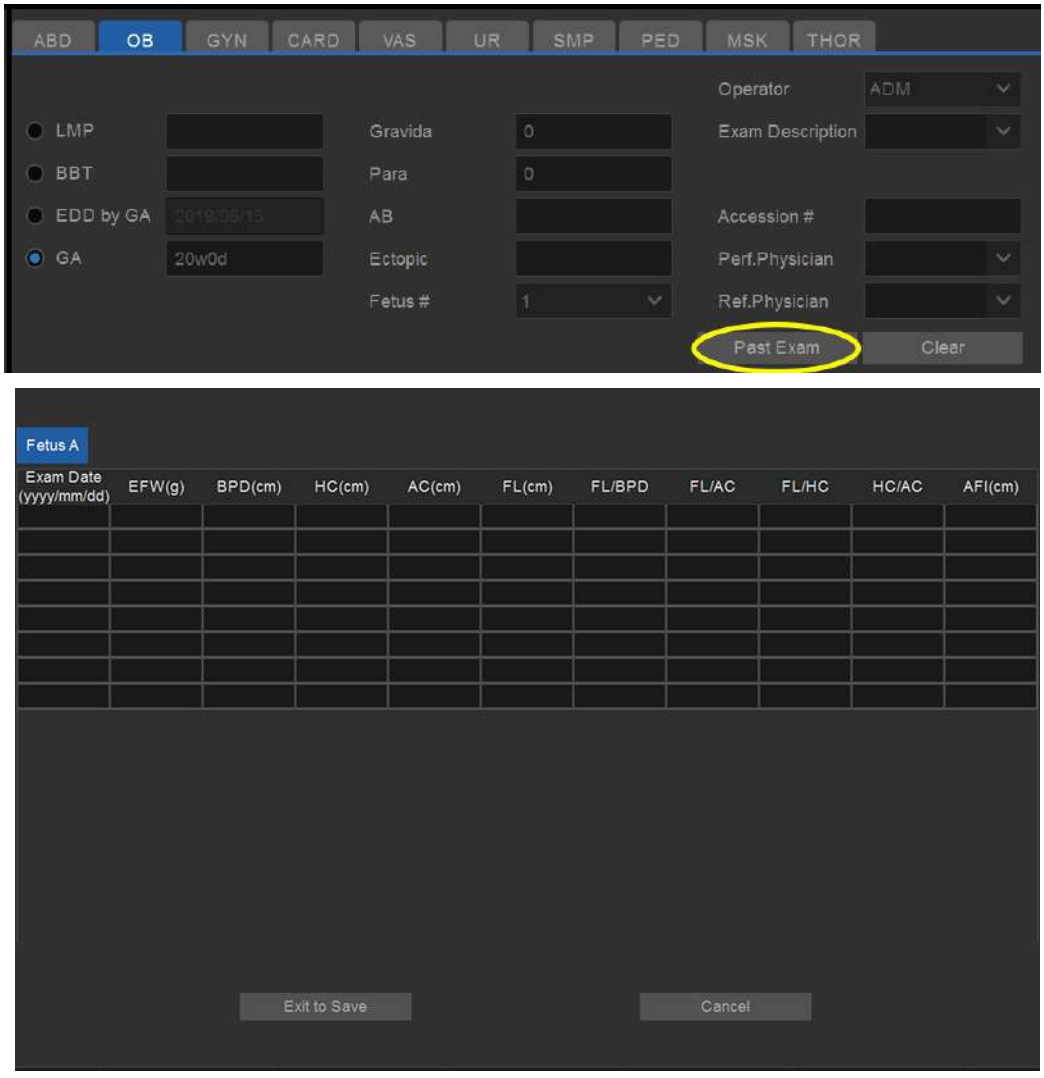


Figure 4-4. Input Past Exam

Patient View/Exam View

Patient View

Lists the patients in the database.

*NOTE: When you double-click the patient on the patient list with the **Set** key, the Review screen displays.*

- Search key–select search item from Patient ID, Last Name, First Name, Birthdate, Sex (f, m), Examdate, Exam today, Accession Number, Exam Description, Examdate before, Exam between, Examdate after, Other ID, Locked (Y, N) or Img. Archived (Y, N).

NOTE: If "Exam between" is selected, the Input Dialog displays and you can select the date from the displayed calender.

NOTE: If "Exam between" is used for the Search key, the From and To dates are separated by a "-" (dash) in the Search String.

NOTE: Img. Archived means that the exam was backed up to external media by EZBackup or Export.

- String–enter appropriate information.

  If you select Locked (Y, N) or Archived (Y, N) for the Search key, enter Y (Yes) or N (No).
- Clear–Clears the entered string.
- Listing XX of XXX -- Displays the quantity of patients in the search window and the quantity of patients in the database.
- Resume Exam–Continues the exam for that patient if you select the last exam of the day.
- New Exam–Creates a new exam based on a current or searched patient.
- Lock/Unlock–Locks the exam/patient. Prevents move and delete functions.

  If you select the patient, all exams are locked, the lock icon displays in the patient ID cell.

  To lock, select the patient to be locked and select **Lock**.

  To unlock, select the locked patient and select **Unlock**.
- Delete–Deletes Patient/Exam.

NOTE: "Delete" is only displayed when you login as Administrator.

Patient View/Exam View (continued)

Exam View–Displays the Exam History of the selected patient.

- The system can display the Detail Mode instead of Exam View when you double click the patient in the patient list or select the patient in the patient list and then select Details. If the Detail Mode preset on Utility -> Connectivity -> Miscellaneous menu is selected, the Detail Mode displays.
- Disk - Displays the disk name on which you saved the exam's image data. If "+" displays behind the disk name, the data is saved on two or more disks.



To maintain optimum performance and to safeguard patient data, keep the total number of patients in the database below 1,000.

To reduce the total number of patients in the database, perform the following procedure.

1. Prepare the unformatted media before EZBackup.

NOTE: Formatted CD-R or DVD-R cannot be used for EZBackup.

2. First perform EZBackup and then Backup (Patient Archive and Report Archive).
3. Go to the archive screen, select the patients/exams to delete. Select "Delete" to delete the selected data.

NOTE: Removing image data with the "EZMove" function does not reduce the patient number in the database.

NOTE: Ensure that all patients are exported or backed up BEFORE deleting them.

We recommend attaching the patient list to the EZBackup media. Insert the media and select DICOM CD Read for dataflow (if you use a USB drive, select DICOM USB Drive Read). Select any patient and press the programmable Set key to print the patient list on the digital printer or PC printer.

Beginning a New Patient

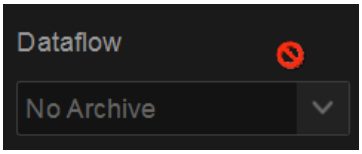
Scanning a New Patient

WARNING

Imaging functions may be lost without warning. Develop emergency procedures to prepare for such an occurrence.

WARNING

Ensure you have selected a dataflow. If No Archive is selected, no patient data is saved. The Dataflow will display as below:



CAUTION

To avoid patient identification errors, always verify the identification with the patient. Make sure the correct patient identification appears on all screens and hard copy prints.

CAUTION

Always use the minimum power required to obtain acceptable images in accordance with applicable guidelines and policies.

CAUTION

Always use the system on a flat surface in the patient environment.

CAUTION

Ensure that the hands of the patient are away from the system during the exam.

The position of the operator and the patient vary by the anatomy of interest being scanned.

In most cases, the operator sits/stands straight in front of the operator console and the patient lies on the bed on the right (or left) side of the system.

Scanning a New Patient (continued)

When starting a new patient's exam, ensure you do the following:

1. Select **Patient** on the control panel.
2. Select **New Patient** on the patient menu.

   If there are images on the clipboard, a pop-up menu appears. Specify whether you want to store images, delete images, or go to active images.
3. Choose the exam category.
4. Verify the dataflow.

NOTE: *DO NOT use the removable media Dataflows on the New patient menu.*

NOTE: *The system will display a warning dialog when the patient is registered to "No Archive". if the "Warn register to No Archive" preset is selected in the Utility -> Connectivity -> Miscellaneous menu, a warning displays. Please select a different dataflow for permanent storage of patient data.*

5. Fill in patient information.

NOTE: *You can also select a patient from the patient database at the bottom of the Patient menu if the patient has a patient ID.*

NOTE: *Columns drive the ordering of the patients displayed. The colums that you select drives the order of the displayed paient database*.

NOTE: *Do not use the following characters when filling in patient information:*

" ‘ / : ; . , * < > | + = [ ] & !, @, #, $, %, ^, &, *, (,), ?, /, ~ , [,], {, }

6. Select ***Register***. Enter Past OB Exam information, if desired.
7. Select the probe to start scanning (or select Esc, Scan, or Freeze).
8. Perform the exam.

Scanning a New Patient (continued)

9. Store the images/loops to the clipboard.

   To store the still image, press **Freeze** and scroll through the frames using the **Trackball**. Select the frame and press **P1**.

   To store the cineloop, press **Freeze** and run the cineloop using the **Trackball**. Select the start/end frame and run the selected loop. Press **P1**.

   Select the start/end frame and scroll through the frames, or, store loops by pressing **P1** during the live scan.

10. When you have completed the study, press ***End Exam***. The Active Images screen displays. Select the images (still frame or cineloop) you want to store or simply select ***Permanent Store*** to store the images permanently.



CAUTION

DO NOT use the following special characters when saving images: !, @, #, $, %, ^, &, *, (,), |, :, ;, <, >, ?, /, ~, [,], {, }.



CAUTION

After completing the measurement, verify that the measurement result window is updated before you send or save the image.

Entering a Patient List Prior to Starting an Exam

All patient information can be entered before starting an exam.

1. Press **Patient** to display the Patient Screen.
2. Press ***New Patient*** to erase the current patient data.
3. Select **Store All** if data from previous patient was not saved.
4. Enter the Patient ID.
5. Enter the patient and exam information.
6. Press ***Register***.
7. Repeat above steps as required.

Select the patient from the Patient List. Select **Resume Exam** to continue the last exam that was performed on the selected patient.

Select **New Exam** to start a new exam on the selected patient.

Starting a new exam on an existing patient

1. Select **Patient** on the control panel.
2. Select the patient from the Patient List.
3. Select **New Exam**.
4. A new exam is created. Enter the data and begin the scan.

Scanning without entering any patient data

To scan a patient without entering any patient data until the end of the exam:

1. Scan the patient and save images to clipboard without the patient information, the system displays a Warning message, “A patient must be selected for permanent storage of images.” Select **OK**, a warning message is also displayed at the bottom of the image monitor in red.
2. When the scanning is finished, press **Patient** to display the Patient Search screen.
3. Enter the Patient ID, patient data and exam information as necessary, select ***Register***.
4. If images or measurements have been stored to the clipboard, the system will display the following message:

   “Unsaved images, measurements or fetus number will be linked to the current patient information, continue?” Press **OK** if you want to permanently store the images/ measurements that were just taken.
5. Enter the Active Images Screen, select ***Permanent Store***.
6. Return to patient page, select **New Patient**.

Ending a Patient

To end a patient:

Press ***Patient*** -> ***New Patient***, then select **Store All** in the pop-up menus to store exam data.

Changing Current Patient to Existing Patient (with Patient ID)

To change the current patient (with patient ID) to an existing patient, when there are some unsaved images on the clipboard for the active exam:

Select the existing patient from the patient list, the following dialog displays.

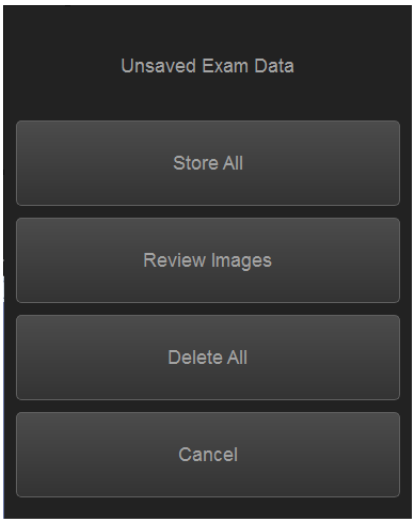


Figure 4-5. Unsaved Exam Data

1. **Store All** All the unsaved images will be saved to the current patient.
2. **Review Images.** Review the unsaved images in **Active Images** page and select to permanent store or delete.
3. **Delete All.** Delete all the unsaved images.

   The system will display a dialog: “Do you really want to delete all temporary images?” Select OK to delete the unsave iamges, select Cancel not to delete the images.
4. **Cancel.** Do nothing with the unsaved data, and return to **Patient** page.

Changing Current Patient to Existing Patient (without Patient ID)

To change the current patient (without patient ID) to an existing patient, when there are some unsaved images on the clipboard for the active exam:

Select the existing patient from the patient list, the following dialog displays.

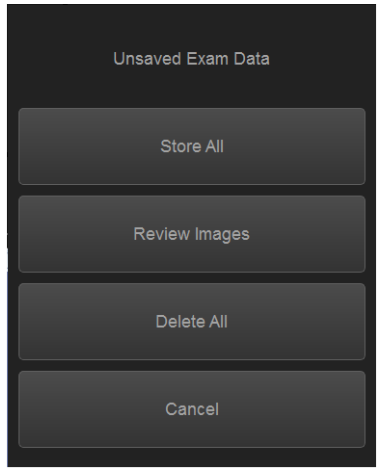


Figure 4-6. Unsaved Exam Data

1. **Store All** All the unsaved images will be saved. The current patient doesn't have Patient ID, the system will indicate to enter patient ID.

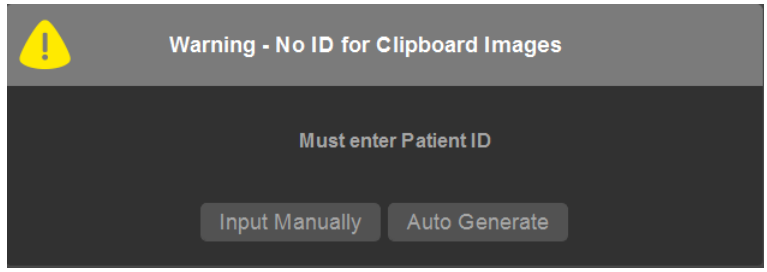


Figure 4-7. Enter Patient ID

Changing Current Patient to Existing Patient (with Patient ID)

(continued)

- **Input manually** Input the Patient ID and other information manually, and then select **Register** to register the new patient. And the system will display:

  "Unsaved images, measurements or fetus number will be linked to the current patient information, continue?" Select OK to save the images.

- **Auto Generate** The system will generate a new patient ID and the unsaved images will be saved to this new patient automatically.

2. **Review Images.** Review the unsaved images in **Active Images** page and select to permanent store or delete.
3. **Delete All.** Delete all the unsaved images.

   The system will display a dialog: “Do you really want to delete all temporary images?” Select OK to delete the unsave iamges, select Cancel not to delete the images.
4. **Cancel.** Do nothing with the unsaved data, and return to **Patient** page.

Deleting the existing patient/exam/image



Before deleting a patient or image from the Patient Screen, make sure you have already saved the data with EZBackup/ EZMove, Backup, or Export. Verify the media before deletion.

Deleting the existing patient

1. Search and select the patient in the patient list.
2. Select ***Delete***. The confirmation dialog box displays.

   OR

   Press the **Cursor** key. A pop-up menu displays. Select ***Delete***. The confirmation dialog box displays.
3. Select **OK** to delete or **Cancel**.

Delete multiple patients from the patient list

1. Select the multiple patients to be deleted from the patient list by holding down the Ctrl key and selecting patients one by one or holding down the Shift key to select a group of patients.
2. Select ***Delete***. The confirmation dialog box displays.

   OR

   Press the **Cursor** key. A pop-up menu displays. Select ***Delete***. The confirmation dialog box displays.
3. Select **OK** to delete or **Cancel**.

Deleting an existing exam

1. Search and select the patient in the patient list under patient screen.
2. Select ***Exam View*** to display patient exam screen.
3. Select the exam to be deleted.
4. Select ***Delete Exam***. The confirmation dialog box displays.
5. Select OK to delete or Cancel.

Deleting an existing image

1. Search and select the patient in the patient list under patient screen.
2. Select ***Exam View***. The patient exam screen displays.
3. Select the exam which contains the image to be deleted.
4. Select ***Active Images*** to display the image list.
5. Select the image to delete and select ***Delete***. The confirmation dialog box displays.
6. Select **OK** to delete or **Cancle**.

Printing the Patient List

You can print the patient list on a connected printer.

1. Move the cursor to the patient list and select any patient.
2. Press the **Cursor** key. The pop-up menu displays.

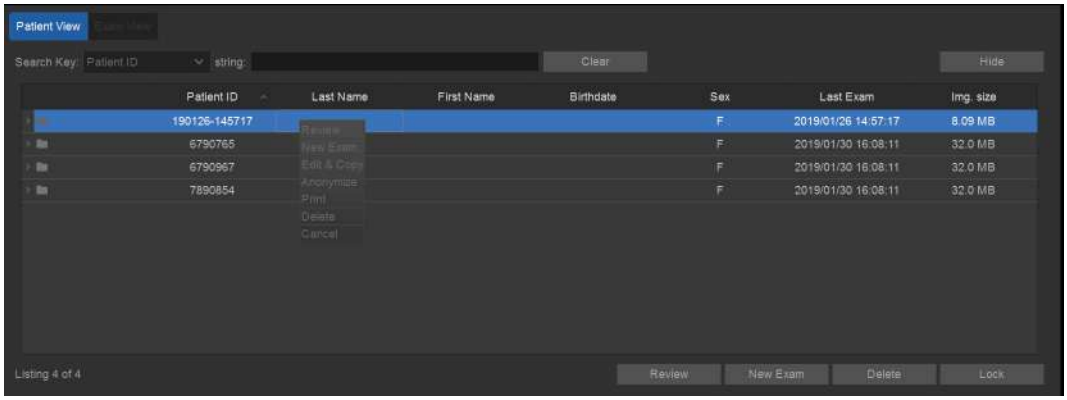


Figure 4-8. Print the patient list

3. Select ***Print*** and press the **Set** key.

Retrieving and editing archived information

Searching for an existing patient

1. Select ***Patient*** to display the Patient Screen.
2. Select the search key. Enter the search string.

NOTE: When the number of patients on a hard disk is in the hundreds, it takes time to search for a patient or switch to another screen. In this case, do one of the following:

- *Uncheck the Auto Search for patient function at the Utility -> Connectivity -> Miscellaneous screen.*
- *Delete unnecessary patient data.*

3. An appropriate patient is displayed.

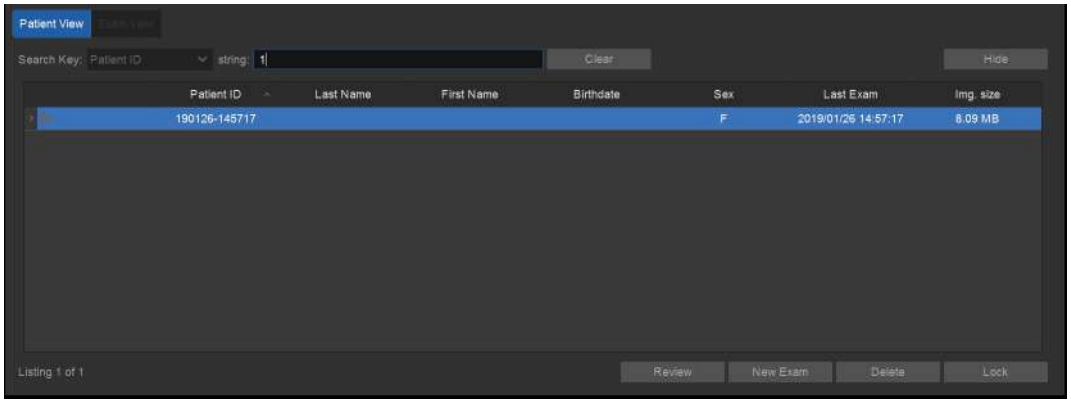


Figure 4-9. Patient Search Screen

- Select ***Review*** to review the exam history of this patient.
- Select ***New Exam*** to create a new exam for this patient.
- Select ***Delete*** to delete this patient. See ‘Deleting the existing patient’ on *page 4-18 for more information.*

NOTE: “Delete” is only displayed when you login as Administrator.

Pop-up menu

If you select the patient and press the **Cursor** key, the pop-up menu displays.

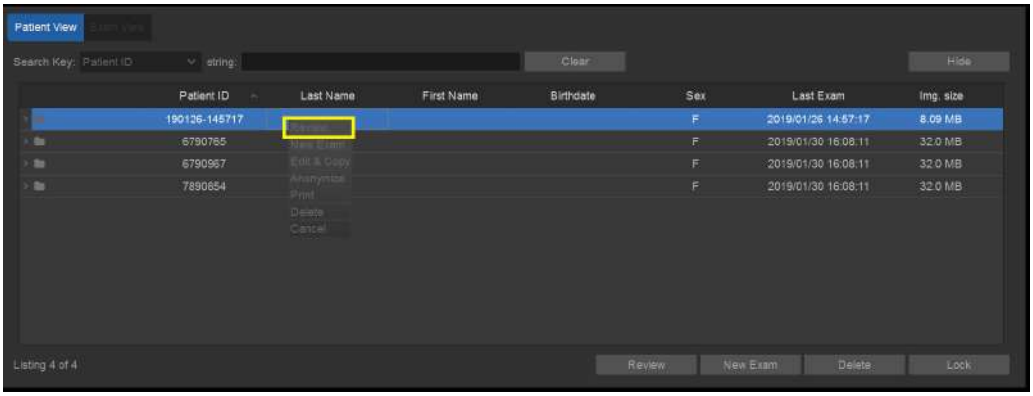


Figure 4-10. Archived Patient

If you select the patient of the day, ***Resume Exam*** displays to continue the exam.

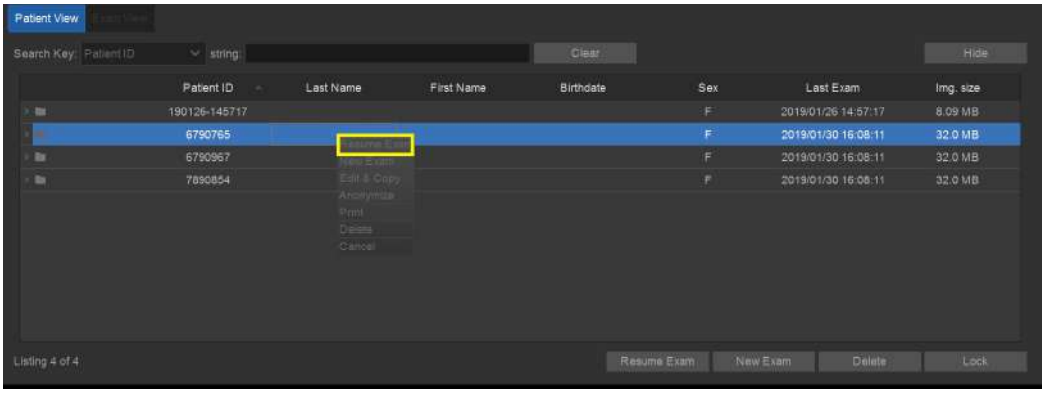


Figure 4-11. Patient of the Day

*NOTE: The preset "Double click on patient list to start", located on the Utility -> Connectivity -> Miscellaneous screen, allows you to display either the Review or New Exam screen by double clicking the **Set** key on the patient name.*

Edit and Copy Patient

The “Edit and Copy Patient” function:

- Copies data of a registered patient from the local archive to a newly-created patient in the local archive. The newly-created patient would have a new identification: patient ID, other ID, patient name, and sex etc.
- Assigns a new identification: new UIDs to the copied exam data. The newly-copied patient would have the same medical data as the patient being copied but with a different identification.

NOTE: “Edit and Copy Patient” will only copy patient data, images inside the local archive; it will not allow patient data or images from outside of the local archive. This includes the following types of images: EZMove, exported, MPEGvue, SaveAs, DICOM Store, or (DICOM) print.

NOTE: Remove the EZMove image link from the database for the copied patient.

NOTE: “Edit and Copy Patient” does not copy the patient’s report and remove the report link from the database for copied patient.

NOTE: “Edit and Copy Patient” does not deal with patient information already burned in image pixels.

NOTE: The image and title bar, including patient information, is copied as is.

NOTE: The “Edit & Copy” function does not display for a current patient.

NOTE: The “Edit & Copy” function does not display when multiple patients are selected.



CAUTION

The user is responsible for patient data, diagnostic information or any other patient-related information entered in the database.

Edit and Copy Patient (continued)

1. Ensure that you are logged in as an Administrator on the system.
2. Select the Local Archive dataflow.
3. Select the patient from the Patient View list and press the **Cursor** key to bring up the “Edit & Copy” pop-up menu.

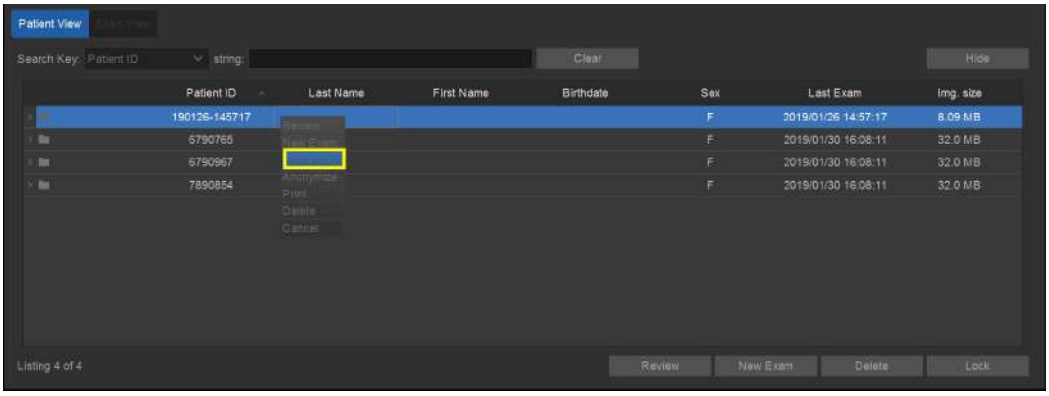


Figure 4-12. Select an Exam to Copy and Edit

4. A confirmation dialog displays. Select ***OK***.

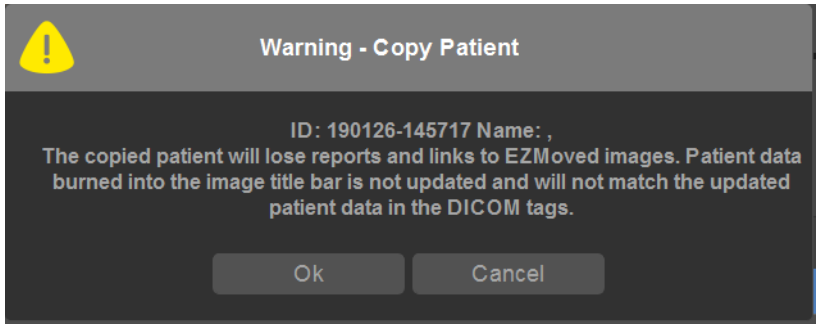


Figure 4-13. Copy Patient Pop-Up Confirmation

Edit and Copy Patient (continued)

5. The “Edit and Copy Patient” dialog displays. All the fields inherit the values from the original patient’s exam, except for Patient ID.

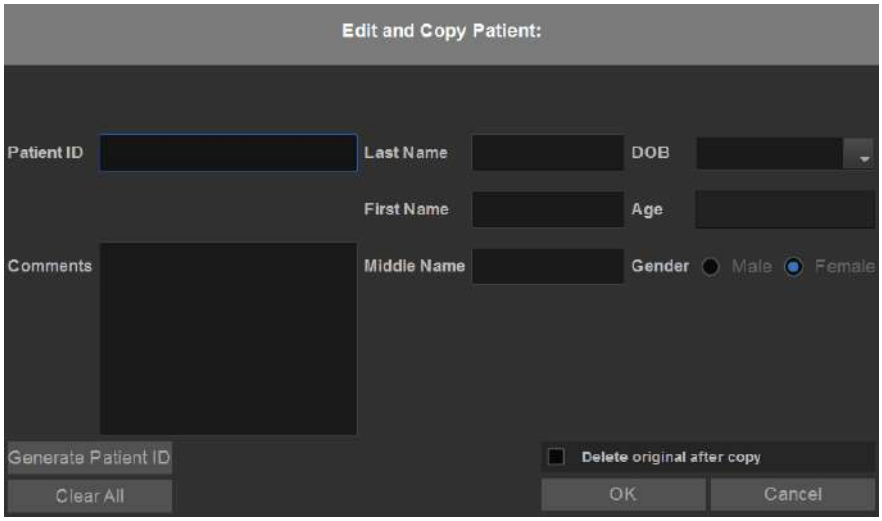


Figure 4-14. Edit and Copy Dialogue

- ***Generate Patient ID*** generates a patient ID.
- ***Clear All*** clears all fields except for Patient ID and Other ID.
- ***Cancel*** button cancels the “Edit and Copy Patient” function.

6. Fill in the Patient information fields, then press OK.

NOTE: If the new entered Patient ID is not unique in the database, the Patient ID turns to red and an error message displays on the status bar.

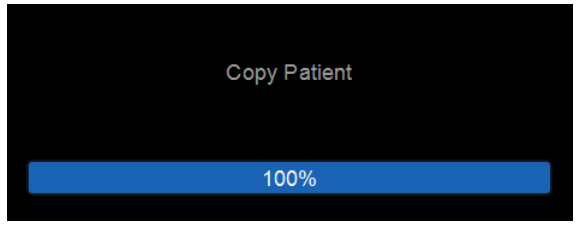


Figure 4-15. Copy Status Bar

Edit and Copy Patient (continued)

7. When the copy is done, the patient list is refreshed.

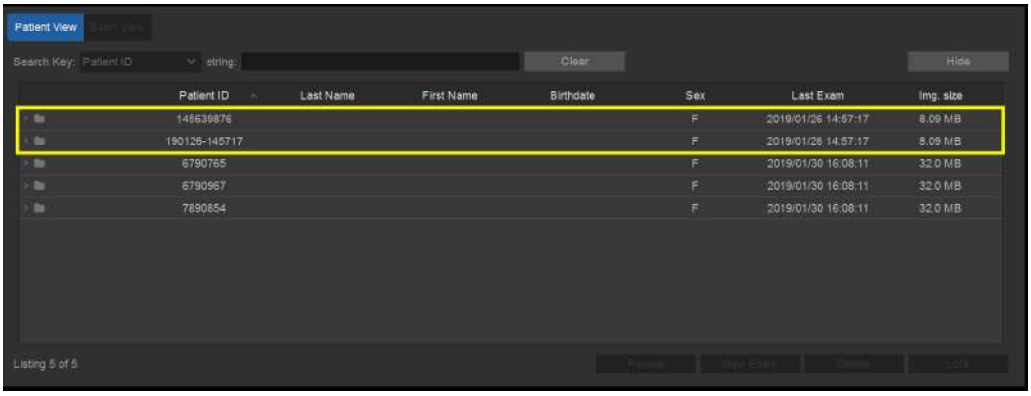


Figure 4-16. Completed Patient Copy

Changing Patient Information or an Exam



The user is responsible for patient data, diagnostic information or any other patient related information entered in the database.

If patient information needs to be edited, pressing ***Patient*** enables the Patient Screen for modifying information.

If the exam for the patient is still active, you can choose the tab that is desired. The exam changes in the Exam View area.

If the exam category needs to be changed, pressing ***New Exam*** allows modification of the Patient Screen without erasing accumulated patient images, measurements, annotations, calculations and worksheets.

1. Display the Patient screen by pressing ***Patient***.
2. Select patient from the Patient list. If need to search the patient, the system automatically searches to see if the patient is already in the database.
   - Select Search key (Patient Data: Patient ID, First Name, Last Name, Birthdate, Examdate etc.).
   - Enter search string (for example, initial letter of Patient Name)

   To have the database shown in its entirety, ***Backspace*** to clear all contents on the Search string and all patient names appear.
3. The appropriate patient is displayed.

   If patient information needs to be edited or the exam category changed, use the New Exam feature. Pressing ***New Exam*** allows modification of the Patient Screen without erasing accumulated patient images, measurements, annotations, calculations and worksheets.

NOTE: *Patient identification information cannot be modified.*

4. Select **Resume Exam** or **New Exam** to register the new exam.

   A new exam is automatically created on that patient unless an exam already exists on that day for that patient.
5. On the control panel, press the ***Esc*** key, the **B-Mode** key or select ***Scan*** key.

   Select the ***Probe*** on control Panel to select preset and appropriate probe, if necessary.

Anonymize the patient information

The Anonymize function:

1. Copies data from a registered patient on the local archive to a newly-created patient on the local archive. The newly-created patient will has new identifiers: patient ID, other ID, patient name, sex, etc.
2. Assigns a new UID to the copied exam data. The newly-copied patient has the same medical data as the copied patient but with a different UID.
3. Assigns new DICOM tags to the copied exam data.

NOTE: "Anonymize" does not copy the patient's report. Remove the report link from the database for copied patient.

NOTE: "Anonymize" does not deal with patient information already burned in image pixels.

NOTE: The "Anonymize" function does not display for a current patient.

NOTE: The "Anonymize" function does not display when multiple patients are selected.



CAUTION

The user is responsible for patient data, diagnostic information or any other patient-related information entered in the database.

1. Ensure that you are logged in as an Administrator on the system.
2. Select the Local Archive dataflow.

Anonymize the patient information (continued)

3. Select the patient from the Patient View list and press the **Cursor** key to bring up “Anonymize” pop-up menu.

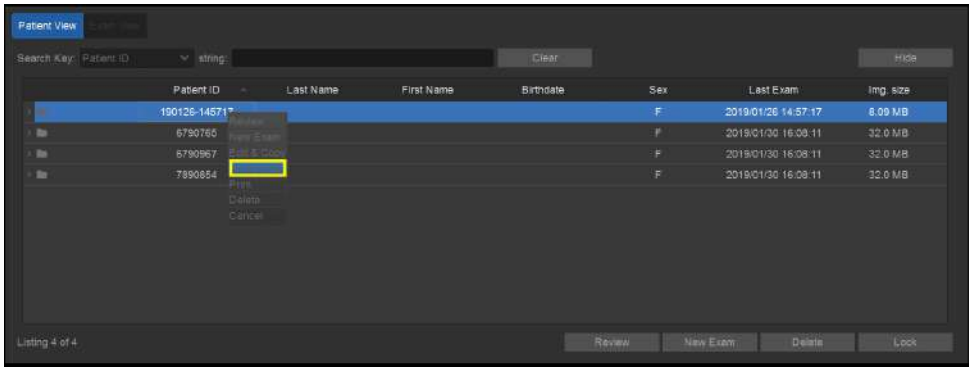


Figure 4-17. Select an Exam a patient to anonymize

4. A confirmation dialog displays. Select **OK**.

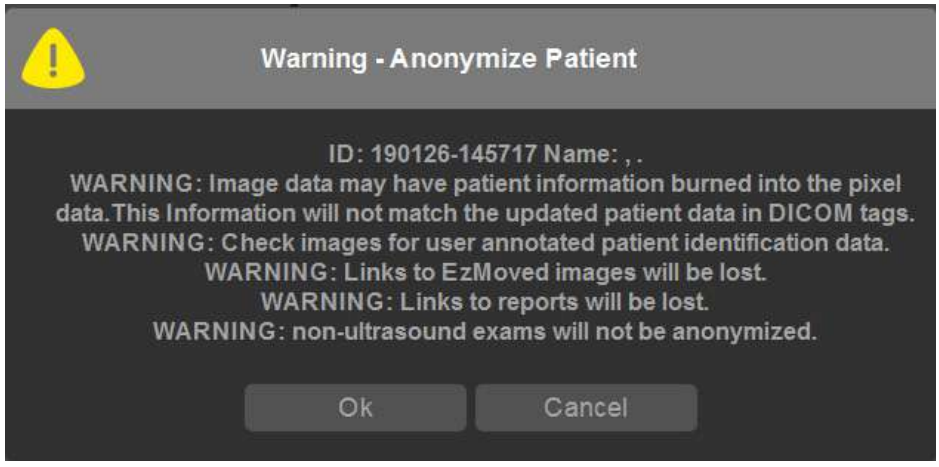


Figure 4-18. Anonymize Patient Pop-up confirmation

NOTE: If the selected patient has no exams, the warning message “Failed to copy the patient” displays.

Anonymize the patient information (continued)

5. The “Anonymize” dialog displays. All the fields inherit the values from the original patient’s exam, except for Patient ID.

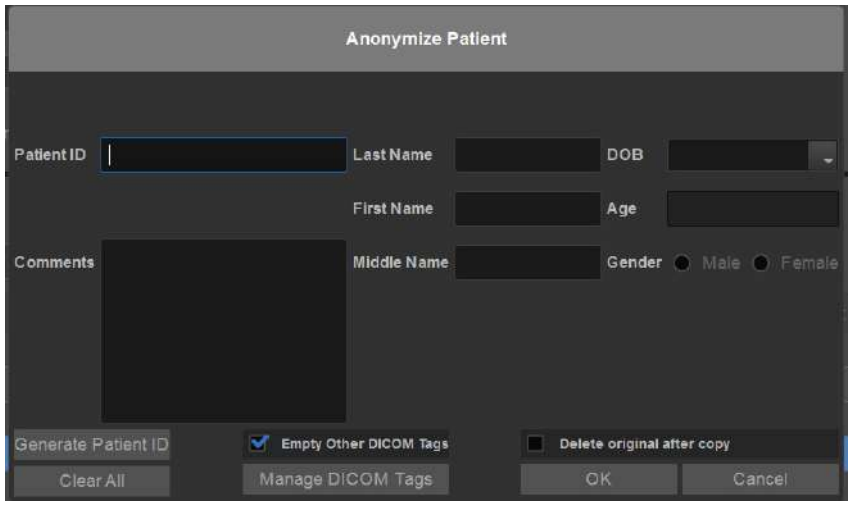


Figure 4-19. Anonymize Patient Dialogue

- **Generate Patient ID** generates a patient ID.
- **Clear All** clears all fields except for Patient ID and Other ID.
- **Cancel** button cancels the “Anonymize” function.

Anonymize the patient information (continued)

- **Manage DICOM Tags** edits the DICOM Tags for the new Patient. This is available when Empty Other DICOM Tags is checked.

  Select **Save and Exit** to save the new DICOM Tags.

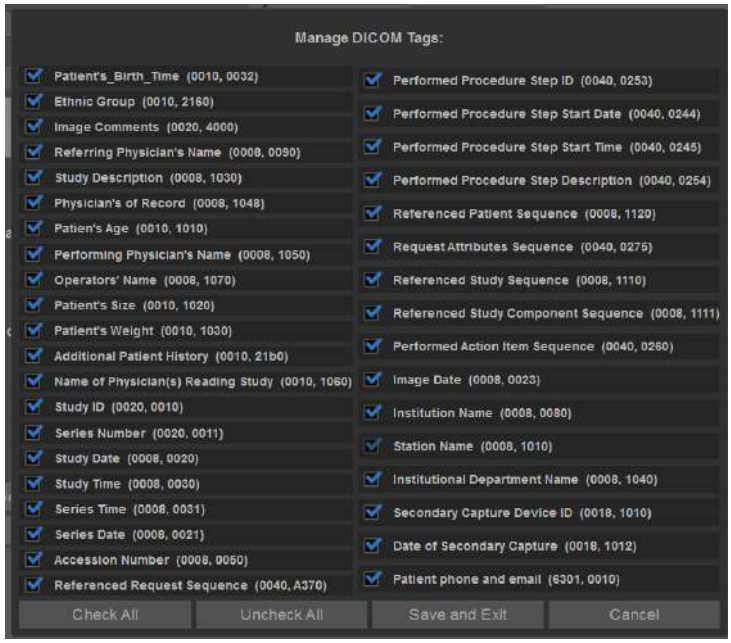


Figure 4-20. Manage DICOM Tags

NOTE: *If **Empty Other DICOM Tags** is unchecked, **Manage DICOM Tags** is not available.*

6. Fill in the Patient information fields, then press **OK**.

NOTE: *The new entered Patient ID should be unique in the database.*

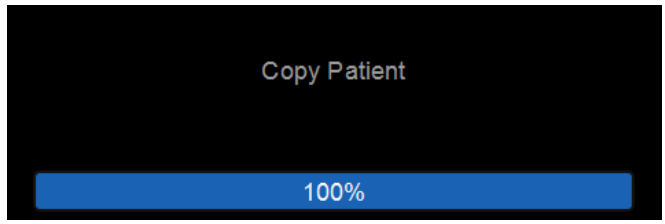


Figure 4-21. Anonymize Patient status bar

Anonymize the patient information (continued)

7. When Anonymizing Patient is done, the patient list is refreshed.

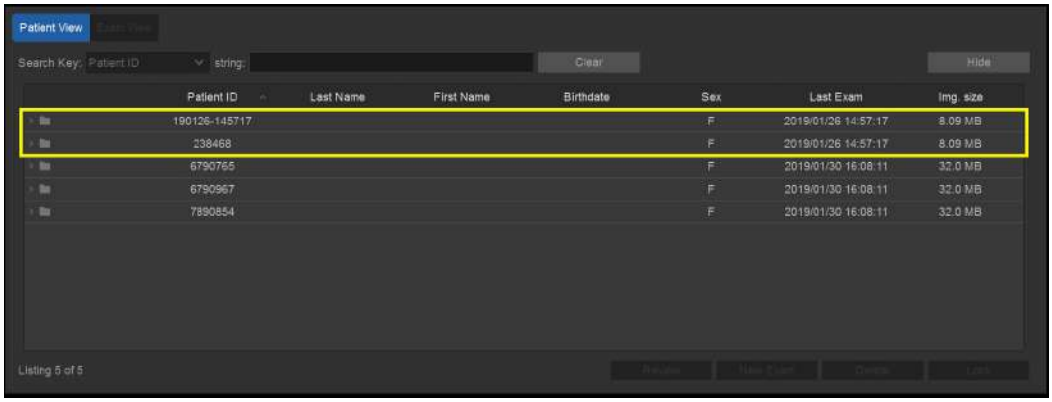


Figure 4-22. Completed Anonymizing Patient

Review images in archive

There are two ways to access to archived images:

- Review the images from a selected examination.
- Select images from the Active Image screen displaying all the images sorted by examination for the actual patient record.

Review the patient exam/image

To review the patient exam,

1. Move the cursor to the patient in the Patient View and double-click. Exam View displays.

   or

   Move the cursor to the patient and select Exam View tab. Exam View Displays.
2. Move the cursor to the desired exam and double-click.
3. Active Images screen displays. Move the cursor to the image and double click or press ***Review***.
4. The review screen displays. Select the image from clipboard.

NOTE: *See 'Clipboard' on page 15-8 for more information.*

Active Images

Active Images displays the images of the exam.

NOTE: CINE loops are not played interactively as you view the active images on the Archive screen.

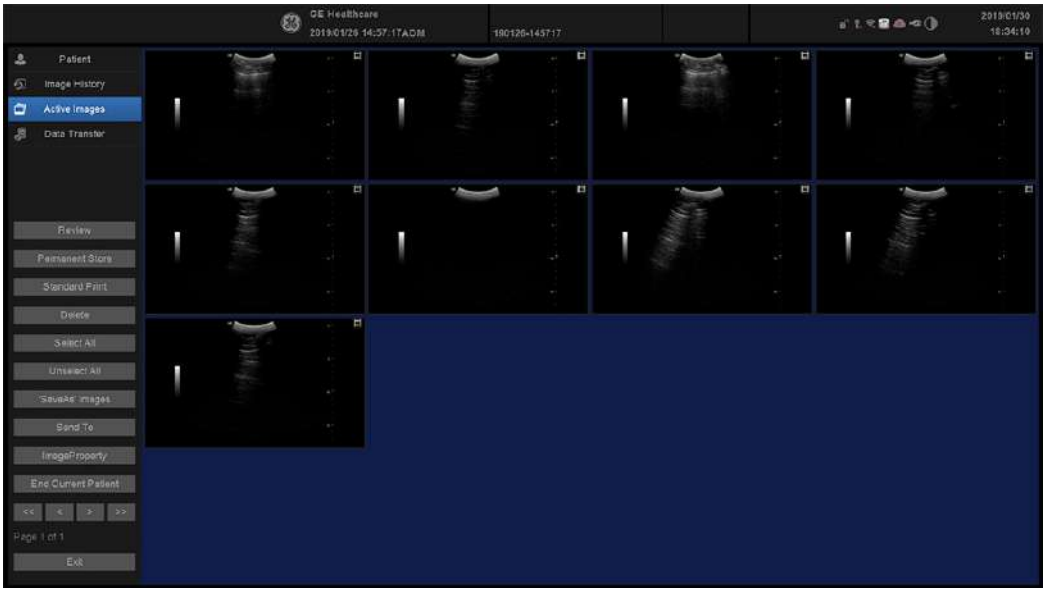


Figure 4-23. Active Images Screen

1. Select the exam which includes the image to review.
2. Select ***Active Images***.
3. Select the image and press ***Review*** or double click on the image. The image is displayed.

   If you select 2 - 4 images and select ***Review***, the archived images are displayed in the split screen.

Active Images (continued)

Table 4-1: Active Images

Parameters	Description
Review	Select the image and press **Review**, the image is displayed.
Permanent Store	Select the images which you want save to the Local hard disk drive.
Standard Print	To print an image, 1. Select the image you want to print from the Active Images screen. You can print one (1) image per sheet or 2x3 images per sheet. 2. Press ***Standard Print***. NOTE: If the printer is not assigned to the button, you will get a message telling you to Check Printer Button Configuration. NOTE: There is no warning to let you know that the printer is not functioning. Check the printer. You need to configure the printer to the Standard Print button via ***Utility*** --> ***Connectivity*** --> ***Button***.
Delete	To delete images, select the images in the active screen, then select ***"Delete"*** on the monitor display.
SaveAs Images	Refer to ''SaveAs' Images' on *page 15-15* for the detail. You can select the multiple images collectively in Active Image screen which you want save by SaveAs. NOTE: We suggest that you save the images page by page with 'SaveAs' Images in Active Images. It takes time if you have many images or raw data.
Send To	Refer to 'Send To (Send the image to the DICOM Device)' on *page 15-32* for the detail. Note: "Send To" button is not displayed in Active Images menu if the patient is not selected.

Analyzing Images

To analyze the archived images, select the image, then select ***Review***. The archived images is displayed with the date and time of archival.

To compare the analyzed image to a live image, press **Dual**. Now both the archived and live images appear on the monitor display. Unfreeze the live image area.

Selecting an Application Preset and a probe

Selecting an Application Preset

The exam category preset that best describes the desired exam to be performed is chosen after the exam category is selected. The factory default preset selections are displayed on the menu area.

Use these parameters as a starting point for the exam.

User-Defined Application Presets

1. Press ***Probe*** on the control panel. Select the Model and Application you want to use as a basis for the new Application Preset. And then select ***Create New***.

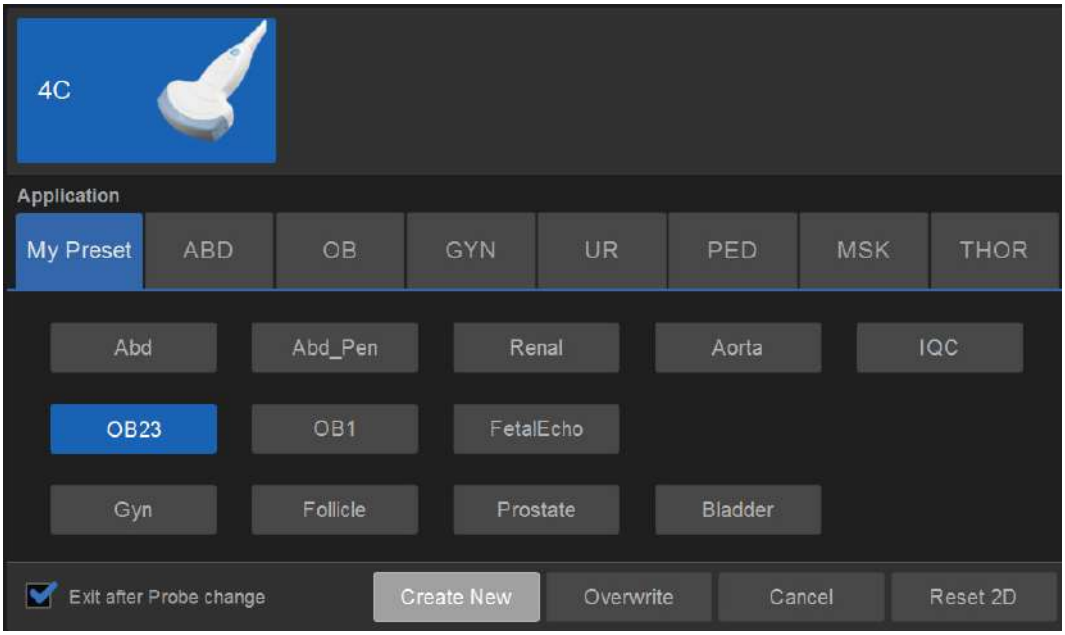


Figure 4-24. Application Preset Menu

User-Defined Application Presets (continued)

2. The Create New Application menu appears. Enter the name and check the “Add to My Preset” box, then select ***Create***.

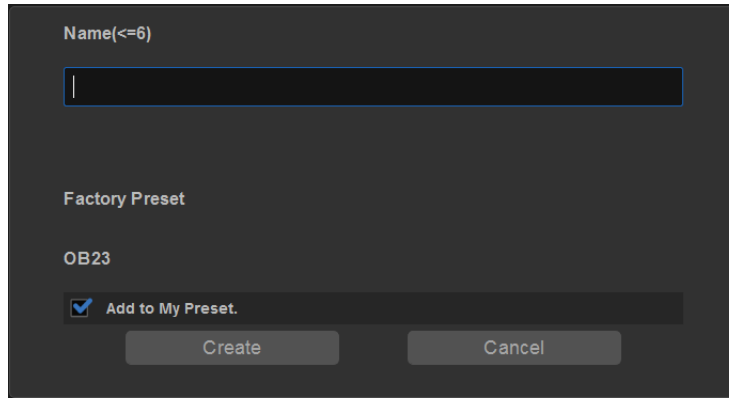


Figure 4-25. Create New User Application Menu

NOTE: The new user application is based upon the current exam category and application, plus any modifications you have made, including the comment library and M&A calcs.

NOTE: The name of the new application cannot include spaces or symbols. However, the name can include numbers and letters.

User-Defined Application Presets (continued)

3. To view/edit the parameters for the user-defined preset, select ***Utility*** --> ***Preset Manager***, then check **Imaging Preset Maganer**.

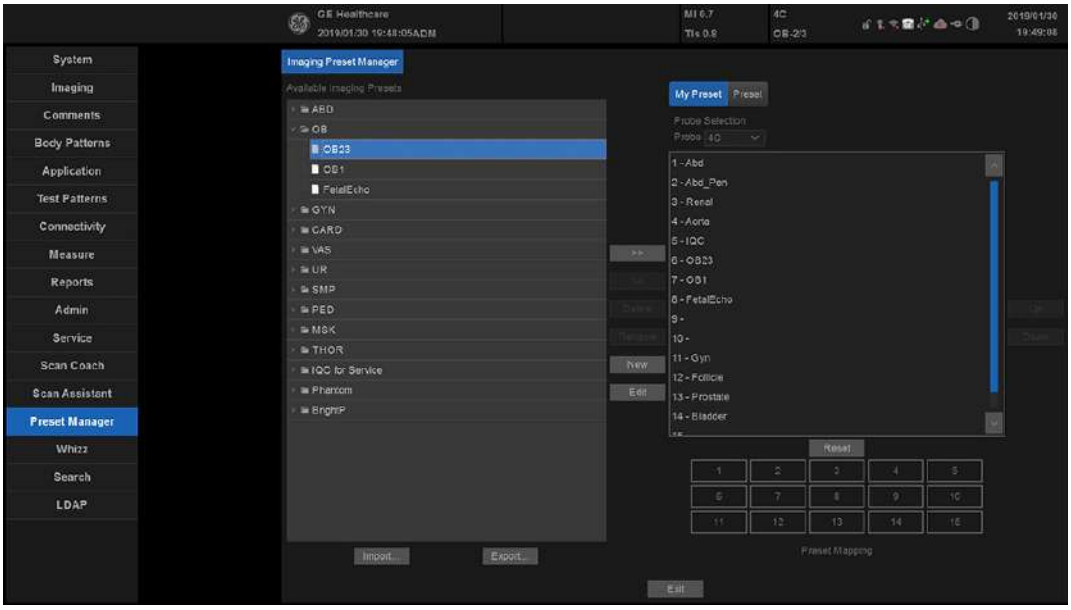


Figure 4-26. Imaging Preset manager

If you change the settings for this application, make sure to save the changes via Save --> Overwrite (user application).

NOTE: If you select Reload Factory Defaults for the User-Defined application that you created, the settings for this user-defined application revert back to the factory settings for the exam category and application it was based upon.

NOTE: If you use the user-defined preset as default preset, re-select the preset in Utility whenever you overwrite the user-defined preset.

*NOTE: You can delete, rename, edit a user-defined application. And you can also create a new application preset by selecting **New**.*

Updating User Presets

You can edit, reset to factory default, or delete any user preset you create, as long as you have selected it in the “Available Imaging Presets” column on the left.

Editing imaging Parameters

To view/edit the parameters for the user-defined preset,

1. Adjust the image while in the user preset you want to edit.
2. Press **Probe** on the control panel.
3. Select [Preset Name] and press ***Overwrite*** .
4. From the Utility--> Preset Manager.

To view/edit the parameters for the user defined preset

1. Press Utility--> Preset Manager. Select the user preset you want to view/edit from Available Imaging Presets Column.
2. Press ***Edit.*** The Imaging page appears.
3. Edit the presets as necessary and press ***Save.***

or

1. Adjust the image while in the user preset you want to edit.
2. Press **Probe*.***
3. Select [Preset Name] and press ***Overwrite*** .

Renaming a User Preset

To rename a user preset,

1. Press Utility--> Preset Manager. Select the user preset you want to rename.
2. Press ***Rename.*** The Rename Preset pop-up menu appears.
3. Type the new name and select Rename***.***

Deleting a User Preset

To delete a user preset,

1. Press Utility--> Preset Manager. Select the user preset you want to delete.
2. Press ***Delete.*** The Delete Preset pop-up menu appears.
3. Confirm that you want to delete this user preset and select **Yes.**

Arranging Presets on Application Preset Menu

On this screen, you specify where you want the new user (and existing) presets to appear on Application Preset Menu.

Each control in Preset Manager aligns with the numbers below. The Preset Manager has 15 controls that can be controlled by the user. In the example below, “1-Abd” would appear where the number “1” is on the Preset Mapping. “2-Abd_Pen” would appear where the number “2” is on the Preset Mapping. And so on. These applications can be positioned by you.

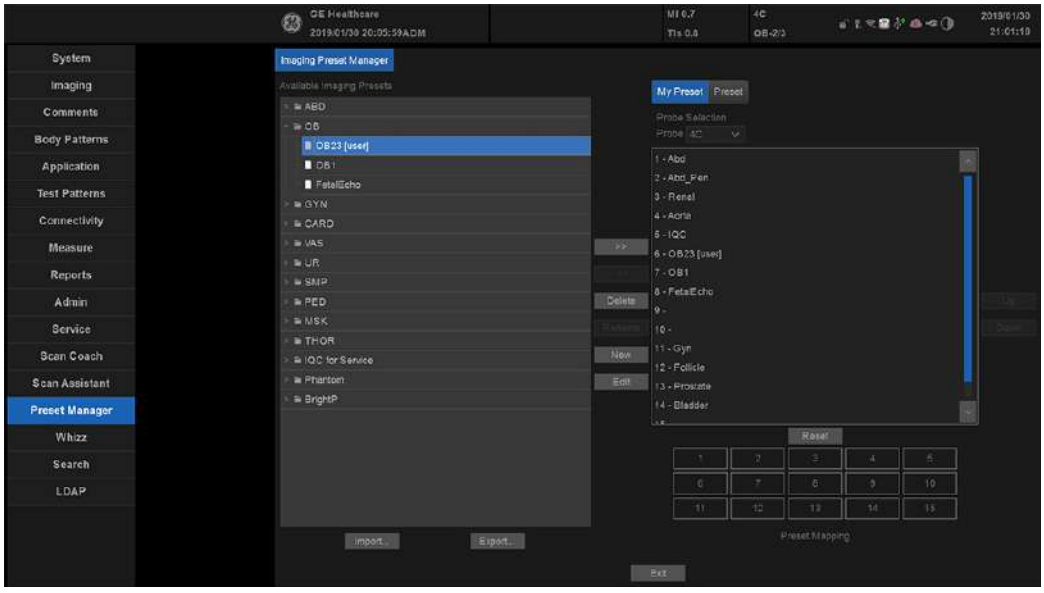


Figure 4-27. Mapping Application Preset Menu

Arranging Presets on Application Preset Menu (continued)

You can move the location of where the application appears on the Application Preset Menu via the Preset Manager.

To reposition an application on the Application Preset Menu,

1. Enter Utility->Preset Manager, select the My Preset you want to move from the My Preset Column.
2. Use the up/down button on the right side of the screen to move the preset to a position, next to the new map number.

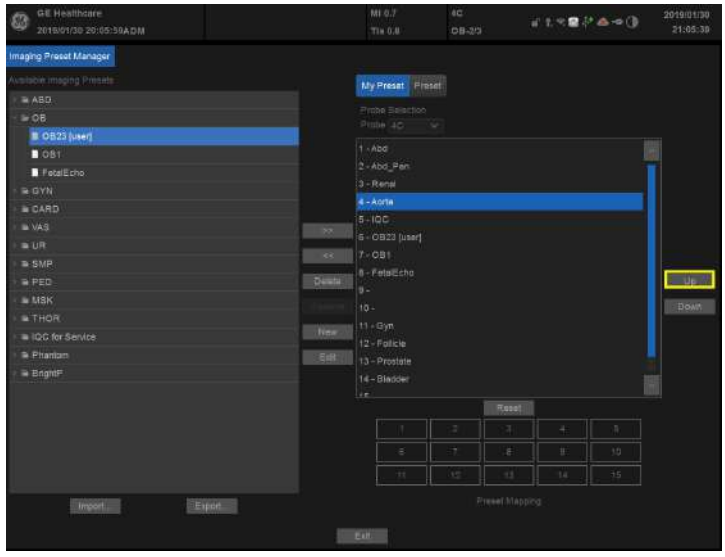


Figure 4-28. Adjust the position of the Preset

In the example below, the preset Aorta has been moved to the 2nd position on the Application Preset Menu.

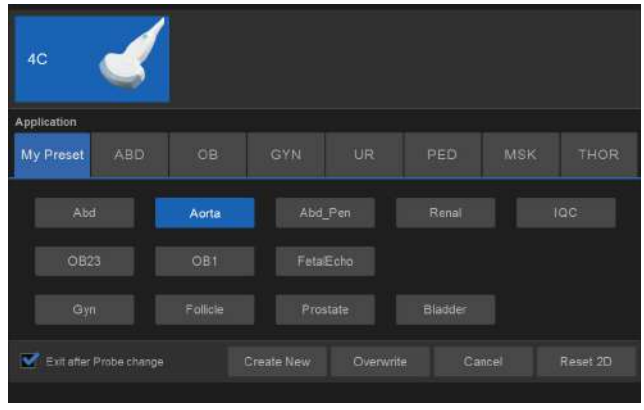


Figure 4-29. Repositioned User Preset

Share My Presets between Versana Active Systems

You can share the My Presets you have created between Versana Active systems by exporting/importing the preset(s) you want to share.

To move a user preset from one Versana Active to another Versana Active system (same software level), first export the user preset(s) you wish to share.

Exporting User Presets

To export a user preset (or presets),

1. Enter Utility-> Preset Manager.
2. Insert the media (Flash Drive, USB Hard Drive).

Exporting User Presets (continued)

3. Select **Export** (on the bottom).

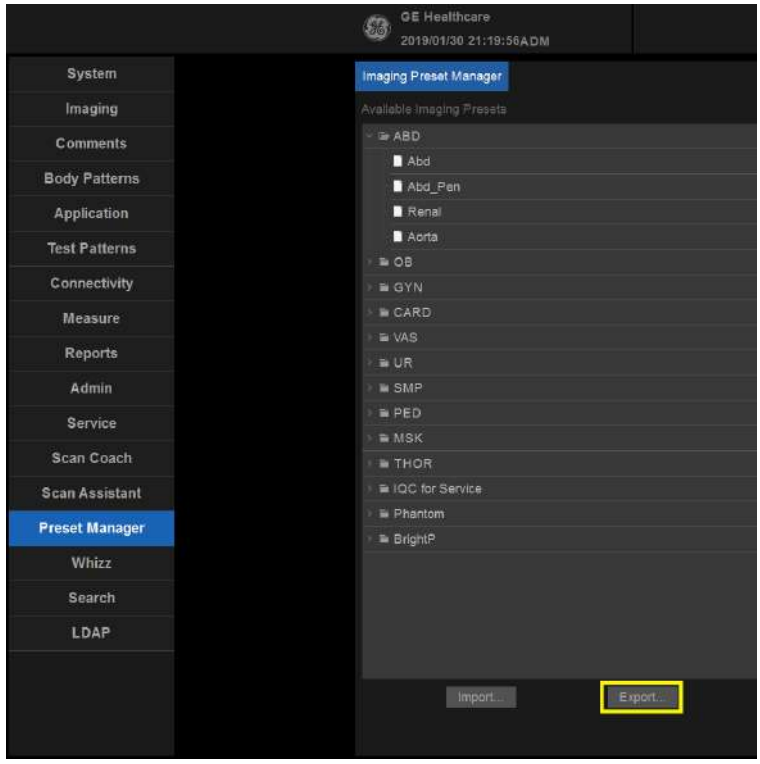


Figure 4-30. Exporting a User Preset

Exporting User Presets (continued)

4. An Export Presets pop-up menu appears that indicates:
   a. destination location (USB Flash Drive/Hard Disk Drive drive location).
   b. preset directory where the preset should be saved (Preset Export).
   c. available presets on the scanner.

   Select the name for the Preset Directory from the Preset Directory pull-down.

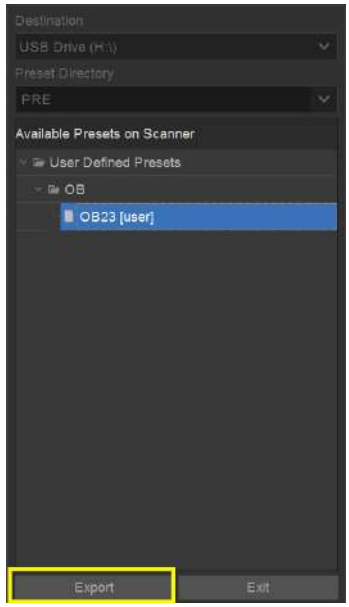


Figure 4-31. Export Presets

5. Select the User Defined Presets under Available presets on Scanner and press Export.
6. Upon a successful export, an informational message will pop-up indicating that “1 preset successfully exported.” Press OK. Then press Exit to close the Export Presets pop-up menu.
7. Press F3 to Eject the media. Take the media to the other system and follow the Importing User Presets instructions below.

Importing User Presets

To import a User Preset,

1. Enter Utility-> Preset Manager.
2. Insert the media (Flash Drive, USB Hard Drive).
3. Press Import. The Import Presets pop-up appears and displays the Source Directory and Available Imaging Presets.
4. Select the “User Defined Presets” under Available Imaging Presets and press Import.

   If these presets are already on this Versana Active, you will be asked whether you want to:

   - Overwrite this preset (Yes, Yes to All, No or No to All).
   - Rename this preset (Type the new name and press Rename).
   - Cancel.
5. Upon a successful Import, an informational message will pop-up indicating that “1 preset successfully imported.” Press OK. Then press Exit to close the Import Presets pop-up menu.
6. Press F3 to Eject the media.

Selecting a probe

- Always start out with a probe that provides optimum focal depths and penetration for the patient size and exam.
- Begin the scan session using the default Power Output setting for the probe and exam.

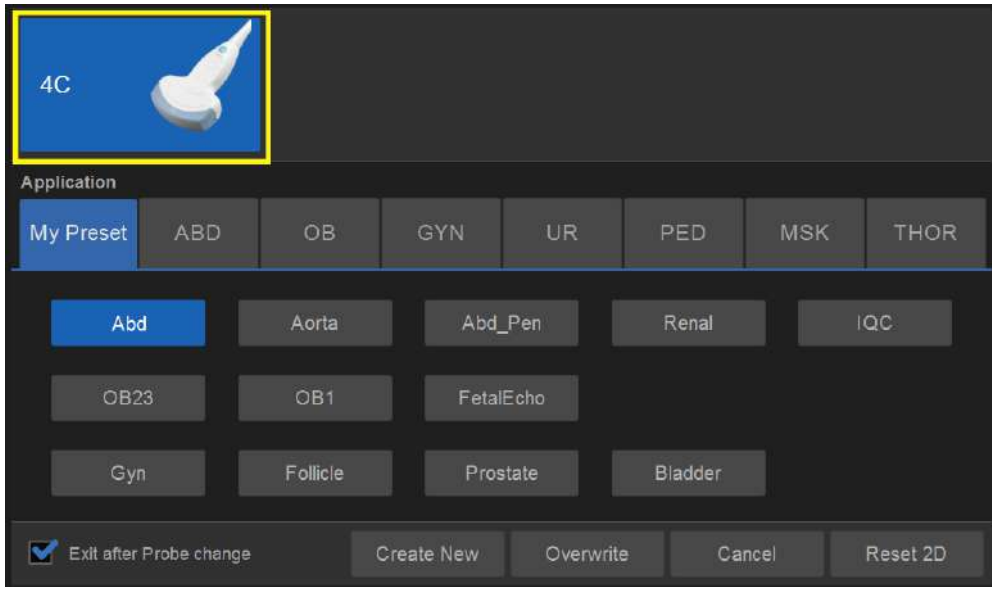


Figure 4-32. Probe Indicators (Example)

1. Probe Indicators.

Follow-up Tool

Overview

The Follow-up tool is intended to perform serial scans on a patient, and compare the images of a previous ultrasound exam to the current exam.

When performing a follow-up exam, the system automatically reloads the scanning parameters including ROI for QAnalysis from previous exam, and allows for side by side scanning for image comparison. This allows the physician to use consistent scanning parameters and Region of Interest (ROI) from exam to exam on the same patient and may assist in assessing a patient condition over time.

Follow-up tool configuration

- Follow-up tool is available in B / B (CHI) / CF/ PDI mode.
- In order to utilize the follow-up tool, images should be saved in RawDICOM format.

  To configure image format as RawDicom:

  Enter Utility -> Connectivity -> Button to set the Print button for this format. RawDicom should be selected in the **Format** field.

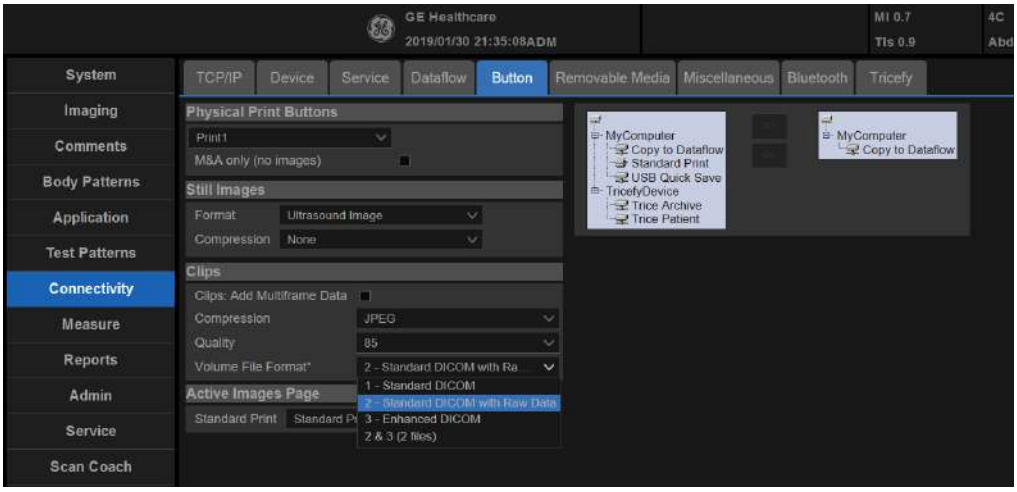


Figure 4-33. Set Image format

Follow-up tool configuration (continued)

- The Customer can configure the Follow Up Button in Utility ->System -> User Configurable Key.

  The Customer can configure Follow Up in the Keyboard Key or the User Defined key.

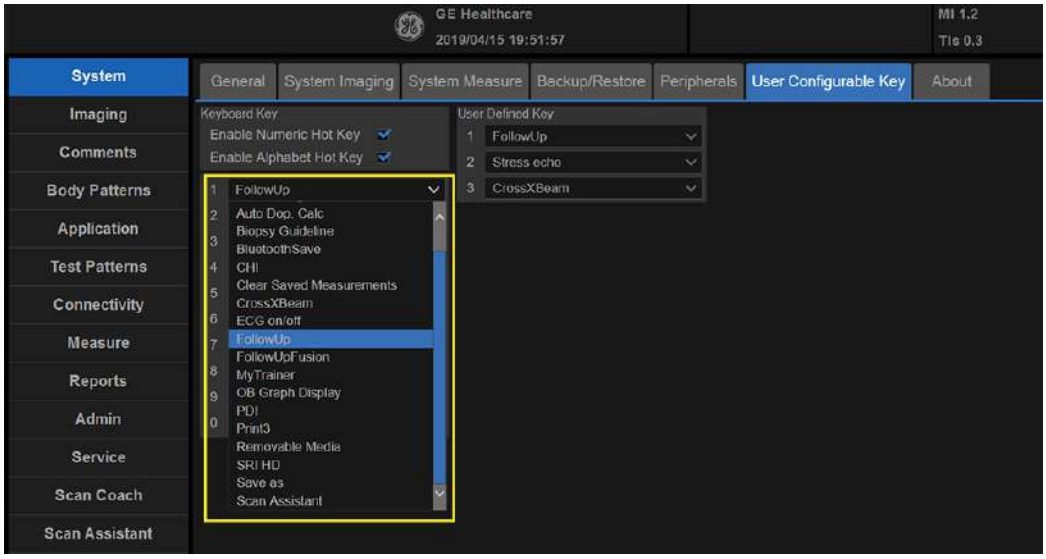


Figure 4-34. Follow Up Tool Configuration (1)

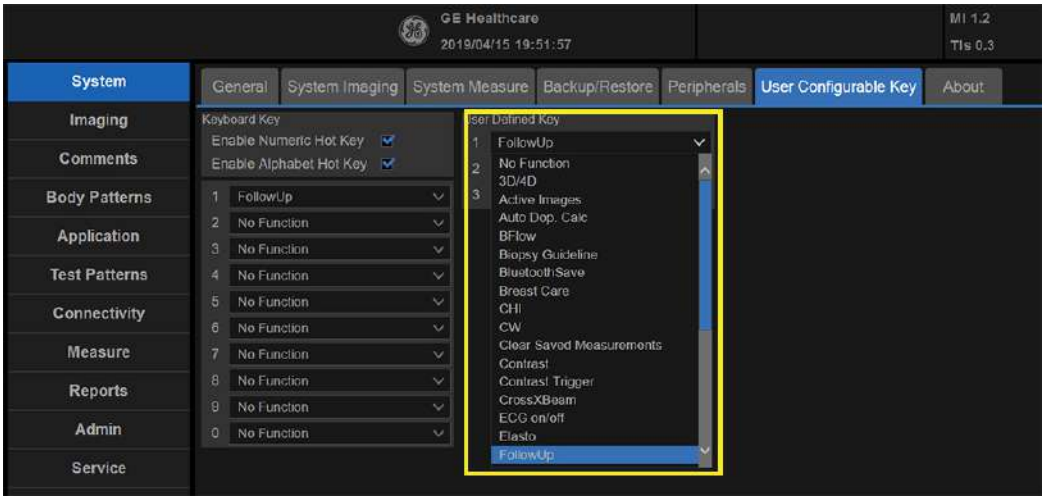


Figure 4-35. Follow Up Tool Configuration (2)

Follow-up tool configuration (continued)

- The Customer can configure the Follow Up Tool settings in Utility -> System -> System Imaging -> Follow Up Tool.

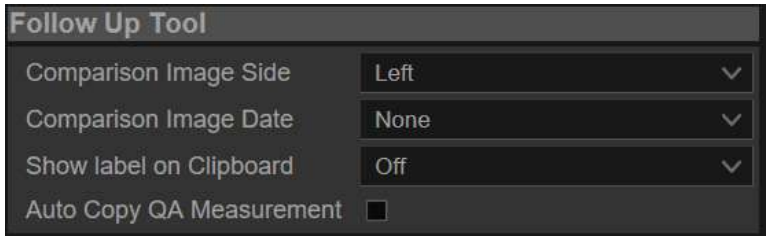


Figure 4-36. Follow Up Tool Setting

- Comparison Image Side: select the comparison image displayed position. The Choices are: Right and Left. The Factory Default value is Left.
- Comparison Date: Choose the date display condition of images which are used for comparison. The choices are: All Dates, Different Dates, None.

  All Dates - The date is always displayed on the comparison image.

  Different Dates - The date only displays when the date of the comparison image is different from the active exam date.

  None - No Comparison image date is displayed.
- Show label on Clipboard: choose when to show the comment label for the image on clipboard. The Choices are: Always, Follow up tool and Off.
- Auto Copy QA Measurement:

  Check the box, QAnalysis measurement is copied automatically from comparison image to the current scanning image.

  Uncheck the box, QAnalysis measurement is not copied automatically from comparison image to the current scanning image.

  The factory default is that the box is unchecked.

Follow-up Tool Workflow

The First Exam

1. Press **Patient** to enter the Patient page.
2. Create a New Patient, and create a new exam for the patient. Select **Scan** to enter scanning mode.

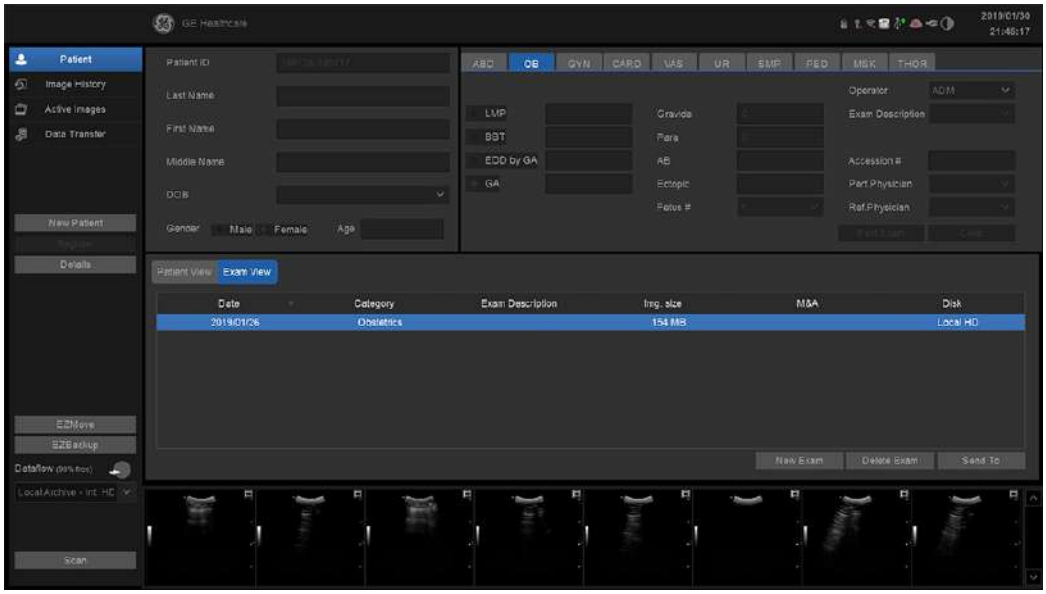


Figure 4-37. Patient Page

3. Press ***Probe*** to select the application and preset.
4. Scanning with B mode and adjust the scanning parameters.

The First Exam (continued)

5. Press **Freeze**.

NOTE: Comments and Body Pattern can be added, and will be stored with the images.



Figure 4-38. Scanning B Mode Page

6. Activate CF or PDI mode and adjust the scanning parameters. Here CF mode is used for example.
7. Press **Freeze**. Press P1 key to save the image.

NOTE: Comments and body mark can be added, and will be stored with the images.

8. Press **Measure** to activate measurement and select measurement from measurement folder.

The First Exam (continued)

9. Select measurement folder and select a measurement item.

NOTE: Follow-up Tool only available for the measurement items under MSK -> Knee -> Fusion.

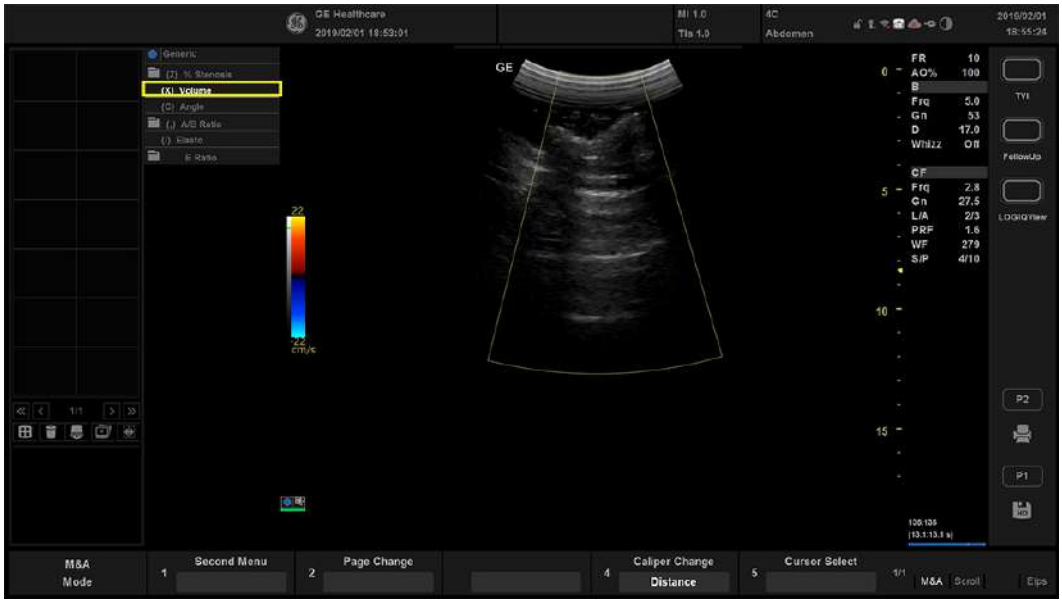


Figure 4-39. Example - Select Measurement

The First Exam (continued)

10. Draw only one ROI and the result is displayed in result window.

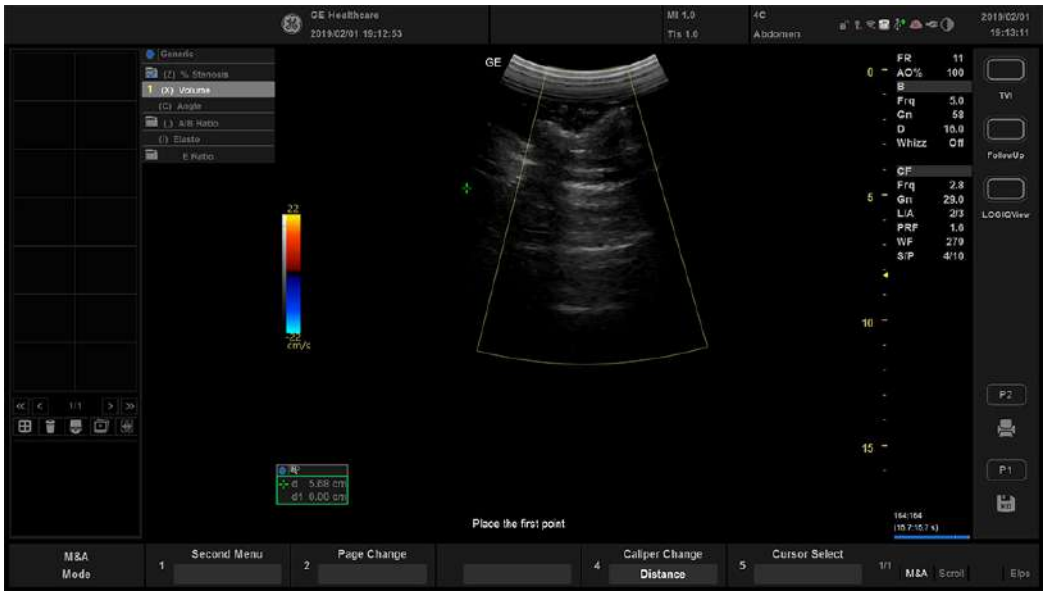


Figure 4-40. Measurement

Select **Rt** (Right) or **Lt** (Left) for the patient's right and left side.

Select **Prox** (Proximal), **Mid** (Middle) or **Dist** (Distal) if the vessel has a location.

11. Press P1 key which is assigned to save the image with measurement.

The Follow-up Exam

NOTE: Before starting Follow-up exam, define a key from User Defined Key for activating/deactivating Fusion via Utility -> System -> User Configurable Key.

NOTE: Before starting Follow-up exam, set the Fusion values via Utility -> Imaging -> B/HAR mode page.

1. Enter Patient page, and select the patient from the **Patient View** list.
2. There are different methods to activate Follow up exam.

NOTE: Be sure to activate the same probe used for the initial exam.

- To access Follow up exam:

a. Select the Exam.

b. Select **Image History** or **Active Images**.

c. Select one image, then select **Compare**.

*NOTE: Only one image is selected at a time so **Compare** can be activated. If more than one image is selected, **Compare** can not be activated.*



Figure 4-41. Select Image to Compare

The Follow-up Exam (continued)

- In scanning mode, select the Follow up exam icon, the Follow up exam is activated.

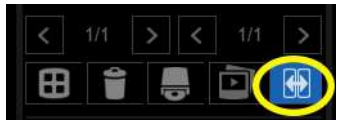


Figure 4-42. Follow up exam icon

OR

Press **Follow Up** key to activate Follow up exam.

The user can configure the **Follow Up** key in Utility -> System -> User Configurable Key.

3. The system enter scanning mode with Follow-up exam. The screen reverts to split screen.

   Click the Follow-up icon to deactivate or activate the Follow-up exam.

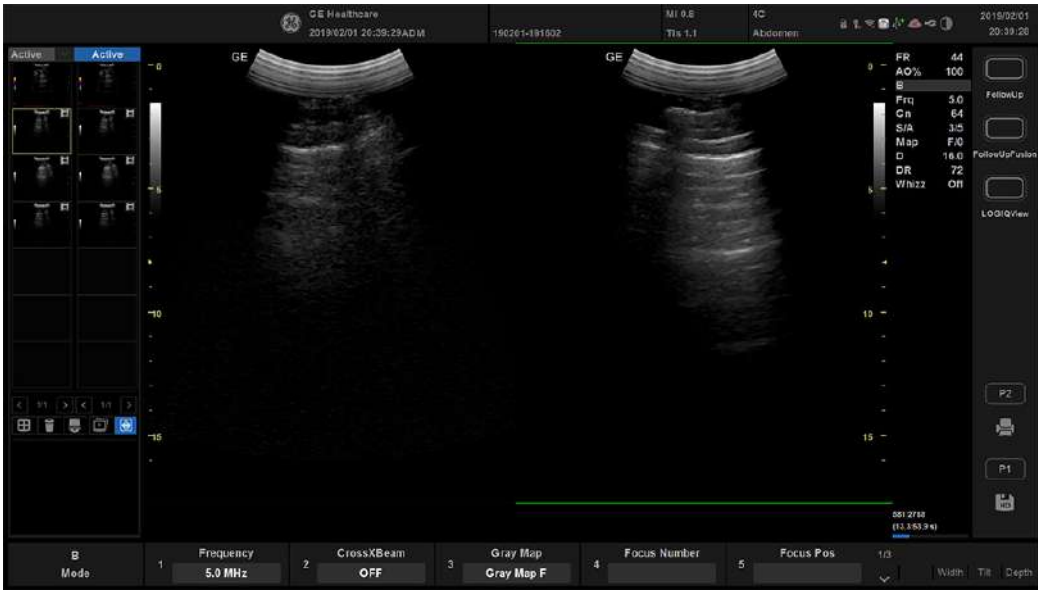


Figure 4-43. Follow-up exam screen

The Follow-up Exam (continued)

As factory default setting, the live image is displayed on the right side of the screen and the selected comparison image is on the left.

The user can configure the display position in Utility -> System -> System Imaging -> Follow Up Tool -> Comparison Image Side.

4. Select a B mode image on the clipboard to do follow up and the body mark and the comments which are added in the selected image will be transferred to the current scanning image.

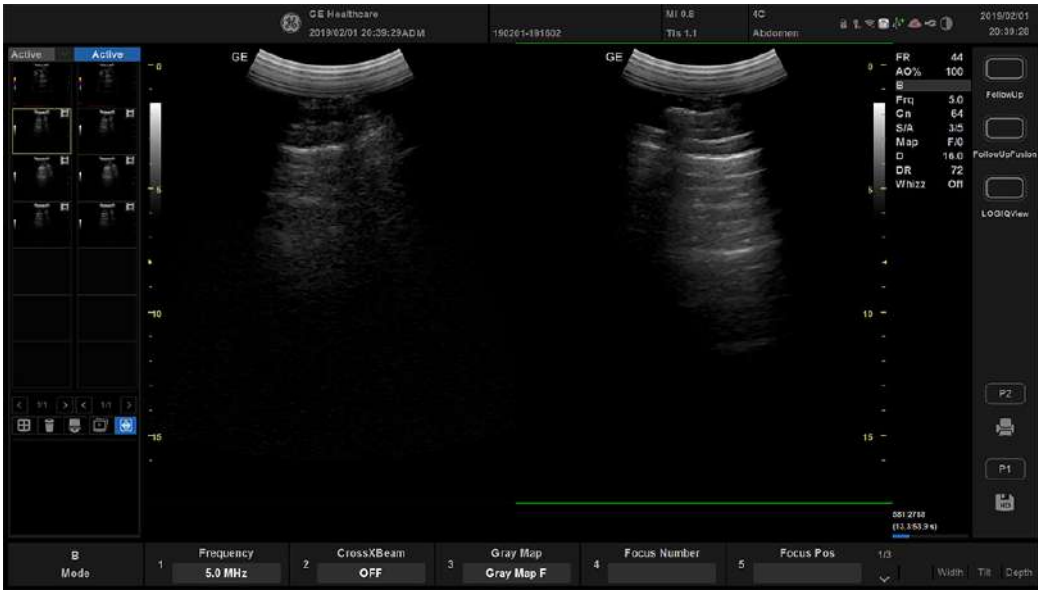


Figure 4-44. Follow-up Compare Screen - B Mode

The Follow-up Exam (continued)

5. Press the key assigned for Fusion to turn on Fusion. The overlay will appear on the active image. Align the bony landmarks or fascial planes with overlay to find the same scanning position from comparative study.

NOTE: You can assigned a key from key User Defined Key to turn on/off Fusion via Utility - System -> User Configurable Key.

Move the probe until the scanning position gets to the mark.

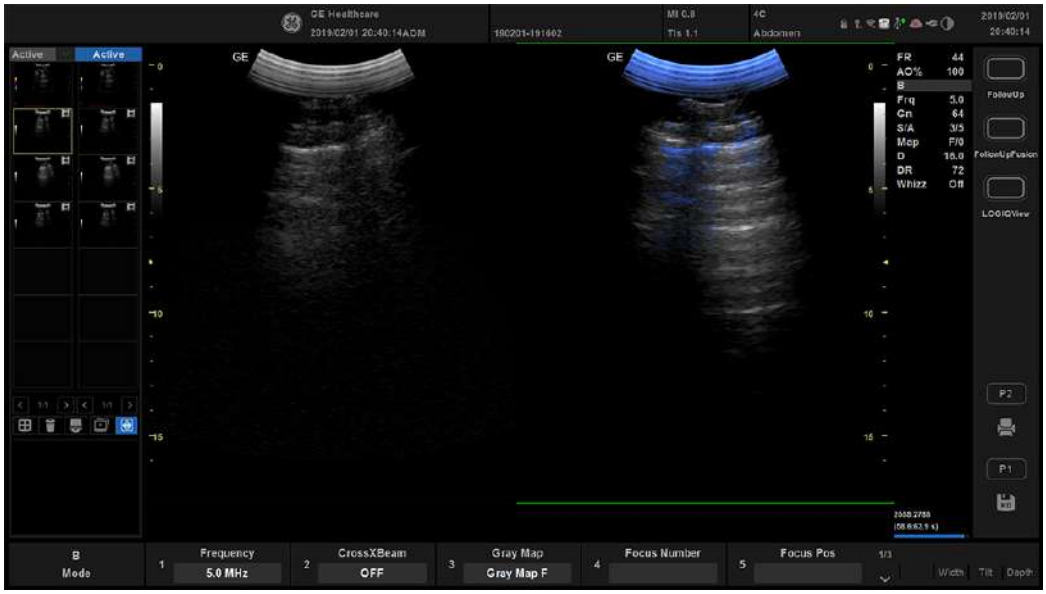


Figure 4-45. Use Fusion

6. Select the assigned key again to deactivate Fusion.

NOTE: Fusion should be turned off before saving the image, otherwise the mark will remain on the image which is frozen and saved.

NOTE: For additional follow-up, select the appropriate clipboard image for comparison.

The Follow-up Exam (continued)

7. Press **Freeze**. Press P1 to save image. An image with split screens will be stored in the exam report.

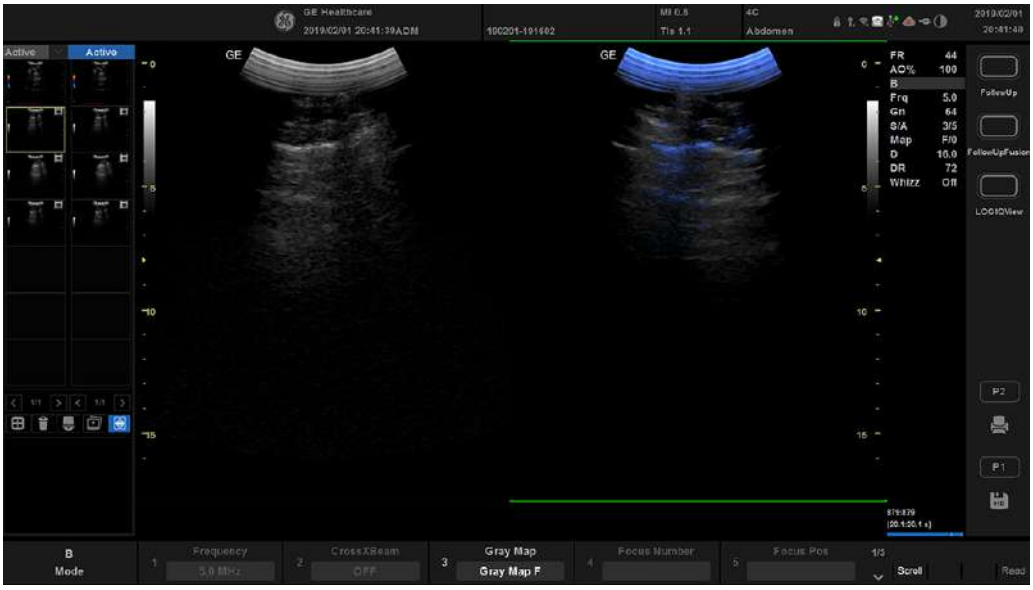


Figure 4-46. Follow up image

The Follow-up Exam (continued)

8. Select one image of Color Flow Mode on the clipboard to do follow up. Color Flow Mode is used for example here.

   The color window automatically appears on the same position and in the same size with the comparison image.

   The scanning parameters is reloaded from the comparison image to the current image.

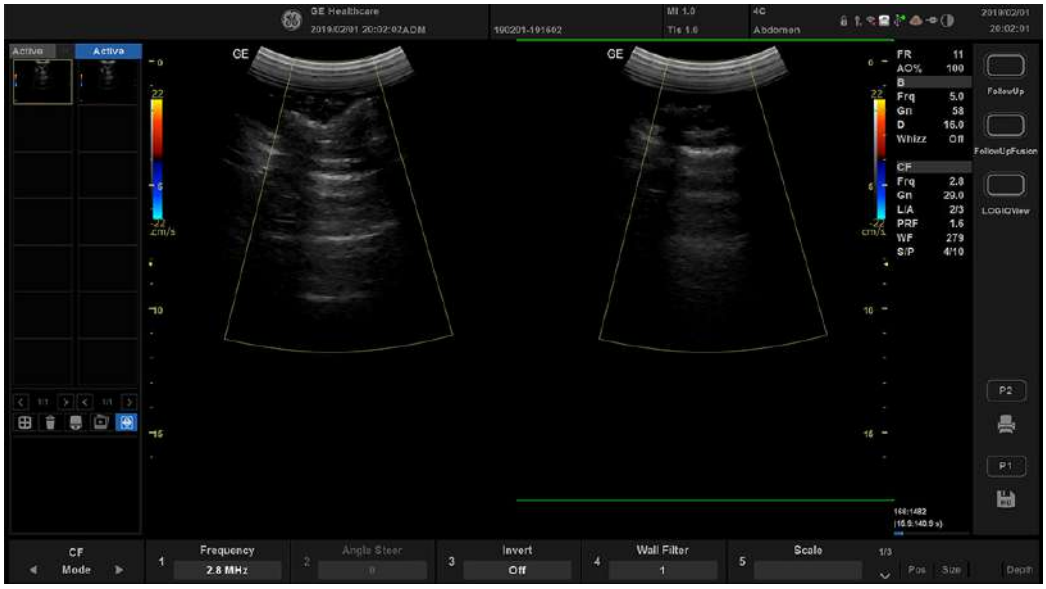


Figure 4-47. Color Mode follow up exam

The Follow-up Exam (continued)

9. Select Fusion from the assigned Function key. When Fusion is activated with image that has been saved in Color, the color disappears automatically from color window. The color bar and color window will remain.

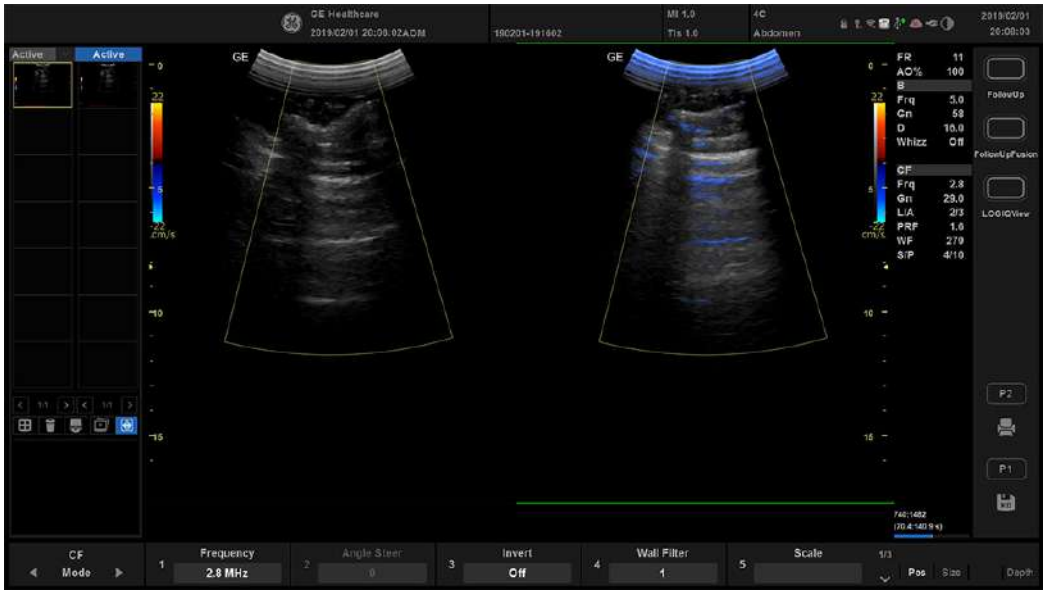


Figure 4-48. Turn on Fusion

10. After the scanning position is located, press the key assigned for Fusion to turn off Fusion. When the Fusion is turned off, color appears automatically in color window. During this operation, the user does not need to press **Color** key to activate color.
11. Press **Freeze**.

    Select the desired frame by using **Frame By Frame** control on the primary menu.

The Follow-up Exam (continued)

12. Press **Measure**. The measurement method, measurement item and ROI will be transferred automatically from comparison image to the current scanning image.

*NOTE: Be sure **Auto Copy QA Measurement (Dual Screen)** has been checked in the Follow Up Tool portion in Utility -> System -> System Imaging. This is not available through factory default.*

*NOTE: If **Auto Copy QA Measurement (Dual Screen)** is not selected, the QAnalysis measurement will not be copied automatically from comparison image to the current scanning image. The user can perform the measurement with new measurement method, measurement item and ROI on the current image.*

The result window displays the measurement result of comparison image and the current image.

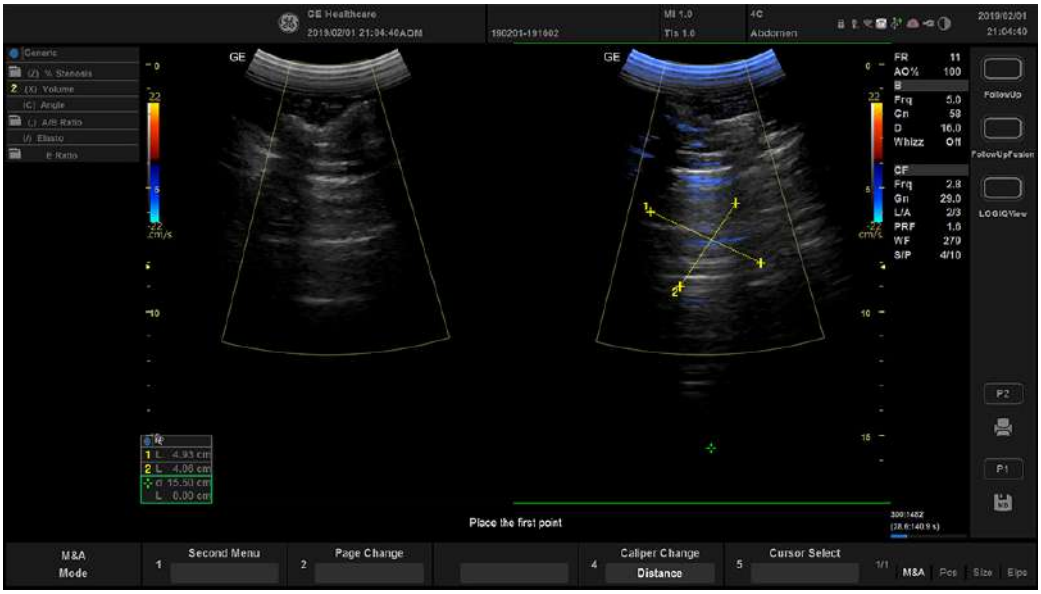


Figure 4-49. Follow up measurement

The Follow-up Exam (continued)

13. Press P1 to save the image and measurement.

    The image with split screens and measurement result for current image and comparison image is stored.

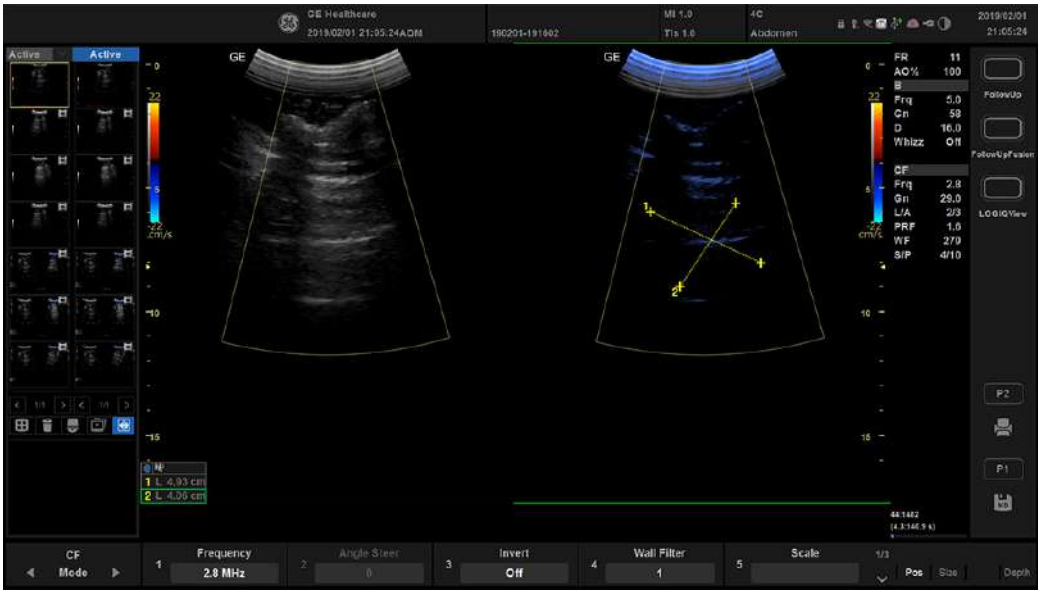


Figure 4-50. Approve the image and measurement

Worksheet

To view a worksheet, press the **Report** key on the control panel. See ‘Viewing and Editing Worksheets’ on *page 7-61 for more information.*

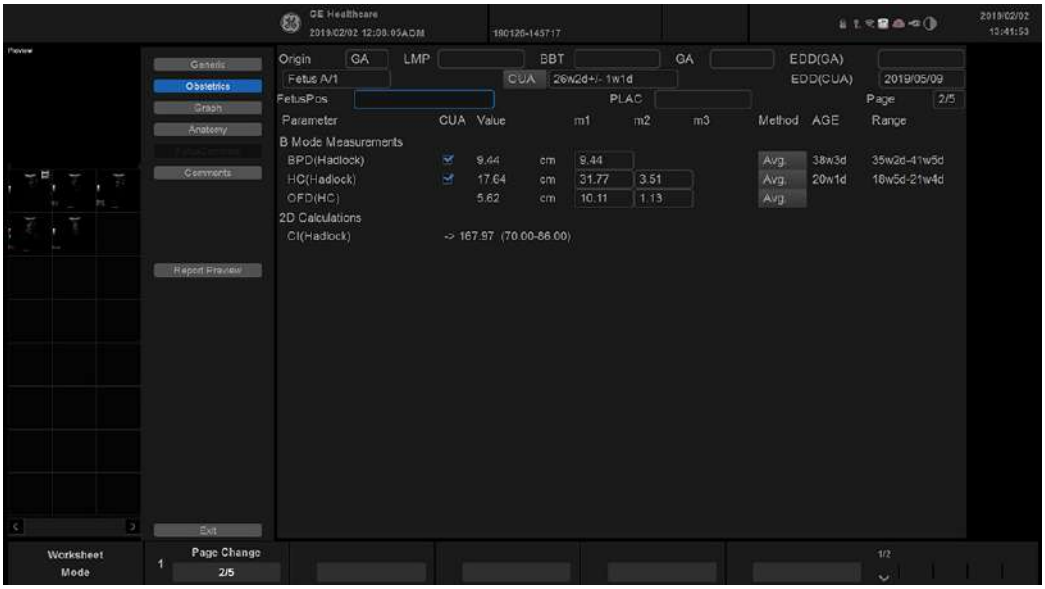


Figure 4-51. Worksheet

Report

To view the report, press **Report** on the control panel.

Select **Report Preview** to enter report. Double click the image, the image will display in the Image window.

The measurement result window with measurement data of current image and comparison image is kept on the image and displays.

NOTE: You can refer to Chapter 14 for more information about Report.

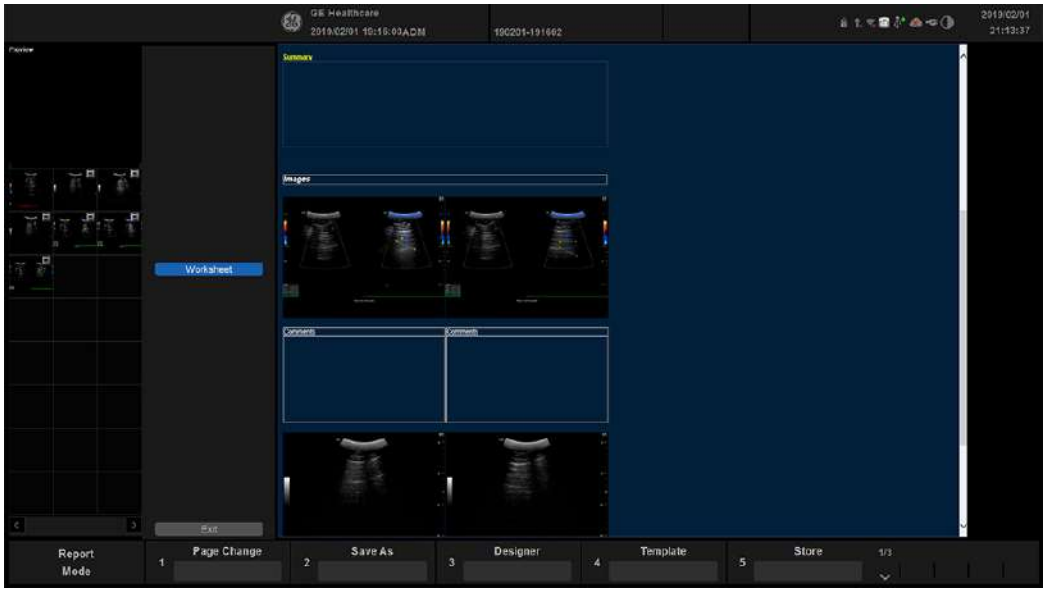


Figure 4-52. Report

Chapter 5

Optimizing the Image

Describes how to adjust the image. This chapter is broken into the following sections: B-Mode, M-Mode, Color Flow Mode, M Color Flow, Doppler Mode, Using Easy 3D Mode and TruScan.

Optimizing B-Mode

Intended Uses

B-Mode is intended to provide two-dimensional images and measurement capabilities concerning the anatomical structure of soft tissue.

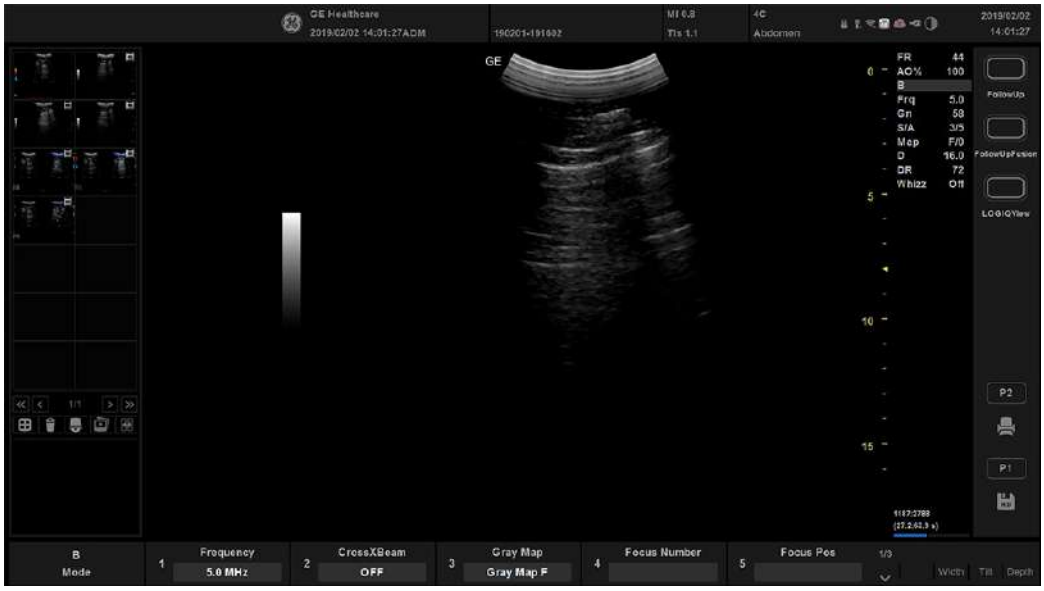


Figure 5-1. B-Mode Display -- Representative Example

Typical B-Mode Exam Protocol

A typical examination using B-Mode might proceed

1. Record exam-related patient information. Verify system setup (probes and presets).
2. Position the patient and the console for optimum operator and patient comfort. Perform the scan.
3. Complete the study by collecting all the data.



Ensure that the hands of the patient are away from the system during the exam.

The position of the operator and the patient vary by scan region.

In most case, the operator sits/stands straight in front of the operator console and the patient lies on the bed on the right (or left) side of the system.



Always use the minimum power required to obtain acceptable images in accordance with applicable guidelines and policies.

B-Mode Scanning Hints


HINTS

These B-Mode controls produce the following results:

Whizz. Whizz will continuously optimize the brightness, contrast and uniformity of B-Mode images when scanning different tissues.Whizz in PW/CW Doppler Mode (ASO: Auto Spectral Optimization) optimizes the spectral data. Auto adjusts the Velocity Scale/PRF(live imaging only), baseline shift, and invert (if preset). Upon deactivation, the spectrum is still optimized. Specify the Whizz Level: Low or High via Utility --> Whizz --> Whizz Level.

Coded Harmonics. Enhances near field resolution. Multiple frequencies available to increase penetration.

Frequency. Higher frequency improves resolution and can be used for imaging superficial structures or small body habitus. Lower frequency improves penetration.

Gray Map. Affects the presentation of B-Mode information. Choose the gray map prior to making other adjustments. There is an interdependency between gray maps, gain, and dynamic range. If you change a map, revisit gain and dynamic range settings.

Dynamic Range. Changes the amount of gray scale information displayed. A higher dynamic range shows more gray scale information displayed, while a lower dynamic range displays less gray scale information more contrast onto the same display scale.

Frame Average. Smooths the image by averaging frames.

Focus Number/Position. Focus is the area where the soundbeam is concentrated to enhance detail in the image. Put focal zone(s) below the area of interest. Frame rate canbe affected by the number of focal zones used.

TGC. Time gain compensation is used to adjust gain at a specific level in the image.

Width. Adjusts the size of region of interest.

Depth

Description

Depth controls the distance over which the B-Mode images anatomy, and the field of view. To visualize deeper structures, increase the depth. To visualize superficial structures, decrease the depth.

Transmit frequency and focus position shall be changed automatically with Depth controls.

Adjusting

Each adjustment cycles you to the next Depth setting. Imaging and display parameters adjust automatically.

To increase/decrease, adjust **Depth**.

Preset

You can set the depth by probe and application on the Utility --> Imaging page.

Values

Depth increments vary by probe and application. Depth displays on the monitor in centimeters.

Depth values are returned to the factory or user preset value when you change the following: Probe, Exam Calc, or End Exam.

Affect on other controls

TGC and focus position may need to be adjusted after adjusting depth.

Changing Depth,

- Clears Cine memory.
- Erases real-time calculations graphics on the display (but not the completed results on the worksheet page).

Bioeffects

Changing the depth may change the TI and/or MI. Observe the output display for possible effects.

Gain

Description B-Mode Gain increases or decreases the amount of echo information displayed in an image. It may have the effect of brightening or darkening the image if sufficient echo information is generated.

Adjusting To decrease/increase, rotate **Gain**.

Gain values vary depending on the probe; they are not associated with a particular position of the key.

NOTE: B-Mode gain is independent of M-Mode and Doppler and Color Flow Gain. Changing the M-Mode Gain while in M-Mode does not affect the B-Mode image gain.

Preset You can set gain by probe and application on the Utility --> Imaging page.

Values Gain displays on the monitor in Gn. Gain values vary by probe, application, and frequency setting.

NOTE: Maximum gain is factory preset to an optimum setting to eliminate noise in the display.

Gain values are returned to the factory or user preset value when you change the following: Probe, Exam Category/Exam Calc, or Patient.

Affect on other controls After you adjust the Power Output, you may need to adjust the gain. Generally speaking, if you increase the Power Output, you need to decrease the gain; if you decrease the Power Output, you need to increase the gain. Gain and TGC interact by adding together.

Bioeffects Gain has no affect on Power Output. However, with increased gain, the power output level can usually be reduced to produce an equivalent image quality.

NOTE: Always optimize gain before increasing the Power Output.

Focus

Description

Focus is the area where the soundbeam is concentrated to enhance detail in the image. Put focal zone(s) below the area of interest. Frame rate can be affected by the number of focal zones used. A graphic caret corresponding to the focal zone position(s) appears on the right edge of the image.

Adjusting

To increase/decrease the number of focal zones, adjust ***Focus Number*** on the primary menu.

To move the focal zone to the near/far field, adjust ***Focus Pos*** on the primary menu.

Focal zones adjust automatically when you adjust the depth.

NOTE: You can set the focus (Depth % and Number, and Number Crossbeam) by probe and application on the Utility--> Imaging page.

Values

Focus zone number and position vary depending on the depth, zoom, probe, application, and frequency setting selected.

Focal zone number values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calc, or Patient.

Affect on other controls

Changing the focal number affects the frame rate. The greater number of focal zones, the slower the frame rate.

Bioeffects

Changing the focal zone may change the TI and/or MI. Observe the output display for possible effects.

Whizz

Description Whizz will continuously optimize the brightness, contrast and uniformity of B mode images when scanning different tissues.

Whizz in PW/CW Doppler Mode (ASO: Auto Spectral Optimization) optimizes the spectral data. Auto adjusts the Velocity Scale/PRF (live imaging only), baseline shift, and invert (if preset). Upon deactivation, the spectrum is still optimized.

Benefit Whizz can enhance productivity by reducing keystrokes.

Adjusting To activate Whizz, press **Whizz** key.

Press **Whizz** key again to turn off Whizz.

NOTE: When the Whizz function is active, the [Whizz] key is illuminated green.

Preset Specify the Whizz Level: Low or High via Utility --> Whizz --> Whizz Level.

To set up Auto Spectrum Optimization (ASO) for Doppler mode, press **Whizz** key.

CrossXBeam

Description

CrossXBeam is the process of combining three or more frames from different steering angles into a single frame. CrossXBeam is available on Convex and Linear probes.

Adjusting

To activate CrossXBeam, select ***CrossXBeam*** on the primary menu.

NOTE: The Primary Menu can be set in Utility -> Application -> Imaging Controls.

To adjust the number of frames being compounded, select CrossXBeam. Select OFF, Low, Medium, or High.

Preset

You can preset B-Mode CrossXBeam:

- Preset the CrossXBeam #
- Preset Focus Width CrossXBeam
- Preset Focus Number CrossXBeam
- Preset Line Density CrossXBeam
- Preset CrossXBeam Type
- Frame Average CrossXBeam

These presets can be made via the Utility --> Imaging page.

CrossXBeam (continued)

Values

CrossXBeam is available on Convex and Linear probes. Multiple focal zones are supported. B-Mode CrossXBeam is available while in B-Mode, Color Flow, or PW Doppler Mode. Steering is optimized by probe. The displayed compound image depth is equal to the image depth of the non-steered frame.

Virtual convex scanning shall be available while CrossXBeam is enable on probe that support both features.

The following features are supported in CrossXBeam:

- Harmonic Imaging
- CINE Loops acquired using CrossXBeam.
- Read Zoom
- All Measurement and Analysis packages
- SRI HD, Rejection, Colorize, Revert, Edge Enhance, Gray Map, Rotation, Biopsy Kit, Dynamic Range, Depth, TGC, Gain, Acoustic Output, Auto.

Benefits

The combined single image has the benefits of reduced speckle noise, reduced clutter, and continuity of specular reflectors. This technique can improve contrast resolution.

SRI-HD (High Detection Speckle Reduction Imaging)

Description

SRI-HD (High Detection Speckle Reduction Imaging) is an adaptive algorithm to reduce the speckle in the ultrasound image. Image speckle usually appears as a grainy texture in otherwise uniform areas of tissue. Its appearance is related to image system characteristics, rather than tissue characteristics, so that changes in system settings, such as probe type, frequency, depth, and others, can change the appearance of the speckle. Too much speckle can impair image quality and make it difficult to see the desired detail in the image. Likewise, too much filtering of speckle can mask or obscure desired image detail. Extra care must be taken to select the optimal SRI-HD level.

SRI-HD is available in B-Mode imaging and may be used with any transducer or clinical application when image speckle appears to interfere with the desired image detail.



Figure 5-2. B-Mode Image before SRI-HD (left) and After SRI-HD (right)

SRI-HD (High Detection Speckle Reduction Imaging) (continued)

Values

We recommend that you select the SRI-HD level by observing the enhanced image in side-by-side dual image comparison with the original, unprocessed image. Dual display mode is activated by pressing the Dual key.

In selecting the level of SRI-HD, you must observe the effects of SRI-HD in the desired region of interest and should make a real-time comparison with the original image. The optimal level depends on the clinical situation and improves with experience. Observing the original and SRI-HD-processed images together helps to determine whether too much or too little SRI-HD has been applied.

Dual image mode for SRI-HD can also be activated on a stored CINE Loop. This allows you to always see the original, unprocessed or enhanced image by going into the Dual display mode and to change the SRI-HD settings when reviewing the CINE Loop.

SRI-HD is available on 3D.

- You cannot change SRI-HD after the scan starts.
- The effects for the rendered image are less than the 2D-image.

Benefits

Smooths the image when image speckle interferes with the desired image detail.

Coded Harmonic Imaging (CHI)

Description Harmonic imaging utilizes Digitally Encoded Ultrasound (DEU). Coded Harmonics enhances near field resolution as well as far field penetration.

Adjusting To activate Coded Harmonic imaging, press **CHI** key on the control panel.

NOTE: You can assign CHI On/Off function to the User Defined key. See 'System/User Configurable Key' on page 16-42 for more information.

NOTE: You can specify the parameters for CHI in Utility -> Imaging -> HAR.

NOTE: Frequency cannot be changed when the image is frozen.

Values On/Off. 'CHI' appears in place of 'B' in the imaging parameters.

NOTE: Changing frequency resets those parameters which are presettable by frequency to their preset values for the current harmonic frequency.

Benefits Coded Harmonics diminishes low frequency high amplitude noise and improves imaging technically difficult patients.

Bioeffects Activating **CHI** mode may change the TI and/or MI. Observe the output display for possible effects.

Frequency

Description Changes system parameters to best optimize for a particular patient type.

Adjusting Adjust Frequency until the desired frequency is selected.

The selected frequency appears as “Frq” in the upper, right-hand portion of the monitor display.

NOTE: Frequency change is not active when the image is frozen.

NOTE: Changing frequency resets those parameters which are presettable by frequency to their preset values for the current frequency.

Values Vary, depending on the probe and application.

Frequency values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or begin a new patient.

Benefits This optimizes the probe's wide band imaging capabilities at multiple frequencies to image at greater depths.

Bioeffects Adjusting frequency may change the TI and/or MI. Observe the output display for possible effects.

Steer

Description You can slant the B-Mode or Color Flow acoustic beam without moving the probe. The steer function only applies to linear probes.

Adjusting To slant the linear image to the left/right, adjust **B-Steer** button on the primary menu.

NOTE: The Primary Menu can be set in Utility -> Application -> Imaging Controls.

NOTE: Steer is not available while using CrossXBeam.

Values Linear probes can be steered left, center, or right up to a maximum of 15 degrees, depending on the probe.

Steer values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or Patient.

Preset Reverse Steer Controls via Utility --> System --> System Imaging.

Benefits Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Peripheral Vascular to image carotids.

Bioeffects Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

Mode Cursor

Description Displays the Mode cursor on the B-Mode image.

Adjusting To activate the cursor mode, select ***Activate M/D Cursor*** via Utility --> System --> System Imaging --> *Controls.*

Then in B mode, press the [PW] or [M] key one time, the M/D cursor appears on the active 2D image. Move trackball to position M/D cursor. Adjust Angle and SV Length as necessary.

Benefits Position M/D cursor on large B-Mode image first before activating M-Mode or Doppler Mode.

Virtual Convex

Description On Linear and Sector probes, Virtual Convex provides a larger field of view in the far field.

Adjusting To activate/deactivate Virtual Convex, select ***Virtual Convex***.

Values On/Off

Benefits Virtual Convex allows for a wider field of view. Available in B-Mode, Color Flow Mode, and Doppler Mode. CrossXBeam is available on Virtual Convex with linear probes.

Bioeffects Activating Virtual Convex may change the TI and/or MI. Observe the output display for possible effects.

NOTE: Color Flow can be steered when in straight fire, but not in Virtual Convex.

TGC

Description TGC amplifies returning signals to correct for the attenuation caused by tissues at increasing depths. TGC slide pots are spaced proportionately to the depth. The area each pots amplifies varies as well. A TGC curve may appear on the display (if preset), matching the controls that you have set (except during zoom). You can choose to deactivate the TGC curve on the image.

Adjusting To decrease/increase TGC, move slide pot to the left/right.

NOTE: *TGC adjusts automatically when using zoom.*

Values When you change the depth, TGC is rescaled across the new depth range. Each pot is proportionately scaled across the depth.

Preset TGC Display On/Off -- preset via Utility --> System --> System Imaging --> Display.

Benefits TGC balances the image so that the density of echoes is the same throughout the image.



Do not apply too much pressure to the TGC slide pots as this could damage the slide pots.

Width

Description	You can widen or narrow the size of the sector angle to maximize the image's region of interest (ROI).
Adjusting	To narrow/widen the angle, press **Set** key until the **Width** is highlighted, then move the Trackball to move left/right to decrease/increase the angle size. Then press **Set** key to set the ROI.
Values	Varies, depending upon the probe (not applicable to linear probes) and application.
Benefits	Increase the sector angle to see a wide field of view; decrease the sector angle when you need to have a faster frame rate, as in fetal heart.
Affect on other controls	Changing the sector angle affects the frame rate. The narrower the sector angle, the faster the frame rate.
Bioeffects	Changing the sector angle may change the TI and/or MI. Observe the output display for possible effects.

Tilt

Description	You can steer the sector angle to get more information without moving the probe while in B-Mode, M-Mode, Doppler Mode, and Color Flow Mode. Tilt is not available on Linear probes.
Adjusting	To tilt the angle to the left/right, press **Set** key until **Tilt** is highlighted, then move the Trackball to the left/right.
Values	Varies, depending on the probe.
Benefits	Allows you to move a reduced sector angle laterally, without moving the probe.
Bioeffects	Steering the sector angle may change the TI and/or MI. Observe the output display for possible effects.

Dynamic Range

Description	Dynamic Range controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast. The Dynamic Range control name changes to Compression on frozen images.
Adjusting	To increase/decrease, adjust ***Dynamic Range***.
Values	The settings cycle in 3 or 6 dB steps from 36 dB to 96 dB. The current value displays. Dynamic Range values vary by probe, application, and frequency setting. Dynamic Range levels are returned to the factory or user preset value when you change the following: Probe, Exam Calcs, Patient, or Multi Frequency.
Affect on other controls	Dynamic range operates in real-time, Freeze, CINE, and CINE Timeline.

Revert

Description Flips the image 180 degrees left/right.

Adjusting To flip the image 180 degrees, select **Revert** on the primary menu.

NOTE: *The* **Revert** *Tab can be set in Utility -> Application -> Imaging Controls.*

Values The image rotates in 180 degrees left/right. Revert settings vary by probe and application.

Revert settings are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or Patient.

Benefits Used for anatomical correctness.


CAUTION

When reading a reverse image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal.

Line Density

Description Optimizes B-Mode frame rate or spatial resolution for the best possible image.

Adjusting Adjust ***Line Density*** to increase resolution or to increase frame rate.

Select the default value via Utility -> Imaging -> B -> Line Density and press ***Save***.

Values Varies by probe.

NOTE: *Not available in cine mode.*

Values vary by probe and application. Line Density values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or Patient.

Benefits A lower line density is useful in fetal heart beat, adult cardiac applications and in clinical Radiology applications requiring significantly higher frame rates.

A higher line density is useful in obtaining very high resolution, e.g., thyroid, testicles.

Affect on other controls Line density changes the vector density and frame rate.

Bioeffects Activating color flow line density may change the TI and/or MI. Observe the output display for possible effects.

Line Density Zoom

Description You can set the default value for Line Density in zoom independently.

Adjusting Select the default value via Utility -> Imaging -> B -> Line Density Zoom and press ***Save***.

Colorize

Description

Colorize is the colorization of a conventional B-Mode image or Doppler Spectrum to enhance the user's ability to discern B, M, and Doppler Mode intensity valuations. Colorize is NOT a Doppler Mode.

NOTE: You can colorize real-time or CINE images.

Colorizes the gray scale image to enhance the eye's discrimination capability.

Spectrum Colorize colorizes the spectrum as a function of power using the inverse of the Colorize map for the signal intensity in each Doppler line.

Colorize enhances the visibility of the spectrum's characteristics and enhances your ability to identify spectral broadening and the edge contours of the spectrum used to define the peak frequency/velocity.

The gray bar displays while Colorize is activated.

Adjusting

To activate Colorize,

1. Select ***Colorize***.
2. Press Primary Menu keys to select available maps.

To deselect, select a gray map.

PRF

Description Reduces noise artifacts in the image. When you activate PRF, the frame rate decreases and the noise artifacts are filtered.

Adjusting To activate PRF, select **PRF** on the primary menu.

NOTE: The Primary Menu can be set in Utility -> Application -> Imaging Controls.

NOTE: Available for only Cardiac application.

Edge Enhance

Description Edge Enhance brings out subtle tissue differences and boundaries by enhancing the gray scale differences corresponding to the edges of structures. Adjustments to M-Mode's edge enhancement affects the M-Mode only.

Adjusting To cycle through settings, adjust **Edge Enhance**.

Values Values vary by probe, application and multi frequency setting. Edge Enhance values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or Patient.

Benefits Edge Enhance cleans out the B-Mode image/M-Mode time line by subduing some of the gray scale in order to highlight the vessel wall or organ. This is helpful when you cannot differentiate between the chambers of the heart.

Affect on other controls Edge Enhance operates in real-time only; not in Freeze or CINE.

Frame Average

Description Temporal filter that averages frames together, thereby using more pixels to make up one image. This has the effect of presenting a smoother, softer image.

Adjusting To adjust frame averaging, adjust **Frame Average**.

Values Values vary by probe, application and multi frequency setting. Frame Average values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or Patient.

Benefits Smooths the image.

Gray Map

Description

The system supplies B, M, and PW Mode system maps.

In Doppler mode, the Clear map offers a bluish coloring compared to the standard gray map. Clear Maps provide a more transparent map. Clear maps are displayed under gray maps.

Adjusting

To select a map, select the ***Gray Map***. A map window displays. The image reflects the map as you go through the selections.

Values

Map values vary by probe, application, and frequency setting. Map values are returned to the factory or user preset value when you change the following: Probe, Preset, Exam Calcs, or Patient.

Rejection

Description

Selects a level below which echoes will not be amplified (an echo must have a certain minimum amplitude before it will be processed).

Benefits

Allows for the elimination from the display of low level echoes caused by noise.

Rotation

Description Flips the image 90 degrees/180 degrees/270 degrees.

Benefits Beneficial in transvaginal scanning.



When reading a rotated image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal.

Suppression

Description Suppresses the noise in the image.

LOGIQ View (Option)

Description

LOGIQ View provides the ability to construct and view a static 2D image which is wider than the field of view of a given transducer. This feature allows viewing and measurements of anatomy that is larger than what would fit in a single image. Examples include scanning of vascular structures and musculoskeletal structures.

LOGIQ View constructs the extended image from individual image frames as the operator slides the transducer along the surface of the skin in the direction of the scan plane. The quality of the resulting image is somewhat user-dependent and requires some additional skill and practice to develop proper technique and become fully proficient.

LOGIQ View is not available for the following:

- Multi Image
- Timeline Modes
- Color Flow Mode
- PDI Mode

Using LOGIQ View

To perform an exam using LOGIQ View,

1. Perform a detailed examination of the anatomy. Optimize parameters for tissue texture and visible window PRIOR TO activating LOGIQ View.
2. Press the user defined key for **LOGIQ View**.
3. To start acquiring the image, press **Dual** key.



HINTS

Slowly scan in a uniform motion lengthwise, end-to-end (with or against the probe orientation marker). LOGIQ View acquires images via leading edge vectors (and does not acquire slices, as in CINE). The image is being stored as you perform the scan and you can watch the LOGIQ View as it is being acquired.

LOGIQ View (Option) (continued)

4. To restart the scan, press **Dual**. You can back up the probe, realign it, then go forward to redo a portion of the scan.
5. To complete the scan, press **Quad** or Freeze (or allow the scan to auto complete). The LOGIQ View is then displayed, scaled to fit entirely on the screen.
6. Perform measurements and record images.

Hints

The quality and usefulness of LOGIQ View images is affected by transducer motion. Incorrect technique can contribute to image distortion.

Guidance and precautions for uniform motion:

- Continuous contact is required throughout the length of the extended image. DO NOT lift the transducer from the skin surface.
- Always keep the transducer perpendicular to the skin surface. DO NOT rock the transducer.
- Keep the motion within the same scan plane, if possible. DO NOT slide the transducer laterally.
- Lateral turning (change in direction to follow anatomical structure) can be accommodated with slower motion. DO NOT make abrupt changes in direction.
- The system accommodates a reasonable range of motion velocity. DO NOT make abrupt changes in speed of motion. Deeper scans generally require reduced speed.

Bioeffects

Activating LOGIQ View has no affect upon Acoustic Output values.

Needle Recognition (Option)

Description

Needle recognition functionality is available with linear probes (12L-RS, L6-12-RS, 9L-RS) and convex probe, 4C-RS. Figure 5-3.b illustrates the position between the needle and probe. Needle recognition can only enhance in-plane needles. The **needle angle** is defined as the angle between the needle and probe surface.

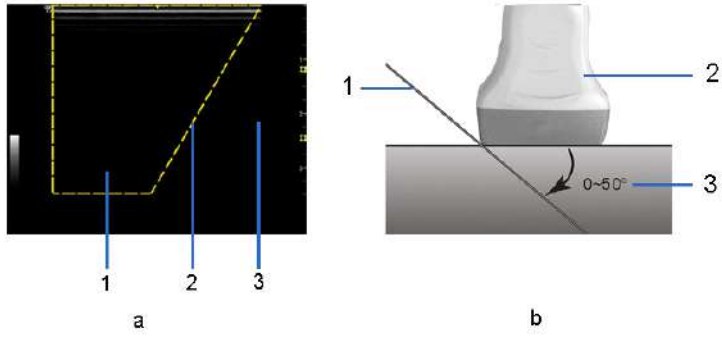


Figure 5-3. a. Enhanced area b. Needle Angle

a

1. Enhanced area
2. Needle guide line
3. Unenhanced area

b

1. Needle
2. Probe
3. Needle angle

NOTE: Needle Recognition is only available in B/CF/PDI.

NOTE: The parameters for adjusting can be set in Utility -> Imaging -> B. To set the desired parameters in the Primary Menu for each button, See 'System Presets' on page 16-3 for more information.

Needle Recognition (Option) (continued)

Adjusting

- Activating Needle Recognition:

  Press user defined **Needle** key on the control panel to activate Needle Recognition

- Adjusting steer direction:

  Needle key cycles through Off/Left or Off/Right depending on the setting in Utility -> Imaging -> B Tab. If the system is set for Off/Left/Right, press **Needle** key again after activating the Needle Recognition in order to change the steering angle from left to right.

- Adjusting the needle recognition beam angle:

  Adjust **Beam Angle** by pressing Primary Menu keys. Max available angles are up to 50 degrees on 12L-RS, 9L-RS, 45 degrees on 4C-RS, and 30 degrees on L6-12-RS.

NOTE: Adjust the needle recognition steering angle to form the needle and the beam angle as perpendicular as possible to get the best needle enhancement.

- Adjusting Needle Gain:

  Adjust **Needle Gain** by pressing Primary Menu keys. Available Needle Gain ranges from 0 to 100 in the increment of 5.

NOTE: Increasing the Needle Gain enhances the needle visibility while decreasing the Needle Gain decreases artifacts and noise. Adjust the Needle Gain to balance the needle enhancement versus level of artifacts/noise.

- Adjusting Needle Thickness:

  Adjust **Needle Thickness** by pressing Primary Menu keys to change the appearance of needle thickness between thick and thin.

NOTE: "Thick" option displays thicker and more prominent appearance of needle while "Thin" option displays thinner but more realistic needle appearance.

Needle Recognition (Option) (continued)

NOTE: The beam divergence and effects of beam steering with a transducer may prevent a segment of the needle shaft from showing in the image if the needle angle is too steep (Figure 5-4).

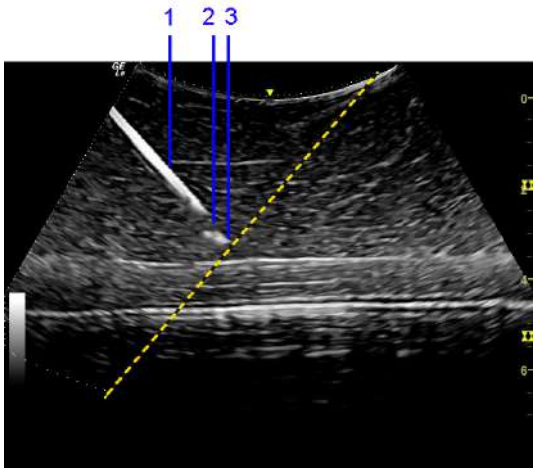


Figure 5-4. Example of needle that is too steep

1. Needle shaft
2. Un-enhanced needle shaft
3. Needle tip

*NOTE: For best results please insert the needle at perpendicular to the dotted guide line (Figure 5-5), or at a **needle angle** that is slightly less than the **Beam Angle** (Figure 5-6).*

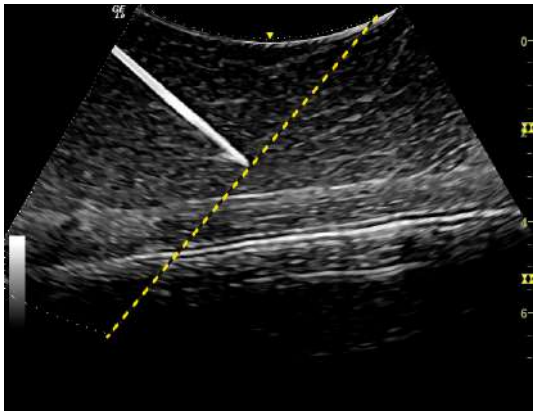


Figure 5-5. Example of needle that is perpendicular to the guide line

Needle Recognition (Option) (continued)

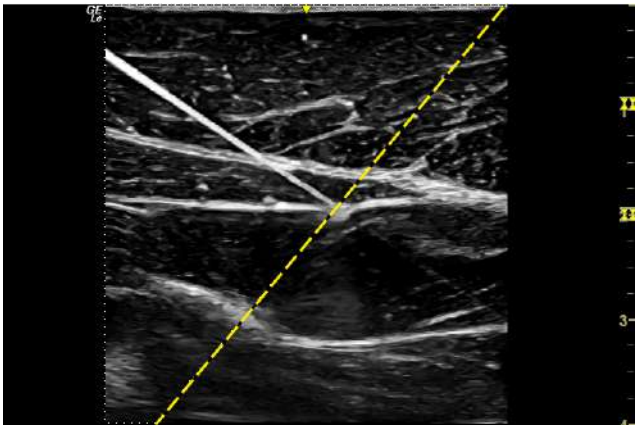


Figure 5-6. Example of needle angle that is slightly less than the beam angle

HINTS

To help verify the location and trajectory of the needle tip, please use needle movement and / or fluid injection.

Make sure the needle is always in the ultrasound plane by slightly moving or tilting the probe to get the best needle enhancement during the needle procedure.

Switch needle On/Off can help to identify artifacts and other not interesting structures.

Needle Recognition values (including enable/disable, Needle Direction, Beam Angle and Needle Gain, etc.) are returned to factory or user preset value when you change: Exam Category, Exam Calcs, or New Patient.

Preset

Needle Directions - preset via Utility -> Imaging -> B Tab.

Beam Angle - preset via Utility -> Imaging -> B Tab.

Needle Gain - preset via Utility -> Imaging -> B Tab.

Needle Thickness - preset via Utility -> Imaging -> B Tab.

Interactive Needle Line - preset via Utility -> Imaging -> B Tab.

Benefits

Provides better biopsy needle visualization than normal B-Mode with steered beam angle and post processing.

Bioeffects

Activating angle Needle Recognition may change the TI and/or MI. Observe the output display for possible effect.

B Flow / B Flow Color (Option)

B Flow

Description

B-Flow is intended to provide a more intuitive representation of non-quantitative hemodynamics in vascular structures.

B-Flow is digitally-encoded Ultrasound, using digital codes to enhance weak signals from small particulate reflectors (blood flow) and suppress signals from strong reflectors (tissue). Flow and tissue are displayed simultaneously without threshold decision and overlay.

All B-Mode measurements are available with B-Flow active: depth, distance along a straight line, % stenosis, volume, trace, circumference, and enclosed area.

Presetting

Preset the default B Flow Mode, either B Flow or B Flow Color via Utility--> Imaging --> BF/BFC button. Specify the default to be either B Flow or B Flow Color.

Activating

To activate/deactivate B-Flow, press user-defined hard key. Doppler Mode is available while in B-Flow; however, M-Mode and Color Flow/PDI Modes are not available.

Using B-Flow

To optimize the image:

Adjust the frequency, display depth, and focal zone location basded on the patient body type and anatomy of interest. Adjust Sensitivity/PRI and Background setting as needed (see below).

Adjust the remaining Imaging parameters and presets as needed; functionally is the same as B-mode when in B-Flow mode.

B Flow (continued)

Scanning Hints

B-Flow is especially intuitive when viewing blood flow, for acute thrombosis, parenchymal flow, and jets. B-Flow helps you visualize complex hemodynamics and highlights moving blood and tissue. B-Flow was implemented using Digitally Encoded Ultrasound (DEU). There are no artifacts such as bleeding, blooming, or aliasing.

The greater the speed, the better the image scatter density and size. If the scan direction is the same as the flow direction, then the image scatter is elongated; if the scan direction is the opposite as the flow direction, then the image scatter is tighter. Therefore, have the scan direction opposite to that of flow direction. Switch the way you hold the probe, with the probe orientation marker inferior to maintain correct orientation on the monitor. Flow starts from where the focal zone is located.

Turn off the background when imaging the kidney, liver, and spleen. Keep the focal zone as close to flow as possible. It is beneficial to narrow the sector width and increase the frame rate.

Benefits

Compared to Color Doppler mode, B-Flow provides better spatial and temporal resolution, displays blood flow in the entire image, i.e. NO ROI, and is not angle dependent as it does not use the Doppler Principle. B-Flow is therefore a more realistic (intuitive) representation of flow information, allowing you to view both high and low velocity flow at the same time.

Affect on other controls

When you activate B-Flow, the system remembers the imaging parameters set while in B-Mode. When you optimize the frame rate via Line Density, you compromise the resolution and when you optimize the resolution, you compromise the frame rate. B-Flow is not available in 3DView.

Bioeffects

When you select B-Flow, the PRF increases.

B Flow (continued)

Flow Type

Available in B-Flow.

Value Low or High.

- Low= Most sensitivity for slow flow (venous, small parts). This setting has the slowest frame rate.
- High= Most sensitivity for fast flow. Provides the highest frame rate and better detection of flow dynamics. Use whenever possible to capitalize on the high frame rate.

Accumulation

Description Accumulation enhances the flow in an image; ideal to capture dynamic flow in a still picture.

Values Off - Infinite. Infinite provides the same result as applying CINE Capture to a B-Flow CINE clip.

Benefit Accumulation detects the maximum signal and holds it (accumulates it) for the level specified (Off - Infinite).

Background

Description In the Background ON mode, both of B-Flow and B-mode are displayed in one image.

Value On or Off.

B Flow (continued)

Sensitivity/PRI

Description

Sensitivity/PRI (Pulse Repetition Interval) is proportional to the time interval between the pulses sent to develop the B-Flow image.

In general, a larger value is recommended for slow flow as slow flow detection requires more time separation between pulses so the system can detect the difference in flow profile. However, a larger value could cause bar artifacts on the image. Therefore, it is suggested to not increase the PRI value more than needed. A small value of PRI should be used when the interest is in fast flow only, e.g. viewing a jet in a stenosis case, where the jet is of interest.

NOTE: Sensitivity/PRI is Probe and Model dependent.

B-Flow Color (BFC)

Description

B-Flow Color is intended to provide a B-Flow representation with colorized flow and background B-Mode image.

Although the BFC is based on B-Flow technology, the BFC image is processed and made by the Color Flow processor and therefore has both the advantages of B-Flow and Color Flow. Consequently, imaging parameters and presets are functionally the same as Color Flow/PDI.

Refer to ‘Optimizing Color Flow’ on *page 5-44* for details on each parameter.

Activating

To activate B-Flow Color,

- While in B-Mode, press user-defined hard key to activate B-Flow. Then select **B Flow Color** on the primary menu.
- Adjust the parameters to get the best image.

B-Flow Color (BFC) (continued)

Enhance (B-Flow Color)

Description	***Enhance*** provides a range of choices for B-Flow Color image quality.
Values	Enhance “Off” is the original B-Flow Color setting which gives you the dynamic appearance of the flow with high frame rate. Enhance “On” adds sensitivity and stability/continuity to the flow’s appearance, along with lower frame rates than Enhance “Off.”

Scale

Description	Same as Scale in Color Flow/PDI Mode.
Values	Increase for higher flow states. Decrease to display smaller vessels and slower flow.

Optimizing M-Mode

Intended Use

M-Mode is intended to provide a display format and measurement capability that represents tissue displacement (motion) occurring over time along a single vector.

Introduction

M-Mode is used to determine patterns of motion for objects within the ultrasound beam. The most common use is for viewing motion patterns of the heart.

Typical exam protocol

A typical examination using M-Mode might proceed as follows:

1. Get a good B-Mode image.
2. Press **M**-Mode. Survey the anatomy and place the area of interest near the center of the B-Mode image.
3. Move the trackball to position the mode cursor over the area that you want to display in M-Mode.
4. Adjust the Sweep Speed, TGC, Gain, Power Output, and Focus Position, as needed.
5. Press **Freeze** to stop the M trace.
6. Record the trace to disk or to the hard copy device.
7. Press **Freeze** to continue imaging.
8. To exit, press **M**-Mode.

M-Mode Display

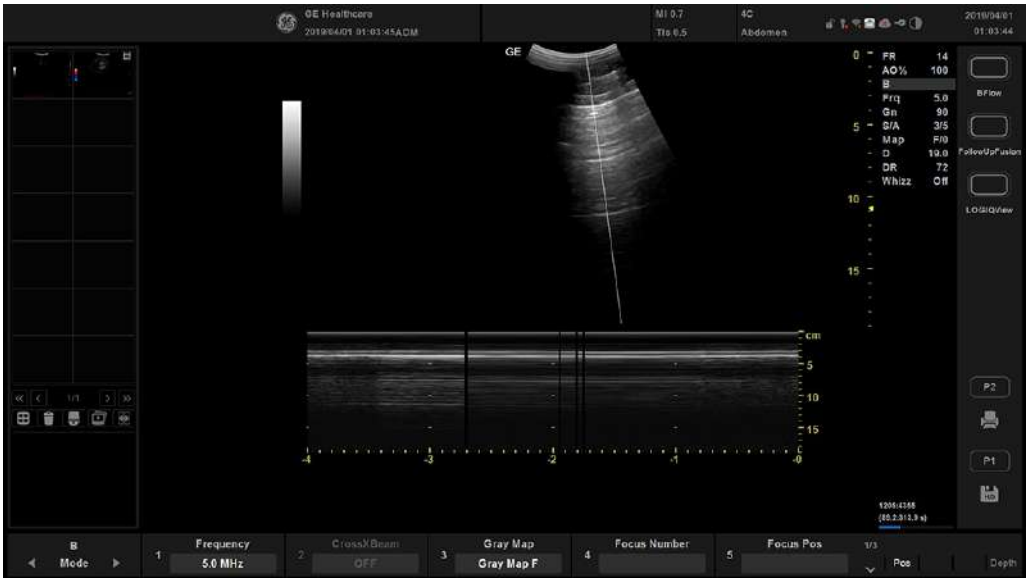


Figure 5-7. M-Mode Display -- Representative Example

Scanning Hints



These M-Mode controls produce the following results:

Sweep Speed. Controls speed of M-Mode update.

Dynamic Range. Affects the amount of gray scale information displayed.

Sweep Speed

Description Changes the speed at which the time line is swept.

Available in M-Mode and Doppler Mode.

Available in M Color Flow Mode.

Adjusting To increase/decrease, select ***Sweep Speed***.

Values Each selection represents a different sweep time.

Sweep Speed values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or Patient.

Benefits You can speed up or slow down the time line to see more or fewer occurrences over time.

NOTE: The sweep speed information represents the user selected sweep speed and should be used only as a reference to confirm that the image was acquired at the selected sweep speed. It is not to be used for measurements or analysis. This is not an absolute value, but simply a reference number. Users performing studies using standardized protocols may find this sweep speed information useful for reading studies from other institutions.

Anatomical M-Mode

Description

Anatomical M-Mode gives you the ability to manipulate the cursor at different angles and positions. The M-Mode display changes according to the position of the cursor.

Anatomical M-Mode displays a distance/time plot from a cursor line, which is independent from the axial plane. AMM is available in B, Color and TVI.

NOTE: To set up AMM, go to Utility--> Imaging--> AMM. Select the specific probe and parameters.

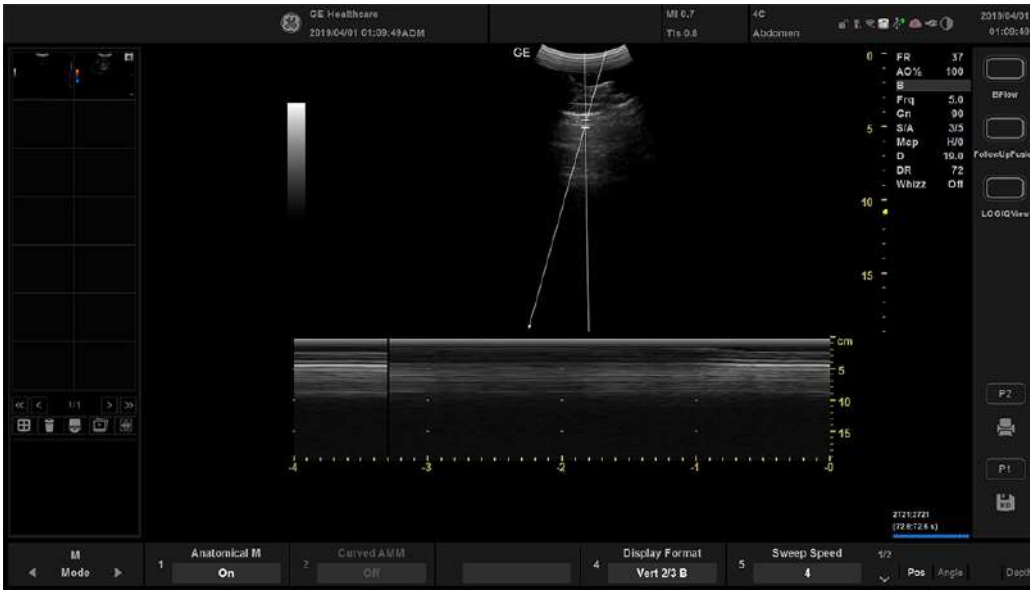


Figure 5-8. Anatomical M Mode

Anatomical M-Mode (continued)

Activating

To activate Anatomical M-Mode:

1. While in M-Mode, select ***Anatomical M***.
2. Press **Set** key until **Pos** is highlighted, move the trackball to position the M cursor over the required area of the image.
3. Press **Set** key until **Angle** is highlighted, move the trackball to allow free rotation of the solid arrow line throughout the 2D image.

Benefits

Anatomical M-Mode gives you the ability to manipulate the cursor at different angles and positions. The M-Mode display changes according to a motion of the M cursor.

Bioeffects

Changing the Packet Size, PRF, and ROI size may change the TI and/or MI. Observe the output display for possible effects.

Curved Anatomical M-Mode (CAMM)

Curved Anatomical M-Mode (CAMM) displays a distance/time plot from a free-drawn cursor line. CAMM is available in B, CF and TVI.

NOTE: Curved Anatomical M-Mode can also be used with previously acquired digitally stored B-Mode images.

1. While in AMM mode, Change Curved AMM to ON in the primary menu.
2. Use the Trackball to position the start point of the time motion curve in the B-Mode image.
3. Press **Set** to fix the start point.
4. Use the Trackball to position the next point.

   The time motion curve is drawn by the green line.
5. Press **Set** to fix the point.
6. Repeat step 4 and 5 to draw a complete time motion curve.

NOTE: The time motion curve can be edited by following the curve back to the desired point and redrawn as desired. Following the curve back to the starting point will delete the time motion curve.

7. Press **Set** twice to complete.

*NOTE: Move the cursor to the desired anchor point and press **Set**. Move the point to the desired position and press **Set**.*

8. The arrow cursor appears on the M-Mode image and the red bar appears on the time motion curve.

   The red bar indicates the position of the time motion curve relative to the arrow cursor on the CAMM image. They move relative to one another.

*NOTE: Press **Set** to clear a cursor line.*

Optimizing Color Flow

Intended Use

Color Flow Mode and Color M-Mode are Doppler Modes intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode or M-Mode image.

Introduction

A typical examination using Color Flow Mode.

1. Follow the same procedure as described under B-Mode to locate the anatomical area of interest.
2. After optimizing the B-Mode image, add Color Flow.

NOTE: *Use all noise reduction controls with care. Excessive application may obscure low level diagnostic information.*

3. Move the color flow area of interest as close to the center of the image as possible.
4. Optimize the color flow parameters so that a high frame rate can be achieved and appropriate flow velocities are visualized.
5. Press **Freeze** to hold the image in memory.
6. Record color flow images as necessary.
7. If more definitive information is needed about flow, utilize the procedures described under Doppler Mode.
8. To exit Color Flow, press **CF**-Mode or **B**-Mode.

Color Flow Mode

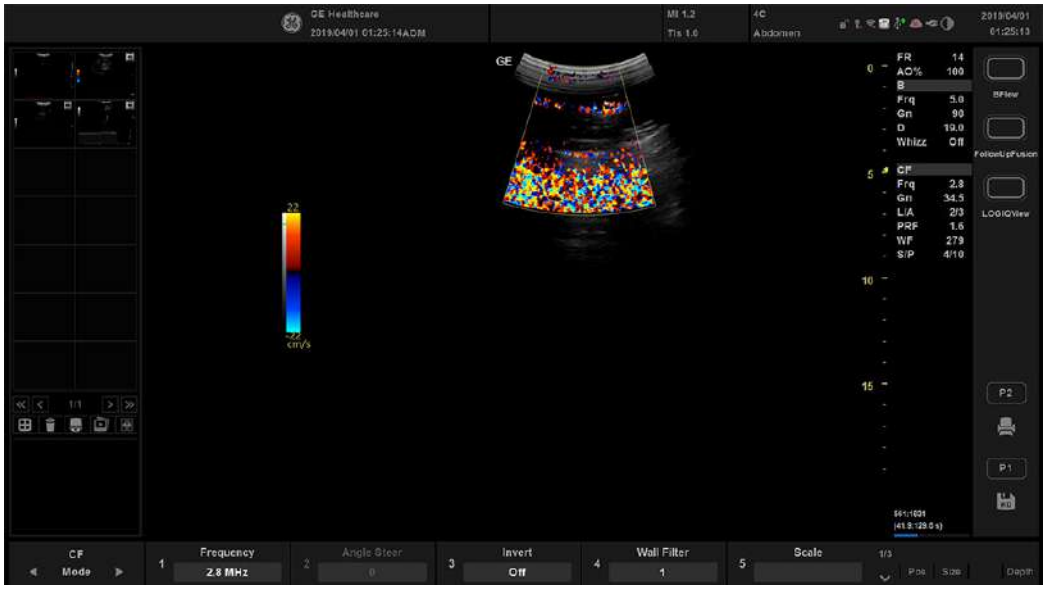


Figure 5-9. Color Flow Mode screen -- Representative Example

Uses

Color Flow is useful to see flow in a broad area. Color Flow allows visualization of flow in the CF ROI, whereas Doppler Mode provides spectral information in a smaller area.

Color Flow is also sometimes used as a stepping stone to Doppler. You use Color Flow to locate flow and vessels prior to activating Doppler.



HINTS

Color Flow Mode controls produce the following results:

Line Density. Trades frame rate for sensitivity and spatial resolution. If the frame rate is too slow, reduce the size of the region of interest, select a different frame rate setting, or reduce the packet size.

Wall Filter. Affects low flow sensitivity versus motion artifact.

Color ***Threshold***. Percentage of gray scale level where color Doppler is overwritten.

Frame Average. Affects temporal smoothing and color Doppler `robustness.'

Flash Suppression. Flash Suppression is a proprietary algorithm for motion artifact control.

Packet Size. Affects the amount of color Doppler sensitivity versus frame rate.

Size. Adjust the size of color window.

Focus Position. The best focusing is at the focal zone location. Put focal zone(s) at the area of interest.

Flow Model shortcuts

Flow Model Shortcuts values vary by application. Below is an example of the Abdominal Flow Model Shortcuts and the folllowing table lists all the following Flow Model Shortcuts by application.

In the Abdominal application on the Color Flow, you will see Aorta, Renal, Renal Art, or Penetration flow selections.

In the Vascular Exam Category--> LEV Application on the Color Flow menu, you will see Low Flow or Fast Flow selections.

Gain

Description	Gain amplifies the overall strength of echoes processed in the Color Flow window or spectral Doppler time line.
Adjusting	To decrease/increase Gain, rotate **Gain**. Gain values change depending on the probe and application; they are not associated with a particular position of the button.
Values	Values vary by probe, application, and multi frequency setting. Gain displays as Gn on the screen. Gain values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, Patient, or Multi Frequency.
Benefits	Allows you to control the amount of color within a vessel or to fill in or clean out spectral information.
Bioeffects	Gain has no affect on Power Output. However, with increased Gain, the power output level can usually be reduced to produce an equivalent image quality.

Scale (Velocity Scale)

Description	Increases/decreases the Scale on the color bar.
Adjusting	To raise/lower the velocity scale, adjust ***Scale*** on the primary menu.
Values	Scale is in kHz. Velocity Scale values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or Patient.
Benefits	Imaging of higher velocity flow requires increased scale values to avoid aliasing.
Affect on other controls	Changing the Velocity Scale may affect Power Output, frame rate, and wall filter. When you adjust the velocity scale, CINE memory is cleared.
Bioeffects	Changing the Velocity Scale range may change the TI and/or MI. Observe the output display for possible effects.

Wall Filter

Description Filters out low flow velocity signals. It helps get rid of motion artifacts caused from breathing and other patient motion.

Values Values vary, depending upon probe, application, and packet size. The wall filter is displayed numerically on the monitor (Hz).

Wall Filter values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or Patient.

Benefits Gets rid of excess, unnecessary low frequency signals caused by motion.

Wall Filter Target Override (Hz)

Description Wall filter target override sets to "**0**".

The algorithm selects a new regression wall filter it updates the wall filter setting and the wall filter cutoff on the user display. If using this algorithm, then the system automatically maintains a target wall filter cutoff as the scale is changed. The target wall filter cutoff is initially set by the results of the user-defined presets for wall filter, scale. The target regression wall filter cutoff shall be updated when the user changes the wall filter setting.

Wall filter target override sets to "**-1**".

The algorithm keeps a user selected regression wall filter, when the user changes the color scale.

Wall filter target override sets to other value.

The algorithm selects a new regression wall filter it updates the wall filter setting and the wall filter cutoff on the user display. In this case, the selected value from the user is the target cut off (Hz).

Values Set the value on the Utility -> Imaging -> PDI -> Wall filter Target Override (Hz) and press ***Save***.

Size/Position of the color window

Description	Adjust size and position of the color window.
Adjusting	The window grows from the center of the color window. To adjust the size, press **Set** until **Size** (Size/Position appears in the **Trackball** status area on the monitor display) is highlighted, then move the Trackball left/right, up/down. To adjust the position, press **Set** until **Pos** is highlighted, then move the **Trackball** to position the color window.
Benefits	Increase the color window to see a larger area; decrease the color window to improve frame rate and spatial resolution.
Affect on other controls	The smaller the color window, the faster the frame rate and vice versa.
Bioeffects	Sizing the color window may change the TI and/or MI. Observe the output display for possible effects.

CF/PDI Focus Depth

Description	You can set the default CF/PDI ROI width.
Adjusting	Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

Invert (Color Invert)

Description Lets you view blood flow from a different perspective, e.g., red away (negative velocities) and blue toward (positive velocities). You can invert a real-time or frozen image.

NOTE: Invert reverses the color map, NOT the color PRF.

Adjusting To reverse the color flow, adjust ***Invert (Color Invert)***.

In Triplex, both Color Flow and Doppler Mode velocity scales are inverted.

Values Invert values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits Allows you to view blood flow according to your personal preference, without flipping the probe.

Baseline

Description Changes the Color Flow or Doppler spectrum baseline to accommodate higher velocity blood flow. Minimizes aliasing by displaying a greater range of forward flow with respect to reverse flow, or vice versa.

Baseline adjusts the alias point. The default baseline is at the midpoint of the color display and at the midpoint of the color bar reference display.

Adjusting To adjust the baseline, adjust **Baseline**.

Values Zero velocity follows the baseline. The total PRF range remains the same. Values vary by probe and application.

Baseline values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or new patient.

Benefits Unwraps the alias during color flow imaging. Higher velocities can be displayed without reversal of colors.

Angle Steer

Description — You can slant the ROI of the Color Flow linear image left or right to get more information without moving the probe. The Angle Steer function only applies to linear probes.

Adjusting — To slant the ROI of Color Flow linear image to the left/right, adjust **Angle Steer**.

Angle Steer can be set in Utility -> Imaging -> CF/PDI.

Limit to 3 Angle Steer if you want to use all angles or just available only 3 angles (left 20, 0, right 20).

Values — Linear probes can be steered left (20, 15, 10 degrees), center, or right (20, 15, 10 degrees). Angle Steer values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or new patient.

Benefits — Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Peripheral Vascular to image carotids.

Bioeffects — Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

Accumulation

Description — Accumulation enhances the flow in an image.

Values — 8 settings: Off, 6 Various levels, or frames, of accumulation, and Infinite. If Accumulation is turned off, then Frame Averaging is used; if Accumulation is set, then Accumulation is used.

Availability — Available in Color Flow, PDI.

Benefit — Accumulation detects the maximum signal and holds it for the level specified.

Color Flow Line Density

Description	Optimizes the Color Flow frame rate or spatial resolution for the best possible color image.
Adjusting	To adjust the line density, adjust **Line Density**. Select the default value on the Utility -> Imaging -> CF -> Line Density and press **Save**.
Values	Frame Rate/Resolution values vary by: Probe, Exam Category, Exam Calcs, new patient, and Frequency. Settings are returned to factory or user preset value when you change any of the above.
Benefits	Low line density is useful in fetal heartbeat, adult cardiac applications, and clinical Radiology applications which require significantly higher frame rates. High resolution is useful in situations where very small vessels are being imaged, e.g., thyroid, testicles.
Affect on other controls	Line density changes the vector density and frame rate.
Bioeffects	Modifying line density may change the TI and/or MI. Observe the output display for possible effects.

Line Density Zoom

Description	You can set the default value for Line Density in zoom independently.
Adjusting	Select the default value via Utility -> Imaging -> CF -> Line Density Zoom and press ***Save***.

Map

Description Allows you to select a specific color map. After you have made your selection, the color bar displays the resultant map.

Adjusting After you activate Color Flow, the Color Flow menu displays. To cycle through available maps, select ***Map***, press primary menu keys to view available maps, and press **Set** to select.

Values Velocity Maps (V). Flow shown as blue away/red toward the probe.

Velocity Variance Maps (VV). Provides a measure of turbulence (stenosis). Adds green to velocity maps.

Benefits Shows the direction of the flow and highlights the higher velocity flows.

Map Compress

Description When you increase the value, high velocity elements in the map are compressed so that the map darkens. When you decrease the value, low velocity elements in the map are compressed so that the map lightens. The effect is visible in the color bar.

Benefits Changes the gradation in the map.

Threshold

Description	Threshold assigns the gray scale level at which color information stops.
Adjusting	To increase/decrease the gray scale threshold, adjust **Threshold**.
Values	The settings cycle through various values: 0%-100% of the gray scale. High values display more color; low values displays more B-Mode gray scale data. Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or new patient.
Benefits	Limits color flow overlay to low level echoes inside vessel walls. Helps minimize color `bleeding' outside vessel walls.

Frame Average

Description	Averages color frames.
Adjusting	To smooth temporal averaging, select ***Frame Average***. The selected value is displayed.
Values	Frame Average values vary by probe and application. The values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or new patient.
Benefits	Higher frame averaging keeps the color displayed longer for increased flow visualization while lower frame averaging provides greater flow dynamics.
Affect on other controls	Trades off between frame rate and color quality. As the color quality increases, the frame rate may decrease and as the frame rate increases, the color image quality decreases.

Transparency Map

Description Brings out the tissue behind the color data.

Adjusting Select ***Transparency Map*** to adjust.

*NOTE: Select the default value on the Utility -> Imaging -> CF -> Transparency Map and press **Save**.*

Benefits Helps demonstrate the tissues behind the color.

Spatial Filter

Description Smooths out the color, makes it look less pixely.

Adjusting Select ***Spatial Filter*** to adjust.

*NOTE: Select the default value on the Utility -> Imaging -> CF -> Spatial Filter and press **Save**.*

Benefits Smooths the image.

Flash Suppression

Description Activates/deactivates Flash Suppression, a motion artifact elimination process.

Values Values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or new patient.

Benefits Beneficial to suppress flash.

Packet Size

Description Controls the number of samples gathered for a single color flow vector.

Values Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or new patient. Values are displayed on the monitor display as P.

Benefits Allows you to improve the color sensitivity and accuracy of color averaging (increase packet size) or frame rate (decrease packet size), as needed.

Affect on other controls When you decrease the packet size, you increase the frame rate at the expense of image quality. When you increase the packet size, you improve image quality at the expense of frame rate.

Bioeffects Changing packet size may change the TI and/or MI. Observe the output display for possible effects.

Sample Volume

Description Adjusts the size of the color flow doppler transmit wave (or pulse) and size (or length). Lower setting gives better flow resolution and a higher setting increases sensitivity.

CF/PDI Sample Volume

Description You can set the default CF/PDI Sample Volume.

Adjusting Select the value on the Utility -> Imaging -> CF -> CF/PDI Sample Volume and press ***Save***.

CF/PDI Center Depth

Description You can set the default CF/PDI Center Depth (cm).

Adjusting Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

CF/PDI Frequency (MHz)

Description You can set the default CF/PDI Frequency (MHz).

Adjusting Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

CF/PDI Auto Frequency

Description You can set the default CF/PDI Auto Frequency.

Adjusting Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

Power Doppler Imaging (PDI)

Description

Power Doppler Imaging (PDI) is a color flow mapping technique used to map the strength of the Doppler signal coming from the flow rather than the frequency shift of the signal. Using this technique, the ultrasound system plots color flow based on the number of reflectors that are moving, regardless of their velocity. PDI does not map velocity, therefore it is not subject to aliasing.



Figure 5-10. Power Doppler Imaging screen -- Representative Example

Adjusting

Press the user defined key for **PDI**. The color flow window appears over the B-Mode image. Move the Trackball to move the CF window. To exit, press **PDI** or select a new mode.

Values

On/Off.

Twelve power (P0-P6 and P8-P12) and one directional PDI maps (P7) are available.

Benefits

Since PDI does not display velocity, it does not alias.

Power Doppler Imaging (PDI) (continued)

Affect on other controls

When PDI is activated, the following controls are adjusted: Color Map is set to a power map. Line Density is adjusted. Threshold is set to 100%. Frame Averaging is adjusted. Packet Size is adjusted.

NOTE: These controls are reset to their previous values upon exiting PDI.



HINTS

When changing maps, higher gain settings may be needed.

Directional Power Doppler

You can select the P7 Directional Power Doppler map while in PDI.

NOTE: If you store a PDI image and recall it, you can still switch to the Directional Power Doppler map and vice versa. However, an image stored as non-directional then switched to directional just adds direction to a non-directional map and vice versa.



HINTS

If the image is aliasing while in Directional Power Doppler, increase the Scale and reduce the Wall Filter.

Tissue Velocity Imaging (Option)

Intended Use

Tissue Velocity Imaging (TVI) calculates and color-codes the velocities in tissue. The tissue velocity information is acquired by sampling of tissue Doppler velocity values at discrete points.The information is stored in a combined format with gray scale imaging during one or several cardiac cycles with high temporal resolution.

TVI can be activated on the sector probes only.

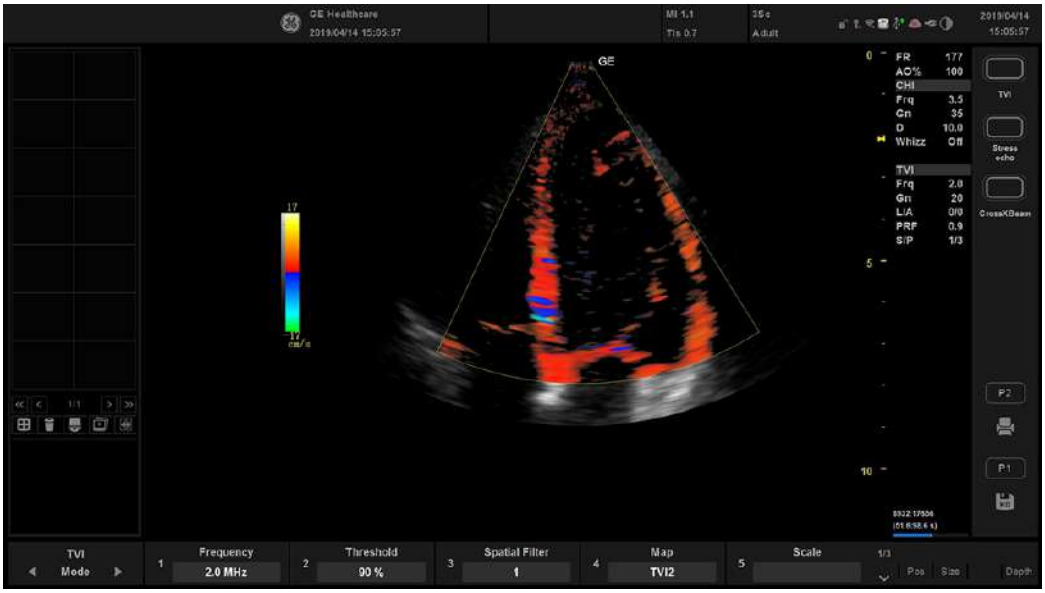


Figure 5-11. Tissue Velocity Imaging Display

Activating TVI

1. Select the sector probe 3Sc-RS.
2. While in B-Mode, press the user defined key for TVI. The TVI image and the menu display.

   While in TVI, press **PW** to activate TVD.

   While in TVI, press **M** to activate TVM.
3. Press **Set** until **Pos** is highlighted, then move the **Trackball** to position the ROI frame over the area to be examined.
4. Press **Set** until **Size** is highlighted, then move the **Trackball** to adjust the dimension of the ROI.

Optimizing TVI

The use of preset gives optimum performance with minimum adjustment. If necessary, the following controls can be adjusted to further optimize the TVI display:

- To reduce quantification noise (variance), the Nyquist limit should be as low as possible, without creating aliasing. To reduce the Nyquist limit: Reduce the Scale value.

NOTE: The Scale value also affects the frame rate. There is a trade off between the frame rate and quantification noise.

- TVI provides velocity information only in the beam direction. The apical view typically provides the best window since the beams are then approximately aligned to the longitudinal direction of the myocardium (except near the apex). To obtain radial or circumferential tissue velocities, a parasternal view must be used. However, from this window the beam cannot be aligned to the muscle for all the parts of the ventricle.

NOTE: PW will be optimized for Tissue Velocities when activated from inside TVI.

*NOTE: You can preset the value on the Utility -> Imaging -> TVI or TVD mode and press **Save**.*

TVI Parameters

You can preset all parameters in Utility -> Imaging ->TVI.

The TVI parameters function the same as those described in the Color Flow specific section. The only differences would be that it pertains to tissue velocity rather than the color flow image. In the table below any TVI parameter or parameter specifics are noted.

About optimizing other parameters, see ‘Optimizing Color Flow’ on *page 5-44* for details.

Table 5-1: TVI Parameters

Control	Details
Visible Description Adjusting Values	 In LIVE/Freeze/Archive, you can display TVI Color with TVI. Select ***Visible***. On or Off.
Line Density	0 or 1. Optimizes B-Mode frame rate or spatial resolution for the best possible image.
Map	Values: TVI1 and TVI2.
Threshold	High values display more color. Low values limit the color to lower tissue echo (Opposite of Threshold in Color Flow Mode).
Spatial Filter	Values 0, 1 and 2.
TVI Gain	Control color transparency. High values display more color; low values display more tissue. This parameter is assigned to the Color Gain control.

TVD Parameters

About optimizing other parameters, see ‘Optimizing Spectral Doppler’ on *page 5-67* for details.

TVM Parameters

Tissue Velocity M Mode image (TVM): Active M mode while in TVI. To display myocardium motion velocity and direction.

Optimizing M Color Flow

M Color Flow Mode

Description

M Color Flow is used for cardiac applications. Color Flow overlays color on the M-Mode image using velocity and variance color maps. The Color Flow wedge overlays the B-Mode image and M-Mode time line.

The Color Flow maps available in M-Mode are the same as in Color Flow Mode. The size and position of the Color Flow window in B-Mode determines the size and position of the Color Flow window in M-Mode.

All M-Mode measurements are available with M Color Flow active: depth, distance along a straight line, % stenosis, volume, trace, circumference, enclosed area, distance, time, slope, and heart rate.

M Color Flow mode can be activated on the sector probes only.

M Color Flow Mode (continued)

Activating

To activate M Color Flow Mode, press **M** (M-Mode). Then press **CF** (Color Flow) - or - press **CF**, then press **M**. CM tab is displayed.

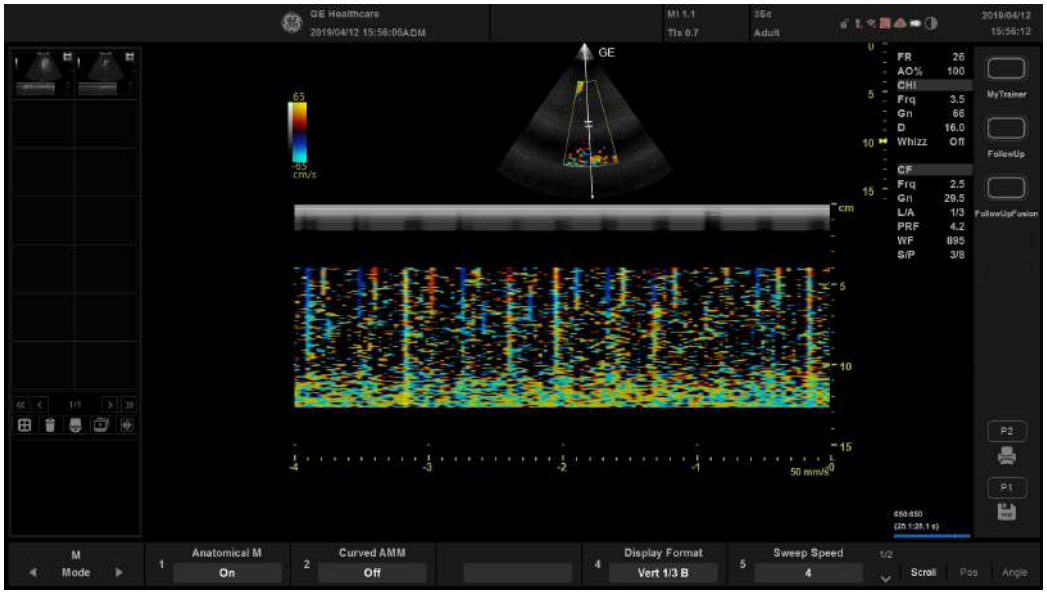


Figure 5-12. M Color Flow screen -- Representative Example

Benefits

Color Flow Mode and Color Flow M-Mode are Doppler Modes intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode or M-Mode image.

Bioeffects

Changing the Sweep Speed, Packet Size, Frame Rate/ Resolution, Zoom, PRF, and ROI size may change the TI and/or MI. Observe the output display for possible effects.

Optimizing Spectral Doppler

Intended Use

Doppler is intended to provide measurement data concerning the velocity of moving tissues and fluids. PW Doppler lets you examine blood flow data selectively from a small region called the sample volume.

Typical Use - PW Doppler

In Pulsed Wave Doppler (PW) Mode, energy is transmitted from the ultrasound probe into the patient, as in B-Mode. However, the received echoes are processed to extract the difference in frequency between the transmitted and received signals. Differences in frequencies can be caused by moving objects in the path of the ultrasound signal, such as moving blood cells. The resultant signals are presented audibly through the system speakers and graphically on the system display. The X axis of the graph represents time while the Y axis represents the shift in frequency. The Y axis can also be calibrated to represent velocity in either a forward or reverse direction.

PW Doppler is typically used for displaying the speed, direction, and spectral content of blood flow at selected anatomical sites. PW Doppler operates in two different modes: conventional PW and High Pulse Repetition Frequency (HPRF).

PW Doppler can be combined with B-Mode for rapidly selecting the anatomical site for PW Doppler examination. The site where PW Doppler data is derived appears graphically on the B-Mode image (Sample Volume Gate). The sample volume gate can be moved anywhere within the B-Mode image.

Typical exam protocol

A typical examination using PW Doppler Mode might proceed as follows:

1. Connect the appropriate probe, leaving the probes in their respective holders.
2. Position the patient for the examination.
3. Press **Patient**. Enter the appropriate patient data using the appropriate exam category.
4. Select the preset, application and probe to be used.
5. Locate the anatomy to be examined. Get a good B Mode image. Press CF to help locate the vessel you wish to examine.
6. Press **PW**. The PW Doppler spectrum appears and the system operates in combined B+Doppler Mode. Adjust **Volume** to adjust Doppler audio. The Doppler signal is heard through the speakers.

   To activate CW, press the user defined key for CW.
7. Position the sample volume cursor by moving the **Trackball** left and right. Position the sample volume gate by moving the **Trackball** up and down. Size the gate by adjusting **SV Length**.
8. Optimize the PW Doppler spectrum, as necessary. Refer to the *Doppler Optimization* section of this chapter for more information.

Typical exam protocol (continued)

9. Press **Set** to toggle between real time B-Mode with Doppler Mode (with audio).
10. Sample along the whole length of the vessel. Make sure that the probe is parallel to flow. Listen, then look, when positioning the sample volume cursor.
11. Press **Freeze** to hold the trace in memory and stop imaging. Activate CINE Timeline, as necessary. See ‘Activating CINE’ on *page 6-11 for more information.*
12. Perform measurements and calculations, as necessary. Refer to the Measurements and Calculations chapter for more information.
13. Record results by pressing the appropriate print key, depending on the setup of your recording devices.
14. Press **Freeze** to resume imaging.
15. Repeat the above procedure until all relevant flow sites have been examined.
16. Replace the probe in its respective holder.
17. To exit PW, press **PW**. To exit CW, press the user defined key for CW.

Spectral Doppler Display

Time zero (the start of the trace) appears on the left side of the graph. As time progresses, the trace moves to the right. The baseline of the graph (representing zero velocity, zero frequency shift, or no detected flow), appears as a solid line running horizontally across the display. By convention, movement toward the probe is positive and movement away from the probe is negative. Positive frequencies or velocities appear above the baseline. Negative frequencies or velocities appear below the baseline.

Typically, blood flow is not uniform but is composed of a mix of blood cells moving at different velocities and in different directions. Thus, the display is composed of a spectrum as gray scale values. Strong signals are displayed as bright while weak signals are displayed as varying shades of gray.

HPRF (High Pulse Repetition Frequency) is invoked when you are operating in PW Doppler Mode and conditions activate HPRF (when the velocity scale factor or sample volume gate depth exceeds certain limits). When HPRF is active, multiple sample volume gates appear along the Doppler mode cursor. Doppler information can be received from any of the multiple sample volume gates. The Doppler signals from all the gates are added together and displayed in one spectrum.

Information about the PW Doppler display is automatically written on the screen and updated when scanning parameters are changed.

This chapter includes:

- A discussion of PW Doppler.
- Activating Pulsed Wave Doppler.
- Optimizing the Doppler spectrum.

Doppler Mode Display

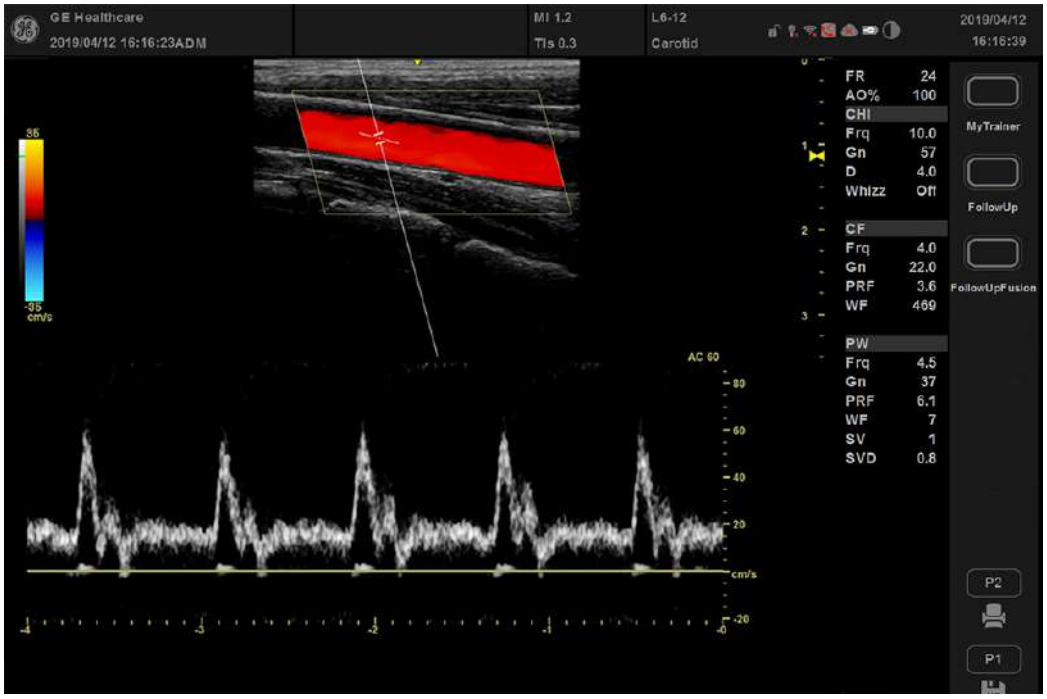


Figure 5-13. PW Doppler Mode Display -- Representative Example

Table 5-2: Doppler Mode Display Explanations

Doppler Display	Description, Format, Values
PRF	Pulse repetition frequency, displayed as PRF in kHz.
Wall Filter	Wall filter size, displayed as WF in Hz.
Doppler Gain	Displays as GN in decibels (dB).
Sample Volume Depth	Displays (in Cm) when Doppler cursor is present.
Doppler Angle (AC ##)	Indicates angle in degrees between the Doppler mode cursor and the angle correction indicator. Displays when Doppler cursor is present. The Doppler Angle displays in red when the angle exceeds 60°. Velocities obtained when the angle is greater than 80° are displayed as asterisks (***).
Spectral Invert	INVERT appears when the spectral trace is inverted and the plus/minus signs (+/-) are reversed.
HPRF	HPRF mode is used when detected velocities exceed the processing capabilities of the currently selected PW Doppler scale or when the selected anatomical site is too deep for the selected PW Doppler scale.

Table 5-2: Doppler Mode Display Explanations (Continued)

Doppler Display	Description, Format, Values
Time Scale	Each selection represents a different sweep time.
Angle Correct	Indicates flow direction.
Sample Volume Gate	Indicates sample volume box. Each probe defaults to a specific range gate.
Doppler Velocity Scale	Flow direction has a positive and negative indicator, noted in centimeters per second (cm/sec.). When the velocity scale is less than 10 cm/s, it is displayed to the first decimal point (4.6 rather than 5 cm/s). The Doppler velocity scale adjust as you adjust the PRF.

Doppler Sample Volume Gate Position (Trackball)

Description Moves the sample volume gate on the B-Mode's Doppler Mode cursor. The gate is positioned over a specific position within the vessel.

Adjusting To move Doppler Mode cursor position, move **Trackball** left or right until positioned over the vessel.

To move sample volume gate position, move **Trackball** up or down until positioned inside the vessel.

Values Defaults to 50% of the depth and can move continuously throughout the field of view.

Benefits Positions the sample volume gate to sample blood flow.

Bioeffects Changing the sample volume gate position may change the TI and/or MI. Observe the output display for possible effects.

Doppler Sample Volume Length

Description Sizes the sample volume gate.

Adjusting To increase/decrease the gate size, adjust ***SV Length***.

You can adjust the sample volume gate length whenever the sample volume gate appears on the display.

NOTE: Adjustments to the sample volume gate size are made from the center point of the sample volume position.

Values Values vary by probe and application.

Sample volume gate size values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or new patient.

Benefits A smaller gate produces accurate sampling results because it is more sensitive. You can also enlarge the gate for sampling large vessels or areas.

Bioeffects Changing the sample volume gate size may change the TI and/or MI. Observe the output display for possible effects.

Angle Correct

Description Estimates the flow velocity in a direction at an angle to the Doppler vector by computing the angle between the Doppler vector and the flow to be measured.

NOTE: When the Doppler Mode Cursor and angle correct indicator are aligned (the angle is 0), you cannot see the angle correct indicator.

Adjusting Flow toward the probe is mapped above the baseline and vice versa.

To adjust the angle relative to the probe face, adjust ***Angle Correct***. The velocity scale changes when you adjust angle correct.

NOTE: Angle Correct can be adjusted in Triplex Mode when Update is activated.

Angle Correct values vary by probe and application. Angle Correct values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits Optimizes the accuracy of the flow velocity. This is especially useful in vascular applications where you need to measure velocity.

Quick Angle

Description Quickly adjusts the angle by 60 degrees.

Adjusting Adjust ***Quick Angle*** to toggle between Off, Right and Left.

Steer and Fine Steer

Description	You can slant the mode cursor of the linear image left or right to get more information without moving the probe. The angle steer function only applies to linear probes.
Adjusting	To slant the mode cursor to the left/right, adjust **Steer** or **Fine Steer**.
Values	Linear probes can be steered left (10, 15, 20 degrees), center, or right (10, 15, 20 degrees). Steer values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or new patient. Fine Steer value can be changed in 2 degree increments.
Benefits	Provides a doppler cursor angle suitable for linear probe orientation. Beneficial in Vascular applications.
Bioeffects	Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

Volume

Description Controls audio output.



Audio sounds change rapidly, often abruptly. Increase the volume in small steps to avoid startling the patient.

Benefits An audio representation of the flow within a vessel can be used to evaluate proper probe angle and position.

Auto Spectrum Optimize (Auto)

For details on Auto, See ‘Whizz’ on *page 5-8 for more information.*

Cycles to Average

Description The average value over a number of cycles (from 1-5). For example, if you set the number of cycles at 3, values would be averaged for 3 cycles. If you have 5 cycles on the display, the PS would be the average of 3 of the 5 cycles, which are identified by a line drawn over the 3 averaged cycles.

Available for live and frozen images.

Display Format

Description Changes the horizontal/vertical layout between B-Mode and Doppler Mode, or time line only.

Benefits You can select how to have your Doppler time line and anatomy displayed.

Set

Description Toggles between simultaneous and update presentation while viewing the timeline.

Adjusting To activate, press **Set** to toggle between simultaneous and update. Doppler Mode does not restart each time the image is updated; however, a black bar may appear with a lightning bolt signalling a break in the timeline.

Values On/Off.

Benefits Update increases the Spectral Doppler display quality.

Bioeffects Activating Update may change the TI and/or MI. Observe the output display for possible effects.

Simultaneous (Duplex/Triplex)

Description Duplex allows two modes to be active at the same time; Triplex allows three modes to be active at the same time.

- B + PW or B + CW or B + CF (Duplex)
- B + PW + CF or B + CW + CF (Triplex)

Update pauses the image while keeping the CW / PW time line active.

When Duplex/Triplex is OFF, either the image or time line is active. Update then switches the active side between the image and the time line.

Preset You can preset Simultaneous in Utility --> Imaging --> General.

Benefits Allows the user to have multiple modes active at the same time.

Baseline

Description

Adjusts the baseline to accommodate faster or slower blood flows to eliminate aliasing.

Adjusting

Baseline adjusts the point in the spectrum where the velocity trace is at zero. The default baseline is at the midpoint of the spectrum.

The baseline displays as a solid line running across the spectrum. The baseline is raised and lowered in equal increments, depending on the current Doppler scale factor. The control does not wrap when the maximum baseline shift (in either direction) has been reached.

Values

50% is the center of the display, +95% is the top edge of the display and 5% is the bottom edge of the display. Baseline values vary by probe and application and are returned to the factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits

Unwraps the alias. Rearranges the velocity scale without changing the velocity scale. Readjusts the positive and negative velocities limit without changing the total velocity range.

Compression

Description Compression controls how echo intensities are converted to shades of gray, thereby increasing the range of contrast you can adjust.

Values The current value displays on the menu. Compression values vary by probe and application and are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits Optimizes the image's texture and smoothness by increasing or decreasing the amount of gray scale.

Invert

Description Vertically inverts the spectral trace without affecting the baseline position.

The plus (+) and minus (-) signs on the velocity scale reverse when the spectrum is inverted.

Positive velocities display below the baseline.

Values Forward/reverse. The trace corresponds to flow direction (positive flow is forward flow toward the probe or negative flow is reverse flow away from the probe). The invert setting is returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient. In Triplex, both Color Flow and Doppler Mode velocity scales are inverted.

Benefits If you change the probe angle to accommodate anatomy, blood flow still moves in the same direction, but the Doppler information will be reversed. It is easier in cases like this to invert the spectrum instead of reversing the probe orientation.

Scale (Velocity Scale)

Description

Adjusts the velocity scale to accommodate faster/slower blood flow velocities. Velocity scale determines pulse repetition frequency.

If the sample volume gate range exceeds single gate Scale capability, the system automatically switches to high PRF mode. Multiple gates appear, and HPRF is indicated on the display.

High PRF

High Pulse Repetition Frequency (HPRF) is a special operating mode of PW Doppler. In HPRF mode, multiple energy pulses are used. This allows higher velocities to be detected without causing aliasing artifacts. HPRF mode is used when detected velocities exceed the processing capabilities of the currently selected PW Doppler scale or when the selected anatomical site is too deep for the selected PW Doppler scale. The pulse repetition frequency (PRF) is displayed to the left of the spectrum in frames per second.

NOTE: Ensure that only one gate overlays a blood vessel at a time. Otherwise, signals from more than one flow area are superimposed.

Adjusting

To raise/lower, adjust the ***Scale*** on the primary menu. The display updates velocity scale parameters after you adjust the velocity scale.

Values

Velocity Scale values vary by probe and application. In Triplex, when you change the velocity scale in Color Flow, the Doppler Mode velocity scale is also updated if Triplex is on.

Velocity Scale values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Scale (Velocity Scale) (continued)

Benefits	Blood flow information is not cut off due to the effect of aliasing.
Affect on other controls	When you raise the velocity scale, the spectral waveform may decrease in size; when you lower the velocity scale, the spectral waveform may increase in size. Changes in the spectrum are relative to changes in the velocity scale, that is, it sizes accordingly. When you adjust the velocity scale, CINE memory is cleared. Adjustments may affect sample volume size and Doppler wall filter.
Bioeffects	Changing the velocity range may change the TI and/or MI. Observe the output display for possible effects.

Wall Filter

Description	Insulates the Doppler signal from excessive noise caused from vessel movement.
Adjusting	To increase/decrease, adjust ***Wall Filter*** on the primary menu.
Values	Values vary, depending upon the probe and application. The current value displays on the monitor. Wall Filter values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient.
Benefits	Gets rid of excess, unnecessary information. Cleans out low level noise above and below the baseline so you don't see or hear it on the spectrum.
Affect on other controls	Wall filter may be changed by changes to the velocity scale.

Trace Method

Description Traces the average mean and peak velocities in real-time or frozen images.

Adjusting To get a peak trace, click MAX. A green trace displays on the spectrum.

To get a mean trace, click MEAN. A blue trace displays on the spectrum.

Benefits Lets you trace the cardiac cycle.

Trace Sensitivity

Description Adjust the trace to follow the waveform for signal strength.

Benefits If the signal is very faint, increasing the Trace Sensitivity will allow the system to trace that signal strength.

Trace Direction

Description Specifies trace direction.

Selecting Trace Position You can select where on the waveform to perform the trace, above, below, or both (above and below).

Mode Cursor

Description Displays the Doppler Mode cursor on the B-Mode image, or displays the M/D-Mode cursor on the PW-Mode image.

Modify Auto Calcs

Description Activates the menu to select which calculations are automatically calculated.

Auto Calcs

Description Activates the calculation automatically which you select in the Modify Auto Calculation when the system is in a state of freeze or live.

Continuous Wave Doppler (CWD) (Option)

Allows examination of blood flow data all along the Doppler Mode cursor rather than from any specific depth. Gather samples along the entire Doppler beam for rapid scanning of the heart. Range gated CW allows information to be gathered at higher velocities.

Steerable

Allows viewing of the B-Mode image to position the Doppler cursor to the area of interest while viewing the Doppler spectrum (shown below in the B-Mode image) and listening to the Doppler Audio signal.

Works with the sector probes.

Activating CW Doppler

To activate CW Doppler Mode, press the user defined key for CW.

The Steerable CW Doppler spectrum displays along with the B-Mode image. The cursor changes to a Doppler cursor.

You can now position and size the sample volume gate to get a velocity. Use Doppler Audio to listen for when the sample volume gate is positioned over an area of flow.

Set toggles between real time B-Mode with Doppler Mode and real time spectral display.

Exiting CW Doppler

To exit CW Doppler Mode, press the user defined key for CW again.

Contrast Imaging (Option)

Overview

NOTE: Please be advised that Contrast imaging MAY NOT BE available on your system. Contrast agents for radiology use are not yet available.

NOTE: The Versana Active is designed for compatibility with most commercially available Ultrasound contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is cleared for use. Contrast-related product features are enabled only on systems for delivery to an authorized country or region of use.



Appropriate training

Only physicians or echo technicians who have received appropriate training can use the Contrast applications.



Misdiagnosis based on image artifacts

Misdiagnosis in ultrasound contrast images may be caused by several artifacts, most importantly:

Motion artifacts: gives rise to signals independently of contrast presence. This may be caused by patient movement; including respiration, or by probe movement influenced by the operator.

Regional drop outs: caused by unintentional destruction of the contrast agent, too low concentration of contrast agent, poor acoustic penetration due to rib/lung shadows or system failing to detect the contrast agent due to erroneous settings induced by the operator.

Tissue harmonics: gives contrast-like signals independently of the presence of contrast agent.



Cardiac rhythm disturbances during perfusion studies using gas ultrasound contrast agents have been observed in the diagnostic range of Mechanical Index (MI) values. See the specific package insert for the contrast agent being used for details.

Overview (continued)



Read and follow contrast agent instructions provided by the manufacturer.

NOTE: The Versana Active is designed for compatibility with commercially available Ultrasound contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is cleared for use. Contrast-related product features are enabled only on systems for delivery to an authorized country or region of use.

By adjusting the acoustic output, you can enhance either contrast harmonics or stimulated acoustic emission (SAE).

Benefits

Injected contrast agents re-emit incident acoustic energy at a harmonic frequency much more efficiently than the surrounding tissue. Blood containing the contrast agent stands out brightly against a dark background of normal tissue.

Clinical Use

Possible clinical uses are to detect and characterize tumors of the liver, kidney, and pancreas and to enhance flow signals in the determination of stenosis or thrombus.

Affect on other controls

The default acoustic output adjusts for contrast imaging and the Power Output key provides more subtle gradations for use while in contrast imaging. When you exit Contrast Imaging, the system returns the acoustic output to its original setting. When you reactivate Contrast Imaging, the system enters the default Contrast Mode.

Most system controls are available (Depth, Zoom, Colorize, etc.). However, some controls are not available (Anatomical M Mode and Rejection).

Controls adjusted while in Contrast Imaging retain these values when you exit Contrast Imaging (except for post-processing controls).

Bioeffect

Activating Contrast Imaging may change the TI and/or MI. Observe the output display for possible effects.

Feature Availability

3D is available; Multi Image and LOGIQView are not available.

Probe

Contrast is only available on the 4C-RS probes.

Mode

Reference Mode

Reference (Ref) Mode is to image the anatomical reference, not the contrast enhancement.

Contrast Mode

There are several contrast imaging techniques. Note that the appropriate imaging technique may vary by agent and application. In other words, the imaging technique is not dedicated for the agent and vice versa.

Parameters

You can preset almost controls in the Utility --> Imaging --> CON or Ref Tab.

Single View/Dual View

Description

Single View displays the active Contrast image only.

Dual View displays the active Contrast image and the reference image simultaneously.

Visualization

Description

Define the display technique.

Values

- **Contrast**. Displays the contrast-enhanced image.
- **Tissue**. Displays the tissue image.
- **Hybrid Contrast**. Displays the contrast-enhanced image and the tissue image using Hybrid Map.

Visualization/Map Indication

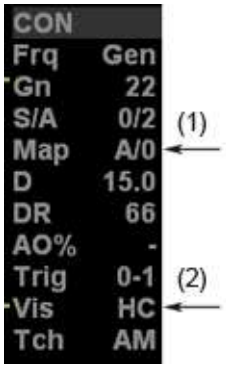


Figure 5-14. Imaging parameter

1. Gray/Colorize Map for current visualization.
2. Visualization: C=Contrast, T=Tissue, HC=Hybrid Contrast

Parameters (continued)

Hybrid Map

Description Select the hybrid map for the Hybrid Contrast visualization in the Dual/Hybrid Display.

Gray Map

Description You can select a map for the contrast image and reference tissue image independently.

Adjusting Select ***Gray Map***.

Contrast Color

Description Select the color map for the Contrast mode image.

Adjusting Select ***Colorize***.

Contrast only

Description Only transmit and receive the acoustic power signal for the contrast-enhanced image.

Adjusting Select ***Contrast Only***.

Parameters (continued)

Frequency

Description Select frequency type for each contrast technique.

Adjusting Frequency can be preset in the Utility -> Imaging -> CON.

- Frequency (AM): Res, Gen, Pen

Sonazoid

Description If you use Sonazoid for Contrast agent, you have to check Sonazoid in Utility -> Imaging -> CON.

Target MI

Description Target MI Control provides the automated adjustment of the acoustic output to keep the specified target MI value to reduce the unexpected results on the contrast exam.

Target MI control can be preset in the Utility -> Imaging -> CON and Ref.

Accumulation

Description Accumulation enhances the flow in an image.

If Accumulation is turned off, then Frame Averaging is used; if Accumulation value is set, then Accumulation is used.

Availability Available in Contrast, Color Flow, PDI, and B-Flow.

Benefit Accumulation detects the maximum signal and holds it for the level specified.

Parameters (continued)

Max (Maximum) Enhance

Description	Sets the acoustic output to its maximum setting (100%)
Values	On/Off. When you deactivate Max Enhance, the acoustic output is returned to its previous setting. Max Enhance is deactivated by the system when you turn it off, change probes, or change the contrast technique.
Benefits	This control provides quick transition to High MI imaging. This allows the user a quick one-button push to destroy the agent. Useful when the user is interested in the bubble wash-in characteristics of the anatomy being scanned.

Time Trigger

Description	The Contrast Trigger scans images at set intervals, delaying imaging according to the time delay that you specify.
Adjusting	On/Off. Adjust **Time Trigger**.

Time Delay

Description	The Contrast Trigger scans images at set intervals, delaying imaging according to the time delay that you specify. Adjust **Time Delay**.
Adjusting	Set the default seconds of Time Delay in Utility -> Imaging -> Con.

Parameters (continued)

Flash

Description This feature provides a way to expose the higher acoustic power for a specified time duration by pressing a control once.

Adjusting Select ***Flash*** on the Primary Menu.

NOTE: Set the frame numbers to scanned with the higher acoustic power in Utility--> Imaging--> Con--> Flash Frames. The frame numbers defined by Flash Frames are applied to both the contrast imaging modes.

- If you select Flash once in the menu, the system scans with 100% acoustic output burst pulses for the specified number of frames. The acoustic output then reverts to the original settings.
- When Max Enhance is ON for the contrast imaging modes, the system keeps Max Enhance = ON with no acoustic output change when Flash is selected in the menu.

Parameters (continued)

Contrast Clock (Timer)

Description

You can use the Contrast Clock by activating it at the time of injection and deactivating it at the end of the exam.

Two timers can be displayed on the bottom-left corner in image area and info area for several injection.

NOTE: You can also configure the system to perform a countdown for the contrast injection with the Utility -> System -> System Imaging -> Countdown Time for Contrast preset.

Adjusting

- Press ***Contrast Clock 1*** to start/stop the T1 timer.
- Press ***Contrast Clock 2*** to start/stop the T2 timer.

Display

There are two areas on the screen where the Contrast Clock displays: on the image and on the lower, left-hand portion of the display. The timer on the image freezes when you freeze the image (the timer updates when you unfreeze the image). However, the timer located on the lower, left-hand portion of the display continues to display over a freeze, probe change, mode change, multi image, and zoom.

The timer also appears on CINE Loops and archived images.

Benefits

The Contrast Clock measures the time since injection.

You can save the data of contrast clock to an external file by using Export Traces of TIC.

1. Press **Freeze**. Scroll with the Trackball to show Cine tab.
2. Select ***TIC Analysis*** on the primary menu to enter TIC application.
3. Put a ROI on the image.
4. Select Export Traces. Type the file name and store it to the storage device.

Relationship with other controls

- L + R Simultaneous Display (L: Tissue, R: Active Visualization)
  - Accumulation/Cine Capture
    - Applied on the right side image only.
    - You cannot compare On and Off image using L + R.
  - SRI-HD
    - Applied on both side image.
  - Frame Average
    - Applied on both side image.
- TIC
  - Measured on active visualization, except “Hybrid Contrast”.
  - “Hybrid Contrast” is disabled and measured on “Contrast” visualization.
- Easy 3D
  - Build volume data from active visualization, except “Hybrid Contrast”.
  - Hybrid map is disabled and forces “Contrast” visualization.
- Archive
  - The raw data size increases between two to three times the size compared to the previous raw data. It takes a longer period of time to save as Cine.

Time Intensity Curve (TIC) Analysis

The basic TIC process works as follows

1. Scan the patient after injecting the contrast agent.
2. Watch the agent flow through the anatomy of interest.
3. When the desired contrast effect has been visualized, freeze the image and select a range of images for analysis.
4. Position an ROI (region of interest) on one of those images where the contrast effect is visible.
5. The system then calculates the mean pixel intensity within that ROI for all frames in the user designated loop and plots the resulting data as a function of time.

You can also choose to fit this data to one of several mathematical functions. The fundamental idea is that the contrast effect flowing through the organ of interest can be modeled mathematically, and details of the wash in and washout of the agent can be gleaned by analyzing the numerical parameters of the mathematical model.

Activating TIC

1. Scan the patient in Contrast mode or select a desired cine loop from the stored images.

NOTE: Images from the current scan session (already in CINE) or from a saved image loop can be used for TIC analysis.

NOTE: TIC analysis is only available if the user has selected an image loop. If the user has selected a saved still image (just one frame), TIC analysis is not available.

2. Press **Freeze**. Move the Trackball

NOTE: The TIC package is only available when the system is in FREEZE mode.

3. ***TIC Analysis*** displays on the primary menu.

NOTE: Subsequent TIC processing is done on the images stored in CINE memory.

4. Select ***TIC Analysis***. The TIC Analysis screen displays. To toggle the trackball function between QA and Scroll, press **Cursor** key.

Activating TIC (continued)

Table 5-3: TIC Mode Display Explanations

Parameter	Description
Max Gradient	Between the CINE Start and End frame, displays the time and gradient that becomes the maximum gradient.
Accumulation	Enhances the flow in an image.
Disable Frame	The current frame is excluded from the CINE Loop display.
Enable All Frames	Re-enables disabled frames.
Horizontal Sweep	Allows you to increase/decrease the time interval over which to plot the TIC curve.
Smoothing	Smooths the trace displayed by applying a filter over a defined time window. Both the filter type and time window are user-selectable. The type of filter available depends on the analysis signal displayed.
Delete Sample Area	Removes selected sample area from the CINE Loop window and accompanying trace in the Analysis window. The Trackball marker must be pointed at an anchored sample area.
Export Trace	Saves trace data in ASCII format, readable in spreadsheet programs. If present, trace data for physiological traces are also exported.
Curve Fitting	Toggles between Wash-In, Wash-Out, and Off.
Set Sample Area Shape	Enables resizing of a selected sample area by setting height, width, and tilt angle. The Trackball marker must be pointed at an anchored sample area.

Exiting TIC Analysis

There are several methods to exit TIC Analysis.

- Select ***Exit TIC Analysis*** on the primary menu.
- Press **Freeze** to unfreeze and resume scanning.

TIC Analysis Screen Description

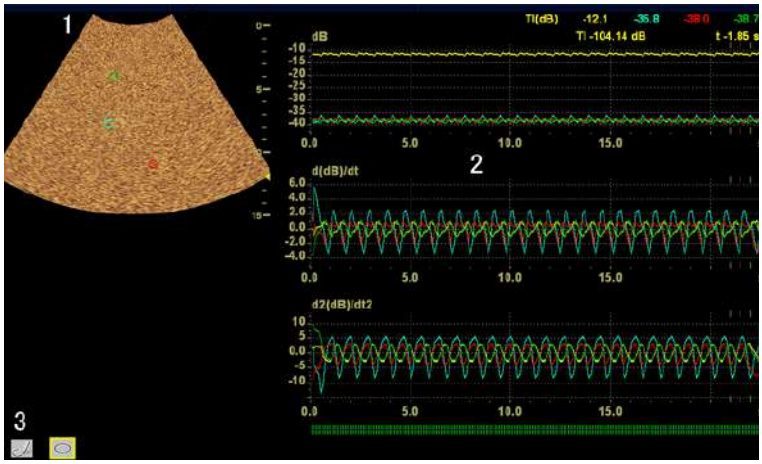


Figure 5-15. TIC Analysis Screen

Table 5-4: QAnalysis Screen Description

1.	Contrast Cineloop Window Sample Area: Indicates sampling position of the intensity (contrast) trace. The sample area is color-coded: the first sample area is yellow, the second green, etc.
2.	Displays time-intensity curve. • Y axis: Intensity scale (logarithmic) (db) or linear acoustic units (AU). • X axis: Time(s) or Dt(s), elapsed time from previous frame. • ECG (where available -- not shown), Frame Marker: displays ECG trace (where available), the current frame marker and the start and stop markers for the cineloop. • Time at cursor position and velocity at cursor position. • Intensity (dB or AU) at cursor position. • Intensity (dB or AU) at frame marker position (color coded)
3.	Sample Area Tools. • Pencil Icon: Creates a sample area based on freehand drawing. • Shape Icon: Creates a sample area with a pre-defined circular/ellipse shape.

System Menu

The System menu on the monitor display can be used.

Analysis Window System Menu

Position the cursor over the analysis window and select **System Menu**. The Analysis Window system menu displays at the cursor position.

NOTE: The system menu is dependent on mode.

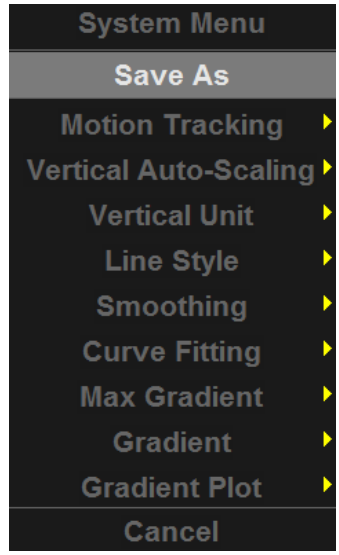


Figure 5-16. Analysis Window System Menu - example

System Menu (continued)

ROI System Menu

Position the cursor on the ROI and select **System Menu**. The ROI system menu displays at the cursor position.

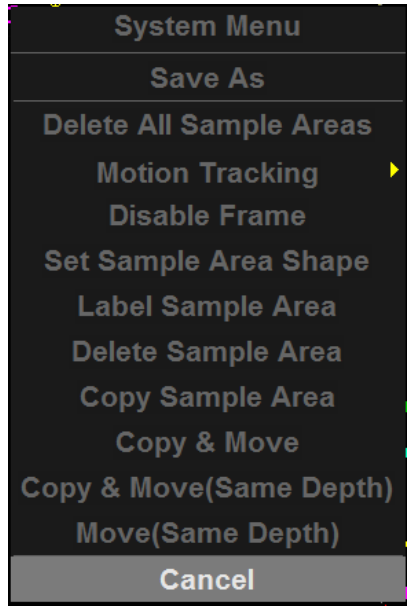


Figure 5-17. ROI System Menu

Frame Marker System Menu

Position the cursor on the Frame Marker in the Analysis Window and select **System Menu**. The Frame Marker system menu displays at the cursor position.

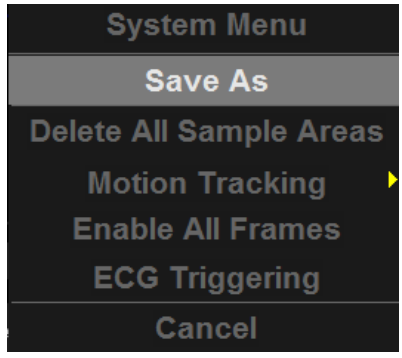


Figure 5-18. Frame Marker System Menu

Selecting TIC Analysis Image Range

A range of frames is selected for the TIC analysis in Cine mode (before accessing TIC Analysis). Only the frames in this range are used for the TIC analysis.

If a range is not selected prior to accessing the TIC Analysis, the system uses the default Cine start and end frames as the default TIC start and stop frames.

1. The first frame in the analysis series is selected by adjusting ***Start Frame*** to the desired frame

   OR

   using **Trackball** or ***Frame by Frame*** to select the desired first frame and then selecting ***Start Frame***.
2. The last frame in the analysis series is selected by adjusting the ***End Frame*** to the desired frame

   OR

   using **Trackball** or ***Frame by Frame*** to select the desired last frame and then selecting ***End Frame***.

Generating a Trace

Up to eight traces can be generated.

About the sample area

The sample area can be in three different states:

- **Free sample area**: freely moving sample area (QA cursor) before anchoring.

NOTE: The free sample area disappears when the QA cursor is moved over a static anchored frame.

- **Static sample area**: the free sample area is anchored by pressing Set.
- **Dynamic anchored sample area**: the sample area is anchored in two or more frames (see Manual tracking below). In these particular frames, the sample area is displayed with an anchor. The sample area moves smoothly between the anchored positions when playing/scrolling the cineloop.

Trace from a pre-defined sample area

1. Press **Cursor** on the control panel to select QA function for trackball.
2. If necessary, select the sample area Ellipse ROI button (shape icon on the monitor display).
3. Move the cursor to one of the Cineloop windows using the **Trackball**.

   The cursor is changed to a sample area (white circle). A preview of the trace is displayed in the Analysis window.
4. Press **Set** to anchor the sample area.

   In this frame, the sample area is marked with an anchor. If the cineloop has more than one heart cycle, a sample area will also be anchored in the corresponding frame in the next heart cycle.

   The trace is updated accordingly in the Analysis window.

Generating a Trace (continued)

Trace from freehand sample area

1. Select the Freehand ROI button (pencil icon on the monitor display).
2. Move the cursor to one of the Cineloop windows using the **Trackball**.
3. Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
4. Press **Set** to anchor the sample area.

   The sample area is automatically closed and the trace is updated accordingly in the Analysis window.

Manual tracking of the sample area (dynamic anchored sample area)

The sample area can be moved within the loop to ensure that data in the trace is generated from the same anatomical location during the cyclic motion of the heart.

1. Place a sample area over a region of interest. Note the anatomical location of the sample area.
2. Scroll to a new frame using the **Trackball**.
3. Press **Cursor** on the control panel to select QA function for trackball.
4. Move the cursor to the sample area using the **Trackball**.
5. Press **Set**. The sample area is unanchored.
6. Drag the sample area to the corresponding anatomical location in the new frame.

   When the sample area is anchored in more than one frame, linear interpolation is performed so that the sample area is smoothly moved between the anchored positions in the selected frames when running the cineloop.

NOTE: *In the original frame and this particular frame the sample area is marked with an anchor.*

7. Press **Cursor** on the control panel to select Scroll function for trackball.
8. Using the **Trackball**, scroll through the cineloop and control that the sample area follows the moving anatomical structure.
9. Add anchored sample areas in several frames to obtain a more accurate displacement of the sample area.

Manual tracking of the sample area (dynamic anchored sample area) (continued)

Moving a dynamic anchored sample area

1. Freeze the image.
2. Press **Cursor** on the control panel to select Scroll function for trackball.
3. Using the **Trackball**, browse through the cineloop to display one of the frames where the sample area was anchored.

NOTE: In these frames, the sample area is marked with an anchor.

4. Press **Cursor** on the control panel to select QA function for trackball.
5. Move the cursor to the sample area using the **Trackball**.
6. Press **Set**. The sample area is unanchored.
7. Drag the sample area to a new location.
8. Press **Set** to anchor the sample area to the new location.

If you want to move the sample area to the same depth, select ***Move (Same Depth)*** from the System Menu.

Zooming in the Analysis window

To zoom:

1. In the Analysis window, press and hold down the **Set** key while dragging the cursor to define the zooming area.
2. Release the **Set** key.

To unzoom:

1. Press the Cursor key in the Analysis window. The system menu displays.
2. Select ***Unzoom***.

NOTE: Shown only in zoom mode.

Delete a trace

The user can delete all traces at once or one at a time.

1. If necessary, press **Cursor** on the control panel to select QA function for trackball.
2. Move the cursor over one of the sample area. Confirm that cursor is changed to hand icon.
3. Select ***Delete Current Sample*** or ***Delete All Samples*** on the primary menu as necessary.

Disabling/Enabling the frame

Frame disabling excludes the actual frame from the cineloop display. Frame disabling is available only with contrast data.

Disabling the frame from the frame marker

To disable One Frame :

1. Use the **Trackball** to move the cursor to the frame maker to disable.
2. Press **Disable Frame**.
3. The frame marker is changed from green to red to indicate the frame has been disabled.

NOTE: The disabled frame is no longer displayed in the reference window when scrolling through CINE memory.

Disabling multi-frames from the frame marker

1. Use the Trackball to move the cursor to the first frame maker to disable.
2. Press and hold down ***Disable Frame***.
3. Move the maker to the last frame to be disabled and release **Disable Frame**.

   The marker is turn red and the data from that frame is removed from the trace and any subsequent trace processing.

Disabling/Enabling the frame (continued)

Disabling a frame from the cineloop window

1. Use the Trackball to move the cursor to the cineloop window.
2. Press ***System Menu***. The system menu displays.
3. Select ***Disable frame***.

   The current frame is disabled and the corresponding frame marker displays red.

Disabling ECG triggered frame (where available)

In a multi-cycle acquisition, the user may deselect all frames in all heart cycles but a selected one. This function can be used for example to select a particular systolic frame for each heart cycle.

1. Scroll through the cineloop to identify the cardiac phase to analyze or identify the cardiac phase on the ECG trace (where available).
2. Position the cursor on the ECG trace (where available) and press **System Menu**. The system menu displays.
3. Select ***ECG triggering*** (where available).

   All frames in all heart cycles are disabled except for the selected and corresponding frames in the other heart cycles.

Disabling/Enabling the frame (continued)

To enable the frames

To re-enable all deleted frames :

1. Position the cursor on the Frame Marker line and press the ***System Menu***. The system menu is displayed at the cursor position.
2. Select ***Enable all frames***.
3. All disabled frames are re-enabled.

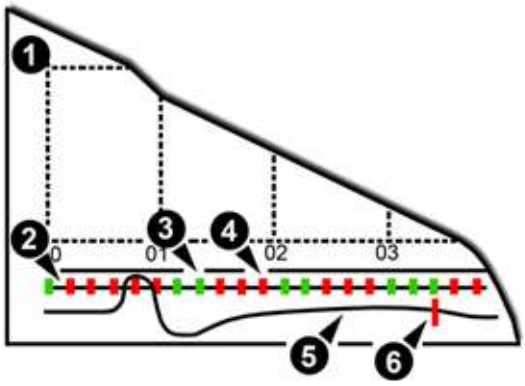


Figure 5-19. Frame markers

1. Analysis Window
2. Frame markers axis
3. Enabled frame (Green)
4. Disabled frame (Red)
5. ECG (where available)
6. Current frame

Manipulating the Sample Area

Up to eight ROIs can be saved on the reference image, with the corresponding eight traces plotted simultaneously on the graph. Each ROI display has a different color, and its corresponding trace data is plotted using that same color.

Once eight ROIs have been saved, the system does not automatically generate an active ROI when the cursor is positioned over the displayed reference image.

The saved ROIs can be a mixture of elliptical and freehand ROIs.

When the user repositions an ROI, the old trace data is erased from the plot and the trace data for the new position replotted.

If the ROI position on the last frame of the selected image range is moved, the corresponding ROIs on all frames are repositioned to match the last frame.

The user shall also have the capability of setting separate ROI positions on different frames of the contrast images, and the system shall linearly interpolate the ROI positions for the frames in between the selected frames.

Manipulating the Sample Area (continued)

Setting the default sample area shape

1. Select ***Set sample area shape***. The Information Box displays.

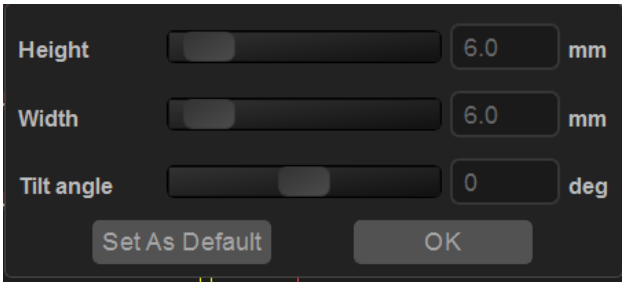


Figure 5-20. Sample Area Information Box

2. Select Height, Width and Tilt angle.
3. Select ***Set as default***. The current ROI size is set as the default for subsequent Ellipse ROIs.

Reshaping a Sample Area

To reshape the sample area:

1. Position the cursor on the ROI to reshape and press **System Menu**.
2. The ROI system menu displays. Select ***Set sample area shape***.
3. Adjust Height, Width and Tilt angle.
4. Press ***OK***. The selected ROI size changes.

Labeling a Sample Area

The sample area label is used to identify data associated with the sample area when exporting.

1. Position the cursor on the ROI to label and press **System Menu**.
2. The ROI system menu displays. Select ***Label sample area***. The Label Dialog box displays.
3. Enter a name for the sample area.
4. Select ***OK***.

Manipulating the Sample Area (continued)

Sample Area Shapes

There are two different methods for determining the shapes of the sample area.

Ellipse ROI

1. Select the ellipse icon (shape icon on the monitor display).
2. When the trackball positions the image display cursor over the reference image(s), an elliptical ROI is automatically generated and displays on the reference image(s).
3. The average intensity value inside the ellipse is calculated for every image in the image analysis range and plotted in the image display area.
4. The last generated or selected ellipse is considered the active ROI, and its trace plot automatically updates as the user repositions it on the reference image. Old traces are erased.
5. When scanning with an elliptical ROI, press **Set** to fix the ROI position and freeze its corresponding trace on the plot. A new active ROI is generated whose position is manipulated by the trackball and whose time-intensity curve traces will be plotted as before, while the previous ROI and trace remain fixed at the points they were saved at.

NOTE: Elliptical ROIs can be positioned in any manner that keeps their center within the image boundaries. In the case that part of the ROI is outside the image boundary, only data from within the image boundary is used for calculating the mean intensity value.

NOTE: You can change the size of the Ellipse ROI by adjusting the Ellipse control.

Sample Area Shapes (continued)

Freehand ROI

1. Select Freehand icon (pencil icon on the monitor display).

   Use the **Trackball** to position the caliper on the reference image at the start point. Press **Set** to fix the start point.
2. Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
3. When a suitable ROI has been drawn, press **Set** a second time.

   The system automatically links the start point to the end point by drawing a straight line between them. The caliper is then free for repositioning for another freehand ROI.

NOTE: You cannot go outside the image boundary when drawing a freehand ROI.

Manipulating the Sample Area (continued)

Copy, move and paste a Sample Area

To copy and paste the ROI,

1. Move the cursor over the ROI and press **System Menu**. The system menu displays.
2. Select ***Copy sample area***.
3. Move the cursor to the desired location for the copied ROI and press the **System Menu** Key. The system menu displays.
4. Select ***Paste sample area***.

To copy and move the ROI,

1. Move the cursor over the ROI and press **System Menu**. The system menu displays.
2. Select ***Copy & move***. Or if you want to move to the same depth as the original ROI, select ***Copy & move (same depth)***.
3. Move the copied ROI using the **Trackball**. Press **Set** to fix the position.

Deleting a Sample Area

Sample ROIs and their corresponding traces can be deleted using ***Delete Current Sample*** *or* ***Delete All Samples***.

1. Select ***Delete Current Sample*** to delete the currently active ROI.
2. Select ***Delete All Samples*** to delete all currently set ROIs and all of their traces.

NOTE: The corresponding traces for the deleted ROIs are erased from the plot.

NOTE: Deleting an ROI causes the ROIs to be deleted from all frames in the analysis loop.

TIC Plot Control

The following controls are user configurable presets which are configurable via the Utility Menu or through the pull-down menu in TIC Analysis mode. When using the pull-down menu:

1. Position the cursor over the analysis window and press **System Menu**. The system menu displays at the cursor position.
2. Select the appropriate parameter.

Vertical Unit

When analyzing the contrast data, the Y-axis can be set to display either logarithmic scale (dB) or linear, acoustic units (AU) for both tissue intensity (2D) or Angio intensity data.

To toggle between dB and acoustical display units for the Y-axis.

- ***dB***—The traditional log compressed B-mode data is used to calculate the time-intensity curve values.
- ***Acoustic***—The system reverse the log compression function to provide un-log compressed data for the TIC analysis.

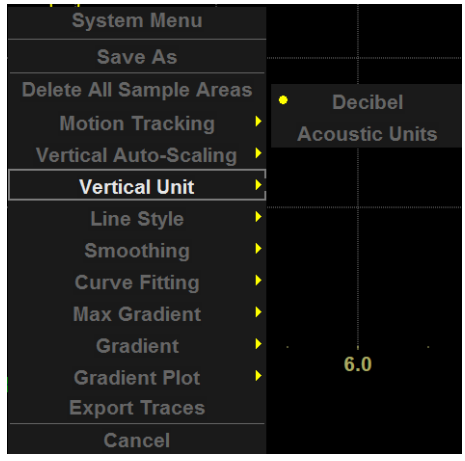


Figure 5-21. Vertical Unit Pop-up menu

TIC Plot Control (continued)

Vertical auto-scaling

The system can be configured to display the full unit range or a range according to the maximum and minimum values of the displayed trace(s) (auto-scaling function). In addition, the auto-scaling function can be set to be live update (updates while the sample area is moved) or delayed (updated when the sample area is anchored).

- ***Delayed***—The system automatically rescale the vertical axis of the trace graph only when a new ROI is saved, to account for changing input dynamic range.
- ***On***—The system automatically rescale the vertical axis of the trace graph every time the currently selected (active) ROI is moved.
- ***Off***—Disable any automatic scaling of the vertical axis. There is user-defined system defaults on the system preset page for the fixed vertical scale to be used for the plot.

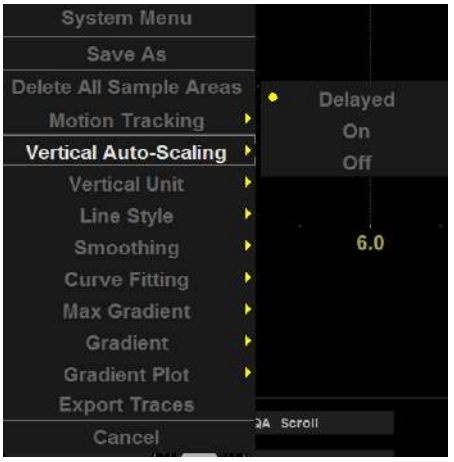


Figure 5-22. Vertical Autoscale Pop-up menu

TIC Plot Control (continued)

Line Style

- ***Solid***—Setting the results in a plotted trace that does not display small boxes at the data points
- ***Squares***—Setting the results in a plot where small squares are displayed at each data point, and the squares are linked together by lines.

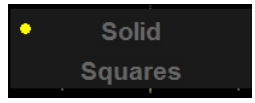


Figure 5-23. Line style Pop-up menu

Horizontal Sweep

Horizontal Sweep allows you to increase or decrease the time interval over which to plot the TIC curve.

The Horizontal Sweep control can range from TBD on the short side to the time interval between the user selected first and last frame. The default is the user selected image range. If the user has not yet selected a first and last frame, the first and last default frames from the displayed CINE loop are used.

TIC Plot Control (continued)

Smoothing

The system can smooth the traces displayed by applying a filter over a defined time window. The type of filter availabe is depending on the analysis signal displayed.

1. Select ***Smoothing***.

   OR

   Position the cursor over the analysis window and press **System Menu**. The System menu is displayed at the cursor position. Select ***Smoothing***.

NOTE: When smoothing is turned on, it applies to all traces in the plot window.

2. The smoothing filter list displays. Select the appropriate parameter.

NOTE: If 'dt' is selected for Horizontal Scale, you cannot use Smoothing.

Trace Measurement

Gradient

Gradient is displayed on the screen instead of Intensity (db or AU). The gradient calculates from 7 points (includes previous and next frames).

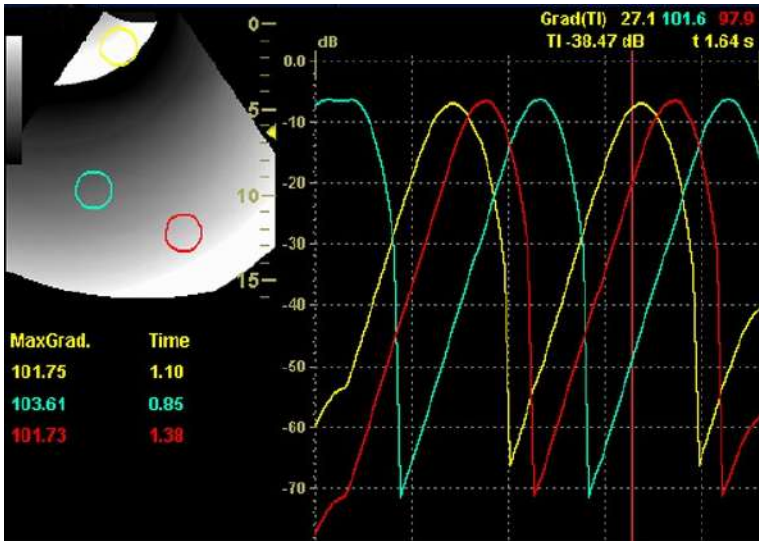


Figure 5-24. Gradient

Trace Measurement (continued)

Max Gradient

Displays the time and gradient that becomes the maximum gradient between the CINE start and end frame.

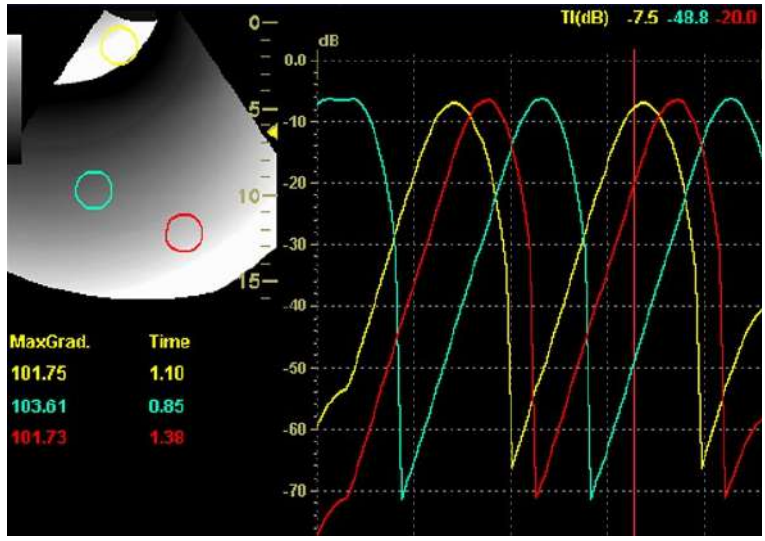


Figure 5-25. Max Gradient

Trace Measurement (continued)

Show graph (Gradient plot)

1. Gradient Plot displays on the TIC system menu.

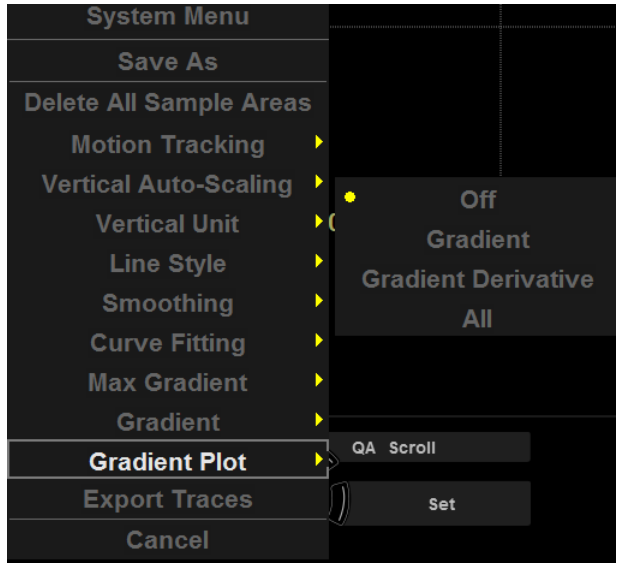


Figure 5-26. System Menu

Show graph (Gradient plot) (continued)

2. Select the parameter.

   - Off: A graph plots TIC.
   - Gradient: Two graphs plot TIC and TIC gradient.

     - Unit of Y-axis is dB or AU in case of intensity.

     - The unit is d(db)/dt or d(AU)/dt in case of the intensity gradient.

     - Gradient values for the current frame are displayed in the upper right corner of the graph.

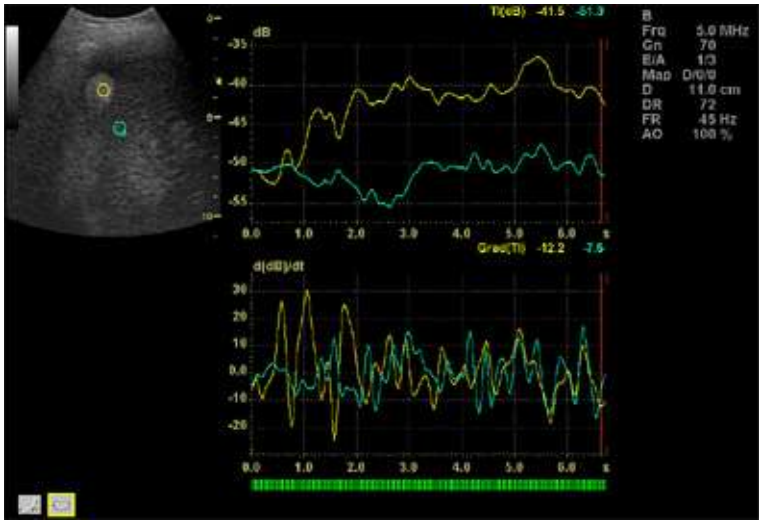


Figure 5-27. Gradient

Show graph (Gradient plot) (continued)

- Gradient Derivative: Two graphs plot TIC and TIC gradient derivative.

  - The Y-axis units is d2(dB)/dt2 or d2(AU)/dts in case of the intensity gradient derivative.

  - Gradient derivative values for the current frame are displayed in the upper right corner of the graph.

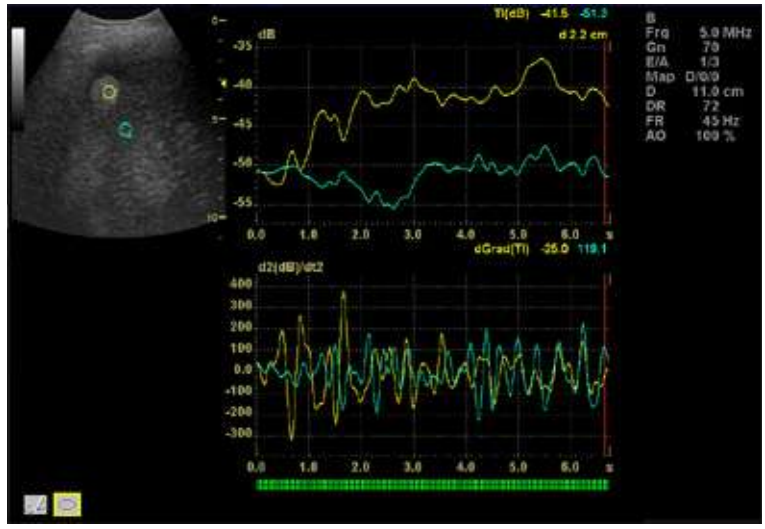


Figure 5-28. Gradient derivative

Show graph (Gradient plot) (continued)

- All: Three graphs plot TIC, TIC gradient and TIC gradient derivative.

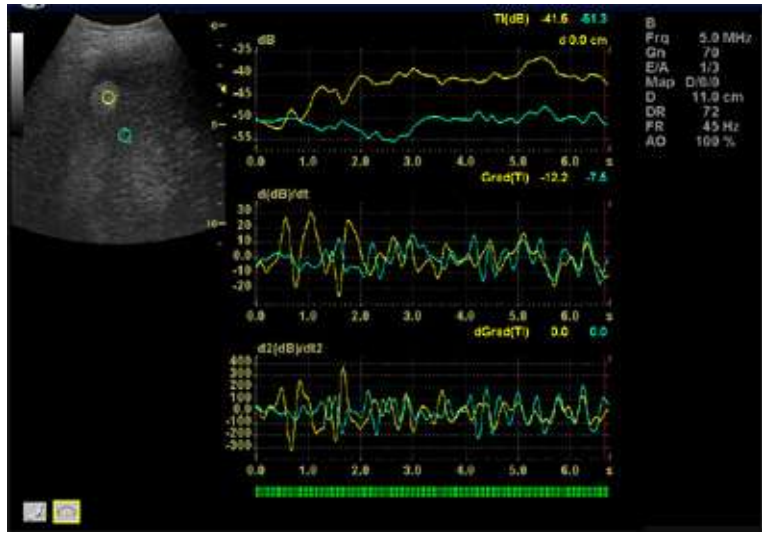


Figure 5-29. All

Curve Fitting

Curve fitting analysis: for research studies of perfusion rates using contrast agents.

1. Select ***Curve Fitting***.

   OR

   Position the cursor over the analysis window and press ***System Menu***. The system menu displays at the cursor position. Select ***Curve Fitting***.
2. The Curve Fitting selection list displays.

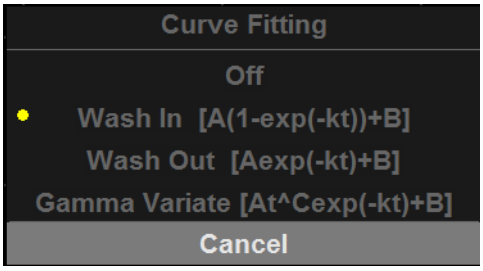


Figure 5-30. Curve Fitting Selection List

- ***Off***—Remove the fitted curves from the plot and the fit parameters from the display.
- ***Wash-in***—Used to find and estimate the local perfusion rate using the contrast agent. Expotential wash-in is described by the function:

  Y(t) = A(1-exp(-kt))+B, where:
  - A (dB or AU) is the intensity from the contrast agent.
  - B (dB or AU) is the intensity at time t=0 (defined as the time of the left marker). This corresponds to the tissue (baseline) signal if no contrast is present at the selected starting point.

NOTE: *A + B = contrast + tissue = plateau level.*

  - k (1/s) is a time constant.

Curve Fitting (continued)

- ***Wash-out***—Used to find and estimate a local wash-out rate. Expotential wash-out is described by the function:

  Y(t) = Aexp(-kt)+B, where :

  - A (dB or AU) is the intensity from the contrast agent.
  - B (dB or AU) is the intensity from the tissue = baseline signal.

  NOTE: A + B is the initial intensity level.

  - k (1/s) is a time constant.

- ***Gamma Variate***

  $Y(t) = At^{c}exp(-kt)+B$

Curve Fitting (continued)

Parameters of Gamma curve fitting

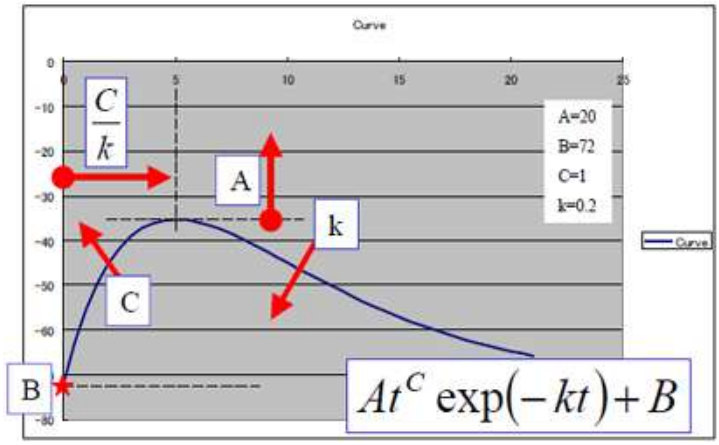


Figure 5-31. Gamma Curve

- t^C: Increasing function (C>0) for “Wash-in”.
  For larger C, the intensity increases quickly before the peak.
- exp(-kt): Decreasing function (k>0) for “Wash-out”.
  For larger k, the intensity decreases quickly after the peak.
- B: Intercept intensity at t=0.
- The peak intensity of the curve is affected by all parameters.
  Larger A, larger B, larger C, and smaller k make larger peak. The peak time is calculated by C/k.
- MSE: Mean Square Error
  If the MSE is small, the difference of actual data and the fitted curve is small.

Set Start/End Frame for Curve Fit per ROI position

1. Generate TIC and perform a Curve Fit.
   In this state, the Curve Fit graph is drawn from Cine Start Frame to Cine End Frame for all the ROIs.

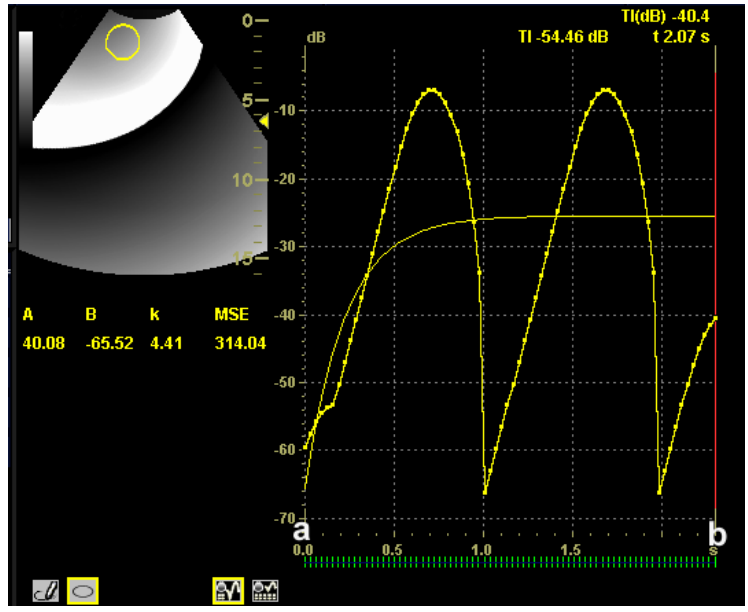


Figure 5-32. Curve Fit screen

a. Cine Start Frame
b. Cine End Frame

Set Start/End Frame for Curve Fit per ROI position (continued)

2. Select the Start Frame as with Cine or use the trackball to select Start Frame and press **Set** with setting Scroll function to trackball by toggle **Cursor**.
3. Set QA function to trackball by toggle **Cursor**, move the arrow pointer on the ROI (hand cursor appears) and press **System Menu**. The system menu appears.
4. Select ***Set curve fit start frame*** from the menu.
5. Select the End Frame as with Cine or use the trackball to select End Frame and press **Set** with setting Scroll function to trackball by toggle **Cursor**.
6. Set QA function to trackball by toggle **Cursor**, move the arrow pointer on the ROI (hand cursor appears) and press **System Menu**. The system menu appears.
7. Select ***Set curve fit end frame*** from the menu. The ROI colored line displays.

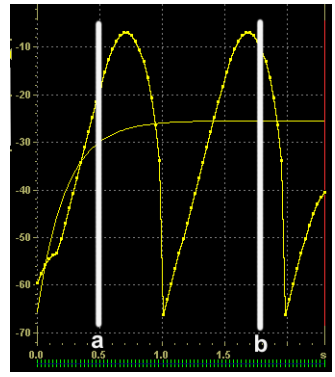


Figure 5-33. New Start Frame and End Frame (Example)

a. Start Frame
b. End Frame

8. Repeat the above procedures as necessary.

   The system retains the start/end frame per ROI while TIC is active. Once the TIC menu is closed, the settings are lost.

Display/Hide Calculation Values

You can specify Time to Peak, Area under the curve, Curve gradient, and Arrival time values for Wash-in, Wash-out, and Gamma Variate curve fitting values.

1. Select ***Curve Fitting Parameters*** on the primary menu. The Curve Fitting Parameters dialog appears.

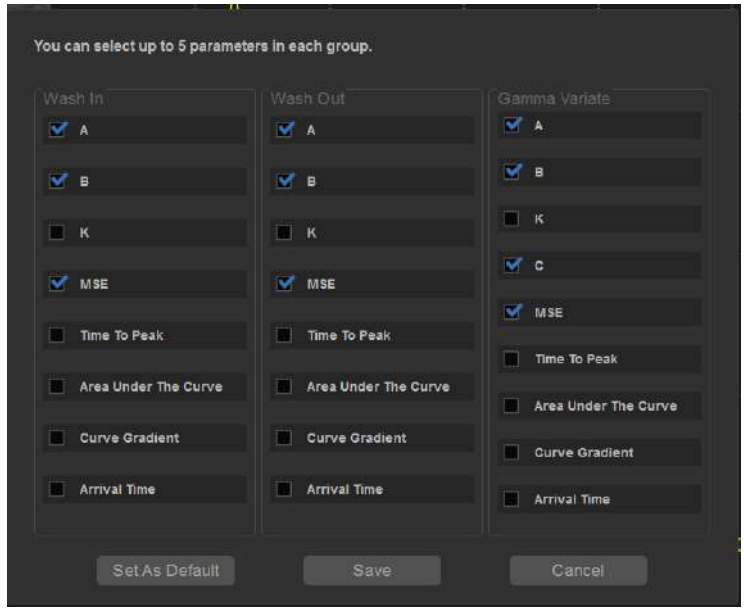


Figure 5-34. Curve Fitting Parameters Dialog

2. Select a maximum of 5 parameters to display for each curve fitting.
   - Save as default: saves as a system preset.
   - Save: saves as temporary.
   - Cancel

NOTE: *If you select more than 5 parameters and select "Save" or "Save as default," you will be prompted the message that "More than 5 parameters selected".*

Display/Hide Calculation Values (continued)

3. The selected parameter displays below the image with the curve fitting active.

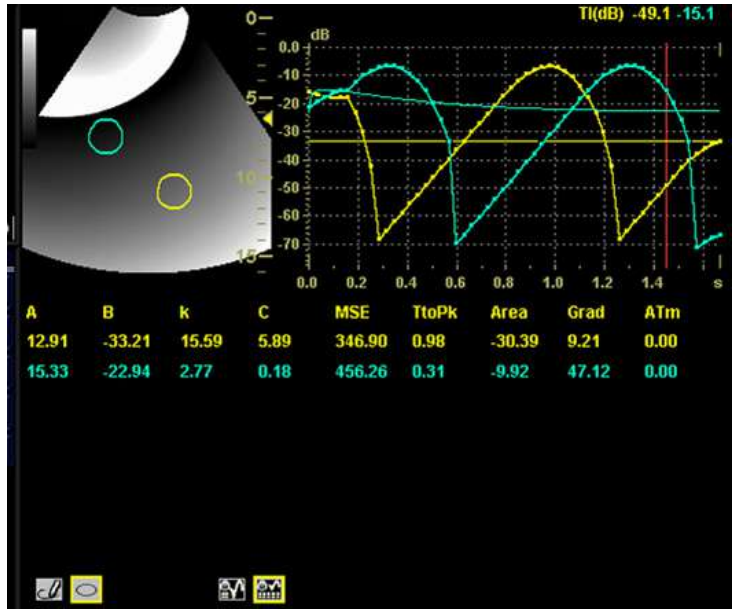


Figure 5-35. TIC image with all selected parameters

Exporting Traces (Saving the Trace Data)

You can save the trace data to an external file.

1. Select ***Export Traces*** on the primary menu to save the trace data.

   OR

   Position the cursor to the Analysis window and press **System Menu**. The system menu displays. Select ***Export traces***.
2. The following window displays.

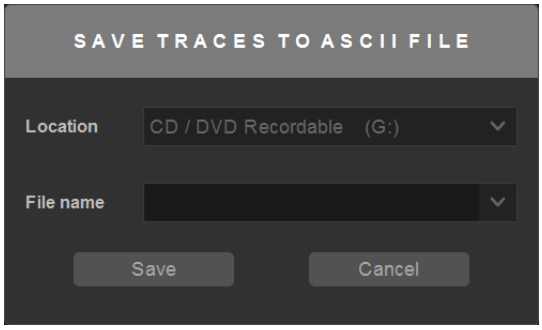


Figure 5-36. Export Trace Window

- Location: Select Location which to save.
- Filename: Enter the filename. (Only Text)

3. Select ***OK*** to save the data and return to the TIC Analysis screen.
   - All displayed ROI traces are saved in the exported file.
   - The fit parameters are included in the trace file if the user has done a curve fit.

Exporting Traces (Saving the Trace Data) (continued)

All plot data (intensity, gradient and gradient derivative) are exported to a text file by “Export Trace”.

Table 5-5: Example of exported file

Time(s):	Trace 1:	Trace 1 dGrad.:	Trace 1 dGrad.
0.00000	-3.97995e+000	-2.15924e+001	8.05159e+001
0.03121	-5.14631e+000	-1.64719e+001	1.74256e+001
0.06242	-5.75798e+000	-1.27675e+001	-7.78004e+001
0.09362	-6.02222e+000	-1.27675e+001	-1.93426e+002
0.12483	-6.11224e+000	-1.44515e+001	-4.17252e+002

NOTE: The Smoothed trace is the one saved if the user has applied a smoothing filter.

NOTE: Only data from the user selected image range is included in the exported trace file.

NOTE: Data for disabled frames are not be included in the exported trace file.

NOTE: No trace results are saved in the standard image database.

NOTE: Trace results are not shown on the Worksheet.

Annotating the TIC Data

The user can annotate both the reference image and the trace plot displays. Use **Comment** key to type the annotation. See Chapter 6 for reference.

Printing TIC Data

Press the appropriate print key in the TIC mode.

The system capture a single still frame which consists of the plot, the reference image and user annotation.

Elastography (Option)

Description

Elastography shows the spatial distribution of tissue elasticity properties in a region of interest by estimating the strain before and after tissue distortion caused by external or internal forces. The strain estimation is filtered and scaled to provide a smooth presentation when displayed.

Below is an example of Elastrography. The Elastography image appears in dual image mode, the Elastography color map/bar appearson the left side of the image, this Elastrography parameters appear on the right side of the screen below E.

Elastography can be activated via the User defined key on the Control Panel.

Elasto is only available on linear probes.

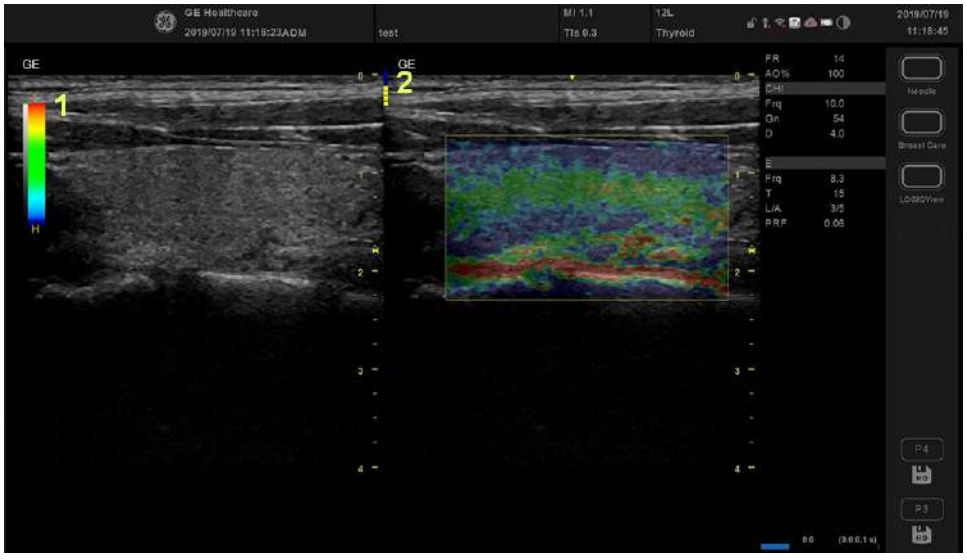


Figure 5-37. Elastography Example

1. Color Map
2. Color Bar

Activating Elastography

Table 5-6: Elastography Parameters Description

Parameter	Description
Axial Smoothing	Controls the smoothness of the elastography image in the axial direction. A higher value means a smoother image.
Lateral Smoothing	Controls the smoothness of the elastography image in the lateral direction. A higher value means a smoother image.
Window	Controls the RF data segment size for the motion tracking. A higher Window value gives a better signal to noise ratio (SNR) at the cost of axial resolution.
Map	Controls the elastography maps. Six different maps are available with various contrast and color schemes, including a grayscale map.
Frame Average	Controls the persistence of the elastography images.
Frequency	Controls the transmit frequency.
Soft Compress	Individually controls the image enhancement for the softer than average tissues.
Hard Compress	Individually controls the image enhancement for the harder than average tissues.
Scale	Controls the time interval between consecutive firings. A lower value dictates a higher sensitivity to weak manual motion.
Transparency	High values bring out the tissue behind the elastography data. You adjust via the Color Gain control; this imaging parameter appears as a “T” on the right-hand portion of the display.
Biopsy Kit	Biopsy Kit.
Sample Vol	Controls the transmit pulse length. A higher value means longer transmit pulse which gives better SNR but reduces axial resolution.
Frame Reject	Controls how many frames get rejected due to low quality vertical motion. A higher value means more frames get rejected. A rejected frame has a completely transparent ROI with the B-Mode background showing through.

Table 5-6: Elastography Parameters Description (Continued)

Parameter	Description
Noise Reject	Controls how many frames get rejected due to lateral and elevational motion. A higher value means more frames get rejected. A rejected frame has a completely transparent ROI with the B-Mode background showing through.
Line Density	Optimizes B-Mode frame rate or spatial resolution for the best possible image.

How to Use

The Elastography image is achieved by pulsating the probe while you are scanning the anatomy of interest. Here are some criteria to use:

Handheld elasticity imaging can be very dynamic as the size of distortion depends on the movement of the hand-held probe. To maintain stable and consistent displayed strains, pay attention to the Quality graph. Two forms of feedback are provided. In either form, an ideal manual compression is indicated by a high value feedback. In addition, apply the following post-processing controls: Smoothing, Window, Scaling, and Frame Averaging.

Elastography displays firmer tissue in blue and softer tissue in red. To enhance Blue, increase Hard Compress; to enhance Red, increase Soft Compress. To enhance elastography contrast, reselect the Color Map.

If you need more resolution, increase Smoothing, increase Frequency, reduce Sample Volume, or reduce Window.

If you need a smoother image, increase Window, Smoothing, and Sample Volume.

If the images seem too flashy, decrease Frame Reject to 1.0 and Noise Reject to have consistent imaging throughout.

NOTE: *Please see 'Q Analysis' on page 5-154 for instructions on how to use Elastography Quantification.*

Additional Notes for Elastography

NOTE: Elasticity Index is not available in the United States.

Definition. Elasticity index (E) is defined as the value from 0.0 to 6.0. This index shows the color distribution within the measured circle (ROI) relative to the whole ROI box. A higher value means “higher stiffness” and “blue color is dominant”.

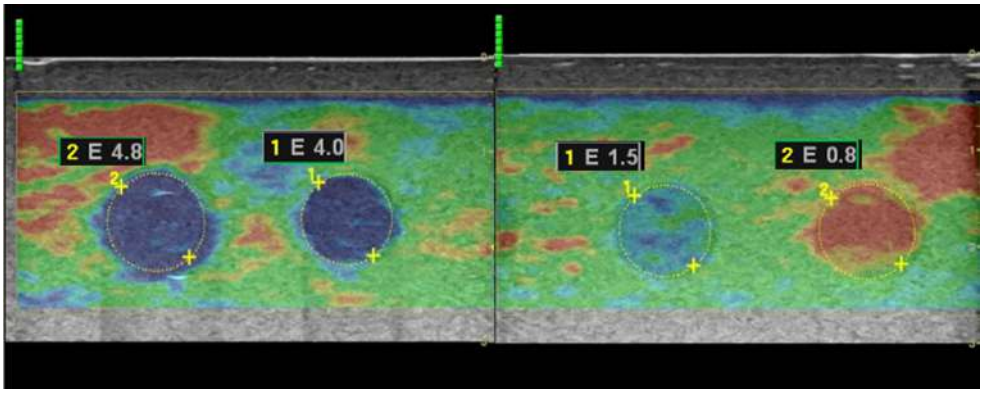


Figure 5-38. Elastography Quantification Definitions

Elasto Raw Data has two data sets of index and color for each pixel. Therefore, this index is not affected by the color appearance change (color map and hard/soft compression). Index detects smaller strain difference of hard region by a assigning wider dynamic range for a smaller strain.

Additional Notes for Elastography (continued)

2D Measurement. Measures the elasticity index of a single ROI and calculates the ratio between two ROIs. You can label two different regions. You can also set the ROI on a reference screen (B mode) with dual screen.

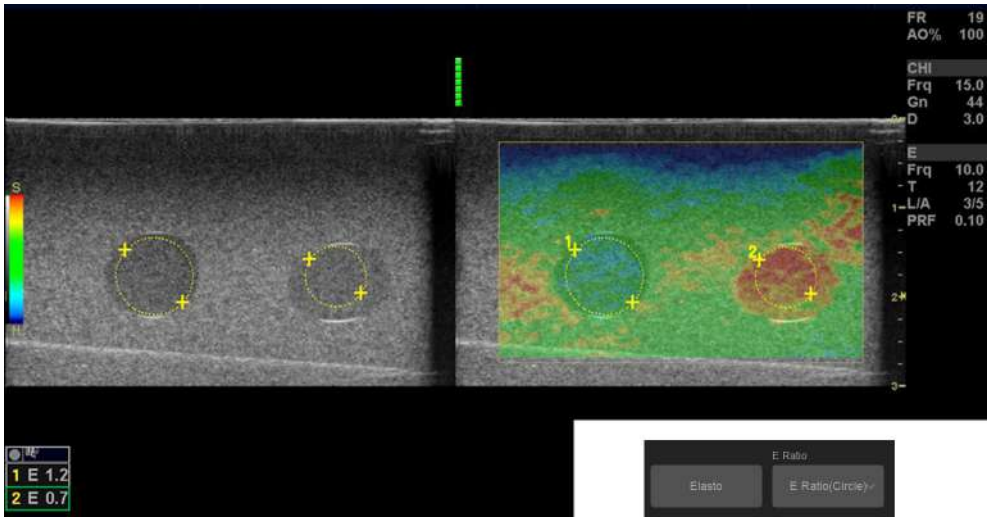


Figure 5-39. 2D Measurements

Additional Notes for Elastography (continued)



HINTS

Limitations:

- This is a relative quantification tool based on freehand manual palpation technology. It cannot show the stiffness by the kPa (kilopascal).
- There is no compatibility among manufacturers regarding the value. It depends on their strain imaging technology and definition of the value.
- Colors indicate degree of stiffness and do not directly correlate to a specific tissue type. Interpretation of what the tissues are and how to apply these ratios clinically is at the discretion of the user.
- Elastography physics dictates that cystic structures will be displayed with a three-layer pattern. This three-layer pattern will start with blue on the Versana Active factory default map (which corresponds to hard), then progresses to green and then to red (which corresponds to soft). The posterior displacement of elastography patterns also may cause the B-Mode cyst to consist primarily of blue with the green to red being posterior to the B-Mode cyst. You need to be aware of the three-layer pattern of a cyst in elastography. Utilizing elastography quantification and setting the ROI in the blue portion of the three-layer pattern on the cyst and then setting the ROI in the “normal” tissue may cause you to misinterpret the elastography quantification ratio as the cyst to be hard as compared to the “normal” tissue.

Breast Care (Option)

Overview

Breast Care provides a protocol of breast scanning which helps user to scan breast by 4 Quadrants or 12 O'clock and axillary fossa consistently. User can use **'P1'** key to follow the scanning steps that allows user to focus on performing the exam rather than on controlling the system and can help user to increase consistency while reducing keystrokes. The system automatically invokes the correct modes, advances to the next step in the exam. After finishing whole scanning steps, report will be generated.

Breast Care does not perform automatic breast lesion detection or classification. The user is required to detect and diagnose any breast tissue abnormality, as well as verify any outputs of Breast Scanning, Breast Lesion M&A, BI-RADS classification.

Breast care is divided into 3 steps: prepare the patient information, scanning and report.

Breast Care

Before Perform the scan, user creates a New Patient. And user can set up modes, PW, Elasto which can be included in scanning steps and 4 Quadrants or 12 O'clock, Review Old Report options in ***Utility -> System -> General -> Breast Care***.

Example of 4 quadrants scanning steps:

1. User selects the appropriate transducer for breast imaging and breast preset selected.
2. Breast Care has been configured as a User Configurable key. User presses to begin protocol.



Figure 5-40. Breast scan screen

Breast Care (Option) (continued)

3. The Breast Care protocol appears on the left side of the display.

   Breast scanning is divided into 4 areas: Right Breast, Right Axillary Fossa, Left Breast, Left Axillary Fossa.



Figure 5-41. Breast scan screen1

Breast Care (Option) (continued)

The pie chart is used to display the breast scan area and result:



Figure 5-42. Pie Chart in Breast Care

- The current scanned area: the circum is highlighted
- Dark blue area: Negative area, there is no finding/lesion with breast anatomy.
- Yellow area: Positive area, there is a finding/lesion with breast anatomy, probable pathology.
- Nipple

Breast Care (Option) (continued)

4. Users have the choice to follow the sequential evaluation of the respective anatomy, and instructions for which keys are used if the user selects to manually categorize a segment as negative or positive for findings.

   The system will visually display blue for a segment if negative selected by user. Positive segment will display yellow if selected by user.

   User can manually mark the lesion in the positive area with bright circles **b** via the button **a** refer to Figure 5-43.

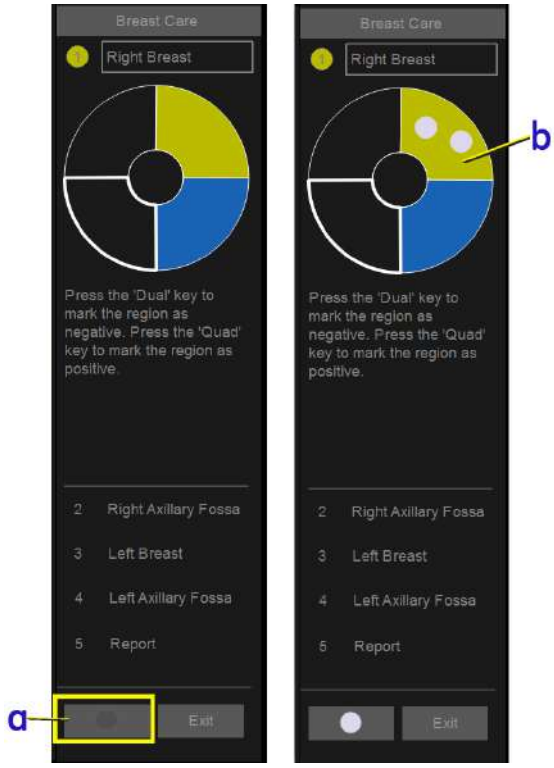


Figure 5-43. Circle marker

If a segment is marked positive by the user, the system will return to that segment for further measurement and color Doppler, refer to steps 5-13.

Breast Care (Option) (continued)

5. The screen is split in to dual screen, the frozen longitudinal plane scan image is placed on the left side.
6. The live image is on the right side and the user performs the transverse plane scan.

   Press **P1** key, perform measurements.



Figure 5-44. Breast scan screen 2

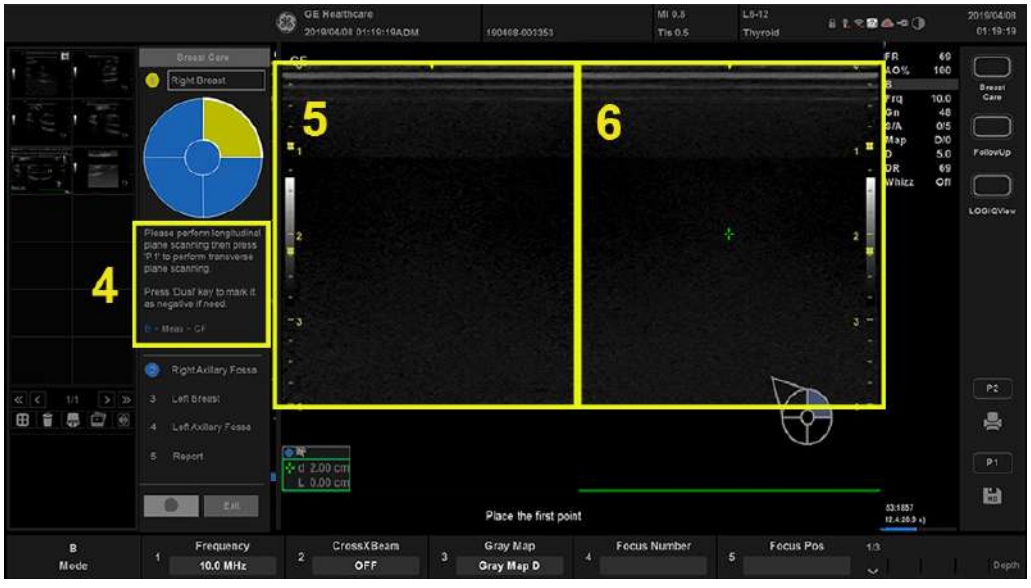


Figure 5-45. Breast scan screen 3

Breast Care (Option) (continued)

7. User can select to manually measure the Length (L), Height (H), Width (W) of structures.
8. Or user can select to use the semi-automated Auto Contour measurement feature for (HxL) and (HxW).
9. The semi-automated Auto Contour feature prompts the user to set the cursor in the center of the lesion.

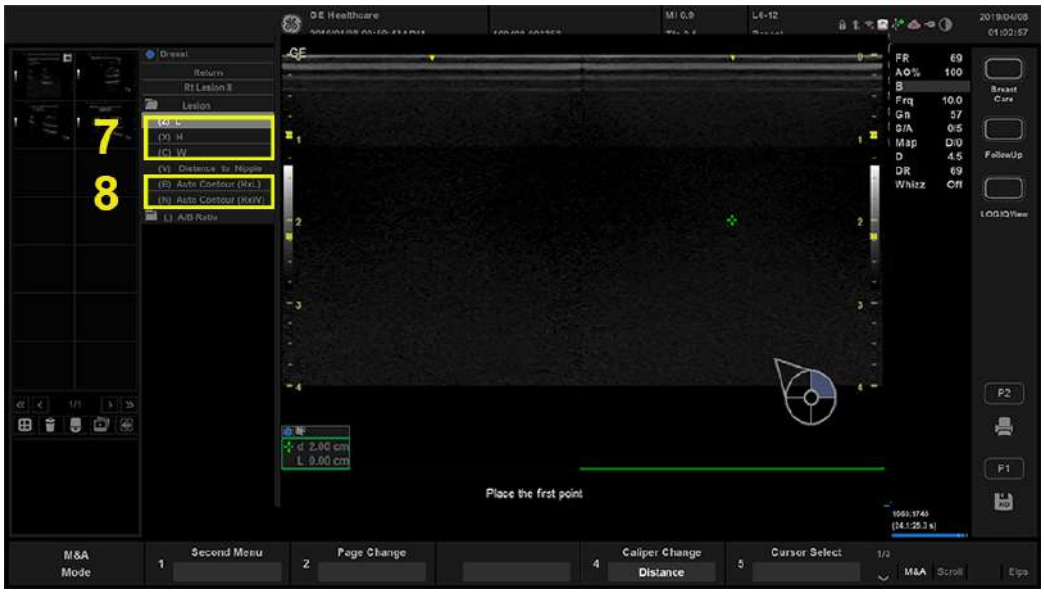


Figure 5-46. Breast scan screen 4

Breast Care (Option) (continued)

10. The next step with the semi-automated Auto Contour feature prompts the user to use the trackball to resize the circle, the measurement circle now acts as a region of interest, based on the size of the lesion to be contoured.

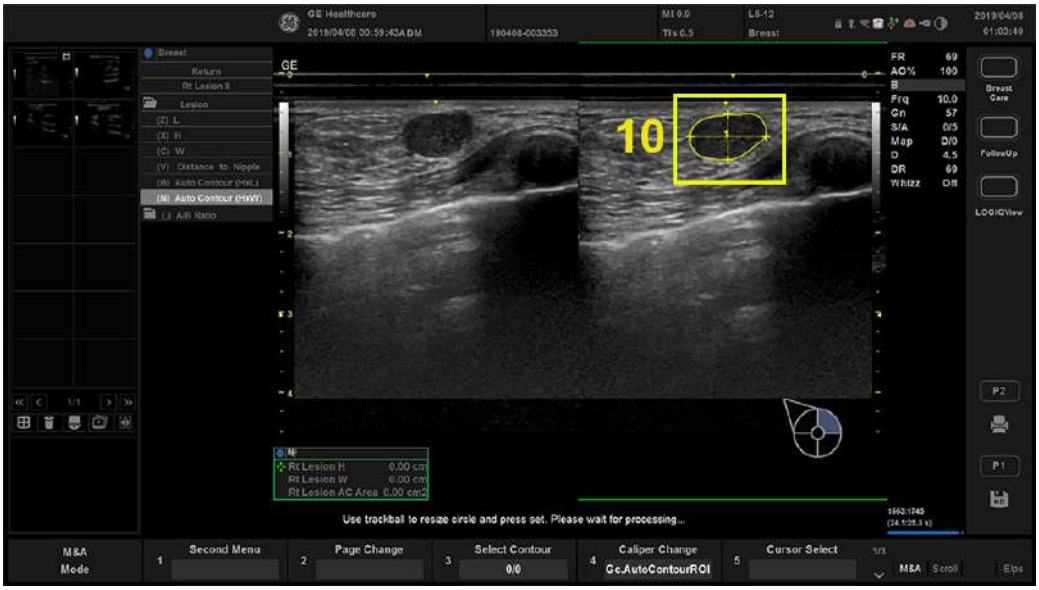


Figure 5-47. Breast scan screen 5

Breast Care (Option) (continued)

11. The Auto-Contour feature now responds with an editable trace for the area within the region of interest.

    Editing features for auto contour available for users before proceeding to next step including delete lesion.

    After the measurement is completed, press **P1** to store image to accept Auto Contour measurement.

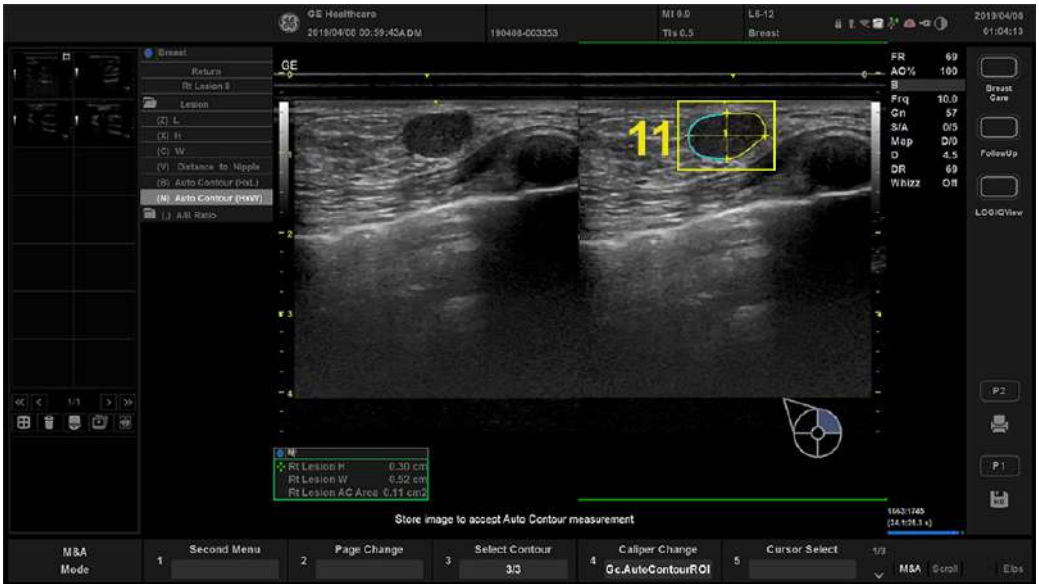


Figure 5-48. Breast scan screen 6

Breast Care (Option) (continued)

12. The system enters CF mode automatically. Press P1 to store image.

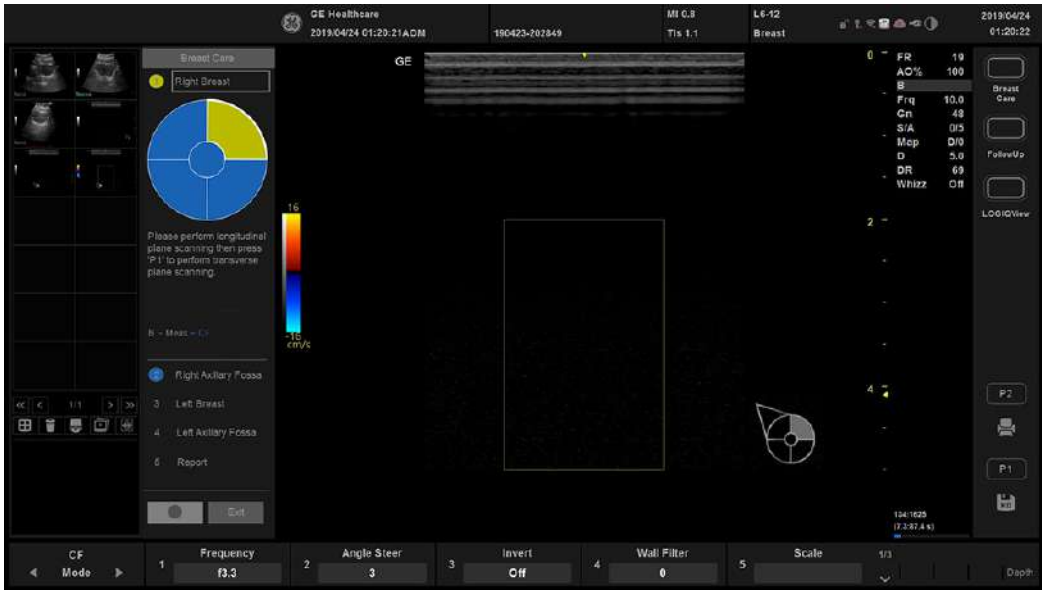


Figure 5-49. Breast scan screen 7

13. User can review or revise the previous measurements by pressing B or Meas or CF or PW (PW appears after user selects PW in Utility -> System -> General -> Breast Care).



Figure 5-50. Breast scan screen 8

Breast Care (Option) (continued)

14. User can press **P1** key to generate report.

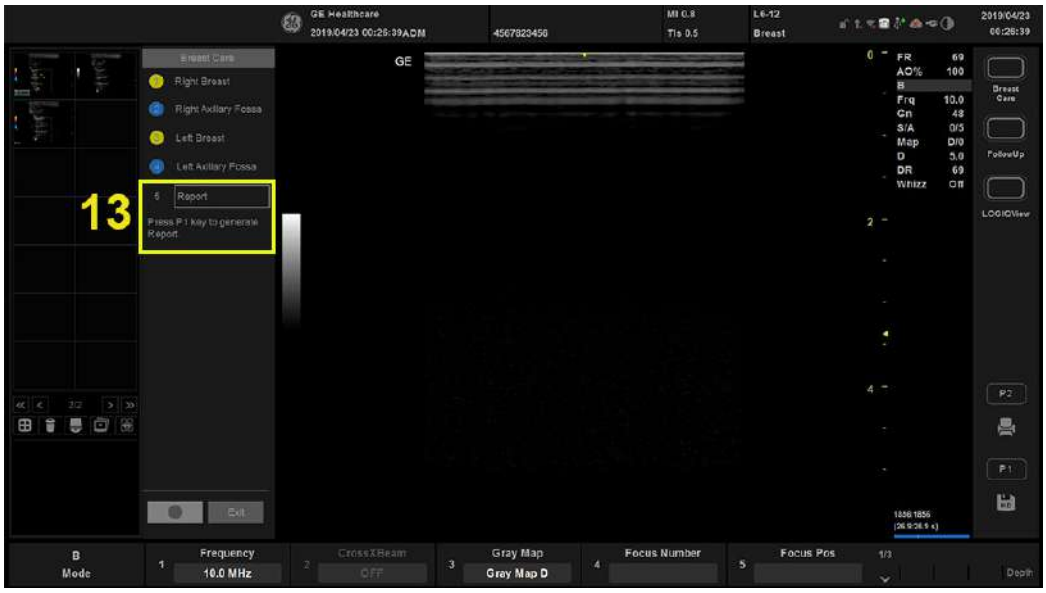


Figure 5-51. Breast scan screen 9



Figure 5-52. Report

TruScan

Overview

TruScan allows you to change imaging parameters to help optimize the images that are set/frozen or archived. TruScan is applicable on cine loops, not just single static DICOM images. This feature provides the user with an opportunity to review and manipulate images after the scan. The function allows you to select a specific area of interest, zoom in and optimize for closer observation.

TruScan on B-mode

To apply various post-processing tools to the image:

- Recall a B-mode raw data image.

  For example: Fetal cardiac image.
- Resize the acquired image by using the zoom function.
- Adjust the image by using various imaging controls.

  a. Use the Active mode key to access B-mode controls on the top menu.

  b. Reduce posterior saturation by adjusting the TGC.

  c. Adjust the image gain and dynamic range.

  d. Use the SRI function to reduce the speckle noise in the image and get an enhanced image.

  e. Use the colorize option to further adjust the image.

  f. Annotate and save the image.

TruScan on Color-Flow

To adjust an image acquired in the Color Flow mode using the post-processing controls:

1. Obtain an image in B-mode and color.

   For example: Carotid image.
2. Freeze and then store the image.
3. Use the Invert function to flip the color map for correct color mapping.
4. Customize the Color Flow by adjusting color gain and choosing a different color map. Choose a transparency map instead of the regular color maps to see the underlying B-mode anatomy.Adjust The baseline and threshold values to optimize the Color Flow and get maximum Color Flow information from the image.

TruScan on Pulse Wave Doppler

To work on a Pulse Wave Doppler spectrum after image acquisition:

1. Acquire a B+Color+spectral Doppler image of the carotid.
2. Obtain a PW spectrum and then freeze.
3. Store the image obtained.
4. Use the Angle correct function to optimize the angle between the Doppler cursor and the vessel to get a velocity measurement.
5. Adjust the baseline, sweep speed and the display format to customize the spectral display.

TruScan and Measurements

Versana Active supports Auto Doppler calcs in both live and frozen mode. This is configured from the secondary menu in the measurement mode. The parameters selected for calculation can be changed later after the image is acquired.

Measurements are also supported on recalled grey scale images saved in DICOM format. This enables users to review patient images and redo measurements and calculations without reimaging or inconveniencing the patients.

Reporting

The raw data acquisition capabilities of TruScan enables re-annotation and re-measurement during remote reporting using a reporting software.

Q Analysis

Overview

Quantitative Analysis (Q Analysis) is available for the image loop acquired in the following modes: Color Flow Mode, Power Doppler Mode and Tissue Velocity Mode. The difference of Q Analysis operations is small among different modes.

Activating QAnalysis

1. Scan the patient in CF/PDI/TVI mode or select a desired cine loop in CF/PDI/TVI mode from the stored images.

NOTE: Images from the current scan session acquired (already in CINE) or from a saved image loop can be used for QAnalysis.

NOTE: QAnalysis is only available if the user has selected an image loop. If the user has selected a saved still image (just one frame), QAnalysis is not available.

2. Press **Freeze**. Then move the trackball to enter CINE mode.

NOTE: QAnalysis is only available when the system is in CINE mode.

3. Select ***QAnalysis*** to activate Quantitative Analysis function. To toggle the trackball function between QA and Scroll, press the **Cursor** key.

Q-Analysis Screen Description

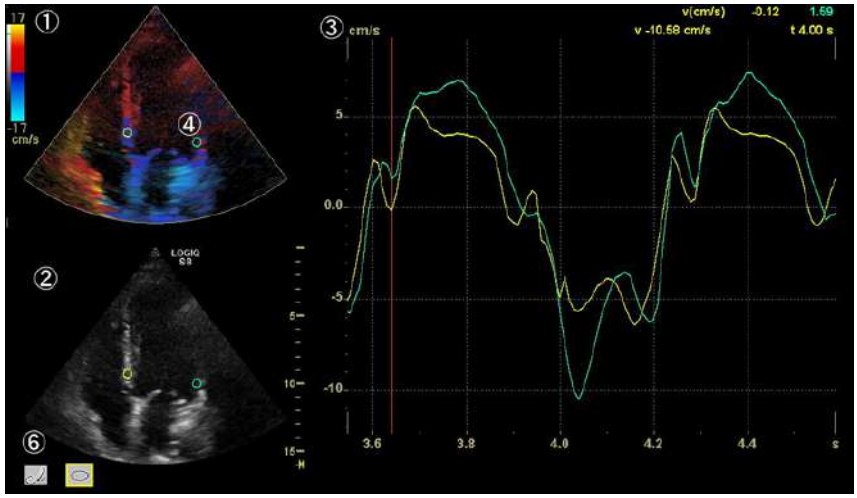


Figure 5-53. TVI mode Q-Analysis Example

Table 5-7: QAnalysis Screen Description

1.	TVI Cineloop Window Sample Area: Indicates sampling position of the velocity. The sample area is color-coded: the first sample area is yellow, the second green, etc.
2.	B Cineloop Window Sample Area: Indicates sampling position of the velocity. The sample area is color-coded: the first sample area is yellow, the second green, etc.
3.	Analysis Window. • Y axis: Velocity scale (cm/s) • X axis: Time(s) • Time at cursor position. • Velocity at Cursor position. • Velocity at frame marker position (Color coded)
4.	Sample Area
5.	Time at cursor position and velocity at cursor position. Position the pointer cursor over the analysis window.
6.	Sample Area Tools. • Pencil Icon: Creates a sample area based on freehand drawing. • Shape Icon: Creates a sample area with a pre-defined circular/ellipse shape.

Q-Analysis Screen Description (continued)

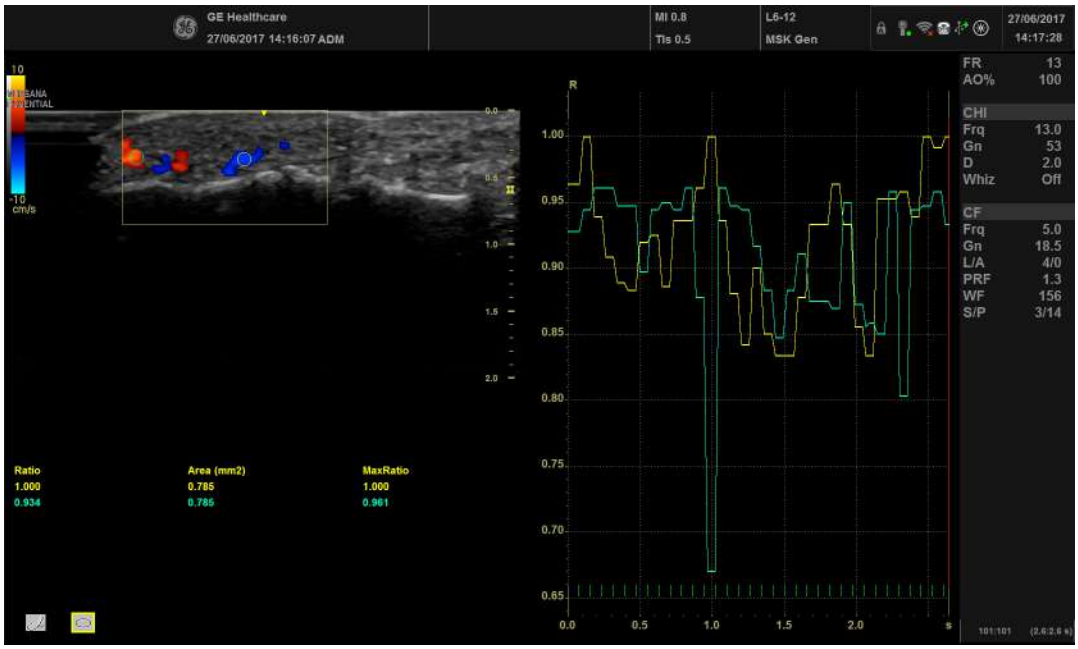


Figure 5-54. CF Mode Q-Analysis Example

Selecting QAnalysis Image Range

A range of frames is selected for the TIC analysis in Cine mode (before accessing TIC Analysis). Only the frames in this range are used for the TIC analysis.

If a range is not selected prior to accessing the TIC Analysis, the system uses the default Cine start and end frames as the default TIC start and stop frames.

1. The first frame in the analysis series is selected by adjusting ***Start Frame*** to the desired frame

   OR

   using **Trackball** or ***Frame by Frame*** to select the desired first frame and then selecting ***Start Frame***.

2. The last frame in the analysis series is selected by adjusting the ***End Frame*** to the desired frame

   OR

   using **Trackball** or ***Frame by Frame*** to select the desired last frame and then selecting ***End Frame***.

Generating a Trace

Trace from a pre-defined sample area

1. Select the sample area Ellipse ROI button (shape icon on the monitor display).
2. Move the cursor to one of the Cineloop windows using the **Trackball**.
3. Press **Set** to anchor the sample area.

   In this frame, the sample area is marked with an anchor. If the cineloop has more than one heart cycle, a sample area will also be anchored in the corresponding frame in the next heart cycle.

   The trace is updated accordingly in the Analysis window.

Trace from freehand sample area

1. Select the Freehand ROI button (pencil icon on the monitor display).
2. Move the cursor to one of the Cineloop windows using the **Trackball**.
3. Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
4. Press **Set** to anchor the sample area.

   The sample area is automatically closed and the trace is updated accordingly in the Analysis window.

Manual tracking of the sample area (dynamic anchored sample area)

The sample area can be moved within the loop to ensure that data in the trace is generated from the same anatomical location during the cyclic motion of the heart.

1. Place a sample area over a region of interest. Note the anatomical location of the sample area.
2. Scroll to a new frame using the **Trackball**.
3. Press **Cursor** on the control panel to select QA function for trackball.
4. Move the cursor to the sample area using the **Trackball**.
5. Press **Set**. The sample area is unanchored.
6. Drag the sample area to the corresponding anatomical location in the new frame.

   When the sample area is anchored in more than one frame, linear interpolation is performed so that the sample area is smoothly moved between the anchored positions in the selected frames when running the cineloop.

NOTE: *In the original frame and this particular frame the sample area is marked with an anchor.*

7. Press **Cursor** on the control panel to select Scroll function for trackball.
8. Using the **Trackball**, scroll through the cineloop and control that the sample area follows the moving anatomical structure.
9. Add anchored sample areas in several frames to obtain a more accurate displacement of the sample area.

Moving a dynamic anchored sample area

1. Freeze the image.
2. Press **Cursor** on the control panel to select Scroll function for trackball.
3. Using the **Trackball**, browse through the cineloop to display one of the frames where the sample area was anchored.

NOTE: In these frames, the sample area is marked with an anchor.

4. Press **Cursor** on the control panel to select QA function for trackball.
5. Move the cursor to the sample area using the **Trackball**.
6. Press **Set**. The sample area is unanchored.
7. Drag the sample area to a new location.
8. Press **Set** to anchor the sample area to the new location.

If you want to move the sample area to the same depth, select ***Move (Same Depth)*** from the System Menu.

Delete a trace

The user can delete all traces at once or one at a time.

1. If necessary, press **Cursor** on the control panel to select QA function for trackball.
2. Move the cursor over one of the sample area. Confirm that cursor is changed to hand icon.
3. Select ***Delete Current Sample*** or ***Delete All Samples*** on the primary menu as necessary.

Manipulating the Sample Area

Up to eight ROIs can be saved on the reference image, with the corresponding eight traces plotted simultaneously on the graph. Each ROI display has a different color, and its corresponding trace data is plotted using that same color.

Once eight ROIs have been saved, the system does not automatically generate an active ROI when the cursor is positioned over the displayed reference image.

The saved ROIs can be a mixture of elliptical and freehand ROIs.

When the user repositions an ROI, the old trace data is erased from the plot and the trace data for the new position replotted.

If the ROI position on the last frame of the selected image range is moved, the corresponding ROIs on all frames are repositioned to match the last frame.

The user shall also have the capability of setting separate ROI positions on different frames of the contrast images, and the system shall linearly interpolate the ROI positions for the frames in between the selected frames.

Manipulating the Sample Area (continued)

Setting the default sample area shape

1. Position the cursor on the ROI on Cineloop windows, a white circle appears.



Figure 5-55. Sample Area Information Box

2. Select ***Set sample area shape***. The Information Box displays.



Figure 5-56. Sample Area Information Box

3. Select Height, Width and Tilt angle.
4. Select ***Set as default***. The current ROI size is set as the default for subsequent Ellipse ROIs.

Manipulating the Sample Area (continued)

Reshaping a Sample Area

To reshape the sample area:

1. Position the cursor on the ROI to reshape and press **System Menu**.
2. The ROI system menu displays. Select ***Set sample area shape***.
3. Adjust Height, Width and Tilt angle.
4. Press ***OK***. The selected ROI size changes.

Sample Area Shapes

There are two different methods for determining the shapes of the sample area.

Ellipse ROI

1. Select the ellipse icon (shape icon on the monitor display).
2. When the trackball positions the image display cursor over the reference image(s), an elliptical ROI is automatically generated and displays on the reference image(s).
3. The average intensity value inside the ellipse is calculated for every image in the image analysis range and plotted in the image display area.
4. The last generated or selected ellipse is considered the active ROI, and its trace plot automatically updates as the user repositions it on the reference image. Old traces are erased.
5. When scanning with an elliptical ROI, press **Set** to fix the ROI position and freeze its corresponding trace on the plot. A new active ROI is generated whose position is manipulated by the trackball and whose time-intensity curve traces will be plotted as before, while the previous ROI and trace remain fixed at the points they were saved at.

NOTE: Elliptical ROIs can be positioned in any manner that keeps their center within the image boundaries. In the case that part of the ROI is outside the image boundary, only data from within the image boundary is used for calculating the mean intensity value.

NOTE: You can change the size of the Ellipse ROI by adjusting the Ellipse control.

Sample Area Shapes (continued)

Freehand ROI

1. Select Freehand icon (pencil icon on the monitor display).

   Use the **Trackball** to position the caliper on the reference image at the start point. Press **Set** to fix the start point.
2. Trace the outline of the desired ROI by moving the caliper with the **Trackball**.
3. When a suitable ROI has been drawn, press **Set** a second time.

   The system automatically links the start point to the end point by drawing a straight line between them. The caliper is then free for repositioning for another freehand ROI.

NOTE: You cannot go outside the image boundary when drawing a freehand ROI.

Deleting a Sample Area

Sample ROIs and their corresponding traces can be deleted using ***Delete Current Sample*** *or* ***Delete All Samples***.

1. Select ***Delete Current Sample*** to delete the currently active ROI.
2. Select ***Delete All Samples*** to delete all currently set ROIs and all of their traces.

NOTE: The corresponding traces for the deleted ROIs are erased from the plot.

NOTE: Deleting an ROI causes the ROIs to be deleted from all frames in the analysis loop.

Disabling/Enabling the frame

NOTE: Disabling/Enabling the frame is available when enter QAnalysis from CF and PDI mode.

Frame disabling excludes the actual frame from the cineloop display. Frame disabling is available only with contrast data.

Disabling the frame from the frame marker

To disable One Frame :

1. Use the **Trackball** to move the cursor to the frame maker to disable.
2. Press **Disable Frame**.
3. The frame marker is changed from green to red to indicate the frame has been disabled.

NOTE: The disabled frame is no longer displayed in the reference window when scrolling through CINE memory.

Disabling multi-frames from the frame marker

1. Use the Trackball to move the cursor to the first frame maker to disable.
2. Press and hold down ***Disable Frame***.
3. Move the maker to the last frame to be disabled and release **Disable Frame**.

   The marker is turn red and the data from that frame is removed from the trace and any subsequent trace processing.

Disabling/Enabling the frame (continued)

Disabling a frame from the cineloop window

1. Use the Trackball to move the cursor to the cineloop window.
2. Press ***System Menu***. The system menu displays.
3. Select ***Disable frame***.

   The current frame is disabled and the corresponding frame marker displays red.

To enable the frames

To re-enable all deleted frames :

1. Position the cursor on the Frame Marker line and press the ***System Menu***. The system menu is displayed at the cursor position.
2. Select ***Enable all frames***.
3. All disabled frames are re-enabled.

Smoothing

NOTE: Smoothing is not available when entering QAnalysis from CF/PDI mode.

The system can smooth the traces displayed by applying a filter over a defined time window. The type of filter availabe is depending on the analysis signal displayed.

1. Select ***Smoothing***.

   OR

   Position the cursor over the analysis window and press **System Menu**. The System menu is displayed at the cursor position. Select ***Smoothing***.

NOTE: When smoothing is turned on, it applies to all traces in the plot window.

2. The smoothing filter list displays. Select the appropriate parameter.

Horizontal Sweep

Horizontal Sweep allows you to increase or decrease the time interval over which to plot the TIC curve.

The Horizontal Sweep control can range from TBD on the short side to the time interval between the user selected first and last frame. The default is the user selected image range. If the user has not yet selected a first and last frame, the first and last default frames from the displayed CINE loop are used.

Drift Compensation

NOTE: Drift Compensation is only available when entering QAnalysis from TVI mode.

Drift Compensation compensates drifting of Tissue Tracking curves by either resetting the curve to zero at the tracking start point (cycle resetting) or by linear compensation throughout the cycle (linear compensation).

NOTE: When Displacement is chosen by AnalysisSignal, Drift Compensation is active.

Statistics

Select **Statistics** to enable/disable display of statistics of the frame or loop. The statistics are shown only when the loop is stopped.

- Ratio: Ratio of Color (Power) Doppler pixel over total ROI area.
- Area (mm2): The size of ROI.
- Max Ratio/ Time of Max Ratio: Maximum Ratio of Color (Power) Doppler pixels in each ROI, and which frame that occurs in.
- Min Ratio/Time of Min Ratio: Minimum Ratio of Color (Power) Doppler pixels in each ROI, and which frame that occurs in.

Trace Measurements

Max Gradient

Displays the time and gradient that becomes the maximum gradient between the CINE start and end frame.

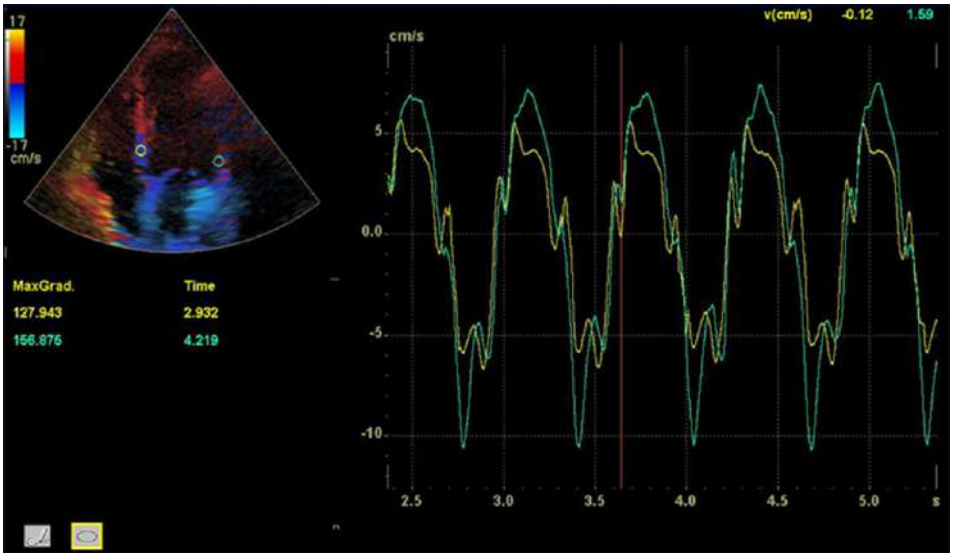


Figure 5-57. Max Gradient

Exporting Traces (Saving the Trace Data)

You can save the trace data to an external file.

1. Select ***Export Traces*** on the primary menu to save the trace data.
2. The following window displays.

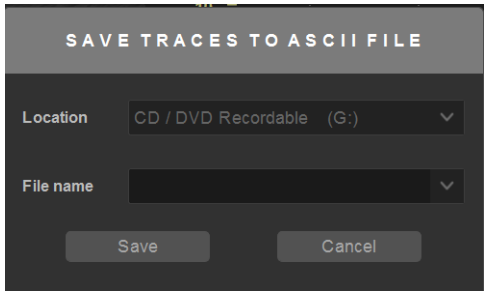


Figure 5-58. Export Trace Window

- Location: Select Location which to save.
- Filename: Enter the filename. (Only Text)

3. Select ***OK*** to save the data and return to the QAnalysis screen.
   - All displayed ROI traces are saved in the exported file.

All plot data (intensity, gradient and gradient derivative) are exported to a text file by “Export Trace”.

Table 5-8: Example of exported file

Time(s):	Trace 1:	Trace 1 dGrad.:	Trace 1 dGrad.
0.00000	-3.97995e+000	-2.15924e+001	8.05159e+001
0.03121	-5.14631e+000	-1.64719e+001	1.74256e+001
0.06242	-5.75798e+000	-1.27675e+001	-7.78004e+001
0.09362	-6.02222e+000	-1.27675e+001	-1.93426e+002
0.12483	-6.11224e+000	-1.44515e+001	-4.17252e+002

NOTE: The Smoothed trace is the one saved if the user has applied a smoothing filter.

NOTE: Only data from the user selected image range is included in the exported trace file.

NOTE: No trace results are saved in the standard image database.

Annotating the QAnalysis Data

The user can annotate both the reference image and the trace plot displays. Use **Comment** key to type the annotation. See Chapter 6 for reference.

Exiting QAnalysis

There are several methods to exit QAnalysis.

- Select ***Exit QAnalysis***.
- Press **Freeze** to unfreeze and resume scanning.
- Press any other button that returns the system to real-time scanning.

Using 3D (Option)

Overview

Table 5-9: 3D Package Options

3D Type	Description	Sensor/No Sensor	Available Tabs
Easy 3D	Designed for rendering B Mode images, e.g., Baby Face scans.	No sensor	3D Acquisition, Easy 3D, Movie
Advanced 3D	Designed for rendering B Mode images, e.g., vessel trees.	No sensor	3D Acquisition, Easy 3D, Advanced 3D, Movie

Easy 3D

Acquiring a 3D Scan

To acquire a 3D scan,

1. Define the key assigned for 3D in Utility -> System -> User Configurable Key.
2. Optimize the B-Mode image. Ensure even gel coverage.
3. Press the User defined key assgined to 3D. Two screens appear.

NOTE: Set appropriate values for Acq Mode and Scan Plane. Also, set the scan distance before scanning.

4. To start acquiring the image, press ***Dual***.
5. To perform a parallel scan, scan evenly. To perform a sweep (fan) scan, rock the probe once. Note the distance of the scan.
6. The 3D volume of interest (VOI) is dynamically assembled on the right side of the screen.

NOTE: If the image stops before you're done scanning, start acquiring the 3D volume of interest again.

7. To complete the 3D scan, press ***Quad***.

NOTE: You can also press Freeze, but then you need to also press the 3D key to obtain the final render.

3D Notes

- Adjust the 3D data set brightness with B-Mode Gain.
- Use Colorize to change the color of the active data set.
- Use Zoom to increase the zoom factor of the active data set.
- Vertical lines may be seen in a resliced image. This usually happens when you scan too fast or if the scan distance is set to a high value.

  Scan more slowly, adjust the frame rate for a faster rate or adjust the scan distance.

Manipulating the Volume of Interest

Imagine you are able to manipulate the 3D volume of interest (VOI) in your hand. The 3D VOI is a tangible anatomical object that you can see and manipulate easily using the Trackball and Set control panel keys.

Practice positioning the pointer at different places within the 3D VOI. Highlight different colors (white, red, yellow, or green). Press Set to select a VOI for manipulation. Use the hand to manipulate the 3D VOI.

Rotating the 3D VOI Left/Right or Forward/Backward

You can rotate it left to right or right to left. You can rotate it forward/backward. Press **Set** key when the white pointer finger is positioned on the white box. Move the closed white hand to manipulate the 3D VOI.

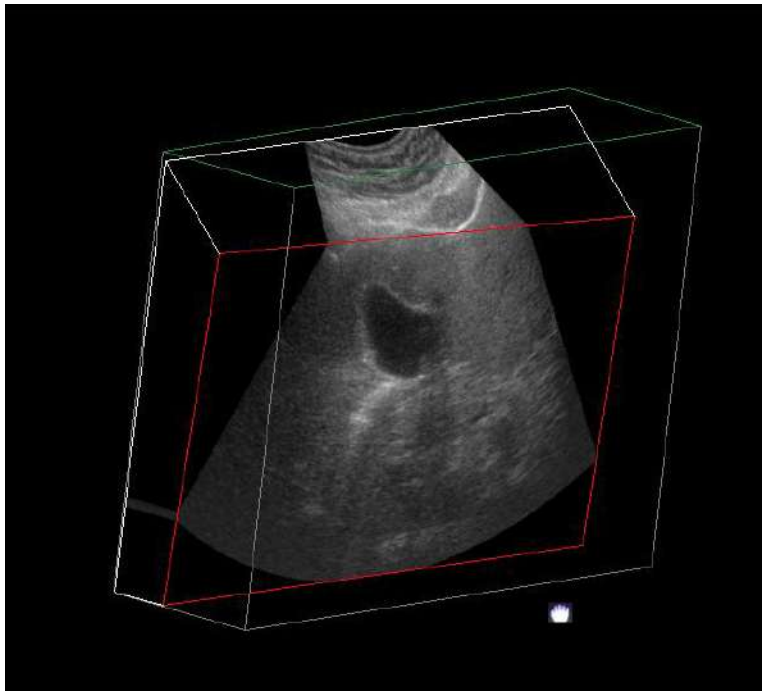


Figure 5-59. Manipulating the 3D Volume of Interest (White Hand)

Moving Through the 3D VOI

You can move through the 3D VOI using the red hand. Press Set when the red pointer finger is positioned on the red box. Move the closed red hand to move through the 3D VOI.

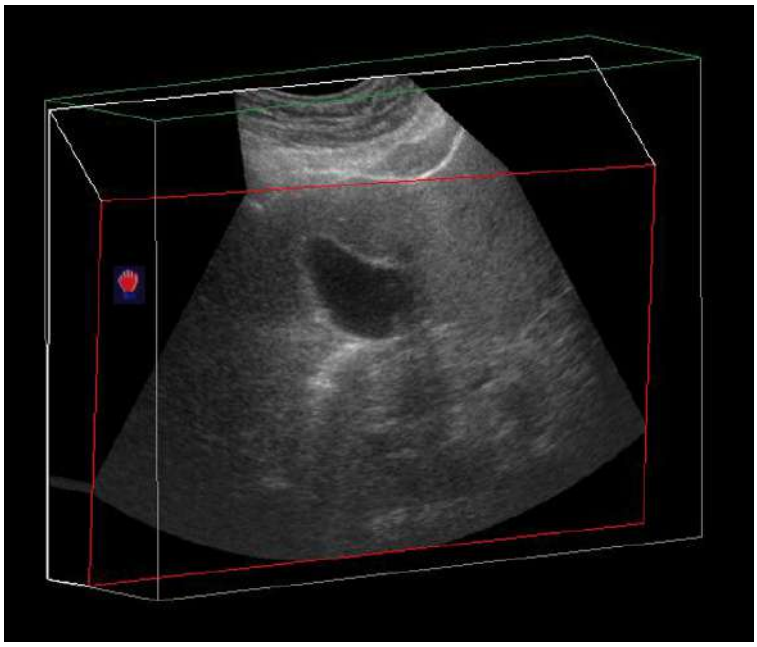


Figure 5-60. Moving through a 3D Volume of Interest (Red Hand)

NOTE: Any plane in the volume can be made active (highlighted with red box) by clicking on it.

Viewing Specific Portions of the Anatomy

You can pull back tissue to view specific portions of anatomy using the yellow hand. Press Set when the yellow pointer finger is positioned on the yellow box. Move the closed yellow hand to manipulate the 3D VOI.

NOTE: This actually moves an edge. A yellow hand appears only when the pointer is on an edge of the VOI.

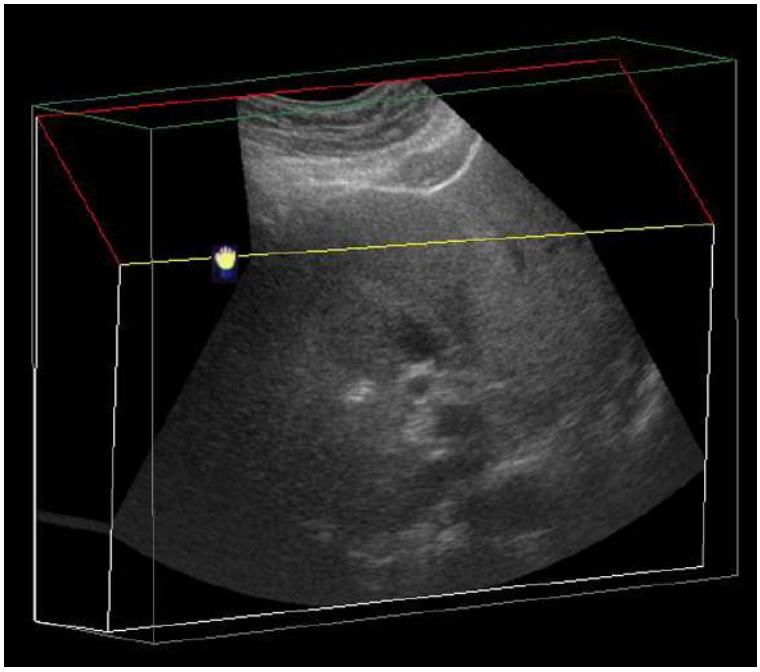


Figure 5-61. Manipulating the Edge of a 3D Volume of Interest (Yellow Hand)

Pulling Back a Corner of the VOI to View Specific Anatomy

You can pull back a corner to view specific portions of anatomy using the green hand. Press Set when the green pointer finger is positioned on the green box. Move the closed green hand to manipulate the 3D VOI.

NOTE: A green hand appears only when the pointer is on a corner of the VOI.

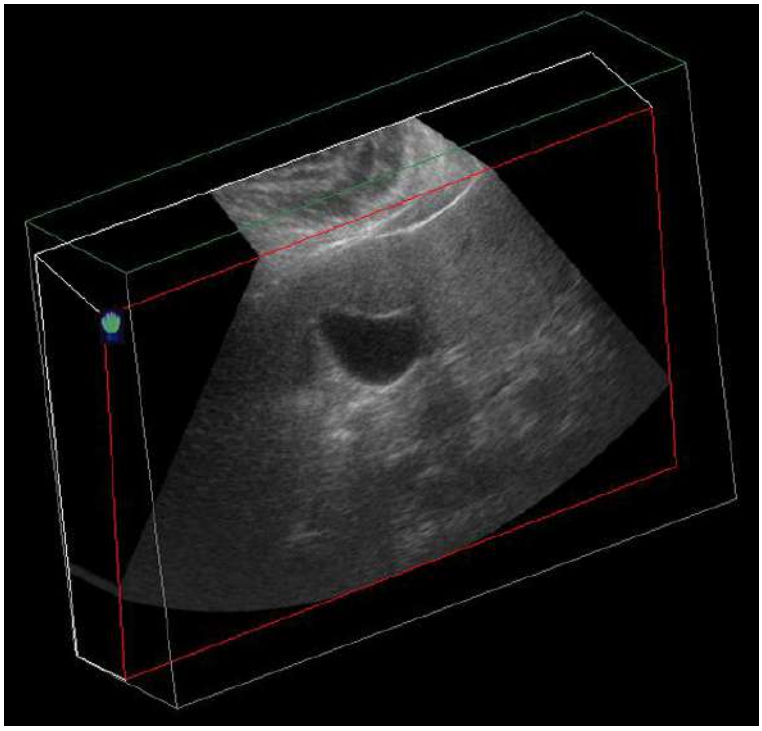


Figure 5-62. Manipulating a Corner of the 3D Volume of Interest (Green Hand)

3D Acquisition Parameter Description

Table 5-10: 3D Acquisition Description and Instructions for Use

3D Parameter	Description
App(Application) Presets	Selections: None, OB - Baby Face **None**. No application preset applied. **OB - Baby Face.** After having scanned in this mode, certain rendering parameters are set automatically. The gray surface mode is activated and the texture mode is switched off. The gray surface mode values for opacity and threshold are set automatically according to the datasets histogram. **User1, User2, User3.** User defined preset.
Acquisition Mode	Selections: Sensorless Parallel, Sensorless Sweep **Sensorless Parallel**. In this mode the probe must be moved during 3D data acquisition without angling it. You should scan the object you want to render in 2-4 seconds. The speed at which you scan should be constant. No sensor is mounted on the probe. • Since the time for post-processing depends on the acquired number of frames, it is recommended that you check the frame rate. Low frame rates result in fewer acquired frames for the 3D dataset which results in intensive post-processing (interpolation). Therefore, low frame rate = long post-processing. **Sensorless Sweep**. In this mode the probe must be moved to a position where you can clearly see a middle cut of the object you want to scan and render. Tilt the probe to about 30 degrees until the object you want to scan disappears. Start the acquisition and tilt the probe over a distance of around 60 degrees until the object disappears again. The entire scan time should be around 2-4 seconds. During the sweep, the probe may not be moved parallel, just tilted. No sensor is mounted on the probe. Before starting an acquisition, take care that the transmitter is positioned correctly during data acquisition and that the transmitter cannot move.
Scan Plane	Selections: Front to Back, Side to Side **Front to Back**. After having scanned in this mode, the rendered dataset is shown in a frontal view. For acquiring a fetal face in sagittal cuts, use this mode. **Side to Side**. After having scanned in this mode, the rendered dataset is shown from a side view. For acquiring a fetal face in coronal cuts, use this mode.
3D	Starts the rendering process.
Scan Distance	Adjusts the distance covered during the scan. Depending on the real width of a scan acquired during a sensorless 3D acquisition, the volume of interest's width can be enlarged or reduced. You can adapt the form of a fetal face if the baby's head looks oval instead of round. The assumed default width of a parallel scan is 6 cm; of a sweep scan 60 degrees.
Display Format	Change the layout between 50/50 and only 2D.

Easy 3D (continued)

NOTE: Selection of user preset shall be effective only while 3D mode is active. Exiting 3D mode and activating again then 3D preset shall be changed to the default, even without New Patient or changing application.

NOTE: When 3D image is recalled, no 3D preset shall be active and parameters are recalled from image file.

NOTE: Default Scan Distance, Opacity and Threshold may not consistent and change per scan. After User Preset was saved and recalled, Opacity and Threshold are consistent.

Easy 3D

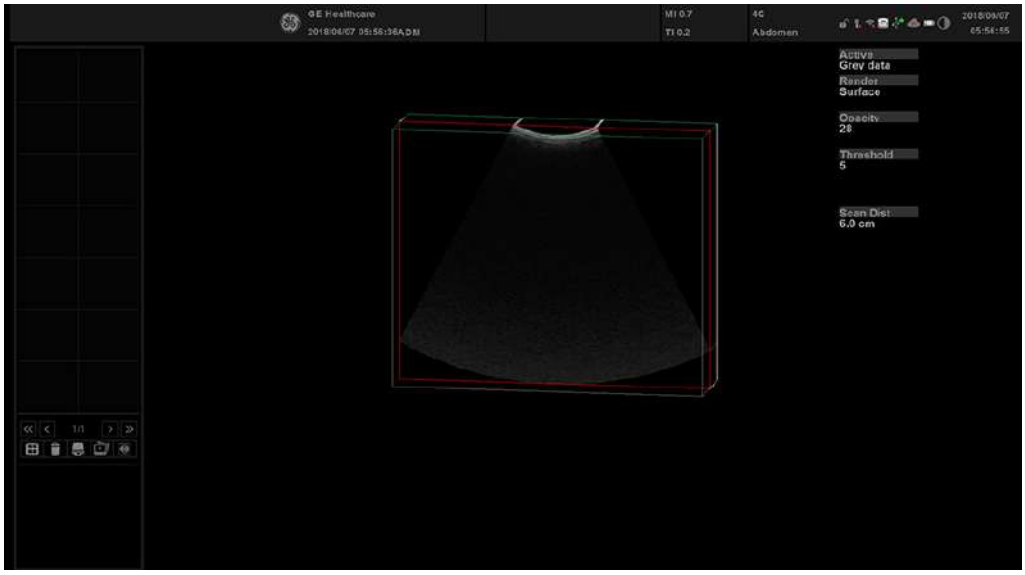


Figure 5-63. Easy 3D

Descriptions and instructions for using Easy 3D follow:

Table 5-11: Easy 3D Description and Instructions for Use

3D Parameter	Description
Reset	Resets the 3D volume of interest back to its original orientation.
Utilities	Select Average Off, Average Light, Average Medium, or Average Strong.
Undo	Undoes any manipulation you have done to your 3D dataset.
Auto Movie	Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated.
Scalpel	Structures, for example a part of the placenta hiding the view to a fetal face, can be cut out in a rendered image. All visible structures can be cut out. The option of ‘erase inside’ deletes all structures inside the marked region. The option of ‘erase outside’ deletes all structures outside the marked region. The region in the rendered image is marked with the Set key. To define the contour of the region, press the S et key for each vertex. To close the contour, double click the Set key. As long as a contour is not closed, it can be traced back with the Cursor key. The cut out process can be undone by the Undo Last function. As soon as the Apply button is pressed, a new dataset is generated.

Table 5-11: Easy 3D Description and Instructions for Use (Continued)

3D Parameter	Description
Gray Surface	Activates the gray surface rendering mode. It leads to a transparent appearance of the object, generated by displaying only a surrounding shell of structures.
Texture	Activates the texture or photorealistic rendering mode. It creates a photorealistic appearance of the object. The shading depends on the orientation of the surface of the object. If both Texture and Gray Surface mode are switched on, the mixture percentage of both modes can be defined.
Render	Changes between the rendered image view and the view of a volume of interest. The volume of interest shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. The volume of interest can be manipulated as described above.
Threshold/Opacity	Threshold defines which gray values are used for rendering and which are considered noise. Opacity defines how strict Threshold is used for discrimination. A low opacity value creates a firmer appearance of the surface. A high opacity value leads to a transparent appearance of the rendered image.
Colorize/Contrast	Colorizes the 3D render or adds contrast to the 3D rendered image.
Overwriter User1/User2/ User3	Overwrite the application preset file with the changes you just made.
Orientation Marker	You can now specify/define, then add the following orientation markers while in 3D via the ***Orientation Marker*** key: • TRV Sup to Inf Ant Scan Prb Rt • TRV Inf to Sup Ant Scan Prb Rt • SAG Lt to Rt Ant Scan Prb Sup • SAG Rt to Lft Ant Scan Prb Sup • Defined • Superior • Inferior • Left • Right • Anterior • Posterior • Cancel • None
Active Data	Manipulations of rendering parameters only have an effect on the data defined as Active Data. After having selected Active Data, a list of data is displayed, Gray Data or Inversion. Choose the data to be manipulated. Active Data is only available when you select both Inversion and Gray Data in Visible Data. Inversion Mode is only available for Black-and-White mode.

Table 5-11: Easy 3D Description and Instructions for Use (Continued)

3D Parameter	Description
Visible Data	After selecting Visible Data, a list of data is displayed, Gray Data or Inversion. Choose the data you want to display. For example, if only Inversion is chosen, the B-Mode image is switched off in the rendered image and only inversion mode is displayed.

Advanced 3D

Descriptions and instructions for using Advanced 3D follow:

Table 5-12: Advanced 3D Descriptions and Instructions for Use

3D Parameter	Description
Reset	Resets the 3D volume of interest back to its original orientation.
Contrast	Adjust to increase or decrease the contrast of the image.
Colorize	Colorizes the gray scale image to enhance the eye's discrimination capability.
Utilities	Use smoothed volume for rending the 3D. Strong = Most Smoothing.
Auto Movie	Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated.
Save Preset	Save as a user preset (User1, 2, or 3).
Undo	Undoes any manipulation you have done to your 3D dataset.
Tile	The display can be divided into 1, 2, 4, or 6 windows. Switching to a lower number of windows keeps the images from left to right.
Scalpel	Structures, for example a part of the placenta hiding the view to a fetal face, can be cut out in a rendered image. All visible structures can be cut out. The option of 'erase in' deletes all structures inside the marked region. The option of 'erase out' deletes all structures outside the marked region. The option of 'erase outside' deletes all structures outside the marked region. The region in the rendered image is marked with the Enter key. To define the contour of the region, press the right Enter key for each vertex. To close the contour, double click the Enter key. As long as a contour is not closed, it can be traced back with the left Set key. The cut out process can be undone by the Undo Last function. As soon as the Apply button is pressed, a new dataset is generated and the cut is permanent

Table 5-12: Advanced 3D Descriptions and Instructions for Use (Continued)

3D Parameter	Description
Active Data	Manipulations of rendering parameters only have an effect on the data defined as Active Data. After having selected Active Data, a list of data is displayed, Gray Data or Inversion. Choose the data to be manipulated. Active Data is only available when you select multiple items in Visible Data. *NOTE: Inversion Mode is only available for Black-and-White mode.*
Visible Data	After selecting Visible Data, a list of data is displayed, Gray Data or Inversion. Choose the data you want to display. For example, if only Inversion is chosen, the B-Mode image is switched off in the rendered image and only inversion mode is displayed.
Define Axis	For certain display and measurement modes (Angular Plane Mode, Angular Volume Measurement Mode), an axis in the volume of interest is required. To define the axis, set the start point by using the Trackball to position one end of the axis and pressing the Enter key, then positioning the other end of the axis and pressing the Enter key.
Group Planes	Selections: Off, Main, Parallel **Off**. A VOI or a rendered image is displayed. The Render button changes between the rendered image view and the view of the VOI. The VOI shows the acquired Ultrasound images transformed into an isotropic rectangular coordinate system. **Main**. Three orthogonal cuts (with colored frames) of the acquired VOI are displayed after pressing Main. The VOI shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. On the left top of the image a complete VOI is displayed. It shows the position of the three orthogonal planes in the VOI. A green point displayed in each plane defines the point of intersection of the three planes. This point can be set to different positions in the planes by double clicking the Enter key. A plane can be moved parallel in the VOI by pressing the Enter key on the position of the green point and moving the Trackball up and down inside the plane. **Parallel.** In this mode all displayed VOIs get the orientation of the last modified volume. Normally four VOIs are displayed. It is possible to display six VOIs by increasing the number of displayed volumes in the Tile area. Between the first and the last VOI, the selected planes are parallel and equidistant. A modification on the plane in one VOI results in a parallel modification of the planes in all other VOIs. To move these planes, press and hold down the Enter key while moving the Trackball.

Table 5-12: Advanced 3D Descriptions and Instructions for Use (Continued)

3D Parameter	Description
Type 1/2	Defines the rendering modes. Selections: Gray Surface, Texture, Maximum Intensity, Minimum Intensity, Average Intensity, and None. If both Type 1 and Type 2 rendering modes are switched on, the mixture of both modes can be defined. **Gray Surface**. Activates the gray surface rendering mode. It leads to a opaque appearance of the object, generated by displaying only a surrounding shell of anatomical structures. Adjust Threshold and Opacity as well. **Texture**. Activates the texture of photorealistic rendering mode. It creates a photorealistic appearance of the object. The shading depends on the orientation of the surface of the object. Adjust Threshold and Opacity as well. **Maximum Intensity**. Transparent appearance of the object. Generated by displaying the maximum gray values in the VOI. **Minimum Intensity**. The rendered image is generated by displaying the lowest gray values in the VOI that exceed the defined threshold. Dark anatomical structures, like cysts, can be shown in this mode. **Average Intensity**. Transparent appearance of the object. Generated by a summation of the gray values. **None for Type 2**. No second rendering mode is used in addition to the Type 1 rendering mode.
3DLandscape	Shows a combination of 2D slices and a 3D rendered image. After a color acquisition you can combine the 2D B-Mode image slices with a 3D rendered color image. This mode allows stepping through the B-Mode images along a vessel structure. The 2D slice can be moved with the Enter key. The Trackball symbol has to be positioned inside the 2D plane. 3DLandscape is only available with a color acquisition image. 3DLandscape is greyed out in the **Menu Select** pull-down menu with Black-and-White mode acquisition image.
Render	Changes between the rendered image view and the view of a volume of interest. The volume of interest shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. The volume of interest can be manipulated as described above.

Table 5-12: Advanced 3D Descriptions and Instructions for Use (Continued)

3D Parameter	Description
Reslice	Selections: Cube, Virtual Rescan, and Cubic Plane. **Cube**. The VOI shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. This mode allows you to work simultaneously with six cut planes. **Virtual Rescan**. The marked cut planes under Reslice Cube (red border) is displayed without any perspective distortions, e.g., parallel to the screen. This allows you to move through the volume one slice at a time in any direction. **Cubic Plane**. Only one cut plane view is shown in a perspective displayed VOI. The cut plane can be moved freely without any limitations.
Overwrite User1/2/3	Overwrite the application presets defined in 3D Acquisition.
Comments	To initiate the comment mode on the 3D image.

Movie 3D

Descriptions and instructions for using Movie 3D follow

Table 5-13: Movie 3D Descriptions and Instructions for Use

3D Parameter	Description
Manual	An animated rotation of the rendered image can be calculated and displayed by this function. Using this function, you first need to define the start and end position of the rotation. To define this, move the VOI to the start position, the press Define Start. Move the VOI to the end position and press Define End.
Movie 360	The calculation and display of a complete rotation around the axis, defined by the Axis button, starts in steps of 15 degrees.
Auto Movie	Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated.
Axis	All rotations (Auto Move and Movie 360) are calculated as rotations around the specified axis (X, Y, or Z).
Movie Speed	You can adjust the speed of any 3D rotation.
Pause	Stops and restarts the rotation. As soon as Pause is pressed, the different rotation steps can be displayed by moving the Trackball.
Colorize/Contrast	Colorizes the 3D render or adds contrast to the 3D rendered image.

Scan Coach (Option)

Before performing Scan Coach function on the system, please read and accept the Statement, Disclaimer and Limitation of liability described as below:

Statement

- Scan Coach IS NOT MEANT TO REPLACE TRAINING, OR TUTORIALS/HANDS-ON. IT IS MERELY A REFRESHER TOOL OF ALREADY RECEIVED EDUCATION AND TRAINING.
- Scan Coach IS AN ON -DEMAND REFRESHER AND REMINDER TOOL WHICH DISPLAYS INFORMATION IN THE FORM OF DICOM IMAGES AND ANIMATIONS; THE PROVIDED REFERENCE MATERIAL MAY HELP USER IN ACQUIRING ULTRASOUND IMAGES.
- Scan Coach DOES NOT PROVIDE A DIAGNOSIS, BUT DOES PROVIDE REFERENCE MATERIAL FOR SOME TYPES OF ACQUISITIONS.
- Scan Coach IS MEANT TO PROVIDE REFERENCE MATERIAL FOR ACQUISITION, BUT IT IS NOT INTENDED TO IDENTIFY DIAGNOSTIC IMAGE QUALITY. ACTUAL IMAGES, INCLUDING IMAGE QUALITY, OF THE DEVICE MAY VARY VERSUS THE PROVIDED REFERENCE MATERIAL.

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Introduction

Scan Coach displays information which helps user acquire the right scan plane. The reference image indicates how the scan plane image for a given step should look like. The probe/beam anime image shows the corresponding probe placement, or beam formation for getting the correct scan plane. The schema anime shows the key anatomical structures to be visualized in two dimensional mode.

Scan Coach can be used as an on-demand refresher/reminder tool in live scanning.

Scan Coach Description



Figure 5-64. Scan Coach Display Description

1. Program step number and step name

NOTE: The user is also able to select the program step by pressing the Up/Down key on the AN keyboard.

2. Select this icon to activate Reference image.
3. Select this icon to activate Animation and Reference image.
4. Select to Restart, Exit or Edit Scan Coach.

Setting up Scan Coach

Go to Utility -> Scan Coach -> Scan Coach Manager to create, import/export and manage the Scan Coach programs.

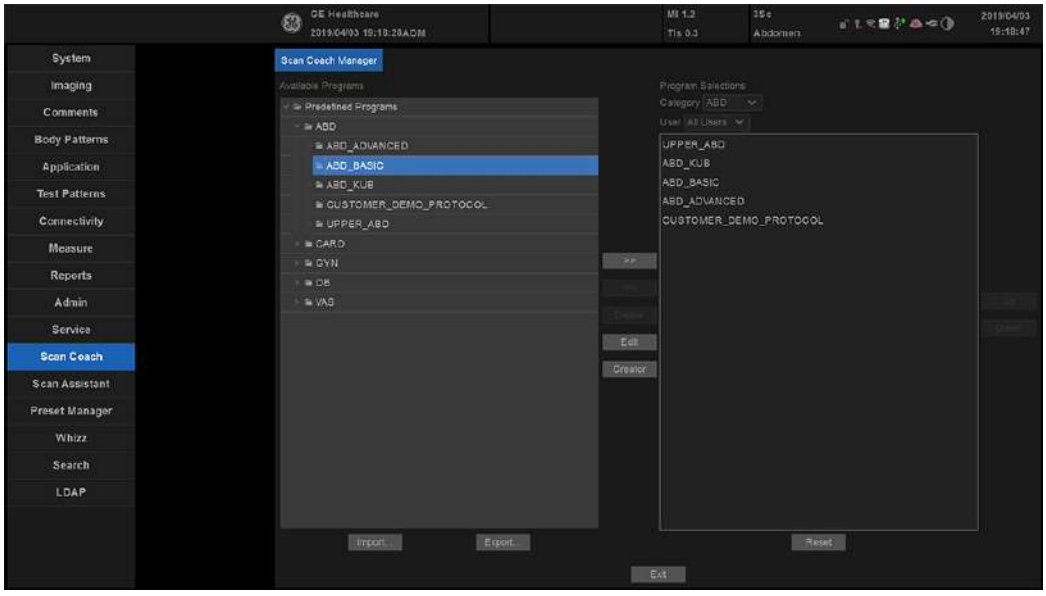


Figure 5-65. Setting up Scan Coach

Using Scan Coach

1. Go to Utility -> Scan Coach-> Scan Coach Manager, select the protocol from the left column, move it to the **Program Selections** column. Then select **Exit** to the Scanning page.

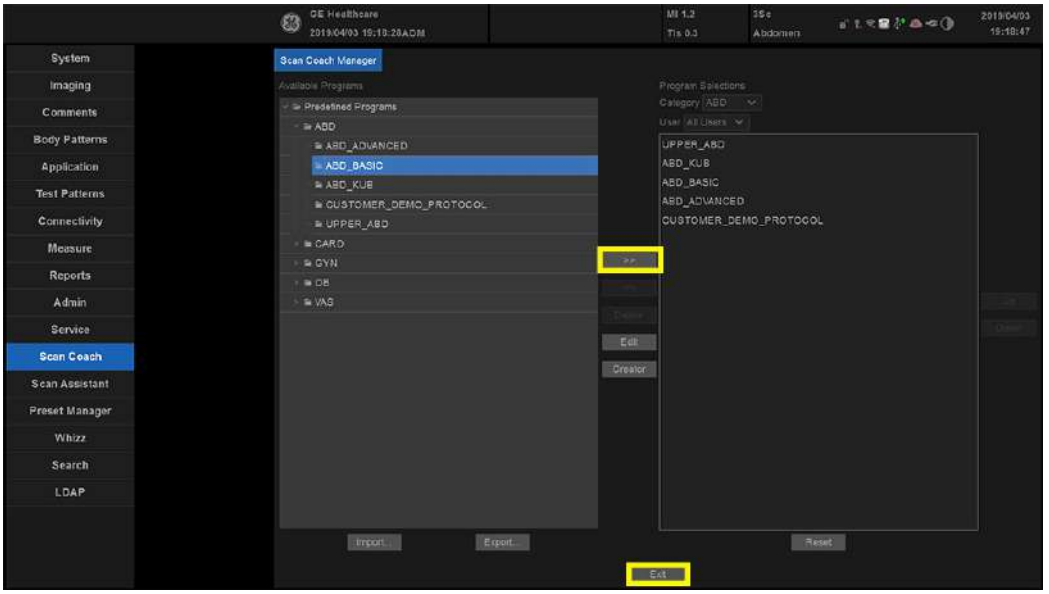


Figure 5-66. Select Scan Coach Protocol

Using Scan Coach (continued)

2. Press **Scan Coach** key on the control panel to activate the Scan Coach function. The Scan Coach addendum displays, refer to ‘Statement’ on *page 5-187* for detailed information. Select **Acknowledge** to continue.

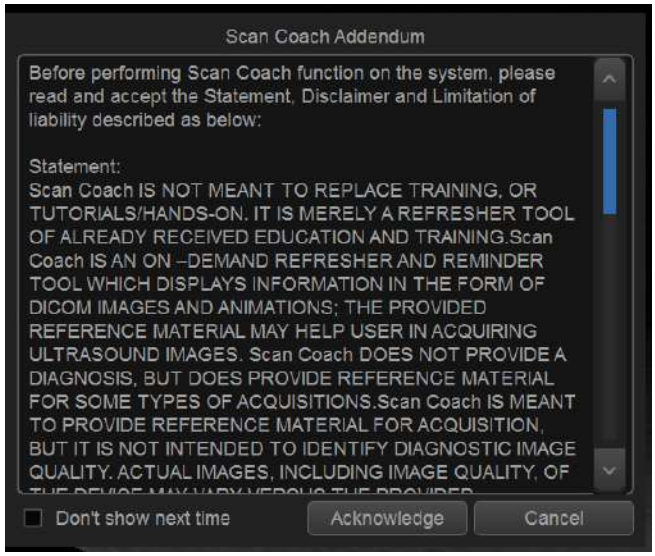


Figure 5-67. Scan Coach Addendum

Or select **Cancel** not to start Scan Coach.

Check the box before **Don’t show next time** and the Scan Coach addendum won’t display next time.

3. Select the protocol from the pull-down menu, and then select **Start**.

NOTE: If there is only one program in the current application, the system will display the Scan Coach screen directly. This step is only available when there are two or more programs.

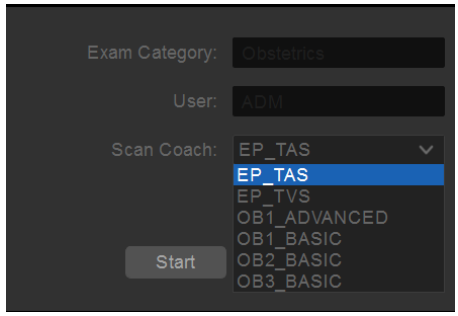


Figure 5-68. Scan Coach Start

Using Scan Coach (continued)

4. If **Always Use Protocol Preview** is selected in **Utility** -> **System** -> **General**, the system will display a demo for the programs. It helps the user understand the workflow of Scan Coach.

*NOTE: Uncheck **Always Use Protocol Preview** and the system will not show the program preview.*

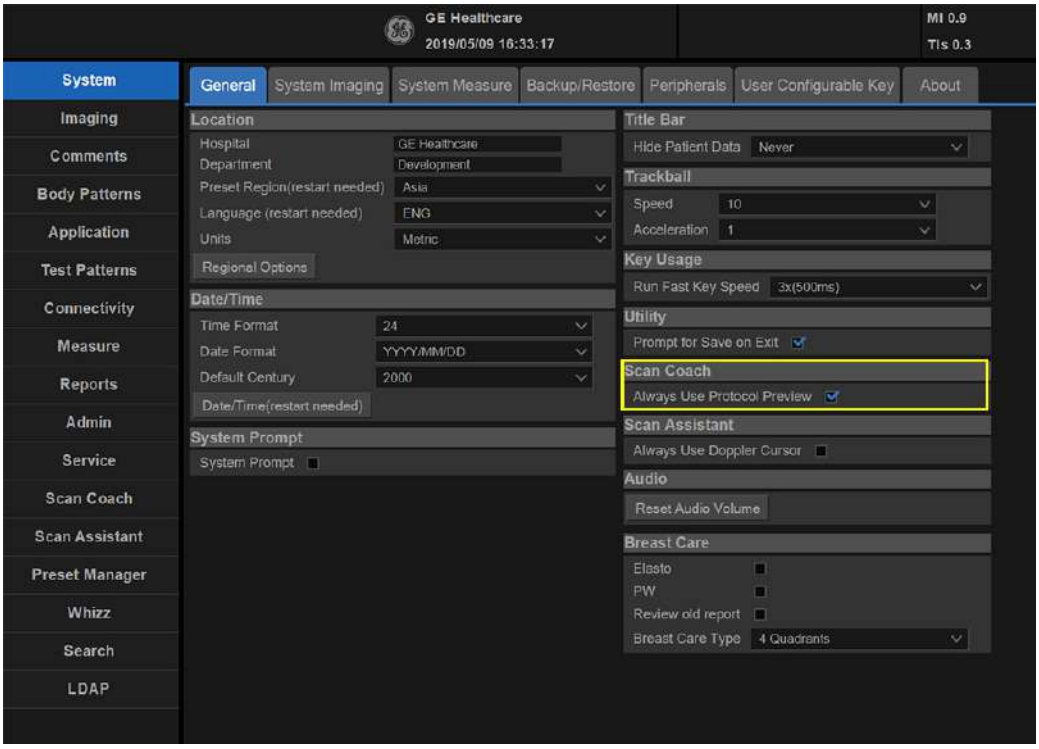


Figure 5-69. Utility->System->General

Using Scan Coach (continued)

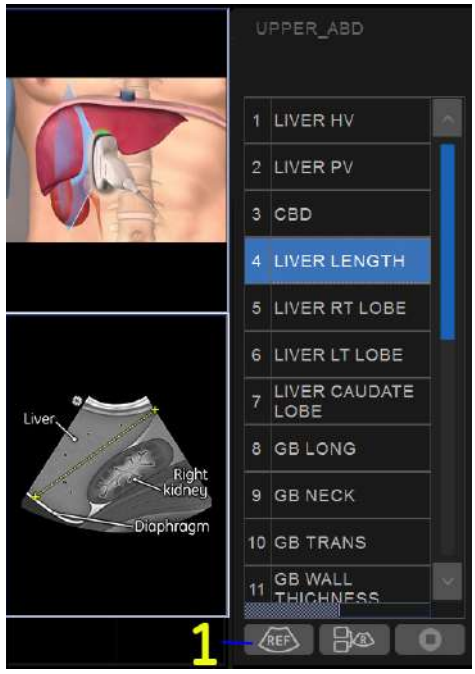


Figure 5-70. Scan Coach Preview

5. Select program, for example, LIVER LENGTH, then select the button **1** to review the reference image.

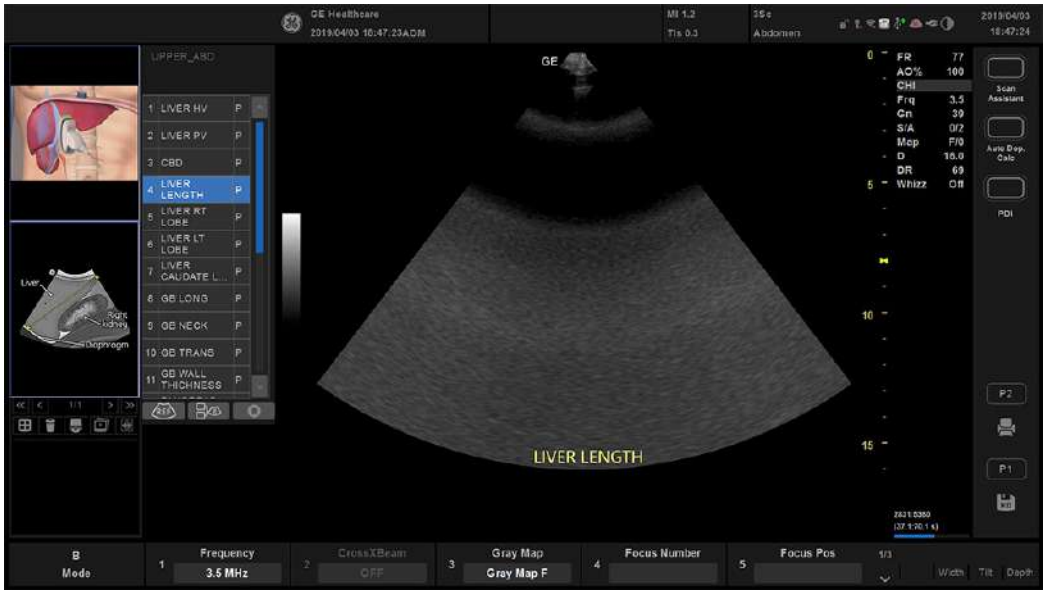


Figure 5-71. Using Scan Coach

Using Scan Coach (continued)

6. The reference image is displayed. Then select the button **2** to view the probe position and schema also.

   You can also press the button 1 to return to the program step list.

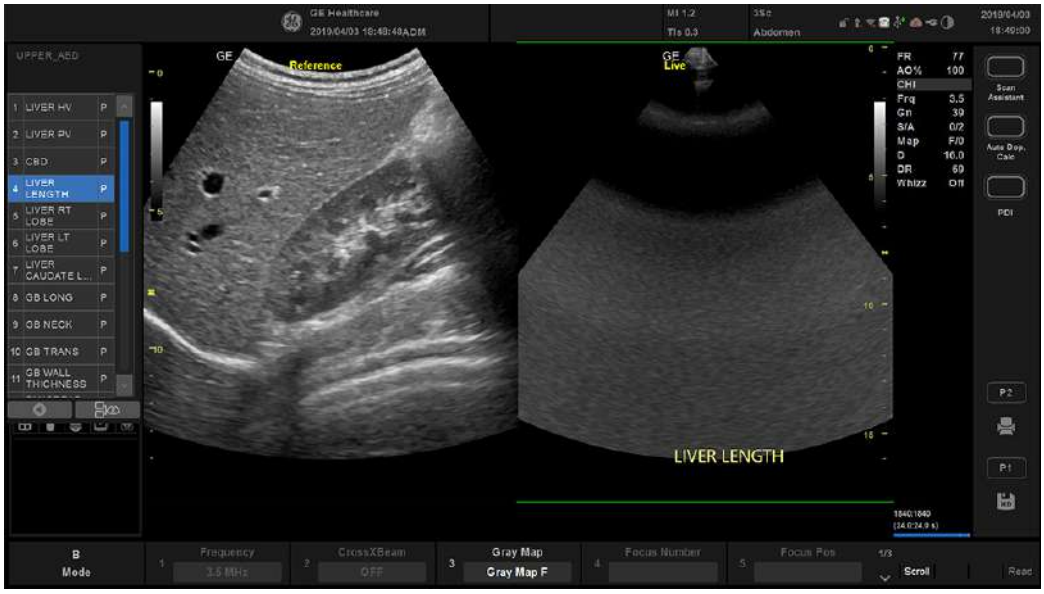


Figure 5-72. Using Scan Coach Reference

Using Scan Coach (continued)

7. It displays reference image, probe position and schema to guide the user acquire the right scan plane.

   Select the button 1 to stop/restart the video that demonstrates the probe position.

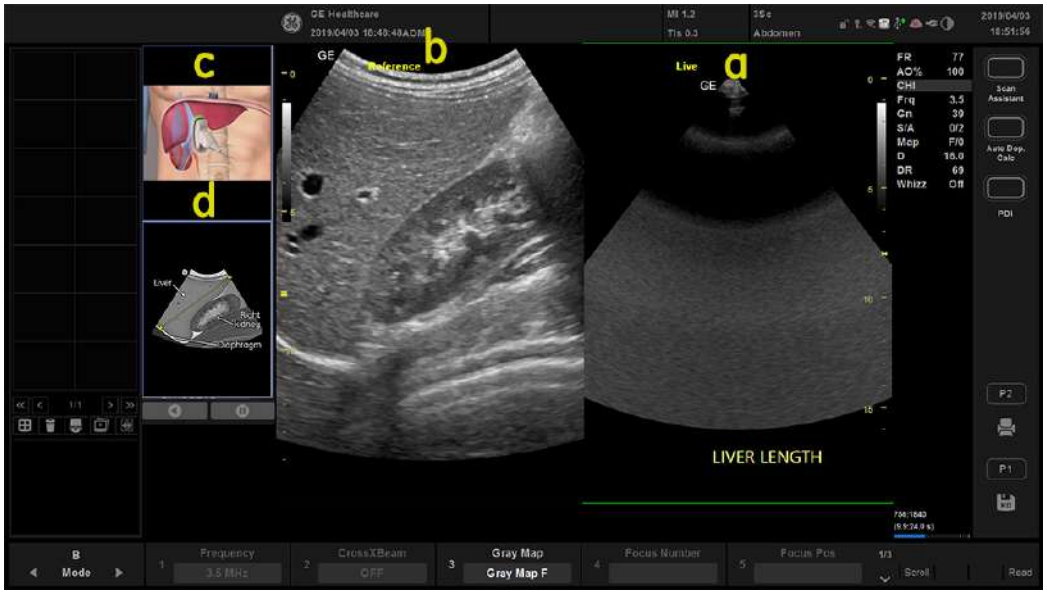


Figure 5-73. Using Scan Coach Animation

a. live scan image
b. reference image
c. probe position
d. two dimensional schema of the current scan plane

Edit Scan Coach Protocol

1. To edit Scan Coach protocols, go to Utility -> Scan Coach -> Scan Coach Manager and select **Creator**.

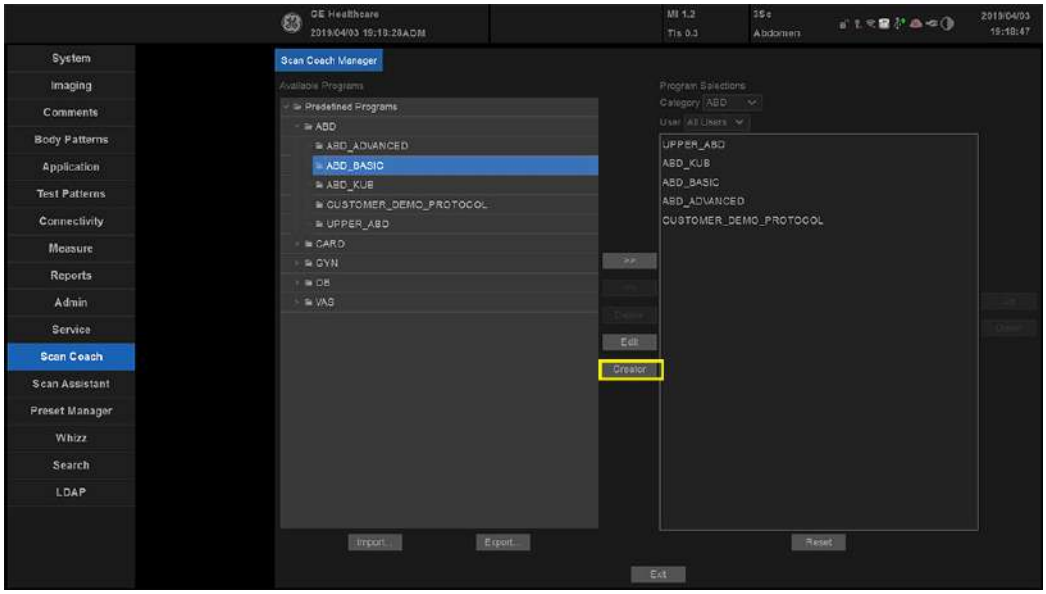


Figure 5-74. Scan Coach Manager

Edit Scan Coach Protocol (continued)

Or Select the button marked as 4 in the program list.

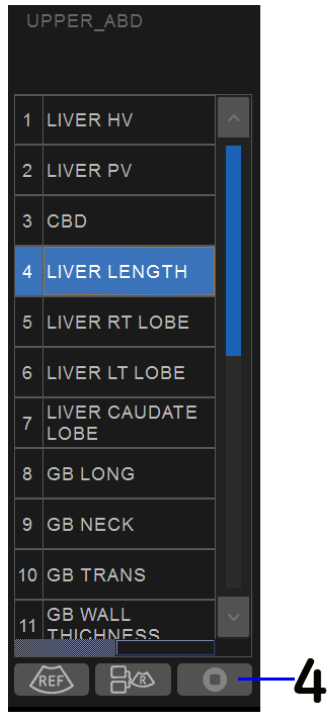


Figure 5-75. Program List

Then select  and the system will lead to the Scan Coach Edit page.

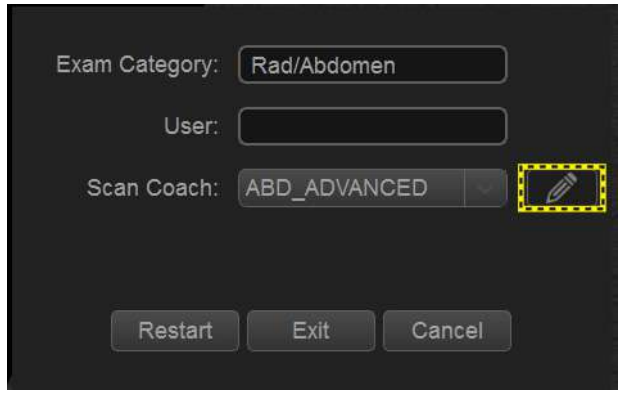


Figure 5-76. Edit the Protocol

Edit Scan Coach Protocol (continued)

2. The Scan Coach Creator is used to build customized programs that can be imported onto the Versana Active. Select **Scan Coach** on the tool bar to display the Scan Coach edit page.



Figure 5-77. Scan Coach Creator

3. Select the Scan Plane. Select **Browse** to upload the reference image.

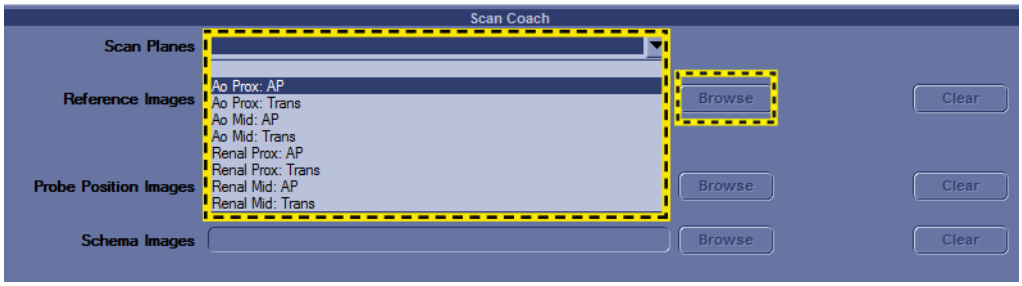


Figure 5-78. Select Scan Plane

Edit Scan Coach Protocol (continued)

4. Select **Upload** to Upload the reference image from the folder called “Reference Images” of the corresponding application. Then select **Close** after the upload is complete.

*NOTE: The reference image only supports *.dcm file.*

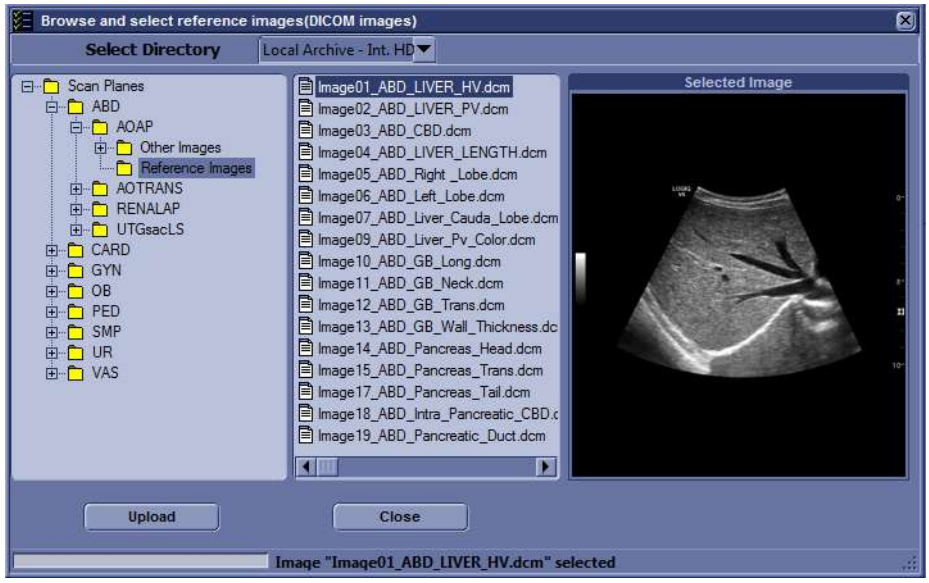


Figure 5-79. Upload Reference Image

Edit Scan Coach Protocol (continued)

The reference image can also be uploaded from external USB stick/HDD/CD/DVD. Select the correct directory from the pull-down menu, and then select the appropriate image to upload.

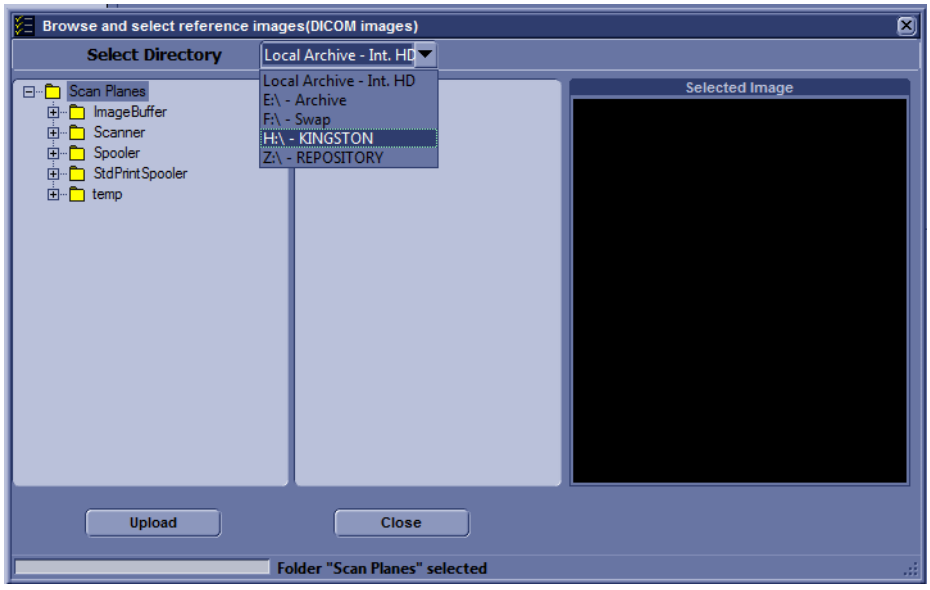


Figure 5-80. Upload Reference Image 2

5. Upload Probe Position Image and Schema Image from the folder called “Other Images” of the corresponding application, or from the external devices.

NOTE: *A protocol can be created without uploading the reference image, but the protocol without reference image do not display in **Scan Coach Manager**. It can be found via **Utility ->Scan Assistant ->Scan Assistant Manager -> Predefined Programs**.*

Scan Assistant

Introduction

Scan Assistant provides an automated exam script that moves you through an exam step-by-step. This allows you to focus on performing the exam rather than on controlling the system and can help you to increase consistency while reducing keystrokes. The system automatically invokes the correct mode and imaging parameters, advances to the next step in an exam, annotates the image, initiates measurements, and assigns the measurements to the worksheet/report.

Availability

The following additional imaging parameters and preferences are available for use in a Scan Assistant program: CW Doppler, Dual on Freeze, Depth, Color Scale, PW Doppler Scale, PW Sample Volume size, and Flow Model Selection.

You can initiate one or more manual Doppler measurements/ calculations.

Body Patterns are available for use during a Scan Assistant program. You can turn a Body Pattern on/off, select a particular Body Pattern graphic, and specify the position of the probe mark on the Body Pattern graphic.

The footswitch can be used with Scan Assistant. You can map Pause/Resume, Previous Step, and Next Step to the footswitch.

The “Always Use Doppler Cursor” preset, available on the Utility --> System --> General page, allows all PW Doppler steps to start with full screen 2D image plus mode cursor. You can specify the Store Order in Scan Assistant to set the Reading Order for the radiologist. The Learn Probe attribute can be set to learn and change the probe for the user in the middle of the exam.

Scan Assistant Definitions

Scan Assistant definitions:

- **Scan Assistant Manager**. Available via the Utility -> Scan Assistant page to import/export Programs created via the Scan Assistant Creator and to assign Programs to a user/exam category.
- **Import**. Used to load Programs created via the Scan Assistant Creator on to the Versana Active.
- **Export**. Used to move Programs from one Versana Active system to another Versana Active.
- **Scan Assistant Creator**. Used to create Scan Assistant Programs.

Scan Assistant Description

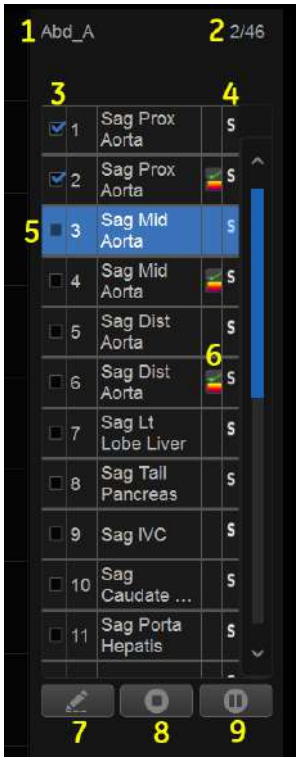


Figure 5-81. Scan Assistant Display Description

1. Program name.
2. Completed steps/out of total number of steps, and step description area.
3. Program step status (Complete/Incomplete), step number, step name. A checkmark indicates that this step has been completed. You can also manually check the box to bypass this step.
4. This column indicates that the action moves the Program to the next step.
5. Active step The box is green when the program is active or yellow when it is paused.
6. This column indicates the mode or when a measurement needs to be made.
7. Edit (Pencil Icon).
8. Stop. Stop also allows the program to be stopped, restarted, or a new program selected.
9. Pause/Resume.

Setting up Scan Assistant

To set up Scan Assistant,

1. Import the Scan Assistant Program created using the Scan Assistant Creator or exported from another Versana Active program.
   a. Insert the media with the saved Program from the Scan Assistant Creator or exported program from another Versana Active.
   b. Press **Utility** -> **Scan Assistant**.
   c. Select Import from the Scan Assistant Manager page.

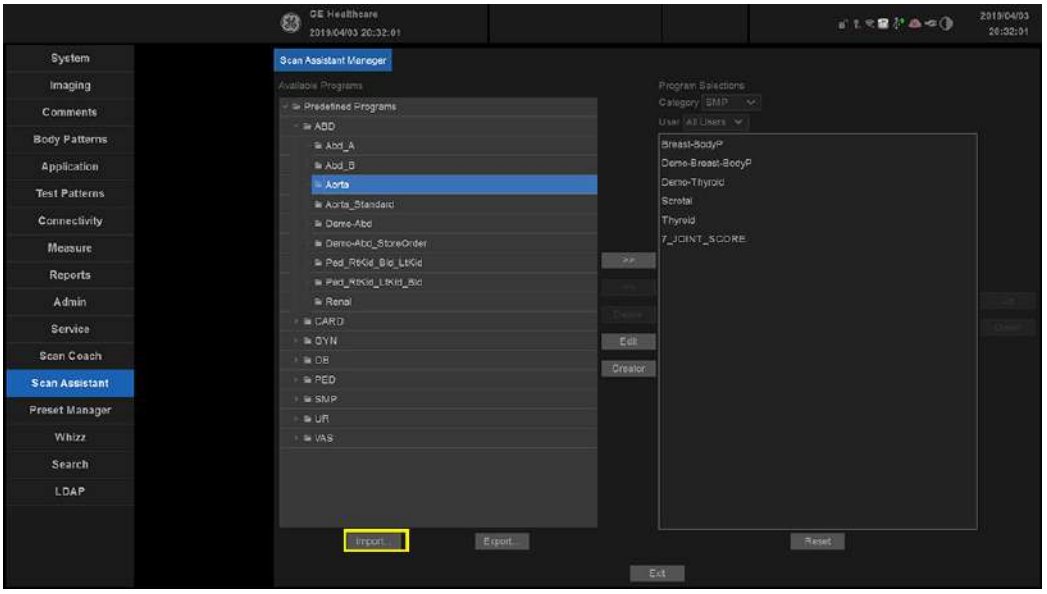


Figure 5-82. Import Programs

   d. In the Source field at the top of the Import Programs pop-up, select the media that the Program is stored on.

Setting up Scan Assistant (continued)

e. Select the Program(s) to be imported. If a folder is selected, all programs in the folder will be imported.

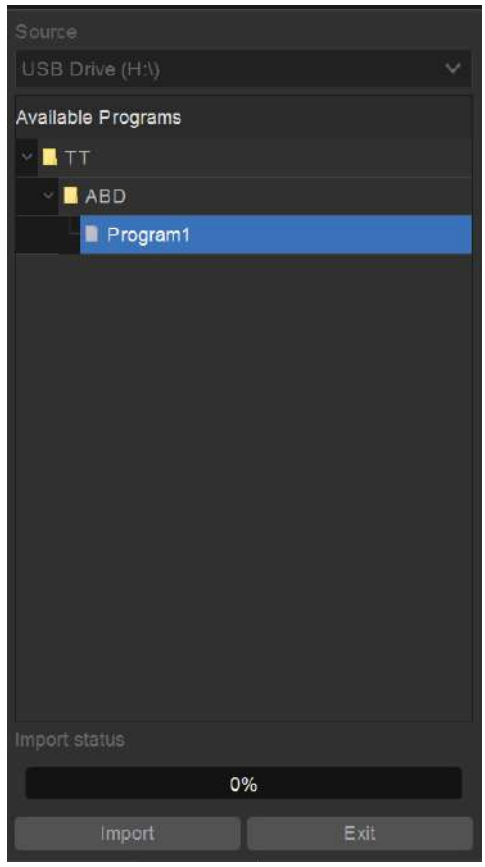


Figure 5-83. Import Programs

Setting up Scan Assistant (continued)

f. Select Import. The Program(s) you selected are stored to the Versana Active. You can add it to the exam category and user.

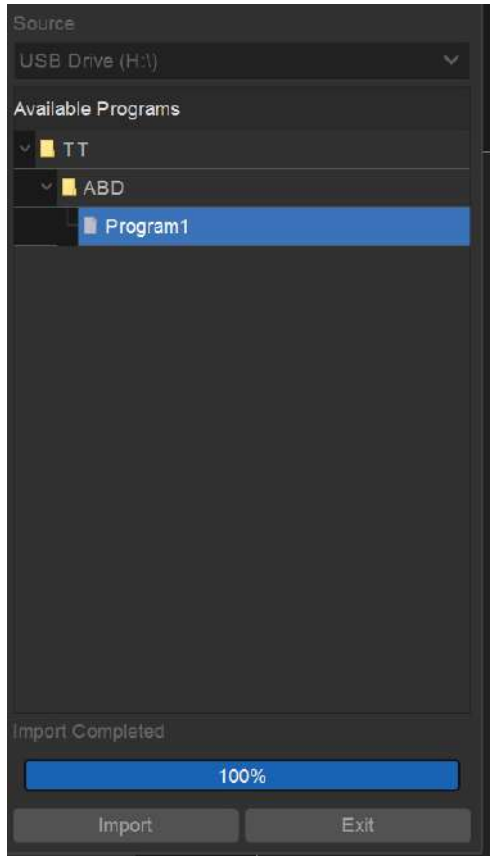


Figure 5-84. Import Completed

Setting up Scan Assistant (continued)

2. Assign the imported Program to the exam category and user. Under Program Selections on the right-hand side of the Scan Assistant Manager page, specify the Exam Category and User for this Program. You can select All Users, or a specific user. If you specify All Users, all users will have the ability to use this Program while in the specified exam category, unless the user has his/her own list defined.
3. Select the imported Program from Available Programs -> Custom Programs on the left-hand side of the page. Then move the imported Program to the exam category and user selected above.

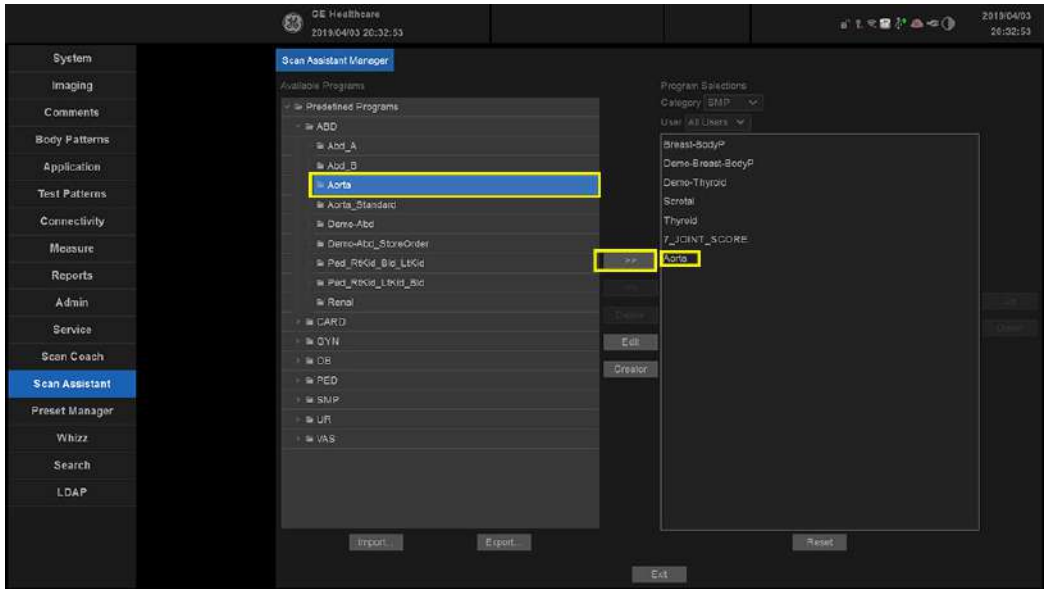


Figure 5-85. Add Program

Setting up Scan Assistant (continued)

You can access the Scan Assistant Creator to edit the exam's program from the imaging display via the Creator Icon located at the bottom of the Scan Assistant Program monitor on the display. You can activate the Scan Assistant Creator from the image screen, make edits, and then run Scan Assistant to test your changes.

NOTE: If you edit the program after you have already stored several images, and your edits change the number of program steps, you are prompted to Restart or Continue the Scan Assistant program.

NOTE: If you edit the program after you have already completed several steps, checkmarked steps remain checkmarked, even if you insert a new step between checkmarked steps. If this is not correct, you can edit the checkmarks or restart the program.

Using Scan Assistant

After you have set up Scan Assistant, the Program is active when you exit the Patient menu. The Program is located on the left-hand side of the display and as you can see in the example below, the annotation for the first step has been automatically noted on the image, ready for you to scan the specified anatomy.



Figure 5-86. Scan Assistant Display

Using Scan Assistant (continued)

1. Follow the steps indicated in the Program: image/measure the appropriate anatomy.
2. Perform the indicated trigger to move to the next step in the Program.

NOTE: The footswitch can be used with Scan Assistant. You can map Pause/Resume, Previous Step, and Next Step to the footswitch.

3. To pause or unpause Scan Assistant, press the pause button on the display.
4. To stop or restart a Program, press the Stop icon at the bottom of the Scan Assistant Program. A dialog pops up. This dialog lets you restart the current Program, start another Program, or stop Scan Assistant.
5. To skip a step or move to a certain step, press the up/down arrows on the keyboard or select the step you want to move to using the Trackball and Set key.

Exporting Scan Assistant Programs

Exporting Scan Assistant Programs allows them to be imported to another Versana Active or to be edited offline with the Scan Assistant Creator tool. To export a Program,

1. Insert the media to save the Program.
2. Press Utility -> Scan Assistant.
3. Select Export from the Scan Assistant Manager page.
4. In the Source field at the top of the Export Programs pop-up, select the media that the Program is to be stored on.
5. Specify the Program Directory using the drop-down menu if the desired Program Directory already exists on the media. If not, or if you want to export the Program to a new Program Directory, type a new Program Directory name in the field.
6. Select the Program(s) to be exported. If a folder is selected, all programs in the folder will be exported.

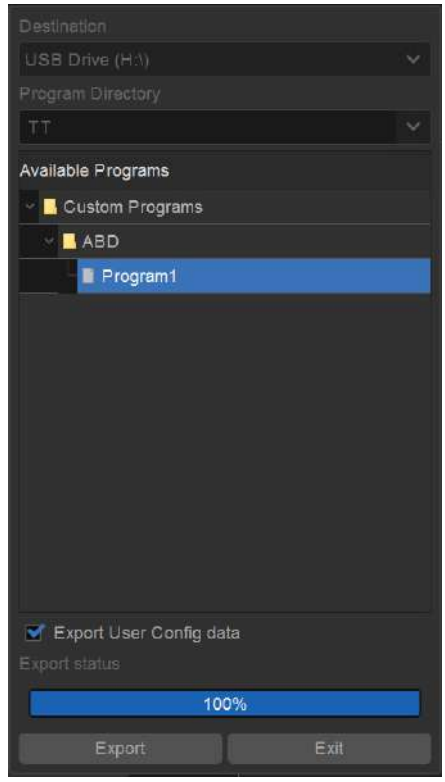


Figure 5-87. Export Programs

7. Select Export. The Program(s) you selected are stored to the media. You can now import it to a new Versana Active.

SonoBiometry (AFB)

SonoBiometry (AFB)

SonoBiometry (AFB) is an alternative to the common fetal biometry measurements. It provides system suggested measurements for AC, BPD, FL, HC and HL which need to be confirmed by the user or can be changed manually.

NOTE: SonoBiometry is only applicable for Hadlock.

Table 5-14: List of Abbreviations

Abbreviation	Full Form	Definition
AC	Abdominal Circumference	Abdominal Circumference of the baby’s abdomen
BPD	Biparietal Diameter	Transverse distance between the protuberances of the two parietal bones of the skull
FL	Femur Length	The length in centimeters of the developing baby's femur (the femur is the long bone in the human thigh)
HC	Head Circumference	Head Circumference of the baby's head
HL	Humerus Length	The length of the Humerus

SonoBiometry (AFB) (continued)

Using SonoBiometry (AFB)

1. Press ***Utility*** and then select System.
2. Select System Measure.
3. Check the desired boxes under SonoBiometry (AFB) Option Selection to enable system suggested measurements.

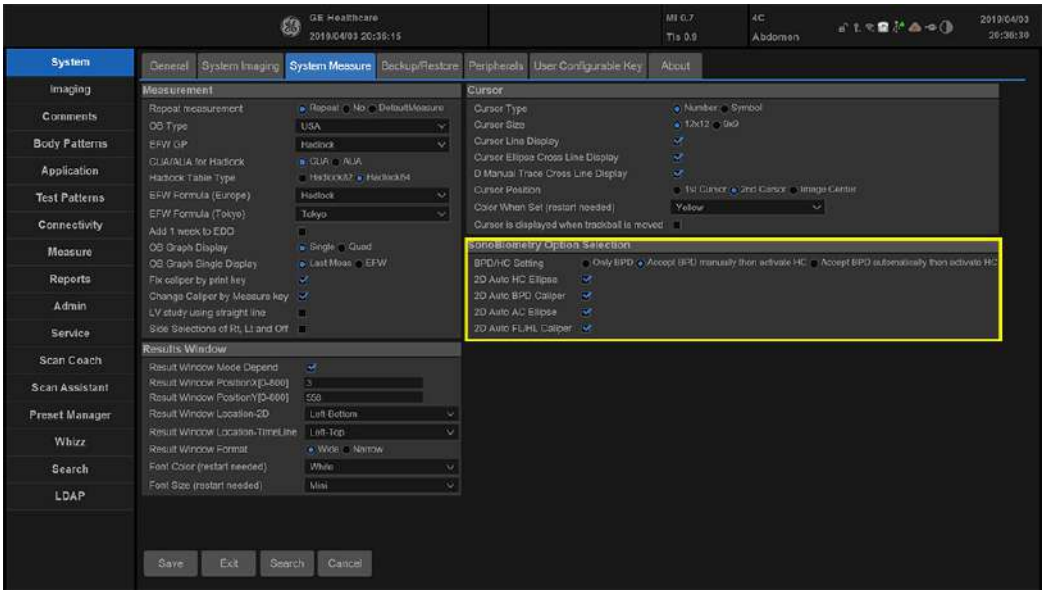


Figure 5-88. SonoBiometry (AFB) checkboxes

Using SonoBiometry (AFB)

- Select OB.
- Press **Measure**.
- Select BPD/HC/AC/FL/HL.

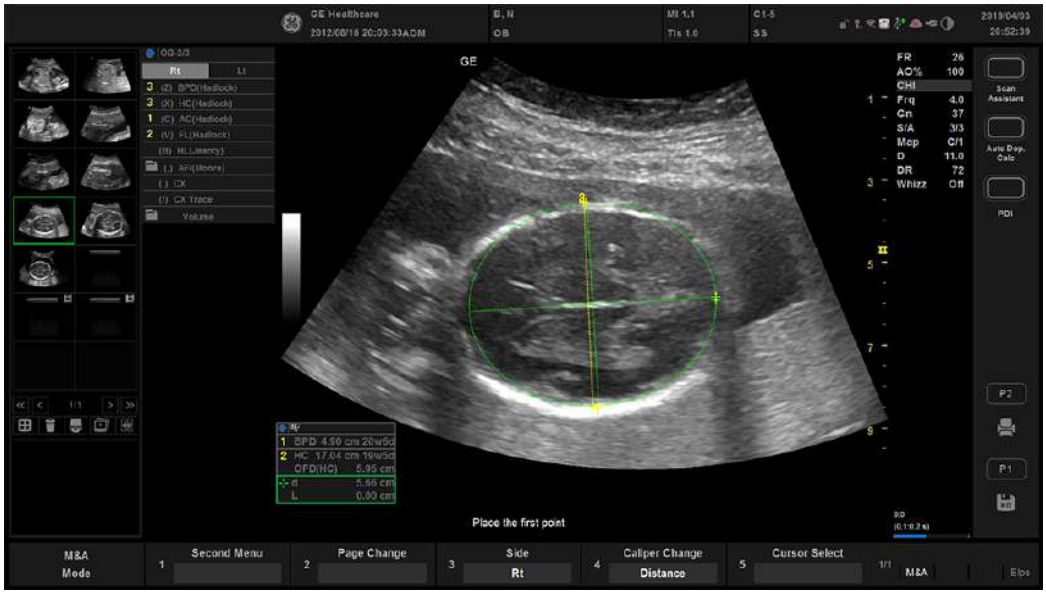


Figure 5-89. SonoBiometry (AFB) option

NOTE: SonoBiometry (AFB) measurements are supported on only recalled raw DICOM images and frozen images.

Using SonoBiometry (AFB) (continued)

You can not use SonoBiometry (AFB) measurements on the following images:

- Images displayed in Dual/Quad view. In these views, an SonoBiometry (AFB) measurement will change to manual measurement automatically.
- Zoomed image.
- Rotated image.

NOTE: If a particular scanned image does not have valid fetus data, a warning message appears: "Auto measurement failure. Adjust calipers manually ...".

NOTE: If a particular image is not supported for SonoBiometry (AFB) measurement, a warning message appears: "Auto measurements do not operate on DICOM images. Using manual measurement ...".

Chapter 6

Scanning/Display Functions

Describes additional ways in which to adjust the image. In addition, describes additional ways to get useful information electronically.

Zooming an Image

Introduction

Zoom is used to magnify a zoom region of interest (ROI). The system adjusts all imaging parameters accordingly. You can also zoom frozen images.

To zoom an image, rotate **Zoom**/**Ellipse** clockwise. A reference image appears in the lower, left-hand section of the display.

To exit zoom, press **B**-Mode or rotate **Zoom** counterclockwise until the reference zoom image is removed.

Reference Image is the small un-zoomed image displayed next to the zoomed image.

Bioeffect

Write Zoom an image changes the frame rate which tends to change thermal indices. The position of the focal zones may also change which may cause the peak intensity to occur at a different location in the acoustic field. As a result, the MI (TI) may change.



Acoustic Output Hazard

Observe the output display for possible effects.

Read vs. Write Zoom

Read Zoom

To activate Read Zoom, turn the **Zoom** button.

Read Zoom magnifies the display of the data without making any changes to the ultrasound image data that is acquired.

Available in a live, frozen, cine, or recalled raw data image.

Write Zoom

To activate Write Zoom, press the **Zoom** button.

With Write Zoom, the Ultrasound line density and/or sampling frequency increases, giving a better resolution.

Available only in pre-processing.

NOTE: Write zoom window size (height and width) can be set via Utility ->Imaging -> B-Mode.

NOTE: The difference between Read Zoom and Write Zoom can be described in relation to photography. With a photograph, Read Zoom manipulates the negative and enlarges the picture; whereas Write Zoom uses a telephoto lens to bring the image closer before taking the picture.



HINTS

First use the Read Zoom (turn button) to get to the area of interest, then use Write Zoom (press button).

Split Screen

Overview

Versana Active supports the following multiple image format:

- Dual (split the window area into 2 areas)
- Wide Dual (split the window area into 2 areas, but wider than the normal dual)
- Quad (split the window area into 4 small areas)

  This is useful, for example, when measuring AFI.
- Simultaneous

Dual/Quad

To activate a dual split screen, press **Dual**. To activate a quad display, press **Quad**.

When you activate Split Screen by pressing **Dual**, the single image is placed on the left side.

To switch between active images, press **Dual**.

To deactivate, press **B**.

NOTE: To put a copy of the image on the opposite side when entering dual split screen, use the "When Entering Dual Image..." preset via Utility --> Application --> Settings.

Simultaneous mode

While using CFM or PDI, press the **Dual** and **Quad** keys simutaeously to display B and B+CFM, or B and B+PDI in real-time on the left and right side.

It is useful to observe the ROI in B-Mode.

Dual Caliper

In split screen, you can draw a caliper, area, ellipse, or spline trace on both the left and right image at the same time. Whichever side of the screen that you annotate is called the “Original” graphic. The copy is called the “Shadow” graphic.

This feature is available in the following modes:

- B-Mode
- Color Flow Mode
- Simultaneous Mode.

NOTE: Dual Caliper IS NOT available in PW Mode or M Mode, or with different probes.

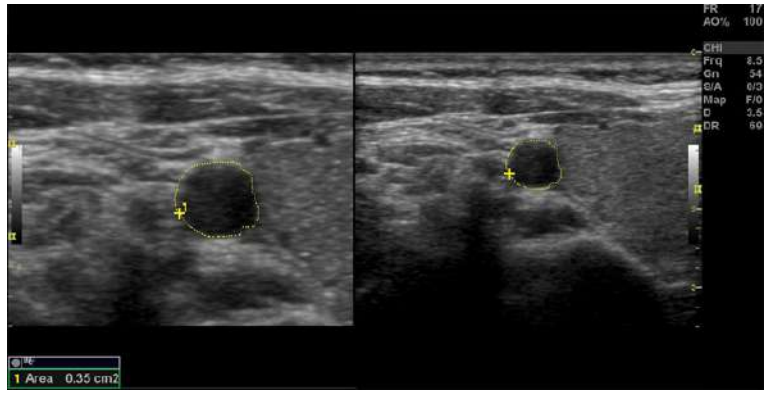


Figure 6-1. Original (Left), Shadow (Right)

Dual Caliper (continued)

NOTE: Only the Original graphic contains the graphic numbering. In this way you can always distinguish between the original and the Shadow graphic.

NOTE: You can only edit the Original graphic; however, when you do edit the Original graphic, the Shadow graphic is also edited at the same time.

NOTE: If you delete either graphic, both are deleted.

NOTE: When a measurement is selected without Dual B-Mode images or with different probe images, a warning message is displayed on the status bar and the selected measurement is cancelled.

NOTE: If the first point of the original graphic is out of the shadow image area, then the warning message displays on the status bar and the shadow graphic is not drawn.

NOTE: The Trackball move area is limited to the narrow area of both images.

NOTE: You cannot take a measurement across dual images.

NOTE: The 2D Dual measurement tool cannot be copied.

Dual Caliper (continued)

Dual caliper for 2D image

2D Dual Caliper / 2D Dual Area / 2D Dual Ellipse / 2D Dual Spline Trace / 2D Dual Circle are not available through the factory default. To enable these measurements, add a new measurement using “2D Dual Caliper”, “2D Dual Area”, 2D Dual Ellipse”, “2D Dual Spline Trace” or “2D Dual Circle” tool in the Utility--> Measure--> M&A preset menu.

1. Select Blank from Add measurement.

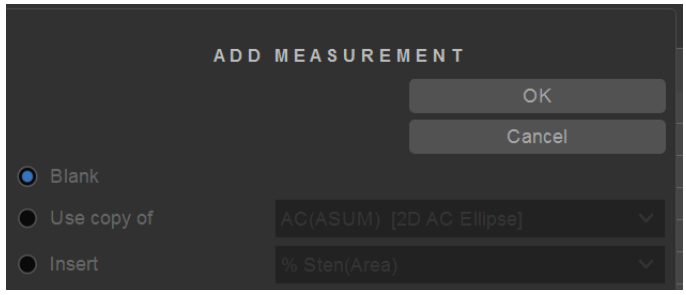


Figure 6-2. Add Measurement

2. Select appropriate dual caliper tool from Tool drop-down menu.

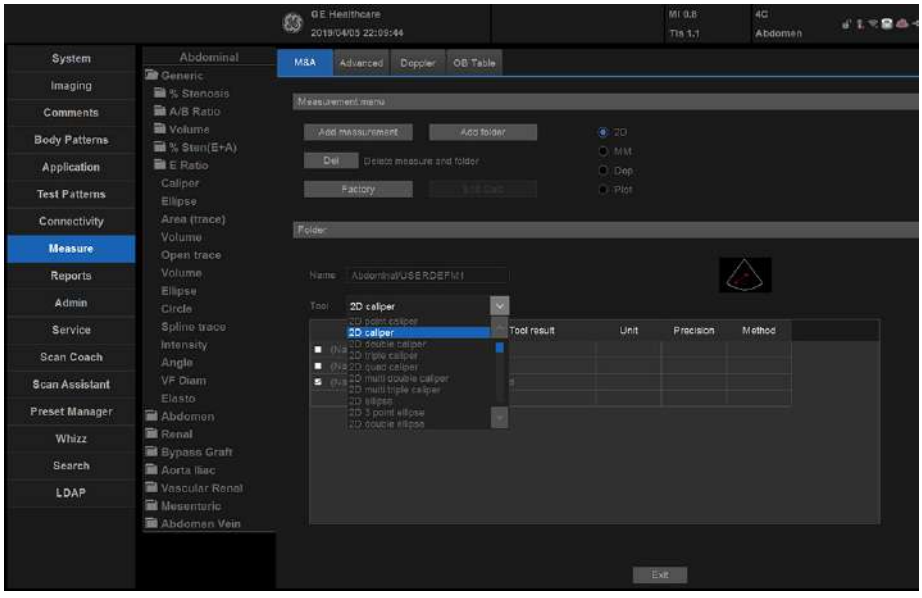


Figure 6-3. Drop-down menu

Using Voice Comment

Introduction

Voice comment is used for saving voice comments on scan or cine loop.

Using Voice Comment

To use voice comment during scanning,

1. Connect the Microphone to the system.
2. Press **Comment** key on the key board. Press **VoiceRecord** on the primary menu.
3. Press the icon again to complete and save the comments.

To play or review the voice comment,

1. Press **VoicePlay** on the primary menu. The system will play the voice comments.

Freezing an Image

Introduction

Freezing a real-time image stops all movement and allows you to measure and print the image.

NOTE: While the image is frozen, all Power Output is suspended.

NOTE: Selecting a new probe unfreezes the image.

Freezing an image

To freeze an image,

1. Press **Freeze**. The Freeze key backlight turns green. Image is on freeze mode (Frozen image).

If you are in a mixed mode, both screen formats stop immediately. Deactivating Freeze restarts both modes and places a black bar on the trace to indicate the time discontinuity.

To reactivate the image,

1. Press **Freeze** again. The Freeze key backlight is turned off (unfreeze). Image is on real time scan mode (Live image).

NOTE: Deactivating Freeze erases all measurements and calculations from the display (but not from the report).

Use the Trackball to start CINE after pressing Freeze.

Post processing

You can use the following controls to process a frozen B-Mode image.

- Revert
- Zoom
- Rejection
- SRI-HD
- Dynamic Range
- Colorize
- Gray Map
- Rotation
- Biopsy Kit
- Edge Enhance

You can use the following controls to process a frozen Color Flow or Doppler Mode image.

- Invert
- Threshold
- Map
- Transparency Map
- Biopsy Kit
- Baseline
- Map Compress
- SRI-HD
- Rejection
- Colorrize
- Revert
- Edge Enhance
- Gray Map
- Rotation
- Dynamic Range

Using CINE

Introduction

CINE images are constantly being stored by the system and are available for playback or manual review via CINE.

Timeline data is continually stored at four times the display width of time line data (and updates the corresponding B-Mode images).

You can view CINE as a continuous loop via CINE Loop or manually review CINE images frame by frame via the Trackball.

Data in CINE is available until new data is acquired. CINE is stored on the system's memory and can be archived as well.

CINE is useful for focusing on images during a specific part of the heart cycle or to view short segments of a scan session.

Activating CINE

To activate CINE,

1. Press **Freeze**.
2. Move the Trackball.

Cine gauge and Monitor Display

The Cine gauge (located on the right-hand side of the monitor) indicates which frame you are viewing of the whole loop (62:123), as well as the time at which this frame occurs within the loop (1.6:3.2 s).

NOTE: The CINE gauge turns green when a Prospective CINE Clip is pending.

Using CINE

Table 6-1: Cine Mode Menu description

Parameter	Description
Loop Speed	Adjust the CINE Loop playback speed.
Cycle Select	Select the heart cycle to review.
Start Frame	Select the start frame.
End Frame	Select the last frame.
Frame by Frame	Review the CINE image frame by frame manually.
Select All	Select all frames of the cineloop.
Sync Mode	Phase synchronizes multiple CINE Loops.
First	Move to the first frame of cineloop.
Last	Move to the last frame of cineloop.
Run/Stop	Start/Stop the cineloop review.
Enhancement	Adjust the Enhance state.
Cine Capture	Enter QAnalysis.
Num Cycles	Control the number of heart cycles to be included in the CINE Loop.

Cine Loop Start/Stop

1. Press **Freeze**.
2. Rotate the **Trackball** horizontally to display the CINE Loop.
3. Select ***Run/Stop*** to playback the loop.
4. Select ***Run/Stop*** again to stop the CINE Loop.

Select the start/end frame

1. Adjust **Start Frame** to select the start frame.
2. Adjust **End Frame** to select the end frame.

Storing / Recalling CINE Loops

To store a CINE Loop, press Run, then press the assigned print key. CINE Loops stored on the Clipboard are indicated with a movie strip icon.

To recall a CINE Loop, double click on the loop on the clipboard.

Synchronize CINE Loops

1. Recall stored cine loop to right side of dual screen.
2. Recall same cine loop to left side of dual screen.
3. Change visualization of left side image
4. Select ***Sync mode*** to start the synchronization.

Cine Mode Selection

To scroll the CINE Loop only, toggle the Trackball key.

Velocity Scale with B-Mode Only

If you review the B-Mode CINE Loop while in Doppler Mode with the Timeline using Scroll B, the Velocity Scale displayed with the Timeline is for the time phase of the currently-displayed B-Mode image, NOT for the time phase of the acquired Doppler Spectrum.

Check the velocity value with the measurement function if you review the CINE Loop using Scroll B. Note that there may be a discrepancy between the velocity scale displayed and the velocity measured using the measurement function.

Preview

Loop Preview can now be enabled independently for Time -Based Store and Mark CINE. This is useful for setting preview preferences based on the application.

Annotating an Image

Introduction

The comment function provides the capability to type the comments of free text and/or insert the pre-defined comments from the comment library. It also provides the user with arrow markers to point to parts of the image.

Pressing the **Comment** key or any keys on the alphanumeric keyboard initiates the comment mode. This assigns the trackball function to controlling the cursor and displays the comment library on the menu area.

In comment mode, text can be added by using the comment library or by typing from the alphanumeric keyboard.

Comments can be erased by powering down, when you press ***Clear*** or ***End Exam***, or when preset via Utility -> Comments.

Introduction (continued)

In addition, the display's home position can be changed (preferred comment area) for each display so that all subsequent comments begin in the same spot.

Pressing the ***F7 (Cursor Home)*** key returns to the user specified position or factory default position.

A new cursor home position is established by placing the cursor in the desired position and pressing ***Shift+F7.***

Comment Mode is activated by pressing the ***Comment*** key. Comment Mode can also be automatically activated by typing from the alphanumeric keyboard.

NOTE: In this case, the cursor begins at the same location where the comment mode was exited.

After activating the comment mode, a vertical bar type cursor appears on the screen. Use the ***Trackball*** to move the cursor.

The factory default color for comments is yellow. The color selection can be changed to any of the colors available on the system. The choices are white, yellow, bright red, orange, etc.

NOTE: The user cannot change the Font Family.

To indicate a specific comment or text group is selected, the color turns to green. Once the comment is set or fixed, the color returns to yellow or to the user selected color.

NOTE: If selected "Automatically Set Text" in Utility -> Comments -> Comments, the system sets the comment at the cursor position automatically when text entry is complete.

To delete comments by character, press the ***Backspace*** key.

To delete all comments and arrow marks, press the ***Clear*** key twice immediately after entering the comment mode.

To exit the Comment/Library Comment function, press the next function you wish to do.

To move by words or by text group, press the ***Tab*** key.

Adding Comments to an Image

Comment Retention

Comments from the B-Mode images are retained and carried over when switching to multi-image format or duplex mode.

The position of the comments is adjusted so that it is at the same relative position with respect to the display window in the new format as it was in the single image format.

NOTE: Comments may not be retained when the image is switched to M-Mode image format depending on the preset.

Arrow Pointers

Arrow pointers can be used by activating the ***F2 (Arrow)*** key on the keyboard. When the pointer comes up, it is a GREEN color, indicating it is active and can be moved.

- Move the pointer using the **Trackball** to any place on the screen. The pointer head direction can be controlled by movement of the Trackball or ***Arrow Rotate***.
- To readjust the length and thickness of the pointer, use the **Arrow Width** or **Arrow Length**. The default for the pointer size can be preset.
- Press **Set** to fix the place of the pointer and direction of the pointer head. The GREEN color turns to YELLOW (or the default color if changed).
- To delete the arrow marks, press the ***Clear*** key right after pressing the ***F2 (Arrow)*** key.

*NOTE: To erase all comments as well as arrows, press and hold the **Clear** key.*

NOTE: To prevent the Trackball from changing the arrow angle, select the "Keep Arrow Angle" preset at Utility -> Comments -> Comments.

Text Overlays

There are 2 layers of the text in comments, which can be selected by toggling the ***F8 (Text1/Text2)*** key on the keyboard. Text1 is the default choice.

By using this function, users can perform a HIDE TEXT/SHOW TEXT, allowing the users to save or print an image without clearing the typed text.

You can specify to display text 1, text 2, or both. This allows you to have some comments that do not change during the exam while allowing you to change the other comment. Toggle the ***F8*** key to cycle through the three Text 1/Text 2 states:

1. Text 1 Only -- Only Text 1 displays.
2. Text 2 Only -- Only Text 2 displays.
3. Text 1 and Text 2 -- Both displayed; only Text 2 comments editable. Only Text 2 comments erased by Clear key. Word Delete only deletes Text 2 comment. Both Text 1 and Text 2 comments erased with new patient, new exam, or probe change.

To preset the Text Overlay Sequence, go to ***Utility -> Comments-> Comments*** and select either **Text 1 and Both** or **Text 1 and Text 2 and Both**.

The font color for the Text1 and Text2 overlays can be set separately. Go to ***Utility -> Comments-> Comments*** and specify the text color for Text 1 Color and Text 2 Color.

NOTE: If you check "Erase when image is unfrozen" in the Utility menu, only the editable text plane erases when you unfreeze the image.

Annotating an image with typed words

- Press **Comment** and type the comments where the cursor is currently located (the display's home position) and use the **Trackball** to further place the comment cursor in the desired location.
- Press ***Enter*** to move to the next line.

NOTE: Comments wrap to the next line when they are within one character of the right margin if Word Wrapping is selected in the Text Boundary preset. See 'Comments Libraries/Comments Preset Menu' on page 16-52 for more information.

The word wrap starts one line below the start of that comment.

Comments appear on all prints, photos, DVR or CINE loops.

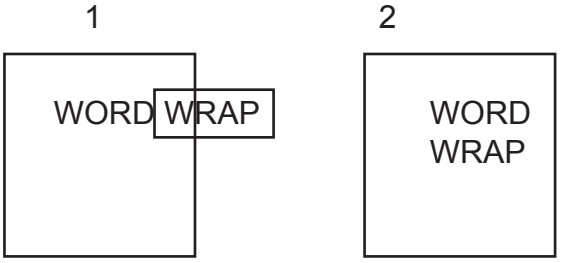


Figure 6-4. Next Line Word Wrap

1. Before
2. After

If the cursor appears at the right edge of the lowest line, or a word cannot be completed in the lower right corner, word wrap cannot be executed.

NOTE: The same word wrap principles apply for library scripts as typed comments.

Annotating an image using the library

To reduce the amount of time spent annotating an image, store frequently-used comments in the Comment Library. As many as 6 libraries are available per study. One of the selected libraries is designated as the default and its entries shall be displayed on the menu the comment mode is activated for that study.

Press **Comment** and move the comment cursor location using the **Trackball**.

Select the desired comment from the menu.

To program your system with specific comments, see ‘Comments Libraries Presets’ on *page 16-49* for more information.

Moving Texts

You have the ability to move comments already on the screen and place them in different locations.

- Place the cursor on the desired text or text group and press ***Set***.
- The selected text color turns to green.
- Use the ***Trackball*** to move the selected text and press ***Set***.

Editing while annotating

Backspace over any error(s) made. Blank spaces take the place of the letter(s) that were there. Continue typing the comment after backspacing over all incorrect letters.

To delete previous character(s):

- Press ***Backspace*** as many times as necessary to make the deletion.
- Once all texts within the selected text group are deleted, then the cursor will find another text group to delete to the upper left direction.
- If there is no more text to delete, the cursor will be located at home position.

To move through the text a word at a time:

- Press ***Tab*** to move to the right by text group (Preset Keyboard Tab = Word)

NOTE: Press Shift + Tab to move to the left.

To activate the last text group typed or selected from the Library:

- Press ***F9 (Grab Word)*** key. The selected comment will be highlighted.
- To increase/decrease the area of the highlighted selection, adjust **Highlight**.

NOTE: Once the text is highlighted, typing comments or choosing them from the library replaces the highlighted text.

NOTE: To select all text groups, Press Shift + F9 (Grab Word) key.

To cancel the last action:

- Select **Undo**.

When the text reaches the limitation of the annotation input, the system will provide a message “The annotation text is max”. More text is not allowed to be added.

Body Patterns

An additional way to annotate the image display is with body patterns. Body patterns are a simple graphic of a portion of the anatomy that is frequently scanned. The body pattern and probe marker can serve as a reference for a patient and probe positioning when im ages are archived or scanned.

Press the **Body Pattern** key on the control panel to enter into body pattern mode. A series of body pattern packages are displayed according to exam category and preset. See ‘Body Pattern Libraries/Applications Preset Menu’ on *page 16-59 for more information.*

The body pattern packages may be customized to accommodate user preference. Up to 30 individual body patterns in the packages can be changed. See ‘Body Pattern Libraries/Libraries Preset Menu’ on *page 16-55 for more information.*

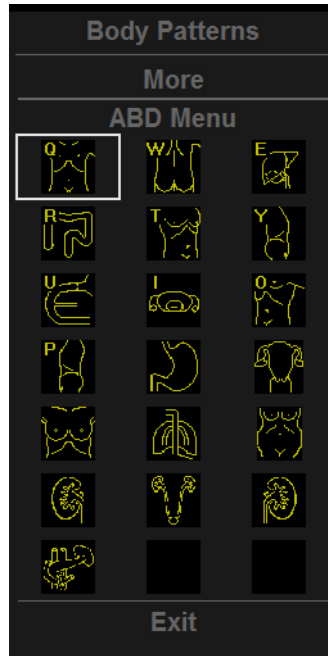


Figure 6-5. Displays of Body Pattern - example

Body Patterns (continued)

Select the desired body pattern and the selected body pattern is displayed on the monitor.

- Select **Move Pattern** on the primary menu to reposition the body pattern with the **Trackball** and **Set** controls.
- Move the body pattern to the desired location.
- A probe mark is associated with the body patterns and illustrates the probe position on the body pattern. This marker can be placed with the **Trackball** and rotated with probe.
- The probe mark type is selectable by adjusting **Probe Type**. There are different choices available with one being a blank selection.
- To clear the body pattern, press the ***Body Pattern*** button to activate body patterns and then select the ***Clear*** key.

Notes for Body pattern (Probe mark)

- Probe Type is the type of probe mark displayed on the body pattern. It can be saved only for each body pattern on the screen while body pattern is activated, but not in the Utility preset menu. Therefore, Probe Type cannot be saved as an Application or System Preset.

  To save the Probe Type,

  a. Activate the **Body Pattern**.
  b. Select a Body Pattern.
  c. Select a type of probe mark with ***Probe Type***.
  d. Place the probe mark at the proper location.
  e. Select **Set** on the control panel to save the body pattern.

- When a Body Pattern is selected and no Probe Mark has been saved on it, the latest used Probe Mark is carried over to the Body Pattern.

Body Patterns (continued)

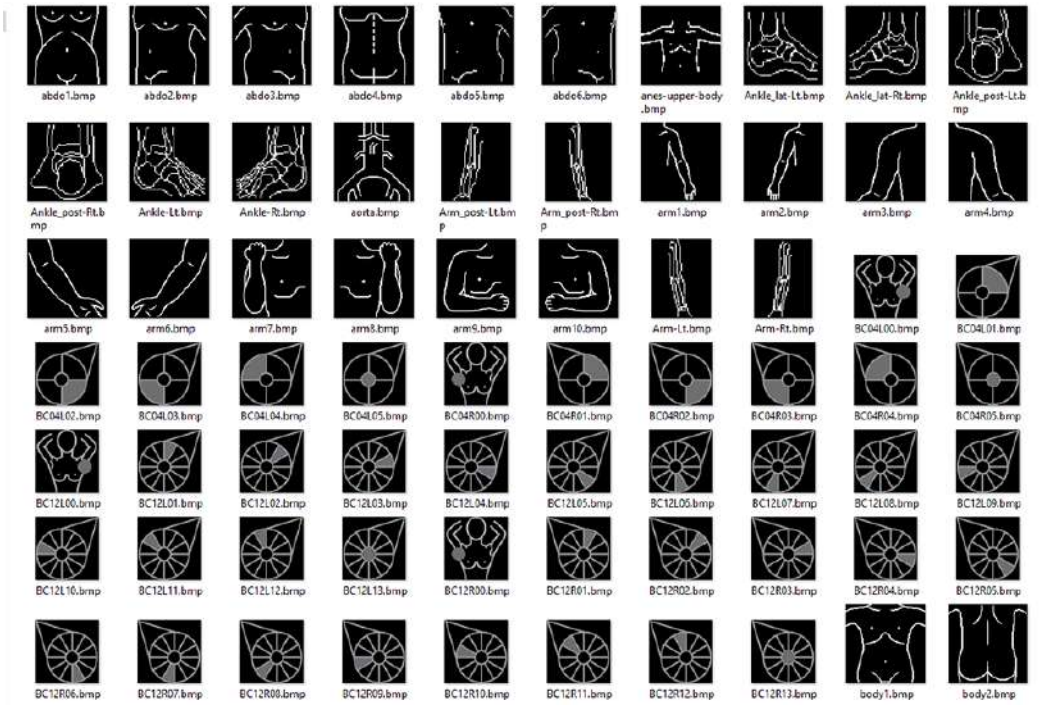


Figure 6-6. Body Patterns Available

Body Patterns (continued)

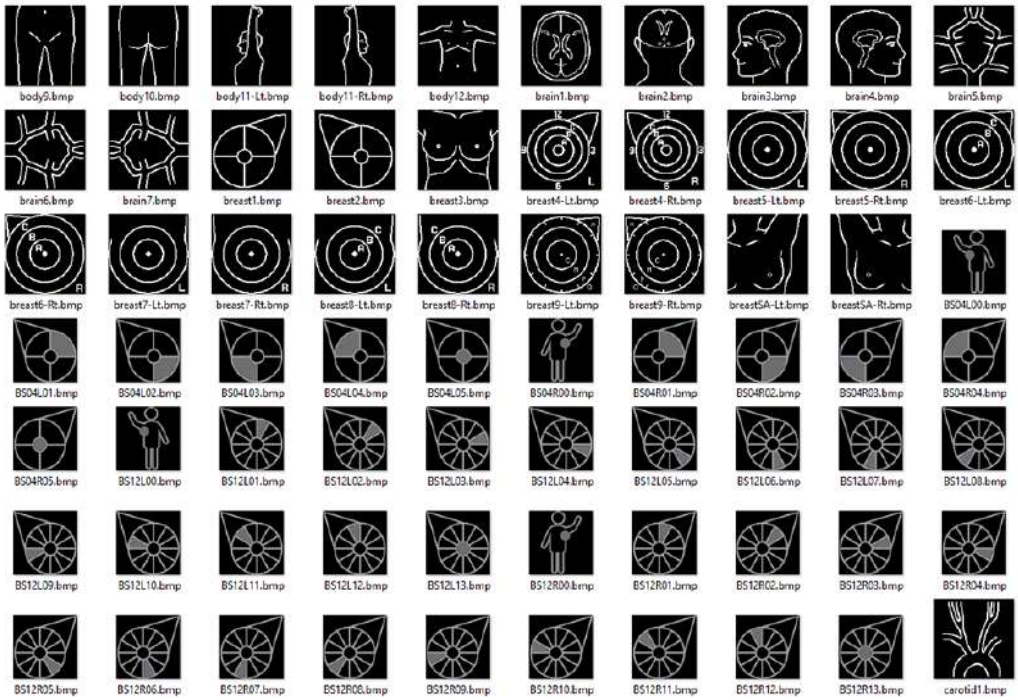


Figure 6-7. Body Patterns Available (continued)

Body Patterns (continued)

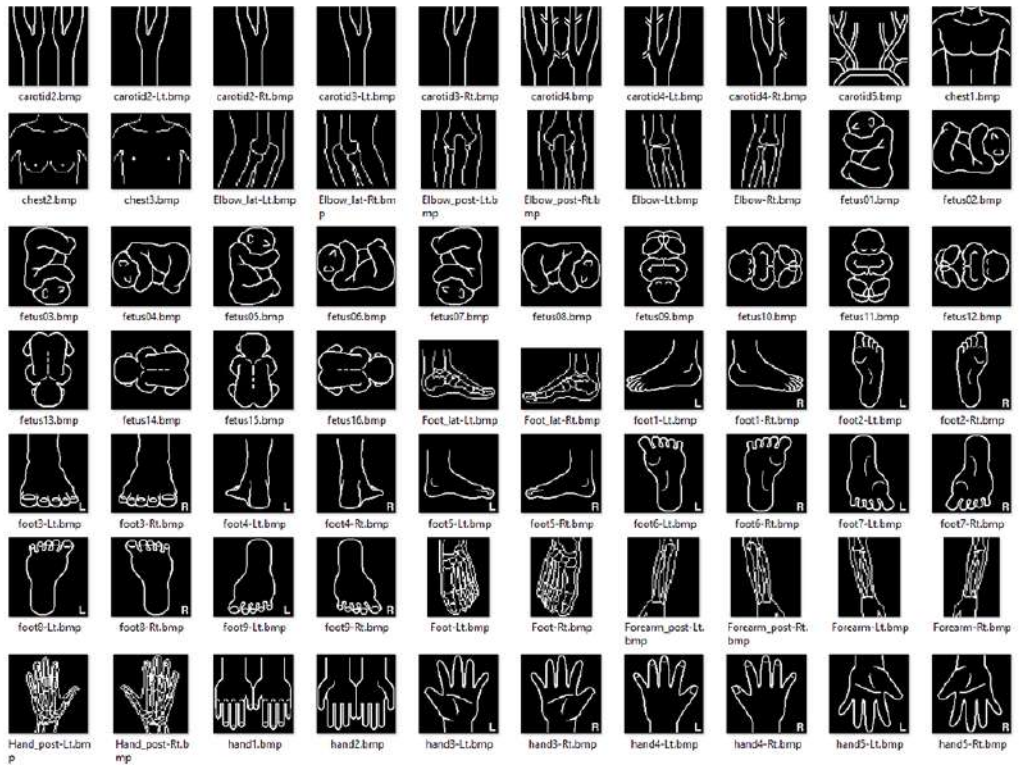


Figure 6-8. Body Patterns Available (continued)

Body Patterns (continued)

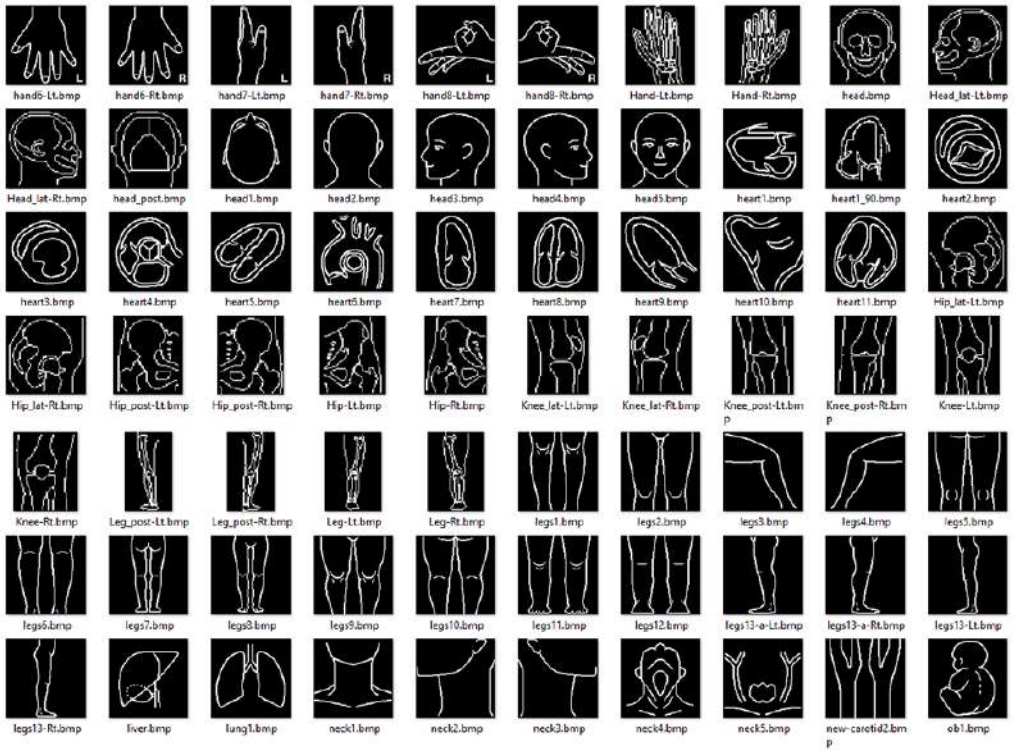


Figure 6-9. Body Patterns Available (continued)

Body Patterns (continued)

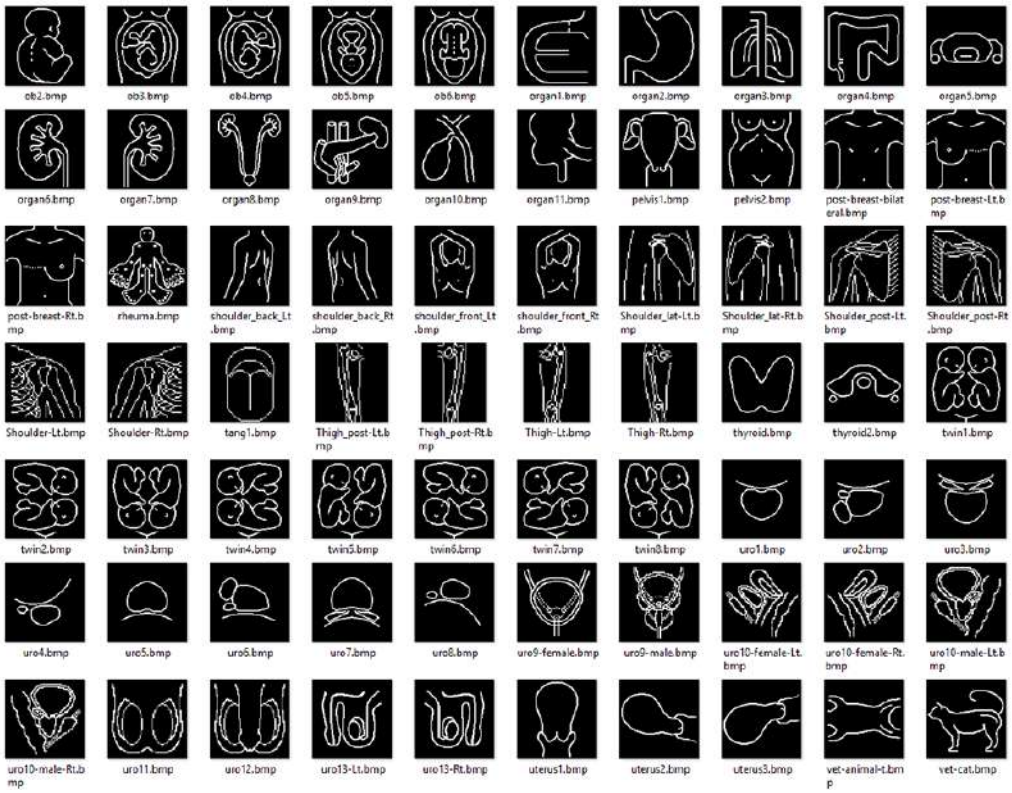


Figure 6-10. Body Patterns Available (continued)

Body Patterns (continued)

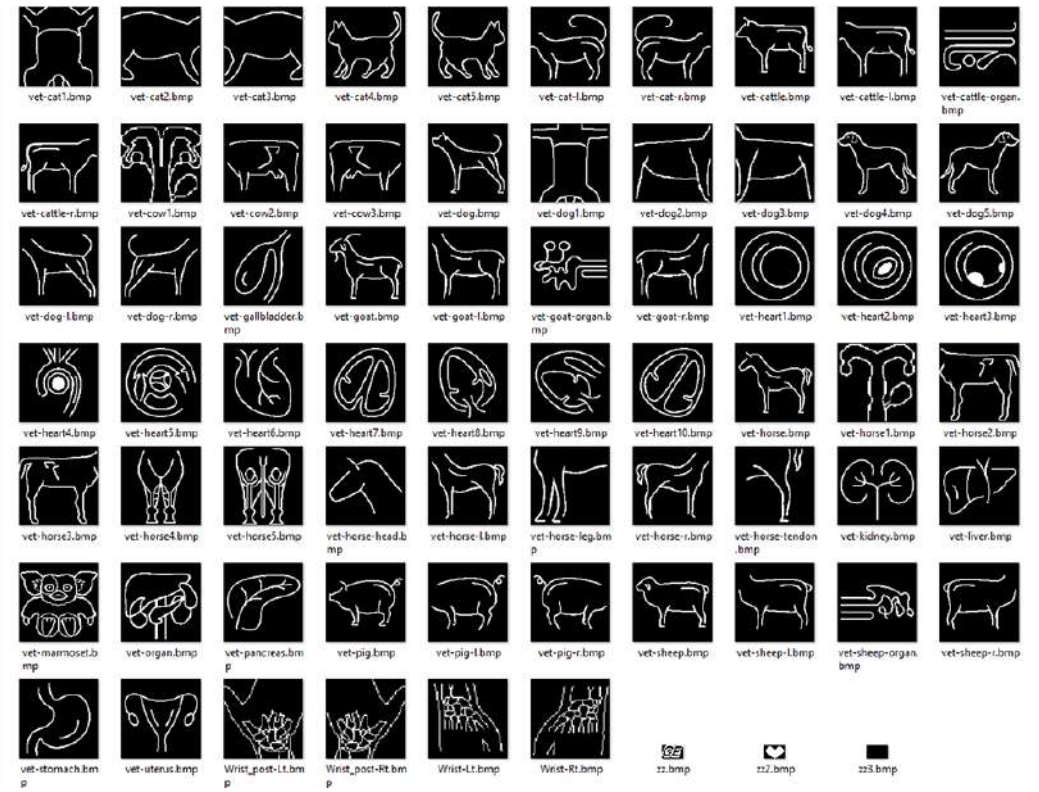


Figure 6-11. Body Patterns Available (continued)

Using the Fast Key

Overview

A keyboard Fast Key is available to record and run a sequence of often-run keystrokes.

NOTE: Ensure that you have a patient selected prior to running the Fast Key operation.

Create a Fast Key

1. Press the ***F5*** key. The “Select OK to create a new Fast Key” dialog displays. Select OK to continue, refer to Figure 6-12 *on page 6-30*

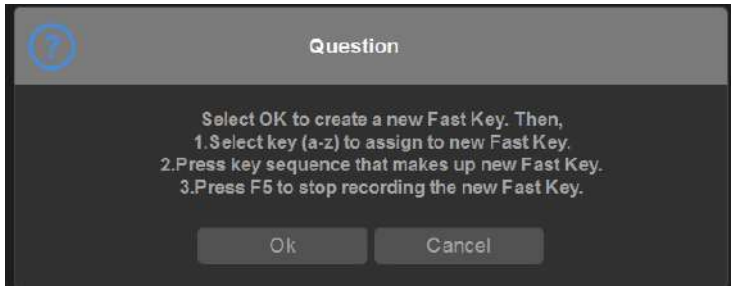


Figure 6-12. Fast Key

2. Select a key to assign a Fast Key to (a-z, 0-9).

   If you select any key besides a-z or 0-9, a warning dialog displays and the procedure is cancelled.

NOTE: Assign Fast Key Function to Key 0 - 9 in Utility -> System -> User Configurable Key before you create a Fast Key.

NOTE: There is no distinction between capital and small letters.

NOTE: The key code is the same in Russian and Greek (a-z, 0-9).

Create a Fast Key (continued)

3. If the selected key is already assigned to a Fast Key, a warning dialog displays.

   Select ***Yes*** to continue. The Fast Key macro file is overwritten.

   Select ***No*** to cancel the Fast Key macro setup.

4. Input the key sequence to be assigned.

NOTE: It is impossible to save a power cycle sequence or any input from outside of the system.

NOTE: The warning dialog displays due to the limitations of the number of key sequences. Press F5 to finish and retry.

5. Press the ***F5*** key to complete a Fast Key macro setup. The information dialog displays. Select ***OK***.

Start a Fast Key

1. Press the ***F6*** key to start a Fast Key. The message “Select the key which the Fast Key is assigned to” displays on the status bar.

NOTE: The F6 key is ignored if another dialog displays on the system.

NOTE: If you press F5 after F6, the F6 function cancels and the F5 function is enabled.

2. Press the key assigned to the Fast Key macro. The message “Fast Key playback is finished” displays on the status bar when the macro is finished.

   To stop the Fast Key macro during the operation, press ***F6***. The message “Fast Key playback is cancelled” displays on the status bar.

NOTE: Select the running speed in the Run Macro Speed preset on Utility -> System -> General.

Backup and Restore the Fast Key

You can backup/restore the key macro via Utility -> System -> Backup/Restore.

To backup, select User Defined Configuration in the Backup section.

To restore, select User Defined Configuration in the Restore section.

Using InSite ExC

InSite ExC

InSite ExC is your direct link with a GE Online Service Engineer or Applications Support Engineer or a Request for Service via the InSite ExC link at the upper right of the display screen.



Figure 6-13. InSite ExC Icon

Types of InSite ExC Service

1. **Contact GE**. Opens a service dispatch with GE Service.
2. **Configure Agent**. Use to access InSite ExC Configuration window.
3. **EZ Configuration Wizard**. Use to configure some common system settings.
4. **Temperature And Power**. Use to check the temperature log.
5. **EZ Diagnostic**. Use to analyse the system error automatically.
6. **Versana Club**. Use to enter Versana Club.

Configure Agent

To access InSite ExC Service configuration window,

1. Click InSite ExC Icon at the upper right of the display screen. Select **Configure Agent** from the list.

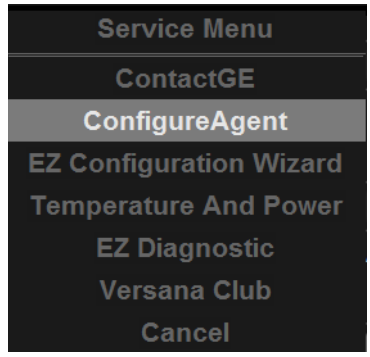


Figure 6-14. Service Menu

2. On configuration window, do the proxy configuration if **Proxy Configuration** is required. Select **Submit**.

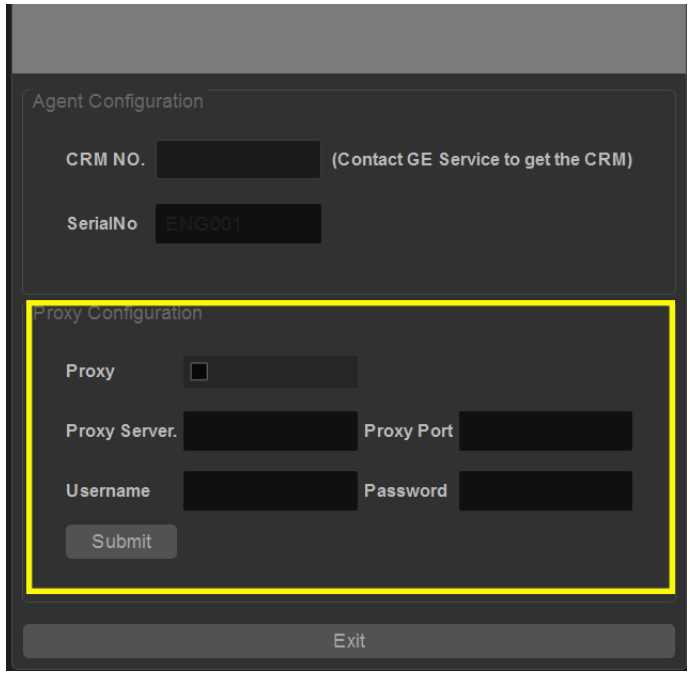


Figure 6-15. InSite ExC configuration

Initiating a Request for Service (RFS)

To initiate an RFS,

1. Position the Windows pointer on top of the GE InSite ExC icon at the top right of the display.
2. Press **Set** Key, select **ContactGE**. This opens of the RFS screen which sends a service dispatch directly to GE Service after you fill in the following information:
   - Problem Type
   - Problem Area
   - Problem Description
   - First Name
   - Last Name
   - Phone Number
   - Email
3. After you have completed filling in all of this information, press ***Submit*** to initiate the Request for Service.

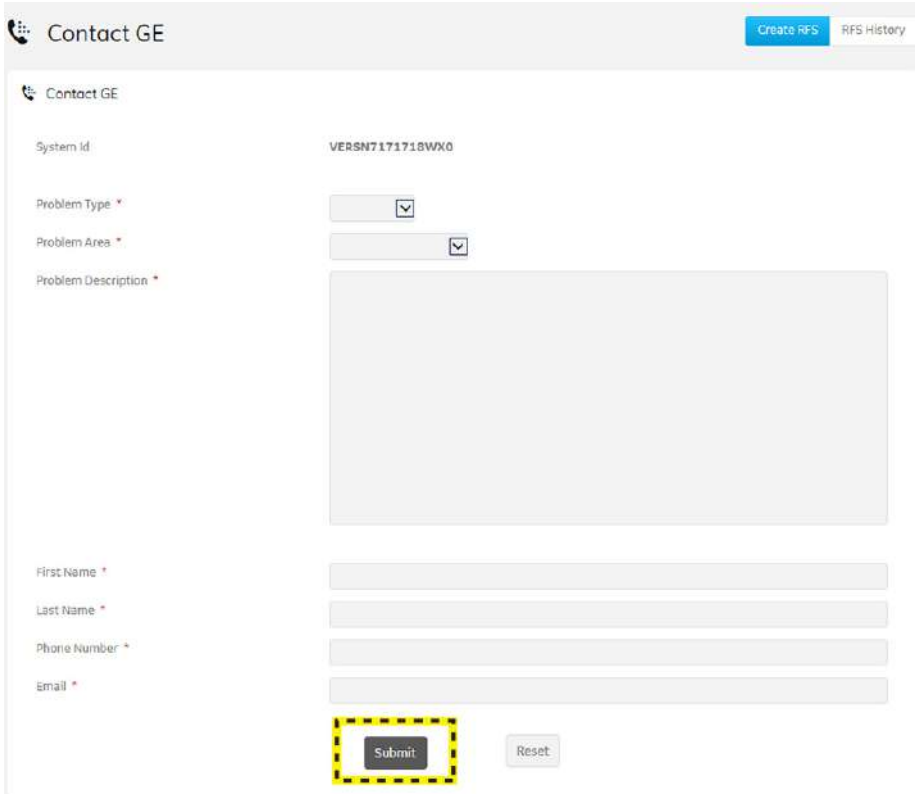


Figure 6-16. Request for Service Contact Information

Initiating a Request for Service (RFS) (continued)

After the request is submit successfully, the following status appears:



Figure 6-17. Request for Service

All requests for service are listed on the **RFS History** for your review.

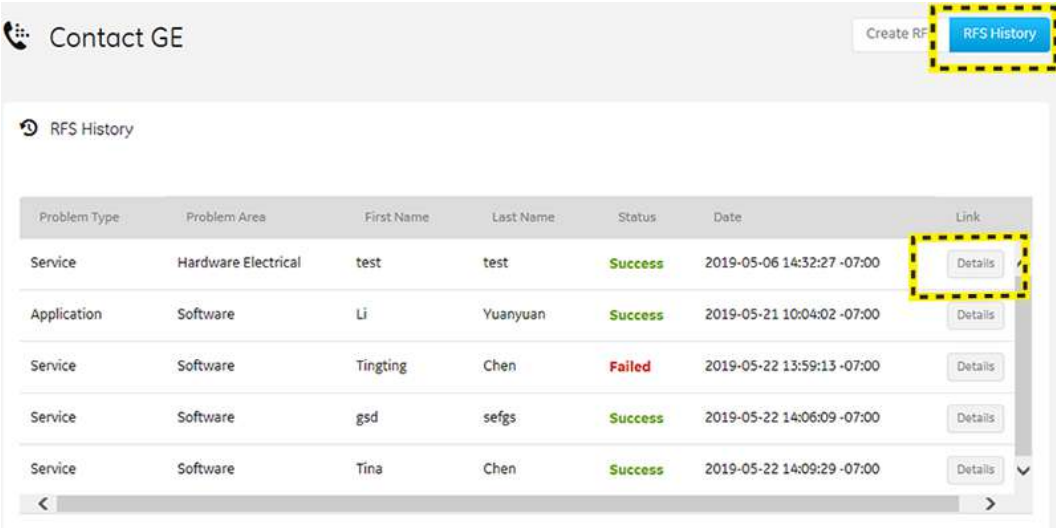


Figure 6-18. RFS History

Initiating a Request for Service (RFS) (continued)

You can review your RFS details by clicking **Details** on RFS History list, refer to Figure 6-18 *on page 6-36*.

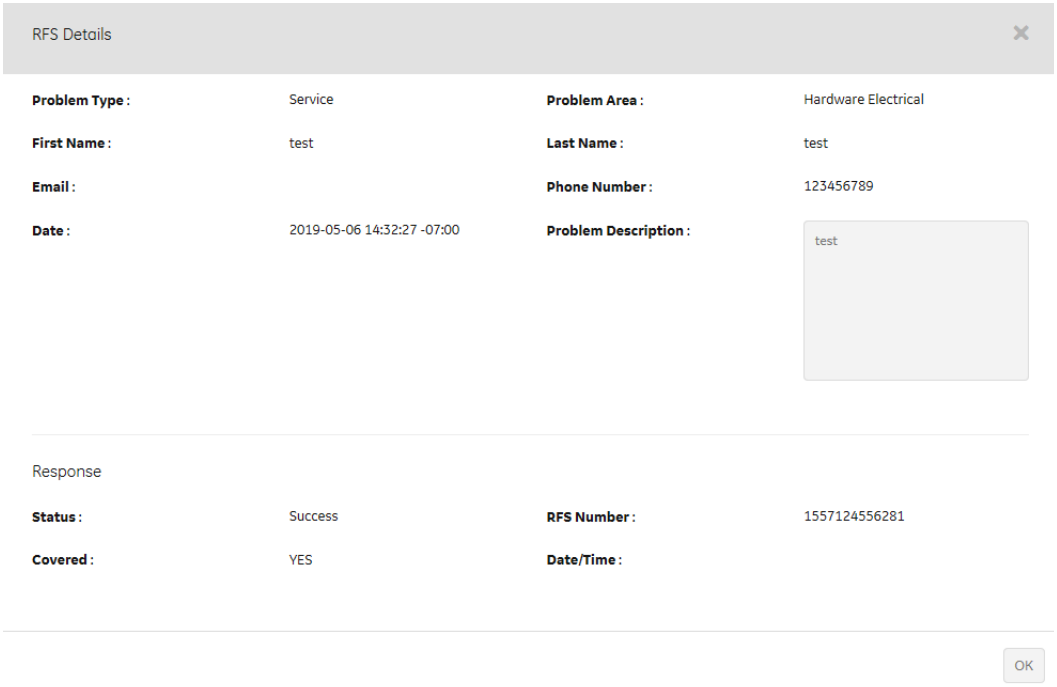


Figure 6-19. RFS Details

Initiating a Technical or Clinical Support Request

To initiate Technical or Clinical Support,

1. Position the Windows pointer on top of the GE InSite ExC icon at the upper right of the display.
2. Press the Trackball Set Key. This opens the following pop-up:
   - ConnectGE
   - EZ Diagnostic
   - Cancel
3. Select ConnectGE for Technical Support; select EZ Diagnostic for GE Service Support; or press Cancel to exit.

NOTE: In addition to contacting a technical/clinical support person, selecting this also changes the polling time from 15 minutes to 15 seconds so that your call can be answered as quickly as possible, as well as allowing disruptive mode.

Initiating a Technical or Clinical Support Request (continued)

InSite ExC icons appear differently, depending on their state:

Table 6-2: InSite ExC Icons

Online Center	Non Disruptive	Disruptive
Not Connected	Black and White Icon - InSite ExC activated but system not open for Technical Support access. 	Red Icon with Clock - InSite ExC activated and open for Technical Support, but currently not active. 
Connected	Yellow Icon - InSite ExC activated and Technical Support can look around on your system, but cannot perform any service-related functions. 	Red Icon with GE Logo - InSite ExC activated and Technical Support can look around on your system, run diagnostics, gather logs, and initiate VCO. 

InSite ExC Definitions

Here are definitions for the different InSite ExC states:

Virtual Console Observation (VCO). Allows Technical Support to control Versana Active functionality remotely.

Disruptive. Allows GE's Technical Support person to connect to your system via VCO, to run diagnostics directly on your Versana Active system, and to collect system logs. When the system is in Disruptive Mode, the icons are red. There are two disruptive states. If you see a telephone with a clock, then the system is in Disruptive, Not Connected Mode. If you see a telephone with GE, then the system is in Disruptive, Connected Mode.

Non-Disruptive. Allows GE's Technical support person to look around on your system, but cannot perform any service-related functions, depending on whether InSite has connected or not connected. There are two Non-Disruptive states. If you see a black and white icon, InSite ExC is activated, but not open for Technical Support access. If you see a yellow icon, InSite ExC is activated and the Technical Support person can look around on your system, but cannot perform any service-related functions.

Connected. InSite ExC is connected.

Not Connected. InSite ExC is not connected.

NOTE: When Disruptive mode has been activated or a diagnostic has been run, the message, "Due to Service testing reboot required," appears in red at the bottom of the display. It is recommended that you reboot the system before use. Make sure you disable disruptive mode before rebooting or the message will not be cleared.

Exiting InSite ExC

To exit InSite ExC,

1. Exit InSite ExC page.
2. Reboot your Versana Active system.

EZ Configuration Wizard

EZ Configuration wizard is a function to enable the operator to configure some common system settings when turning on the system for the first time after the software installation.

For Versana Active, you can also enter EZ Configuration Wizard by clicking the Insite icon at the top right of the screen.

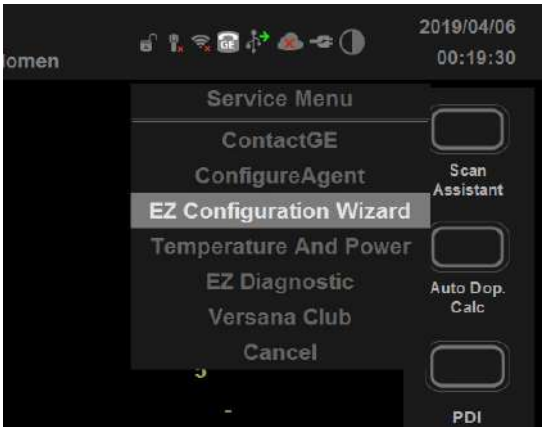


Figure 6-20. Enter EZ Configuration Wizard

EZ Configuration Wizard (continued)

1. Set password for passphrase for Disk encryption.
   System will remember the password automatically.

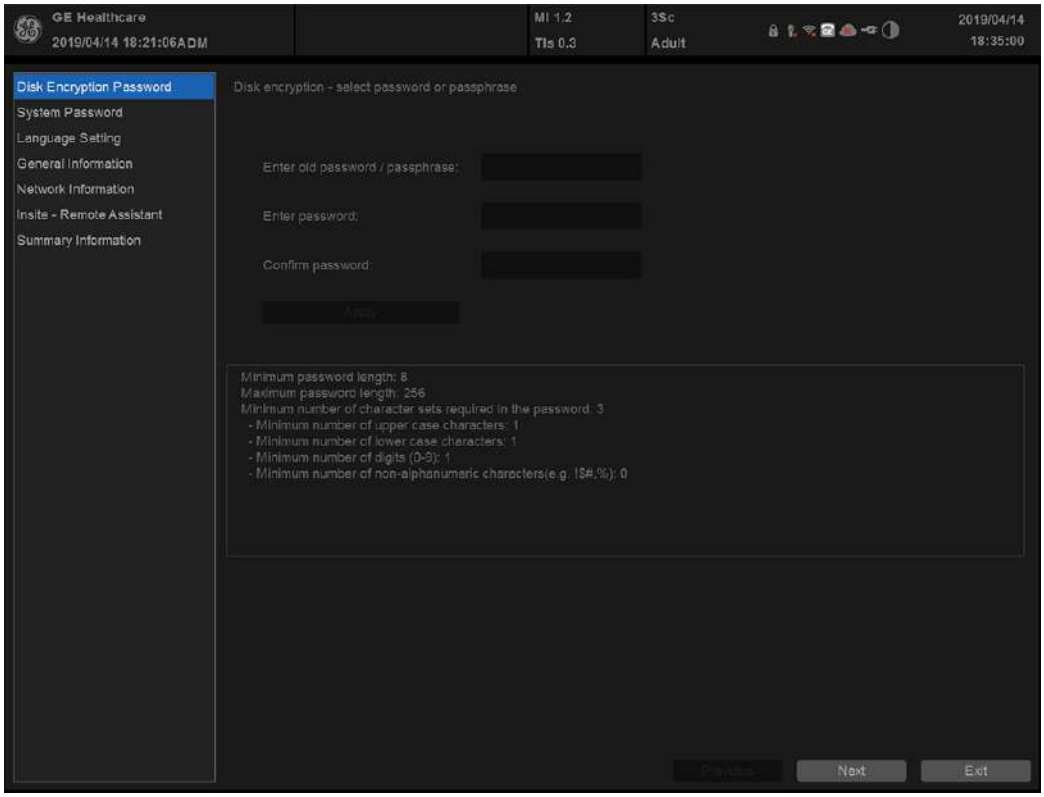


Figure 6-21. Set Disk Encryption Password

EZ Configuration Wizard (continued)

2. Set password for Driver D (includes Archive of patient information, temp files, user defines, logs).

   System will remember the password automatically.

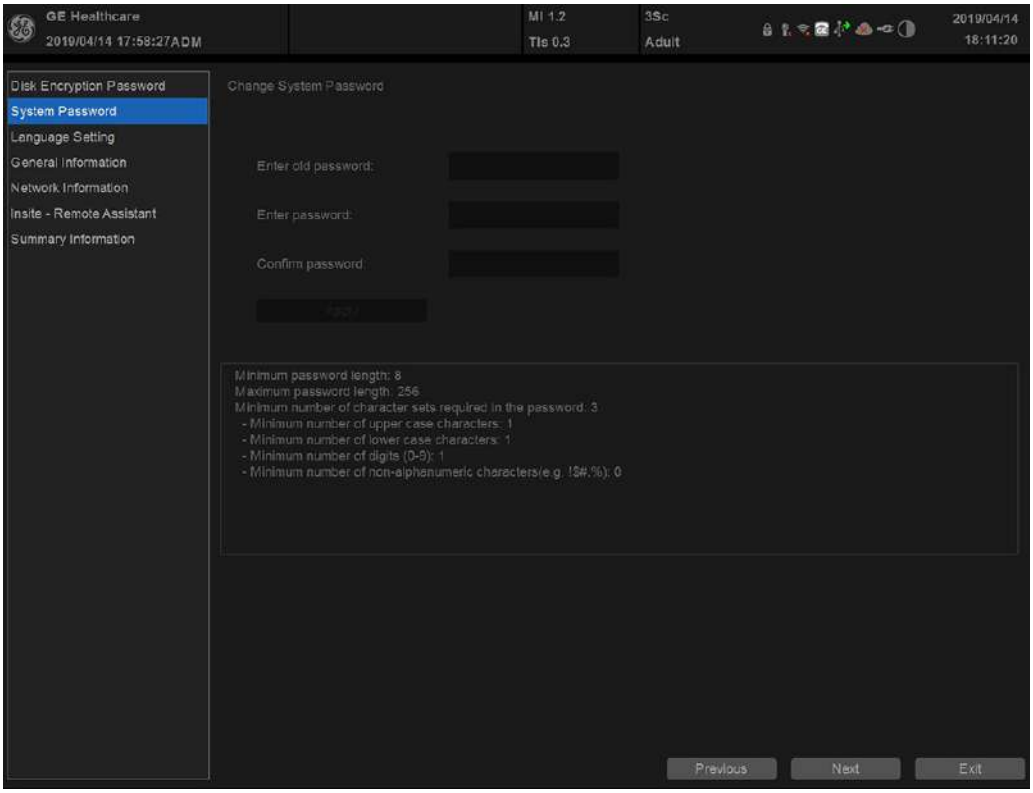


Figure 6-22. Set password for Driver D

NOTE: When the HDD is removed from the unit, it will need password to decode.

EZ Configuration Wizard (continued)

3. Select the appropriate language for system language and keyboard language from the drop-down list.

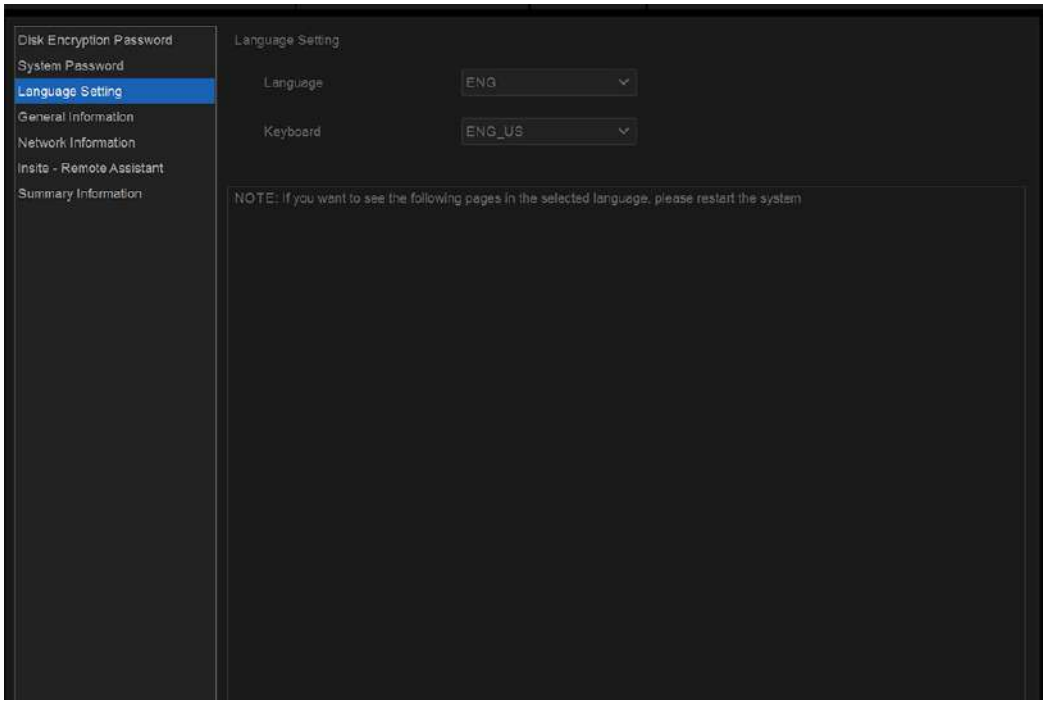


Figure 6-23. System Language settings (1)

*NOTE: If you select **Exit**, you will exit the installation wizard.*

- If you do not change the language, press **Next** to continue.
- If you change the language setting, press **OK** to restart the system.

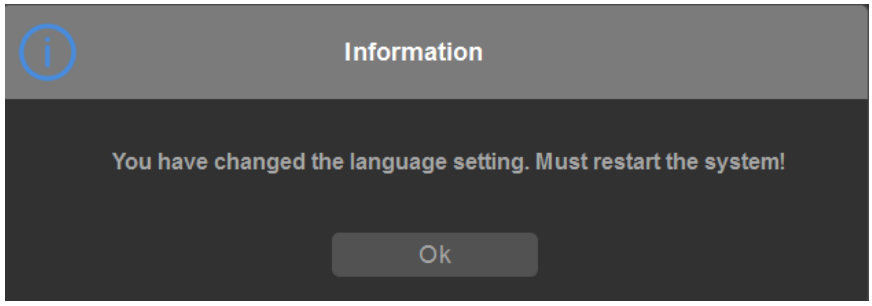


Figure 6-24. System Language settings (2)

*NOTE: If you press **Previous**, you will go to the previous page.*

EZ Configuration Wizard (continued)

4. This screen shows the hospital and time information, and you can set the system date and time here.

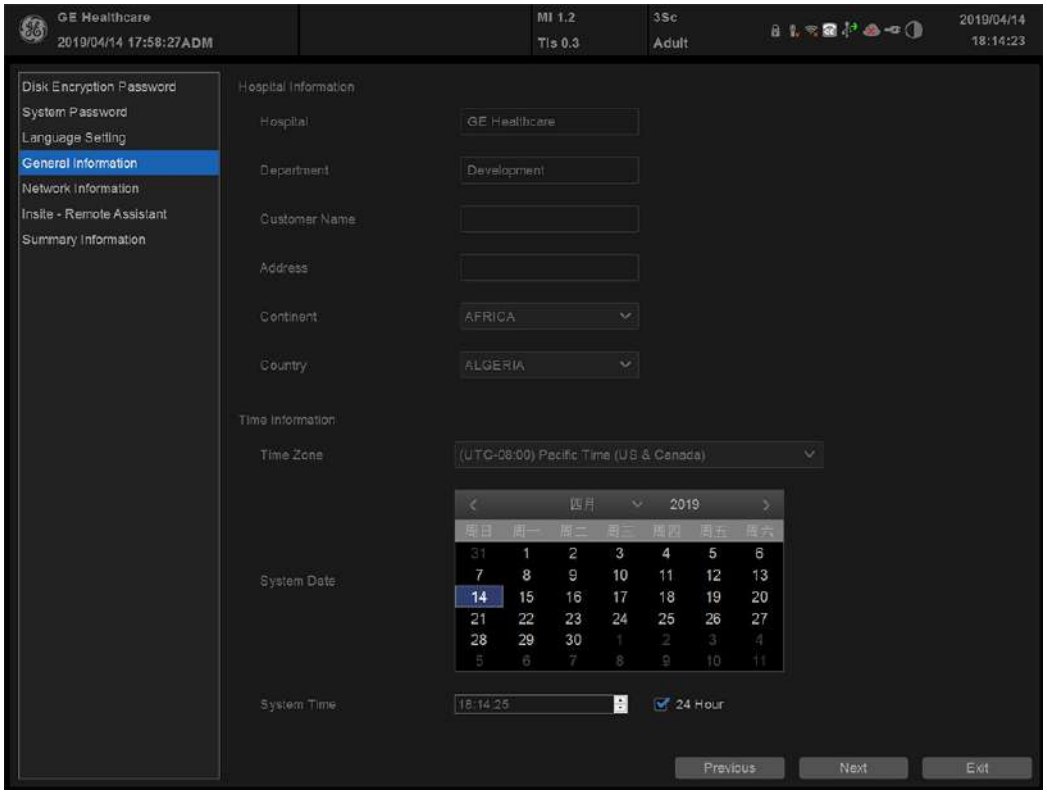


Figure 6-25. General Information

5. Press **Next** to continue.

EZ Configuration Wizard (continued)

6. The **Network Information** screen shows the configuration of wireless and local network:

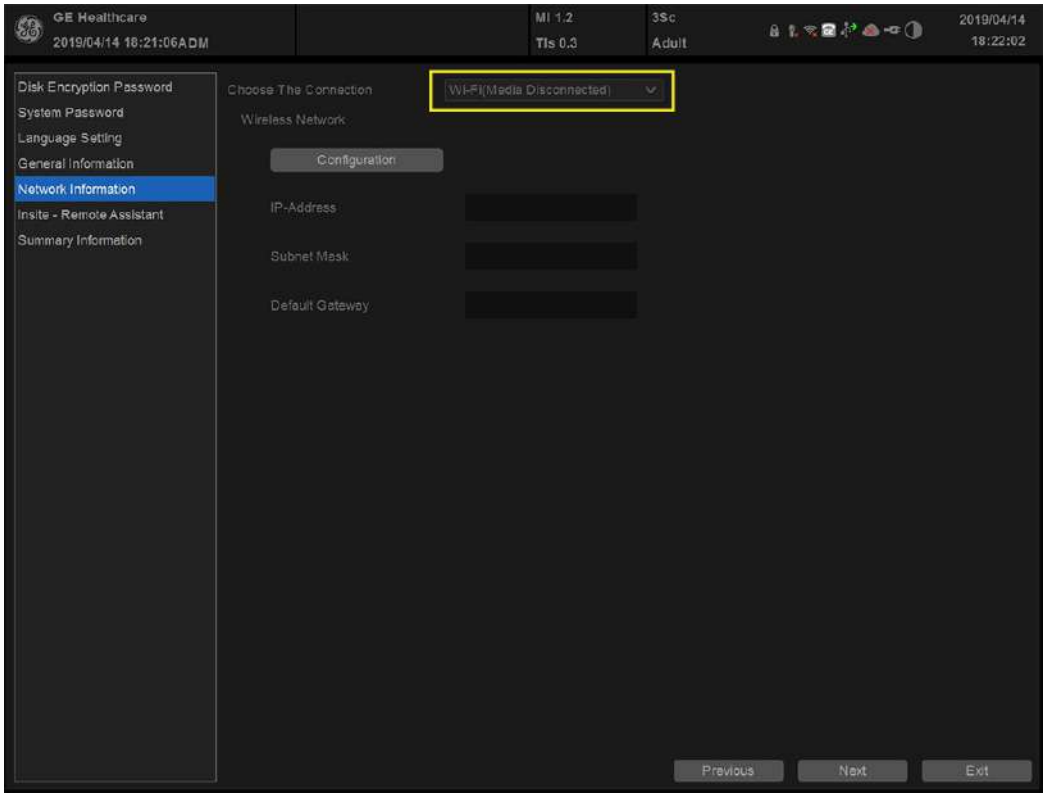


Figure 6-26. Wireless Network Information

EZ Configuration Wizard (continued)

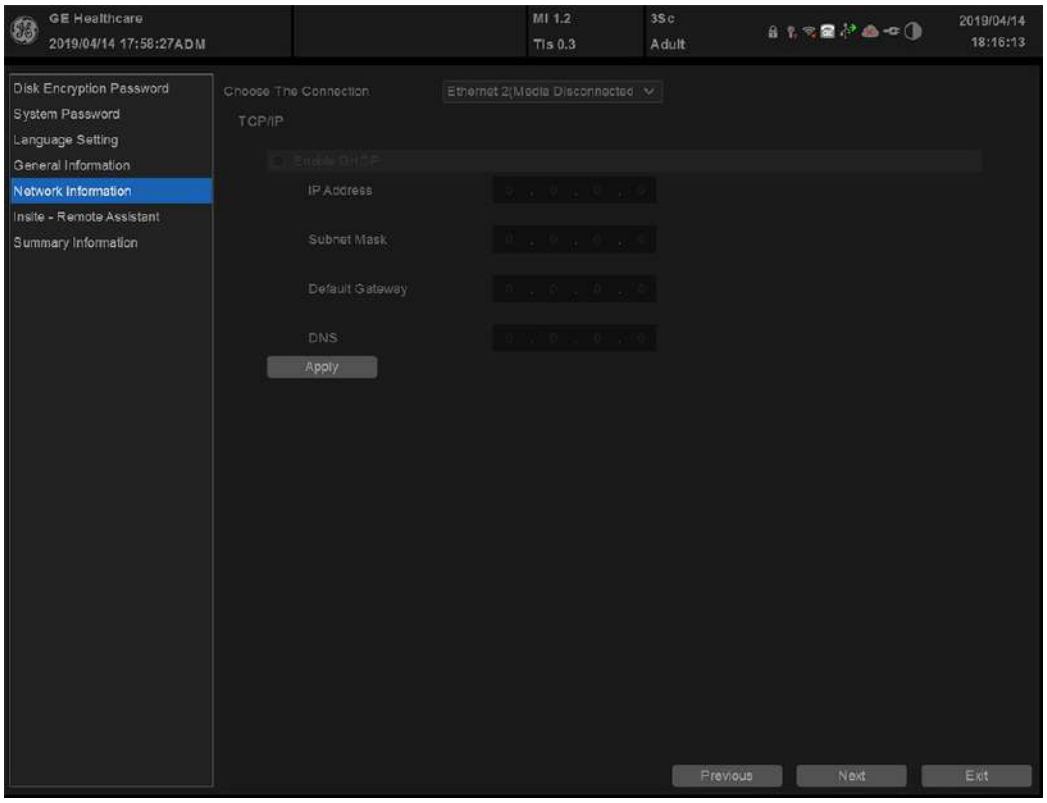


Figure 6-27. Local Network Information

Table 6-3: Network settings

Preset Parameter	Description
Enable DHCP	Select to set TCP/IP.

7. Press **Next** to continue.

EZ Configuration Wizard (continued)

8. The **Insite Information** screen shows the configuration of Agent and Proxy.

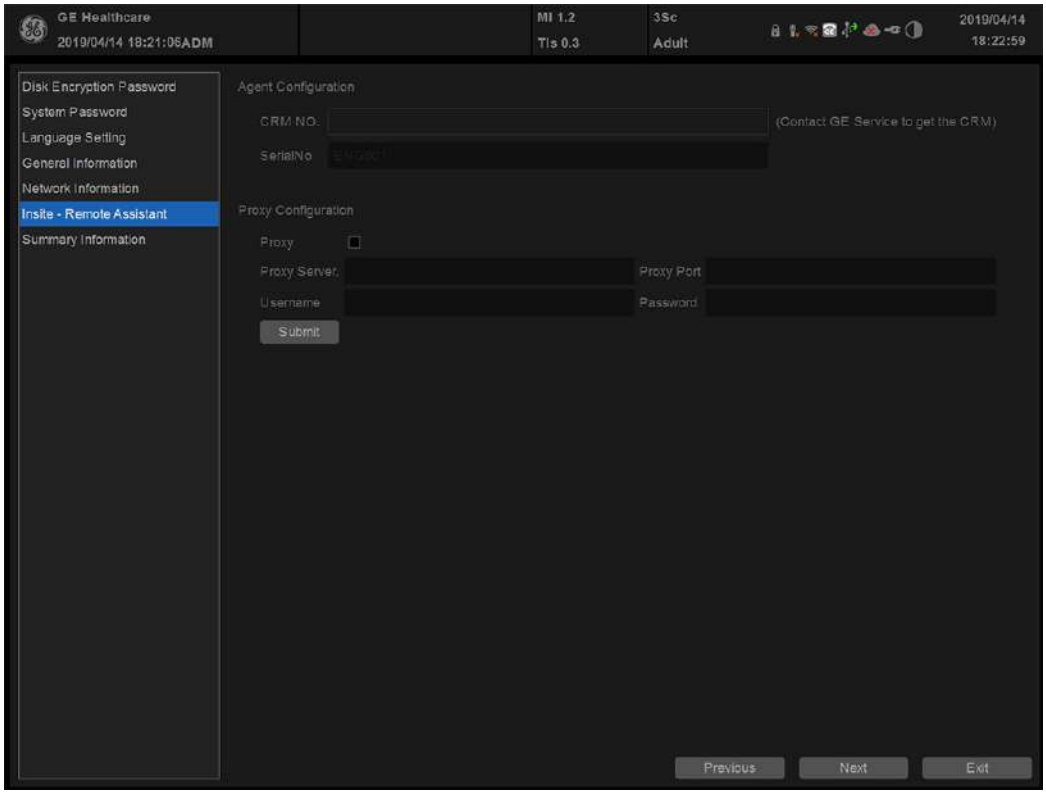


Figure 6-28. Insite Information

9. After having set the Insite Information, press **Next** to continue.

EZ Configuration Wizard (continued)

10. This screen shows the report of the previous settings. You can export it to the database.

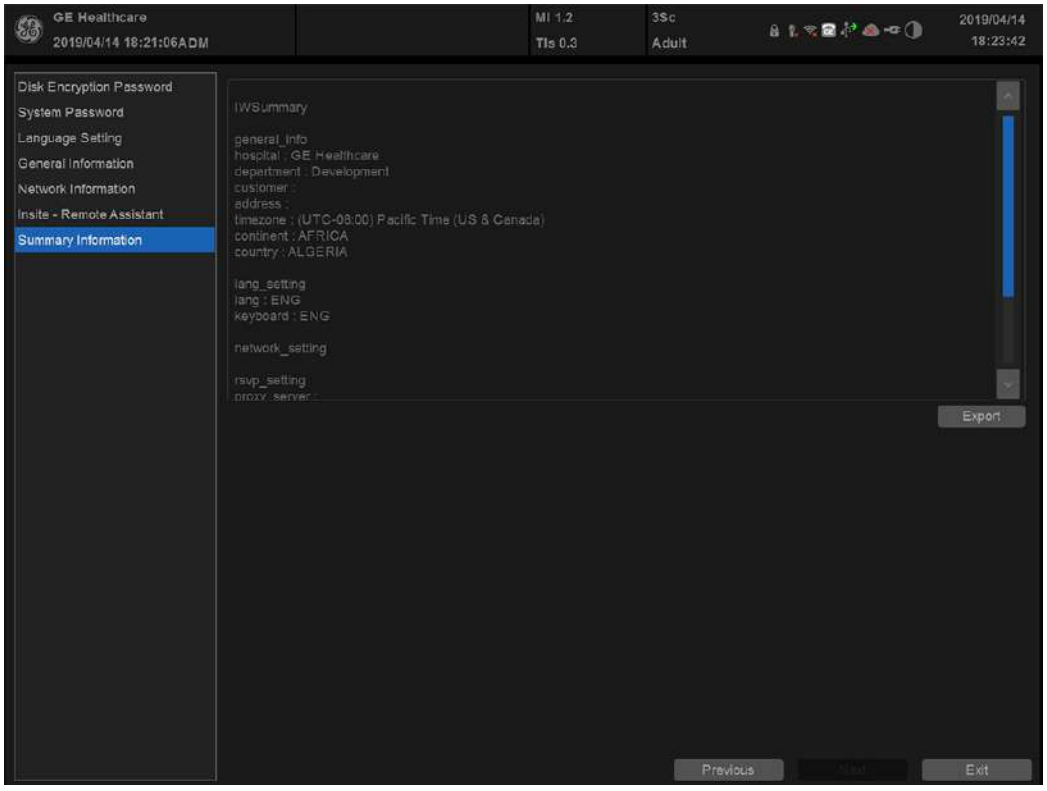


Figure 6-29. Summary Information

Press **Export** and select the location where you want to store the report.

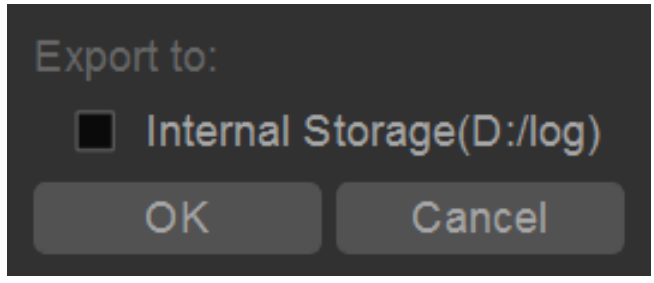


Figure 6-30. Export Summary

11. Press **Exit** to exit Installation Wizard.

Electronic Documentation

Documentation Distribution

Documentation is being provided via:

- Hardcopy
  - User Guide (translated)
  - Release Notes (translated)
  - Advanced Reference Manual
  - AIUM Acoustic Output Booklet (USA only, hard copy)
- Electronic media. You can view user documentation (all languages) on a PC or on the Ultrasound Scanner via the Customer Documentation media, which includes:
  - Basic User Manual (English only)
  - Advanced Reference Manual (English only)
  - User Guide (translated)
  - Release Notes and Workarounds (translated. optional)
  - Basic Service Manual (English only)

Using Online Help Via F1

Online Help is available via the F1 key. After pressing F1, Help appears. The Help screen is divided into three sections: navigational tools on the top, left portion of the screen (Hide, Back, Forward), help book navigational tools on the left portion of the screen (Contents, Index, Search, Favorites), and the content portion on the right side of the screen where help topics are displayed.

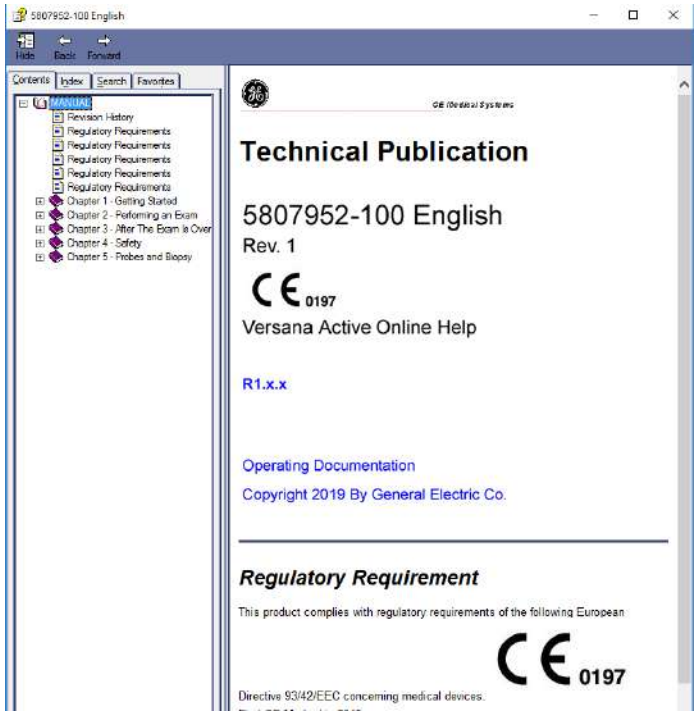


Figure 6-31. Opening Online Help Screen

Navigating through the Help Book

Online Help is organized like a manual, with individual chapters, sections, and pages. Click on the plus (+) sign next to MANUAL to open up the book. Click on the plus sign next to the chapter you want to view to open up that chapter. Click on the plus sign next to the section you want to view to open up that section. Open up the page to view that page's information.

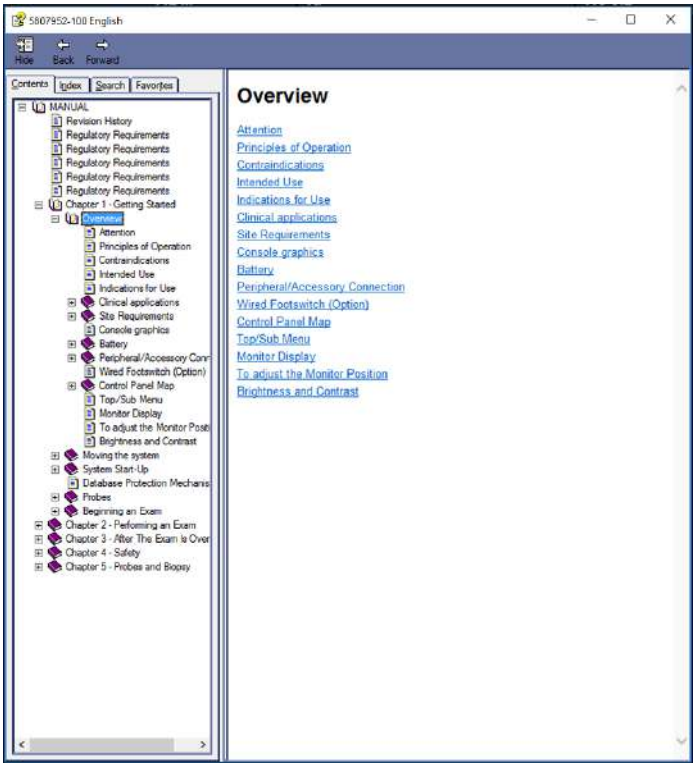


Figure 6-32. Sample Online Help Topic

The blue, underlined text links you to related topics. Click on the link to move to the new topic.

Links

After you click on a blue, underlined portion of text, the screen updates with this link's content. To go back to the previous screen, press Back. To return to the link, press Forward.

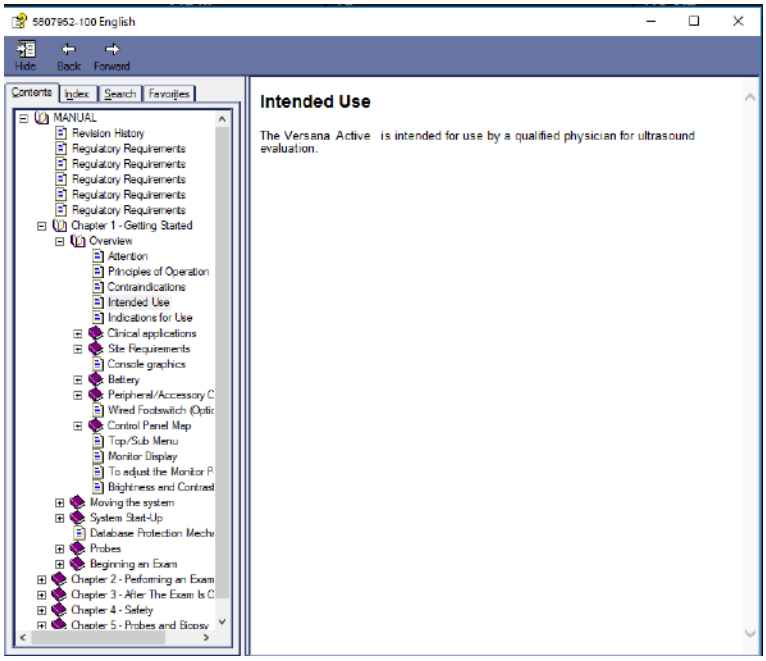


Figure 6-33. Topic Link

Searching for a Topic

To search for a specific topic, click on the Search tab in the left portion of the screen. Type in the topic name in the *Type in the keyword to find:* field. Topics with the word or phrase you typed appear in the *Select Topic to display: area*. Either double click on the topic you want to view or highlight the topic and press the Display button to view this topics.

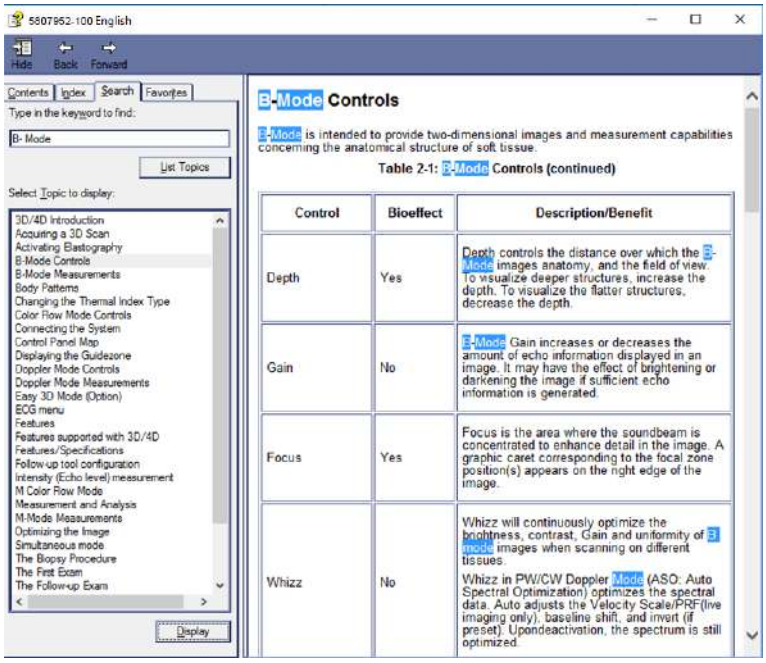


Figure 6-34. Search Result

Saving Favorite Topics

You may find that there are topics you need to refer to often. In this case, it's a good idea to save these topics as Favorites. To save a topic as a favorite, press the Favorites tab, highlight the topic in the Topics window, and press the Add button. You can now view this topic quickly by going to the Favorites help tab.

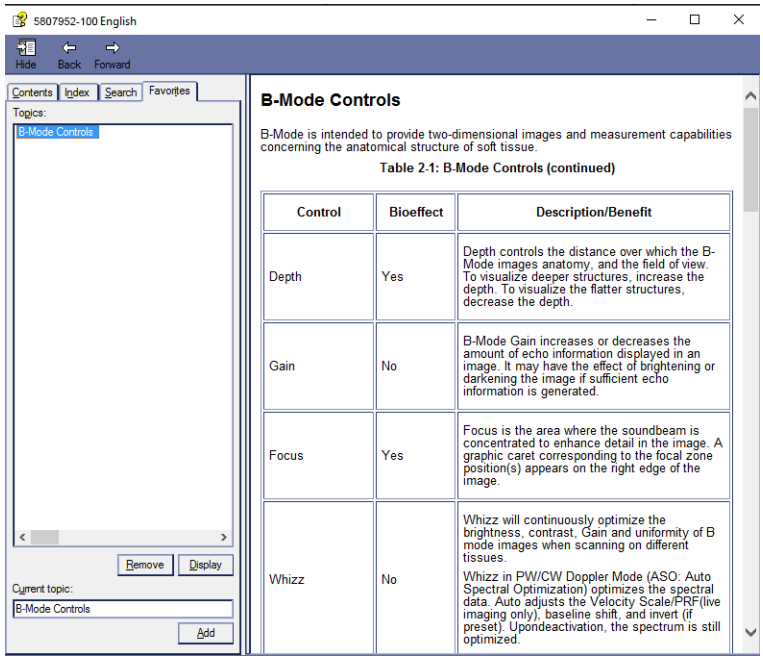


Figure 6-35. Adding Favorites

Using the Index

Or, you can look for topics by using the Index. Press the Index tab, then use the scroll bar to look up a topic.

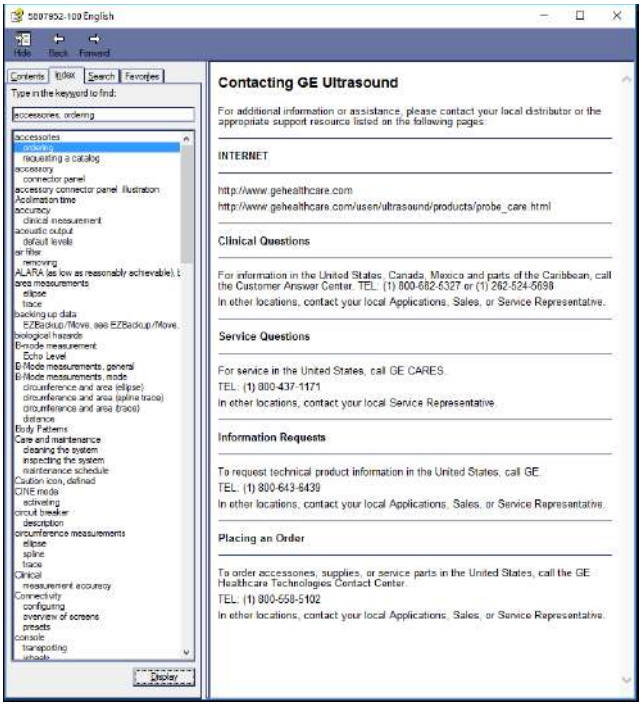


Figure 6-36. Index

Other Help Features

To hide the left side of the screen, press the Hide icon at the upper, left-hand portion of the screen. To view the left side of the screen again, press the Show icon at the upper, left-hand portion of the screen.

To size the Help window, position and hold down the cursor at the corner of the screen while moving the Trackball.

To move the Help window, position and hold down the cursor at the very top of the Help window while moving the Trackball on the control panel.

Exiting Online Help

To exit Online Help, press the ‘X’ in the upper, right-hand corner of the Online Help window.

Electronic media

Accessing Documentation Via a PC

To view user documentation on a PC,

1. Insert the media into the media drive.
2. Open the media drive on your desktop.
3. Select and open the item you want to view.

To close the window, click on the ‘X’ in the upper, right-hand corner of the browser window.

NOTE: If your PC does not have Adobe Reader, a free download is available on the Adobe web site at http://www.adobe.com.

My Trainer

Overview

My Trainer provides a quick guide to operate the system.

To access My Trainer,

1. Press Alt + H to enter My Trainer.

   Or,

   Press Utility -> System -> User Configurable Key. Check Enable Keyboard Key, then set **My Trainer** in the Keyboard Key or User Defined Key.

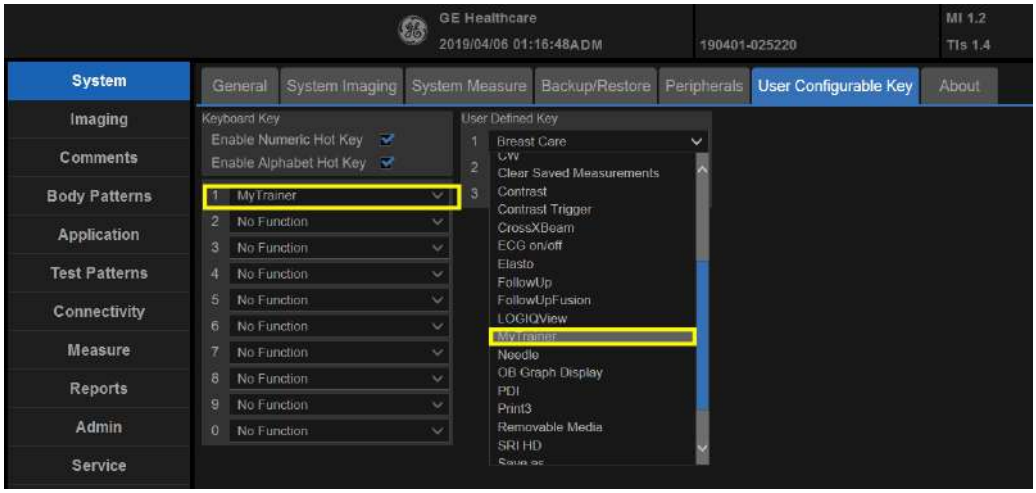


Figure 6-37. Set My Trainer

2. Press defined key to access My Trainer.

Overview (continued)

There are five sections in My Trainer. The five sections are displayed on the left side of the My Trainer interface.



Figure 6-38. Sections display

1. Getting Started: Circuit breaker, Probe Connection
2. System Setting: Facility name set up, Date time set up, Enable options check, Language setting, User configuration, User preset
3. Peripheral Connection: Back panel ports, Network Connectivity, Connect to a printer, DICOM setting, Back-up/ restore the patient information, Software version
4. Maintenance: Trackball, Contact GE service, Connect to Insite, Log export, Air Filter Replacement
5. Quick Card: Control Panel Overview, Entering Patient Data, Selecting a Probe/Application, Measurements, Annotating an Image, Adjust Color ROI, Pulsed Wave Doppler, Split Screen, End Exam, About GE Healthcare.

Overview (continued)



Figure 6-39. Interface Illustration

The interface of the My Trainer includes below information:

1. The product name of the system.
2. Sections. Select the button to expand the section to show the list of subsections.
3. Subsections.
4. The highlighted subsection shows this subsection is currently opened and displayed on the right side.
5. Exit. Press this button to exit this interface.
6. The left number shows the current page of the subsection. The right number shows the total pages of the subsection.
7. Illustration with graphic.
8. Text instruction about how to operate.

Table 6-4: Page turning

	Select the arrow to go to the previous page
	Select the arrow to move to the next page.

Table 6-4: Page turning

	Select the arrow to go to the home page.
	Select the arrow to go to the end page.

Chapter 7

General Measurements and Calculations

Describes how to perform general measurements and calculations.

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by system accuracy, but also by the use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.



The system provides calculations (e.g. estimated fetal weight) and charts based on published scientific literature. The selection of the appropriate chart and clinical interpretation of calculations and charts is the sole responsibility of the user. The user should consider contraindications for the use of a calculation or chart as described in the scientific literature. The diagnosis, decision for further examination, and medical treatment must be performed by qualified personnel following good clinical practice.

Overview

This section provides information about taking measurements and describes calculations available in each mode. It includes the following topics:

- Exam workflow
- Location of measurement controls
- Description of calipers
- List of generic measurements
- General information about taking measurements
- Mode Measurements: Step-by-step instructions for taking specific measurements, organized by mode
- Basic steps to view and edit reports

Exam workflow

For each patient, the system organizes information by exam category, study, and measurement. The definitions of these terms are as follows:

- **Exam Category** – categories include the following:
  - Abdomen
  - Obstetrics
  - Gynecology
  - Cardiology
  - Vascular
  - Urology
  - Small Parts
  - Pediatrics
  - MSK
  - Thoracic
- **Study/Preset** – after you choose an exam category, the system allows you to select a study. For example, when you choose the Obstetrics exam category, you can choose one of the following studies:
  - Generic
  - OB-1
  - OB-2/3
  - OB-General
  - Fetal Heart
  - OB/GYN Vessel
- **Measurement** – the measurements and calculations needed to analyze an item of anatomy. For example, a femur length is a measurement. A measurement can include several pieces of measurement data. For example, to calculate the area of a gestational sac, you need to measure width, length, and depth.

For details on how to start a new patient, ‘Beginning an Exam’ on *page 4-2*.

Location of Measurement Controls



Figure 7-1. Locating Measurement Controls

1. **Clear**. During a measurement sequence, erases the measuring caliper and measurement data from the display. When not performing a measurement sequence, clears all calipers and measurements from the display.
2. **Measure**. Activates a measurement caliper and the calculation package associated with the currently selected preset.
3. **Depth/Zoom/Ellipse**. **Ellipse** activates the area/ellipse measurement function. During the ellipse adjustment, use the **Trackball** to increase or decrease the size of the ellipse. Select ***Cursor Select*** to adjust the measurement calipers.
4. **Set**. **Set** fixes the caliper for measurements and completes the measurement sequence.
5. **Trackball**. Moves the measurement calipers, selects the measurement on the Summary Window.

Description of calipers

While you are making a measurement, the measurement caliper is either active (open plus sign) or fixed (closed plus sign). An active caliper is green and a fixed caliper is yellow.

The system allows you to identify measurements by number or by unique symbol. If you choose Number as the Cursor Type, after you complete a measurement, it is assigned a number. If you choose Symbol as the Cursor Type, after you complete a measurement, the caliper symbol changes to one of the nine shown below. The symbols are used in sequence as listed. The first symbol is used for the first measurement, the second symbol for the second measurement, and so on. The numbers or symbols also identify measurements in the Results Window.



Figure 7-2. Fixed Caliper Symbols

For information about how to choose Cursor Type of Number or Symbol, See ‘System/System Measure Preset Menu’ on *page 16-16 for more information.*

Measurement line display

While you are making a measurement, the system displays a dotted line to show the measurement. After you press **Set** to complete the measurement, the dotted line remains on the display if the Cursor Line Display, found on the System -> System Measure screen, is selected. If Cursor Line Display is not selected, the system erases the dotted line and only the measurement calipers with a number or symbol are displayed.

List of general measurements

The following types of general measurements are available when you press **Measure** but do not choose a specific calculation. The type of measurement depends on the current scan mode.

After pressing Measure, rotate between various measurement types with the adjusting of **Caliper Change**.

B and CF Modes

- Dist (Caliper)
- Trace
- Spline
- Intensity
- Open Trace
- Open Spline

NOTE: You can preset the sequence of B and CF area measurements in the Measure Key Sequence (B/CF) preset in the Utility -> Measure -> Advanced screen. See the "M&A Advanced Preset" section for more information.

Doppler Mode

- Velocity
- Trace
- Time

M-Mode

- Caliper
- Distance

General Instructions

You can take measurements in all modes and image formats, including real-time, frozen, CINE. After you select an exam category, the available calculations are displayed.

Measurement and calculation results

As you take measurements, each measurement is given a sequential number on the display and in the Results Window. The system can display nine measurements on the screen at one time.

While you are taking a measurement, the value in the Results Window updates until you complete the measurement.

Once the Results Window has nine measurements, if you make any further measurements, the system erases the first measurement and adds the new measurement (“first in, first out”).

Measurement graphics are kept while in cine scroll. The measurement graphic is redisplayed on the frame where it is taken, if preset on the Advanced M&A page.

Selecting a calculation

When you take measurements, you can select the calculation before you take the measurement or after you take it. For example, in Obstetrics, if you select the calculation before you take the measurement, the estimated fetal age is displayed as you take the measurement. If you select the calculation after you take the measurement, the estimated fetal age is displayed after you complete the measurement.

NOTE: After you take a measurement, if you select a calculation and the measurement is not applicable for the calculation, then the system assumes you want to start the calculation. The system then uses the calculation for the next measurement.

If there is a measurement listed in the Results Window that has not been assigned a calculation, to assign the measurement:

1. Press **Measure**.
2. To select the measurement in the Results Window, move the **Trackball** to the measurement.

   The measurement is highlighted.
3. Press **Set**.

   The system displays a list of applicable calculations. For example, if it is a distance measurement, the list includes all distance calculations for the current study.
4. To select an item in the list, move the **Trackball** to highlight the item and press **Set**.

   The system assigns the calculation to the measurement.

Selecting a measurement in a different application

While scanning a patient, you may find that you want to measure an item that is not in the current application. To select a calculation from a different application:

1. Press **Measure**.
2. Press **Second Menu**, the exam category menu is displayed.
3. Select the exam category that has the calculation you want to make.

   The system displays the selected exam category.
4. Select the study and the desired measurement.
5. After you complete the measurement, to return to the original application, repeat steps 1–4.

*NOTE: This measurement **DOES NOT** appear on the original application report.*

Moving the Results Window

You may want to change where the Results Window is positioned on the monitor display. There are two ways to move the Results Window:

1. Move the cursor to the “Move Results Window Icon”. Press and hold down **Set** key meanwhile moving the Trackball to position the Results Window at the desired position, then release **Set** key.

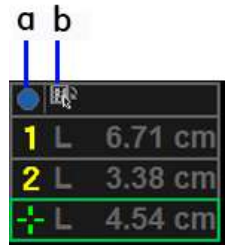


Figure 7-3. Results Window Icons

   a. Minimize Results Window Icon
   b. Move Results Window Icon

2. Select Utility -> System -> System Measure. In the Results Window portion, you can position the window on the screen. The display can be moved into the following locations:
   - Left Top
   - Left Bottom
   - Right Top
   - Right Bottom
   - Extreme Right Top
   - Extreme Right Bottom

Minimize/Maximize the Results Window

Move the arrow pointer by Trackball to the top-left icon in the Result Window and press **Set**. The Window is minimized and displays only the icons. Press **Set** again to maximize the display.

Erasing measurements

The following actions erase measurements from the system's memory:



- If you adjust the Trackball, unfreeze the image, or press Clear, the system erases all completed measurements and calculations on the display. Measurements and calculations, however, remain on the reports.
- If you select **End Exam**, the system erases all measurements and calculations on the display and clears the reports.
- If you make a new measurement that exceeds the maximum number of allowable measurements, the system erases the first (oldest) measurement and adds the new measurement.
- If the second caliper is active, to erase the second caliper and activate the first caliper, press **Clear**.

General Instructions (continued)

The following are actions you can take while performing measurements.



- Before making measurements, to stop the acquisition of image data, press **Freeze**.
- For measurements such as distance, to make fine adjustments before completing the measurements, adjust **Measure** to toggle between active calipers.
- Before completing the measurement sequence, to erase the active measuring caliper and the current data measured, press **Clear**.
- After the sequence is complete, to erase all data that has been measured to this point, but not data entered on report pages, press **Clear**.
- When there are several measurements on the display, to rotate through and activate previously fixed calipers, adjust **Cursor Select**. After a cursor is activated, you can change the measurement.

  NOTE: If you want to change a trace measurement, you must erase it and trace again.
- To repeat any measurement, select that measurement again.

Calculation formulas are available in the *Advanced Reference Manual*.

Measurement and Calculation Setup

Measurements and studies are organized for typical work flows. If you want, you can change this set up. You can specify which studies are in each exam category, and which measurements and calculations are in each study. You can change the measurements that are available. The Versana Active allows you to quickly and easily set up your system so that you can work most efficiently.

This section describes how to:

- Change a study to include different measurements
- Add a new study or measurement
- Remove a study from an exam category
- Change measurement parameters
- Create a measurement formula to correctly handle unit conversions
- Edit user-defined calculations
- Define application-specific measurement parameters
- Specify the default manual calc measurements for a selected study or folder

Starting Study and Measurement SetUp

You can make changes to studies and measurements in the Measurement & Analysis screen. To open the screen:

1. Enter **Utility-> Measure** .
2. On the monitor display, select **M & A** tab.

   The system displays the Measurement & Analysis screen on the monitor display.

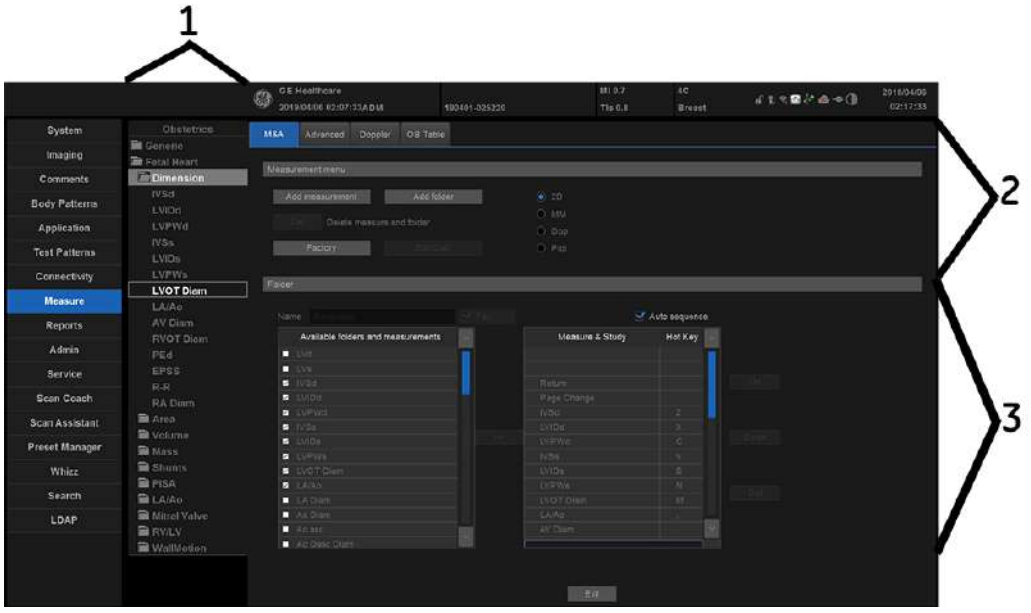


Figure 7-4. Measurement & Analysis screen

1. **Selection menu**: select exam category, study, or measurement.
2. **Measurement menu**: add and delete studies (folders) and measurements; select mode.
3. **Folder or measurement**: define studies and measurements. This section changes between Folder and Measurement, depending on what you select in the Selection menu.

NOTE: In the Measure menu, the navigational tabs across the top may differ from system to system but the functionality is the same.

Selecting an exam category

When you open the Measurement & Analysis screen, it displays the exam category that was last used on the system. To select the exam category you want to work with:

1. Move the **Trackball** to highlight the exam category at the top of the Selection menu.
2. Press **Set**.

   The system displays a list of exam categories.
3. Move the **Trackball** to highlight the exam category you want.
4. Press **Set**.

The Selection menu lists studies and measurements for the selected exam category.

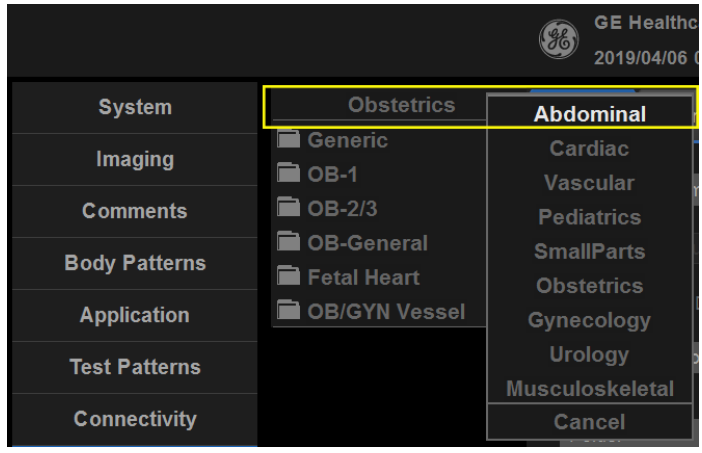


Figure 7-5. Select Exam Category

Selecting the measurement mode

In the Measurement menu section of the Measurement & Analysis screen, select one of the following:

- 2D (B-Mode)
- MM (M-Mode)
- Dop. (Doppler Mode)
- Plot (Plot Mode—The measurement on the plot graph of the QAnalysis)

The Selection menu lists studies and measurements for the selected mode.

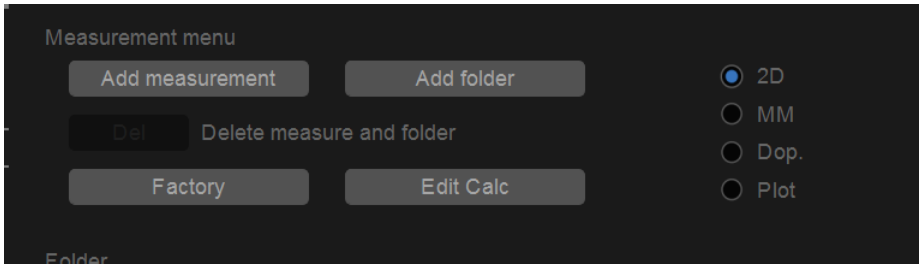


Figure 7-6. Select Mode

Selecting a study or measurement

To work with a folder or measurement, you must first select it in the Selection menu. The Selection menu lists the studies and measurements for an exam category. The studies and measurements are organized in a hierarchy. The following example shows the highest level of the Obstetrics exam category, with the OB studies listed.

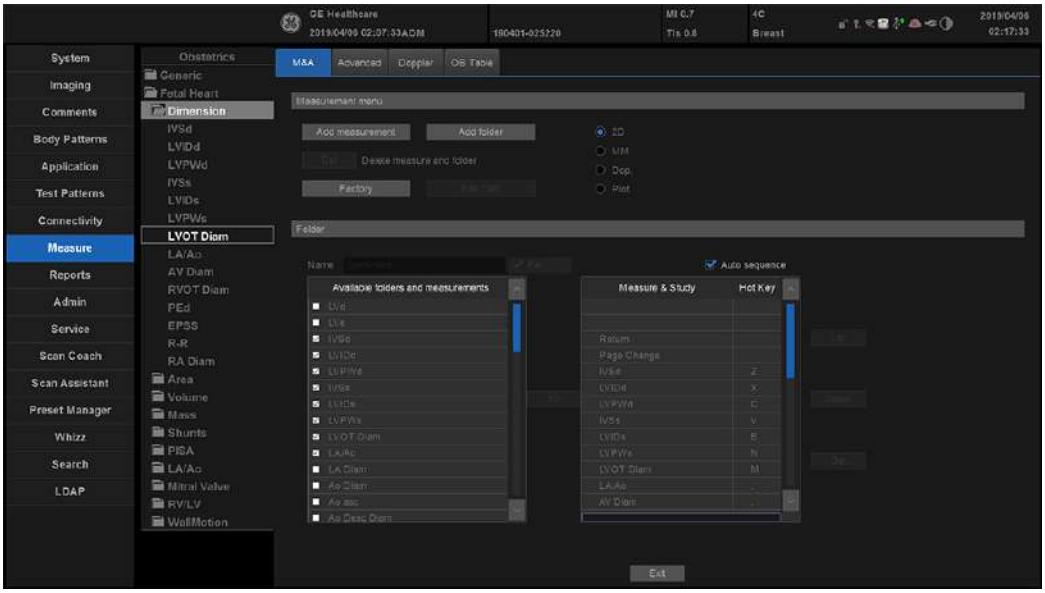


Figure 7-7. Selection Menu: Exam Studies

Selecting a study or measurement (continued)

After you select a study, the Selection menu shows all folders and measurements in the study. The Folder section of the Measurement & Analysis screen changes, and lists the measurements. The Selection menu shows all measurements for the OB-1 exam category.

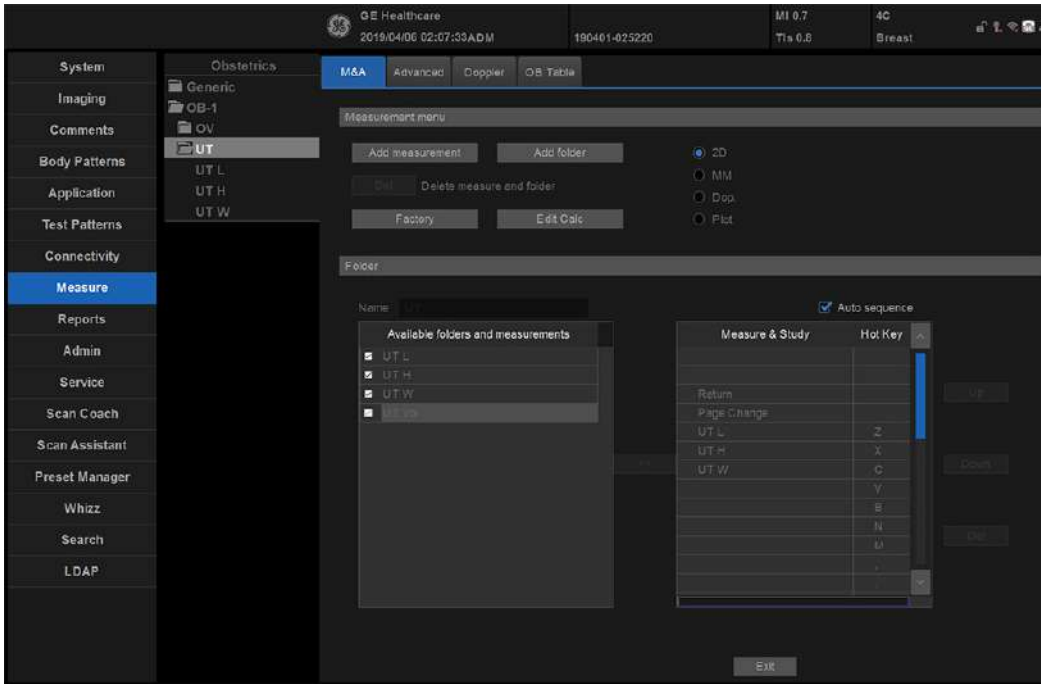


Figure 7-8. Selection Menu: OB-1 Exam Category

Selecting a study or measurement (continued)

The following example shows the Selection menu after the BPD measurement is selected. The Measurement section is now displayed, with information about the BPD measurement.

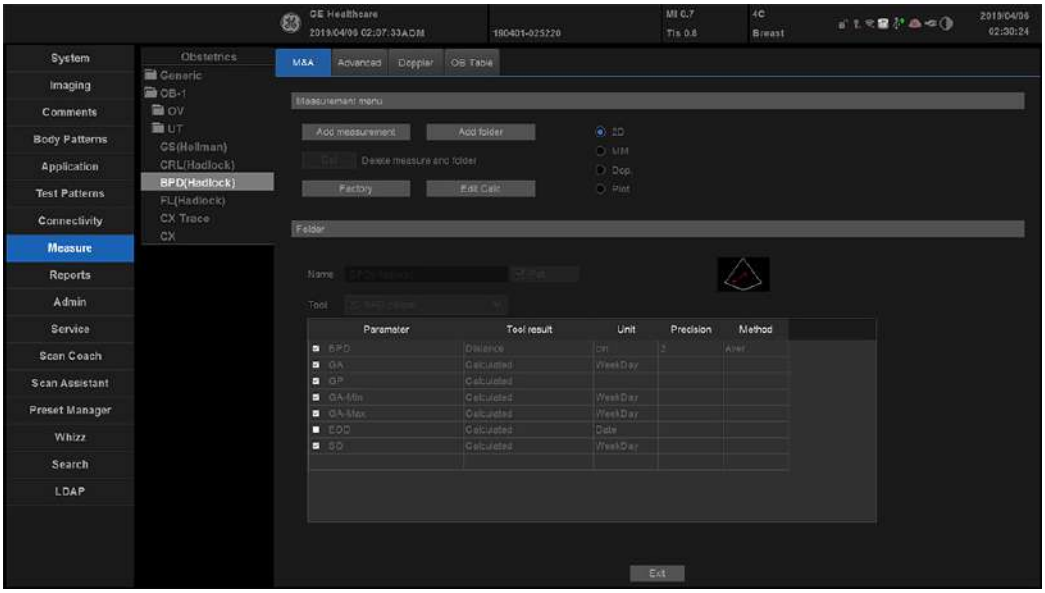


Figure 7-9. Selection Menu: BPD Measurement

Selecting a study or measurement (continued)

To select a folder or measurement:

1. Move the **Trackball** to the Selection menu and highlight the folder or measurement.
2. Press **Set**.
   - If you selected a folder, the system displays the folder in the Folder section of the Measurement & Analysis screen.
   - If you selected a measurement, the system displays the measurement in the Measurement section of the Measurement & Analysis screen.

NOTE: *Items must be selected in the Available folders and measurements list to be in the Selection menu. To move or change an item that is in the Available folders and measurements list but not in the Selection menu, move the **Trackball** to the check box for the item, and press **Set**. The item is now listed in the Selection menu.*

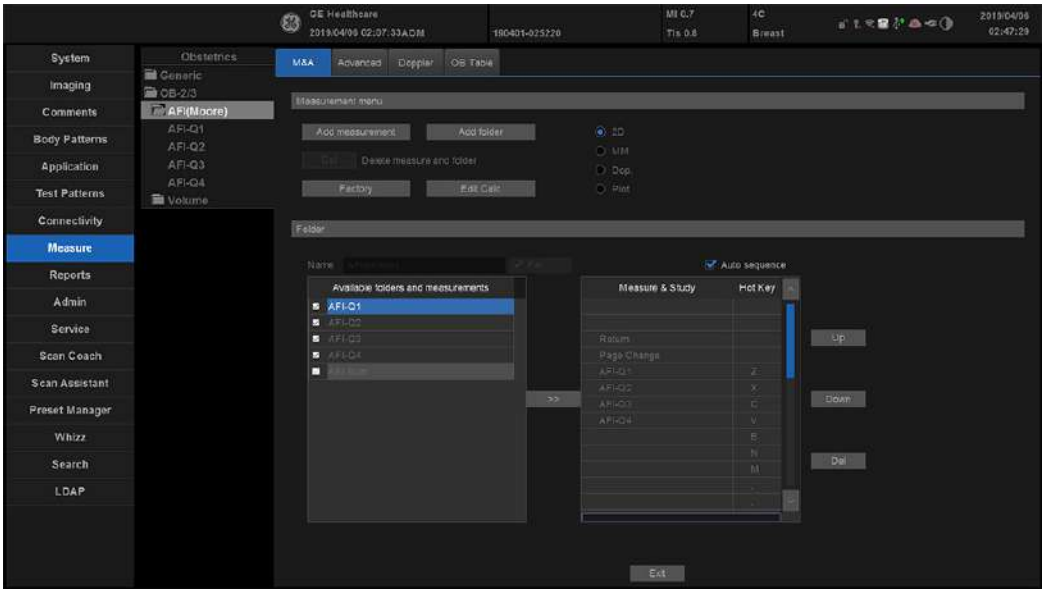


Figure 7-10. Available folders and measurements check boxes

Using folders

When you select a folder in the Selection menu, the system displays all folders and measurements that are in the folder. A folder can indicate a study, or can indicate a measurement group that contains related measurements. For example, a calculation such as OB Amniotic Fluid Index (AFI) requires four measurements, one of each quadrant. The AFI folder contains four measurements.

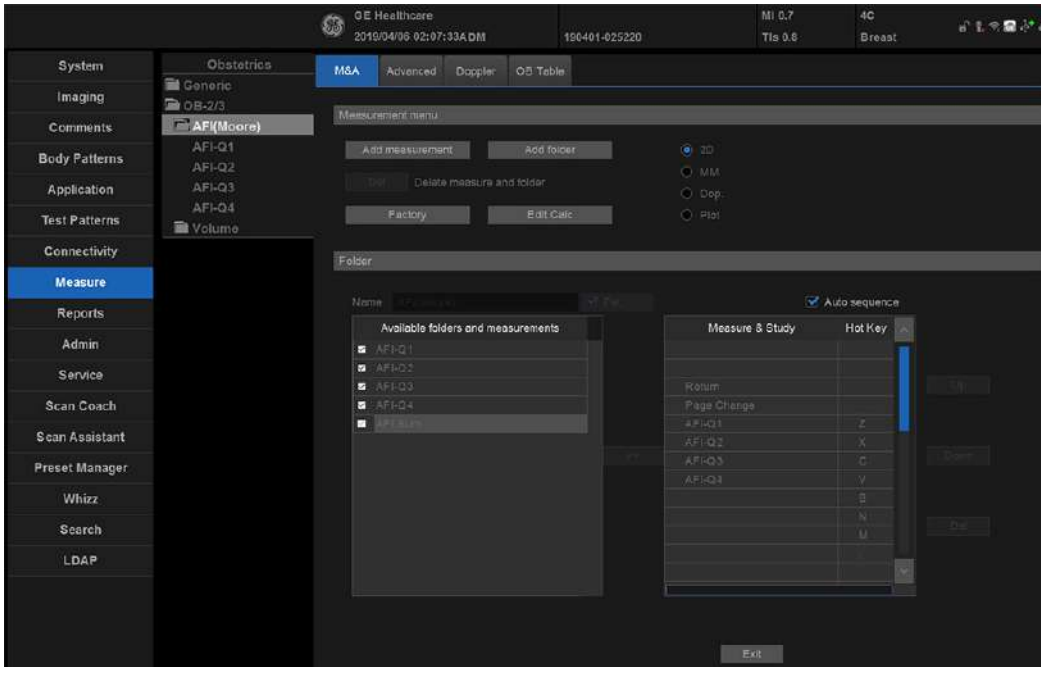


Figure 7-11. AFI Folder

Specifying Which Measurements Go in a Study or Folder

The Folder section of the Measurement & Analysis screen has two lists of folders and measurements. This is where you specify which items go in a study or folder.

- **Available folders and measurements.** The left list contains all possible folders and measurements for the selected study or folder.
- **Measure & Study.** The right list has all folders and measurements currently selected for the study or folder. These are selected from the Available folders and measurements list. These are the folders and measurements you see when you are scanning and choose an exam category. This also defines the order the folder or measurement is located, based on the number in this list.

Specifying Which Measurements Go in a Study or Folder (continued)

To add an item to the Measure & Study list:

1. In the Measure & Study list, move the **Trackball** to highlight which folder you want to put the item in, and press **Set**.

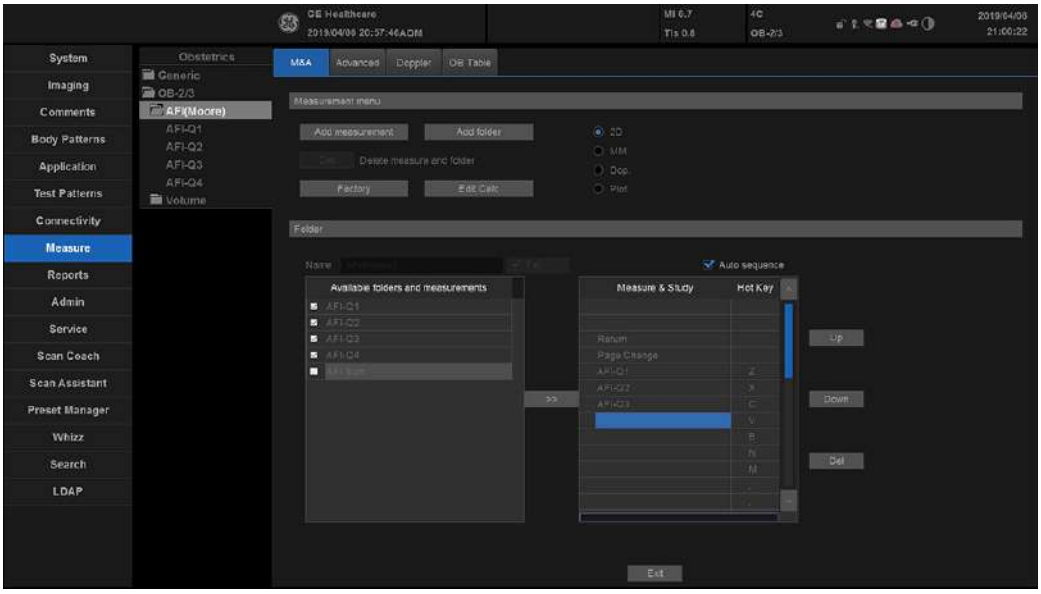


Figure 7-12. Measure & Study list: Selecting item and position

2. Move the **Trackball** to highlight an item in the Available folders and measurements list, and press **Set**.

Specifying Which Measurements Go in a Study or Folder (continued)

3. Select the arrow between the lists. The item is copied to the Measure & Study list.

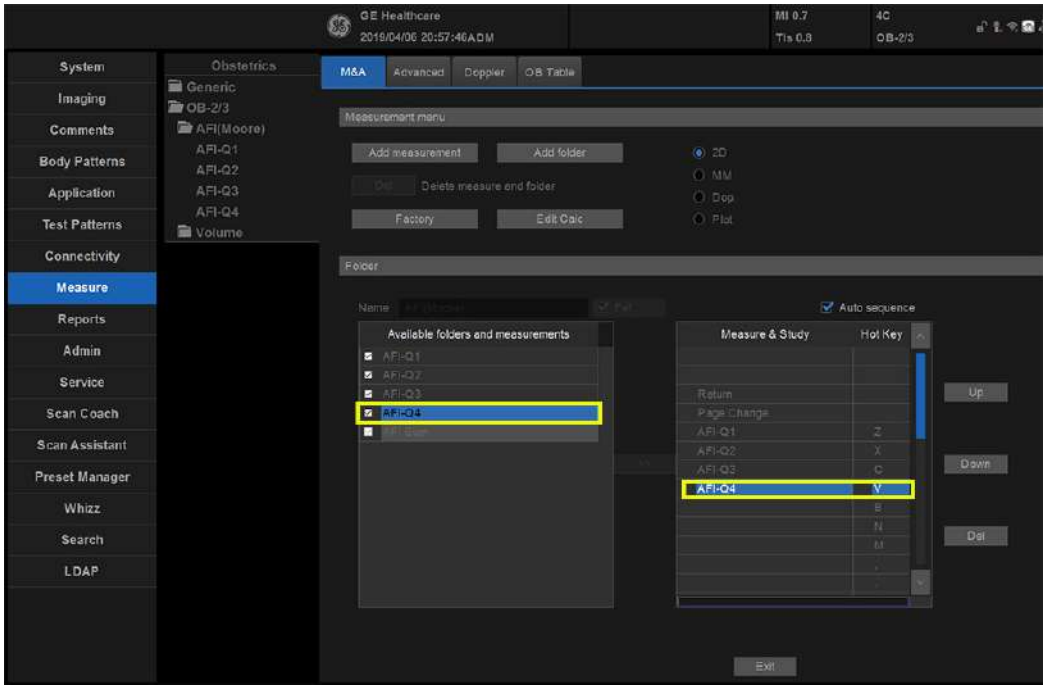


Figure 7-13. Measure & Study list: New item added

The selected item is now displayed in the Measurement Summary Window.

NOTE: If an item is already in the Measure & Study list, the system does not allow you to add it again. To move an item within the Measure & Study list, See 'Moving items in the Measurement Summary Window' on page 7-26 for more information.

Specifying Which Measurements Go in a Study or Folder (continued)

Measurement Summary Window

The figure below shows the OB menu area and a portion of the Measurement and Analysis screen for OB.

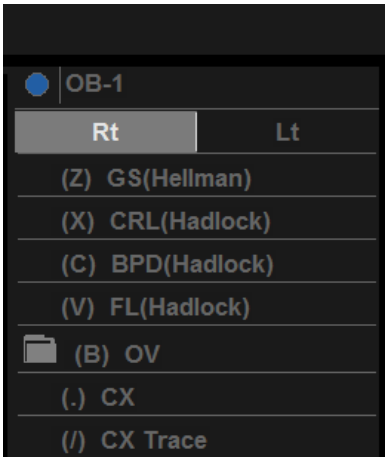


Figure 7-14. Measurement Summary Window

Moving items in the Measurement Summary Window

To move items that are displayed in the system menu, you move them in the Measure & Study list.

1. Move the **Trackball** to highlight an item in the Measure & Study list.
2. Select the up or down arrow.

   The item is displayed at the selected position in the system menu.

Removing items from the System Menu

To remove an item from the Selection menu:

1. Move the **Trackball** to move to the item in the Available folders and measurements list.
2. To clear the check box for the item, move the **Trackball** to the check box and press **Set**.

   The system removes the item from the Selection menu, the Measure & Study list, and from the System Menu. It is also not listed in the Summary Window.

Setting up an automatic measurement flow

In some cases, related measurements are put in a measurement folder. This allows you to logically organize measurements. It also allows you to specify that the system automatically start each measurement in a folder, one after the other. This is the automatic sequence feature. To use this feature:

1. In the Selection menu, select the folder that contains the measurements you want.

   The system displays the folder and lists the measurements.
2. In the Folder section of the Measurement & Analysis screen, select Auto sequence. For OB-1 measurements, Uterine Volume measurements are put in the Uterine folder.

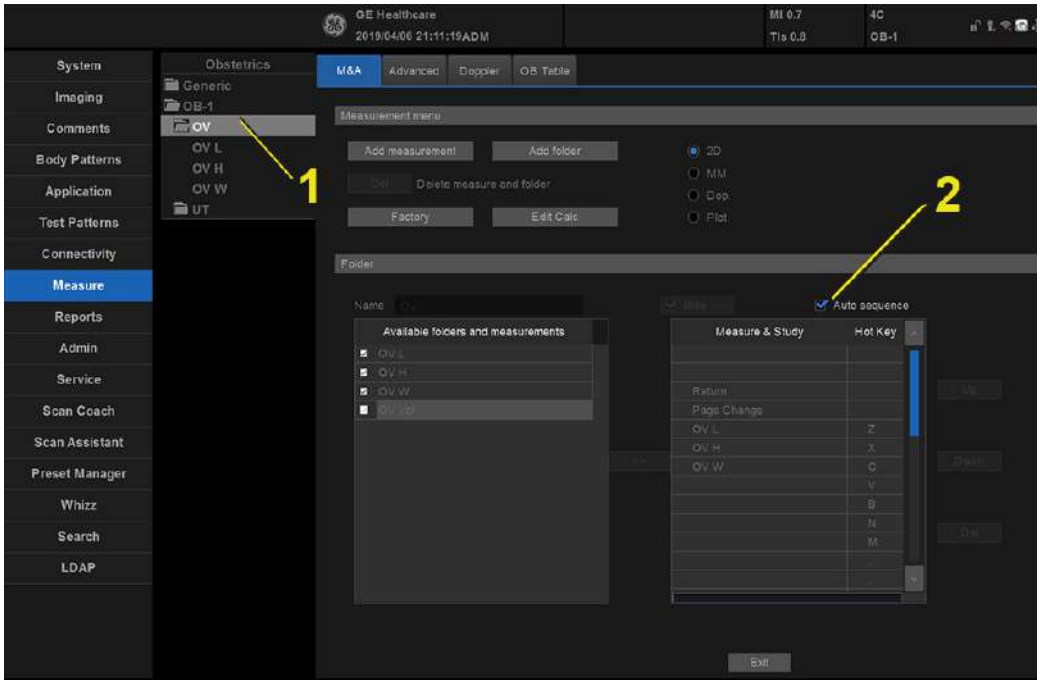


Figure 7-15. Measurement & Analysis screen: Auto sequence

1. Selection Menu
2. Auto Sequence

Changing Measurements

You can make changes to some of the measurements. For example, Head Circumference can be measured with an ellipse, a trace, or two distances. You can specify which measurement type you want the system to use as the default. You specify the measurement type by selecting the tool to use to make the measurement.

- To change the tool used to make a measurement:

  In the Measurement section of the Measurement & Analysis screen, select the desired tool from the Tool list. Select the arrow to display the drop-down list.

NOTE: If the Tool field is gray, it cannot be changed.

After you choose the tool, this is what the system expects when you scan and choose this measurement.

NOTE: The diagram to the right of the Tool list shows the measurement type. In the following example, ellipse is selected and the diagram shows an ellipse.

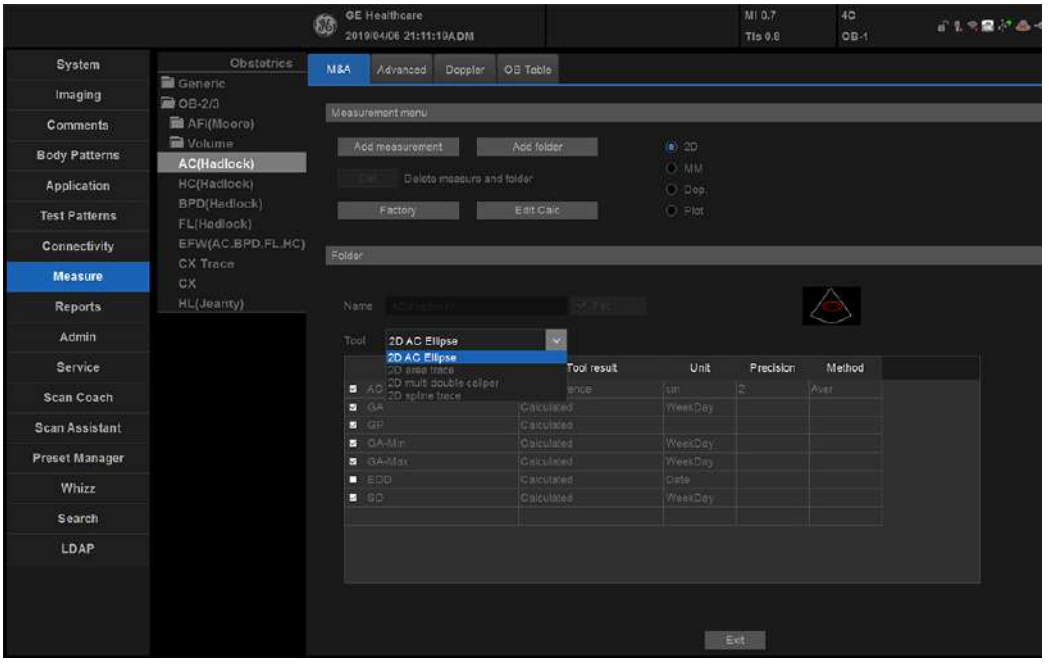


Figure 7-16. Measurement & Analysis screen: Change measurements

Adding Folders and Measurements

Adding a folder

When you add a folder, it can be a study, or a measurement folder that includes related measurements.

1. In the Selection menu, select the study or folder where you want to add the folder.
2. In the Measurement menu section, select Add folder.
   - If you select Blank, the system adds a folder with a name such as USERDEFS1. It is listed in the Selection menu.
   - If you want to use an existing folder, select Insert, and then select a folder from the list. The list includes all folders defined for the current exam category and selected mode. You cannot edit this folder.

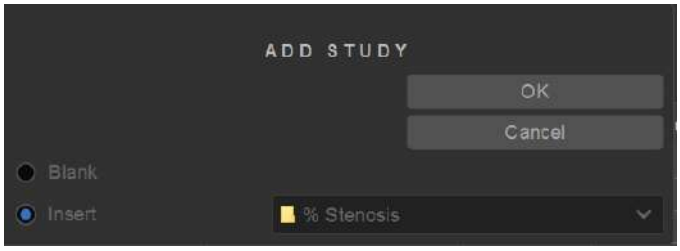


Figure 7-17. Add folder Window

3. Select the user-defined folder in the Selection menu.

   The system displays the new folder in the Folder section of the Measurement & Analysis screen.
4. To name the folder, move the **Trackball** to highlight the Name field, press **Set** twice, and type the name.

NOTE: *DO NOT use “single quotes” for a parameter name, a measurement name, a folder name or an author name.*

5. To add measurements to the folder, See ‘Adding a user-defined measurement’ on *page 7-31 for more information.*

Adding a folder (continued)

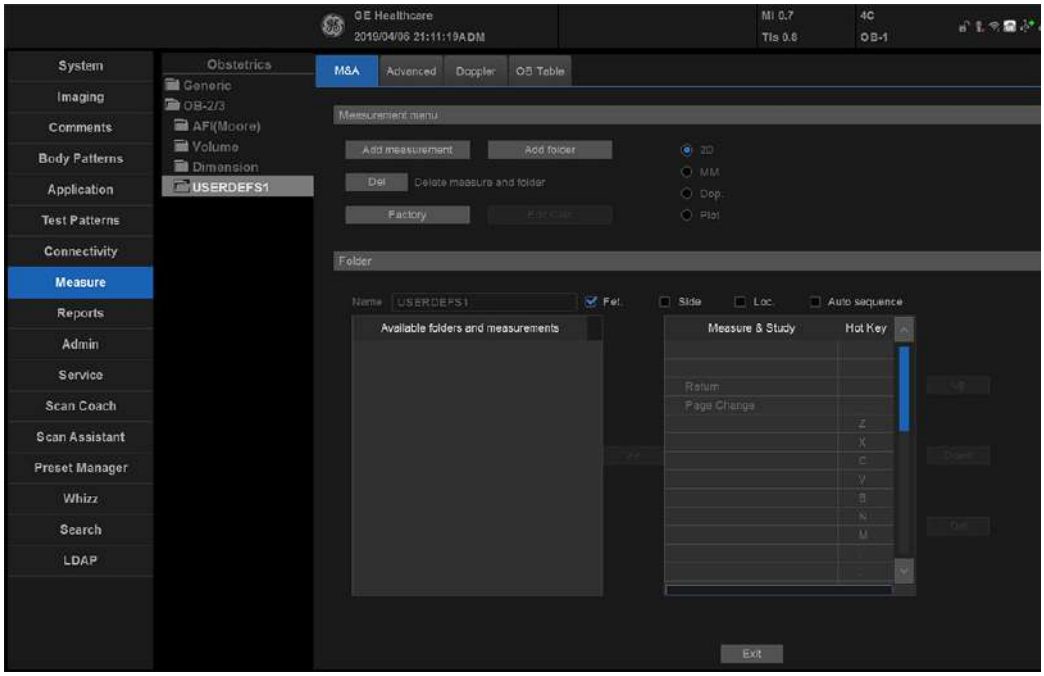


Figure 7-18. Measurement & Analysis: Add folder

Adding a user-defined measurement

WARNING

Please remember that you are responsible for confirming the correctness and accuracy of the user input formula that you add.

You can create a user-defined measurement in a system-defined folder or in a folder you created.

NOTE: DO NOT use "single quotes" for a parameter name, a measurement name, a folder name or an author name.

1. In the Selection menu, select the study or folder where you want to add the measurement.
2. In the Measurement menu section, select ***Add Measurement***.

   The system displays the Add Measurement window.



Figure 7-19. Add Measurement window

3. Do one of the following:
   - If you want to create this measurement from a copy of an existing measurement, select ***Use copy of***, and then select a measurement from the list. The list includes all measurements defined for the current exam category and selected mode.

NOTE: This only applies to OB and Cardiac.

   - If you want to use an existing formula, select ***Insert***, and then select a measurement from the list. The list includes all measurements defined for the current exam category and selected mode. You cannot edit this formula.
   - If you want to create a blank new measurement, select ***Blank***.

Adding a user-defined measurement (continued)

4. Select ***OK***.
   - If you created a blank measurement, the system adds a measurement with a name such as USERDEFM1.
   - If you created a measurement from a copy of an existing measurement, the system lists the measurement and its parameters in the Measurement section.
5. When you create a new measurement, the measurement name is automatically highlighted. Type a name for the new measurement. You can change the name of a measurement you created from a copy.

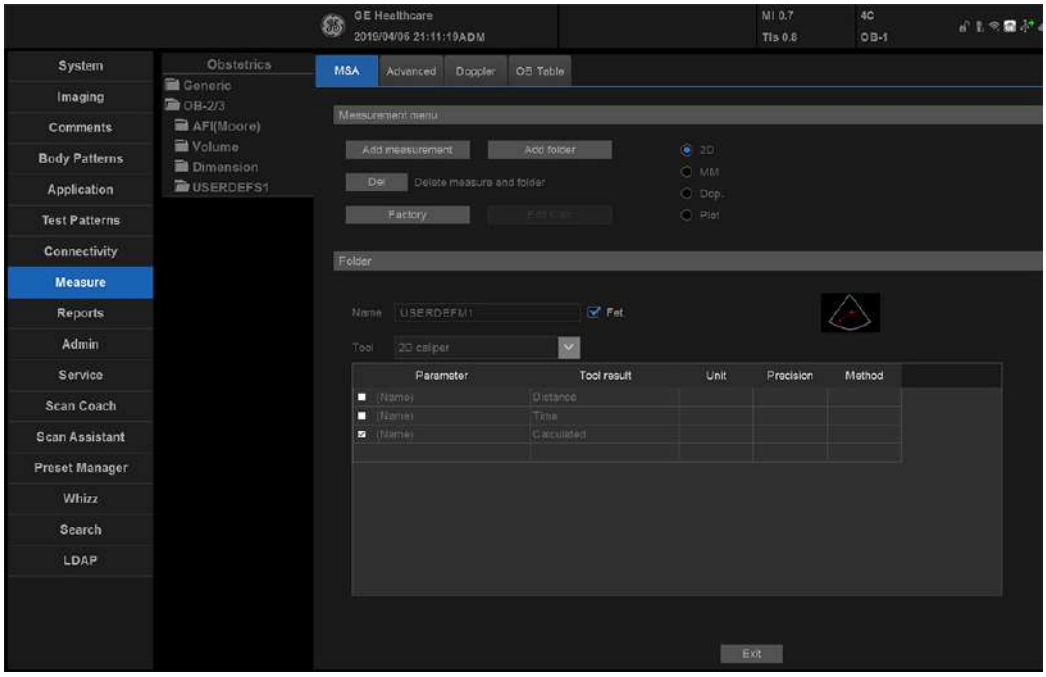


Figure 7-20. Measurement & Analysis: Add measurement

Adding a user-defined measurement (continued)

NOTE: 2D Dual Caliper, 2D Dual Area, 2D Dual Ellipse, and 2D Dual Spline Trace are not available through the factory default. To enable these measurements, add a new measurement using "2D Dual Caliper", "2D Dual Area", "2D Dual Ellipse", or "2D Dual Spline Trace" tool.

Defining measurement parameters

After you add a measurement, you can add parameters. You may also want to change parameters if you copied an existing measurement. See 'Changing or adding measurement parameters' on *page 7-33 for more information.*

Changing or adding measurement parameters

You can make changes to measurement parameters and you can add measurement parameters.

Changing measurement parameters

To change a measurement parameter:

1. In the Selection menu, select the measurement.
2. To change the name of the Parameter, move the **Trackball** to the parameter name and press **Set** twice. Type a name for the parameter.

For a description of other measurement changes, See 'Changing Measurements' on *page 7-28 for more information.*

Editing Calculations

To modify user-defined calculations:

1. In the Measurement menu section, select ***Edit calc***.

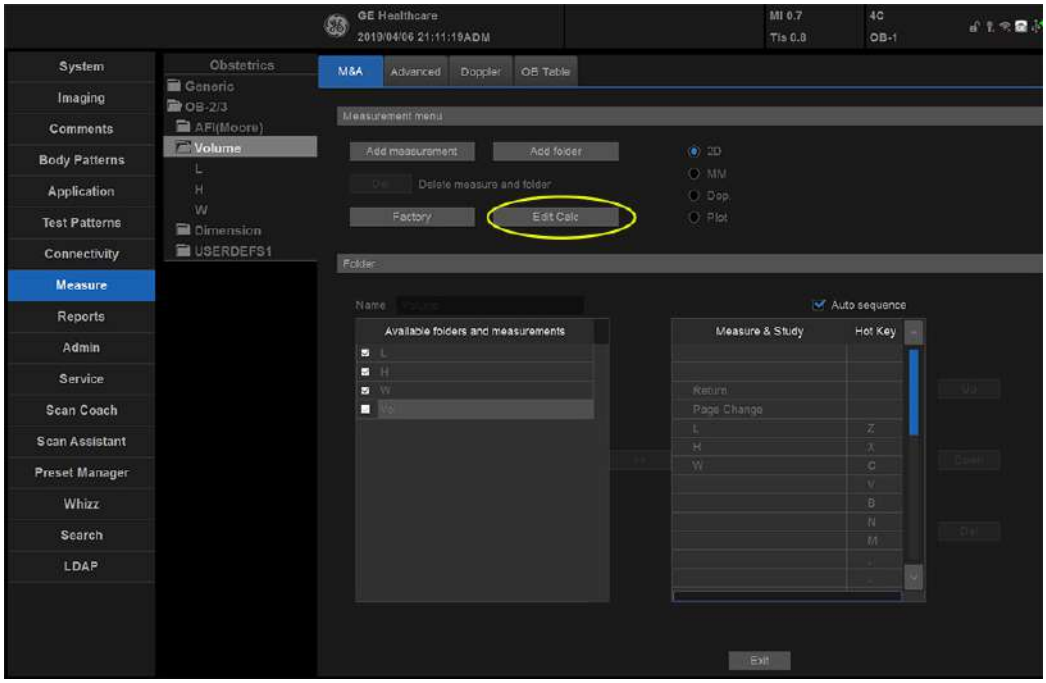


Figure 7-21. Edit Calc

The Modify User CALC window displays.

Editing Calculations (continued)

2. In the User Defined list, select the calculation that you want modified, then select ***OK***.

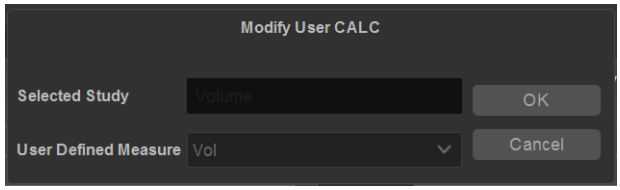


Figure 7-22. Modify User CALC window

3. The Measure tab for user-defined calculations displays. Double click on the equals sign symbol under Tool Result for the desired parameter.
4. Edit the formula as needed and select ***OK***.

Deleting a Folder or Measurement

NOTE: You can only delete user-defined folders or measurements. You cannot delete default system folders or measurements.

1. Select the folder or measurement in the Selection menu.
2. In the Measurement menu section, select the Del next to Delete measure and folder.

M&A Advanced Preset

The system allows you to specify application-specific values for certain parameters. You specify the parameter values on the Advanced tab of the Measurement & Analysis screen.

1. Enter ***Utility***->**Measure**.
2. On the monitor display, select the Advanced tab.

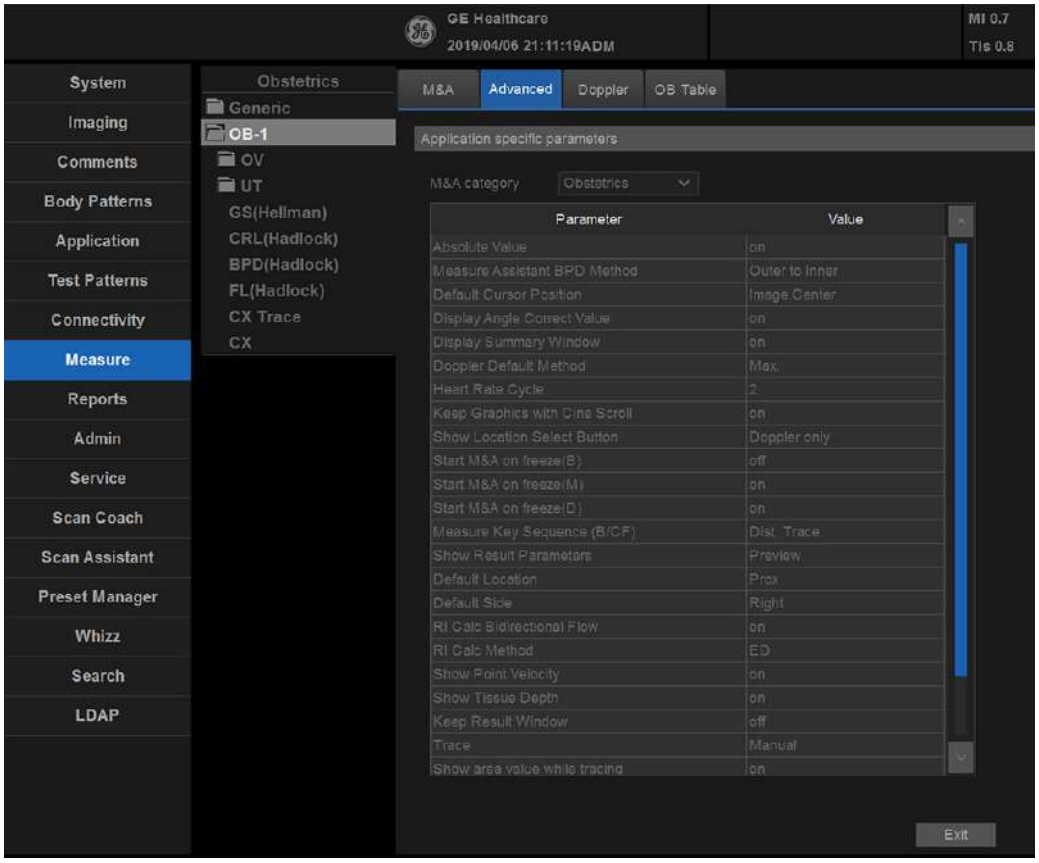


Figure 7-23. M&A Advanced Preset Menu

M&A Category: Display and select current exam category.

Parameter: Lists application specific parameters.

Value: Select the value for a parameter.

3. To select an exam category, select it from the M&A category list.

   The Parameters list displays parameters for the selected category.

M&A Advanced Preset (continued)

4. To select a value for a parameter, select it from the Value list.

NOTE: The parameters that appear are category dependent.

Table 7-1: M&A Advanced

Preset Parameter	Description
Absolute Value	Displays the absolute value of the Doppler Velocity measurement (On or Off)
Display Angle Correct Value	On or Off
Display Summary Window	On or Off
Doppler Default Method	Avg, Max, Min or Last
Heart Rate Cycle	1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 *NOTE: For Cardiac, you can select only "1".*
Keep Graphics with Cine Scroll	If you select "On", the measurement graphics remain while in CINE scroll. The measurement graphic redisplays on the frame where the measurement was taken in B-Mode.
Start M&A on a Freeze (B)	Off: Select measurement manually on Freeze On: Measurement menu appears automatically on Freeze. Caliper: Measurement menu and caliper appear automatically on Freeze.
Start M&A on a Freeze (M)	
Start M&A on a Freeze (D)	
Measure Key Sequence (B/CF)	2 Sequences: Dist, Trace; Dist, Spline 2 Sequences: Dist, Open Trace: Dist, Open Spline 3 Sequences: Dist, Trace, Spline; Dist, Spline, Trace; Dist, Spline, Intensity; Dist, Trace, Intensity; Dist, Trace, Open Trace; Dist, Spline, Open Trace 4 Sequences: Dist, Trace, Spline, Intensity; Dist, Spline, Trace, Intensity; Dist, Spline, Trace, Open Trace; Dist, Trace, Open Trace, Spline
Show Result Parameters	Preview or After Set cursor: Preview: Displays while taking the measurement. After Set Cursor: Displays after completing the measurement.
Default Location	Off, Prox, Mid or Dist
Default Side	Left, Right or Off
RI Calc Bidirectional Flow	On or Off
RI Calc Method	MD or ED
Show Location Select Button	Both on B and Doppler, Doppler only or No Display NOTE1: Only Abdominal, Vascular, Obstetrics and Gynecology have this preset. NOTE2: For Obstetrics and Gynecology, you can select only Doppler only or No Display.

Table 7-1: M&A Advanced (Continued)

Preset Parameter	Description
Show BM Folder Name on Worksheet	On or Off
Show Measure Name on Worksheet	On or Off
Show Point Velocity	On or Off
Show Tissue Depth	On or Off
Keep Result Window	Auto, On or Off
Trace	Auto or manual
Vol Flow Method	TAMEAN or TAMAX
Vol Flow Compensation with TAMAX	If you select TAMAX as the volume flow method, then you MUST specify the coefficient to use. Select from 0.5 to 1.0.
Worksheet Default Display	Mode/Expand (Abdominal, Small Parts, Obstetrics, Gynecology, Urology and Pediatrics) or Worksheet Summary (Vascular)
Doppler AutoCalc Velocity Unit	Velocity, Hz, Both or Auto
WMS Freeze Loop at ES	On or Off
WMS Segment Model	16 segments or 18 segments
WMS Initial Scoring	Undefined or Normal
WMS Scoring Legend	ASE, European or Asian
Hip Orientation	Cranial-left or Caudal-left
Show area value while tracing	On or Off

Manual Calcs Presets

The system allows you to preset the parameters for manual calculations. You specify the parameter values on the Doppler tab of the Measurement & Analysis screen.

1. Enter Utility -> Measure -> Doppler .

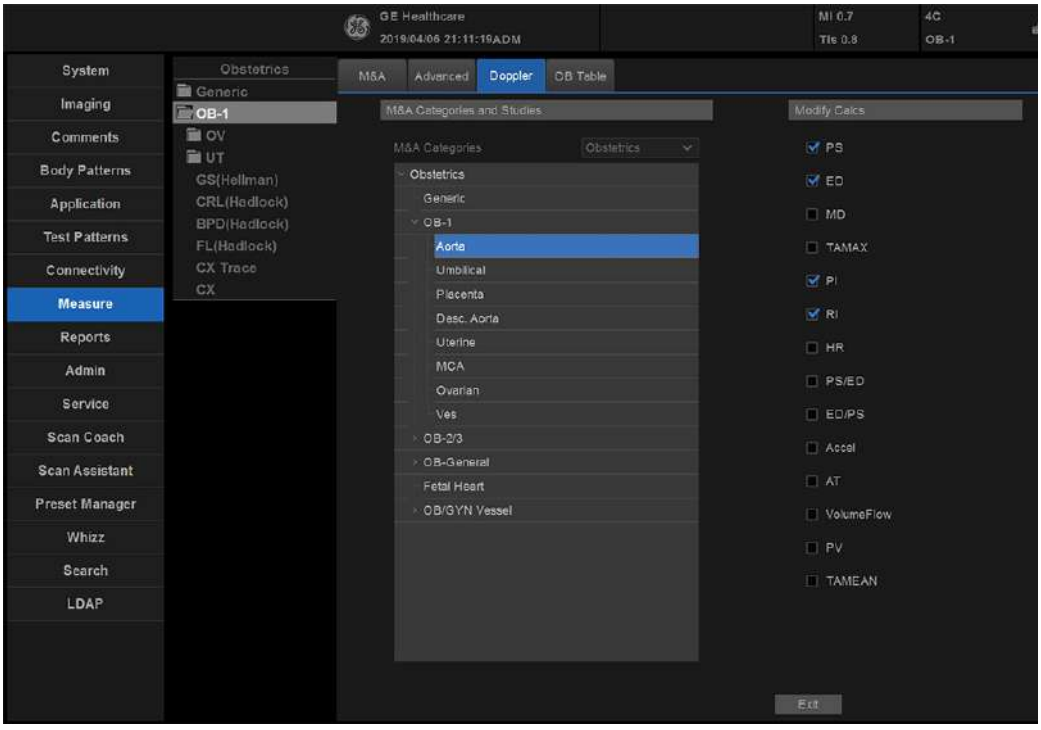


Figure 7-24. M&A Doppler Preset Menu

M&A Category: Display and select current exam category.

Manual Calcs Presets (continued)

2. To select an exam category, select it from the M&A category list.

   The system displays a hierarchical view of the exam category and the studies and folders in the category.
3. In the hierarchical view, select a study or folder.
4. In the Modify Calcs column, select the measurements that you want to the system to show for manual calcs for the selected study or folder.
5. Select **Exit**.

Application Measurement Preset

The Application Measurement presets allow different calculation packages to be available under different application presets.

The presets allow you to configure the Measurement Categories and Measurement Exam Calcs. These presets are found on the Utility -> Application -> Measurements screen.

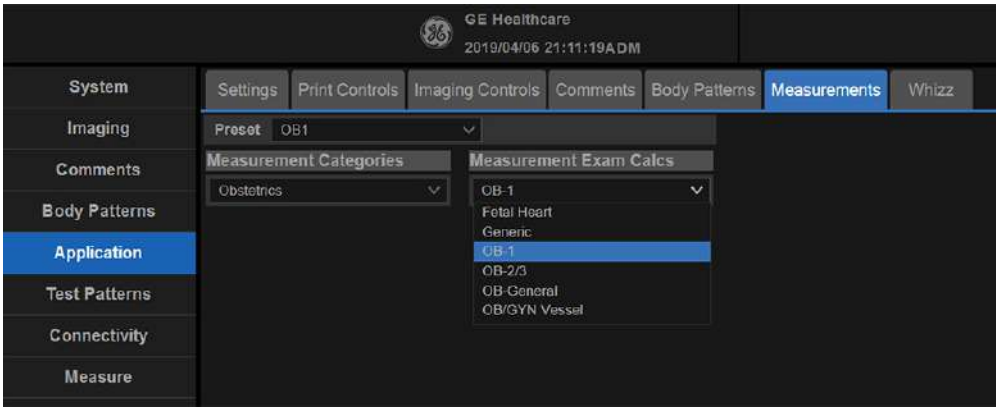


Figure 7-25. Application Measurement

Mode Measurements

B-Mode Measurements

Two basic measurements can be made in B-Mode.

- Distance
- Circumference and Area
  - Ellipse Method
  - Trace Method
  - Spline Method

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

Distance measurement

To make a distance measurement:

1. Press **Measure**.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points, if preset accordingly.
5. To complete the measurement, press **Set**.

   The system displays the distance value in the Results Window.

The following hints can help you to perform distance measurements:



HINTS

- **Before** you complete a measurement:
  - To toggle between active calipers, adjust **Cursor Select**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- **After** you complete the measurement:
  - To rotate through and activate previously fixed calipers, adjust **Cursor Select**.
  - To erase all data that has been measured to this point, but not data entered onto reports, press **Clear**.

Circumference and area (ellipse) measurement

You can use an ellipse to measure circumference and area. To measure with an ellipse:

1. Press **Measure**.
2. To position the active caliper, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper, move the **Trackball**.
5. Rotate the **Ellipse** control; an ellipse with an initial circle shape displays.
6. To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
7. To increase the size, rotate the **Ellipse** control in a clockwise direction. To decrease the size, rotate the **Ellipse** control in a counterclockwise direction.
8. To toggle between active calipers, adjust **Cursor Select**.
9. To complete the measurement, press **Set**. The system displays the circumference and area in the Results Window.



HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Circumference and area (trace) measurement

Trace

To trace the circumference of a portion of the anatomy and calculate its area:

1. Press **Measure** key to enter Measure mode.
2. Adjust **Caliper Change** in the primary menu to **Trace**.
3. To position the caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**. The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.
6. To complete the measurement, press **Set**. The system displays the circumference and the area in the Results Window.

Circumference and area (trace) measurement (continued)

Open Trace

To trace the circumference of a portion of the anatomy and calculate its length:

1. Press **Measure** key to enter Measure mode.
2. Adjust **Caliper Change** in the primary menu to **Trace**.
3. To position the caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**. The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.
6. To complete the measurement, press **Set**. The system displays the circumference and the length in the Results Window.



HINTS

Before you complete the trace measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To erase the dotted line but not the caliper, press **Clear** once.
- To clear the caliper and the current data measured, press **Clear** twice.

Circumference and area (spline trace) measurement

To trace the circumference of a portion of the anatomy and calculate its area:

1. Press **Measure**.
2. Adjust **Caliper Change** in the primary menu to **Spline**.
3. To position the first caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**. The first caliper turns yellow. The second caliper appears at the same position as the first caliper and is green.

*NOTE: When pressing the **Clear** key once, the second caliper disappears and the first caliper is activated.*

*If **Clear** is pressed again, the first caliper disappears and the Spline trace is cancelled.*

5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.

*NOTE: The **Clear** key functionality is the same as noted in the previous step.*

The spline trace requires at least three points to draw the trace. Continue setting the points of the trace until the desired points are set.

6. Press **Set** again after the last caliper is fixed to finalize the spline trace. All points are removed from the line and the spline trace turns yellow.

   Press **Set** twice to finish this measurement.

   If **Clear** is pressed twice when more than 3 points exist on the trace, all points are removed and the first caliper again displays.

NOTE: Spline trace is not available through the factory default. The system defaults to trace. To enable spline trace, modify the Measure Key Sequence preset found in Utility -> Measure -> Advanced preset.

Circumference and area (spline trace) measurement (continued)

Edit the spline trace

1. Select ***Cursor Select***. The spline trace changes to green and all points appear on the trace as yellow.

   A pick-caliper appears on the center of the image and the message “Edit spline trace” displays at the bottom of the screen.

NOTE: The pick-caliper is used to select and move the trace points.

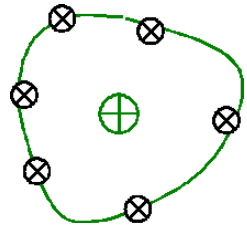


Figure 7-26. Edit spline trace

Select ***Cursor Select*** again. The trace is deactivated (changes to yellow) and all points, including the pick-caliper, are removed.

If the previous/next fixed caliper exists on the image, it is activated.

*NOTE: Pressing **Clear** at this time removes all points and the trace graphic.*

2. Move the pick-caliper to the desired point and press **Set**. The point is activated and turns green.
3. Move the point to the desired position and press **Set**. The point is fixed and turns yellow. The pick-caliper appears on the center of the image.

NOTE: The spline trace is updated at run time.

*NOTE: To remove a point, press **Clear** while moving the point. The trace turns green and the remaining points continue to be shown as yellow. If there are less than three points, the spline trace is removed.*

4. Press **Set** again. All points are removed from the trace and the trace is shown as yellow.

Intensity (Echo level) measurement

To make an echo level measurement:

1. Press **Measure** key to enter Measure mode.
2. Adjust **Caliper Change** in the primary menu to **Intensity**.
3. To position the caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**. The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.
6. To complete the measurement, press **Set**. The system displays the echo level in the Results Window.

NOTE: The echo level measurement is only available on a frozen image, not on a B-paused image.

NOTE: Echo Level is not available through the factory default. To enable echo level, modify the Measure Key Sequence preset, found in the Utility -> Measure -> Advanced preset.

2D Dual caliper

NOTE: 2D dual caliper / 2D dual area / 2D dual ellipse / 2D dual spline trace / 2D dual circle are not available through the factory default. To enable these measurements, add new measurement using “2D dual caliper”, “2D dual area”, “2D dual ellipse”, “2D dual splinetrace” or “2D dual circle” tool in the Utility -> Measure -> M&A preset menu.

You can take a measurement on dual images with B and B mode, on dual images with B and CF mode, with simultaneous mode or on dual images with live image with 2D dual measurements.

1. Select an added measurement from the menu area to enable the appropriate measurement. A caliper displays.

NOTE: When the measurement is selected without dual B images or with different probe images, warning message is displayed on the status bar, and the selected measurement is canceled.

2. To position the caliper at the start point, move the **Trackball**.

   You can use both images as an original image.

NOTE: If the first point of the original graphic is out of the shadow image area, then the warning message displays on the status bar and the shadow graphic is not drawn.

3. To fix the start point, press **Set**. The caliper changes to an active caliper.

NOTE: Only original graphic has graphic numbering to distinguish between original image and shadow image.

NOTE: The trackball move area is limited to the narrow area of both images.

NOTE: Only the original graphic can be edited. When the original graphic is edited, the shadow graphic is also updated

4. To complete the measurement, press **Set**. The system displays the measurement result in the Results Window.

NOTE: It's impossible to take a measurement across dual images.

NOTE: 2D Dual measurement tool can not be copied.

NOTE: When one of them (original and shadow) is deleted, then both graphic are deleted.

Doppler Mode Measurements

Basic measurements can be made in Doppler Mode.

- Velocity
- TAMAX and TAMEAN (Manual or Auto Trace)
- Two Velocities with the Time Interval and Acceleration between them
- Time Interval
- Volume Flow

NOTE: The following instructions assume that you do the following:

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the Doppler Mode part of the display.
3. Press **Freeze**.

Velocity

To measure velocity:

1. Press **Measure** key to enter Measure mode.

   Adjust **Caliper Change** in the primary menu to **Velocity**.

   An active caliper with a vertical and horizontal dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**. The system displays the velocity measurement in the Results Window.

Slope (Velocity, Time Interval and Acceleration)

To measure two velocity values, the time interval (ms), and acceleration (m/s^2):

1. Press **Measure** key to enter Measure mode.

   Adjust **Caliper Change** in the primary menu to **S/D Caliper**.

   An active caliper with a vertical and horizontal dotted line displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the two peak end point velocities, the time interval, and the acceleration in the Results Window.

Time interval

To measure a horizontal time interval:

1. Press **Measure** key to enter Measure mode.

   Adjust **Caliper Change** in the primary menu to **S/D Time**.

   An active caliper with a vertical and horizontal dotted line displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the time interval between the two calipers in the Results Window.

TAMAX and TAMEAN

Manual Trace

The value measured depends upon the Vol Flow Method preset. The two selections available are: Peak (TAMAX) and Mean (TAMEAN).

To do a manual trace of TAMAX or TAMEAN:

1. Press **Measure** key to enter Measure mode.

   Adjust **Caliper Change** in the primary menu to **S/D Trace**.

   Enter Utility -> Measure -> Advanced preset menu, set **Trace** preset to **Manual**.
2. To position the caliper at the trace start point, move the **Trackball**.
3. To fix the start point, press **Set**.
4. To trace the maximum values of the desired portion of the spectrum, move the **Trackball**.

   NOTE: To edit the trace line, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the measurement values in the Results Window.

TAMAX and TAMEAN (continued)

Auto Trace

The value measured depends upon the Vol Flow Method preset. The two selections available are: Peak (TAMAX) and Mean (TAMEAN).

To do an auto trace of TAMAX or TAMEAN:

1. Press **Measure** key to enter Measure mode.

   Adjust **Caliper Change** in the primary menu to **S/D Trace**.

   Enter Utility -> Measure -> Advanced preset menu, set **Trace** preset to **Auto**.
2. To position the caliper at the trace start point in the Doppler spectrum, move the **Trackball**.
3. To fix the start point, press **Set**.
4. To position the vertical caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system automatically fixes both calipers and traces the maximum value between the two points. The system displays this value in the Results Window.

NOTE: When you set the Auto Trace for Both (above and below), the system picks up the maximum power of the signal, NOT the maximum velocity. If the maximum velocity is not the maximum power, the system may not trace accurately. If you want to use maximum velocity, select either Above or Below.

Edit Trace

Auto Trace can be edited after taking an Auto Trace measurement.

1. After taking an Auto Trace measurement, select the measurement result on the result window. The Edit Trace (Edit Peak or Edit Mean) menu window appears.

NOTE: If the system cannot take the trace data correctly from the image, Edit Trace does not work.

2. Select ***Edit Trace***. The first caliper (manual trace caliper) appears on the center of the image. Use the **Trackball** to move the caliper on the trace line to the start point.

*NOTE: To cancel Edit Trace at this time, press **Clear**, **Scan**, or **Freeze**.*

3. Press **Set** to fix the first caliper. The second caliper appears. Edit the trace manually using the second caliper.

   The Ellipse control is used to edit the trace.

*NOTE: When pressing the **Clear** key once at this time, the second caliper disappears and the first caliper appears in the center of the image.*

*NOTE: If you press **Scan** or **Freeze** at this time, the caliper is automatically fixed and the result window updates.*

4. Press **Set** to fix the second caliper. The trace and the result window update. The trace data (TAMAX and TAMEAN) are updated, though the other points (e.g. PS, ED) are not updated by trace. The points can be edited with ***Cursor Select***.

NOTE: While in Edit Trace, Cursor Select is disabled.

5. Repeat Edit Trace as needed.

Doppler Auto Calc Average Cycle

When using Auto Calc, a selection is available to average a number of cycles automatically. There is also a preset selection in the Utility Imaging PW page for this feature. When using average cycle:

- Selected cardiac cycle lines display on the image. Point calipers are not displayed.
- When changing the number of cycles from 1 to >1, all the data is reacquired from the image, recalculated and updated.
- When multiple cycles are selected in AutoCalc, the average values calculate and display automatically.
- When selecting Peak Value (PV), average cycle is not available.

NOTE: You cannot edit the lines while in Average Cycle. Cursor Select is not available at that time.

NOTE: Average Cycle data is acquired from the display image area only, for both live and frozen. The average cycle data fails if the setting for the number of cycles is larger than the number of image cycles.

Volume Flow - Manual Calc

You perform a manual Volume Flow measurement using the TAMAX plus a Volume Flow coefficient compensation.

1. To perform the Volume Flow measurement using the TAMAX plus a Volume Flow coefficient compensation, in Utility-->Measure-->Advanced, select the following:
   - Trace = Manual
   - Vol Flow Method = TAMAX [you MUST also select a Volume Flow coefficient for use with TAMAX.]
   - Vol Flow Compensation with TAMAX = [select value from 0.5 to 1.0]
2. Set Auto Calcs to ***Off*** via Doppler Mode-->Modify Auto Calcs-->Off.
3. Select a folder in Doppler Mode-->select a calculation folder-->select Show All.
4. Select Volume Flow. You'll notice that TAMAX is automatically selected.

NOTE: Ensure that you have placed the caliper in the spectral window when selecting the Volume Flow measurement.

5. Trace the TAMAX. The system prompts you to "Mark the first point on the spectral doppler." Press **Set**.
6. The system prompts you to "Trace the velocity spectrum boundary." Press **Set**.

NOTE: You can back up while tracing the TAMAX by using the Trackball.

7. Trace the vessel diameter. The system prompts you to "Mark first point of vessel diameter for volume flow calculation." Press **Set**.
8. The system prompts you to "Mark last point of vessel diameter for volume flow calculation." Press **Set**.
9. The Volume Flow is calculated in ml/min.

Volume Flow - Auto Calc

You can perform an automatic Volume Flow measurement using TAMEAN or using the TAMAX and a Volume Flow coefficient.

1. To perform the Volume Flow measurement using the TAMEAN, in Utility-->Measure-->Advanced, select the following:
   - Trace = Auto
   - Vol Flow Method = TAMEAN

   OR, to perform the Volume Flow measurement using the TAMAX plus a Volume Flow coefficient compensation, select the following:
   - Trace = Auto
   - Vol Flow Method = TAMAX [if you use TAMAX, you MUST also select a Volume Flow coefficient for use with TAMAX.]
   - Vol Flow Compensation with TAMAX = [select value from 0.5 to 1.0]
2. Set Auto Calcs to ***Live*** via Doppler Mode-->Modify Auto Calcs-->Live.
3. Perform the scan.
4. Select Volume Flow via Doppler Mode-->Modify Auto Calcs-->VOLUME FLOW. The system prompts you through the measurement.
5. Take vessel diameter for volume flow calculation. Set the first cursor.
6. Mark last point of vessel diameter for volume flow calculation. Press **Set**.
7. The calculation automatically completes the Volume Flow measurements as ml/min.

NOTE: If you change the TAMAX coefficient, the Volume Flow is automatically adjusted when in Auto Calcs (but not in Manual Calcs).

Flow Volume (FV)

Flow Volume estimates the volume of blood that flows through a vessel per unit time. It is derived from a vessel's cross-sectional diameter obtained from the B-Mode portion of the image and the mean velocity of flow in the vessel obtained from the Doppler portion of the image. It is measured in milliliters. When the FV measurement is made, FVO is automatically calculated.

To measure flow volume:

1. Select **FV** from Doppler menu.
2. Place the dotted horizontal line caliper at each of the time base on the Doppler spectrum.
   - If Trace Auto is selected, the waveform is automatically traced.
   - If Trace Auto is not selected, manually trace the desired portion of the waveform.

     The caliper moves to the B-Mode area.
3. Use the Ellipse or Trace method to measure the circumference and area of the vessel.

   The flow volume (FV) is calculated and displayed in milliliters. The flow volume output (FVO) is also calculated and displayed in milliliters/minute.

Flow Volume Output (FVO)

This measurement is used to measure the flow volume output in a vessel on the Doppler spectrum. It is measured in milliliters/minute. When the FVO measurement is made, FV is automatically calculated.

M-Mode Measurements

Basic measurements that can be taken in the M-Mode portion of the display are:

- Tissue Depth (Distance)
- Time Interval
- Time Interval and Velocity

NOTE: The following instructions assume that you do the following:

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the M-Mode part of the display.
3. Press **Freeze**.

Tissue depth

Tissue depth measurement in M-Mode functions the same as distance measurement in B-Mode. It measures the vertical distance between calipers.

1. Press **Measure** key to enter Measure mode.

   Adjust **Caliper Change** in the primary menu to **MM Distance**.

   An active caliper with a vertical and horizontal dotted line displays.
2. To position the active caliper at the most anterior point you want to measure, move the Trackball.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the most posterior point you want to measure, move the Trackball.
5. To complete the measurement, press **Set**.

   The system displays the vertical distance between the two points in the Results Window.

Time interval

To measure a horizontal time interval and velocity:

1. Press **Measure** key to enter Measure mode.

   Adjust **Caliper Change** in the primary menu to **MM Time**.

   An active caliper with a vertical and horizontal dotted line displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the time interval between the two calipers in the Results Window.

Slope (Time interval and Velocity)

To measure time and velocity between two points:

1. Press **Measure** key to enter Measure mode.

   Adjust **Caliper Change** in the primary menu to **MM Slope**.

   An active caliper with a vertical and horizontal dotted line displays.
2. To position the active caliper at the start point, move the Trackball.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the Trackball.
5. To complete the measurement, press **Set**.

   The system displays time(s) and slope between the two points in the Results Window.

Viewing and Editing Worksheets

NOTE: Worksheets are not saved if the system crashes.

As you complete measurements, the system puts measurement data in the appropriate worksheets.

To view a worksheet

To view a worksheet, select ***Report*** on the control panel.

The system displays the worksheet for the current study.

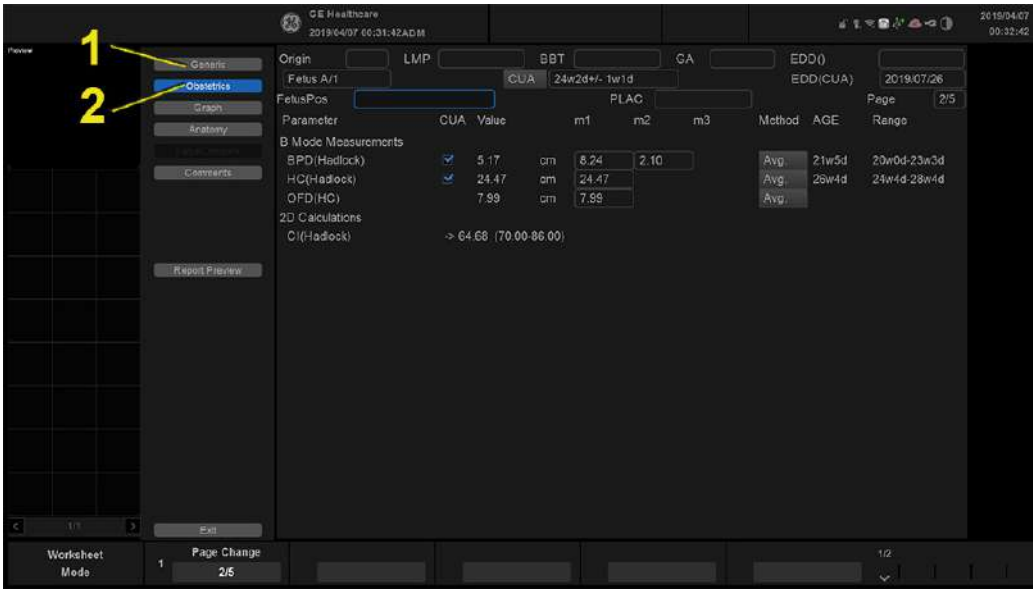


Figure 7-27. OB B-Mode Report

To view a worksheet (continued)

1. **Generic**: Select to view the generic measurements worksheet.
2. **Obstetrics**: Select to view a particular exam categories worksheet.

If a worksheet has more data on a second page, to view the next page, adjust the **Page Change** control on the primary menu.

To return to scanning, do one of the following:

- Select ***Report***.
- Press ***Esc***.
- Select the *Exit* button.

To edit a worksheet

To change data on a worksheet:

1. Move the **Trackball** to the field you want to change.
2. Press **Set**.
3. Type the new data in the field. The new data is displayed in blue to indicate that it was manually entered.

To delete or exclude data on a worksheet:

1. Move the **Trackball** to the field you want to delete or exclude, press the **Cursor**. The field is highlighted.
2. Do one of the following:
   - To delete the field, select ***Delete Value***.
   - To exclude the field, select ***Exclude Value***.

     The data in the field is not visible and is not included in report calculations.
   - To include a value that you previously excluded, select ***Exclude Value***.

To edit a worksheet (continued)

To type a comment on a report:

1. Select ***Comments***. The Comments window opens.
2. Type comments about the exam.
3. To close the Comments window, select other Menu.

To turn the volume measurement value off:

- Select the method type ***Off***. The value field becomes blank.

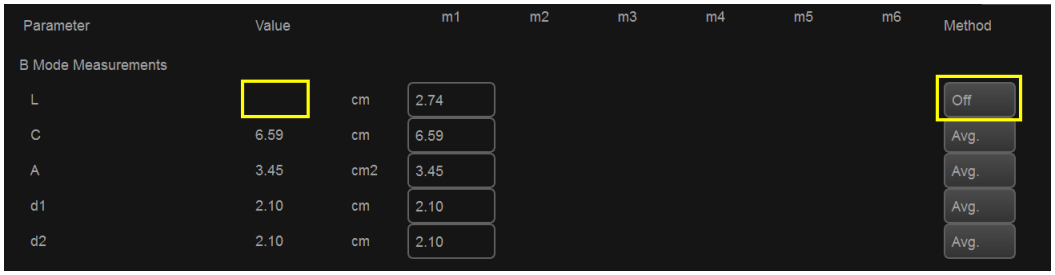


Figure 7-28. Volume Parameter Off



HINTS

Some fields on the report are view only, and others you can change or select. To easily see which fields you can change or select, move the **Trackball**. As the cursor moves over a field that you can change or select, the field is highlighted.

Delete All Worksheet Values

You can delete all measurement values on a worksheet.

1. When the worksheet is displayed on the monitor, press the **Clear** key; the following warning message appears:

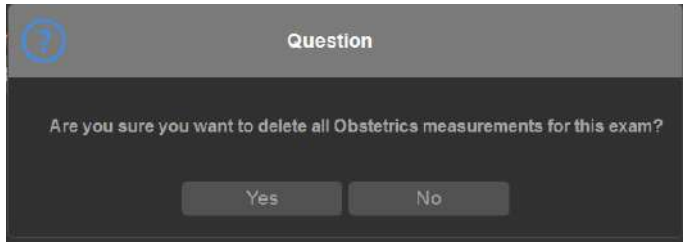


Figure 7-29. Delete Warning Message

2. Select ***Yes*** to delete all.

   Select ***No*** to cancel the deletion.

Wide Dual Screen Measurements

To preform the measurements in wide dual screen, select the measurement item from primary menu.

1. Press the **Dual** key on the control panel to enter wide dual screen.

NOTE: Ensure that the "Dual Screen" has been selected in the Automitic Wide Screen... portion of the Utility -> System -> System Imaging.

2. Press **Measure** on the control panel. The Result window displays at the left bottom of the screen. To perform measurement, select measurement item from left measurement list or select measurement item from the primary menu at the bottom of the screen. To switch to a different mode measurement package, press the Left/right arrow keys on the Alphanumeric keyboard.

NOTE: The location of the Result Window and measurement item while in wide dual screen is different than when in single and dual screen.

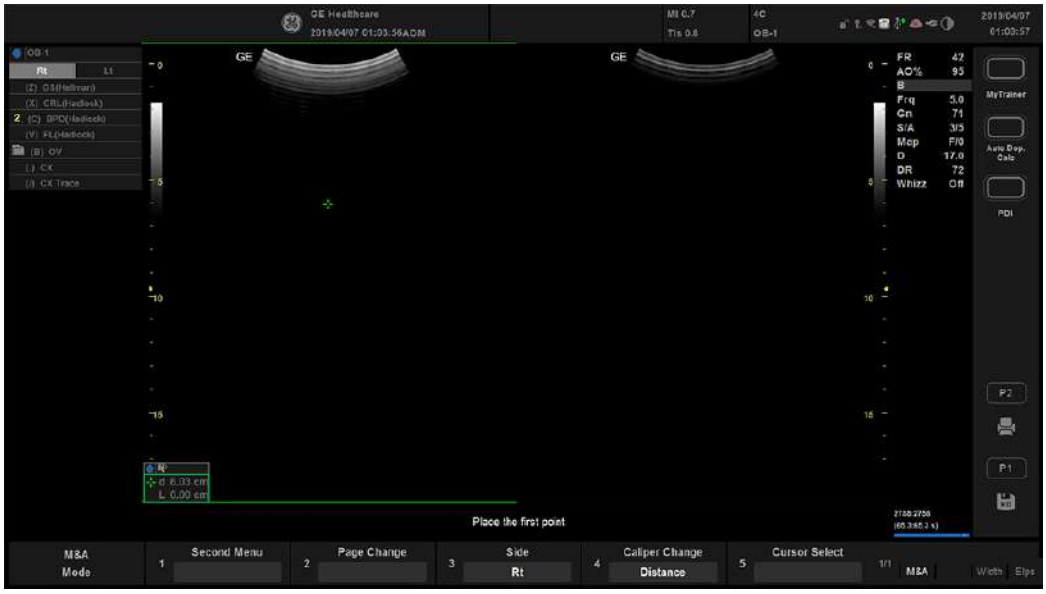


Figure 7-30. Wide Dual screen measurements

Generic Measurements

Overview

Each exam category has a Generic study. The Generic studies provide you quick access to measurements such as volume, angle, A/B ratio, and % stenosis. The particular measurements available in each Generic study vary, depending on the exam category and the mode. This section describes generic measurements, organized by mode.

To access Generic studies:

1. On the Control Panel, press **Measure**.
2. Select **Second Menu** on the primary menu.
3. Select the ***Generic*** folder in the story menu.

Calculation formulas are available in the *Advanced Reference Manual*.

Assign a name to the generic measurement

NOTE: Available for any linear and circumference measurement.

1. Move the cursor over the measurement result window and press **Set**.
2. Select ***User Name*** from the menu. The dialogue window displays.

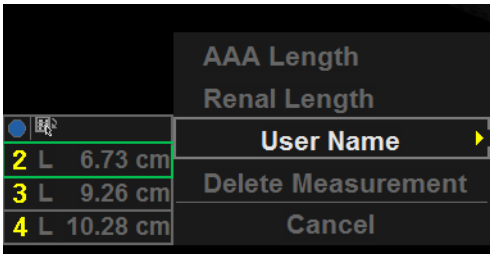


Figure 7-31. Users Name Menu

3. Enter the appropriate name and select OK.

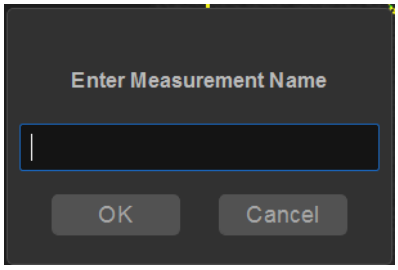


Figure 7-32. Enter new parameter

B-Mode Measurements

In B-Mode, the Generic study includes the following measurements:

- % Stenosis
- Volume
- Angle
- A/B Ratio

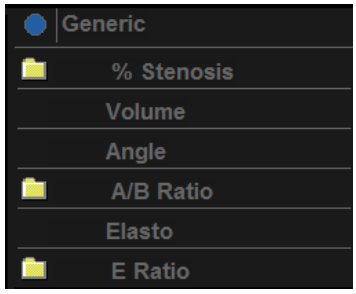


Figure 7-33. B-Mode Generic Study

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

% Stenosis

You can calculate % Stenosis by diameter or by area, depending on the mode.

NOTE: The Versana Active automatically activates the % Stenosis with the default selection. If another method is preferred, select it from the Primary Menu Key.

Diameter

NOTE: When you use diameter to calculate the %stenosis, always take the measurement from a cross-sectional view of the vessel.

To calculate percent stenosis by diameter:

1. From Generic, select ***% Stenosis***.
2. Select ***%sten(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the inner area of the blood vessel.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the outer area of the blood vessel.

   The system displays each distance measurement and the% Stenosis in the Results Window.

For details on how to make a distance measurement, See ‘Distance measurement’ on *page 7-42 for more information.*

NOTE: For the diameter calculation, do NOT take a distance measurement from a longitudinal view. This may lead to an inaccurate assessment of % stenosis.

% Stenosis (continued)

Area

To calculate percent stenosis by area:

1. From Generic, select ***% Stenosis***.
2. Select ***%sten(Area)***.

   The system displays a caliper.
3. Make a trace measurement of the inner area of the blood vessel.

*NOTE: To erase an open trace, move the **Trackball**.*

4. Press **Set**.

   The system displays a second caliper.
5. Make a trace measurement of the outer area of the blood vessel.

   The system displays the two area measurements and percent stenosis in the Results Window.

See ‘Circumference and area (trace) measurement’ on *page 7-44 for more information.*

Ellipse + Area

To calculate percent stenosis by ellipse and area:

1. From Generic, select ***% Sten[E+A]*** folder.
2. Ellipse is selected by default.

   The system displays a caliper.

NOTE: You can select the trace at this time.

3. Make an ellipse measurement of the inner area of the blood vessel.
4. Press **Set**.

   The system displays a caliper.
5. Make a trace measurement of the outer area of the blood vessel.

   The system displays the two area measurements and percent stenosis in the Results Window.

NOTE: % Stenosis (E+A) is not available through the factory default. To enable %Stenosis (E+A), add “%Steno(E+A)” to the Measure & Study list on the Utility -> Measure -> M&A screen.

Volume

The volume calculation can be made from any of the following measurements:

- One distance
- Two distances
- Three distances
- One ellipse
- One distance and one ellipse

For details on how to make a distance measurement, See ‘Distance measurement’ on *page 7-42 for more information.*

For details on how to make an ellipse measurement, See ‘Circumference and area (ellipse) measurement’ on *page 7-43 for more information.*

*NOTE: IMPORTANT!! If you want to make a volume calculation using one or two distances, you must select **Volume** BEFORE you make the measurements.*

NOTE: If you select Fix Caliper by Print Key on the Utility --> System --> System Measure, the print key does not function like the Set key, but instead ends the measurement sequence and initiates the volume calculation based on the number of measurements taken so far.

To make a volume calculation using one or two distances:

1. Select ***Volume***.
2. Make one or two distance measurements.
3. Select ***Volume***.

   The system displays the distances and the volume in the Results Window.

*NOTE: Use the **Clear** key to erase the green caliper.*

To make a volume calculation using three distances:

1. Make three distance measurements.

*NOTE: Three distances can be done in the dual format mode (side by side images). One measurement is usually made in the sagittal plane and two measurements in the axial plane. To use the dual format mode, press the **Dual** key on control panel.*

2. Select ***Volume***.

   The system displays the distances and the volume in the Results Window.

Volume (continued)

To make a volume calculation using one ellipse:

1. Make one ellipse measurement.
2. Select ***Volume***.

   The system displays the ellipse measurement and the volume in the Results Window.

To make a volume calculation using one ellipse and one distance:

1. Make one distance measurement and one ellipse measurement.
2. Select ***Volume***.

   The system displays the distance and ellipse measurement and the volume in the Results Window.



HINTS

- Volumes are most accurate when measurements are taken in the sagittal and axial scan planes.
- To display sagittal and axial plane images simultaneously, use the side-by-side dual format option.

NOTE: If you change the parameters or category during the volume measurement, please follow the procedure below before you restart the measurement.

1. *Check the number of each measurement in the summary window.*
2. *If the numbers are not all the same, it shows that you have the calculation which is not completed. Open the Report and clear that calculation.*

Volume (continued)

Table 7-2: Volume Calculations

Calc Name	Input Measurements
Volume (spherical)	One distance
Volume (prolate spheroidal)	Two distances, d1>d2
Volume (spheroidal)	Three distances
Volume (prolate spheroidal)	One ellipse: (d1 major axis, d2 minor axis)
Volume (spheroidal)	One distance d1, and one ellipse (d2 major axis, d3 minor axis)

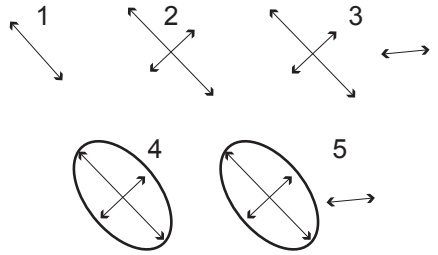


Figure 7-34. Volume Calculation Examples

1. One distance
2. Two distances
3. Three distances
4. One ellipse
5. One distance and one ellipse

Calculation formulas are available in the *Advanced Reference Manual*.

Volume (continued)

Post-assignment for General Volume

You can input a unique name for the general volume measurement. You can group the general volume measurements for each application.

1. Complete the volume measurement.
2. Move the caliper to the measurement result box (with green frame) and select **Set**.
3. The volume name menu appears. Select Name Volume.

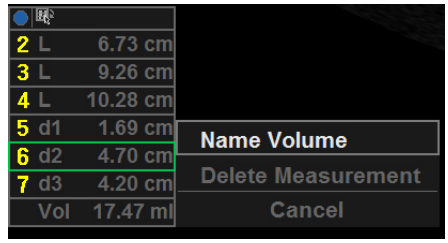


Figure 7-35. Volume Name menu

4. The dialog box displays. Enter a new name or choose the existing name.

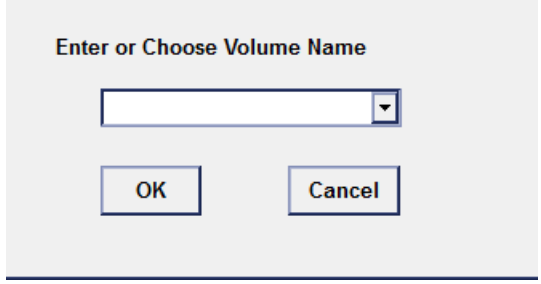


Figure 7-36. Volume Name Dialog box

NOTE: The factory default volume name cannot be changed (for example, Renal Volume).

Angle

This function measures the angle between two intersecting planes.

1. From the Generic, select ***Angle***.

   The system displays an active caliper.
2. To position the caliper, move the **Trackball**.
3. To fix the position of the first caliper, press ***Set***.

   The system displays a second active caliper.
4. To position the second caliper at the apex of the angle, move the **Trackball**.
5. To fix the position of the second caliper, press **Set**.

   The system displays a third active caliper.
6. To position the third caliper, move the **Trackball**.
7. To complete the angle measurement, press **Set**.

   The system displays the angle in the Results Window.

*NOTE: To rotate through and activate previously fixed calipers, adjust the **Cursor Select** control.*

A/B Ratio

In B-Mode, you can calculate A/B ratio by diameter or by area.

NOTE: The Versana Active automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Primary Menu Key.

Diameter

To calculate A/B ratio by diameter:

1. From Generic, select ***A/B Ratio***.
2. Select ***Ratio(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the first diameter.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the second diameter.

   The system displays each distance measurement and the A/B ratio in the Results Window.

NOTE: The first distance is the A diameter. The second distance is the B diameter.

For details on how to make a distance measurement, See ‘Distance measurement’ on *page 7-42 for more information.*

Area

To calculate A/B ratio by area:

1. From Generic, select ***A/B Ratio***.
2. Select ***Ratio(Area)***.

   The system displays a caliper.
3. Make a trace measurement of the A area.

*NOTE: To erase an open trace, move the **Trackball**.*

   The system displays a second caliper.
4. Make a trace measurement of the B area.

   The system displays the two area measurements and the A/B ratio in the Results Window.

For details on how to make a trace measurement, See ‘Circumference and area (trace) measurement’ on *page 7-44 for more information.*

M-Mode Measurements

In M-Mode, the Generic study includes the following measurements:

- % Stenosis
- A/B Ratio
- HR (Heart Rate)

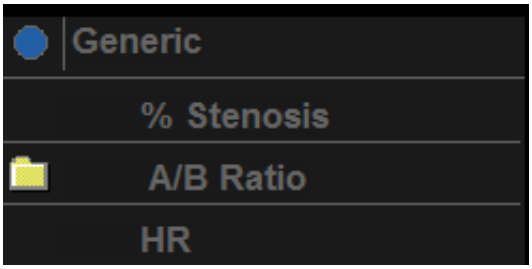


Figure 7-37. M-Mode Generic Study

% Stenosis

See '% Stenosis' on *page 7-69 for more information.*

A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity.

NOTE: The Versana Active automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Primary Menu Key.

Diameter

See 'Diameter' on *page 7-76 for more information.*

Time

To calculate A/B ratio by time:

1. Select ***A/B* Ratio**.
2. Select ***Ratio(Time)***.

   The system displays an active caliper.
3. To position the caliper at the A point, move the **Trackball**.
4. To fix the measure point, press **Set**.

   The system displays a second active caliper.
5. To position the second caliper at the B point, move the **Trackball**.
6. To complete the measurement, press **Set**.

   The system displays the two time measurements and A/B ratio in the Results Window.

Velocity

To calculate AB ratio by velocity:

1. Select ***A/B* Ratio**.
2. Select ***Ratio(Velocity)***.

   The system displays an active caliper with vertical and horizontal dotted lines.
3. To position the caliper at the A velocity, move the **Trackball**.
4. To fix the measure point, press **Set**.

   The system displays a second active caliper.
5. To position the second caliper at the B velocity, move the **Trackball**.
6. To complete the measurement, press **Set**.

   The system displays the two velocity measurements and the A/B ratio in the Results Window.

Heart Rate

To calculate the heart rate from M-Mode:

1. Obtain an image and press Measure. Select ***HR***.
   The system displays an active caliper.
2. To position the caliper at a recognizable point in the first cycle, move the **Trackball**.
3. To fix the first caliper, press **Set**.
   The system displays a second active caliper.
4. To position the caliper at the identical point in the next cycle (depending on preset), you need to move the **Trackball**.

NOTE: In the message bar at the bottom of the display, the system indicates the number of cycles you should measure.

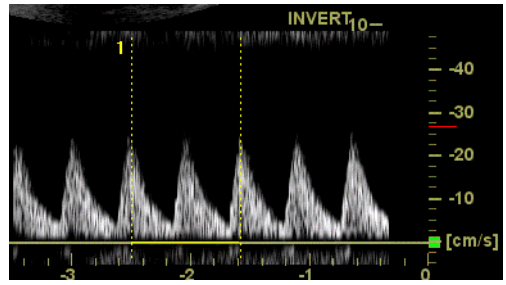


Figure 7-38. Two Heart Beat Reference (example in Doppler mode)

5. To complete the measurement and transfer the calculation to the report, press **Set**.

Doppler Mode Measurements

In Doppler Mode, the Generic study includes the following measurements:

- PI (Pulsatility Index)
- RI (Resistive Index)
- S/D Ratio or D/S Ratio
- A/B Ratio
- HR (Heart Rate)



Figure 7-39. Doppler Mode Generic Study

NOTE: The following instructions assume that you do the following:

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the Doppler Mode part of the display.
3. Press **Freeze**.

Control Assignment

Cancel Transfer

NOTE: Only for Vascular, Abdomen, OB and GYN.

After the Auto Vascular calculation results are assigned to a particular vessel, the user can cancel the assignment and assigned parameters are removed from Report page.

When Cancel Transfer occurs, a message appears on the screen to indicate the value was erased from Report page.

Vessel location

If the vessel has a location, you can select one of the following:

- Proximal (***Prox***)
- Middle (***Mid***)
- Distal (***Dist***)

NOTE: If you do not wish to assign a vessel location, press the lit location, then no location is assigned. Choose the folder you want the value assigned to.

To select one of the locations, adjust the Primary Menu Key control.

Side Rt/Lt

The system has measurements for the patient's right and left side. To select right or left, adjust the Primary Menu Key.

Pulsatility Index (PI)

For auto trace:

1. Select ***PI***.

   The system displays a caliper and a vertical dotted line.
2. Position the caliper at the beginning of the waveform.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. Position the caliper at the end of the waveform.
5. To complete the measurement, press **Set**.

   The system displays peak systole, minimum diastole, end diastole, TAMAX, and PI in the Results Window.

For manual trace:

1. Select ***PI***.

   The system displays a caliper and a vertical dotted line.
2. Position the caliper at the beginning of the waveform.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. Manually trace the entire waveform.
5. To complete the measurement, press **Set**.

   The system displays peak systole, minimum diastole, end diastole, TAMAX, and PI in the Results Window.

Resistive Index (RI)

1. From the Doppler Generic, select ***RI***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the peak systolic velocity, move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at the end diastolic velocity, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays PS, ED, and RI in the Results Window.

PS/ED or ED/PS Ratio

To calculate the Peak Systole/End Diastole ratio or End Diastole/Peak Systole ratio:

1. Select ***PS/ED*** or ***ED/PS***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole (PS) or end diastole (ED), move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole (ED) or peak systole (PS), move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, and PS/ED or ED/PS ratio in the Results Window.

Heart Rate

To measure heart rate, See ‘Heart Rate’ on *page 7-79 for more information.* or select any of the following measurements.

A/B Ratio

In Doppler Mode you can measure A/B ratio by velocity, time, or acceleration.

NOTE: The Versana Active automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Primary Menu Key.

Velocity

See 'Velocity' on *page 7-78 for more information.*

Time

See 'Time' on *page 7-78 for more information.*

Acceleration

To measure A/B ratio by acceleration:

1. Select ***A/B Ratio***.
2. Select ***Ratio(Acc)***.

   The system displays an active caliper.
3. Make a distance measurement of the A acceleration point.
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper for the second distance measurement.
4. To make a distance measurement of the B acceleration point, repeat steps a–d.

   The system displays the two acceleration measurements and the A/B ratio in the Results Window.

Flow Volume (FV)

Flow Volume estimates the volume of blood that flows through a vessel per unit time. It is derived from a vessel's cross-sectional diameter obtained from the B-Mode portion of the image and the mean velocity of flow in the vessel obtained from the Doppler portion of the image. It is measured in milliliters. When the FV measurement is made, FVO is automatically calculated.

To measure flow volume:

1. Select **FV-D** from Doppler menu.
2. Place the dotted horizontal line caliper at each of the time base on the Doppler spectrum.
   - If Trace Auto is selected, the waveform is automatically traced.
   - If Trace Auto is not selected, manually trace the desired portion of the waveform.

     The caliper moves to the B-Mode area.
3. Use the Ellipse or Trace method to measure the circumference and area of the vessel.

   The FV Diameter, TAMAX, Volume and Volume Flow (FV) are calculated and displayed in the result window.

Modify Auto Calcs

When you select key, the Modify Calculation menu is displayed as below. In this menu, you select parameters to display in the Auto Vascular Calculation window. Only parameters that can be used by the calculation are displayed.

Select ***Save as Default*** to save the selected parameters as the default calculations for this application.

Select ***Return*** to return to the previous scan screen.

If you select ***PV***, all selected parameters are turned off. When you deselect ***PV***, the system returns to the previously selected calculation.

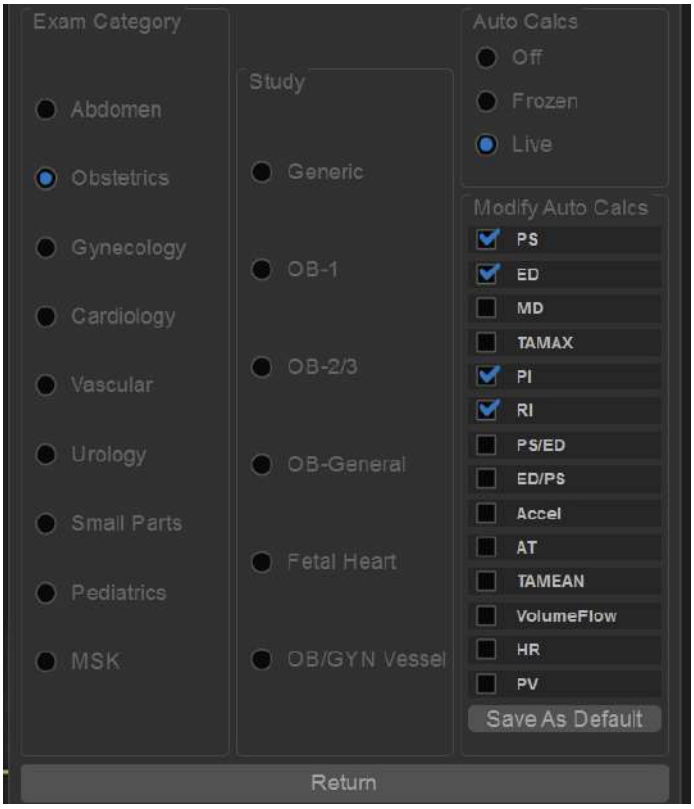


Figure 7-40. Modify Auto Calculation Menu

Modify Auto Calcs (continued)

Acceleration

1. Select ***Accel***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole, move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, acceleration time, and acceleration in the Results Window.

Acceleration Time (AT)

1. Select ***AT***.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the acceleration time in the Results Window.

Peak Systole (PS), End Diastole (ED), or Minimum Diastole (MD)

To calculate the peak systole, end diastole, or minimum diastole:

1. Select ***PS***, ***ED***, or ***MD***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, or minimum diastole in the Results Window.

Auto vs. Manual Calculations

The same calculations can be performed using either manual or auto calcs.

Manual Calcs

To perform manual calcs:

1. To turn Auto Calcs off and perform manual measurements, choose ***Auto Calcs -> OFF*** on the PW menu.
2. After obtaining a waveform, press **Measure**. Choose the appropriate vessel folder or calculation. The system walks you through the measurement.

NOTE: To program which calculations are done under manual calcs when using measurement folders for measuring specific vessels, press the Utility key. Select Measure -> Doppler and program your manual calcs (Auto Calcs OFF). Each vessel must be programmed individually and saved after each change.

NOTE: To set the Auto Cals Off - Use the Modify Auto Calcs on the Primary Menu.

Auto vs. Manual Calculations (continued)

Auto Calcs

To perform auto calcs:

1. Ensure that the auto calcs function is on by choosing ***Modify Auto Calcs -> Frozen*** or ***Live*** on the PW tab of the second menu.
   - Live: Auto calculation activates when the system in alive state.
   - Freeze: Auto calculation activates when you press Freeze.
   - Off
2. After obtaining a waveform, press **Measure**. Choose the appropriate vessel folder, side and location. The measurements that are pre-programmed are performed automatically and entered in the report.

To modify auto calcs:

1. Select ***Modify Auto Calcs*** on the Primary Menu.
2. Choose the measurements to be performed with this preset.
3. To save these measurements:
   - If this is a temporary change, press ***Return***.
   - If this is a permanent change, select ***Save as default***.

   The measurements are saved and can be performed with the auto calcs function.

Auto vs. Manual Calculations (continued)

Edit Auto Calcs

Auto Calcs can be edited after taking an Auto Trace measurement.

1. After taking an Auto Calc with a trace, select the measurement result on the result window. The Edit Trace menu window appears.

NOTE: If the system cannot take the trace data correctly from the image, Edit Trace does not work.

2. Select Edit Trace. The first caliper (manual trace caliper) appears on the center of the image. Use the **Trackball** to move the caliper on the trace line to the start point.

*NOTE: To cancel Edit Trace at this time, press **Clear**, **Scan**, or **Freeze**.*

3. Press **Set** to fix the first caliper. The second caliper appears. Edit the trace manually using the second caliper.

   The Ellipse control is used to edit the trace.

*NOTE: When pressing the **Clear** key once at this time, the second caliper disappears and the first caliper appears in the center of the image.*

*NOTE: If you press **Scan** or **Freeze** at this time, the caliper is automatically fixed and the result window updates.*

4. Press **Set** to fix the second caliper. The trace and the result window are updated. The data is retaken from the trace and updated.

NOTE: While in Edit Trace, Cursor Select is disabled.

   The trace data (TAMAX and TAMEAN) is updated, but the other selections (e.g. PS, ED) are not updated by trace. The points can be edited using ***Cursor Select*** if needed.

5. Repeat Edit Trace as needed.

Helpful hints


HINTS

The following hints can help when making a measurement.

- Prior to making measurements, use the Cine function, if necessary, to display the best image.
- As you take measurements, each measurement is given a sequential number on the display and in the Results Window. Nine measurements can be displayed in the Results Window at one time.
- Once the Results Window has nine measurements, if you make any further measurements, the system erases the top (first) measurement and adds the new measurement last (“first in, first out”).
- While you are taking a measurement, the value in the Results Window updates until you complete the measurement.

Chapter 8

Abdomen and Small Parts

Describes how to perform Abdomen and Small Parts measurements and calculations.

Abdomen/Small Parts Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

Calculation formulas are available in the *Advanced Reference Manual*.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning an Exam’ on *page 4-2 for more information.*

Any measurement can be repeated by selecting that measurement again from the Primary Menu Key.

Abdomen

Overview

Abdominal measurements offer a few different types of measurement studies:

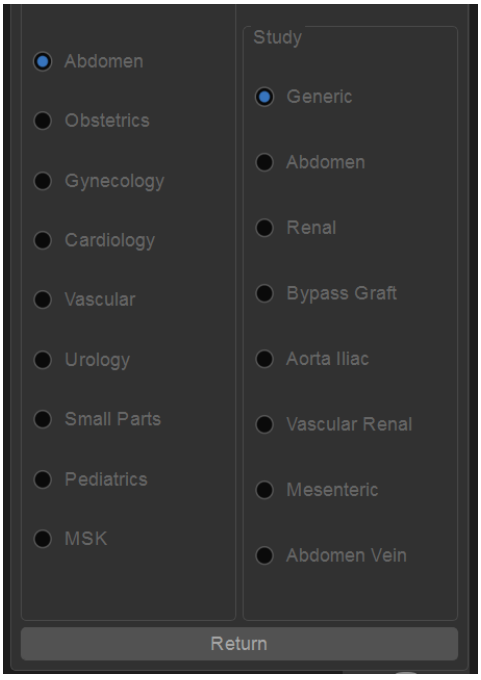


Figure 8-1. Abdomen Exam Category

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-66 for more information.*
- Abdomen
- Renal

To change a study:

1. Press **Measure**.
2. Press the **Second Menu**, studymenu is displayed.
3. To choose another study, select that desired study.

Small Parts

B-Mode Measurements

The Small Parts exam category includes the following two folders:

- Generic - Common to all applications. See ‘Generic Measurements’ on *page 7-66 for more information.*
- Thyroid
- Scrotal
- Breast

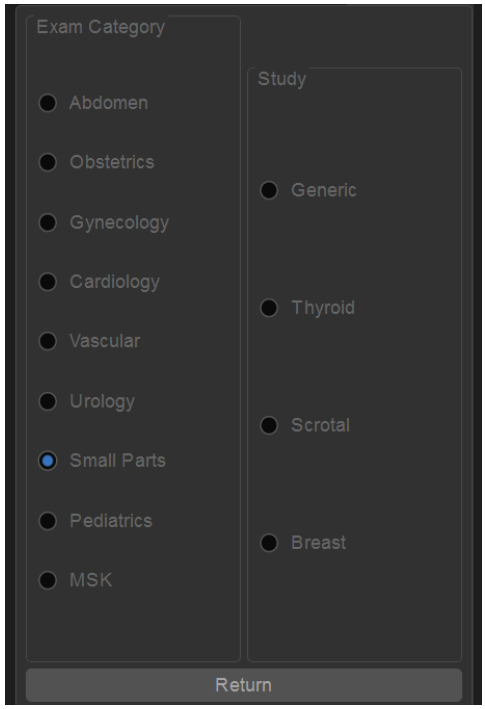


Figure 8-2. Small Parts Exam Category

Thyroid

Thyroid Left/Right

Each of these is a standard distance measurement. Length and height are typically measured in the sagittal plane. Width is measured in the transverse/axial plane.

To measure thyroid length, width, or height:

1. Press the **Second Menu**, select **Small Parts** and then select ***Thyroid***.
2. Select ***Lt or Rt Thyroid***. Change the orientation (side), if necessary.
3. Select ***Thyroid L***, ***Thyroid W***, or ***Thyroid H***.

   An active caliper displays.
4. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.
5. The system automatically prompts to make the second and third distance measurements.

   After you complete the third distance measurement, the system displays the thyroid volume in the Results Window.

Isthmus AP

To measure the anterior/posterior isthmus tissue, perform a distance measurement.

Scrotal

Scrotal Left/Right

Each of these is a standard distance measurement. Length and height are typically measured in the sagittal plane. Width is measured in the transverse/axial plane.

To measure scrotal length, width, or height:

1. Press the **Second Menu**, select **Small Parts** and then select ***Scrotal***.
2. Select ***Lt or Rt Testicle***. Change the orientation (side), if necessary.
3. Select ***Testicle L***, ***Testicle W***, or ***Testicle H***.

   An active caliper displays.
4. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.
5. The system automatically prompts to make the second and third distance measurements.

   After you complete the third distance measurement, the system displays the scrotal volume in the Results Window.

Epididymis

To measure the epididymis structure, perform a distance measurement.

Breast Options

There are two options related to Breast:

- Measure Assistant Breast - this contains the auto contour feature and auto Height and Length. It also has measurements related to Breast (distance to nipple, ratio)
- Breast Productivity - this includes lesion measurement folders, show features, summary, etc.

This section covers both the Breast M&A Package and Measure Assistant Breast (Auto Contour) features.

Breast Lesion M&A

Breast Lesion M&A allows you to document up to 30 breast lesions for each breast. Lesion Height/Width/Length, Distance to Nipple, and A/B Ratio are available. Distance to Nipple allows you to enter the value. This is not a calculated measurement.

BI-RADS lesion classification can be notated via Show Features and Show Assessment.

The Measure Assistant Breast (Auto Contour) feature can also be used to automatically detect and outline the breast lesion.

Worksheet and Summary Worksheets show all the documented right/left breast lesions.

Breast Lesion M&A (continued)

From the Small Parts Model, select the Breast Application. Next, select the Right/Left Lesion. The following menu appears:

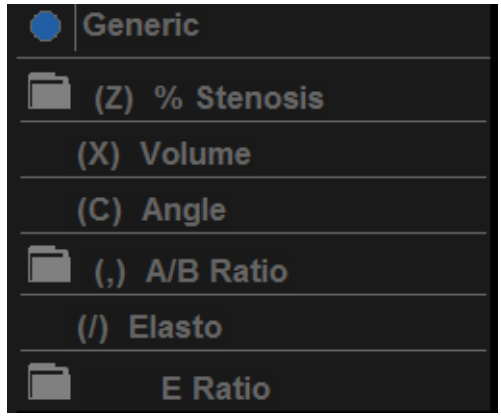


Figure 8-3. Default Breast Lesion M&A Menu

Table 8-1: Breast Lesion M&A Parameters

p	Description
Position	Specify the position of the lesion: Clock position 1-12 O'Clock, Areolar, SubAreolar, Axillary, or "-" (default).
Segment	Specify A, B, C, None, or "-" (default).
Show Features	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature. If a Feature has an asterisk next to it (*), then you can select multiple notations -- select all that apply and then select 'Done.' These features are displayed on the Below is a list of each Feature with its possible notations: • Shape: Oval, Round, Irregular, None (-) • Orientation: Parallel, Not Parallel, None (-) • Margin: Circumscribed, Indistinct, Angular, Microlobulated, Spiculated, None (-) • Boundary: Abrupt Interface, Echogenic Halo, None (-) • Echo Pattern: Anechoic, Hyperechoic, Complex, Hypoechoic, Isoechoic, None (-) • Posterior Features: No posterior features, Enhancement, Shadowing, Combined Pattern, None (-) • Surrounding Tissue*: Duct changes, Cooper's ligament changes, Edema, Architectural distortion, Skin thickening, Skin retraction/irregularity, None (-) • Calcifications*: Macrocalcifications, Microcalcifications out of mass, Microcalcifications in mass, None (-) • Special Cases*: Clustered microcysts, Complicated cysts, Mass in or on skin, Foreign body, Lymph nodes-intramammary, Lymph nodes-axillary, None (-) • Vascularity: Not Present or not assessed, Present in Lesion, Adjacent to Lesion, Diffuse in surrounding tissue, None (-)
Show Assessment	Specify the BI-RADS Assessment: None (-), 0, 1, 2, 3, 4a, 4b, 4c, 5, 6. A comment field is available directly below the BI-RADS Assessment.
Return	Press to return to the previous screen.
Lesion #	Indicates which lesion you are viewing (Lesion # of Total Number of Lesions). Press the left/right arrow to move from lesion to lesion.
L	Lesion Length
H	Lesion Height
W	Lesion Width
Distance to Nipple	Used to manually enter the distance the lesion is from the nipple.
Auto Contour (HxL)	Press to activate the Auto Contour feature, using the height and length.
Auto Contour (HxW)	Press to activate the Auto Contour feature, using the height and width.
Rt or Lt A/B Ratio	Right or Left Lesion A/B Ratio, measured by Area or Diameter.
Composition	Specify the composition of the lesion: None (-), Solid, Systic, or Complex.
Delete Lesion	Press to delete this lesion.

Worksheet and Summary Worksheets

Worksheets and Summary Worksheets are provided for all documented Breast Lesions.

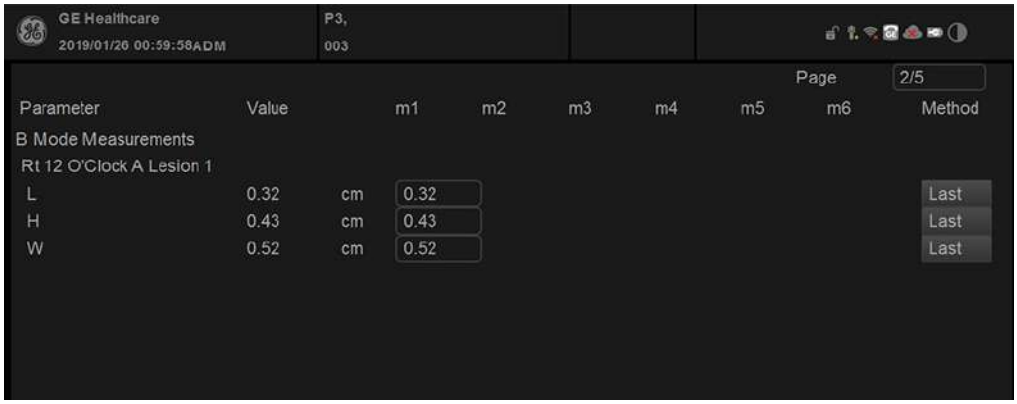


Figure 8-4. Breast Lesion Worksheet

Worksheet and Summary Worksheets (continued)

To move to the next page, select Page Change on the primary menu.

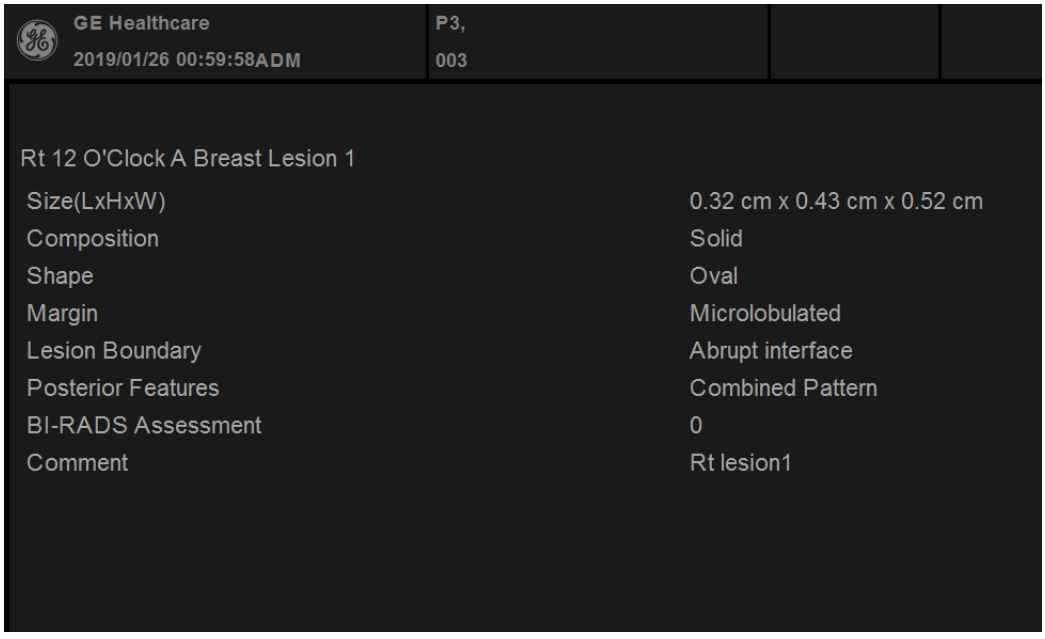


Figure 8-5. Breast Lesion Summary

Measure Assistant Breast (Auto Contour)

You can request that the system trace/outline the border of a breast lesion using Measure Assistant Breast (Auto Contour). You do this by setting the Region of Interest (ROI) around the lesion; the system can then measure the lesion by drawing the contour around it.

The system can store up to 30 breast lesions. The system tracks these by numbering the lesions consecutively.

To automatically detect the breast lesion on the display,

1. Press **Measure**.
2. Press **Auto Contour (HxW)**.
3. Place the Cursor in the center of the lesion and press Set. Size the ROI around the lesion. Use the Trackball to resize the ROI.
   - To increase the size of the circle, move the Trackball down and to the right.
   - To decrease the size of the circle, move the Trackball upand to the left.

NOTE: Include the entire lesion, even if additional surrounding tissue is included.

4. Press **Set**. A trace appears around the lesion.
5. Size the trace via the Trackball.
6. Press **Set**. The contour around the breast lesion is generated.

NOTE: Multiple breast lesion traces may be generated by the system.

7. Inspect the generated contour for accuracy. If edits are necessary, excecute steps 8-10 to edit the contour prior to accepting the measurement.Otherwise, skip to step 11.
8. To cycle through the generated contours, press **Cursor Select**.
9. To edit the selected contour, move the Trackball to appropriately size the edit region and then press **Set**.
10. The blue portion of the contour can be edited by moving the Trackball to the portion of the contour you want to edit.

Measure Assistant Breast (Auto Contour) (continued)

NOTE: The Caliper closest to the cursor enables editing.

NOTE: To limit the horizontal/vertical editing capabilities, you can set a preset via Utility--> Measure--> Advanced--> Small Parts--> Restrict Breast Contour Caliper Edit.

11. After you have completed your edits, press P1 to accept the measurement.

Thyroid Productivity Package (Option)

A Thyroid Productivity Package is now available.

The Thyroid Productivity Package is only available when the Thyroid Productivity Option is activated.

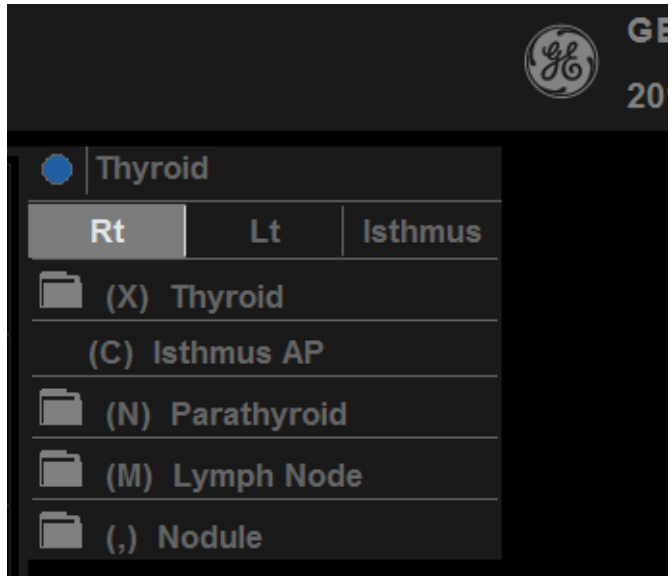


Figure 8-6. Thyroid/Parathyroid/Lymph Node Menu

Table 8-2: Thyroid/Parathyroid/Lymph Node Parameters

Preset Parameter	Description
Side	Specify the side: **Right, Left, Isthmus**.
Worksheet/Summary	Select to view the Worksheet/Summary Worksheet.
Add#1, Add#2, etc.	Cycles through the available lesions, or adds a new lesion/node/nodule, etc.
Rt/Lt Thyroid Rt/Lt Parathyroid Rt/Lt Lymph Node Rt/Lt Nodule	When measuring the Left/Right Thyroid/Parathyroid/Lymph Node/Nodule, these folders highlight on the screen. Length, Height, and Width are available for all thyroid measurements. The Cortical Thickness measurement is available for the Lymph Node. Show Features is available for all thyroid measurements.
Location	Parathyroid: Specify Upper Gland or Lower Gland Lymph Node: Supraclaviculoar fossa, Lower cervical, Middle cervical, Uppercervical, Parotid, Submandibular, Submental, Posterior triangle Nodule -- Use Up/Down Toggle to adjust. • Location A: Upper, Lower, Mid, None • Location B: Lateral, Medial, Mid, None

Table 8-2: Thyroid/Parathyroid/Lymph Node Parameters

Preset Parameter	Description
Isthmus Lymph Node Isthmus Nodule	When measuring the Isthmus Lymph Node/Nodule, these folders highlight on the screen. Length, Height, and Width are available for all isthmus measurements. The Cortical Thickness measurement is available for the Lymph Node. Show Features is available all isthmus measurements.

Show Features - Overall Thyroid	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature and on the Summary Worksheet.
	Below is a list of each Feature with its possible notations by measurement type:
	• Overall Thyroid
	  • Resected: Totally, Partially, None (-)
	  • Appearance: Within normal limits, Abnormal, Symmetric, Asymmetric R>L, Asymmetric L>R, None (-)
	  • Comment

Show Features - Lt/Rt Thyroid / Parathyroid / Lymph Node / Nodule	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature and on the Summary Worksheet.
	Below is a list of each Feature with its possible notations by measurement type:
	• Lt/Rt Thyroid
	  • Resected: Totally, Partially, None (-)
	  • Echogenicity: Homogeneous; Coarse; Heterogeneous; Hashimoto, Classic; Hashimoto, Probable; None (-)
	  • Vascularity: Normal, Increased, Decreased, None (-)
	  • Size: Normal, Enlarged, Small, None (-)
	  • Comment
	  • Isthmus Comment
	• Lt/Rt Parathyroid -- Upper/Lower Gland
	  • Visibility: Visualized, Not Visualized, None (-)
	  • Comment
	• Lt/Rt Lymph Node
	  • Appearance: Within normal limits, Suspicious, Pathologic, None (-)
	  • Composition: Cystic, Complex, Solid, None (-)
	  • Vascularity: Normal, Increased hilar, Increased non-hilar, None (-)
	  • Comment
	• Lt/Rt Nodule
	  • Shape: Round, Oval, Irregular, Lobulated, None (-)
	  • Margin: Well Defined, Well Defined with halo, Well Defined with partial halo, Well Defined with complete halo, Poorly defined, Irregular, None (-)
	  • Composition: Solid, Cystic, Mixed, Complex, Heterogeneous, None (-)
	  • Vascularity: Normal, Increased, Decreased, Central Vasc (Avascular, Hypovascular, Isovascular, Hypervascular, Severely Hypervascular), None (-)
	  • Calcification: No Calcification, Coarse central, Coarse rim, Punctate scattered, Punctate clumped, Colloid, Mixed, None(-)
	  • Comment

Table 8-2: Thyroid/Parathyroid/Lymph Node Parameters

Preset Parameter	Description
Show Features - Isthmus	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature. Below is a list of each Feature with its possible notations by measurement type: • Isthmus Lymph Node • Appearance: Within normal limits, Pathologic, None (-) • Composition: Cystic, Complex, Solid, None (-) • Vascularity: Normal, Increased, None (-) • Comment • LIsthmus Nodule • Shape: Round, Oval, Irregular, Lobulated, None (-) • Margin: Well Defined, Well Defined with halo, Well Defined with partial halo, Poorly defined, Irregular, None (-) • Composition: Solid, Cystic, Mixed, Complex, Heterogeneous, None (-) • Vascularity: Normal, Increased, Central Vasc (Avascular, Hypovascular, Isovascular, Hypervascular, Severely Hypervascular), None (-) • Calcification: Coarse central, Coarse rim, Punctuate scattered, Punctuate clumped, Colloid, Mixed, None (-) • Comment
Return	Press to return to the previous screen.
H	Height
W	Width
L	Length
Isthmus AP	Used to measure the Isthmus height distance.
Cortical Thickness	Cortical thickness of the lymph node.
Delete	Press to delete this anatomy.

TI-RADS (ACR)

TI-RADS (ACR) is Thyroid Imaging Reporting and Data System (from ACR). ACR TI-RADS could provide guidance regarding management of thyroid nodules on the basis of their ultrasound appearance.

To activate TI-RADS on the system:

1. Select the appropriate probe and Thyroid preset.
2. Select Nodule in Measure Menu.

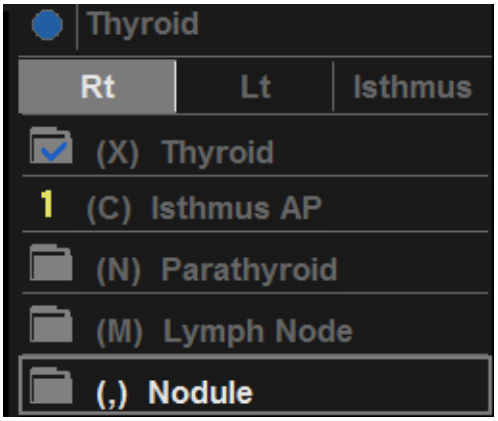


Figure 8-7. Select Nodule

3. Measure Nodule L*H*W* manually or Auto Contour(HxL)/(HxW).

TI-RADS (ACR) (continued)

4. Select **TI-RADS(ACR)** in the primary menu. Then TI-RADS(ACR) menu appears. Select each category for the Nodule. All points will be sumed up automatically.

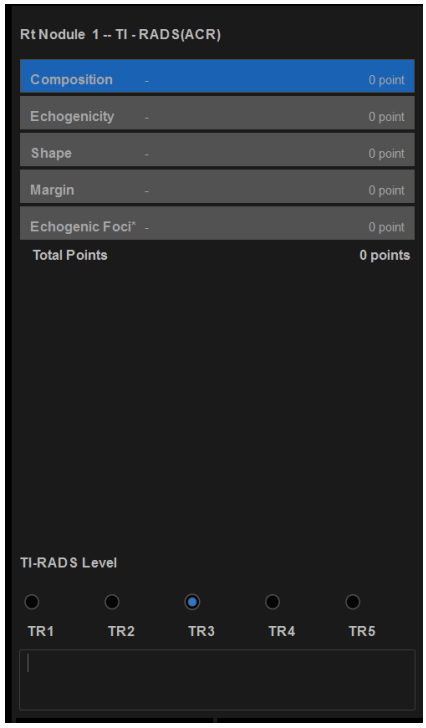


Figure 8-8. TI-RADS(ACR) Menu

5. Mark TI-RADS Level TRx manually.
6. After the completion, press Report key to check all the measurements and TI-RADS in the Worksheet.

Worksheet and Summary Worksheets

Worksheets and Summary Worksheets are provided for all documented Thyroid anatomies.



Figure 8-9. Thyroid Worksheet

To move to the next page, select Page Change on the primary menu.

Worksheet and Summary Worksheets (continued)

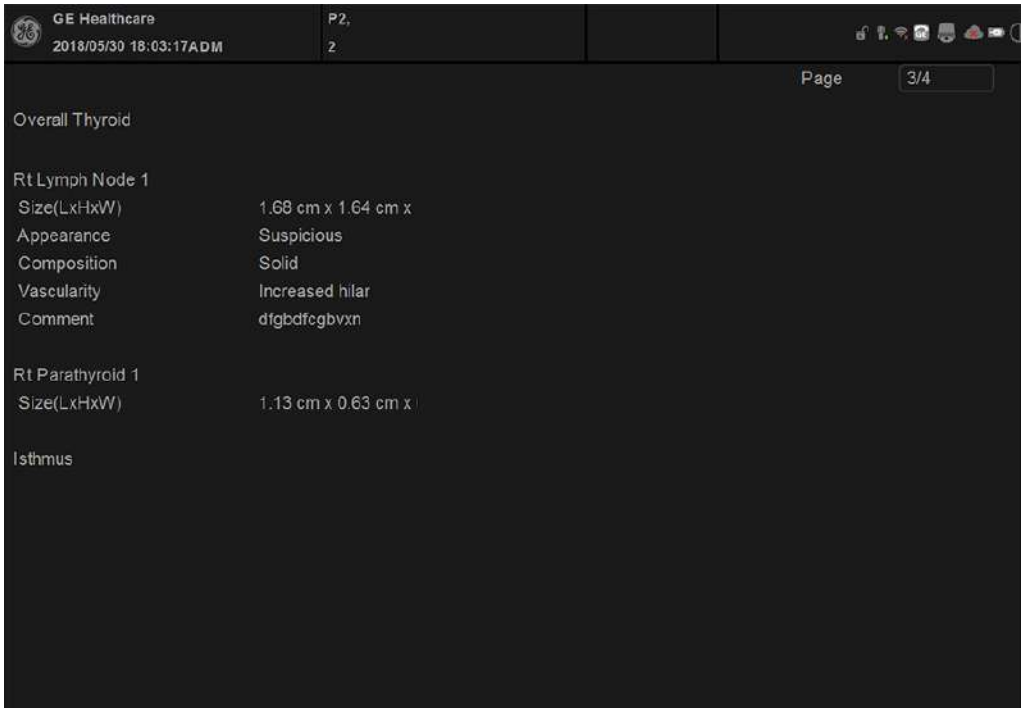


Figure 8-10. Thyroid Summary Report

NOTE: To exit back to the previous measurement screen, press Set on exit.

NOTE: To exit back to the scan screen, press Report on the control panel.

Chapter 9

OB/GYN

Describes how to perform obstetric and gynecology measurements and calculations, and how to use OB graphs and reports.

OB Exam

Exam Preparation

Prior to an ultrasound examination, the patient should be informed of the clinical indication, specific benefits, potential risks, and alternatives, if any. In addition, if the patient requests information about the exposure time and intensity, it should be provided. Patient access to educational materials regarding ultrasound is strongly encouraged to supplement the information communicated directly to the patient. Furthermore, these examinations should be conducted in a manner and take place in a setting which assures patient dignity and privacy.

- Prior material knowledge and approval of the presence of nonessential personnel with the number of such personnel kept to a minimum.
- An intent to share with the parents per the physician’s judgement, either during the examination or shortly thereafter, the information derived.
- An offer of choice about viewing the fetus.
- An offer of choice about learning the sex of the fetus, if such information becomes available.

Ultrasound examinations performed solely to satisfy the family's desire to know the fetal sex, to view the fetus, or to obtain a picture of the fetus should be discouraged.

Acoustic Output Considerations

General warning

The Versana Active system is a multi-use device which is capable of exceeding FDA Pre-enactment acoustic output (spatial peak-temporal average) intensity limits for fetal applications.



It is prudent to conduct an exam with the minimum amount and duration of acoustic output necessary to optimize the image's diagnostic value.

Concerns surrounding fetal exposure

Always be aware of the acoustic output level by observing the Acoustic Output Display. In addition, become thoroughly familiar with the Acoustic Output Display and equipment controls affecting output.

Training

It is recommended that all users receive proper training in fetal Doppler applications before performing them in a clinical setting. Please contact a local sales representative for training assistance.

To Start an Obstetrics Exam

NOTE: Calculation formulas are listed in the Advanced Reference Manual.

To begin an Obstetrics exam, you enter patient data or, if the patient data from a previous exam is saved in the system, find the patient information.

1. Press ***Patient*** on the control panel.
2. To choose an Obstetrics exam, move the ***Trackball*** to highlight Obstetrics, then press ***Set***.

   The obstetric fields are listed in the Exam Information section of the Patient Data Entry screen.
3. Do one of the following:

   - If the patient data is already stored in the system, search for the data. Use the search fields in the bottom section of the Archive screen. For information about how to search for patient data, See ‘Changing Patient Information or an Exam’ on *page 4-26 for more information.*

     When the correct patient data is listed in the search list, move the ***Trackball*** to highlight the patient name and press ***Set***. The system displays the patient data.

     *NOTE: To change patient data, use the **Trackball** to move the cursor to the field and press **Set**. Press **Backspace** to delete the data, and then type the correct data.*

   - If the patient data is not stored in the system, enter the data. To enter data in a field, move the ***Trackball*** to highlight the field and then press ***Set***. Use the ***Tab*** key to move between fields. Obstetric patient fields are listed in the following table.

     NOTE: For information about entering general patient data such as Patient ID and name, See ‘Beginning a New Patient’ on page 4-10 for more information.

To Start an Obstetrics Exam (continued)

Table 9-1: Obstetric fields

Field	Description
LMP	Last Menstrual Period; enter the date that the patient started her last menstrual period. You must enter 4 digits for the year. When you type the month and day, the system fills in the /. The Date Format preset chosen in Utility -> System -> General determines the required format.
BBT	Basal Body Temperature.
EDD by LMP	Estimated Delivery Date by LMP; the system fills in the date after you enter the LMP.
GA by LMP	Gestational Age by LMP; the system fills in the age after you enter the LMP.
Gravida	Number of pregnancies.
Para	Number of births.
AB	Number of abortions.
Ectopic	Number of ectopic pregnancies.
Fetus #	Number of fetuses; default is 1. Can be 1-4.
Operator	The person (not a physician) who performs the scan. Choose from the list.
Exam Description	Describe the type of exam.
Accession #	Exam number used with hospital information system (DICOM). This is a tracking number from the worklist.
Perf Physician	The physician who performs the exam. Choose from the list or type the name.
Ref. Physician	The physician who requested the exam. Choose from the list or type the name.

To Start an Obstetrics Exam (continued)

After you complete the patient information, you can begin the scan.

1. To change from the Patient Data Entry screen to the Scan screen, do one of the following:
   - Select ***Scan*** on the **Patient** screen.
   - Select **Freeze** on the control panel.
   - Press the **B-Mode** key on the control panel.

   The system displays the scan screen.
2. To choose the appropriate probe, select the probe on the **Probe** screen.
3. Scan the patient.
4. On the Control Panel, press ***Measure***.

   The default Obstetrics study is displayed.

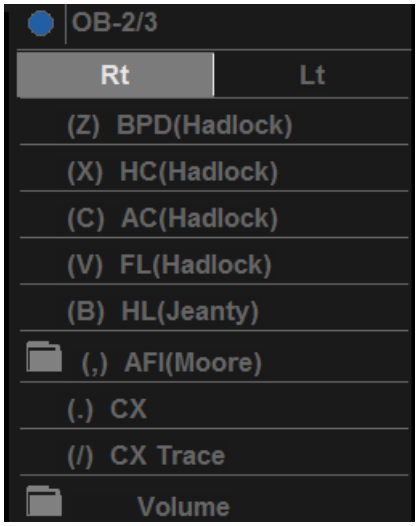


Figure 9-1. OB-General Study

OB Type change

The Versana Active system includes measurements for the following studies: USA, Europe, Tokyo, Osaka and ASUM.

Select OB Type in Utility -> System -> System Measure. See ‘System/System Measure Preset Menu’ on *page 16-16 for more information.*

NOTE: ASUM studies include the following measurements:

- ASUM: AC, BPD, and CRL
- ASUM 2001: AC, BPD, CRL, FL, HC, HL, and OFD

OB Measurements and Calculations

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

Introduction (continued)

When you make measurements, you can select the calculation before you make the measurement or after you make it. If you select the calculation before you make the measurement, the Results Window shows the estimated fetal age as you make the measurement. If you select the calculation after you make the measurement, the estimated fetal age is displayed after you complete the measurement. The measurements steps in this section tell you to select the calculation before you make the measurement.

The following pages describe how to make OB measurements and calculations. The measurements are organized by mode, and within mode are listed in alphabetical order.

Out of Range – If the system indicates that a measurement is out of range (OOR), it means one of the following:

- The measurement is out of the normal range based on the gestational age that is calculated from the LMP. The system determines OOR from the ultrasound age compared to the gestational age. The gestational age is calculated from the last menstrual period or the estimated delivery date.
- The measurement is outside of the range for the data used in the calculation. That means that the measurement is either less than or more than the range of measurements used to determine fetal age based on the measurement.

NOTE: Calculation formulas are listed in the Advanced Reference Manual.

B-Mode Measurements

This section describes all B-Mode measurements that you typically find in OB studies. Additional OB measurements follow the typical ones.

Abdominal Circumference (AC)



To calculate abdominal circumference, you make an ellipse, trace, spline trace or two distance measurements.

Ellipse

1. Select ***AC***; an active caliper displays.
2. To position the active caliper, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper, move the **Trackball**.
5. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, select **Cursor Select** key.
6. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.



HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Abdominal Circumference (AC) (continued)

Trace

1. Select ***AC***; an active caliper displays.
2. To position the caliper, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The caliper changes to an active caliper.
4. To trace the measurement area, move the **Trackball** around the anatomy.
5. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.



HINTS

- Before you complete the ellipse measurement:
  - To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
  - To clear the caliper and the current data measured, press **Clear** once.
- To rotate through and activate fixed calipers from other measurement, adjust **Cursor Select**.

Abdominal Circumference (AC) (continued)

Spline Trace

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***Spline***.
3. To position the caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**. The second caliper appears at the same position.
5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.
6. To position the third caliper, move the **Trackball** and press **Set**.

NOTE: The spline trace requires at least 3 points to draw a trace. Continue setting the points of the trace until the desired points are set (by moving the Trackball to the appropriate position and pressing Set).

7. To finalize the spline trace, press **Set** twice at the last caliper position.

   The system displays the circumference in the Results Window.

Abdominal Circumference (AC) (continued)

Two distances

1. Select ***AC***; an active caliper displays.
2. To make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.
      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.
      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.
      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the abdominal circumference in the Results Window.



HINTS

- Before you complete a measurement (press **Set**):
  - To toggle between active calipers, select **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate fixed calipers from other measurements, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto reports, press **Clear**.

Biparietal Diameter



To measure biparietal diameter, make one distance measurement:

1. Select ***BPD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the biparietal diameter in the Results Window.

Crown Rump Length



To measure crown rump length, make one distance measurement:

1. Select ***CRL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the crown rump length in the Results Window.

Femur Length



To measure femur length, make one distance measurement:

1. Select ***FL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the femur length in the Results Window.

Gestational Sac



To calculate the gestational sac, you make three distance measurements in two scan planes. To display two scan planes, press the **Dual** key. Get an image in each scan plane and press **Freeze**.

1. Select ***GS***; an active caliper displays.
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
2. To make the second and third distance measurement, repeat steps a–d.

   After you complete the third distance measurement, the system displays the gestational sac measurement in the Results Window.



You can calculate the gestational sac by one distance measurement.

1. Select ***GS***; an active caliper displays.
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      After you complete the measurement, the system displays the gestational sac measurement in the Results Window.

Head Circumference (HC)



To calculate head circumference, you make an ellipse, trace, spline trace or two distance measurements.

Ellipse

1. Select ***HC***; an active caliper displays.
2. To position the active caliper, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper, move the **Trackball**.
5. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, select **Measure**.
6. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.



HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Head Circumference (HC) (continued)

Trace

1. Select ***HC***; an active caliper displays.
2. To position the caliper, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The caliper changes to an active caliper.
4. To trace the measurement area, move the **Trackball** around the anatomy.
5. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.



HINTS

Before you complete the ellipse measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To clear the caliper and the current data measured, press **Clear** once.

Head Circumference (HC) (continued)

Spline Trace

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***Spline*** from popup menu.
3. To position the caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**. The second caliper appears at the same position.
5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.
6. To position the third caliper, move the **Trackball** and press **Set**.

NOTE: The spline trace requires at least 3 points to draw a trace. Continue setting the points of the trace until the desired points are set (by moving the Trackball to the appropriate position and pressing Set).

7. To finalize the spline trace, press **Set** twice at the last caliper position.

   The system displays the circumference in the Results Window.

Head Circumference (HC) (continued)

Two distances

1. Select ***HC***; an active caliper displays.
2. To make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.
      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.
      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.
      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the abdominal circumference in the Results Window.


HINTS

- Before you complete a measurement (press **Set**):
  - To toggle between active calipers, select **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate fixed calipers from other measurements, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

Amniotic Fluid Index (AFI)



To calculate the amniotic fluid index, you make measurements of the four quadrants of the uterine cavity. The system adds these four measurements together to calculate the Amniotic Fluid Index.

NOTE: The four quadrants can be measured with distance (caliper) or circumference (circle) measurements. Select the appropriate AFI quadrant key to show the popup menu to select caliper or circle.

1. Select ***AFI***.

   The first distance measurement, AFI-Q1, is already selected.

2. Make a standard distance measurement for the first quadrant:

   a. To position the active caliper at the start point, move the **Trackball**.

   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.

   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.

   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.

3. When the measurement of the first quadrant is completed, unfreeze and move to the second quadrant.

4. After you obtain the image, press **Freeze** and then **Measure**.

   The system prompts you to continue with the AFI measurements. Make sure that the next quadrant has been selected.

Amniotic Fluid Index (AFI) (continued)

5. Perform a standard distance measurement for the second, third, and fourth quadrants (see step 2).

   When all four quadrants have been measured, the system calculates the AFI total and displays it in the Results Window.



HINTS

- If you unfreeze the image after doing an AFI measurement, the system does not delete the previous measurements. Unfreeze and change scan planes as necessary.
- To specify that an unassigned distance measurement be used for an AFI measurement:
  - Select ***AFI***.
  - Press **Measure**.
  - Move the **Trackball** to highlight the unassigned distance measurement in the Results Window.
  - Select the AFI measurement on the menu.
- If the fluid in a pocket is zero, set the second caliper on top of the first one to give it a zero value.
- You can measure an AFI quadrant that is zero (0) by pressing **Set** twice.

A/B Ratio

In B-Mode you can calculate A/B ratio by diameter or by area. See ‘A/B Ratio’ on *page 7-76 for more information.*

Angle

See ‘Angle’ on *page 7-75 for more information.*

Antero-Postero Trunk Diameter & Transverse Trunk Diameter (APTD-TTD)



Make two distance measurements, one of the antero-postero trunk diameter and one of the transverse trunk diameter.

1. Select ***APTD_TTD***; an active caliper displays.
2. Make a distance measurement of the antero-postero trunk diameter:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
3. To make a distance measurement of the transverse trunk diameter, repeat steps a–d above.

   The system displays the antero-postero trunk diameter and the transverse trunk diameter in the Results Window.

Antero-Postero Trunk Diameter by Transverse Trunk Diameter (AxT)



Make two distance measurements, one of the antero-postero trunk diameter and one of the transverse trunk diameter.

1. Select ***AxT***; an active caliper displays.
2. Make a distance measurement of the antero-postero trunk diameter:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
3. To make a distance measurement of the transverse trunk diameter, repeat steps a–d above.

   The system displays the antero-postero trunk diameter, the transverse trunk diameter, and AxT in the Results Window.

Cardio-Thoracic Area Ratio (CTAR)



To calculate cardio-thoracic area ratio, you make two ellipse measurements.

1. Select ***CTAR***; an active caliper displays.
2. Make an ellipse measurement of the cardiac area:
   a. To position the active caliper, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second caliper, move the **Trackball**.
   d. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, adjust Cursor Select.

   e. To complete the ellipse measurement, press **Set**.

      The system displays the cardiac area measurement in the Results Window
3. To make an ellipse measurement of the thoracic area, repeat steps a–e.

   The system displays the cardio-thoracic area ratio in the Results Window.

Estimated Fetal Weight (EFW)



To measure estimated fetal weight, you make several OB measurements. These measurements can vary, based on how your system is set up. Measurements can include biparietal diameter, fetal trunk area, femur length, antero-postero trunk diameter and transverse trunk diameter, abdominal circumference, head circumference and spinal length.

1. Select ***EFW***.

   The system displays the required measurements.

2. Make each measurement.

   The system displays each measurement in the Results Window. The estimated fetal weight is displayed in the Results Window only with Tokyo or Osaka OB type.

NOTE: For a description of any of the required measurements, refer to that measurement.

Fetal Trunk Area (FTA)



To measure fetal trunk area, you make an ellipse, trace, spline trace or two distance measurements.

Ellipse

1. Select ***FTA***; an active caliper displays.
2. To position the active caliper, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper, move the **Trackball**.
5. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, adjust Cursor Select.
6. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.



HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Fetal Trunk Area (FTA) (continued)

Trace

1. Select ***FTA***; a caliper displays.
2. If necessary, select ***Trace*** from popup menu.
3. To position the caliper at the start point, move the **Trackball**.
4. To fix the trace start point, press **Set**.

   The caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy.

   A dotted line shows the traced area.
6. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.



HINTS

Before you complete the trace measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To clear the caliper and the current data measured, press **Clear** once.

Fetal Trunk Area (FTA) (continued)

Spline Trace

1. Select ***FTA***; an active caliper displays.
2. If necessary, select ***Spline*** from popup menu.
3. To position the caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**. The second caliper appears at the same position.
5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.
6. To position the third caliper, move the **Trackball** and press **Set**.

NOTE: The spline trace requires at least 3 points to draw a trace. Continue setting the points of the trace until the desired points are set (by moving the Trackball to move to the appropriate position and pressing Set).

7. To finalize the spline trace, press **Set** twice at the last caliper position.

   The system displays the circumference in the Results Window.

Fetal Trunk Area (FTA) (continued)

Two distances

1. Select ***FTA***; an active caliper displays.
2. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.
      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.
      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.
      The system displays the distance value in the Results Window and displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.
   The system displays the measurement in the Results Window.



HINTS

- Before you complete a measurement:
  - To toggle between active calipers, adjust Cursor Select.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate previously fixed calipers, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto reports, press **Clear**.

Foot Length



To measure foot length, make one distance measurement:

1. Select ***Ft***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the foot length in the Results Window.

Humerus Length



To measure humerus length, make one distance measurement:

1. Select ***HL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the humerus length in the Results Window.

Nuchal Translucency (NT)

To measure nuchal translucency, make one distance measurement:

1. Select ***NT***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the nuchal translucency in the Results Window.

NOTE: Nuchal Translucency is not available through the factory default. To enable Nuchal Translucency, add NT to the measurement folder in Utility -> Measure -> M&A -> Add measurement (Insert).

Occipitofrontal Diameter



To measure occipitofrontal diameter, make one distance measurement:

1. Select ***OFD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the occipitofrontal diameter in the Results Window.

% Stenosis

In B-Mode, you can calculate % Stenosis by diameter or by area. See ‘% Stenosis’ on *page 7-69 for more information.*

Spinal Length (SL)



To measure spinal length, make one distance measurement:

1. Select ***SL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the spinal length in the Results Window.

Transverse Abdominal Diameter



To measure transverse abdominal diameter, make one distance measurement:

1. Select ***TAD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the transverse abdominal diameter in the Results Window.

Transverse Cerebellar Diameter



To measure transverse cerebellar diameter, make one distance measurement:

1. Select ***TCD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the transverse cerebellar diameter in the Results Window.

Thorax Transverse Diameter



To measure thorax transverse diameter, make one distance measurement:

1. Select ***ThD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the thorax transverse diameter in the Results Window.

Tibia Length



To measure tibia length, make one distance measurement:

1. Select ***Tibia***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the tibia length in the Results Window.

Ulna Length



To measure ulna length, make one distance measurement:

1. Select ***Ulna***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the ulna length in the Results Window.

Volume

See ‘Volume’ on *page 7-71 for more information.*

M-Mode Measurements

In M-Mode you can measure % stenosis, A/B ratio, and heart rate.

% Stenosis

In M-Mode, you measure % Stenosis by diameter. See ‘% Stenosis’ on *page 7-77 for more information.*

A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity. See ‘A/B Ratio’ on *page 7-78 for more information.*

Heart Rate

See ‘Heart Rate’ on *page 7-79 for more information.*

Doppler Mode Measurements

You can use Doppler mode to study fetal blood flow in the heart, umbilical cord, placenta, and middle cerebral arteries. OB/GYN Doppler mode also allows you to study uterine and ovarian blood flow.

The OB/GYN vessel study includes the following vessels:

- Aorta (Ao)
- Umbilical
- Placenta
- Desc. Aorta
- Uterine (right and left)
- Middle Cerebral Artery (MCA) (right and left)
- Ovarian (right and left)

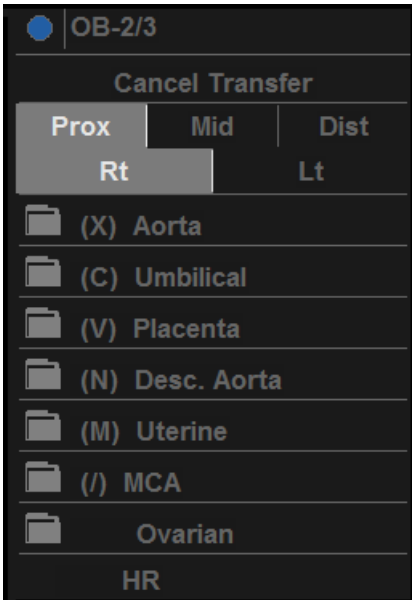


Figure 9-2. OB/GYN Vessels

Doppler Mode Measurements (continued)

For each of these studies, you can make any of the following measurements. See ‘Doppler Mode Measurements’ on *page 7-80 for more information.*:

- Peak Systole (PS)
- End Diastole (ED)
- Minimum Diastole (MD)
- Heart Rate
- TAMAX
- Pulsatility Index (PI)
- Resistive Index (RI)
- PS/ED Ratio
- ED/PS Ratio
- Acceleration
- AT
- TAMEAN
- Volume Flow
- PV

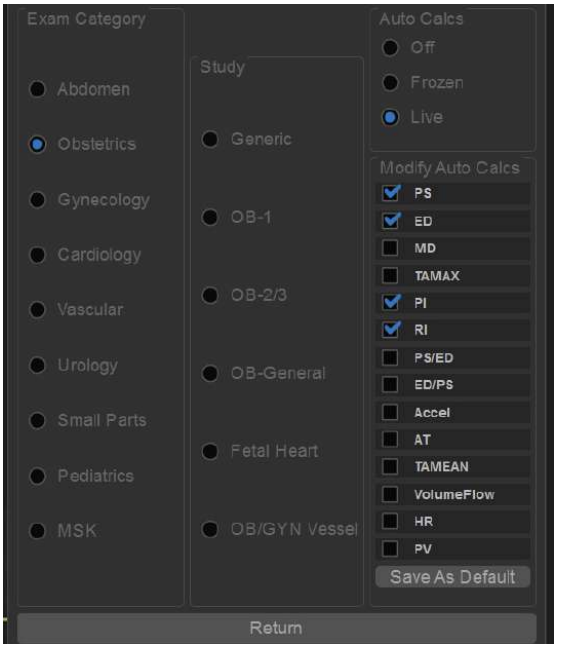


Figure 9-3. OB/GYN Vessal Menu

To select OB/GYN vessel measurements

OB/GYN Vessel measurements use the auto sequence feature. With this feature, when you select a folder for the vessel you want to measure, the system automatically starts the first measurement. It then continues with each of the other measurements in that study.

1. Select the folder for the vessel you want to measure.

   The system shows all the measurements for that vessel. The caliper for the first measurement is automatically displayed.
2. Make the measurement.

   After you complete each measurement, the system starts the next measurement. After the last measurement is complete, the system returns to the OB/GYN Vessel.

Your system is set up to show the measurements that you usually make for each vessel. To make a measurement that is not shown for the selected vessel:

1. Select the folder for the vessel you want to measure.
2. Select Show All.

   The system display all possible vessel measurements.
3. Select the desired measurement.

OB Report

The OB Report lists patient information, and all measurement and calculation data.

To view the OB Report:

1. Press the ***Report*** key on the control panel.
   The report appears as follows.

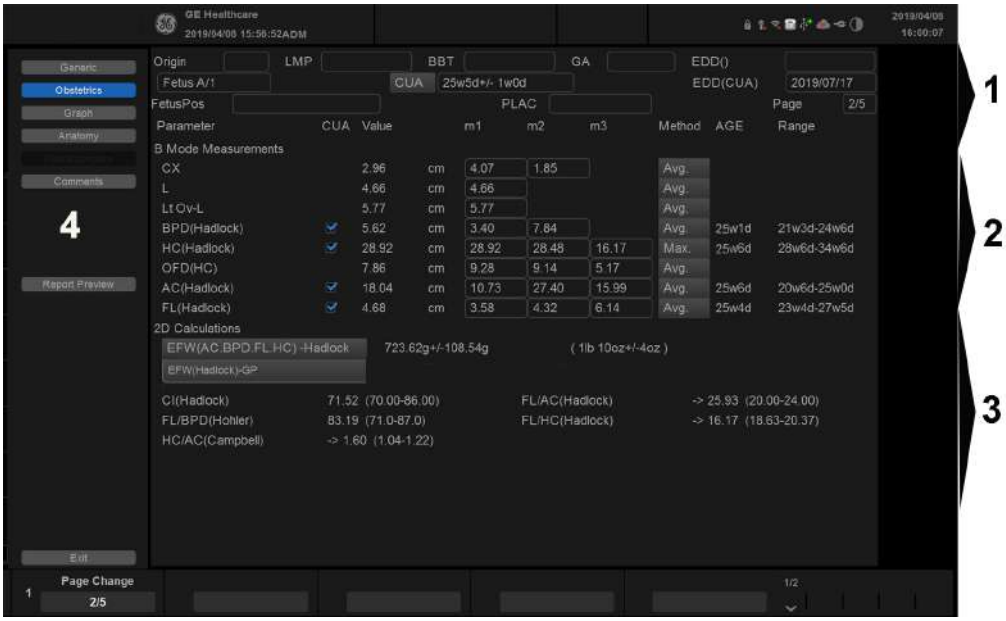


Figure 9-4. OB Report

The OB Report has three sections of information:

1. Patient data
2. Measurement information
3. Calculation information
4. Report menu list

Patient data

The Patient data section, at the top of the report, lists information from the Patient Data Entry screen.

You can select the following fields:

- FetusNo – if this is a multi-gestational patient, you can select the fetus in this field. You can also adjust the **Fetus** selection to change the fetus.
- CUA/AUA – select the ultrasound age calculation method
  - Composite Ultrasound Age (CUA) – regression calculation
  - Average Ultrasound Age (AUA) – an arithmetic average

  You can select the method in this field, or adjust the **Select CUA/AUA** control.

NOTE: *CUA/AUA is only available when you select USA OB Type in Utility -> System -> System Measure menu.*

You can enter information in the following fields:

- FetusPos – type information about the fetus position.
- PLAC – type information about the placenta.

Measurement information

This section lists the results of all measurements.

- CUA or AUA – If this field is checked, the system uses the measurement to calculate the ultrasound age.
- Value – The measured value. If more than one measurement was made for an item, the system uses the specified method (average, maximum, minimum, or last) to determine this value.
- m1–m3 – Up to three measurement values for each item. If you make more than three measurements, the report uses the last three.
- Method – When there is more than one measurement for an item, this specifies the method used to calculate the measurement value listed in the Value column. Choices are average, maximum, minimum, last, or off. To change the method:
  a. Move the **Trackball** to the Method field.
  b. Press **Set**.
  c. Move the **Trackball** to select from the list.
  d. Press **Set**.
- AGE – The fetal age for this measurement.
- Range – The typical range of fetal age for this measurement.

Calculation information

This section of the report provides calculation choices and lists calculation results.

- EFW – lists the parameters used to calculate EFW. This is followed by the calculation result.

  To change which parameters are used:

  a. Select this field or press ***Select EFW***.

  b. Select the desired parameters.

- EFW GP – lists the source used to calculate EFW–GP (growth percentile). This is followed by the growth percentile.

  To change the source:

  a. Select this field or press ***Select GP***.

  b. Select the desired source.

The remaining calculation information shows ratios for several measurements, and the Cephalic Index (CI).

The report shows if any of the ratios are out of range (OOR). Out of range indicates one of the following:

- The measurement is out of the normal range based on the gestational age that is calculated from the LMP. The system determines OOR from the ultrasound age compared to the gestational age. The gestational age is calculated from the last menstrual period or the estimated delivery date.
- The measurement is outside of the range for the data used in the calculation. That means that the measurement is either less than or more than the range of measurements used to determine fetal age based on the measurement.

For more information about how to use the report, see ‘Viewing and Editing Worksheets’ on *page 7-61* for more information.

Report Menu list

Use following report menu list to switch between different summary reports.

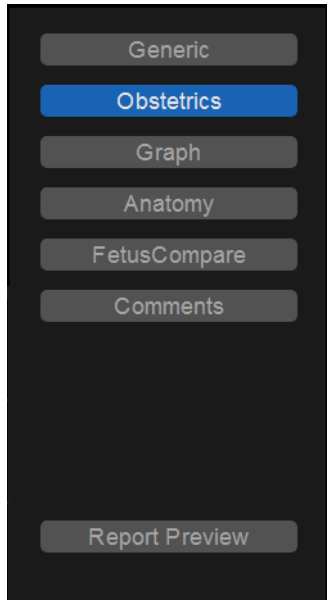


Figure 9-5. Report menu list

Anatomical Survey

Overview

The Anatomy page provides a checklist of the Fetus.



Figure 9-6. Anatomical Survey

Editing

- To activate the Anatomical Survey, select ***Anatomy*** on the OB Report screen.
- Fill the required field.

Table 9-2: Anatomical Survey

Field	Description
Fetus Pos	Indicate the fetal position within the uterus.
PLAC	Identify the location of the placenta.
Normal	Select to set all the values in the checklist to “Normal“.
Abnormal	Select to set all the values in the checklist to “Abnormal“.
Scanned	Select to set all the values in the checklist to “Scanned“.
Clear	Select to clear all the values in the checklist.

Select ***Exit*** to return to the Scan screen.

NOTE: The patient specific contents input on the Anatomical Survey page are returned to the factory default settings after starting a new patient.

OB Graphs

Overview

OB Graphs allow you to assess fetal growth compared to a normal growth curve. When a patient has completed two or more ultrasound exams, you can also use the graphs to look at fetal trending. For multi-gestational patients you can plot all fetuses and compare the growth on the graphs.

The Versana Active provides the following two basic types of graphs:

- **Fetal Growth Curve graphs** – show one measurement per graph. These graphs show the normal growth curve, positive and negative standard deviations or applicable percentiles, and ultrasound age of the fetus using the current measurement. For multi-gestational pregnancies, you can view all fetuses. If previous exam data is available, the graph can show fetal trending.
- **Fetal Growth Bar graph** – shows the ultrasound age and the gestational age based on patient data. Plots all measurements on one graph.

To View OB Graphs

To view OB graphs:

1. Press ***Report*** key on the control panel.
2. Select ***Graph*** in the report menu list.

Fetal Growth Curve Graph



Figure 9-7. Fetal Growth Curve Graph

The horizontal axis shows the fetal age in weeks. The system determines this age from the data on the Patient Data Entry screen. The vertical axis shows one of the following:

- For measurements, mm or cm
- For ratios, percent
- For fetal weight, grams

Fetal Growth Curve Graph (continued)

The Fetal Growth Curve Graph shows the following information for the selected measurement:

- The normal growth curve
- The standard deviations or relevant percentiles
- The gestational age of the fetus, using patient data (vertical dotted line)
- Using the current ultrasound measurement data, where the fetus is on the growth curve

The legend at the bottom of the graph shows the symbols and colors that indicate data for fetal trending (Past and Present) and multiple gestation (Fetus).

To select the measurement

To select which measurement you want to display on the Fetal Growth Curve Graph, do one of the following:

- To select a specific measurement:
  a. On the graph display, move the **Trackball** to the Measurement Type field and press **Set**.

     The system displays a list of measurements.

  b. Move the **Trackball** to select the desired measurement and press **Set**.

     The system displays the Fetal Growth Curve Graph for the selected measurement.
- To scroll through all Fetal Growth Curve Graphs, adjust the **Fetus** control on the second menu.

Fetal Growth Curve Graph (continued)

To select the age to use

To plot the fetus age, the system allows you to use the gestational age (GA) from the LMP, or to use the composite ultrasound age (CUA). To select, adjust the **Select GA** control. The information in the left column changes between CUA and GA(EDD), and the data may change.

To view a single or four graphs

You can view either a single Fetal Growth Curve Graph or you can view four graphs at the same time. To select each view, press ***Single*** or ***Quad***.



Figure 9-8. Fetal Growth Curve Graph: Quad View

The measurement values are displayed at the bottom of the graph.

Fetal Growth Curve Graph (continued)

To change measurements in quad view

When you view four graphs simultaneously, you can select which four you want to see. To change each graph in quad view:

1. On the graph display, use the **Trackball** to move the cursor to the small box that is upper left of each graph, then press **Set**.

   The system displays a list of measurements.

2. Move the **Trackball** to select the desired measurement and press **Set**.

   The system displays the Fetal Growth Curve Graph for the selected measurement.

To scroll through all Fetal Growth Curve Graphs, adjust the **Graph Change** control.

Fetal Trending

When you have ultrasound data for more than one exam for a patient, you can use the data to look at fetal trending on the Fetal Growth Curve Graphs.

1. Select ***Graph*** and select the desired Fetal Growth Curve Graph.
2. Select ***Plot Both***.

   The system automatically finds the data from previous ultrasound exams, and displays it on the graph with the present data.

The legend at the bottom of the graph shows the symbols and colors that indicate Past and Present data.

To edit patient data

When you are working with graphs, you can change or enter the following patient data.

- GA(LMP) – this field is computed using the LMP date on the Patient Data Entry screen. To change this field:

NOTE: *You can only change this field on the Fetal Growth Curve Graph in single view.*

a. Move the **Trackball** to the field, which is left of the graph. To select the field, press **Set**.

   The system displays a window with the GA weeks and days.

b. To select each field, move the **Trackball** to move to the field and press **Set**.

c. Type the correct weeks or days.

d. Select OK.

   The system makes the following changes:

- GA (LMP) is now GA (GA) and shows the age you entered.
- In the Patient Data section, the GA changes.
- In the Patient Data section, The EDD (LMP) changes to EDD(GA) and shows an updated date, using the GA you entered.

  The LMP is erased.

- FetusPos – type information about the fetus position.
- PLAC – type information about the placenta.

To return from a graph to the scan display

After viewing graphs, to return to the scan display, do one of the following:

- On the graph display, select Exit.
- Press Freeze/Report on the control panel.

Fetal Growth Bar Graph

The fetal growth bar graph shows current exam measurements and the normal growth range based on the gestational age. It shows all measurements on one graph.

To view the Fetal Growth Bar Graph:

1. Press **Report**.
2. Select ***Graph***.
3. Select **Bar**.



Figure 9-9. Fetal Growth Bar Graph

- The horizontal axis shows the gestational weeks.
- The red vertical line shows the gestational age using the patient data.
- The blue dotted vertical line shows the ultrasound age using the current measurements.
- The yellow x shows the ultrasound age for each measurement.
- The green rectangle shows the normal age range for the measurement.

You cannot do fetal trending or view multiple gestation data on the bar graph.

OB-Multigestational

Multiple Fetus

Versana Active allows you to measure and report multiple fetus development. The system can report a maximum of four fetuses.

To enter the number of fetuses

If more than one fetus is imaged during the exam, select the number of fetuses in the Patient Data Entry Menu.

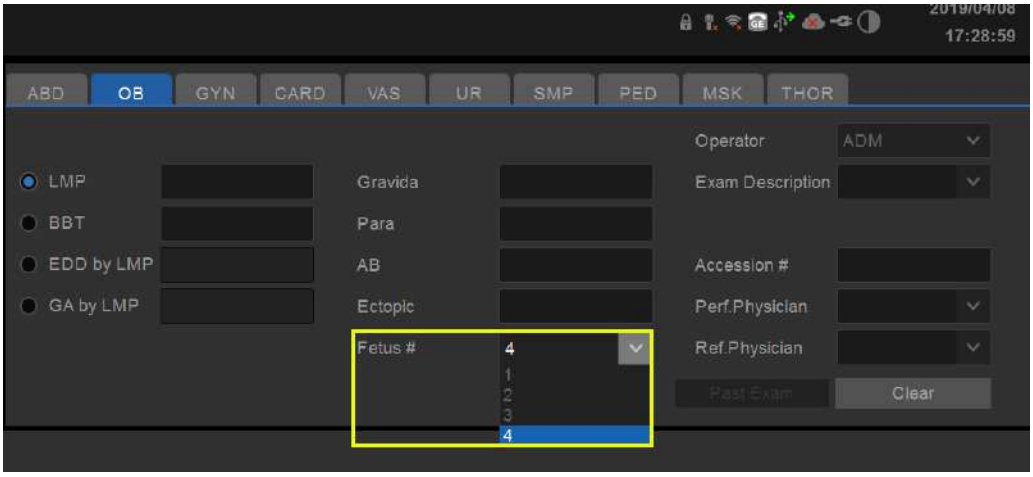


Figure 9-10. Fetus Number

When you start an OB exam, the system automatically fills in the Fetus # field with 1. To change the number:

1. Move the cursor to the fetus number and press **Set**.

   The number is highlighted.
2. Select the correct number and press **Set**.

   The system displays a message to confirm that you want to change the fetus number.
3. Select ***Yes***.

To identify each fetus

For measurements, calculations, and report displays, the system labels each fetus A, B, C, or D. Each fetus is identified by a letter and the total number of fetuses. For example, fetus A/4 is fetus A from a total of 4.

When scanning, you can enter information about the fetus position and placenta location. You can enter the information in the Patient Data section of the reports and the graphs. You can type up to 20 characters in the FetusPos field and 16 characters in the PLAC fields.



Figure 9-11. Patient Data section of the OB Report

To select a fetus

During measurements and calculations, to change between fetuses, do one of the following:

- Adjust the **Fetus** selection.
- Move the **Trackball** to move to the Summary Window and select the fetus.

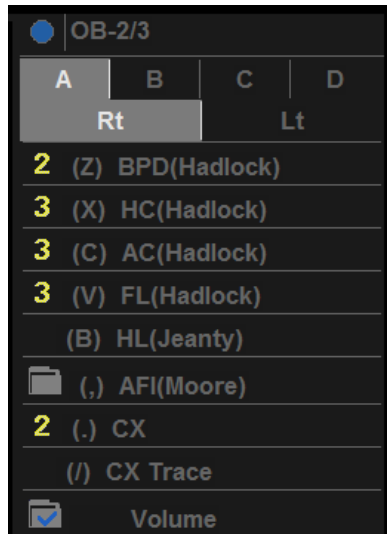


Figure 9-12. Summary Window: Multiple fetus

You can change between fetuses at any time during the exam.

NOTE: After you change to the next fetus, any measurements you make are recorded and reported to that fetus. If you have any active measurement or calculation that is not completed when you change the fetus, the system cancels the measurement or calculation.

To view multiple fetuses data on graphs

You can view multiple gestation data on fetal growth curve graphs. After you have made measurements for each fetus, select ***Graph***.

1. To view the graph for each fetus, do one of the following:
   - Adjust the **Fetus** selection.
   - In the Patient Data section, move the **Trackball** to highlight the FetusNo field. In the list of fetuses, move the **Trackball** to select the fetus you want, and press **Set**.
2. To display data for multiple fetuses on the same graph, select ***Fetus All***.

The legend at the bottom of the graph shows the symbols and colors that represent each fetus.

To compare multiple fetus data on a worksheet

With multiple fetuses, you can list and compare measurements of the fetuses on the report.

Select ***Report***, then select ***Fetus Compare***.

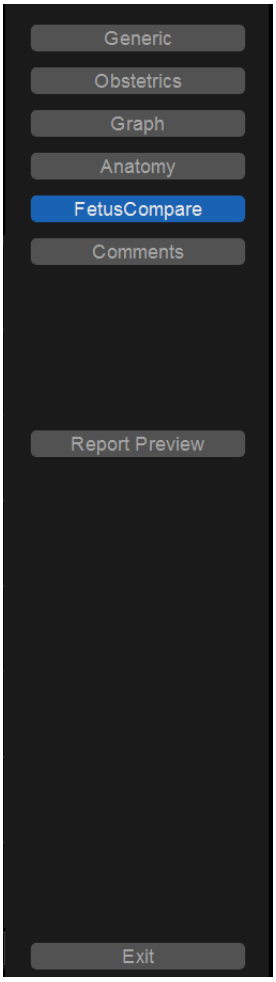


Figure 9-13. OB Worksheet Display

To compare multiple fetus data on a worksheet (continued)

When you select ***Fetus Compare***, the system lists the measurement results for each fetus on the worksheet.

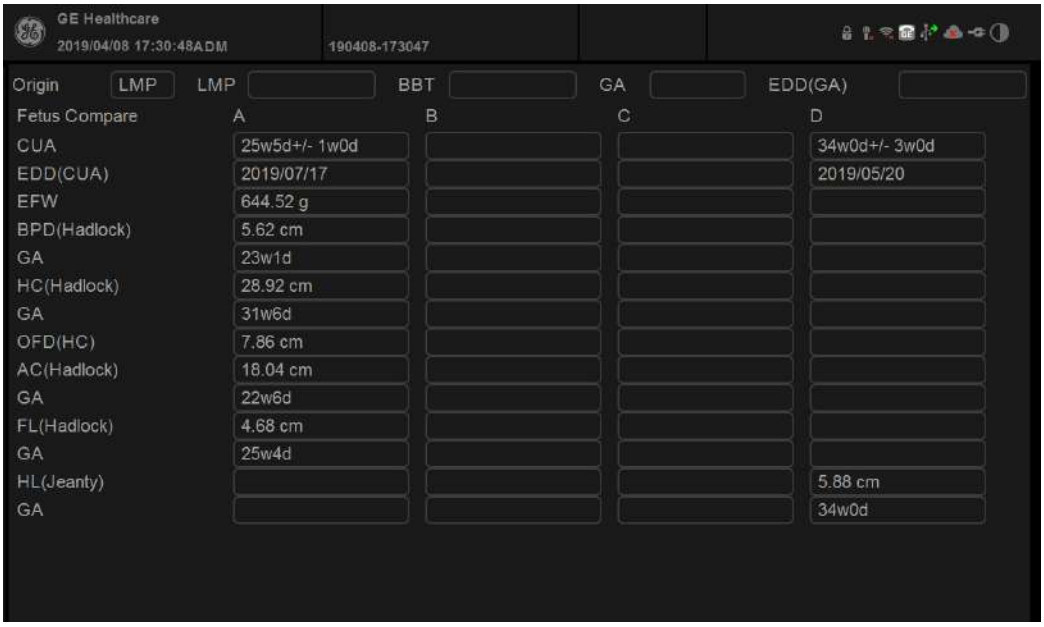


Figure 9-14. Worksheet Display with Fetus Compare

OB Table Editor

Overview

You can add user programmable OB tables to the system.

OB Table Settings Menu

You add OB Tables in the Measurement & Analysis menu. To open the menu:

1. Enter **Utility** -> **Measure**, then select ***M&A***.
2. Check the Exam Category. Make sure that Obstetrics is selected.

   If it is not selected, select Obstetrics and continue selecting the folders until the appropriate area is selected as to where this new OB Table will be entered. For example, select Obstetrics, then select OB-2/3. If there are further folders within OB-2/3, select that appropriate folder.

OB Table Settings Menu (continued)

3. On the monitor display, select the OB Table tab.
   The system displays the OB Table settings menu.

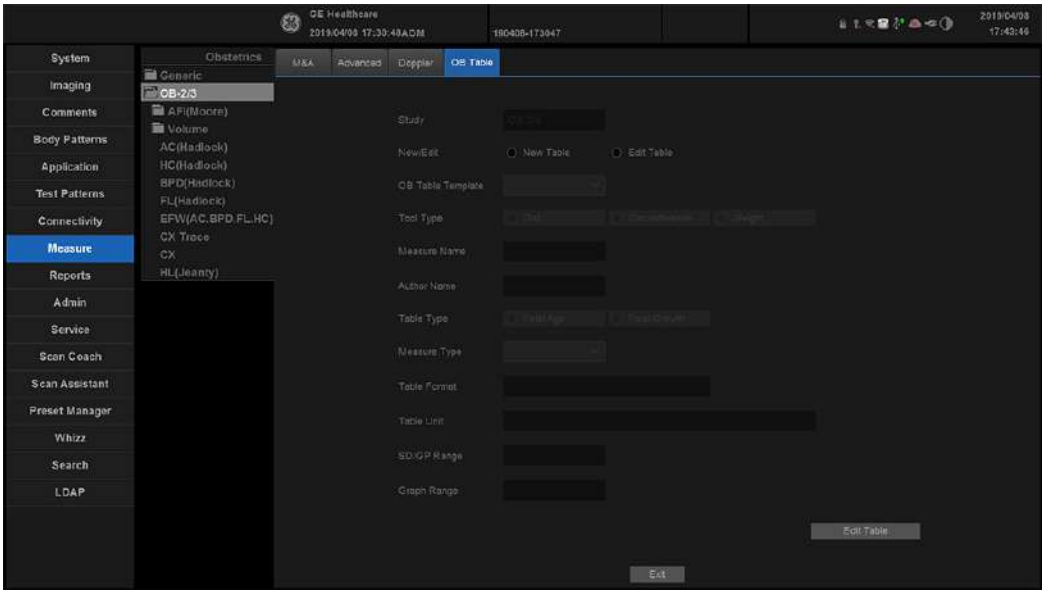


Figure 9-15. OB Table settings

OB Table Settings Menu (continued)

4. The OB Table settings menu lists OB Table parameters. Specify the following parameter values as appropriate:
   - **Study**: Shows the study to which this measurement table belongs.
   - **New/Edit**: To create a new OB table, select New Table. To edit an existing user-programmable OB table, select Edit Table.

NOTE: You cannot edit the system's OB Tables.

   - **OB Table Template**: To create a new OB table, select the Template (1 - 7) which you want to use as the basis of the user programmable OB Table. See 'OB Table Templates' on *page 9-66 for more information.*

     To edit an existing user OB table, select the desired OB table to edit.
   - **Tool Type**: Select the type of measurement: Distance or Circumference.
   - **Measure Name**: Type the name of measurement that will display on the menu.
   - **Author Name**: Type the author's name.
   - **Table Type**: If necessary, select the Table Type: Fetal Age or Fetal Growth.
   - **Measure Type**: Select a measurement type that can be used to calculate EFW, for example BPD.

NOTE: Measure Type is used only when calculating EFW.

NOTE: The following items are display only: Table Format, Table Unit, SD/GP Range, and Graph Range. The system determines these values automatically, based on the type of OB table you are creating.

5. After specifying all parameter values, move the **Trackball** to *Edit Table* and press **Set**.

   The system displays the Edit Menu.

NOTE: If any of the OB table parameters are not correct, the Edit Menu is not displayed.

OB Table Templates

Tool Type:

- Distance: 2D Caliper
- Circumference: 2D Ellipse, 2D Trace, 2D Caliper

Template 1

Table 9-3: Template 1 (based on Hadlock)

Template 1: SD Range Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	Week	Week
	Table Range	1SD		
	Graph Range	1SD		
Measurement Result	Value [cm]			
	GA [#w#d]			
	Min [#w#d]			
	Max [#w#d]			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	Week	mm	Week
	Others are same as above			

Template 2

Table 9-4: Template 2 (based on Tokyo)

Template 2: SD Range Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	Day	Day
	Table Range	1SD		
	Graph Range	1SD		
Measurement Result	Value [cm]			
	GA [#w#d]			
	SD: day(+/-)			
	EDD (Date)			
	GA-Min [#w#d]			
	GA-Max [#w#d]			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	Day	mm	Day
	Others are same as above			

Template 3

Table 9-5: Template 3 (based on Osaka)

Template 3: SD Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	Day	mm
	Table Range	1SD		
	Graph Range	1SD		
Measurement Result	Value [cm]			
	GA [#w#d]			
	SD: sd=(mv-pv)/sd			
	EDD (Date)			
	GA-Min [#w#d]			
	GA-Max [#w#d]			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	Day	mm	mm
	Others are same as above			

Template 4

Table 9-6: Template 4 (based on several European tables)

Template 4: 5%-95% Table					
Fetal Age Table	Table Format	MEAS	MIN	MEAN	MAX
	Table Unit	mm	WeekDay	WeekDay	WeekDay
	Table Range	5%:95%			
	Graph Range	5%:95%			
Measurement Result	Value [cm]				
	GA [#w#d]				
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,				
	EDD (Date)				
	GA-Min [#w#d]				
	GA-Max [#w#d]				
Fetal Growth Table	Table Format	AGE	MIN	MEAN	MAX
	Table Unit	WeekDay	mm	mm	mm
	Table Range	5%:95%			
	Graph Range	5%:95%			

Template 5

Table 9-7: Template 5 (based on several European tables)

Template 5: 5% - 95% Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	WeekDay	mm
	Table Range	1SD		
	Graph Range	5%:95%		
Measurement Result	Value [cm]			
	GA [#w#d]			
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,			
	EDD (Date)			
	GA-Min [#w#d]			
	GA-Max [#w#d]			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	WeekDay	mm	mm
	Table Range	1SD		
	Graph Range	5%:95%		

Template 6

Table 9-8: Template 6 (based on several European tables)

Template 6: 10% - 90% Table					
Fetal Age Table	Table Format	MEAS	MIN	MEAN	MAX
	Table Unit	mm	WeekDay	WeekDay	WeekDay
	Table Range	10%-90%			
	Graph Range	10%-90%			
Measurement Result	Value [cm]				
	GA [#w#d]				
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,				
	EDD (Date)				
	GA-Min [#w#d]				
	GA-Max [#w#d]				
Fetal Growth Table	Table Format	AGE	MIN	MEAN	MAX
	Table Unit	WeekDay	mm	mm	mm
	Table Range	10%-90%			
	Graph Range	10%-90%			

Template 7

Table 9-9: Template 7 (Based on several european tables)

Template 7: 10% - 90% Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	WeekDay	mm
	Table Range	1SD		
	Graph Range	10%:90%		
Measurement Result	Value [cm]			
	GA [#w#d]			
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,			
	EDD (Date)			
	GA-Min [#w#d]			
	GA-Max [#w#d]			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	WeekDay	mm	mm
	Table Range	1SD		
	Graph Range	10%:90%		

OB Table Edit Menu

The data you enter in the OB Table Edit Menu depends on whether the table type is Fetal Age or Fetal Growth.

Fetal Age Table

If you are creating or editing a Fetal Age table, the OB Table Edit Menu is as follows:

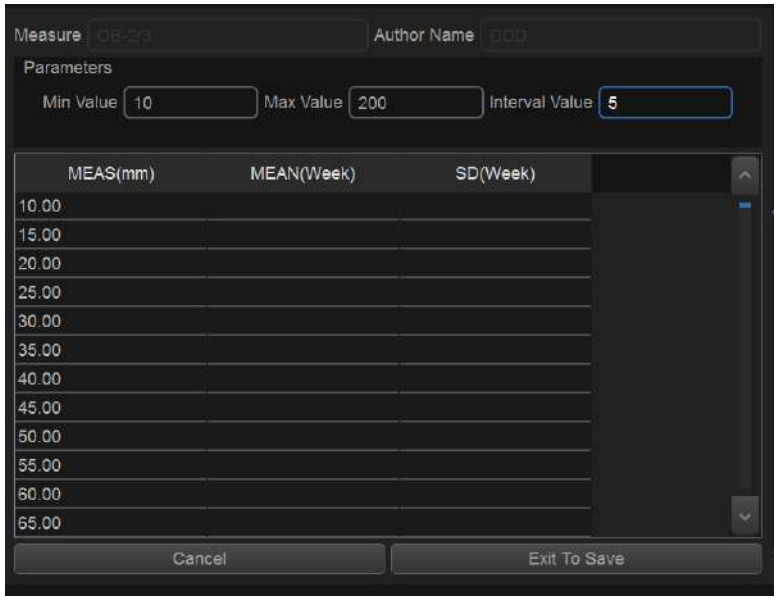


Figure 9-16. OB Table Edit Menu: Fetal Age Table

Complete the field

1. Input value to Min, Max and Interval of the Parameters field.

   The system automatically fills in the MEAS column.

   Input value to the columns of MEAN and SD.

NOTE: *To move between the fields in the table, use the up, down, left, and right arrow keys.*

NOTE: *You must enter a minimum of two rows of data. Any lines with a blank cell are not saved.*

To save the Table Data, move the **Trackball** to Exit to Save and press **Set**. If you want cancel this table, move the **Trackball** to move to Cancel and press **Set**.

Fetal Growth Table

If you are creating or editing a Fetal Growth table, the OB Table Edit Menu is as follows:

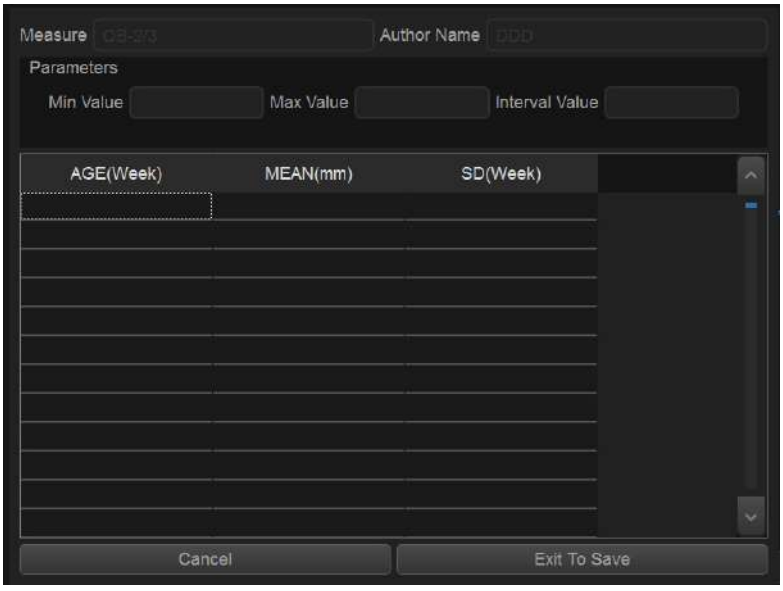


Figure 9-17. OB Table Edit Menu: Fetal Growth Table

Complete the field

1. Input value to the required columns.

NOTE: To move between the fields in the table, use the up, down, left, and right arrow keys.

NOTE: You must enter a minimum of two rows of data. Any lines with a blank cell are not saved.

2. To save the Table Data, move the **Trackball** to Exit to Save and press **Set**. If you want to cancel this table, move the **Trackball** to Cancel and press **Set**.

After you complete the OB table, it is now available for the selected study. To use the measurement, you must assign it to a menu. See ‘Measurement and Calculation Setup’ on *page 7-13 for more information.*

EFW for OB User Table/Formula Editor

EFW Table Editor

You can edit an EFW Formula at the OB Table Editor.

1. Select Utility -> Measure -> OB Table.
2. Select the appropriate parameters and press ***Edit Table***.
   a. New/Edit: Select “New Table”
   b. OB Table Template: Select appropriate template.
   c. Tool Type: Select “Weight”
   d. Measure Name: Enter measurement name.
   e. Author Name: Enter author’s name.
   f. Table Type: Select “Fetal Age”

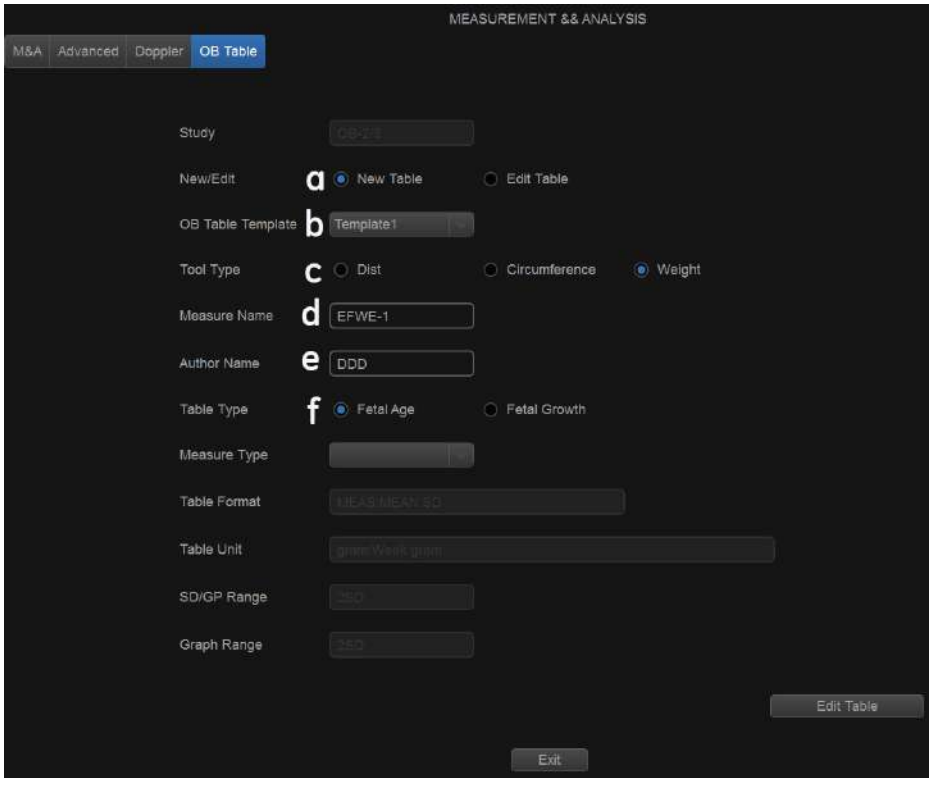


Figure 9-18. OB Table Tab Screen

EFW Table Editor (continued)

3. Edit the table data and press ***Exit To Save***.

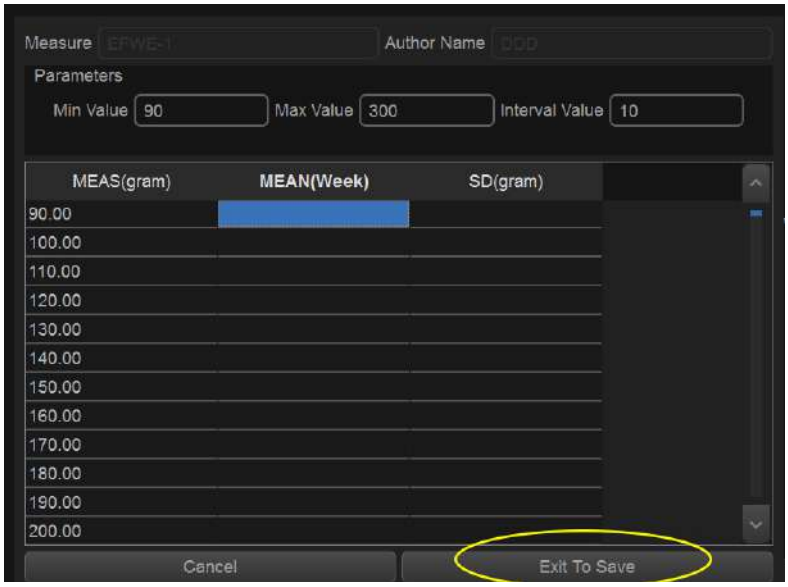


Figure 9-19. OB Table Editor Screen

EFW Formula Editor

Select the M&A tab and select ***Edit Calc***. The Modify User CALC window displays.

Select the user table previously added from the User Defined pull-down menu and press ***OK***.

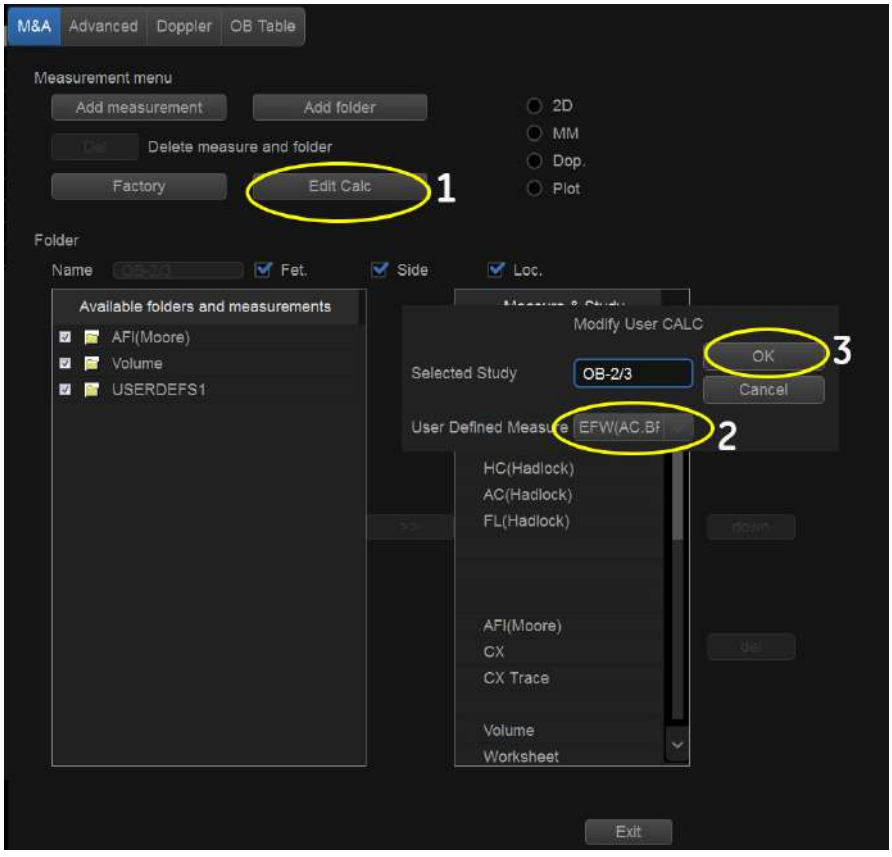


Figure 9-20. Modify User CALC window

NOTE: When you edit a formula, be careful of the following points.

- If you want to calculate EFW by centimeter, add “*100” to the {parameter}.
- If EFW is calculated in grams, add “/1000“ to the formula.

or example,

10^(1.56{AC[Hadlock]}*100+0.08*{FL[Hadlock]}*100)/1000

GYN Measurements

Introduction

The Gynecology exam category includes the following three studies:

- Generic. This study is common to all exam categories. See ‘Generic Measurements’ on *page 7-66 for more information.*
- General Gynecology. This study includes uterine, ovarian, ovarian follicle, and endometrium measurements.
- OB/GYN Vessel. This study includes the following vessels: uterine, ovarian, umbilical, middle cerebral artery, aorta, placenta, and descending aorta.

NOTE: The calculation formulas are listed in the Advanced Reference Manual.

To Start a Gynecology Exam

To begin a gynecology exam, you enter patient data or, if the patient data from a previous exam is saved in the system, find the patient information.

For details about how to start an exam, See ‘To Start an Obstetrics Exam’ on *page 9-4 for more information.*

After you complete the patient information, you can begin the scan.

1. To change from the Patient screen to the Scan screen, do one of the following:
   - On the keyboard, press ***Esc***.
   - Select ***Scan***.
   - On the Control Panel, select **Freeze**.
   - On the Control Panel, press the B-Mode key.

   The system displays the Scan screen.
2. To choose the appropriate probe, select the probe on the **Probe** page.
3. On the Control Panel, press ***Measure***.

   The default Gynecology study is displayed on the menu.

B-Mode Measurements

In B-Mode, you make the measurements in the General Gynecology study. These measurements include:

- Uterine length, width, and height
- Ovarian length, width, and height
- Ovarian follicle
- Cervix
- Endometrium thickness

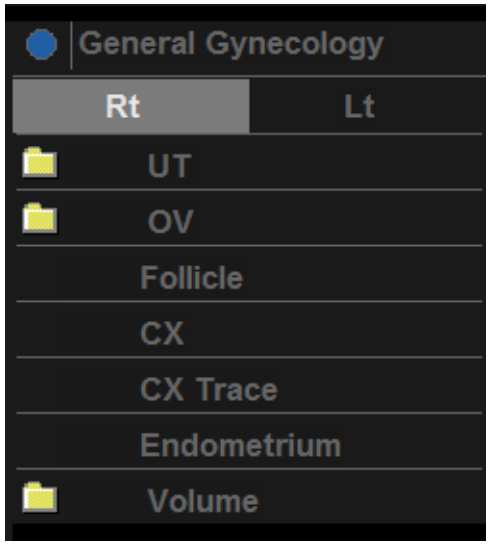


Figure 9-21. General Gynecology study

Follicle measurements

You can make left and right ovary follicle measurements from one, two, or three distances.

One distance

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. To position the active caliper at the start point, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
6. To complete the measurement, press **Set**.
7. Press **Clear**.

   The system displays the ovary follicle measurement in the Results Window.

Follicle measurements (continued)

Two distances

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.
5. Press **Clear**.

   The system displays the ovary follicle measurement in the Results Window.

Follicle measurements (continued)

Three distances

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second distance measurement, the system displays an active caliper.
4. To make the second and third distance measurement, repeat steps a–d above.

   After the third measurement, the system displays the ovary follicle measurement in the Results Window.

Endometrium thickness

To measure the endometrium thickness, make one distance measurement.

1. Select ***Endometrium***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the endometrium thickness in the Results Window.

Ovary length, width, and height

You can measure the length, width, and height of the left and right ovaries. Each measurement is a typical distance measurement made in the appropriate scan plane.

Typically, length and height are measured on the sagittal plane while the width is measured on the axial/transverse plane.

To measure ovarian length, width, or height:

1. Scan the patient's right or left ovary in the appropriate plane.
2. To select left or right, adjust the **Side** selection.
3. Select the ***OV*** folder, then select ***OV L***, ***OV W***, or ***OV H***.
4. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second measurement, the system displays an active caliper for the next measurement.
5. To make the second and third distance measurements, repeat steps 3–4.

   After you complete the length, width, and height measurements, the system displays the ovarian volume in the Results Window.

Uterus length, width, and height

Each of these is a standard distance measurement. Typically, length and height are measured on the sagittal plane while the width is measured on the axial/transverse plane.

To measure uterus length, width, or height:

1. Scan the patient in the appropriate scan plane.
2. Select the ***UT*** folder, then select ***UT L***, ***UT W***, or ***UT H***.

   An active caliper displays.
3. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second measurement, the system displays an active caliper for the next measurement.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the uterine volume in the Results Window.

Cervix measurements

You can make cervix measurements from one distance or spline trace.

One Distance

1. Select ***CX***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.
6. The system displays the cervix measurement in the Result Window.

Spline Trace

1. Select ***CX Trace***; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**. The first caliper turns yellow. The second caliper appears at the same position as the first caliper and is green.
4. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.

   The spline trace requires at least three points to draw the trace. Continue setting the points of the trace until the desired points are set.
5. Press **Set** again after the last caliper is fixed to finalize the spline trace. All points are removed from the line and the spline trace turns yellow.

   *NOTE: Pressing **Set** twice finishes the trace measurement.*
6. The system displays the cervix measurement in the Result Window.

Chapter 10

Cardiology

Describes how to perform cardiac measurements and calculations.

Cardiology Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Scanning a New Patient’ on *page 4-10 for more information.*

Any measurement can be repeated by selecting that measurement again from the menu.

Cardiology Measurements

Overview

Cardiology measurements offer two different types of measurement studies, Generic and Cardiac.

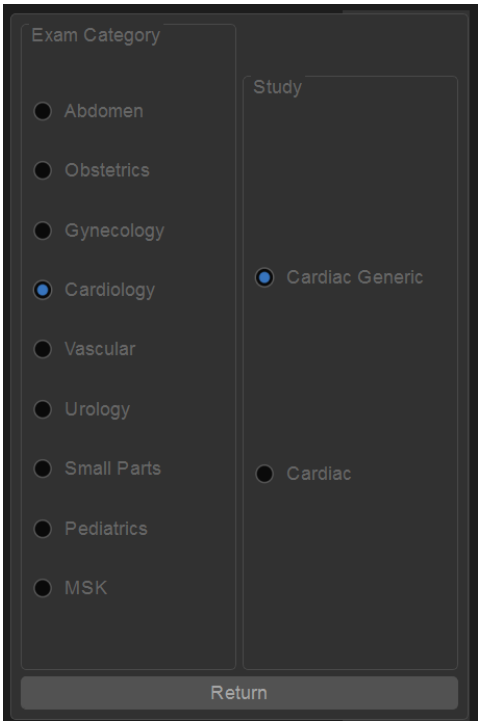


Figure 10-1. Cardiac Exam Calc

- Generic – Each exam category has a Generic study. The Generic studies provide you quick access to measurements.
- Cardiac – This study includes all cardiac measurements.

Naming Format for Cardiac Measurements

When you make a measurement, you select the abbreviation for the measurement on the menu. Most abbreviations are made using acronyms. The following table lists acronyms used for naming cardiac measurements.

Table 10-1: Cardiology Abbreviations

Acronym	Name
% STIVS	% Interventricular Shortening
A	Area
Acc	Acceleration
AccT	Flow Acceleration Time
ALS	Aortic Leaflet Separation
Ann	Annulus
Ao	Aorta
AR	Aortic Regurg
Asc	Ascending
ASD	Atrial Septal Defect
AV	Aortic Valve
AV Cusp	Aortic Valve Cusp Separation
AVA	Aortic Valve Area
AV-A	Aortic Valve Area by Continuity Equation
BSA	Body Surface Area
CI	Cardiac Index
CO	Cardiac Output
d	Diastolic
D	Diameter
Dec	Deceleration
DecT	Deceleration Time
Desc	Descending
Dur	Duration
EdV	End Diastolic Volume
EF	Ejection Fraction
EPSS	E-Point-to-Septum Separation

Table 10-1: Cardiology Abbreviations

Acronym	Name
EsV	End Systolic Volume
ET	Ejection Time
FS	Fractional Shortening
FV	Flow Volume
FVI	Flow Velocity Integral
HR	Heart Rate
IVRT	IsoVolumetric Relaxation Time
IVS	Interventricular Septum
L	Length
LA	Left Atrium
LAA	Left Atrium Area
LAD	Left Atrium Diameter
LPA	Left Pulmonary Artery
LV	Left Ventricle
LVA	Left Ventricular Area
LVID	Left Ventricle Internal Diameter
LVL	Left Ventricle Length
LVM	Left Ventricular Mass
LVPW	Left Ventricle Posterior Wall
ML	Medial to Lateral
MPA	Main Pulmonary Artery
MR	Mitral Regurgitation
MV	Mitral Valve
MVcf	Mean Velocity Circumferential Fiber Shortening
MVO	Mitral Valve Orifice
OT	Outflow Tract
P	Papillary Muscles
PA	Pulmonary Artery
PAP	Pulmonary Artery Pressure
PDA	Patent Ductus Arterosis

Table 10-1: Cardiology Abbreviations

Acronym	Name
PEP	Pre-Ejection Period
PFO	Patent Foramen Ovale
PG	Pressure Gradient
PHT	Pressure Half Time
PI	Pulmonary Insufficiency
PISA	Proximal Isovelocity Surface Area
PR	Pulmonic Regurgitation
PV	Pulmonic Valve
PV-A	Pulmonic Valve Area by Continuity Equation
PVein	Pulmonary Vein
PW	Posterior Wall
Qp	Pulmonic Flow or CO
Qs	Systemic Flow or CO
RA	Right Atrium
RAA	Right Atrium Area
Rad	Radius
RAD	Right Atrium Diameter
RPA	Right Pulmonary Artery
RV	Right Ventricle
RVA	Right Ventricle Area
RVAW	RIght Ventricle Anterior Wall
RVD	Right Ventricle Diameter
RVID	Right Ventricle Internal Diameter
RVL	Right Ventricle LEngth
RVOT	Right Ventricle Outflow Tract
s	Systolic
SI	Stroke Index
ST	Shortening
SV	Stroke Volume
SVI	Stroke Volume Index

Table 10-1: Cardiology Abbreviations

Acronym	Name
T	Time
TA	Tricuspid Annulus
TAML	Tricuspid Annulus Medial to Lateral
TR	Tricuspid Regurgitation
TV	Tricuspid Valve
TVA	Tricuspid Valve Area
Vcf	Velocity Circumferential Fiber Shortening
Vel	Velocity
VET	Valve Ejection Time
Vmax	Maximum Velocity
Vmean	Mean Velocity
VSD	Ventricular Septal Defect
VTI	Velocity Time Integral

In this manual, the abbreviation for each measurement is listed in parenthesis after the measurement, as follows:

- Aortic Root Diameter (***Ao Diam***)
- Left Ventricle Posterior Wall Thickness, Diastolic (***LVPWd***)

For example, to measure the Aortic Root Diameter, you select ***Ao Diam***.

Cardiac Measurements

This section lists cardiac measurements and the steps to perform them. The measurement information in this section is organized by mode, then by region of interest, and then by type of measurement. The organization is as follows:

- Mode; there is a section for B-Mode, M-Mode, Color Flow Mode, and Doppler Mode. There is also a Combination Mode section, which includes calculations that are a result of measurements made in more than one mode.
- Within each mode section, there are sections for region of interest, such as aorta or mitral valve.
- Within each region of interest section, there are sections for type of measurement, such a one distance, two distance, trace, or velocity flow trace. Each measurement type section lists all cardiac measurements that are that type, and then describes the steps to perform that type of measurement.

Some measurements, such as Aortic Root Diameter or Aortic Valve Cusp Separation, can be made in B-Mode or M-Mode. The information for these measurements is included in both B-Mode and M-Mode sections.

NOTE: You can select the diastole frame/systole frame (ED/ES or ES/ED) with the assigned control.

Steps to perform a measurement

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Making two distance measurements

1. Select the measurement; an active caliper displays.
2. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurements and ratio in the Results Window.

Steps to perform a measurement (continued)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

Steps to perform a measurement (continued)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Steps to perform a measurement (continued)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Making a time interval/slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the time interval and slope measurements in the Results Window.

B-Mode Measurements

Aorta

One distance measurement

- Aortic Root Diameter (***AO Diam***)
- Aortic Arch Diameter (***AO Arch Diam***)
- Ascending Aortic Diameter (***Ao Asc Diam***)
- Ascending Aortic Diameter (***Ao Asc Diam***)
- Aorta Annulus Diameter (***Ao Annulus Diam***)
- Aorta Isthmus (***Ao Isthmus***)
- Aorta ST Junction (***Ao st junct***)

Aortic Valve

One distance measurement

- Aortic Diameter (***Ao Diam***)
- Aortic Valve Cusp Separation (***AV Cusp***)
- Aortic Valve Diameter (***AV Diam***)

One trace measurement

- Aortic Valve Area Planimetry (***AVA Planimetry***)
- Transverse Aortic Valve Area (***Trans AVA (d), Trans AVA (s)***)

Left Atrium

Two distance measurements

- Left Atrium Diameter to AO Root Diameter Ratio (***LA/AO Ratio***)

One distance measurement

- Left Atrium Diameter (***LA Diam***)
- Left Atrium Length (***LA Major***)
- Left Atrium Width (***LA Minor***)

One trace measurement

- Left Atrium Area
  - Diastolic (***LAA (d)***)
  - Systolic (***LAA (s)***)

One trace measurement and one distance measurement

- Left Atrium Volume, Single Plane, Method of Disk
  - Diastolic (***LAEDV A2C***) (***LAEDV A4C***)
  - Systolic (***LAESV A2C***) (***LAESV A4C***)

Left Ventricle

NOTE: The user can select the Straight/Line (polygonal line) with the LV study tool. Adjust the appropriate control on the Primary Menu Key to make the selection.

One distance measurements

- Left Ventricle Mass Index
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)
- Left Ventricle Volume, Teichholz
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Volume, Cubic
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Internal Diameter
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Length
  - Diastolic (***LVLd***)
  - Systolic (***LVLs***)
- Left Ventricle Outflow Tract Diameter (***LVOT Diam***)
- Left Ventricle Posterior Wall Thickness
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)
- Left Ventricle Length (***LV Major***)
- Left Ventricle Width (***LV Minor***)

Left Ventricle (continued)

One trace measurements

- Left Ventricle Outflow Tract Area (***LVOT Diam***)
- Left Ventricle Area, Two Chamber
  - Diastolic (***LVA (d)***)
  - Systolic (***LVA (s)***)
- Left Ventricle Area, Four Chamber
  - Diastolic (***LVA (d)***)
  - Systolic (***LVA (s)***)
- Left Ventricle Area, Short Axis
  - Diastolic (***LVA (d)***)
  - Systolic (***LVA (s)***)
- Left Ventricle Endocardial Area, Width (***LVA (d)***)
- Left Ventricle Epicardial Area, Length
  - Diastolic (***LVAepi (d)***)
  - Systolic (***LVAepi (s)***)

One time interval measurements

- Heart Rate, Teichholz
- Heart Rate for Two Chamber study
- Heart Rate for Four Chamber study
- Heart Rate for Two Chamber Area-Length study
- Heart Rate for Two Chamber Method of Disk study
- Heart Rate for Four Chamber Area-Length study
- Heart Rate for Four Chamber Method of Disk study
- Heart Rate for Bi-Plane Method of Disk study

Left Ventricle (continued)

Two distance measurements

- Ejection Fraction, Teichholz (***LVIDs***)
- Ejection Fraction, Cubic (***LVIDs***)
- Left Ventricle Posterior Wall Fractional Shortening (***LVPWs***)
- Left Ventricle Stroke Index, Teichholz (***LVIDs***, and Body Surface Area)
- Left Ventricle Fractional Shortening (***LVIDs***)
- Left Ventricle Stroke Volume, Teichholz (***LVIDs***)
- Left Ventricle Stroke Volume, Cubic (***LVIDs***)

Body surface area and stroke volume measurements

- Left Ventricle Stroke Index, Single Plane, Two Chamber, Method of Disk (***LVIDd***, ***LVIDs***)
- Left Ventricle Stroke Index, Single Plane, Four Chamber, Method of Disk (***LVIDd***, ***LVIDs***)
- Left Ventricle Stroke Index, Bi-Plane, Bullet
- Left Ventricle Stroke Index, Bi-Plane, Method of Disk (***LVAd***, ***LVAs***)

  The system calculates body surface area from the patient's height and weight.

Left Ventricle Study

- Diastolic (***LVd***)
- Systolic (***LVs***)

  The Left Ventricle study automatically sequences the following measurements:

  - Interventricular Septum (***IVSd***, ***IVSs***)
  - Left Ventricle Internal Diameter (***LVIDs***, ***LVIDd***)
  - Left Ventricle Posterior Wall Thickness (***LVPWs***, ***LVPWd***)

Mitral Valve

One distance measurements

- Mitral Valve Annulus Diameter (***MV Ann Diam***)
- E-Point-to-Septum Separation (***EPSS***)

One trace measurement

- Mitral Valve Area by Pressure Half Time (***MVA By PHT***)
- Mitral Valve Area Planimetry (***MVA Planimetry***)

Pulmonic Valve

One distance measurement

- Pulmonic Valve Annulus Diameter (***PV Ann Diam***)
- Pulmonic Diameter (***Pulmonic Diam***)

Right Atrium

One distance measurement

- Right Atrium Diameter, Length (***RA Major***)
- Right Atrium Diameter, Width (***RA Minor***)

One trace measurements

- Right Atrium Area (***RA Area***)
- Right Atrium Volume, SIngle Plane, Method of Disk (***RAAd***)
- Right Atrium Volume, Systolic, SIngle Plane, Method of Disk (***RAAs***)

Right Ventricle

One trace measurement

- Left Pulmonary Artery Area (***LPA Area***)
- Right Pulmonary Artery Area (***RPA Area***)

One distance measurements

- Right Ventricle Internal Diameter
  - Diastolic (***RVIDd***)
  - Systolic (***RVIDs***)
- Right Ventricle Diameter, Length (***RV Major***)
- Right Ventricle Diameter, Width (***RV Minor***)
- Right Ventricle Wall Thickness
  - Diastolic (***RVAWd***)
  - Systolic (***RVAWs***)
- Right Ventricle Outflow Tract Diameter (***RVOT Diam***)
- Left Pulmonary Artery (***LPA***)
- Main Pulmonary Artery (***MPA***)
- Right Pulmonary Artery (***RPA***)

System

One distance measurements

- Interventricular Septum Thickness
  - Diastolic (***IVSd***)
  - Systolic (***IVSs***)
- Inferior Vena Cava (***IVC***)
- Main Pulmonary Artery Diameter (***MPA Diam***)
- Systemic Vein Diameter (***Systemic Diam***)
- Patent Ductus Arterosis Diameter (***PDA Diam***)
- Patent Foramen Ovale Diameter (***PFO Diam***)
- Pericardial Effusion Diastole (***PEd***)
- Ventricular Septal Defect Diameter (***VSD Diam***)
- Atrial Septal Defect Diameter (***ASD Diam***)

Body surface area and stroke volume measurements

- Interventricular Septum (IVS) Fractional Shortening (***IVSs***)

  The system calculates body surface area from the patient's height and weight.

Tricuspid Valve

One distance measurements

- Tricuspid Valve Annulus Diameter (***TV Ann Diam***)
- Tricuspid Valve Area (***TV Area***)

Auto EF Measurements (Option)

Automated Ejection Fraction (AutoEF) is a semi-automatic measurement tool used for measurement of the global EF (Ejection fraction). The AutoEF tool is used as an optional decision support tool.

The AutoEF tool tracks and calculates the myocardial tissue deformation based on feature tracking on B-mode cine loops.

AutoEF is performed on either one or both apical 4-chamber or 2-chamber views, in any order.

The result is presented as Ejection Fraction value for each view and average Ejection Fraction for the whole LV. All values are stored to the worksheet after the results are approved (see ‘Tracking Validation’ on *page 10-31*).

NOTE: The AutoEF tool is intended for adult cardiology and is not intended to be used in pediatrics cardiology.

Acquisition

1. Create an exam, connect the ECG device and make sure to obtain a stable ECG trace.
2. Acquire B-mode cineloops of an Apical 4 chamber view (4-ch) and an Apical 2 chamber view (2-ch).
   - The frame rate should be between 37 and 80 frames per second. A higher frame rate is recommended for high heart rate.
   - Versana Active should be configured to store at least 100 ms before and after each heart cycle.
   - If the acquisition has more than one heart cycle, the analysis will be done on the second last heart cycle.
   - The entire myocardium should be visible.
   - A depth range that includes the entire left ventricle should be used

NOTE: The AutoEF processed image loop runs slower than the actual cardiac motion. To see the loop in correct playback speed, exit AutoEF.

Starting AutoEF

1. Recall any one of the stored views and press **Measure**.
2. In the Measurement menu, select ***AutoEF***.
   The View selection menu is displayed.

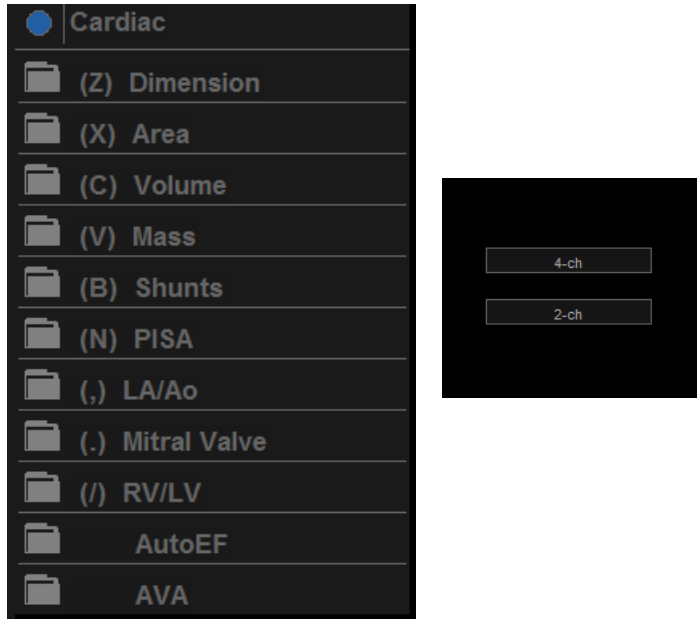


Figure 10-2. View Selection Menu

3. Select the name of the current view: 4-ch or 2-ch. A ROI is defined and tracked through the entire heart cycle as detailed below.

Defining the endocardial border (EB)

When selecting a view to analyze, the system automatically displays a frame where the endocardial border is usually clearly visible. The system automatically displays the ROI for tracking on the screen and the tissue tracking starts. When the tracking is completed and displayed, you can either accept the results or recalculate/redraw the endocardial border (EB).

Selecting “Recalc”

When selecting Recalc, you have the option to correct the EB manually or to revert to the semi-automatic 3 Point EB definition mode. (To revert to semi-automatic mode, press Auto ROI.) If you adjust any point in the EB and wait a few seconds, the system automatically starts reprocessing.

You can also choose another frame to redefine the EB. To choose another frame, turn off the YOYO function, and adjust the Left/Right marker.

It is also possible to define an EB in semi-automatic 3 Point mode.

Defining Endocardial Border (EB) in semi-automatic 3 Point mode

To define the endocardial border, place three points at the endocardial border; two annular points at the base and one at the apex. Follow the indications displayed on the screen when placing the three points.

After placing the third point on the Apex, an endocardial border will automatically be traced (Figure 10-3 *on page 10-26*).

After Selecting 3 Points, the old EB is cleared from the screen and you can redefine a new EB using the 3 Point EB Definition method as described above.

NOTE: Correct border tracing is important for an accurate EF measurement. The system has an adaptive border tracing function: using the endocardial three points as a guide, the system will analyze the image and automatically adapt the border tracing to an optimal position.

NOTE: The YOYO function is turned on to help finding the correct location for the points.

Editing the endocardial border trace

1. If required, use the Edge Shift Left/Right controls to delineate separately the left or right portions of the endocardial border visually as best as possible.
2. If required, move the trackball cursor over the border trace, select an anchor point (red circle), press SET and correct the trace by dragging the anchor point to a new location (Figure 10-4 *on page 10-27*). The shape of the border trace will update accordingly.
3. In case you wish to start over, press 3 Points and re-position the 3 points defining the basal and apex points.

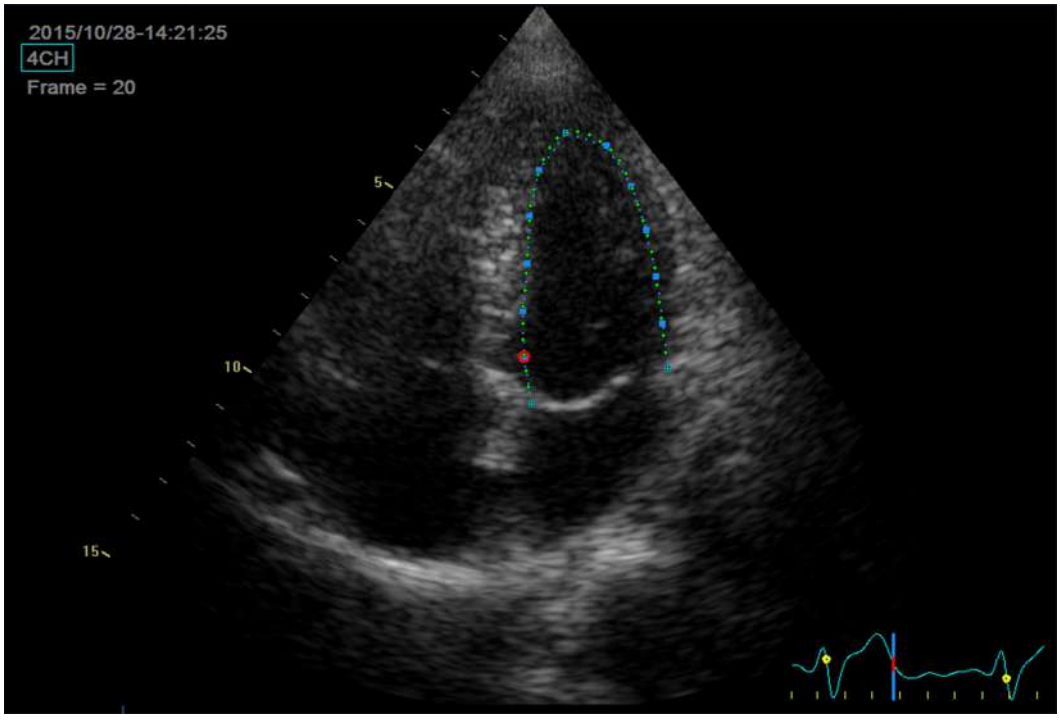


Figure 10-3. Defining a ROI

Editing the endocardial border trace (continued)

4. Place the trackball cursor over the desired point.
5. Selected Point is marked by a red circle.
6. Click over the red circle, it will turn to a square.

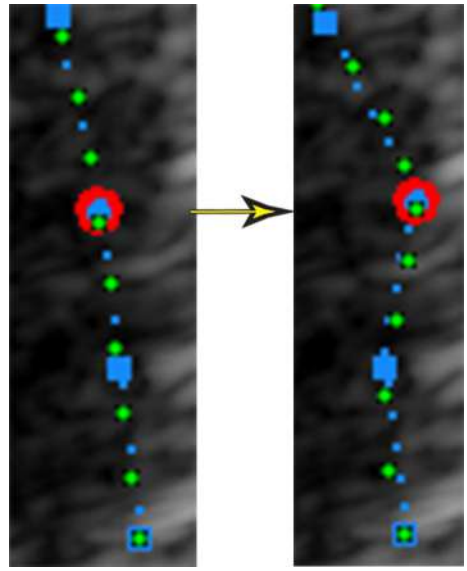


Figure 10-4. Selected anchor point on the inner border trace

7. Move the square to re-align the border trace.
8. Press the **Process** button when ready.

NOTE: Data processing is configured by default to start automatically if the cursor is not moved for a few seconds. If the trace needs to be adjusted, make sure to make the changes immediately after the ROI is displayed.

EF results screen

When processing is complete, the EF results screen is displayed (Figure 10-5 *on page 10-29*).

NOTE: The bi-plane results (BiP) will only appear on screen (Figure 10-5) after measuring both 2-Ch and 4-Ch views.

The AutoEF processed image runs slower than the original loop speed. In order to see the loop in correct playback speed, exit AutoEF.

The running loop is shown on the left. A green dotted line marks the inner border of the chamber. In case of poor tracking, the system will automatically display parts of the border in red.

The system will automatically pick the frames with the maximal area (ED) and minimal area (ES) and place them on the right area of the display.

The End Diastolic volume (EDV) and end Systolic Volume (ESV) is calculated and shown above each frame.

The resulting EF calculation is displayed on the top of the screen.

EF results screen (continued)

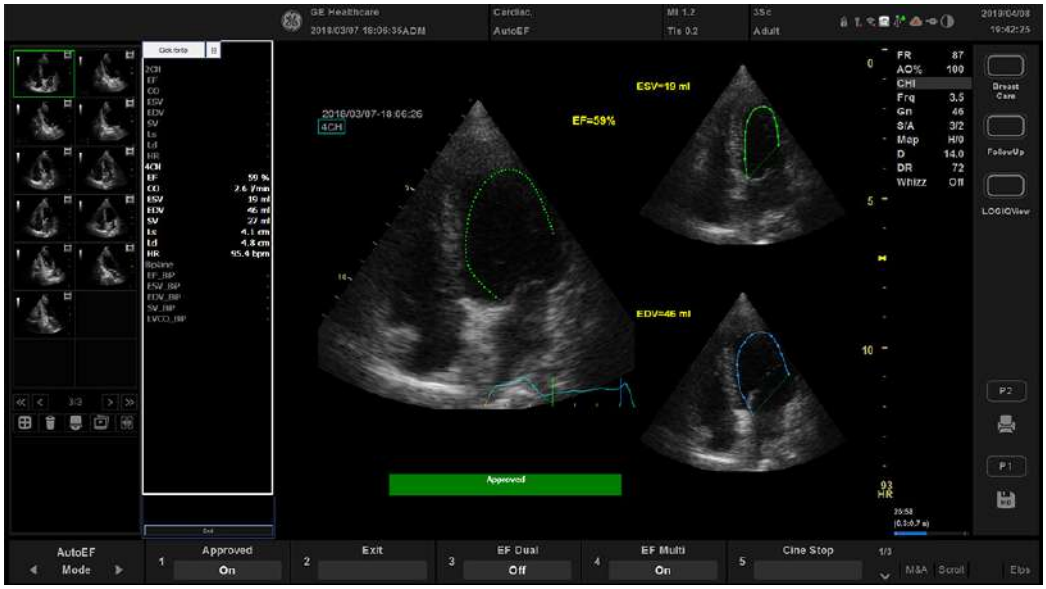


Figure 10-5. AutoEF Result Multi Screen

EF results screen (continued)



Figure 10-6. AutoEF Results Dual Screen - Alternative screen mode

Tracking Validation

The tracking must be visually controlled and validated. If the tracking results are visually correct press the red Approve button. The button turns green and is labeled Approved. The calculated values will be stored and appear in the worksheet.

The following can be done if tracking needs correction:

- Press ***EF Dual*** to enlarge ES and ED frames and position them side-by-side (Figure 10-6 *on page 10-30*).
- You may manually select a different ED frame or ES frame using the ED frame or ES frame rotary.
- You may edit any misaligned point on either ED or ES frames. This is done by:

  a. Placing the trackball cursor over the desired point.

  b. Clicking over the red circle, it will turn to a square.

  c. Pressing **Set** and moving the square to re-align the border trace.

  d. The ESV, EDV and EF will be recalculated accordingly.

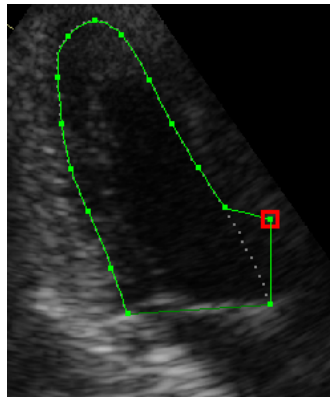


Figure 10-7. Border trace edit

Tracking Validation (continued)

e. In case these results are incorrect, you may go back to the previous step by pressing the Recalc button and editing the endocardial border (‘Defining the endocardial border (EB)’ on *page 10-24*).

f. In case editing the endocardial border is too difficult, you may start all over again by pressing Auto ROI and retrace the border (‘Defining the endocardial border (EB)’ on *page 10-24*).

Possible causes of poor tracking

Poor tracking quality could result from a variety of causes. The common causes for bad tracking are:

- Erroneous placement of the basal points when defining the border. If the basal points are placed too far from the annular region, the border segments at the annular base will not move together with the underlying 2D image throughout the entire heart beat.
- Erroneous placement of the apex point when defining the border. The point should be placed so that the resulting border trace covers mainly the endocardium. If the apex point is placed too high, the border trace will mainly cover the epicardium resulting in poor tracking.
- Too much clutter. Images with too much static clutter will result in poor tracking.

Results

For each of the views, a results screen containing the EF calculation, appears (Figure 10-5 *on page 10-29*) in a mini-report. The mini-report appears on the left side of the results window.

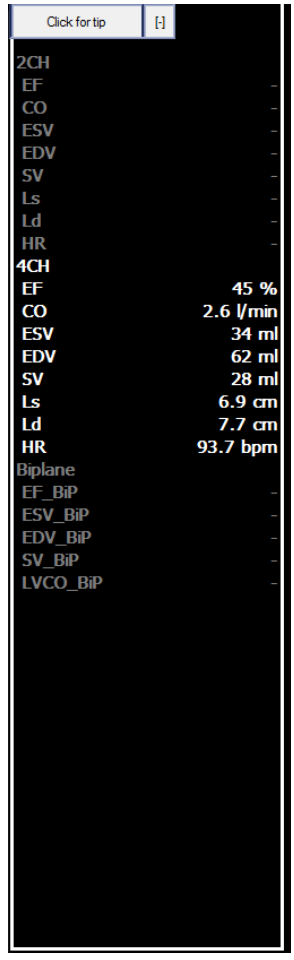


Figure 10-8. Mini Report

Results (continued)

The results are summarized in the worksheet and in the report. AutoEF calculations are displayed with a Q in the worksheet to designate these are from an Auto measure.

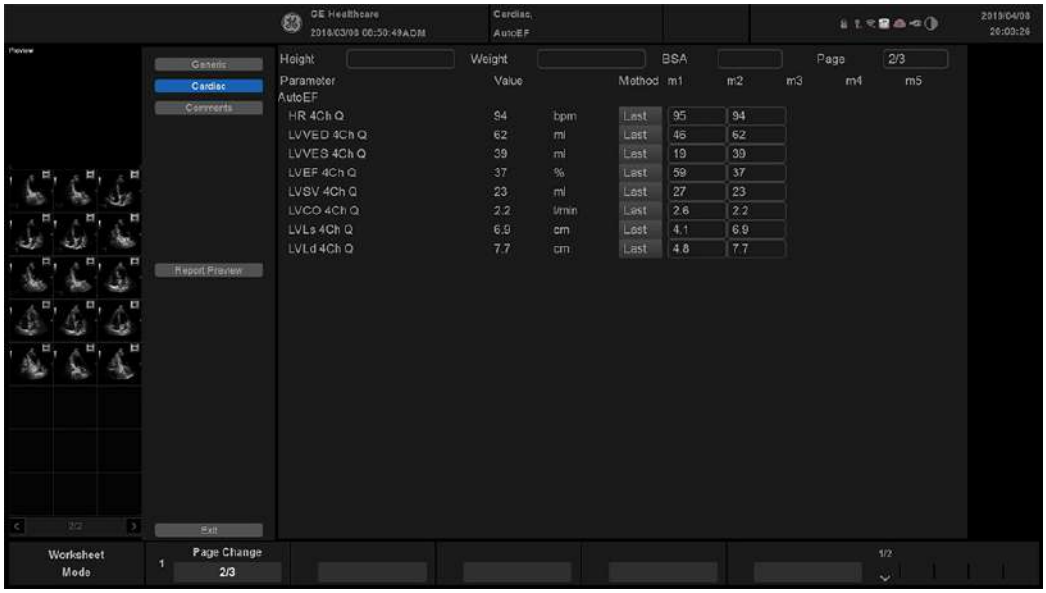


Figure 10-9. Results in Worksheet - Page 1

Results (continued)



Figure 10-10. Results in Report template

Exit AutoEF

Press **Exit** to end AutoEF.

Pressing Report, Patient or Scan also closes the AutoEF package.

NOTE: Do not disable any sub-measurement of AutoEF in Utility --> Measure, as this will disable the whole set of AutoEF measurements.

NOTE: For consistent results, do not delete individual AutoEF measurements from the worksheet. Always delete a full column.

M-Mode Measurements

Aorta

One distance measurement

- Aortic Root Diameter (***AO Root Diam***)

Aortic Valve

One distance measurements

- Aortic Valve Cusp Separation (***AV Cusp***)

Left Atrium

One distance measurement

- Left Atrium Diameter (***LA Diam***)

Two distance measurement (ratio)

- Left Atrium Diameter to AO Root Diameter Ratio (***LA/AO***)

Left Ventricle

One distance measurements

- Left Ventricle Volume, Teichholz
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Volume, Cubic
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Internal Diameter
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Posterior Wall Thickness
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)

One time interval measurement

- Heart Rate, (R-R)
- Left Ventricle Ejection Time (***LVET***)
- Left Ventricle Pre-Ejection Period (***LVPEP***)
- Velocity Circumferential Fiber Shortening (***Vcf***)

Left Ventricle Study

The Left Ventricle study (***LV Study***) automatically sequences the following measurements:

- Interventricular Septum (***IVSd, IVSs***)
- Left Ventricle Internal Diameter (***LVIDd, LVIDs***)
- Left Ventricle Posterior Wall Thickness (***LVPWd, LVPWs***)

Mitral Valve

One distance measurements

- E-Point-to-Septum Separation (***EPSS***)

One slope measurements

- Mitral Valve Anterior Leaflet Excursion (***D-E Excursion***)
- Mitral Valve D-E Slope (***D-E Slope***)
- Mitral Valve E-F Slope (***E-F Slope***)

Right Ventricle

One distance measurements

- Right Ventricle Internal Diameter
  - Diastolic (***RVIDd***)
  - Systolic (***RVIDs***)
- Right Ventricle Wall Thickness
  - Diastolic (***RVAWd***)
  - Systolic (***RVAWs***)

One time interval measurements

- Right Ventricle Ejection Time (***RVET***)
- Right Ventricle Pre-Ejection Period (***RVPEP***)

Right Ventricle Study

The Right Ventricle study (***RV study***) automatically sequences the following measurements:

- Right Ventricle Internal Diameter (RVIDd, RVIDs))

Pulmonic Valve

One time interval measurements

- QRS complex to end of envelope (***Q-to-PV close***)

System

One distance measurements

- Interventricular Septum
  - Diastolic (***IVSd***)
  - Systolic (***IVSs***)
- Pericardial Effusion (***PEd***)

Two distance measurement:

- Interventricular Septum (IVS) Fractional Shortening (***LVD - LVS / LVD x 100***)

Tricuspid Valve

One time interval measurements

- QRS complex to end of envelope (***Q-to-TV close***)

Doppler Mode Measurements

Aortic Valve

Velocity flow trace measurements

- Aortic Insufficiency Mean Pressure Gradient (***AI Trace***)
- Aortic Insufficiency Peak Pressure Gradient (***AI Vmax***)
- Aortic Insufficiency Mean Velocity (***AI Trace***)
- Aortic Insufficiency Mean Square Root Velocity (***AI Trace***)
- Aortic Insufficiency Velocity Time Integral (***AI Trace***)
- Aortic Valve Mean Velocity (***AV Trace***)
- Aortic Valve Mean Square Root Velocity (***AV Trace***)
- Aortic Valve Velocity Time Integral (***AV Trace***)
- Aortic Valve Mean Pressure Gradient (***AV Trace***)

One peak velocity measurements

- Aortic Valve Peak Pressure Gradient (***AR Vmax***)
- Aortic Insufficiency Peak Velocity (***AR Vmax/AI Vmax***)
- Aortic Insufficiency End-Diastolic Velocity (***ARend Vmax/ AIend Vmax***)
- Aortic Valve Peak Velocity (***AV Vmax***)
- Aortic Valve Peak Velocity at Point E (***AV Vmax***)
- Aorta Proximal Coarctation (***Coarc Pre-Duct***)
- Aorta Distal Coarctation (***Coarc Post-Duct***)

One slope measurements

- Aortic Valve Insufficiency Pressure Half Time (***AR PHT***)
- Aortic Valve Flow Acceleration (***AV Trace***)
- Aortic Valve Pressure Half Time (***AV Trace***)

Aortic Valve (continued)

One time interval measurements

- Aortic Valve Acceleration Time (***AV AccT***)
- Aortic Valve Deceleration TIme (***AI PHT***)
- Aortic Valve Ejection Time (***AVET***)
- Aortic Valve Heart Rate
- Time

Two time interval measurement

Slope through aortic valve trace:

- Aortic Valve Acceleration to Ejection Time Ratio (***AVET***)
- Aortic Valve Area according to PHT

Left Ventricle

One peak velocity measurements

- Left Ventricle Outflow Tract Peak Pressure Gradient (***LVOT maxPG***)
- Left Ventricle Outflow Tract Peak Velocity (***LVOT Vmax***)

One velocity flow trace measurements

- Left Ventricle Outflow Tract Mean Pressure Gradient (***LVOT Trace***)
- Left Ventricle Outflow Tract Mean Velocity (***LVOT Trace***)
- Left Ventricle Outflow Tract Mean Square Root Velocity (***LVOT Trace***)
- Left Ventricle Outflow Tract Velocity Time Integral (***LVOT Trace***)

One time interval measurements

- Left Ventricle Heart Rate (***LVOT Trace***)
- Left Ventricle Ejection Time (***LVET***)

Mitral Valve

NOTE: When measuring the MV E/A velocity, Auto/Manual trace can be modified with the appropriate Primary Menu Key control.

One velocity flow trace measurements

- Mitral Valve Regurgitant Flow Acceleration (***MV Trace***)
- Mitral Valve Regurgitant Mean Velocity (***MV Trace***)
- Mitral Regurgitant Mean Square Root Velocity (***MR Trace***)
- Mitral Regurgitant Mean Pressure Gradient (***MR Trace***)
- Mitral Regurgitant Velocity Time Integral (***MR Trace***)
- Mitral Valve Mean Velocity (***MV Trace***)
- Mitral Valve Mean Square Root Velocity (***MV Trace***)
- Mitral Valve Velocity Time Integral (***MV Trace***)
- Mitral Valve Mean Pressure Gradient (***MV Trace***)

One peak velocity measurements

- Mitral Regurgitant Peak Pressure Gradient (***MR Vmax***)
- Mitral Valve Peak Pressure Gradient (***MV Vmax***)
- Mitral Regurgitant Peak Velocity (***MR Vmax***)
- Mitral Valve Peak Velocity (***MV Vmax***)
- Mitral Valve Velocity Peak A (***MV A Velocity***)
- Mitral Valve Velocity Peak E (***MV E Velocity***)

One slope measurements

- Mitral Valve Area according to PHT (***MV PHT***)
- Mitral Valve Flow Deceleration (***MV DecT***)
- Mitral Valve Pressure Half Time (***MV PHT***)
- Mitral Valve Flow Acceleration (***MV AccT***)

Mitral Valve (continued)

Two distance measurement

- Mitral Valve E-Peak to A-Peak Ratio (A-C and D-E) (***MV E/A Ratio***)

One time interval/slope measurements

- Mitral Valve Acceleration Time (***MV AccT***)
- Mitral Valve Deceleration Time (***MV DecT***)

One time interval measurement

- Mitral Valve Ejection Time (***M VET***)
- Mitral Valve A-Wave Duration (***MV A Dur***)
- Mitral Valve Time to Peak (***MV TTP***)
- Time

Two time interval measurement

Body surface area and stroke volume measurements:

- Stroke Volume Index by Mitral Flow (***MV Trace***)

  The system calculates body surface area from the patient's height and weight.

One distance and two velocity measurement:

- Mitral Valve Area from Continuity Equation (***MV Vmax***)

Pulmonic Valve

One peak velocity measurements

- Pulmonic Insufficiency Peak Pressure Gradient (***PI Vmax***)
- Pulmonic Insufficiency End-Diastolic Pressure Gradient (***PR Trace***)
- Pulmonic Valve Peak Pressure Gradient (***PV Vmax***)
- Pulmonic End-Diastolic Pressure Gradient (***PR Trace***)
- Pulmonic Insufficiency Peak Velocity (***PR Vmax***)
- Pulmonic Insufficiency End-Diastolic Velocity (***PRend Vmax***)
- Pulmonic Valve Peak Velocity (***PV Vmax***)
- Pulmonic End-Diastolic Velocity (***PV Trace***)

One velocity flow trace measurements

- Pulmonary Artery Diastolic Pressure (***PV Trace***)
- Pulmonic Insufficiency Mean Pressure Gradient (***PR Trace***)
- Pulmonic Valve Mean Pressure Gradient (***PV Trace***)
- Pulmonic Insufficiency Mean Velocity (***PR Trace***)
- Pulmonic Insufficiency Mean Square Root Velocity (***PR Trace***)
- Pulmonic Insufficiency Velocity Time Integral (***PR Trace***)
- Pulmonic Valve Mean Velocity (***PV Trace***)
- Pulmonic Valve Mean Square Root Velocity (***PV Trace***)
- Pulmonic Valve Velocity Time Integral (***PV Trace***)

Pulmonic Valve (continued)

One slope measurements

- Pulmonic Insufficiency Pressure Half Time (***PR PHT***)
- Pulmonic Valve Flow Acceleration (***PV AccT***)

One time interval measurements

- Pulmonic Valve Acceleration Time (***PV AccT***)
- Pulmonic Valve Ejection Time (***PVET***)
- Pulmonic Valve Pre-Ejection Period (***PVPEP***)
- QRS complex to end of envelope (***Q-to-PV close***)
- Time

Two time intervals measurements

- Pulmonic Valve Acceleration to Ejection TIme Ratio (***PV AccT***, ***PVET***)
- Pulmonic Valve Pre-Ejection to Ejection Time Ratio (***PVPEP***, ***PVET***)

Right Ventricle

One peak velocity measurements

- Right Ventricle Outflow Tract Peak Pressure Gradient (***RVOT Vmax***)
- Right Ventricle Systolic Pressure (***RVOT Vmax***)
- Right Ventricle Outflow Tract Peak Velocity (***RVOT Vmax***)

One velocity flow trace measurement

- Right Ventricle Diastolic Pressure (***RVOT Trace***)
- Right Ventricle Outflow Tract Velocity Time Integral (***RVOT Trace***)

One time interval measurement

- Right Ventricle Ejection Time (***PVET***)

System

One peak velocity measurements

- Pulmonary Artery Peak Velocity (***PV Vmax***)
- Pulmonary Vein Velocity Peak A (reverse) (***P Vein A***)
- Pulmonary Vein Peak Velocity
  - End-Diastolic (***P Vein D***)
  - Systolic (***P Vein S***)
- Systemic Vein Peak Velocity
  - End-Diastolic (***PDA Diastolic***)
  - Systolic (***PDA Systolic***)
- Ventricular Septal Defect Peak Velocity (***VSD Vmax***)
- Atrial Septal Defect Peak Velocity (***ASD Vmax***)

One velocity flow trace measurements

- Pulmonary Artery Velocity Time Integral (***Pulmonic VTI***)
- Systemic Vein Velocity Time Integral (***Systemic VTI***)

One time interval measurements

- Pulmonary Vein A-Wave Duration (***P Vein A Dur***)
- Time
- IsoVolumetric Relaxation Time (***IVRT***)
- IsoVolumetric Contraction Time (***IVCT***)

Two peak velocity measurements

- Pulmonary Vein S/D Ratio (***P Vein D, P Vein S***)
- Ventricular Septal Defect Peak Pressure Gradient (***VSD maxPG***)

Two velocity flow trace measurements:

- Pulmonic-to-Systemic Flow Ratio (***Qp/Qs***)

Tricuspid Valve

One peak velocity measurements

- Tricuspid Regurgitant Peak Pressure Gradient (***TR Vmax***)
- Tricuspid Valve Peak Pressure Gradient (***TV Vmax***)
- Tricuspid Regurgitant Peak Velocity (***TR Vmax***)
- Tricuspid Valve Peak Velocity (***TV Vmax***)
- Tricuspid Valve Velocity Peak A (***TV A Velocity***)
- Tricuspid Valve Velocity Peak E (***TV E Velocity***)

One velocity flow trace measurements

- Tricuspid Regurgitant Mean Pressure Gradient (***TR Trace***)
- Tricuspid Regurgitant Mean Velocity (***TR Trace***)
- Tricuspid Regurgitant Mean Square Root Velocity (***TR Trace***)
- Tricuspid Regurgitant Velocity Time Integral (***TR Trace***)
- Tricuspid Valve Mean Pressure Gradient (***TV Trace***)
- Tricuspid Valve Mean Velocity (***TV Trace***)
- Tricuspid Valve Mean Square Root Velocity (***TV Trace***)
- Tricuspid Valve Velocity Time Integral (***TV Trace***)

One time interval measurements

- Tricuspid Valve Time to Peak (***TV TTP***)
- Tricuspid Valve Closure to Opening (***TCO***)
- Tricuspid Valve A-Wave Duration (***TV A Dur***)
- QRS complex to end of envelope (***Q-to-TV close***)

Tricuspid Valve (continued)

One slope measurements

- Tricuspid Valve Pressure Half Time (***TV PHT***)

One velocity flow trace and one area measurement

- Stroke Volume by Tricuspid Flow (***TV SV***)

Two peak velocity measurement

- Tricuspid Valve E-Peak to A-Peak Ratio (***TV E/A Velocity***)

Color Flow Mode

Aortic Valve

One distance measurements

- Proximal Isovelocity Surface Area: Regurgitant Orifice Area (***PISA AR***)
- Proximal Isovelocity Surface Area: Radius of Aliased Point (***PISA AR***)

One velocity flow trace measurements

- Proximal Isovelocity Surface Area: Regurgitant Flow (***PISA AR***)
- Proximal Isovelocity Surface Area: Regurgitant Volume Flow (***PISA AR***)

One peak velocity measurement

- Proximal Isovelocity Surface Area: Aliased Velocity (***PISA AR***)

Mitral Valve

One distance measurements

- Proximal Isovelocity Surface Area: Regurgitant Orifice Area (***PISA MR***)
- Proximal Isovelocity Surface Area: Radius of Aliased Point (***PISA MR***)

One velocity flow trace measurements

- Proximal Isovelocity Surface Area: Regurgitant Flow (***PISA MR***)

One peak velocity measurement

- Proximal Isovelocity Surface Area: Aliased Velocity (***PISA MR***)

Cardiac Worksheet

After you make cardiac measurements, you can review all the data on the cardiac worksheet. To view the worksheet, select the ***Report*** on the control panel.

The cardiac worksheet has a heading for each mode, and for each folder. In Figure 10-11, the mode heading is B-mode Measurements, followed by Cube/Teichholz. Each measurement from that folder is listed next. The next folder is then listed, in this example, RV/LV.



Figure 10-11. Cardiac Worksheet: Page 1

If a worksheet has more data on a second page, to view the next page, select **Page Change**.

To return to scanning, select the ***Report*** or press ***Esc***.

Worksheet information

The information on the cardiac worksheet is as follows:

- Parameter – This column lists the mode, the measurement folder, and the specific measurement.
- Value – The measured value. If more than one measurement was made for an item, the system uses the specified method (average, maximum, minimum, or last) to determine this value.
- m1-mN - All measurement values for each item. If you make more than six measurements, the worksheet has a scroll bar to show all values (cardiac worksheet only).
- Method – When there is more than one measurement for an item, this specifies the method used to calculate the measurement value listed in the Value column. Choices are average, maximum, minimum, or last. To change the method:

  a. Move the **Trackball** to the Method field.

  b. Press **Set**.

  c. Move the **Trackball** to select from the list.

  d. Press **Set**.

For more information about working with worksheets, See ‘Viewing and Editing Worksheets’ on *page 7-61 for more information.*

Setting up and Organizing Measurements and Calculations

When you receive your Versana Active system, the studies and measurements are organized for typical work flows. If you want, you can change this set up. You can change studies, create studies, and specify which measurements and calculations are in each study. You can change the measurements that are available on the Primary Menu Key. The Versana Active allows you to quickly and easily set up your system so that you can work most efficiently.

For information about how to customize studies and measurements, See ‘Measurement and Calculation Setup’ on *page 7-13 for more information.*

When you make cardiac measurements, the results you see in the Results Window and the Worksheet can vary, depending on what you have set up in the Utility screens.

Generic Study

The Cardiology B Mode Generic exam category includes the following measurements:

- Area (Trace)
- Volume
- Volume (d)
- Volume (s)
- Dist (Distance) Ratio
- Area Ratio
- R-R

The Cardiology M Mode Generic exam category includes the following measurements:

- LV Study
- LA/Ao
- RV Study
- D-E Excursion
- Slope Caliper
- Caliper
- Time
- HR
- Dd/Ds Study

The Cardiology Doppler Mode Generic exam category includes the following measurements:

- Point
- Manual Trace
- MV E/A Ratio
- PHT
- Time
- HR

Cardiac Doppler Measurements

Cardiac Output (CO)

To measure CO (Cardiac Output), make a velocity measurement in the Doppler Spectrum. A FCA (Flow Cross-Sectional Area) is measured on the vessel in B-Mode. These two measurements are used to calculate SV (Stroke Volume). Finally, a HR (Heart Rate) measurement is taken in the Doppler Spectrum. SV and HR are then used to calculate cardiac output.

1. Select **CO** from either the B-Mode or Doppler menu.

   The caliper (horizontal dotted line) appears in the Doppler spectrum.
2. Measure the Stroke Volume.

   After the stroke volume measurements have been completed, a vertical line caliper appears in the Doppler spectrum.
3. Measure the Heart Rate. See ‘Heart Rate’ on *page 7-79 for more information.*

   CO (Cardiac Output) is computed from the SV and HR values and is displayed.

Automatic CO calculation

If the following measurements have previously been made in any order, CO (Cardiac Output) automatically calculates when it is selected from the Calculation menu:

- Velocity in Doppler Mode
- Functional Cross Sectional Area in B-Mode (Circumference/ Area)
- Heart Rate in Doppler Mode

E/e’ Ratio

The ratio of early transmitral velocity to early diastolic velocity of the mitral annulus (E/e’) is measured in Doppler Mode and TVD mode.

1. First, measure MV E/A Velocity to get “E”.
2. Measure e’.

NOTE: The system displays “e” in place of “e’” on the menu.

3. The system calculates E/e’ ratio automatically.

Stress Echo (Option)

Introduction

The Versana Active Ultrasound system provides an integrated stress echo package, with the ability to perform image acquisition, review, image optimization, and wall segment scoring and reporting for a complete, efficient stress echo examination.

The stress package provides a protocol template for the two types of stress exams (exercise and pharmacological stress).

In addition to preset factory protocol templates, templates can be created or modified to suit your needs.

You can define various quad screen review groups, in any order and combination, that will suit your normal review protocol.

When reviewing stress examination images, the images are viewed at their original image quality, and different post-processing and zoom factors may be applied to the images under review for effective image optimization.

The protocol template may be configured for Continuous Capture.

A stress echo examination consists of three steps:

- Selection of a stress test protocol template
- Image acquisition
- Stress Analysis

NOTE: If WallMotion Segment Score is not displayed on the screen, select the "WallMotion" preset in the Utility -> Measure -> M&A -> Plot -> Available Folders and Measurements.

Getting started with a stress study

1. After selecting the appropriate application and probe and connecting ECG, press the user defined key for **Stress echo**. The protocol screen displays the layout of the default stress protocol for the current probe. This layout is also known as a template.

Table 10-2: Protocol Tab

Parameter	Description
Analyze	Display the Analysis screen
Template Editor	Display the template editor screen
Add Level	Add Level to the template
Delete Images	Delete the selected image
Move Image	Move the selected image to the another cell
Sync. Select	Synchronize the selected images.
End CC	End Continuous Capture
Begin/Cont.	Begin or continue the acquisition
Template	Display the template list
T1	Display/Hide the timer T1
T2	Display/Hide the timer T2
Cancel	Cancel Stress Echo

Getting started with a stress study (continued)

2. To use the current template, press ***Begin/Cont.*** to initiate scanning.

   To use another template, press ***Template***. The template list displays.

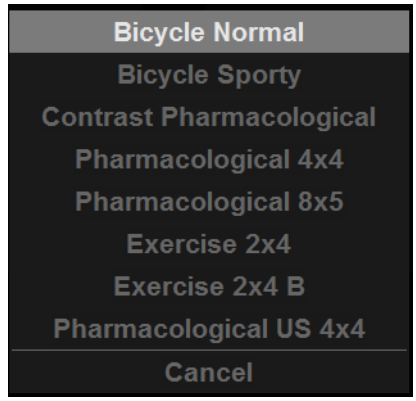


Figure 10-12. Template List

3. **Trackball** to the desired template and press **Set**.

Getting started with a stress study (continued)

4. The selected template displays.



Figure 10-13. Template (Example)

a. Level
b. Projection
c. Current Acquisition (green)

5. Press ***Begin/Cont.*** to initiate scanning using the new template.

Image acquisition

Images are acquired in a pre-defined order, according to the selected template. The highlighted (green) cell of the template matrix, displayed in the Clipboard window, indicates which view is currently being acquired.

The names of the view and levels for the current cell are displayed on the top left corner of the image area and under the template matrix.

Acquisition Screen

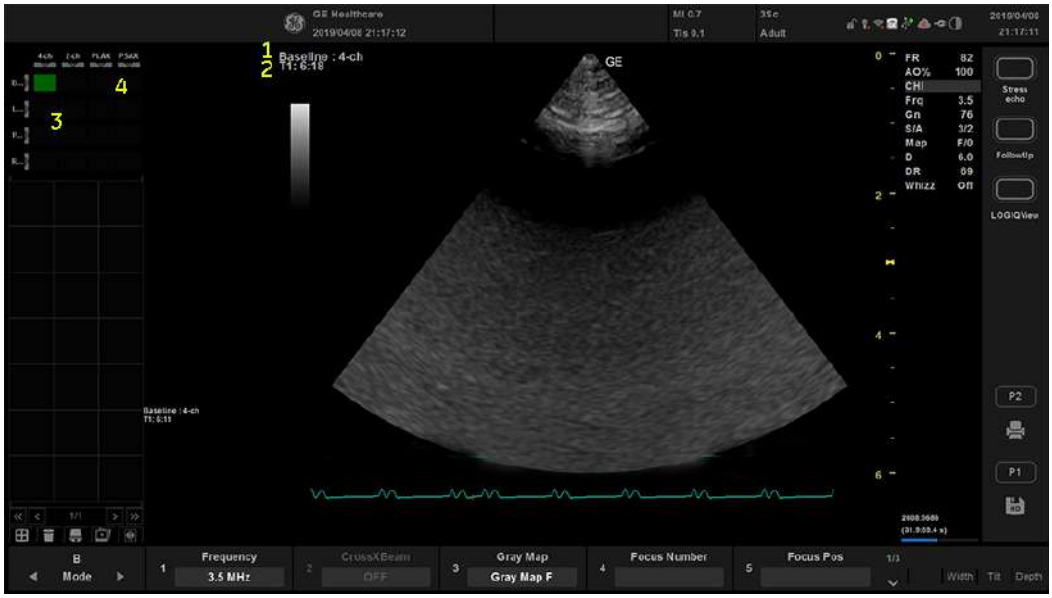


Figure 10-14. Acquisition Screen

1. Current View Level
2. Timer
3. Template Matrix
4. Current View (Green cell)

Starting acquisition

1. Select the template.
2. Press ***Begin/Cont.***
3. Perform a scan that conforms with the view that is highlighted in the template matrix on the Clipboard window.
4. Press P1 key.
   - If the actual stress level is configured to preview the cine loop before storing, use the cine loop controls to select the most appropriate heart cycle and if desired adjust the loop markers. Press **P1** again to save the selected cine loop.

     or

     If you do not want to store the cine loop, press **Freeze** to cancel. Return to the scan screen.
   - If the actual stress level is not configured to preview the cine loop before storing, the system automatically stores the last heart cycle.

Stress levels can be configured for side-by-side display/ comparison of the reference loop from baseline or previous level and the loop to acquire.

5. After storing the cine loop, the system automatically highlights the next view in the matrix to be acquired.
6. Repeat previous steps until all required views are completed.
7. If you select Auto Start Analysis on the Template Editor for this template, a dialogue asking “Do you want to start protocol analysis now?” displays when the last acquisition is complete. If you select Yes, the Stress Echo Analysis screen is displayed.

The template used can be configured so that analysis automatically starts by displaying the first protocol group. The wall segment scoring diagrams for each view is displayed in the Parameter window on the left side of the screen.

Starting acquisition (continued)

If **Stress echo** is selected during acquisition, the following Protocol Mode displays.

Table 10-3: Protocol Mode during acquisition

Parameter	Description
Stop	Stop Stress Echo.
Pause	Pause Stress Echo. The template matrix continues in display. Even if you press P1, the cine loop does not store to the matrix.
Select Cycles	The Continuous Capture Selection screen is displayed (only available in Continuous Capture mode).
Analyze	Enter Analysis screen.
Template	Enter Template screen.
Add Level	Add level to the template.
T2	Display (Start)/Hide Timer T2.

Selecting a view during acquisition

A fixed protocol is provided for scanning, based on the selected template. The system automatically highlights the next view to be acquired in the template matrix, as images are stored. However, the order of scanning may be changed manually as follows:

Manual selection of a view during acquisition

1. Use the **Trackball** or the ***arrow keys upwards and downwards*** on the alphanumeric keyboard to move the cursor to the cell that represents the view to be acquired.

   The selected cell in the template matrix, highlighted in red, indicates the non-default position. When blinking, it contains a previously-stored acquisition.
2. Scan and save the selected loop as explained in the previous section.

After storage, the system automatically highlights the next available view to be acquired.

Moving an acquired image

An image can be moved from one cell to another during acquisition.

Procedure 1

1. When in the Protocol screen, press ***Move Image***.
2. Use the **Trackball** to move the cursor to the desired image.
3. Press **Set**.
4. Use the **Trackball** to move the cursor to the destination cell.
5. Press **Set**. The image is moved from the source cell to the destination cell.

Procedure 2

1. In the Protocol screen, use the **Trackball** to move the cursor to the cell containing the image to move (source cell).
2. Press and hold down **Set**.
3. With the **Set** key still depressed, move the **Trackball** to the desired cell.
4. Release the **Set** key. The image is moved from the source cell to the destination cell.

If the destination cell contains an image, the images from the source and destination cells is exchanged when moving an acquired image.

Timers

Two timers can be displayed in the Stress mode acquisition screen, beside the template matrix.

Timers

- T1 displays the elapsed time from the start of stress examination.
- T2 starts when entering live scanning on the second stress level.

Both T1 and T2 timers can be manually stopped and restarted during the acquisition.

The display of T1 and T2 is user-configurable.

NOTE: If you activate the Timer in Stress Echo, the T1 timer is displayed in the lower left-hand corner of the image area after exiting Stress Echo.

Continuous Capture mode

Continuous Capture mode enables the user to perform acquisition continuously for all views at any level depending on the selected template configuration. Continuous Capture consists of temporary saving images acquired in a storage buffer. To enable best possible use of the limited storage buffer capacity, a Pause/Capture mode is provided, as opposed to the normal Freeze/Scan mode. The Pause mode enables scanning and live display on the screen, without any capture, thereby leaving the buffer available.

To run Continuous Capture, the user has to select a template where this feature is activated.

The buffer bar

When entering a level with Continuous Capture enabled, a buffer bar displays in the window.

The Buffer bar displays the following information:

- The scanning state
  - Pause (live scanning without storing)
  - Capture (live scanning with storing to buffer)
- The percentage of the buffer that is filled
- The buffer filling progression showed by a filling gage
- The capturing sessions, reflected by the red lines along the buffer bar



Figure 10-15. Buffer Bar

Controlling the capture process

When entering a stress level with Continuous Capture enabled, the system is automatically set in Pause mode.

1. Press **P1** to start image capture.

   “Capture” is displayed in the buffer bar, the gage starts filling and the percentage of filled memory buffer increases.
2. Press **P1** again to stop capture.

   “Pause” is displayed in the buffer bar.

When 90% of the memory buffer is filled up, the text display in the buffer bar turns red.

The system enters Freeze mode automatically once the buffer is full and the captured loops display in the Continuous Capture selection screen.

Activating Continuous Capture

1. Do all your pre-stress acquisitions in the Cardiac application.
2. Press the user defined key for **Stress echo**. The Protocol screen displays.
3. Press ***Template***. The template list displays.
4. Select the template ***Exercise 2x4*** from the list.
5. Press ***Begin/Cont.***.
6. Acquire the resting loops in all four views.

*NOTE: Use the **P1** key to store the images.*

7. Once the fourth loop is acquired, the system enters into a waiting mode where Continuous Capture is in a pause state awaiting the patient to exercise.
8. When the patient is back on the bed, press **P1**. The Continuous Capture acquisition starts.
9. Acquire all your views.

   The memory buffer gage increases. When memory exceeds 90%, the percent number turns red.
10. Press **Freeze** to finish.

Activating Continuous Capture (continued)

11. Press ***Select Cycle***.

    The Continuous Capture selection screen displays.

    If the buffer is full, the system automatically displays the Continuous Capture Selection screen.

    Refer to the next section if additional image acquisitions are necessary after the buffer is full.

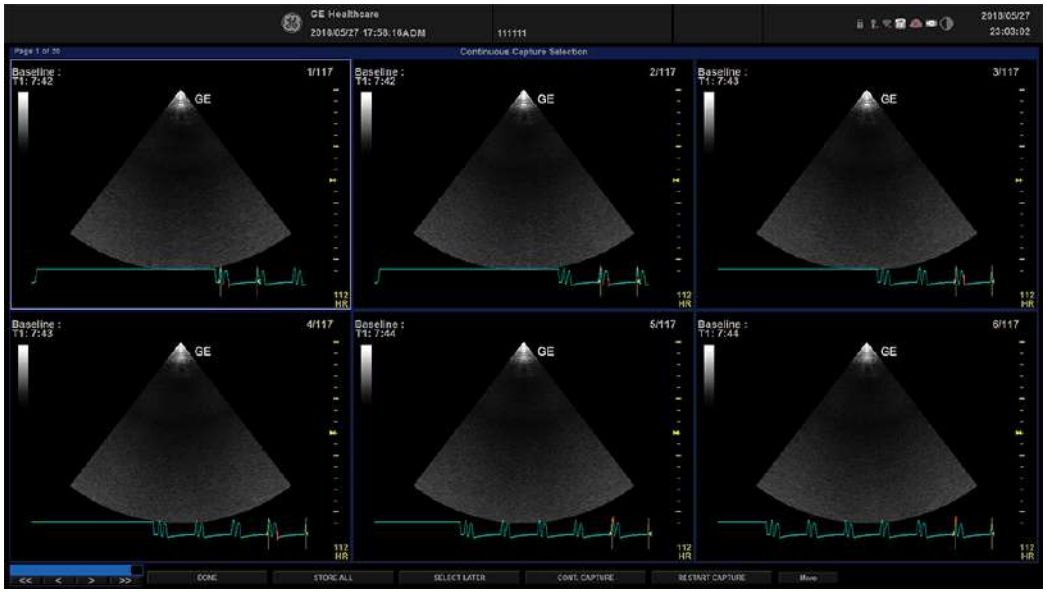


Figure 10-16. Continuous Capture Selection Screen

Activating Continuous Capture (continued)

12. Assign the cine loops to the four views.
    a. **Trackball** to the desired loop.
    b. Press **Set**. A drop-down menu appears with the available choices.
    c. **Trackball** to the appropriate view.
    d. Press **Set**.

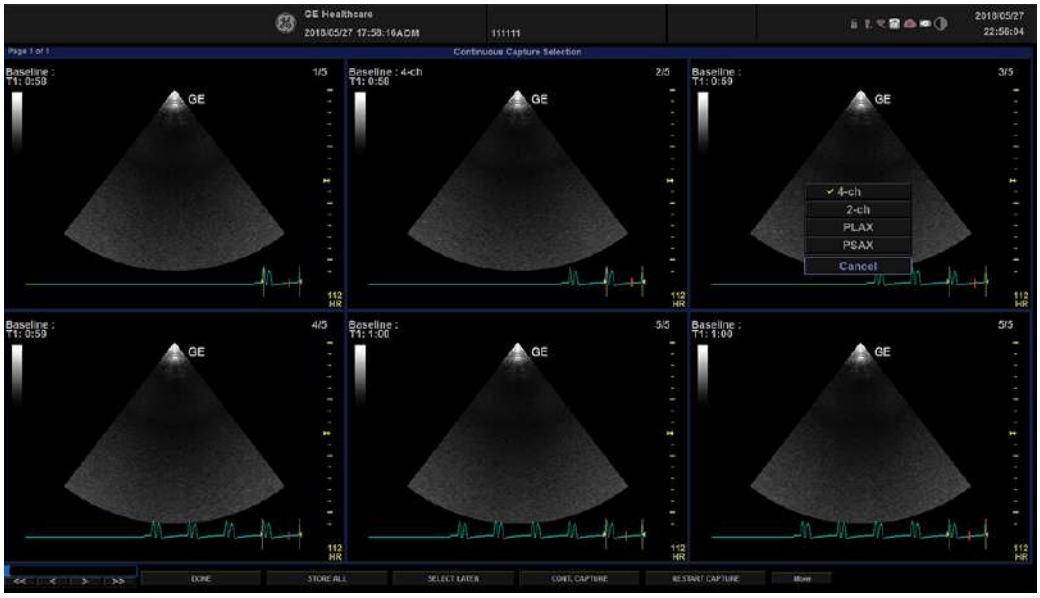


Figure 10-17. Drop-down Menu

    e. Continue these steps until all views are selected.

NOTE: *To access additional cycles, use the arrow keys on the lower left portion of the select cycle screen.*

Activating Continuous Capture (continued)

f. Select ***Done*** when complete. A dialogue window displays, asking whether the entire Continuous Capture acquisition should be saved.

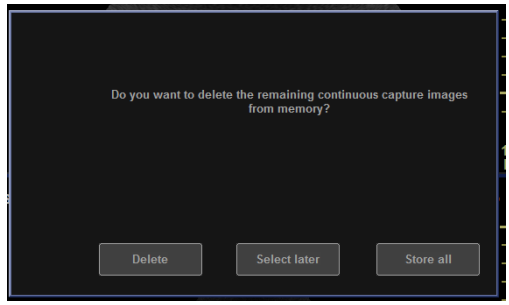


Figure 10-18. Dialogue Window

13. Press ***Delete*** to discard the loop or press ***Store all*** to keep the entire loop.
14. Perform Analysis and scoring.

Continuous Capture with additional image acquisition

If the buffer is filled up before all the image acquisitions are done, additional loops can be stored in the clipboard before doing image assignment to the views.

1. Perform the Continuous Capture. See ‘Activating Continuous Capture’ on *page 10-69 for more information.* (Steps 1 to 11).
2. In the Continuous Capture selection screen, press ***Select Later***.

   The Continuous Capture screen displays.
3. Perform the additional acquisition.
4. In order to resume the stress echo exam and assign loops for the views from the Continuous Capture buffer, press the user defined key for ***Stress echo***. Then press **Template**. If not displayed, select the template ***Exercise 2x4*** from the template list.
5. Click the continuous capture images on the Protocol Template screen.

   The Continuous Capture selection screen displays.
6. Assign the cine loops to the view. See ‘Activating Continuous Capture’ on *page 10-69 for more information.* (Step 12 a - f).
7. Press ***Delete*** to discard the loop or press ***Store all*** to keep the entire loop.

   The normal procedure is to discard the loop. The loop is very big and requires a lot of disk space.
8. Perform Analysis and Scoring.

Postponed image assignment

The assignment of the cine loops to the view can be done on a later stage on a stored Continuous Capture acquisition.

1. Perform the Continuous Capture. See ‘Activating Continuous Capture’ on *page 10-69 for more information.* (Steps 1 to 11).
2. Press ***Store all***.

   The entire Continuous Capture acquisition is stored. The examination can be ended and the image assignment, analysis and scoring can be done later.
3. Re-open the examination, if necessary.
4. Press the user defined key for ***Stress echo***. Then press **Template**. The Protocol screen displays.
5. Click the continuous capture images on the Protocol Template screen.

   The Continuous Capture selection screen displays.
6. Assign the cine loops to the view. See ‘Activating Continuous Capture’ on *page 10-69 for more information.* (Step 12 a - f).
7. Select ***Done***.
8. Perform analysis and scoring.

Restart capture from the Continuous Capture Selection

- Press ***Restart Capture***.

  The recording in memory is deleted and the Continuous Capture starts again.

Resume Continuous Capture

- Press ***Continue Capture***.

  Resumes Continuous Capture recording (only if the Continuous Capture buffer is not full).

Assiging and storing the cine loop

The cine loops captured in the buffer are assigned to the stress protocol views and stored from the Continuous Capture selection screen.

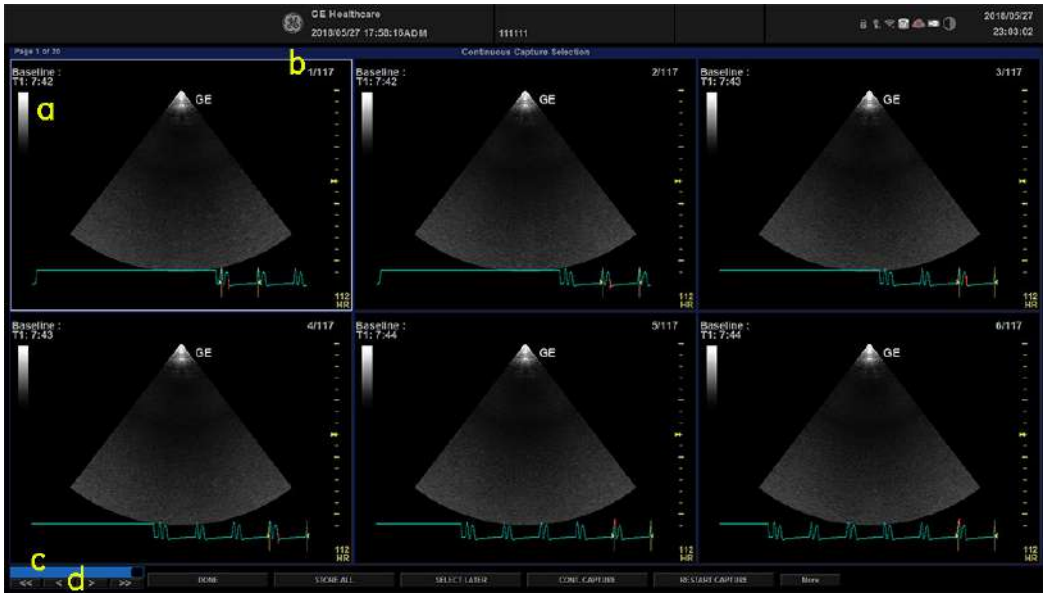


Figure 10-19. Continuous Capture Selection Screen

a. Highlighted loop
b. Cycle number and total number of cycles
c. Blue Gauge: Position of the highlighted loop within buffer area.
d. Navigation Controls: << < > >> (back to first selection, back to previous selection, forward to next selection, and forward to final selection).

Assigning a cine loop to a view

1. Use the **Trackball** to move the cursor to the desired cine loop in order to assign it to a particular view of the stress template.

   The frame of the loop is highlighted.

2. Press **Set**.

   A pop-up menu displays with the view names of the template.

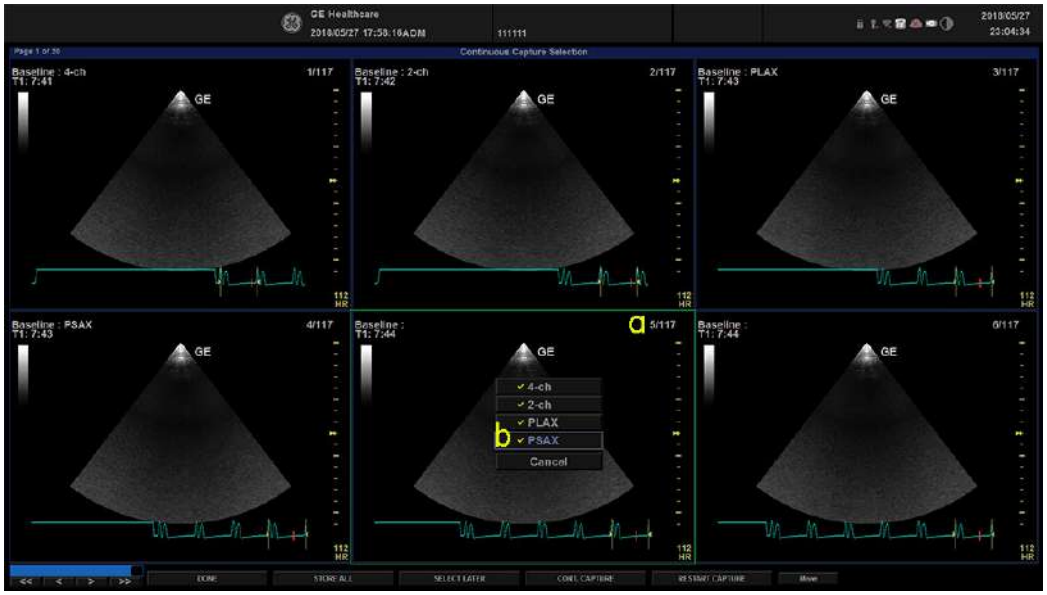


Figure 10-20. Loop Assignment

a. Already assigned view

b. Views pop-up menu

NOTE: A checkmark appears on the Views pop-up after you have assigned a view to an image.

Assigning a cine loop to a view (continued)

3. Use the **Trackball** to select the required view name.
4. Press **Set**.

   The name of the view displays above the timers in the window.
5. Repeat steps 1 through 4 to assign loops to the other views of the level.
6. Press ***Done*** when complete.

   A dialogue window displays asking whether the entire Continuous Capture acquisition should be saved.
7. Press ***Delete*** to discard the loop or press ***Store all*** to keep the entire loop.

   The normal procedure is to discard the loop. The loop is very big and requires a lot of disk space.

Post Acquisition Features

Post acquisition, you can utilize Raw Data to adjust the following in B-Mode:

- Zoom
- SRI HD
- Rejection
- Frame Average
- TGC
- Maps
- Dynamic Range
- Gain
- Rotation

You can also take measurements post Stress Echo acquisition.

Analysis

Analysis consists of viewing previously saved loops and assigning scores to each cardiac segment, in order to quantify the function of the muscle or wall segment.

Depending on the protocol configuration, the analysis stage can start manually or automatically after completion of the stress test. In this case, the usual procedure consists of sequentially opening all image groups (if defined) and performing scoring from image to image.

The quad screen is the standard display for comparing heart cycles. The heart cycle loops in the display are synchronized to enable comparison. Each loop in the quad screen can be magnified, using the zoom control.

Image Selection for Analysis

Images can be selected manually or from a pre-defined group in the Protocol screen.

Selection of Images from a group

If groups of images have been defined in the protocol template, you can select a group of images for analysis and sequentially analyze all images from all groups from within the Analysis screen.

1. In a stress examination, press ***Template***. A preview of the acquisition displays.
2. Press ***Analyze***. A pre-defined group appears in the display with a Wall Segment window on the left.
3. To advance to other groups, use the **Trackball** to move the cursor to the arrows at the bottom of the Wall Segment window. Select an arrow to advance to another group. For further clarification, see callout F in Figure 10-21.

Manual selection of images from Analysis screen

1. When currently in the protocol analysis screen in the Stress analysis quad screen, hold down the ***SHIFT*** key while performing Steps 2 through 4.
2. Use the **Trackball** to move the cursor to the first image to select in the template matrix.
3. Press **Set**. The frame of the selected loop is in the Stress analysis screen and the next window in the quad screen is automatically selected.
4. Repeat step 2 and 3 to select other images.
5. Depress ***SHIFT*** .

Manual selection of images in the Protocol screen

1. In a stress examination, press ***Template***. A preview of the acquisition displays.
2. Use the **Trackball** to move the cursor to the first image to select.
3. Press **Set**. The frame of the selected loop highlights.
4. Repeat Steps 2 and 3 to select other images.
5. Press ***Analyze*** to open images in the Analysis screen.

Scoring acquired loops

1. After image selection, press ***Analyze***.
   The Stress Echo analyze screen displays.

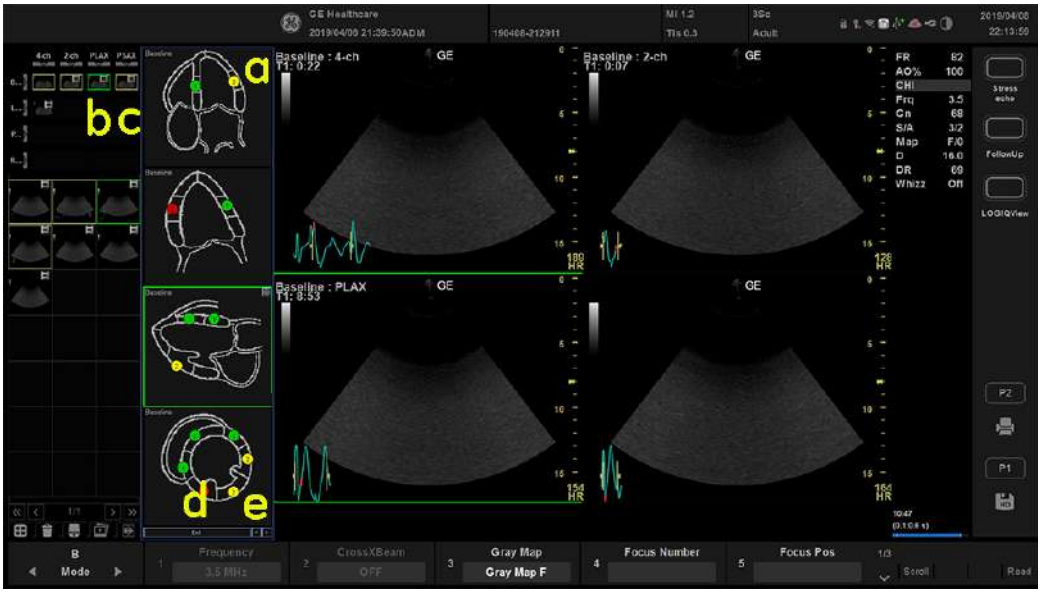


Figure 10-21. Analysis Screen

a. Wall segment diagram
b. Selected loop (Highlighted frame)
c. Displayed loops (Highlighted frames)
d. Exit Wall motion scoring
e. Change page or enter next image group

Scoring acquired loops (continued)

2. Use the **Trackball** to move the cursor to a segment in one of the scoring diagrams and press **Set**.

   The Score pop-up list displays.

3. Use the **Trackball** to move the cursor to a score.
4. Press **Set**.

   The score displays in the relevant segment area in the diagram.

NOTE: To edit a score, select it and choose a new score.

5. Repeat step 1 through 3 to score relevant segments.
6. Press the **Change Page** arrow to display the next group of images.
7. Repeat step 1 through 3 to score relevant segments on the new loops.

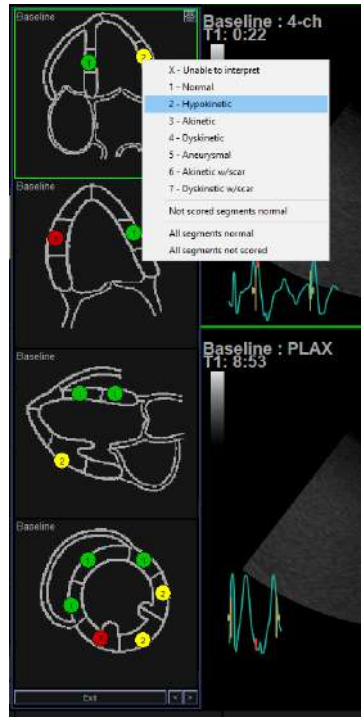


Figure 10-22. Segment Scoring

NOTE: Since Cine changes into sync mode, subsequent scans are also synchronized. Exit sync mode from the Cine menu.

Editing/Creating template

The stress package provides protocol templates for exercise as well as pharmacological stress examinations.

The user can create new templates or modify existing templates to suit the individual needs. Up to ten projections and fourteen stress levels can be created in a template.

Templates created may be temporary, used only during the current examination, or saved as new templates, for future use and reference.

The editions that may be performed include:

- Adding/Deleting levels and projections.
- Assigning new labels to levels and projections.
- Defining level options.
- Defining new groups.

Templates are edited/created from the Template editor screen.

Entering the Template editor screen

1. Press the user defined key for **Stress echo**.
2. Press ***Template***.The template list displays.
3. Use the **Trackball** to select the Template Editor.
4. Press **Set**. The Template Editor screen displays.

OR

1. Press the user defined key for **Stress echo**.
2. Press ***Template Editor*** on the primary menu. The Template Editor screen displays.

Template Editor screen overview



Figure 10-23. Template Editor Screen

Table 10-4: Template

Parameter	Description
Template	Select a pre-defined template from the pull-down menu. The protocol template preview updates accordingly.

Table 10-5: Protocol Template Preview

Parameter	Description
Protocol Template Preview	• Displays an updated preview of the template accordingly to the settings applied. • To change Projection and Stress level labels, select a pre-defined label from the pull-down menu or press **Set** in the actual label field and type a new name.

Table 10-6: Template Settings

Parameter	Description
Template Settings	• Cycles: select the number of cine loop heart cycles to store for each level from the pull-down menu or enter the desired value manually. • Continuous Capture: Checking this parameter enables continuous image acquisition throughout the level. The images acquired are temporarily stored in the system's storage buffer. • Preview of store: Checking this parameter enables review and adjustment of cine loops before store. • Show reference: Checking this parameter displays a dual screen with the reference level (first or previous level) on the left and the live image on the right.

Table 10-7: Scan Mode

Parameter	Description
Scan Modes	• 2D, Color, PW (Pulsed Wave Doppler), CW (Continuous Wave Doppler), MM (M-Mode), Color MM, Color PW, Color CW

Table 10-8: Other options

Parameter	Description
Other Options	• Grid Size: Enter the number of levels and projections for the selected template. • Timers: If you check this parameter, starts T1 and T2 timers automatically. • Auto-start analysis: If you check this parameter, displays the Stress Echo Analysis when the last acquisition is performed. • Show Systole in Analysis: When selected, the systolic part of the cardiac or ECG cycle is only displayed. The whole cycle is not displayed. • Smart Stress: Check Smart Stress to store a subset of the image acquisition settings (e.g., Zoom, Gain, Compress, etc.) for each view in the protocol. Smart Stress enables you to set image acquisition settings for each view at a baseline level and automatically get the same image settings in the corresponding views in the next levels. • Reference image: When Show Reference is selected, selects either corresponding baseline loop or corresponding loop from the previous level to be displayed as reference image during acquisition.

Table 10-9: Pre-defined groups

Parameter	Description
Pre-defined groups	• Shows the image groups created. • New group: Creates a new image group. Select the desired images on the template preview. • Update group: Edits a selected group after new loop selection on the template preview. • Delete group: Deletes a selected group.

Selecting a base template to edit

1. Select the base template from the template pull-down menu on the upper left corner.
2. Press **Set**.

   The selected template displays in the protocol template preview field, showing the levels, projections and their labels.

Adding/Deleting levels and projections

1. Enter the number of levels and projections in the Grid size field.

   The new grid size displays in the protocol template preview field.
2. Press ***New Template*** to create a new template.

   or

   Press ***Save Template*** to update the base template.

Display timers

1. Check the box(es) to display timer(s) as specified.

NOTE: The timers can also be started or stopped at any time during stress examination by using the T1 and T2 Primary Menu key.

Start analysis automatically

1. Check ***Auto Start Analysis*** to display the Stress Echo Analysis screen when the last acquisition is performed.

Smart Stress

1. Check Smart Stress to store and automatically reuse a subset of the image acquisition settings in the baseline level view in the corresponding views in the next levels.

Configuring levels

The following options can be set up for each level:

Number of cycles to be stored in the cine loop:

1. Enter or select the desired number in the Cycles field.

Continuous Capture

1. Check Continuous Capture if continuous image acquisition throughout the level is desired.

   When Continuous Capture is selected, preview of the cine loop and reference display during acquisition are not possible.

Preview of store

1. Check Preview of store if review and adjustment of cine loops before storage is desired.

Show reference

1. Check Show reference if the display of the corresponding reference loop is desired during acquisition (Dual screen mode).

Adding a group

1. In the Protocol template preview field, select the cells to be part of the group.
2. In the Pre-defined group field, press ***New group***.

   A dialogue box displays to ask the user to enter a name for the new group.
3. Enter the group name.
4. Press ***OK***. The new group displays in the pre-defined group field.

Updating an existing group

1. In the Pre-defined group field, select the group to edit.

   The selected cells are highlighted in the Protocol template preview field.

NOTE: The selected group is highlighted by a Green frame.

2. Either select a new cell(s) to add to the group or deselect an existing cell(s) to remove from the group.
3. Press ***Update group***.

   The display in the Protocol template preview field is updated accordingly.

Deleting a group

1. In the Pre-defined group field, select the group to delete.

NOTE: The selected group is highlighted by a Green frame.

2. Press ***Delete group***.

   The group is removed from the list in the pre-defined group field.

Specifying Scan Mode for each Projection

1. Specify the Scan Mode for each Projection: 2D (B-Mode), Color Flow Mode, M-Mode, Color M-Mode, PW Mode, Color PW Mode, CW Mode, or Color CW Mode.

Saving the Template

You can save the template using controls at the bottom of the Template Editor page, or use the controls on the primary menu.

Table 10-10: Template Editor Saving Options

Parameter	Value
New Template	Select this option to create an entirely new template.
Save As Template	If you would like to create a new template based on the existing template with your modifications, select to Save this Template As, and give it a name.
Save Template	Select this option to save the default template with your modifications.
Delete Template	Select this option to delete a template.

Wall Motion Segment Setup

You can set up the following parameters for Wall Motion Segment in the Utility screen (Utility--> Measure--> Advanced--> Cardiac).

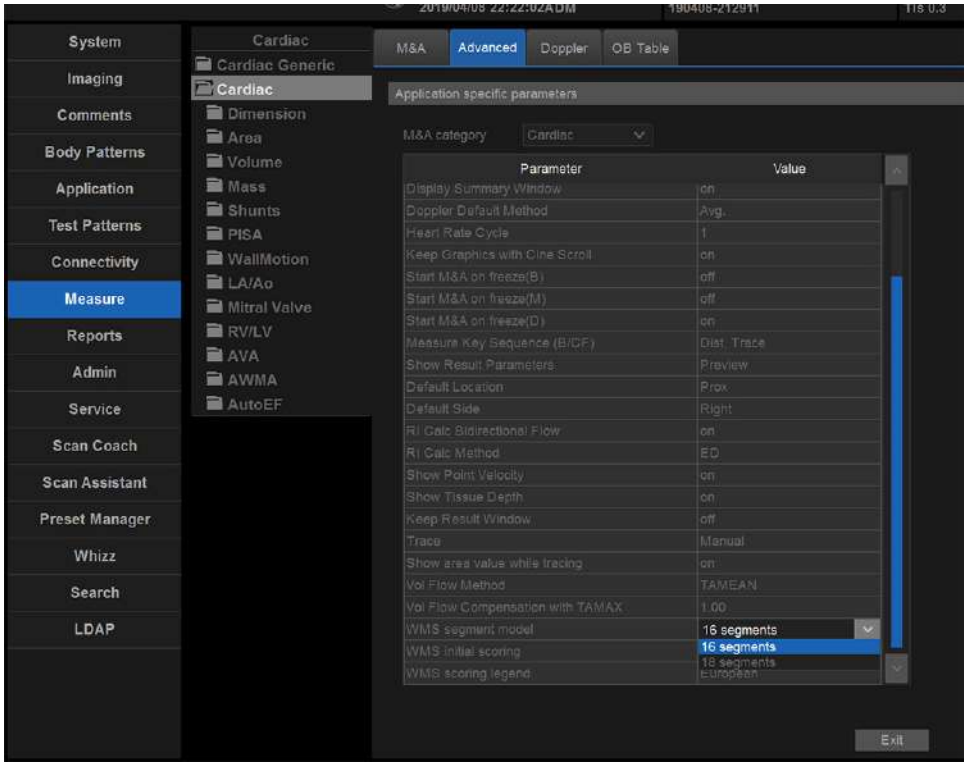


Figure 10-24. Cardiac Wall Motion Segment Setup

Table 10-11: Wall Motion Segment Parameters

Parameter	Value
WMS freeze loop at ES	Specify to freeze the Loop at End Systole
WMS Segment Model	Select 16 or 18 segments
WMS initial scoring	Undefined or Normal
WMS scoring legend	ASE, ASIA or European

Utility Application Settings for Protocol

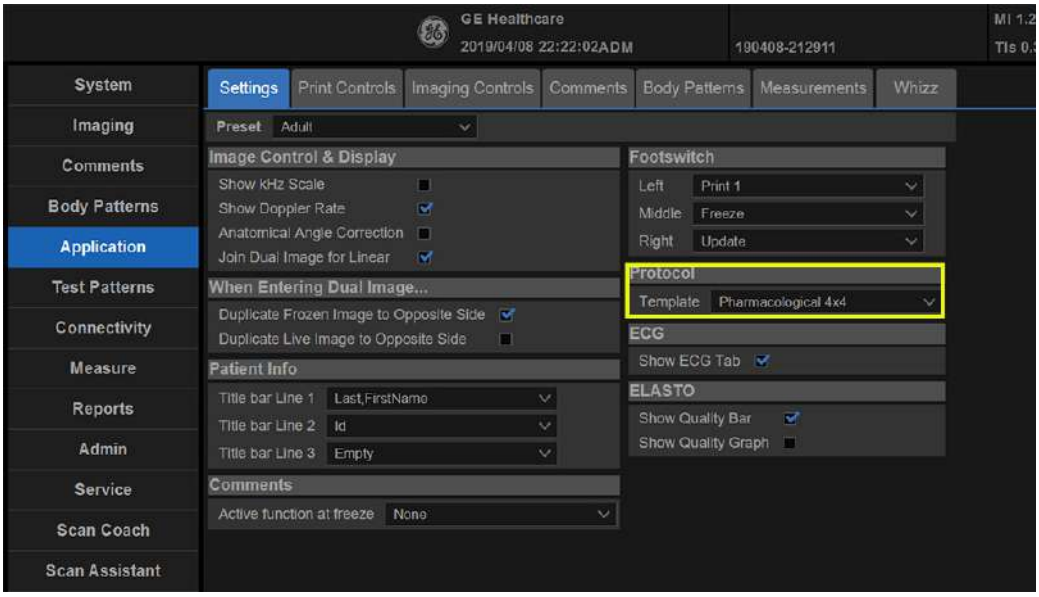


Figure 10-25. Protocol Setup

Table 10-12: Protocol Parameters

Parameter	Description
Template	Select the default template.

Report

If you set up the Wall Motion Analysis field on the Report, you can insert the results.

Select Report to view either the Bull's Eye or Cut Plane Report.



Figure 10-26. Bull's Eye Report Sample

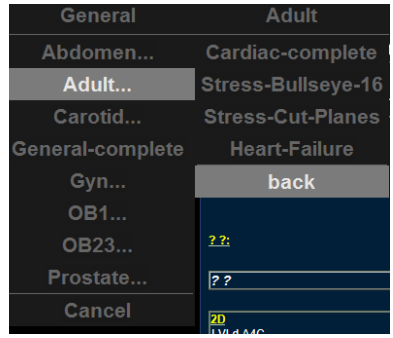
Report (continued)



Figure 10-27. Cut Planes Report Example

HINTS

Select either Bull's Eye or Cut Plane on the Reports--> Adult Template.



ECG Option

Overview


WARNING

DO NOT USE the physiological traces of the Versana Active Ultrasound system for diagnosis and monitoring.


CAUTION

- ECG electrodes should not make contact with other conductive parts, including earth.
- After the defibrillator stimulates the patient, the ECG needs 4 to 5 seconds for recovery.
- The quality of the ECG trace depends on the stability and conductivity of the electrodes during the test, especially during high stages when the patient's movements can cause artifacts.
- Make sure that the lead wires do not swing.
- The device is not waterproof. Do not expose the device to water or any kind of liquid. Maintain in a dry place:
  - The exterior of the recorder may be wiped clean with a soft cloth. Do not use harsh cleaning agents to clean the unit. Do not immerse the unit in any liquid.
  - Clean the cables with a hospital approved cleaning procedure such as those recommended by AAMI or AORN. Do not immerse cables in water.
  - Worn or damaged patient cables are the most common cause of poor ECG signals. ECG signals (or wave patterns) that consistently contain noise or artifact may suggest need for ECG wire or cable replacement.
  - Store the device in a dry place.
  - Always protect the recorder from coming into contact with moisture. In rain or snow conditions, protect the recorder from bad weather elements by wearing the recorder inside a coat.

ECG connecting

The ECG module is connected to the system via USB ports.



Figure 10-28. Connecting ECG to the system

ECG Trace Monitor Display

The scanned image is synchronized with the ECG trace. In Doppler or M-Mode, the traces are synchronized with that particular mode's sweep.

The user can control the gain, position and sweep speed of the traces.

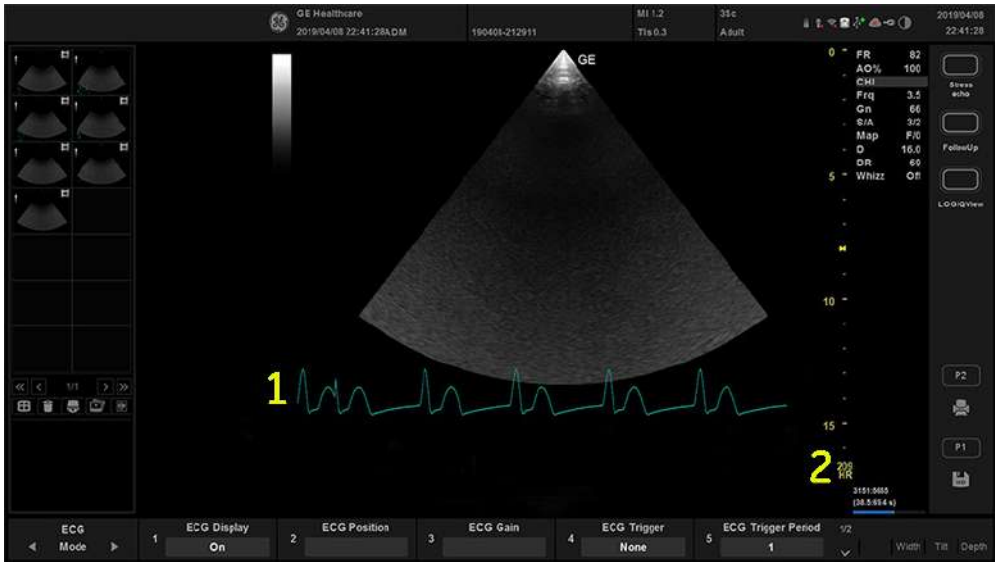


Figure 10-29. ECG Trace Display

1. ECG
2. Auto Heart Rate Display

ECG menu

The ECG menu provides for control of the input signals.

Without the ECG option, the ECG menu is not displayed.

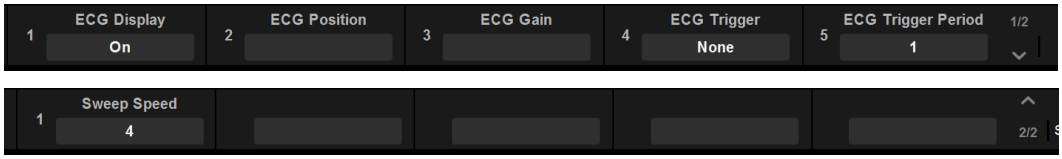


Figure 10-30. ECG Primary Menu

ECG menu (continued)

Table 10-13: ECG parameters

Parameter	Description
Sweep Speed	Change the speed of the trace. The sweep speed of the physio signal on the B-Mode image can be set independent of the timeline (Doppler and M-Mode) sweep speed.
ECG Trigger	Enables intermittent imaging based on the ECG. The trigger location(s) relative to the R trigger are set with the Delay Time key. • Press ECG Trigger and select one of the options (None, Trig1, Trig2, and Both) and adjust the delay time using the Delay Time key. ECG Trig 1 specifies the delay (ms) from R-wave to triggered frame. ECG Trig 2 specifies the delay from R-wave to second frame. Both activates ECG Trig 1 and ECG Trig 2 simultaneously. Trig 2 must be greater than Trig 1 for dual triggering (Both) to be active.
ECG Display	Provides the ability to turn on the ECG trace and Auto Heart Rate for display on the monitor.
ECG Trigger Period	The control specifies the number of heart cycles (R-waves) that are skipped between ECG triggers. The default is 1 or no skipping.
Delay Time	In ECG Trigger Mode: If only ECG Trig1 or ECG Trig2 is selected via the ECG Trigger key, the Delay Time key controls the R-Delay time of the active trigger. If both triggers are selected (Both), press this key to toggle ECG Trig1 and ECG Trig2 and rotate the key to change the delay time. Once the trigger is set, the snap shot image is displayed each time the update line passes the active trigger(s). In Timer Trigger Mode: Adjusting the key changes the delay time between images.
ECG Gain/Position	Allows for the amplitude control of the ECG trace or allows for the vertical positioning of the ECG trace on the image display. Press the key to toggle between Gain and Position. The default is Gain.

Chapter 11

Vascular

Describes how to perform Vascular measurements and calculations.

Vascular Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

Patient information must be entered before beginning an exam. See ‘Scanning a New Patient’ on *page 4-10 for more information.*

Any measurement can be repeated by selecting that measurement again from the menu.

Vascular Measurements

Introduction

Vascular measurements offer several different types of measurement studies:

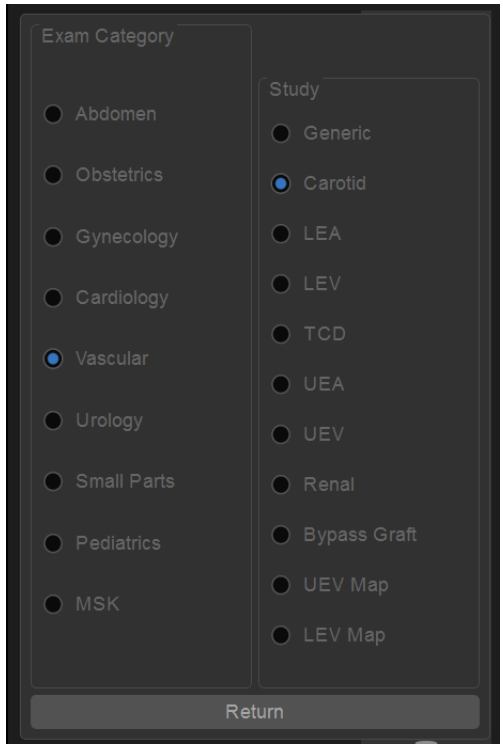


Figure 11-1. Vascular Exam Category

Introduction (continued)

- Generic – Common to all applications. See ‘Generic Measurements’ on *page 7-66 for more information.*
- Carotid
- LEA (Lower Extremity Artery)
- LEV (Lower Extremity Vein)
- TCD (Trans Cranial Doppler)
- UEA (Upper Extremity Artery)
- UEV (Upper Extremity Vein)
- Renal
- Bypass Graft
- UEV (Upper Extremity Vein) Map
- LEV (Lower Extremity Vein) Map

To change an exam calc:

1. Press the **Second Menu** on the primary menu.
2. To select another exam study, select the desired exam study folder.

A vascular study is a group of particular vessels. You can customize the vessel exam calcs in the configuration menu. See ‘Measurement and Calculation Setup’ on *page 7-13 for more information.*

When you use Auto Vascular calculation, you use the vessel keys to post-assign vascular calculations. When you are not using Auto Vascular calculation, the vessel key is used for manual measurement.

IMT Measurement

You can measure the average of the intima media thickness for use as the index of arterial sclerosis.

IMT can be measured both on the posterior and the anterior walls of the vessel.

NOTE: Due to the physical properties of ultrasound imaging, the posterior IMT measurement is generally more accurate than the anterior IMT measurement.

IMT Measurement - Auto

Auto IMT automatically measures the thickness of the Intima Media on the far and near vessel walls. Near Wall IMT is the distance between the trailing edges of the adventitia and intima; the Far Wall IMT is the distance between the leading edges of the adventitia and intima.

Set up the parameters you want to record on the report on the Utility -> Measure -> M&A page while are in the Carotid application. Select CCA/ICA/BIF -> IMT Far/Near -> Parameter (Average, Max, Min., Standard Deviation, Points, or Distance).

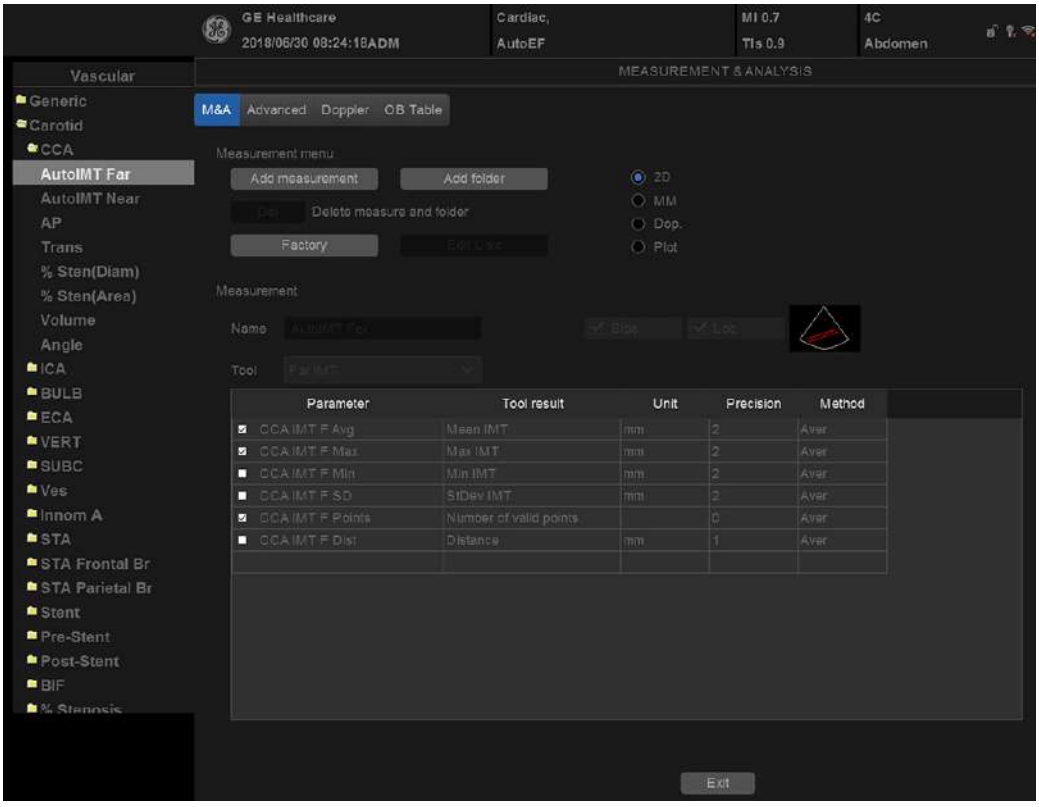


Figure 11-2. Configuring Auto IMT

IMT Measurement - Auto (continued)

In the Vascular Carotid application, the Auto IMT measurement is available.

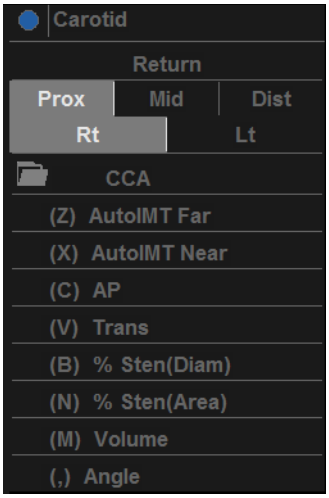


Figure 11-3. Auto IMT menu

The following controls are available.

Table 11-1: Auto IMT description

Parameter	Description
IMT Far	Select to begin the Far Field IMT measurement.
IMT Near	Select to begin the Near Field IMT measurement.
Length/Offset Rotary	Push to save Length/Offset as a preset. -40/+40 Length. At zero, you can freely adjust the length, but only vertically. Press key to save value as default. Offset distance, -20 (Left) / +20 (Right)
Overall / IMT Trace Fit / Intima	Adjusts (re-measures) the IMT automatically measured by the system.
Rt / Lt Side	Select Left / Right Side.
Cursor Select	Allows you to update cursor placement.

IMT Measurement - Auto (continued)

To measure the IMT,

1. In the Carotid application, press **Freeze**, press **Measure**.
2. Select the appropriate IMT measurement. For example, If measuring the IMT of the far wall of the right common carotid artery, select Rt CCA folder, and then ***IMT Far***.
3. Use the **Trackball** to set the length. Or use the ***IMT Length / IMT Offset*** control to set the length and offset distance. The Offset key controls how far away from the vertical line the measurement starts. Length is the length of the tool itself. If set to zero, you can adjust it anywhere on the image.
4. Press **Set**.

   You can either adjust the trace prior to pressing P1 key or press P1 key to store the image which also saves the measurement to the Report.

   To adjust the trace, use the ***IMT Overall*** control. The Trace fit (up/down) adjusts the inter luminal line whereas the overall (rotate) adjusts both IMT lines.

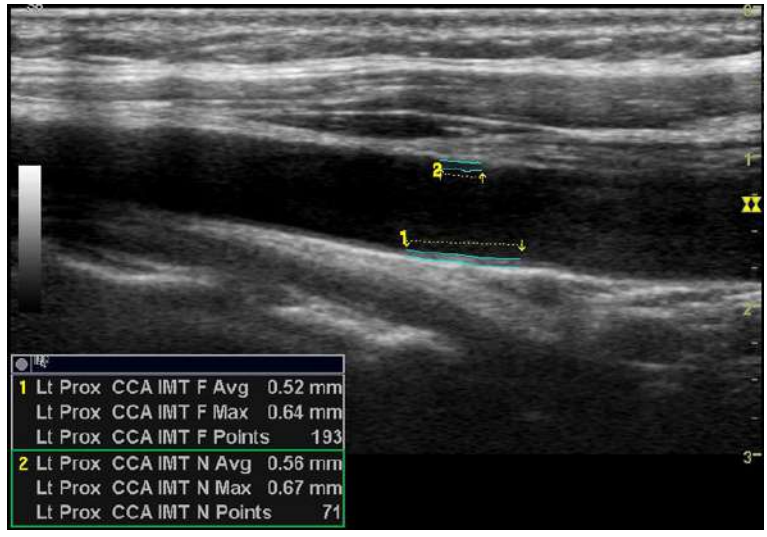


Figure 11-4. Example of Auto IMT Far Measurement

IMT Measurement - Auto (continued)

5. Position the cursor, then select ***IMT Near***.
6. Use the Trackball to set the length. Or use the Length / Offset control to set the length and offset distance.
7. Press **Set**. “Store image to accept IMT measurement” displays in the message area. If the traces fit both layers of the wall, approve the measurement by press the P1 key to store the image.

   To adjust the trace prior to pressing P1 key, use **Cursor Select** on the primary menu. The measurement is saved to the Report.

NOTE: *Since the IMT measurements are done semi-automatically, the operator has to approve the detection by visual inspection before storing the results in report.*

Auto Vascular Calculation Overview

Auto Vascular Calculation enables the Versana Active to detect and identify a cardiac cycle. It allows you to assign measurements and calculations during live timeline imaging, while the image is frozen, or in CINE. Peak values are detected for venous flow.

During cardiac cycle detection, the system identifies the cardiac cycle using calipers, vertical bars, and/or highlighting of timeline data. Use of identifiers is based on measurements and calculations selected by an operator for the current application. The system may place calipers at early systolic peak, peak systole, minimum diastole and end diastole. Vertical bars may also be placed to indicate the beginning and end of the cardiac cycle. The peak and/or mean trace may be highlighted. You can edit the cardiac cycle identified by the system or select a different cardiac cycle.

You can select the calculations to be displayed in the M&A Result window during live scanning or on a frozen image. These calculations are displayed at the top of M&A Result Window located adjacent to the image. These calculations are presettable by application which means you can set up the default calculations to be displayed for each application.

Auto Vascular Calculation

Activating Auto Vascular Calculation

To activate Auto Vascular Calculation, select **Auto Calc** from Live (calculations displayed on the real-time image) or Freeze (calculations displayed on the frozen image).

To deactivate Auto Vascular calculation, select ***Off***.

Setting up Auto Vascular Calculation Parameters

- **Selecting Auto Trace**

  You can select to have a continuous auto trace of the max or mean velocities.

  - Select Max or Mean from ***Trace Method*** in Utility -> Imaging -> PW page.

- **Selecting Trace Direction**

  Trace Direction lets you use peak timeline data above, below, or composite (above and below) the baseline.

  - Select Above, Below, or Both to set the peak timeline data in Utility -> Imaging -> PW page.

- **Modify Calculation**

  a. Press PW key on the control panel.

  b. Select ***Modify Auto Calcs*** on the primary menu. Or select **Second Menu** after pressing Measure key.

  The Modify Calculation menu is displayed.

  c. Select which measurements and calculations are to be displayed in the Auto Vascular calculation window.

  You can select the following parameter: PS, ED, MD, HR, TAMAX, PI, RI, Accel, PS/ED, ED/PS, AT, Volume Flow, PV.

Auto Vascular Calculation (continued)

Auto Vascular Calculation Exam

1. Preset the system.
2. Perform the scan and press **Freeze**.
3. Activate Auto Vascular Calculation.

   The system performs a calculation automatically.



Figure 11-5. Auto Vascular Calculation

Auto Vascular Calculation Exam (continued)

The Auto Vascular calculation is assigned to particular vessel measurements.

1. Press **Measure** to display the Measurement menu.
2. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
3. Select the desired vessel name from the menu.

   Selected vessel measurements are automatically assigned with the Auto Vascular calculation. The results are then displayed in the Results Window.

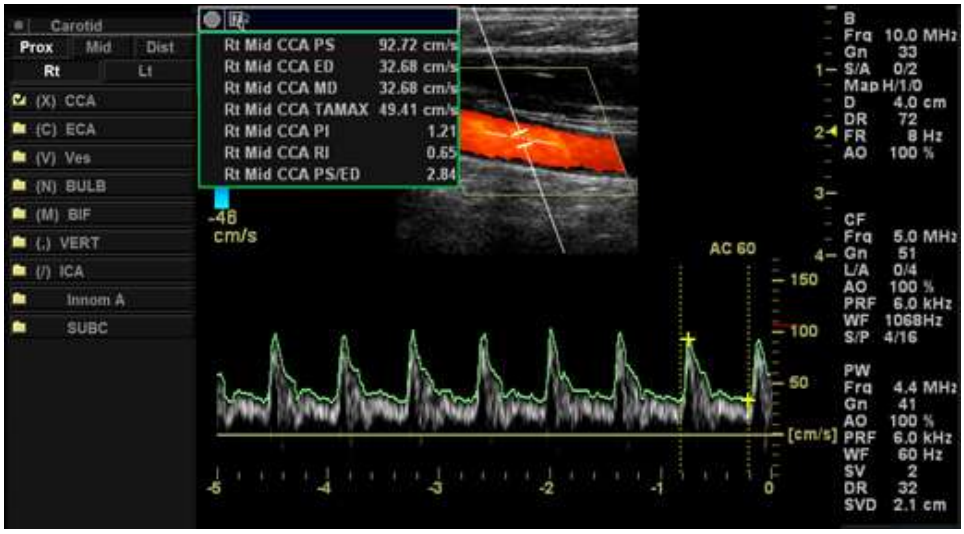


Figure 11-6. Assigned Vessel

*NOTE: When you want to cancel the assignment, you can use the **Cancel Transfer**. See 'Cancel Transfer' on page 7-81 for more information.*

Auto Vascular Calculation (continued)

During the course of an exam, the cardiac cycle may be indicated between two yellow bars; the peak trace and the mean trace may appear in green; calculation indicators appear on the spectral trace as a caliper identifier (these vary, depending on the selected calculation in the Results Window).

The right-most, most complete cycle is typically chosen to be the selected cardiac cycle. You can select a different cardiac cycle.

To select a different cardiac cycle:

- Move through CINE memory with the Trackball until the desired cardiac cycle is selected by the system.

NOTE: You need several good cycles in front of the new cardiac cycle for this to be successful. Oftentimes, this is problematic near a freeze bar.

- Use the ***Cycle Select*** control to cycle to a different cardiac cycle.

NOTE: You need several good cycles in front of the new cardiac cycle for this to be successful. Oftentimes, this is problematic near a freeze bar.

To move the systole or diastole position:

- Use the ***Cursor Select*** control to move the start systole position or the end diastole position.

Manual Vascular Calculation

You can perform the following calculations manually when Auto Doppler Calculation is not activated.

1. Press **Measure**.

   If necessary, you can select another Exam Calc and then select parameters from Modify Calculation.
2. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
3. Select the desired vessel folder.

   The Measurement menu is displayed.

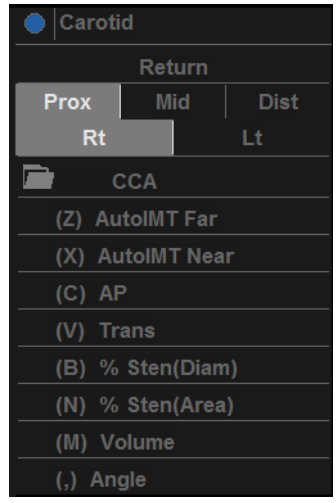


Figure 11-7. Measurement Menu Example

4. Make the required measurements according to the system, or select your preferred measurements.

Manual Vascular Calculation (continued)

For each vessel in Doppler mode, you can make any of the following measurements. See ‘Doppler Mode Measurements’ on *page 7-80 for more information.*:

- Peak Systole (PS)
- End Diastole (ED)
- Minimum Diastole (MD)
- Heart Rate
- TAMAX
- TAMEAN
- Pulsatility Index (PI)
- Resistive Index (RI)
- S/D Ratio
- D/S Ratio
- Acceleration (Accel)
- Acceleration Time (AT)
- Volume Flow
- Peak Value (PV)

To select vascular measurements

Your system is set up to show the measurements that you usually make for each vessel. To make a measurement that is not shown for the selected vessel:

1. Select the folder you want to measure.

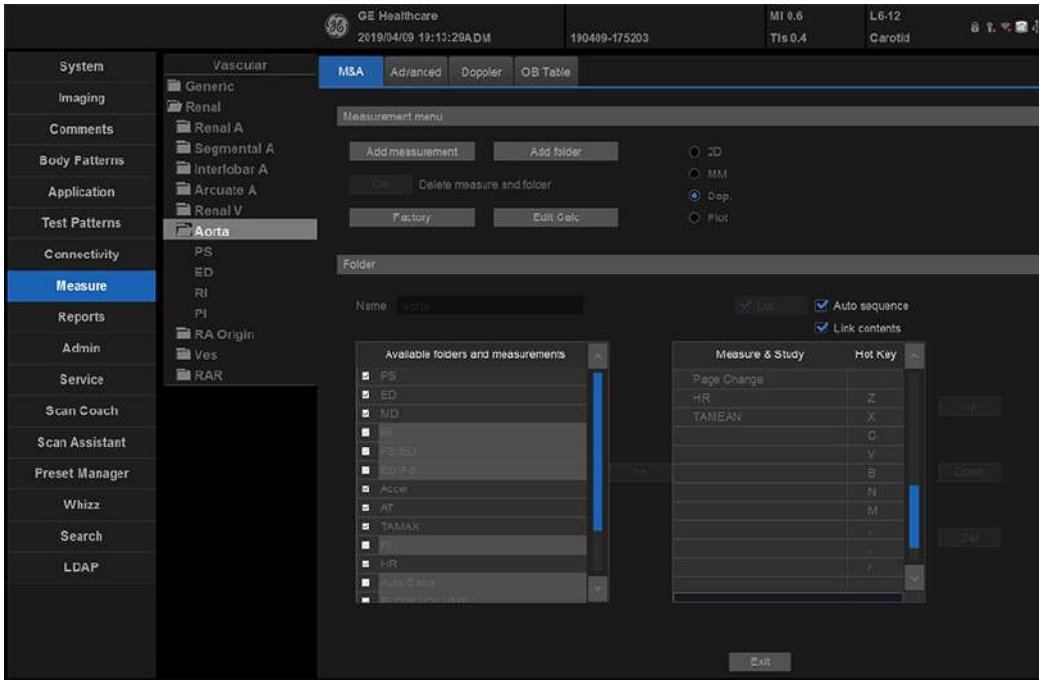


Figure 11-8. Aorta folder - example

2. The system displays all possible vessel measurements.

To select vascular measurements (continued)

3. Select the desired measurement.

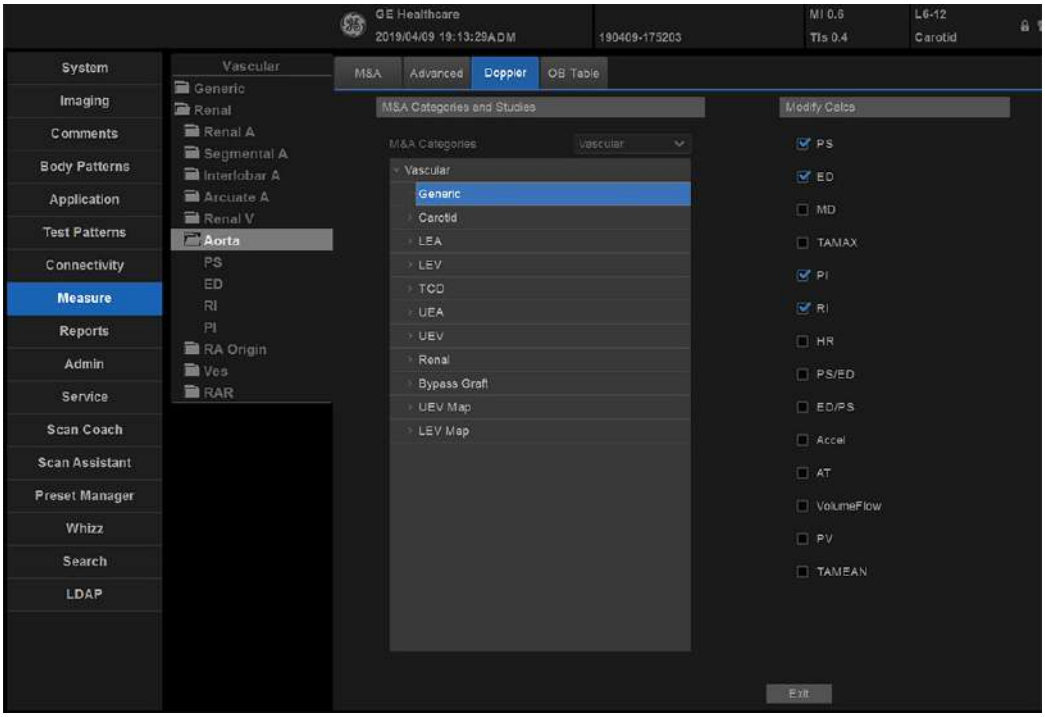


Figure 11-9. Vascular Measurements

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

Naming format for vessels

When you want to measure a vessel, you select the folder for the vessel. Many vessel folders are labeled with an abbreviation. The following table lists abbreviations used for naming vascular vessels.

Table 11-2: Vascular Vessel Abbreviations

Acronym	Name
ACA	Anterior Cerebral Artery
AComA	Anterior Communicating Artery
ATA	Anterior Tibial Artery
ATV	Anterior Tibial Vein
Axill	Axillary Artery
Axill V	Axillary Vein
BA	Basilar Artery or Brachial Artery
Ba V	Basilic Vein
Br V	Brachial Vein
CCA	Common Carotid Artery
Ceph V	Cephalic Vein
CFV	Common Femoral Vein
CHA	Common Hepatic Artery
Com Femoral	Common Femoral Artery
CIA	Common Iliac Artery
CIV	Common Iliac Vein
Com Iliac A	Common Iliac Artery
DFA	Deep Femoral Artery
DFV	Deep Femoral Vein
Dors Pedis	Dorsalis Pedis
DPA	Dorsalis Pedis Artery
ECA	Exterior Carotid Artery
EIA	External Iliac Artery
EIV	External Iliac Vein
FV	Femoral Vein
GSV	Greater Saphenous Vein

Table 11-2: Vascular Vessel Abbreviations

Acronym	Name
ICA	Internal Carotid Artery (Transcranial Doppler)
ICA	Interior Carotid Artery (Carotid Artery)
IJV	Internal Jugular Vein
IMA	Inferior Mesenteric Artery
Inn	Innominate
IVC	Inferior Vena Cava
LSV	Lesser Saphenous Vein
MCA	Middle Cerebral Artery
Mcub V	Median Cubital Vein
Mid Hep V	Middle Hepatic Vein
MRA	Main Renal Artery
PCA	Posterior Cerebral Artery
PComA	Posterior Communicating Artery
Peron	Peroneal
POP	Popliteal
PTA	Posterior Tibial Artery
PTV	Posterior Tibial Vein
RA	Radial Artery
SMA	Superior Mesenteric Artery
SMV	Superior Mesenteric Vein
SUBC	Subclavian Artery
SUBC V	Subclavian Vein
SFA	Superficial Femoral Artery
TCD	Transcranial Doppler
TIPS	Transjugular Intrahepatic Portosystemic Shunt
UA	Ulnar Artery
VERT	Vertebral Artery

Vascular Worksheet

Overview

The vascular report is structured to automatically display vascular measurements made at specific anatomical sites. The report can also display an average, last, maximum, or minimum value of the latest three measurements. Calculated ratios are automatically summarized and displayed.

To view the Vascular Worksheett

1. Press **Measure**.
2. Select ***Report***.

   The system displays the report.

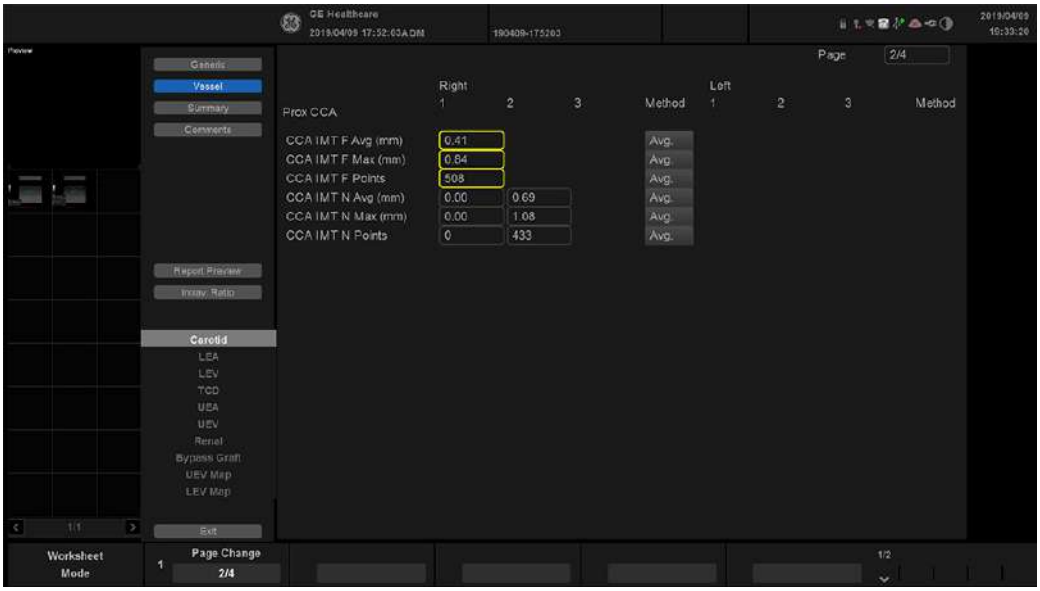


Figure 11-10. Vascular Worksheet - Example

To view the Vascular Worksheett (continued)

Only measured parameters are displayed. Location information is labeled with vessel name first. Measured parameters of the vessel are grouped under the vessel label.

Selected value by method is highlighted, however, when the average method is selected, the highlighted cursor is removed.

When an entire vessel measurement does not have sides (left or right), the side label is not displayed in that vessel study report.



HINTS

Some fields on the report are view only, and others you can change or select. To easily see which fields you can change or select, move the **Trackball**. As the cursor moves over a field that you can change or select, the field is highlighted.

Report Display

1. **Generic**: Select this key to display the Generic Report. Generic study measurements/calculations, such as volume and velocity, are displayed on this report.
2. **Vessel**: Select this key to display the Vessel Report.

   Values can be edited from this page.
3. **Summary**: Select this key to display the Vessel Summary.
4. **Comments**: Select this key to display the Examiner's comment window. See 'To edit a worksheet' on *page 7-62 for more information.*
5. **Delete Value**: Use to delete a value (each measurement value). See 'To edit a worksheet' on *page 11-23 for more information.*
6. **Exclude Value**: Use to exclude a value from the result line. See 'To edit a worksheet' on *page 11-23 for more information.*
7. **Intravessel Ratio**: Select this key to display the Intravessel Ratio Calculation window. See 'Intravessel ratio' on *page 11-28 for more information.*
8. **Page Change**: If a report has more data, to view the next page, adjust the Page Change control.

To edit a worksheet

To change data on a report:

1. Press **Report**.
2. To position the cursor at the field you want to change, move the **Trackball**.

   Press **Set**. The field is highlighted.
3. Type the new data in the field and move the cursor to another place. Press **Set**. The new data is displayed in blue and asterisk are appended to value and resultant value to indicate that it was manually entered.

   The average measurements, calculations and ratios are automatically updated to reflect the edited values.

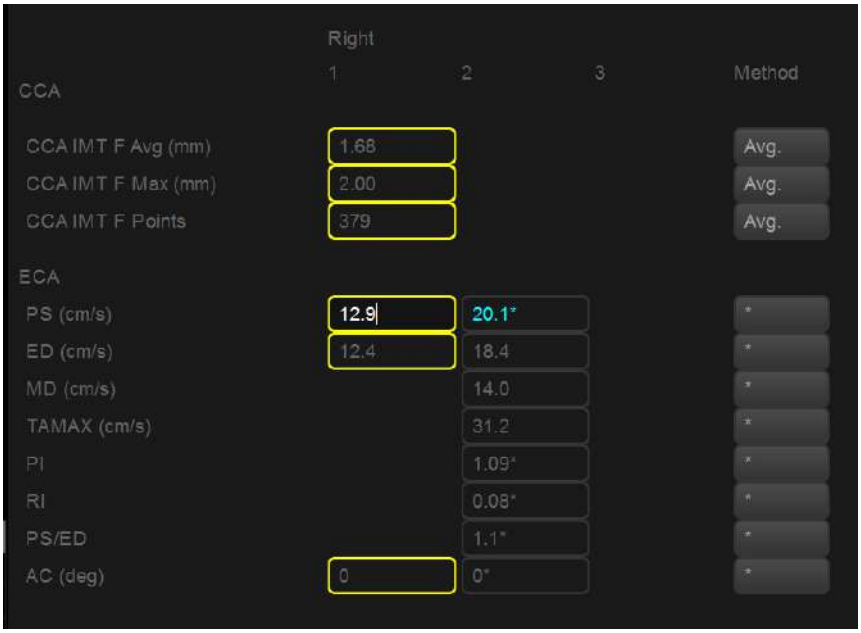


Figure 11-11. Display of the edited value

*NOTE: If the user moves the cursor to the edited value and presses the **Set** key once, the value returns to the original value before the edit.*

To edit a worksheet (continued)

To delete data:

1. Select **Report**.
2. To position the cursor at the field you want to delete or exclude, move the **Trackball**.

   The field is highlighted.
3. Select ***Delete Value*** from the primary menu.

For Example:

1. If the user measured RI 4 times, however, latest 3 sets of measurements were displayed in the report.

Table 11-3: Example of Latest Measurements in Report

Result Number	#2	#3	#4
PS	0.500	0.600	0.700
ED	0.100	0.200	0.300
RI	0.800	0.667	0.571

1. Then, the user deleted PS value of #3 from the report.
2. The whole set of #3 measurements is deleted from the report and #1 set of measurements is shifted and displayed as below.

Table 11-4: Example of Report after Value Deleted

Result Number	#1	#2	#4
PS	0.400	0.500	0.700
ED	0.000	0.100	0.300
RI	1.000	0.800	0.571

To edit a worksheet (continued)

To exclude data:

When the user selects a particular value on the Report and selects ***Exclude Value***, this value is excluded from result line and resultant value is re-calculated without this value and also calculation values using this value is 'blank'.

1. Select **Vessel Worksheet**.
2. To position the cursor at the field you want to delete or exclude, move the **Trackball**.

   Press **Set**. The field is highlighted.
3. Select ***Exclude Value*** from the primary menu.
4. The data in the field is not visible and is not included in report calculations as below.
5. To add back in a previously excluded value:

   Select ***Exclude Value*** from the primary menu. The value(s) are now visible and included in the report calculations.

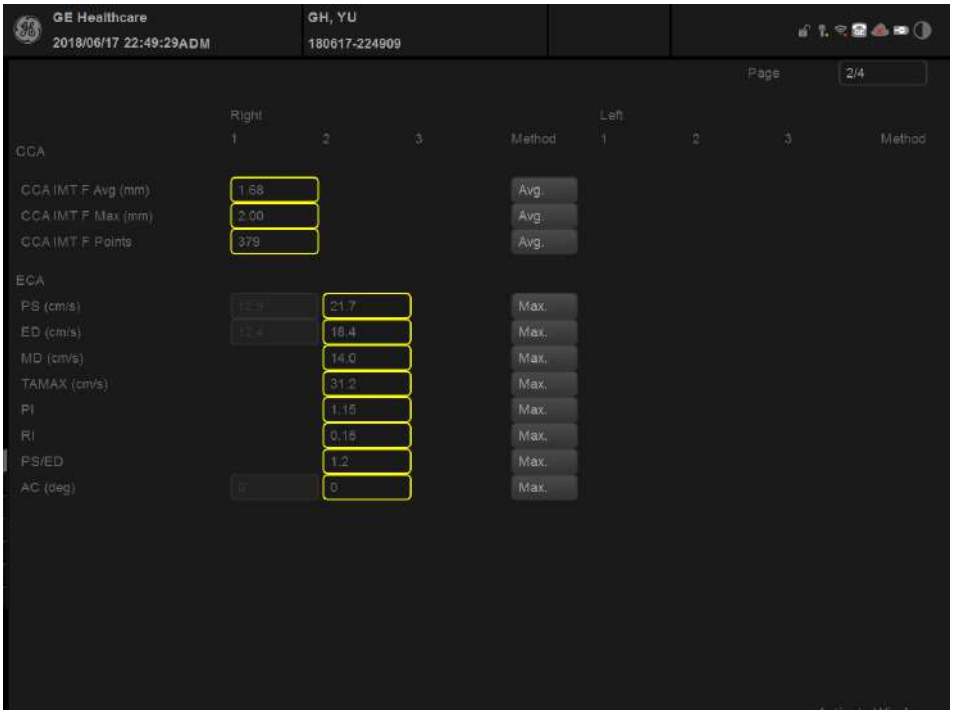


Figure 11-12. Display of the excluded value

To edit a worksheet (continued)

The user can select the method for calculating the cumulative value.

This value is only calculated by using displaying values. If the user takes parameters more than 3 times, the last 3 values are used for this calculation.

1. Move cursor to method column and press **Set**.
2. The pull-down menu is displayed. Move the cursor to any one of methods and press **Set**. The selected method is displayed in the column.



Figure 11-13. Pop-up menu of methods

Examiner's Comments

To type a comment on a report:

1. Select ***Comments*** on the report screen.
2. Type comments about the exam.
3. To close the Examiner's Comments window, select **Report Preview**. The comments appear on the report.

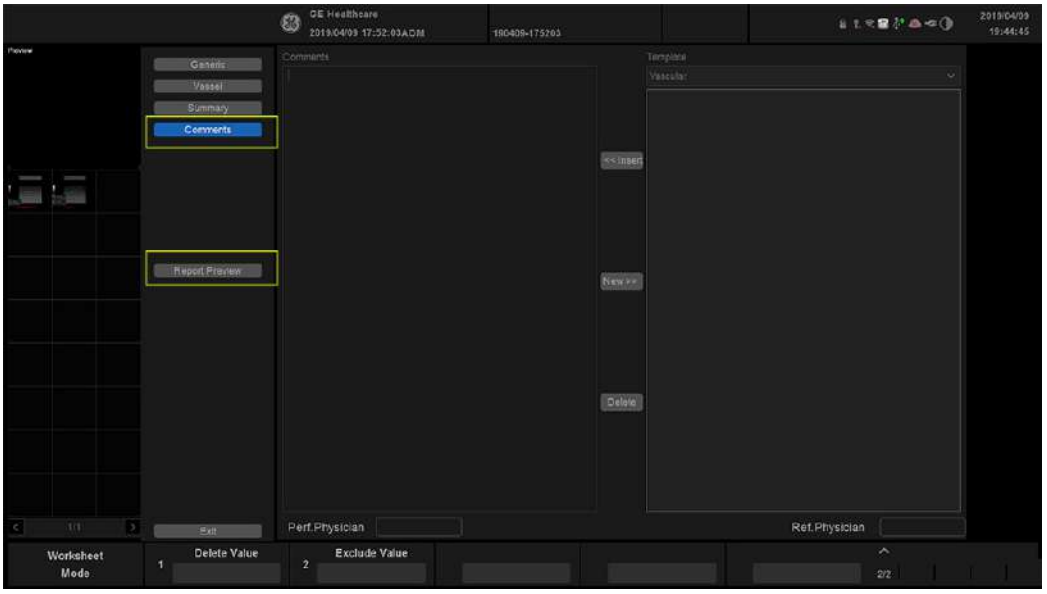


Figure 11-14. Examiner's comments field

Intravessel ratio

To calculate Intravessel ratio, you need a measurement of assessing pressure and stenotic velocities.

1. Select ***Intrav. Ratio*** to display the pop-up window in the header section of the report.

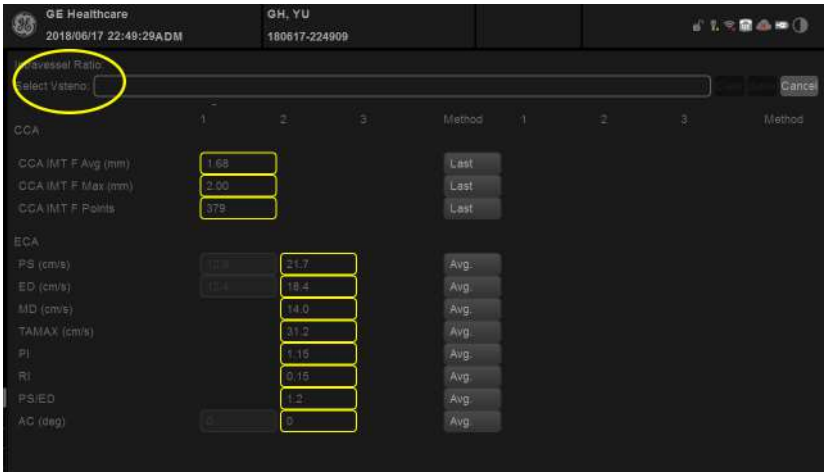


Figure 11-15. Intravessel Pop-up Window

2. Select the first velocity.

   The value is displayed in the window.

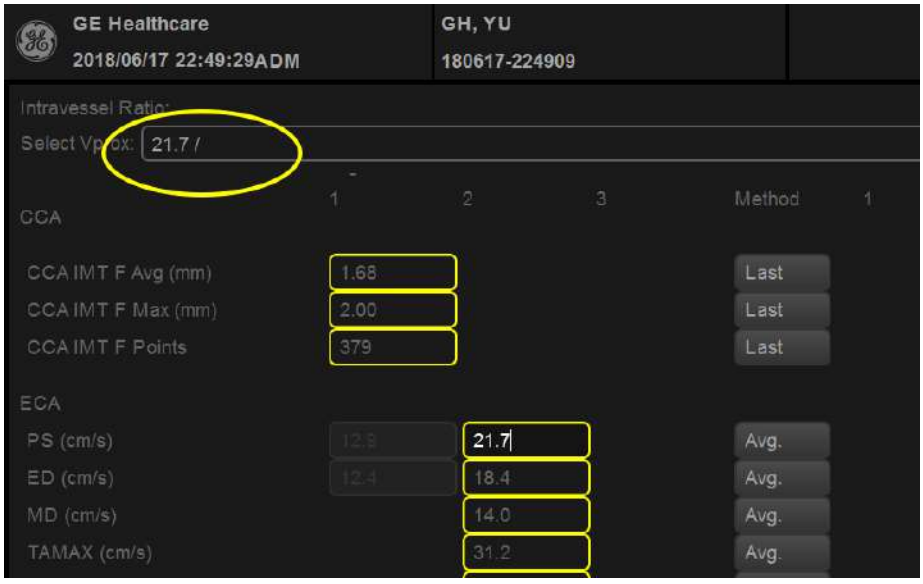


Figure 11-16. Intravessel ratio one

Intravessel ratio (continued)

3. Select the second velocity.
   The second value and Result value are displayed in the window.

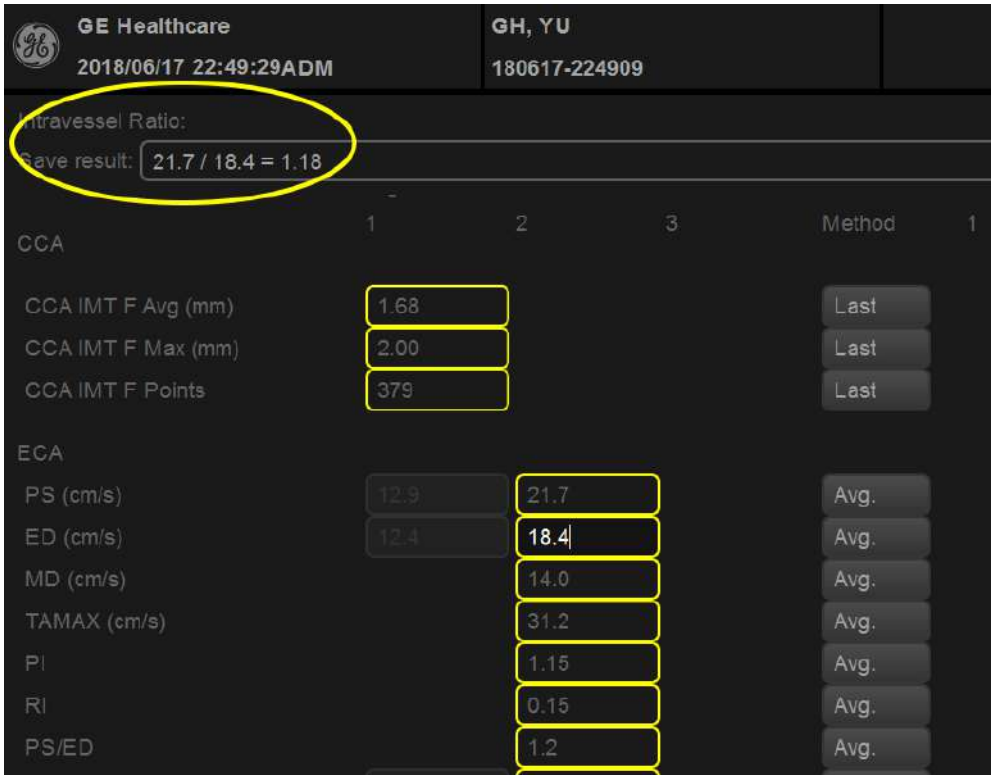


Figure 11-17. Intravessel ratio two

- To save the Intravessel ratio to the Vessel Summary, move the cursor to ***Save*** and press **Set**.
- To clear values, move the cursor to **Clear** and press **Set**.
- To cancel and exit Intravessel ratio, move the cursor to Cancel and press **Set**.

NOTE: Intravessel Ratio is only displayed and saved in the Vessel Summary as Intra-Ratio.

Vessel Summary

The Summary is designed to automatically display measurements made at specific anatomical sites. Calculated ratios are automatically summarized and displayed.

The Summary can be displayed at any time during the exam by selecting ***Summary*** from the Vascular report menu.



Figure 11-18. Vessel Summary - Example

Vessel Summary (continued)

1. The first row, indicating Right or Left, is not displayed when the side is not defined in the vessel. In the third column on the second line, you select the calculations. Move the cursor to the third column, and the pop-up menu is displayed. The selected parameter is displayed in every third column.

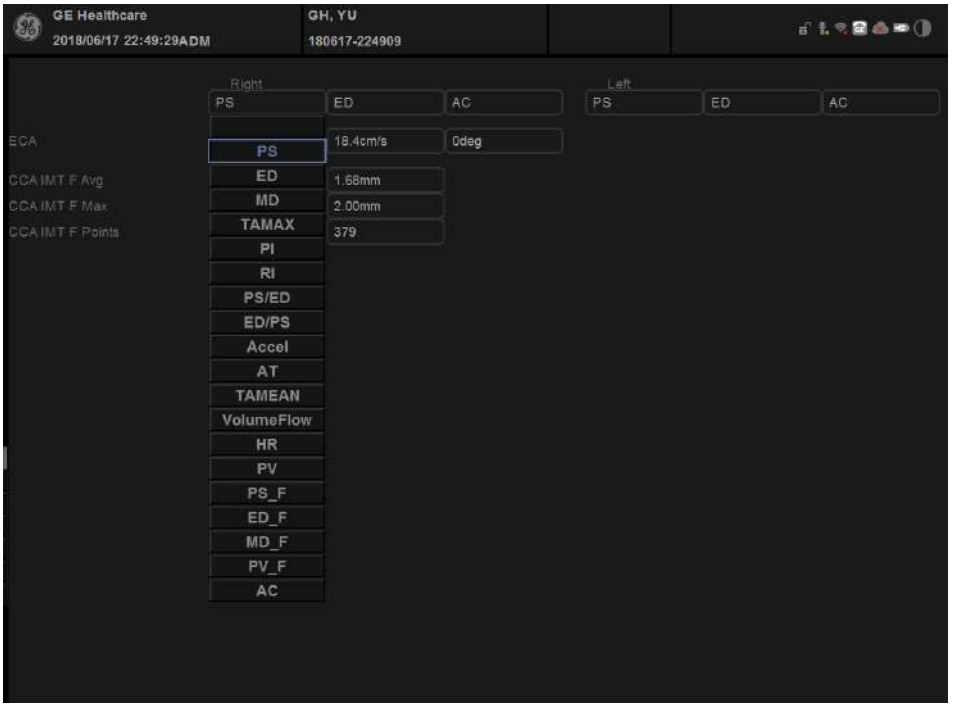


Figure 11-19. Pop-up menu

2. Vessel Name with location information.
3. Check Box. Use to select the vessel velocity for calculating the vessel ratio (ex. ICA/CCA). You can only select one location (position) in a vessel.
4. Result value column. This value cannot be changed or excluded from this page.
5. Calculation name and result. ICA/CCA: The ICA/CCA ratio selects the highest systolic ICA and CCA velocities when calculating this ratio, and displays the velocities.

Carotid Study

In the configuration page for ICA/CCA ratio, you can specify which portion of the CCA vessel (Prox, mid, distal) is chosen. You can override the selections on the Vessel summary.

The ICA/CCA ratio is able to be configured for either systole or diastole.

The vertebral vessel also has systole and diastole selections. In the summary page, there is a box to select flow reversal for vertebral flows. The choices are Ante (Antegrade), Retr (Retrograde), and Abs (Absent).

To select the method:

Move cursor to the box and press **Set**. After the pop-up menu (Blank, Ante, Retr, Abs) is displayed, select from a menu of choices. The selected choice is displayed in the column.

The box is independent of Left and Right.

Renal Artery Study

For renal arteries, you can calculate RENAL/AORTIC ratio (RAR) based on peak systolic velocities.

You can combine the two renal summary pages, and have a heading to separate the different measurements (main renal, intra renal). You can scroll between the measurements. The most commonly used, the main renal artery, is the default.

Lower Extremity Artery Study

For the lower extremity artery, you need an intra vessel ratio (assessing pre vs. stenotic velocities). You can specify which (ratio is stenotic/pre).

The intra-vessel ratio needs to be available for all vascular measurements. This appears on the report only if used.

Recording Worksheett

The report can be saved as you would any ultrasound image. Once it is displayed on the screen, it can be recorded on the DVR, printed on the B/W printer, stored on media with the Image Archive option.

Chapter 12

Urology

Describes how to perform Urology measurements and calculations.

Urology Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning an Exam’ on *page 4-2 for more information.*

Any measurement can be repeated by selecting that measurement again.

The system retains all measurements, but the report retains only the last six measurements of each type.

Urology Calculations

Introduction

Urology measurements offer three different types of measurement studies:

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-66 for more information.*
- Urology
  - This chapter describes Urology B-Mode measurements.
  - The Urology M-Mode measurements are common to other applications. See ‘M-Mode Measurements’ on *page 7-77 for more information.*
  - The Urology Doppler measurements are common to other applications. See ‘Doppler Mode Measurements’ on *page 7-80 for more information.*
- Pelvic Floor. See ‘Pelvic Floor Measurements’ on *page 12-10 for more information.*

To change a study:

1. Press the **Second Menu** button, the Urology exam category menu is displayed.
2. To select another study, select the desired study.

Urology B-Mode Measurements

In B-Mode, the Generic Exam Calcs for Urology includes the following measurements:

- % Stenosis
- Volume
- Angle
- A/B Ratio

See ‘B-Mode Measurements’ on *page 7-68 for more information.*

The following measurements are located specifically in the Urology Exam Calcs. Those specific measurements (Bladder Volume, Prostate Volume and Renal Volume) are listed on the following pages.

Press **Measure** key. Then select the **Second Menu** button, the following category is displayed.

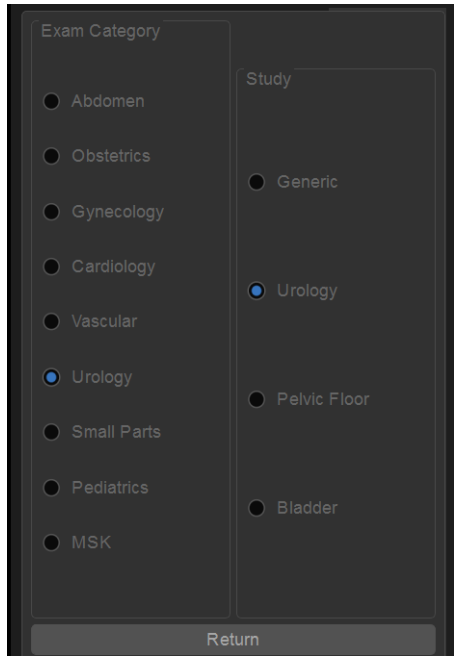


Figure 12-1. Urology Exam Calcs B-Mode

NOTE: Bladder(0.7) Vol, Bladder Vol, Post Void Vol, Prostate Vol, Renal Vol, Renal (0.8) Vol and Volume can be displayed if preset at the Utility -> Measure screen.

Bladder Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

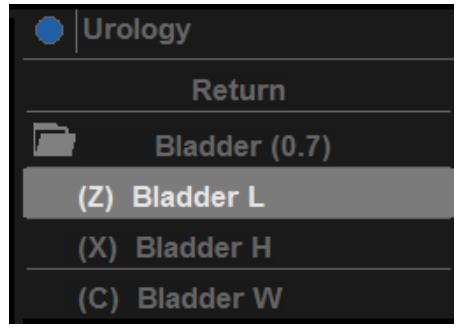


Figure 12-2. Bladder Volume

To measure Bladder Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Bladder*** folder, an active caliper displays.
3. Perform a standard distance measurement.

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the bladder volume in the Results Window.

Prostate Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

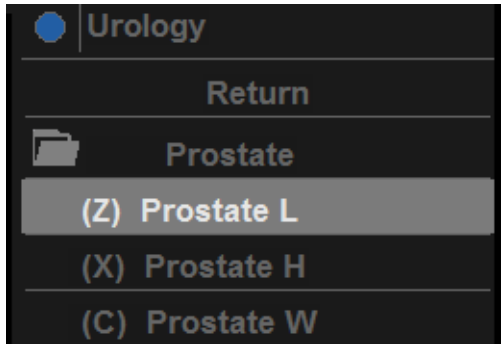


Figure 12-3. Prostate Volume

To measure Prostate Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Prostate*** folder, an active caliper displays.
3. Perform a standard distance measurement.

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the prostate volume in the Results Window.

Prostate Volume (continued)

PSA Measurement

If you enter the value of PSA (Prostatic Specific Antigen) and PPSA Coefficient at the Urology Patient screen, PSAD and PPSA are automatically calculated.

The values are displayed on the Report (if set appropriately on the Report Designer page).

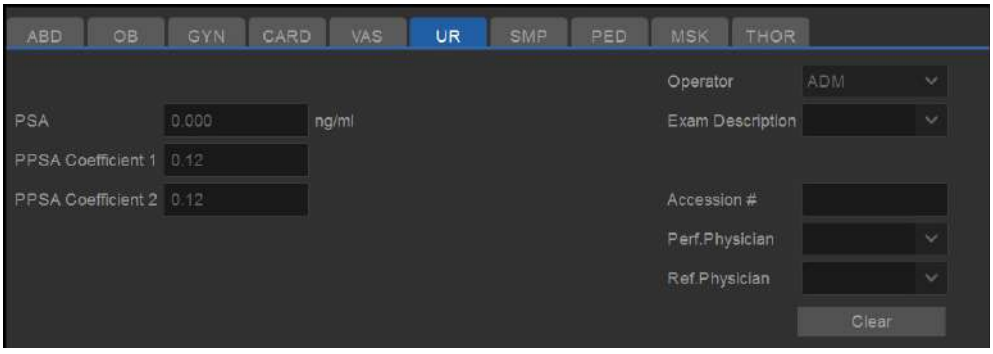


Figure 12-4. Urology Patient Screen

Prostate Volume (continued)

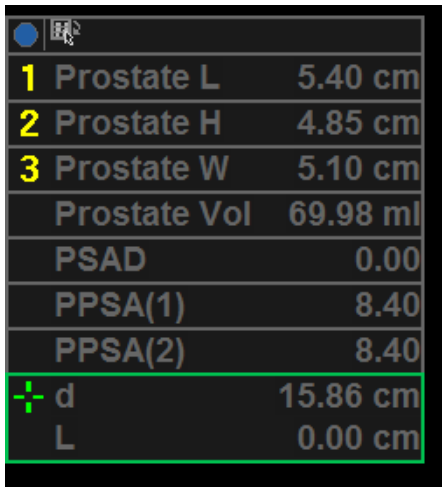


Figure 12-5. Measurement result window

PSAD: Prostatic Specific Antigen (PSA) Density – defined as: PSAD = PSA/Volume

PPSA: Predicted Prostate Specific Antigen – defined as: PPSA = Volume x PPSA Coefficient

Report

- For the prostate volume calculation, you can select the method “m1, m2...” in addition to Avg., Max., Min. and Last.
- The value of PSA and PPSA are displayed.



Figure 12-6. Urology Report

Renal Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

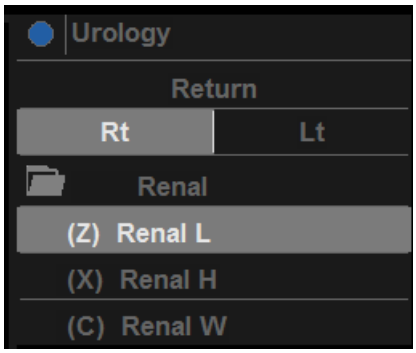


Figure 12-7. Renal Volume

To measure Renal Volume:

1. Scan the patient in the appropriate scan plane.
2. Select ***Side***.
3. Select the ***Renal*** folder, an active caliper displays.
4. Perform a standard distance measurement:

   The system displays the distance value in the Results Window.
5. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the renal volume in the Results Window.

Pelvic Floor Measurements

Pelvic floor measurements can be performed in the Pelvic Floor study. The measurements are located in the Exam Calc folder in the Urology preset.

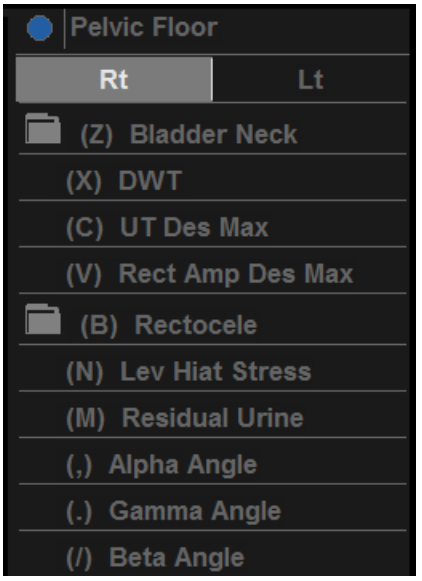


Figure 12-8. Pelvic Floor Measurements

Bladder Neck Rest

Obtain an image with the patient at rest (relaxed).

1. Create a straight line (zero or baseline) to line up with the inferior/posterior of symphysis pubis bone.
2. Once the baseline is positioned, a caliper appears. Position the caliper at the anterior margin of the bladder neck. A positive number displays since the caliper is placed below the baseline.
3. A distance is calculated in millimeters.

Pelvic Floor Measurements (continued)

Bladder Neck Stress

Obtain an image after the patient performs the Valsalva maneuver.

1. Create a straight line (zero or baseline) to line up with the inferior/posterior of symphysis pubis bone.
2. Once the baseline is positioned, a caliper appears. Position the caliper at the anterior margin of the bladder neck.

   If the bladder neck is below the baseline, the Bladder Neck Stress is a positive number. If the bladder neck is above the baseline (closer to the transducer face), the number is negative.

Bladder Neck Descent (BND)

The Bladder Neck Descent is a calculation that should be calculated after measuring the Bladder Neck Rest and Bladder Neck Stress.

BND = Bladder Neck Rest - Bladder Neck Stress

NOTE: If the Bladder Neck Stress is a negative number, it becomes positive and is added to the bladder neck rest measurement.

Detrusor Wall Thickening (DWT)

Three distance measurements of the bladder wall dome are calculated into a mean dimension and displayed in millimeters.

Uterine Descent Max

1. Create a straight line (zero or baseline) to line up with the inferior/posterior margin of symphysis pubis bone.
2. Measure using a 2-caliper dimension to the inferior position of the uterus in a stress image and display in millimeters

Pelvic Floor Measurements (continued)

Rectal Ampulla Descent Max

1. Create a straight line (zero or baseline) to line up with the inferior/posterior margin of symphysis pubis bone.
2. Measure using a 2-caliper dimension to the inferior position of the rectal ampulla in a stress image and displayed in millimeters

Rectocele Depth

Two 2-caliper diameter measurements to measure depth and width of the rectocele. Displayed in millimeters.

Levator Hiatus Stress

Two 2-caliper diameter measurements and calculate an area displayed as cm squared.

Residual Urine

Two 2-caliper diameter measurements calculate as: (x) times (y) times 5.9 minus 14.9 equals Residual Volume displayed in ml.

Auto Bladder Volume Measurement (Whizz On)

Auto Bladder Volume automatically measures the Bladder Volume. It's main application is to measure three longest orthogonal lines (L, H and W) from two bladder slices.

It provides "Auto Bladder LxH" and "Auto Bladder W" to take L, H and W values, then automatically calculate the Bladder Volume.

Set up the parameters you want to record on the report in Utility -> Measure -> M&A page -> Select the Auto Bladder Volume Tool.

The following controls are available.

Table 12-1: Auto Bladder Volume description

Parameter	Description
L	L value from bladder slice.
H	H value from bladder slice.
W	W value from the bladder slice.
Vol	Bladder volume calue calculated by 0.7xLxHxW or 0.5xLxHxW.

Auto Bladder Volume Measurement (Whizz On) (continued)

To measure the bladder volume while whizz is turned on:

1. Select Bladder application.
2. Enter **Utility** -> **Whizz** -> **Whizz** page, check **Preset** as Bladder and select **Auto IQ Optimization, Auto Measurement** and **Auto Annotation**.

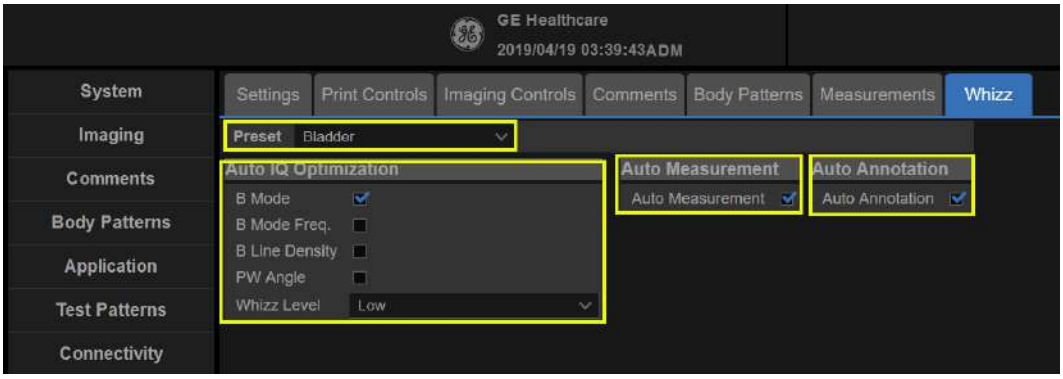


Figure 12-9. Utility -> Whizz -> Whizz page

3. Press Whizz key on the control panel to turn on Whizz.

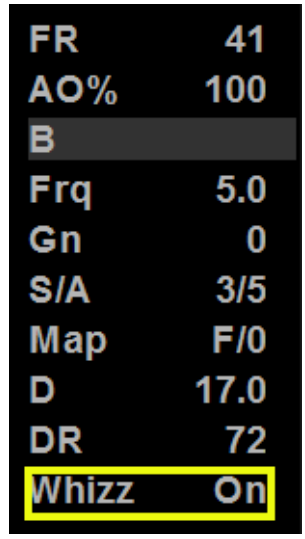


Figure 12-10. Whizz On

Auto Bladder Volume Measurement (Whizz On) (continued)

4. Activate the M&A package, press **Measure**.
5. Select the Auto Bladder(0.7) or Auto Bladder (0.5).
6. Place the caliper anywhere outside the bladder and position it. Press **Set.**
7. The first caliper is anchored in place and rectangle appears, free to adjust.

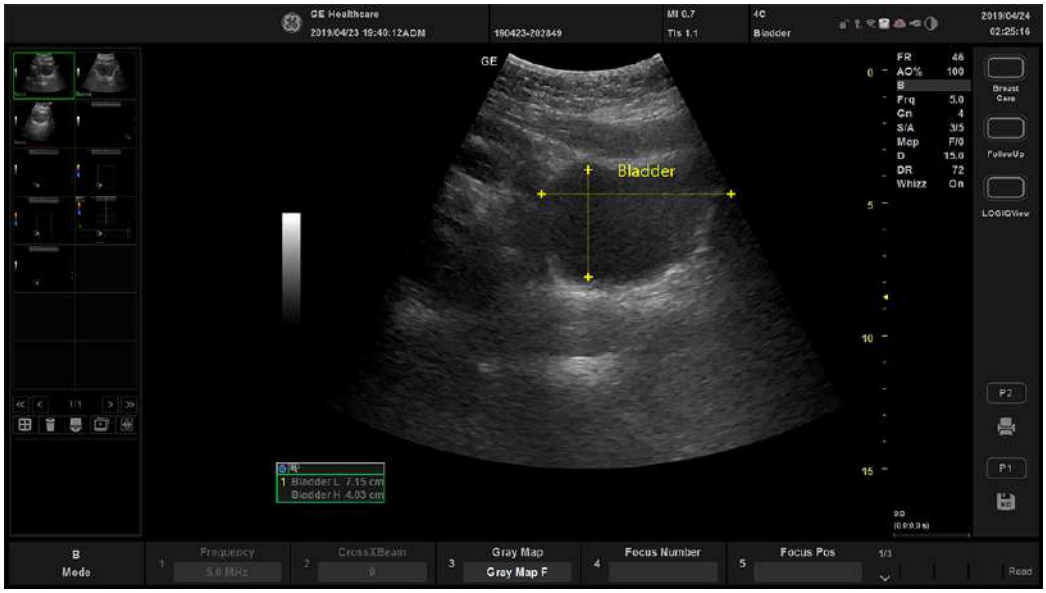


Figure 12-11. Auto bladder L & H

Auto Bladder Volume Measurement (Whizz On) (continued)

8. Move the second caliper to the right or to the left to generate a dotted rectangle connecting the two cursors.

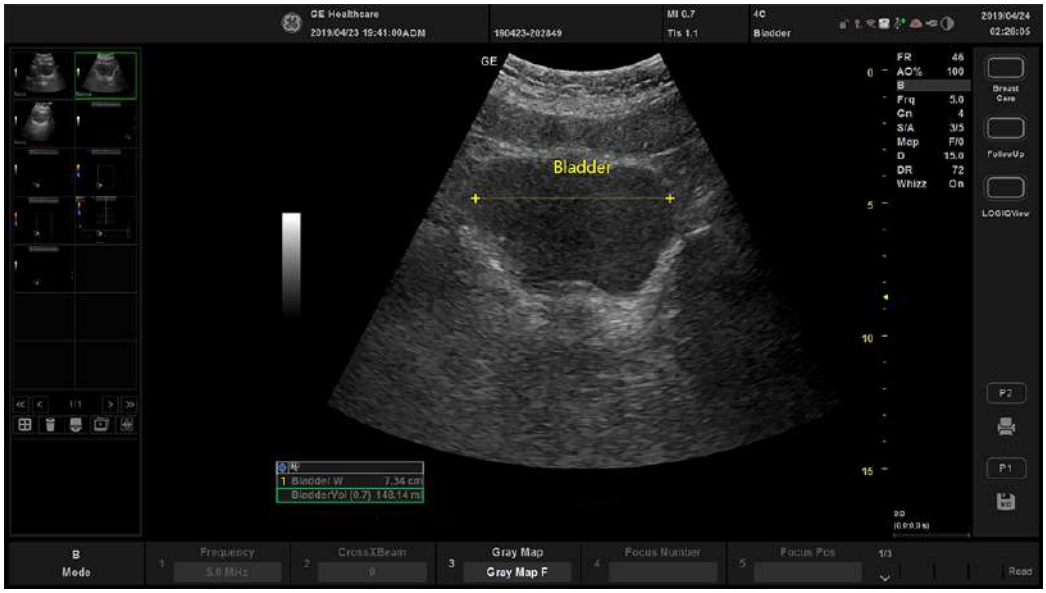


Figure 12-12. Auto Bladder Width

9. After a measurement, the length of lines are displayed in the result window as “Bladder L/H/W”.
10. User could select and adjust the calipers of lines by “Cursor Select”.

NOTE: Do not select the region of interest including many non-bladder area. Do not select the region of interest inside the bladder area.

NOTE: The accuracy for auto bladder volume measurement is ±30%.

Chapter 13

Pediatrics

Describes how to perform Pediatrics measurements and calculations.

Pediatrics Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning an Exam’ on *page 4-2 for more information.*

Any measurement can be repeated by selecting that measurement again.

The system retains all measurements, but the report retains only the last six measurements of each type.

The six report measurements can be averaged and the average used in other calculations.

Pediatrics Calculations

Overview

Pediatrics measurements offer two different types of measurement studies:

- Generic. The Generic Calculations study is common to all applications. See ‘Generic Measurements’ on *page 7-66 for more information.*
- Pediatric Hip (PedHip).
  - This chapter describes Pediatrics B-Mode measurements.
  - The Pediatrics M-Mode measurements are common to other applications. See ‘M-Mode Measurements’ on *page 7-77 for more information.*
  - The Pediatrics Doppler measurements are common to other applications. See ‘Doppler Mode Measurements’ on *page 7-80 for more information.*

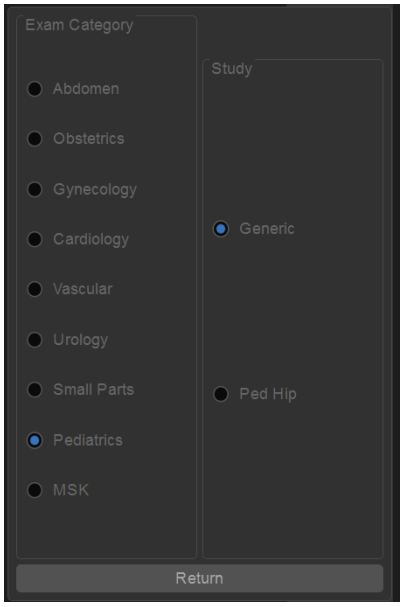


Figure 13-1. Pediatrics Exam Category

Pediatrics

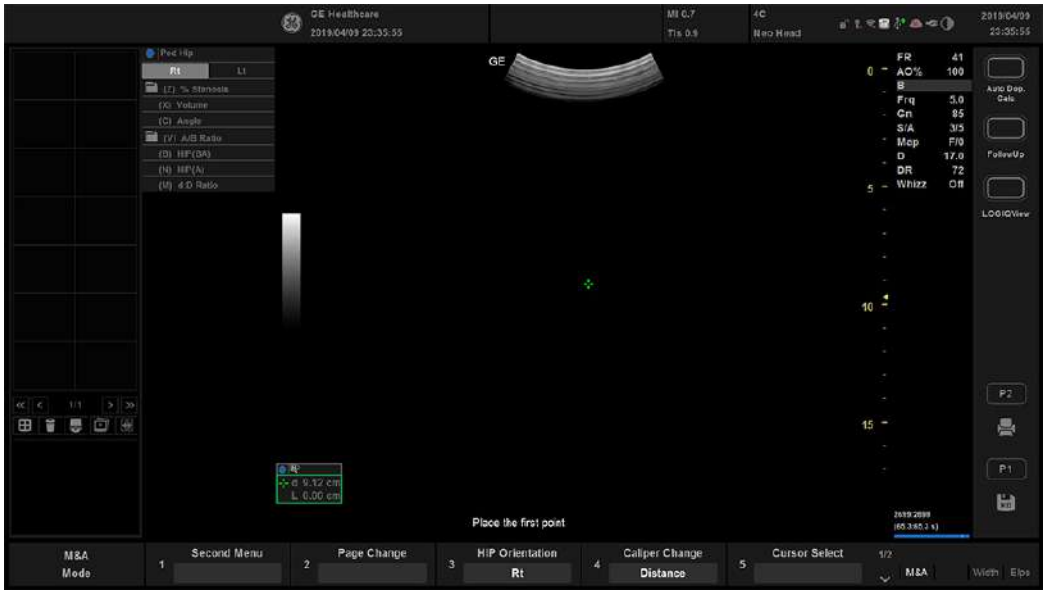


Figure 13-2. Pediatrics B-Mode Measurement

Hip Dysplasia Measurement

The HIP calculation assists in assessing the development of the infant hip. In this calculation, three straight lines are superimposed on the image and aligned with the anatomical features. The two angles are computed, displayed, and can be used by the physician in making a diagnosis.

The three lines are:[1]

1. The baseline connects the osseous acetabulum convexity to the point where the joint capsule and the perichondrium unite with the iliac bone.
2. The inclination line connects the osseous convexity to labrum acetabulare.
3. The Acetabulum roof line connects the lower edge of the osilium to the osseous convexity.

The α (Alpha) angle is the supplement of the angle between 1 and 3. It characterizes the osseous convexity. The β (Beta) angle is the angle between lines 1 and 2. It characterizes the bone supplementing additional roofing by the cartilaginous convexity.

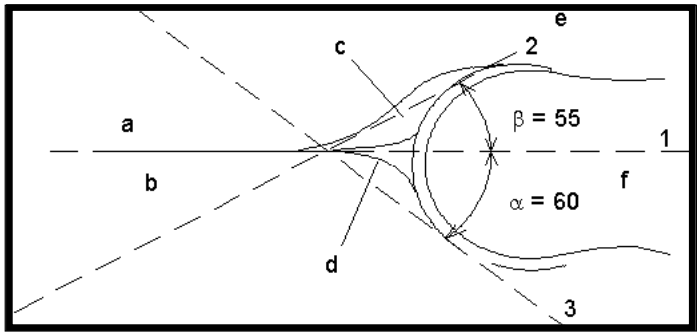


Figure 13-3. Hip Dysplasia

Anatomical Landmarks	
a. Ilium	d. Bony Roof
b. Iliac Bone	e. Cartilaginous acetabular roof
c. Labrum	f. Femoral Head

[1]Source: R GRAF, journal of Pediatric Orthopedics, 4: 735-740(1984)

Hip Dysplasia Measurement (continued)

To make a Hip Dysplasia measurement:

1. Select either the ***right*** or ***left side*** (orientation) and then select ***HIP***.

   A horizontal dotted line displays.
2. To place the baseline, move the ***Trackball***. Position the crosshairs edge at the osseous convexity of the ilium.
3. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
4. To fix the baseline, press ***Set***.

   The system displays a second dotted line at an angle.
5. To place the line along the inclination line of the osseous convexity to labrum acetabulare, move the ***Trackball***.
6. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
7. To fix the second measurement line, press ***Set***.

   The system displays a third dotted line at an angle.
8. To place the caliper along the acetabular roof line, move the ***Trackball***.
9. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
10. To fix the third measurement line and complete measurement, press ***Set***.

    The system displays the hip measurements (α and β) in the Results Window.

Alpha HIP

The Alpha HIP measurement measures the angle between the iliac baseline and the bony roof line. To make an Alpha HIP measurement:

1. Select either the ***right*** or ***left side*** (orientation) and then select ***Alpha HIP***.

   A horizontal dotted line displays.
2. To place the baseline, move the ***Trackball***. Position the crosshairs edge at the osseous convexity of the ilium.
3. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
4. To fix the baseline, press ***Set***.

   The system displays a second dotted line at an angle.
5. To place the caliper along the acetabular roof line, move the ***Trackball***.
6. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
7. To fix the second measurement line, press ***Set***.

   The system displays the alpha hip measurement (α) in the Results Window.

d:D Ratio Measurement

The d:D Ratio measurement measures the percentage of the femoral head coverage under the bony roof. To make this measurement:

1. Select either the ***right*** or ***left side*** (orientation) and then select **d:D Ratio**.

   A horizontal dotted line displays.
2. Use the ***Trackball*** to place the baseline along the ilium. Position the crosshairs edge at the osseous convexity of the ilium.
3. Use the **Ellipse** control to adjust or change inclination or ***Hip Rotate***.
4. Press ***Set*** to fix the baseline.
5. The system displays a circle representing the femoral head. Use the ***Trackball*** to position the circle.
6. Use the **Ellipse** control to size the femoral head circumference.
7. Press ***Set*** to fix the femoral head circumference.

   The system displays the d:D ratio for the femoral head in the Results Window.

Chapter 14

ReportWriter

Describes how to generate reports.

Standard Report Pages

Introduction

The Versana Active enables the generation of patient reports based on the examination performed and the analyses that were made during the exam. The reports are generated using the data stored in the system with pre-selected template.

You may edit a report while performing the exam; customize, delete, or add measurements; and save changes until you use the Store command. Once Stored, the reports are read-only.

It is recommended that the data be saved often, and then carefully reviewed before the report is Stored. Use the worksheet to facilitate the review and adjust data before storing a report. The final report can be printed on a standard printer.

Creating a report

Reports summarize the data obtained in the examination. They can contain data, images, and cine loops.

Once generated, the report can be viewed, images can be added, and the patient's personal data can be modified. The examination data itself CANNOT be changed.

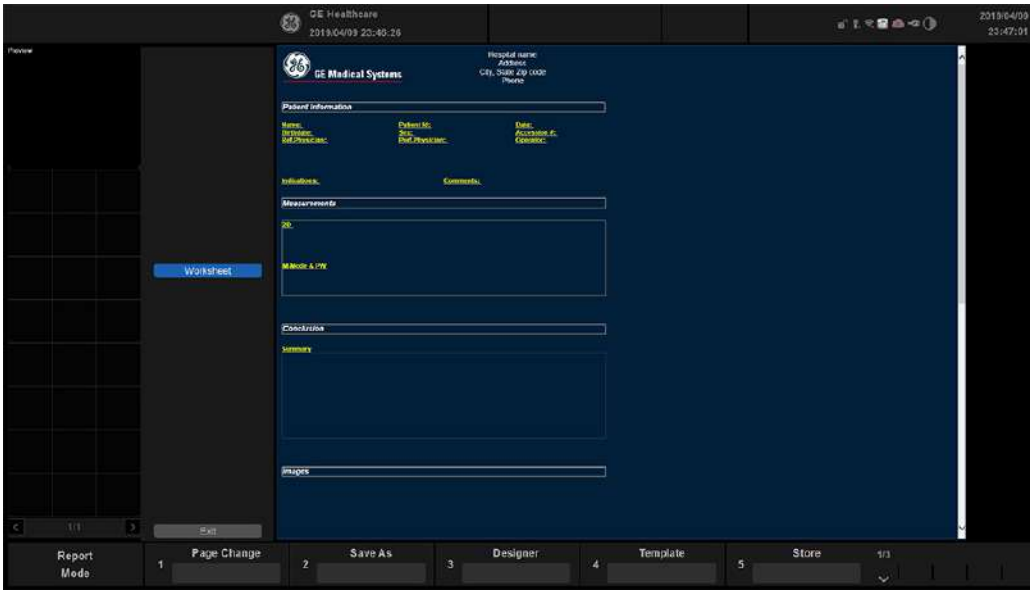


Figure 14-1. Report Example

Activating the Report

1. Select ***Report*** on the keyboard.
2. Select ***Report Preview***.



Figure 14-2. Report Menu Display Example

3. The system displays the default report for the current application on the monitor.

   The information entered during the examination is automatically filled in the appropriate fields (e.g. demographic, diagnosis, comments).

   The preview image appears when the cursor is over the clipboard image.

Activating the Report (continued)

4. Adjust the ***Page Change*** control to move down the page.

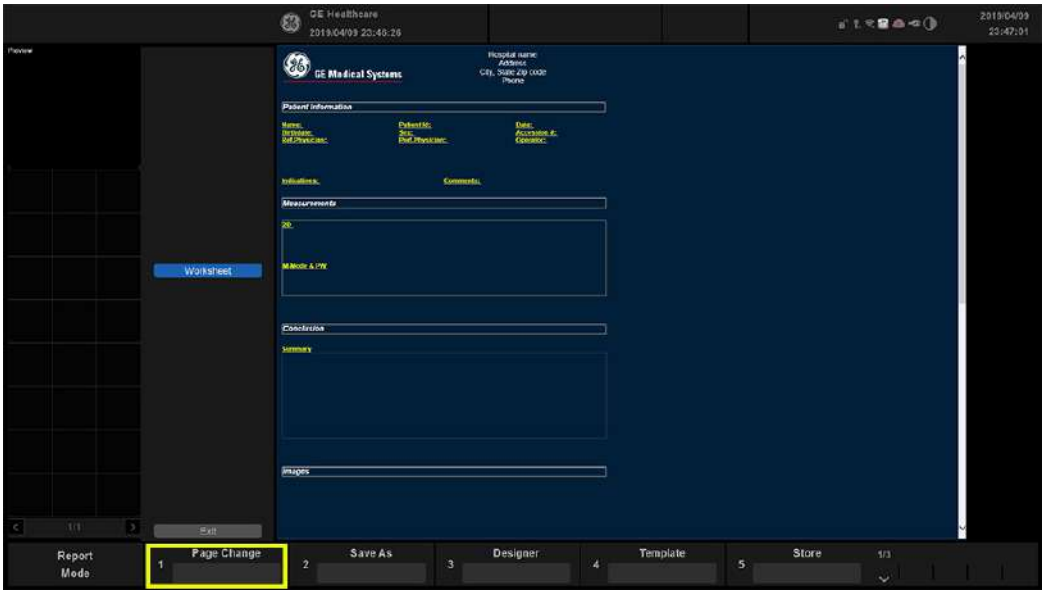


Figure 14-3. Worksheet Page Example

Table 14-1: Report Button Controls

Button	Description
Page Change	Changes to another page of the report.
Save As	Exports the report page to storage media as CHM or PDF format.
Designer	Accesses template editor screen.
Template	Selects templates from the list of selected applications.
Store	Stores the report page into Archive as CHM file.
Retrieve	Retrieves the report page from Archive. Stored Date/Time is appended to the name of stored report.
Print	Prints out the report to the default printer.
Delete	Deletes the report page from Archive.
Worksheet	Accesses Worksheet Page.
Graph	Accesses OB Graph page (applies only to OB).
Anatomical Page	Accesses Anatomical Survey page (applies only to OB).
*CHM is a compressed HTML help file.	

Selecting another template

You can select another template for the current patient:

1. Select ***TEMPLATE*** on the primary menu at the bottom of the monitor display.
2. A list of available templates and exam categories displays.

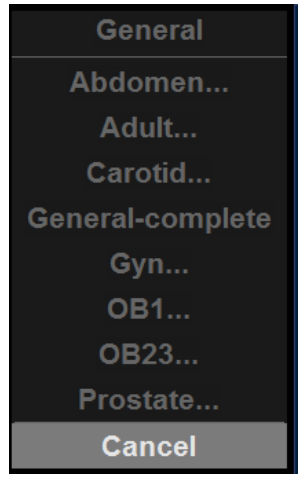


Figure 14-4. Application List Example

Selecting another template (continued)

3. Select the desired template using the **Trackball** and press **Set**.

   The selected template displays on the monitor.

NOTE: *If you select another exam category, the template list of the selected category displays. Select the desired template.*

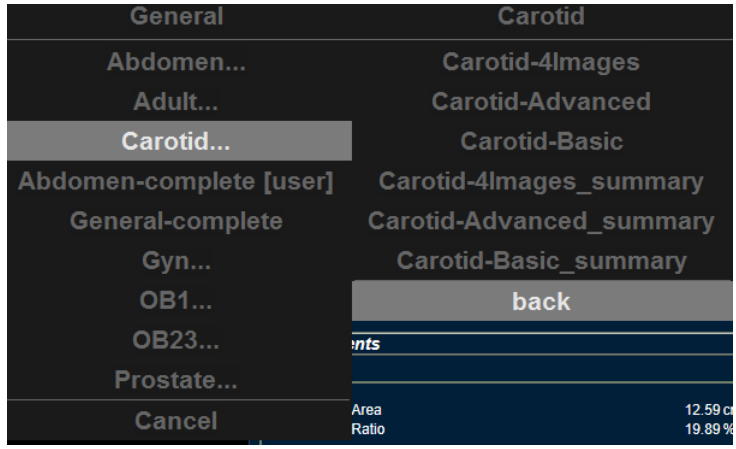


Figure 14-5. Available Template list

4. Select the desired template name and press **Set**.
5. The report changes to the selected template.

Factory Templates

The system has factory templates for each application. You can modify these templates or create user-defined templates. You need to save revised/new templates with unique names.

A template may include one or more of the following:

- Measurements
- Worksheet or Vessel Summary Images
- Anatomical Surveys or Biophysical Profiles
- Anatomical Graphics
- Graphs
- Images areas
- Score Boxes

NOTE: Additional factory templates can be added from the Utility-->Reports menu (OB for multiple gestation, Renal, etc.).

Editing a Report

*NOTE: It is recommended that the user DO NOT use the special characters like !, @, #, $, %, ^, &, *, (,), |, :, ;, <, >, ?, /, ~, [,], {, }, in the report. When these characters are entered into a report, the characters may be deleted.*

Entering the hospital address

When using a factory template, the area for the hospital information is usually placed in the upper portion of the report.

To make a new area, See ‘Fixed Text’ on *page 14-52 for more information.*

To modify the factory template:

1. Select ***Report*** on the control panel.
2. Select ***Report Review***.
3. Select ***Designer***.
4. Double-click on the area for the hospital information in the template. The Fixed Text dialogue box displays.

Entering the hospital address (continued)

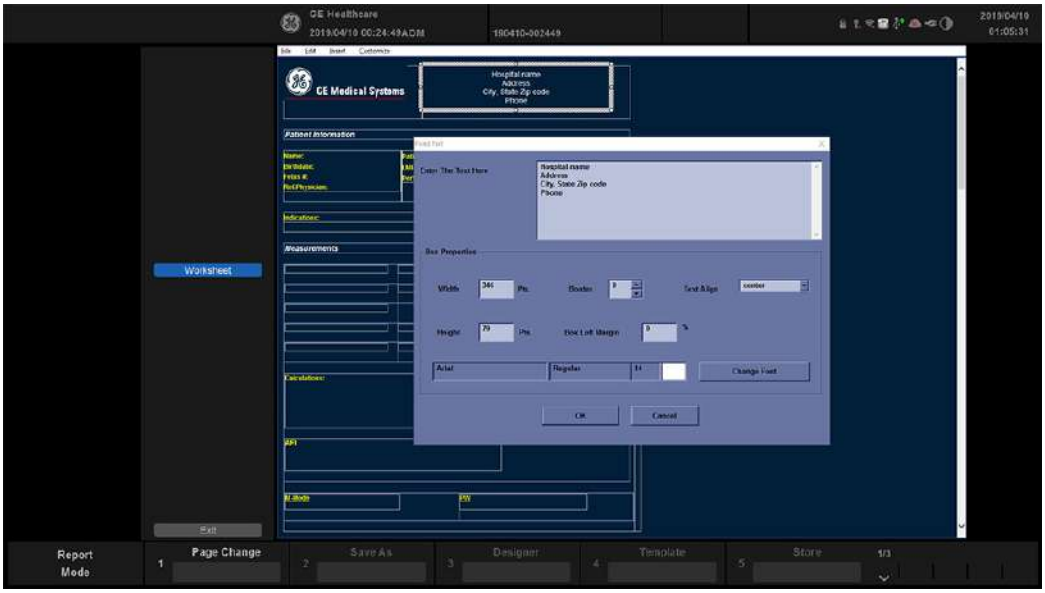


Figure 14-6. Fixed Text Dialogue Box

5. Make changes as necessary.
   a. Enter the hospital address in the text area.
   b. Modify Box Properties (box width, box border line width, text align, box height, box left margin, and font).
6. Select ***OK***.

Entering the hospital address (continued)

7. Save the template.

   To keep the same template name:

   - Select Save from the File menu, and press **Set**. The Save Template dialog box opens.
   - Select ***Yes***. The template retains the same name and appends “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:

   - Select Save As from the File menu, and press **Set**. The Save Template As dialog box opens.
   - Enter the name of the new template, and press **Set**. The template receives the new name and appends “[user]”. For example, NewReport[user].

8. Exit the Report Designer. The report with the hospital address displays.

Inserting the hospital logo

When using a factory template, the area for the logo is usually placed in the upper left portion of the report.

To make a new area, See ‘Fixed Text’ on *page 14-52 for more information.*

To modify the factory template:

1. Save the preferred hospital logo in either a jpeg or bmp format on the removable media.

NOTE: *Label the logo with a unique name (e.g. HospitalNameLogo.bmp). If the different logo is printed on the report, rename the logo image you want to use and insert it into the report template again.*

2. Insert the removable media.
3. Select ***Report*** on the control panel.
4. Select ***Designer***.
5. Double-click logo box at the left top so that the frame is highlighted. The logo box displays.

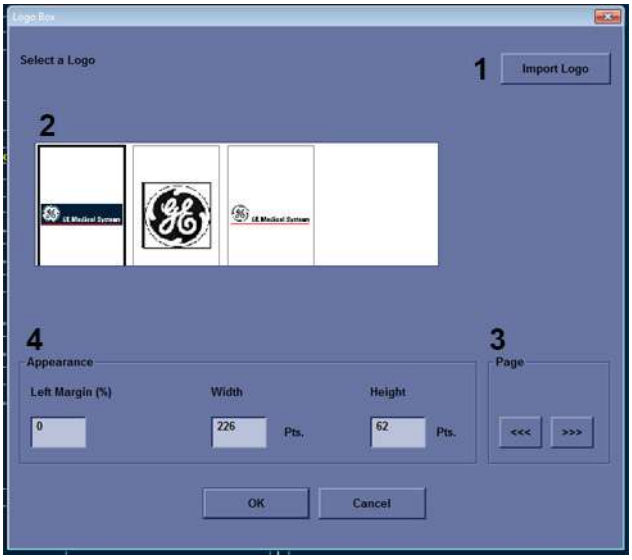


Figure 14-7. Logo Box

Inserting the hospital logo (continued)

6. Select Import Logo (1). Select the removable media first and then the hospital logo.
7. Select ***OK***. The hospital logo displays in the logo list (2). Click the logo to select.

NOTE: Scroll the logo list using the left/right arrow key (3).

8. Modify Appearance (4).
9. Select ***OK***.
10. Save the template.

    To keep the same template name:

    - Select Save from the File menu, and press Set. The Save Template dialog box opens.
    - Select Yes. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

    To save the template with a new name:

    - Select Save As from the File menu, and press Set. The Save Template As dialog box opens.
    - Enter the name of the new template, and press Set. The template receives the new name and adds “[user]”. For example, NewReport[user].

11. Exit the Report Designer. The template with the hospital logo displays.

NOTE: If a different logo prints on the report, rename the logo image which you want on the report and insert it into the report template again.

Changing the Archive Information

When using a factory template, the Archive Information is usually placed below the hospital name and logo.

The contents of the Archive Information is inserted through the related page automatically. If you want to change the description, such as Information or Comments that was entered in the patient menu:

1. Double-click the yellow text to be changed, e.g. Information or Comments.

   The area where the description was entered (e.g. Patient menu) displays.
2. Change the existing data as necessary.
3. Select ***Report*** to return to the report.

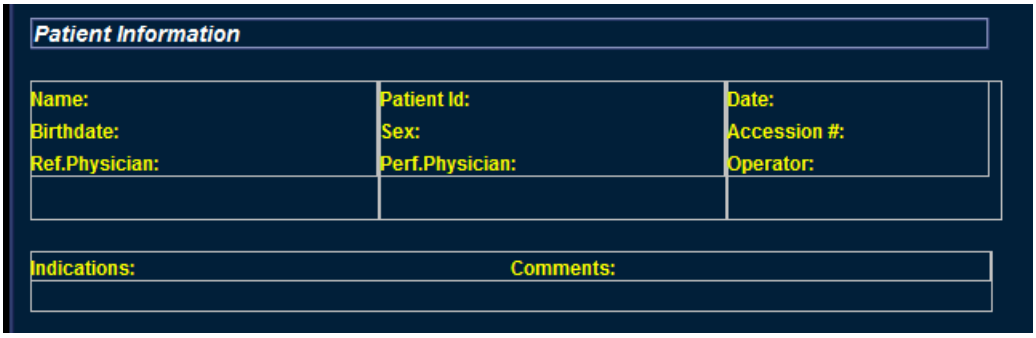


Figure 14-8. Patient Information Area (Example)

Modifying the displayed objects of Archive Information

1. Select ***Designer***.
2. Double click on the area for the Archive Information in the template. The Archive Information Box displays.

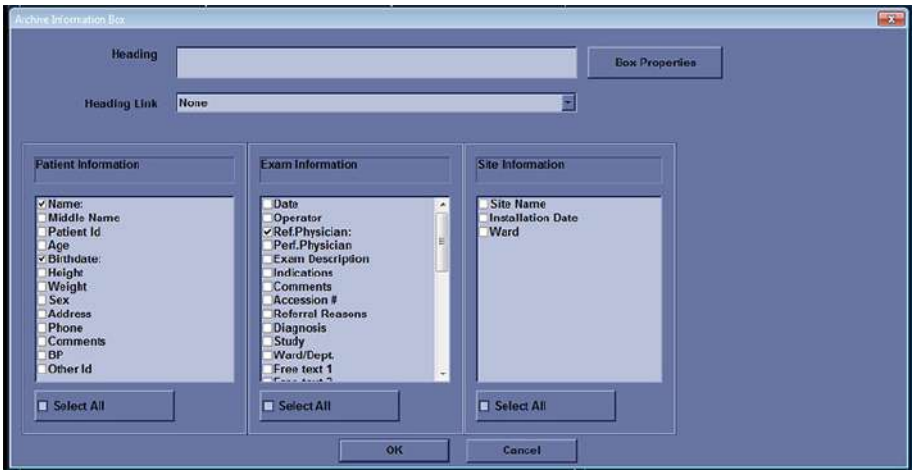


Figure 14-9. Archive Information Box

3. Click the checkboxes to select and deselect the objects. Objects with checkmarks will appear in the report template.
4. Select Box Properties to change the font, font size, font color, or box size, and select ***OK***.
5. Select ***OK*** to return to the Report Designer.
6. Save the template.

   To keep the same template name:

   - Select Save from the File menu, and press **Set**. The Save Template dialog box opens.
   - Select ***Yes***. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:

   - Select Save As from the File menu, and press **Set**. The Save Template As dialog box opens.
   - Enter the name of the new template, and press **Set**. The template receives the new name and adds “[user]”. For example, NewReport[user].
7. Select File -> Exit to leave the Report Designer.

Entering free text

You can enter free text to the report using the alphanumeric keyboard.

The factory template terms their text area as “Summary or Comments”.

1. Move the cursor to the text field and press **Set**.

NOTE: You can enter the text only to the field set as free text in the Report Designer.

NOTE: DO NOT enter “%s” in a free text field and then try to edit/ save the template in the Report Designer.

2. Type the text.

Inserting Text

1. Select **Designer**.
2. Move the cursor where the text is to be inserted and press **Set**.
3. Select the Text Field from the Insert menu. The Text Field dialog box displays.

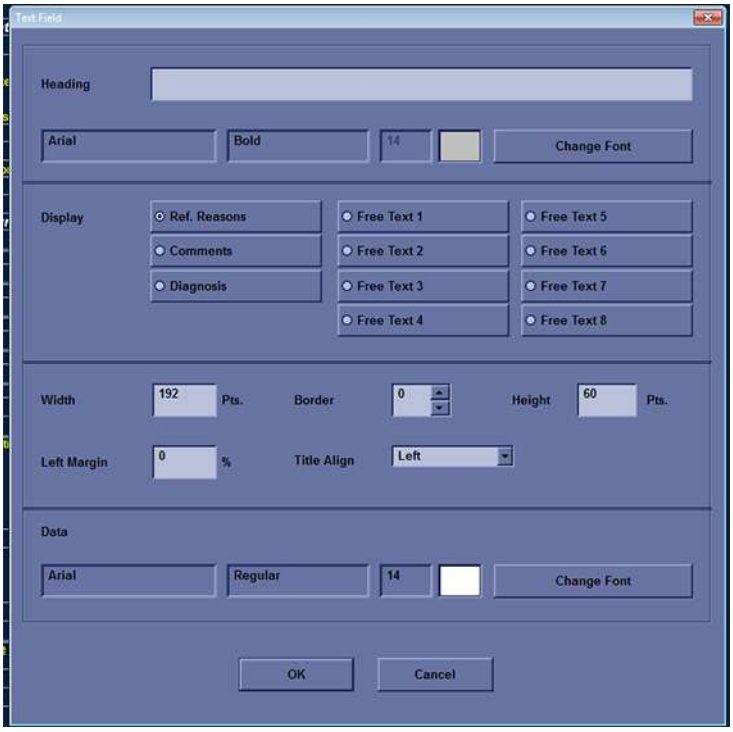


Figure 14-10. Text Field Dialogue Box

4. Select the appropriate display items:
   - Ref. Reasons: Retrieves this information from the Direct Report
   - Comments: Retrieves this information from the Comment field of the patient screen and the Exam Comment field of the worksheet.
   - Diagnosis: Retrieves this information from the Direct Report
   - Free Text 1 - 8

Inserting Text (continued)

5. Type the heading Text.
6. Modify box properties, the heading text and font, and data.
7. Select OK or Cancel.
8. Save the template.

   To keep the same template name:

   - Select Save from the File menu, and press Set. The Save Template dialog box opens.
   - Select Yes. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:

   - Select Save As from the File menu, and press Set. The Save Template As dialog box opens.
   - Enter the name of the new template, and press Set. The template receives the new name and adds “[user]”. For example, NewReport[user].

Inserting an image to the report

Some factory templates include an image area. If you want to insert or modify the image area, See ‘Insert Image’ on *page 14-43 for more information.*

To insert images from clipboard into the image field of the report:

1. Move the cursor to the desired image on the clipboard.

NOTE: The preview image appears when the cursor is over a clipboard image.

2. Press and hold down the **Set** key and drag the selected image to the report by using the **Trackball** or double click the **Set** key on the desired image.
3. To move images between image areas, press and hold down the **Set** key and using the **Trackball**, drag the selected image to the new location.

   To remove an image from the report, press and hold down the **Set** key and using the **Trackball**, drag the select image back to the clipboard.

Measurement result section

Measurement results for the current patient display automatically if you have the measurement section in the report template.

The factory template has an appropriate measurement result area. If you want to insert or modify the measurement area, See ‘Measurements’ on *page 14-49 for more information.*

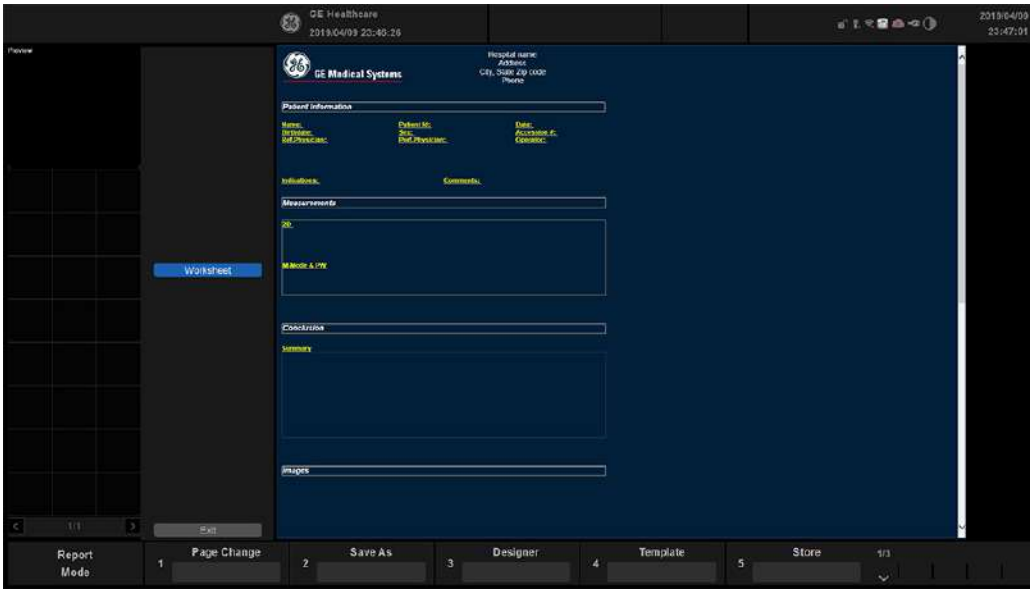


Figure 14-11. Measurement section

Inserting the worksheet

You can insert the worksheet (like you can insert an image) to the image display field. To set an image display field in the report template, See ‘Insert Image’ on *page 14-43 for more information.*

1. Display the worksheet on the monitor display.
2. Save the worksheet using the **P1** key.
3. Select ***Report Preview***.
4. Drag the worksheet into the report.
   a. Move the cursor to the desired worksheet on the clipboard.
   b. Press and hold down the **Set** key. Use the **Trackball** to drag the selected worksheet into the Image Display Field.
   c. Release **Set**.

NOTE: You can also move the cursor to the desired worksheet on the clipboard, double-click the worksheet, move the cursor to the Image Display Field, and select Set.

5. The worksheet displays on the report.

NOTE: You can double-click the worksheet in the report to change the background color to white to save ink during printing. Double-click the worksheet again to return the worksheet to the original color.

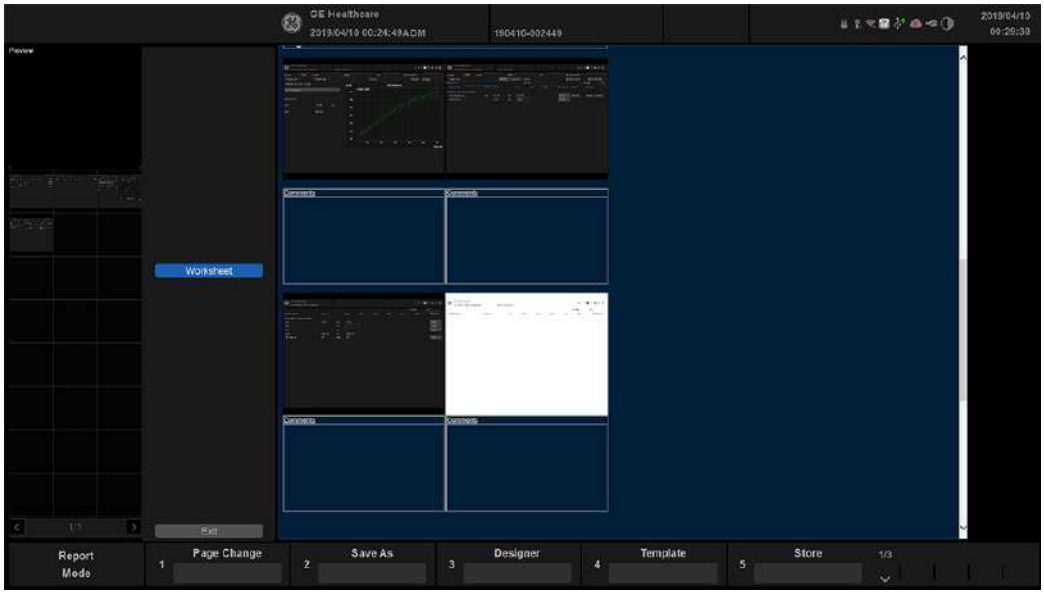


Figure 14-12. Worksheet in Report

Placing objects side-by-side

If you want to place images, the image and comment, anatomical graphic and comment, etc. side-by-side, you must first place a table, which has two (or more) columns, into the report template.

1. Press ***Report*** on the control panel.
2. Select ***Designer*** to display the Report Designer.
3. Place the cursor where you want to insert the object.
4. Select Table from the Insert menu. Insert Table box displays.

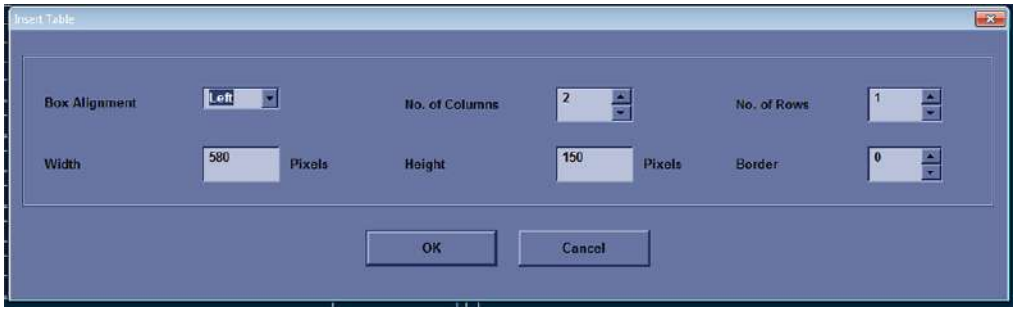


Figure 14-13. Insert Table Box

5. Set the number of columns to 2 (or more, as required) and change the table parameters, if needed. Select OK.

NOTE: If you do not need a table border, set the Border to 0. Add additional rows if required.

6. Place the cursor in the column and select the desired items from the Insert menu (e.g. logo, image, free text). Specify those items.
7. Repeat step 6 for each column as required.

Placing objects side-by-side (continued)

8. Save the template.

   To keep the same template name:

   - Select Save from the File menu, and press **Set**. The Save Template dialog box opens.
   - Select ***Yes***. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:

   - Select Save As from the File menu, and press **Set**. The Save Template As dialog box opens.
   - Enter the name of the new template, and press **Set**. The template receives the new name and adds “[user]”. For example, NewReport[user].

You can insert the images in the order preferred, by row or column, on the factory templates. See ‘Inserting the Table’ on *page 14-35 for more information.*

Accessing Worksheet, OB Graph and Anatomical Survey Pages

If the Worksheet, OB Graph, and/or Anatomical Survey pages have been saved for the current patient, you can access these pages from the report page.

NOTE: OB Graph and Anatomical Survey pages apply only to OB.

1. Select either ***Worksheet***, ***Graph*** or ***Anatomical Page*** on the primary menu.

   There is also Fixed Text set up as hyper links for these pages. Cursor to the fixed text and press **Set**.
2. The system displays the appropriate page (Worksheet, OB Graph or Anatomical Survey).
3. Select ***Report Preview*** to return to the Report page.

Retrieving an Archived Report

1. Select ***Retrieve***. The Retrieve menu displays.

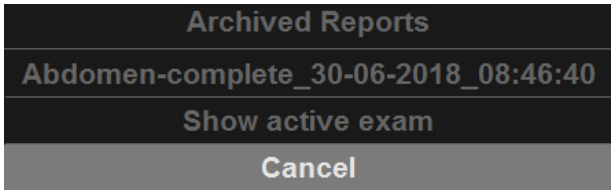


Figure 14-14. Retrieve Menu

2. Select the desired report and press ***Set***.

NOTE: The retrieved report cannot be edited.

Deleting a Report from Archive

1. Select ***Delete***. The delete menu appears on the screen.

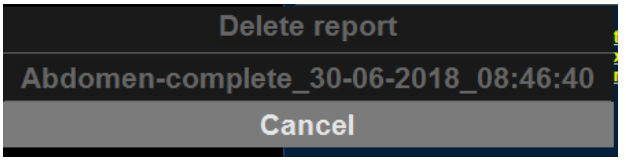


Figure 14-15. Delete Reports Menu

2. Select the report to delete and press **Set**.

Printing the Report

1. Select ***P2*** to print out the report.
   The Report is printed on the default printer.

NOTE: To preview the Print Layout before printing, See 'Preview the Print Layout' on page 14-32 for more information.

NOTE: Double-click the worksheet and/or image in the report to change the background color to white A white background will save ink during printing. Double-click the worksheet or image again to return to the original color.

Storing the Report

1. Select ***Store***.
   The Report is saved as a CHM file to Archive.

NOTE: The archived report cannot be edited; therefore, it is recommended that the data is carefully reviewed before the report is saved.

Exporting the Report to Media

Reports can also be saved in a user-defined locations in the following formats:

- Compiled HTML (.CHM) files: readable from any web browser.
- Portable Document Format (.PDF) files: readable with Adobe Acrobat reader.

1. Select File.
2. Select ***Save As***.

   The Save As dialog box appears on the screen.

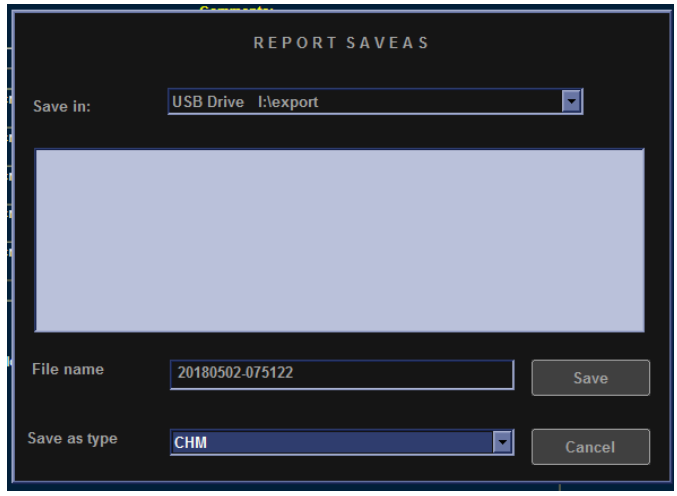


Figure 14-16. Save as dialog box

3. Enter the Report title in the File Name field.
4. Select the media to export the Report. The system supplies a name (numeric DICOM UID, unique identifier).
5. Select PDF or CHM from the Save as type pull down menu.
6. Select ***Save***.

Exiting the report

1. Select ***Store*** to save the report.

NOTE: If the user is working on a report and leaves the report screen for any reason, all information added to the report is automatically saved without loss of data.

2. Select Exit key to close the report page.

Designing Your Own Template

Template Designer

You can design and create your own customized template from a blank template page, or you can use an existing template (factory or user-defined) and save the changes.

Display the desired template and select ***Designer*** to open the Template Designer page.

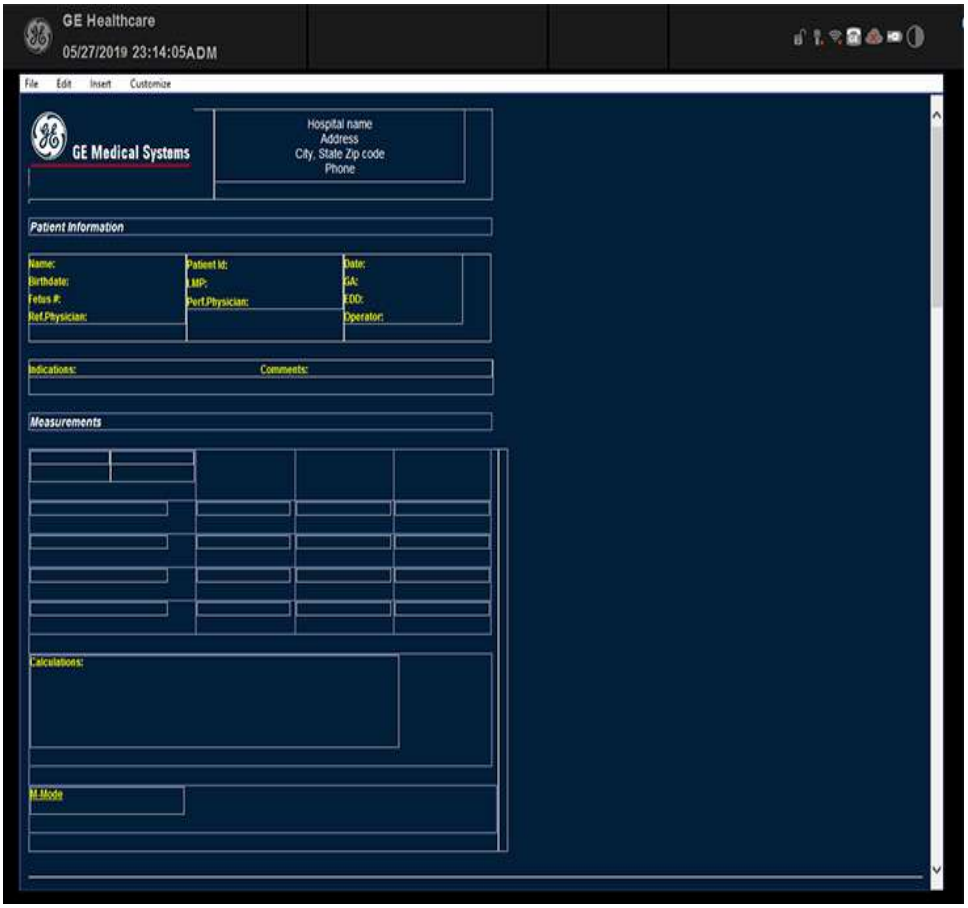


Figure 14-17. Report Designer

File Menu

Enter File Menu:

1. Select a Template.
2. Select Designer.
3. Click on File.

Table 14-2: File Menu

	Description
New	Creates a new template. A blank template appears.
Save	Overwrites the existing template.
Save As	Saves as a new name.
Page Setup	Enters Print Layout screen.
Print Preview	Executes print preview.
Exit	Exits Report Designer page.

Create a new template

To design a new template without using a pre-existing factory template:

1. Select ***Designer*** to open the Report Designer.
2. Select New from the File menu, and press **Set**.
   The blank template displays.
3. Create the report template as needed.
4. Select Save from the File menu, and press **Set**.
   The Save Template As dialogue box displays.
5. Enter a template name and click OK.
6. To exit Report Designer, select **Exit** from the File menu, and press **Set**.
   - Yes: Saves changes and exits Report Designer.
   - No: Does not save changes and exits Report Designer.

Create a new template and save as a factory template name

To design a new template by modifying an existing factory template and keeping the same name of the factory template:

1. Select and display the existing factory template.
2. Select ***Designer*** to open the Report Designer.
3. Modify the report template as needed.
4. To save changes, select **Save** from the File menu, and press **Set**.

   The Save Template dialog box displays.

   - Yes: Saves changes.
   - No: Does not save changes.
   - Cancel: Returns to Report Designer.

NOTE: *The template name displays in the template list, retains the same name, and adds "[user]". For example, "OB23-Basic[user]". You do not lose the original factory template.*

5. To exit Report Designer, select **Exit** from the File menu, and press **Set**.

   - Yes: Saves changes and exits Report Designer.
   - No: Does not save changes and exits Report Designer.
   - Cancel: Returns to Report Designer.



HINTS

Save changes frequently as you modify your template. Saving often reduces the risk of losing all your changes.

Create a new template and save with a new name

To design a new template by modifying or copying an existing factory template and saving it with a new name:

1. Select and display the existing factory template.
2. Select ***Designer*** to open the Report Designer.
3. Modify the report template as needed.
4. Select **Save as** from File menu and press **Set**.
   The Save Template As dialog box displays.
5. Type the new template name and click OK.
6. Select Exit from the File menu and **Set**.
7. The Report Designer closes and returns to the Report Page.

NOTE: The template receives the new name and adds "[user]". For example, NewReport[user].

Page Setup

1. Modify the factory template as necessary in **Designer**.
2. Select **Page Setup** from File menu and press **Set**.
3. Change the paper size or orientation to fit the print layout, as necessary.

   To define the header and footer for the printed report, type text and enter the required variables listed in the table below. Select “Different for first page” and enter a specific header/footer for that page.

Table 14-3: Variable and Definition

Variable	Definition	Variable	Definition
{pid}	Patient ID	{prt}	Current time (printing time)
{pnm}	Patient name	{cp}	Current page
{pbd}	Patient date of birth	{tp}	Page count
{exd}	Examination date	{c}	Subsequent text is centered
{prd}	Current date (printing date)	{r}	Subsequent text is right aligned.
{inm}	Institution name		

NOTE: Default is left aligned. Report will appear as black ink on white background.

4. Select ***OK*** or Cancel.

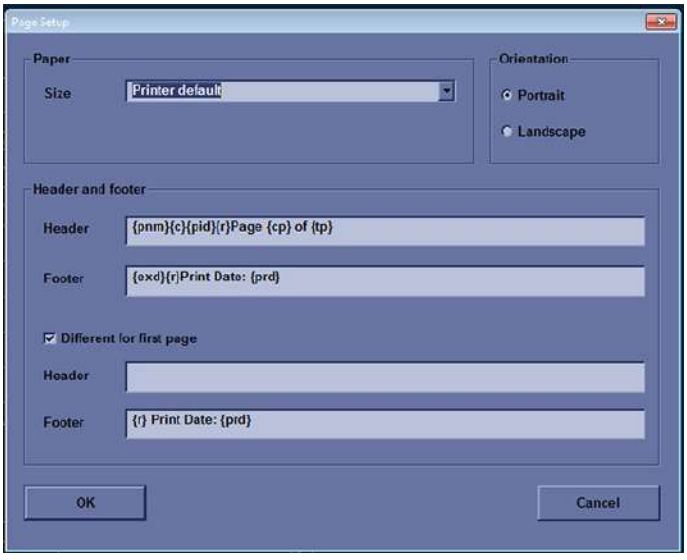


Figure 14-18. Page Setup Dialog

Preview the Print Layout

1. Select ***Template*** to choose the Report Template.
2. Select **Designer**.
3. Select **Print Preview** from File Menu, and press ***Set***.
4. The Print Preview screen displays.

   If changes need to be made, select **Close** to exit the Preview page. Modify the template or return to the Report and modify the contents.

Edit Menu

Table 14-4: Edit Menu

	Description
Delete	Deletes the selected object from the report template.
Undo	Restores the previous state(s) of the report template.

Deleting a template object

1. Select the object to be deleted.
2. Select Delete from the Edit menu, and press **Set.** The object is deleted from the template.

Undoing the operation

1. Select Undo from the Edit menu, and press **Set**.
2. Repeat as required.

Insert Menu

Table 14-5: Insert Menu

	Description
Page Break	Inserts a Page Break.
Table	Inserts a Table.
Logo	Inserts a Logo Bitmap File.
Archive Info	Inserts Archive Information.
Anatomical Graphics	Selects anatomical graphics by category to be inserted into a field.
Image	Inserts the image display field to the template.
Wall Motion Analysis	Selects Cut Planes, Bull's Eye, or Score Table Box.
OB/GYN	Selects OB Graph, Bar Graph or Anatomiy.
Measurements	Inserts the measurement display field in the template.
Text Field	Edits text field.
Fixed Text	Enters any comments as Fixed Text.
Dropdown Text	Edits dropdown text.

Inserting the Page Break

1. Place the cursor where the Page Break is to be inserted and press **Set**.
2. Select Page Break from the Insert menu and press **Set**. The page break line displays on the template.

Inserting the Table

1. Place the cursor where the table is to be inserted and press **Set**.
2. Select **Table** from the Insert menu and press **Set**. The Insert Table dialog box displays.

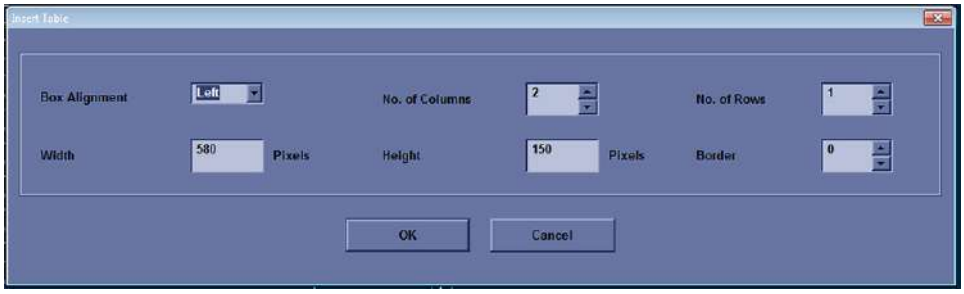


Figure 14-19. Insert Table Dialog

3. Specify each parameter as required.

NOTE: To set the table border as not visible, set "Border" parameter to 0 (zero)

4. Select OK to insert the table or Cancel.

*NOTE: To insert/delete a row/column from the table or access table properties, double click the **Set** key in any empty area inside the table. A table menu appears with those options.*

Inserting Images in a Table

You can choose the order in which images are inserted into tables: by row (default) or by column.

Image Order by Row

The system default inserts images in the cells of the first row, then to the next row.

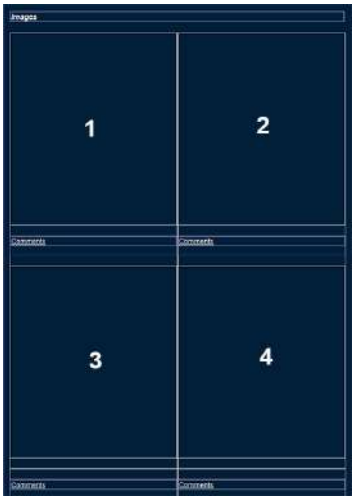


Figure 14-20. Image Order—Row Preference (System Default)

1. Follow the instruction for inserting a table. When specifying parameters, specify:

   No. of Columns=2; No. of Rows=2

2. After inserting the table, insert an image box in each cell of the table.

   a. Move the cursor to the first cell and select Insert -> Image.

   b. Repeat this step for each cell in the table.

After the template is saved and you are working in the ReportWriter, when you select images to be inserted in the table, they are placed in the default order.

Inserting Images in a Table (continued)

Image Order by Column

If you prefer to have the image placement by column, images are inserted in each cell of the first column, then the next column.

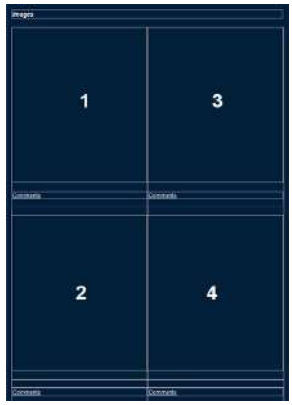


Figure 14-21. Image Order—Column preference

In order to achieve the column preference, you need to create a table with 2 columns and 1 row. In each cell of this table, you need to insert another table.

1. Follow the instructions for inserting a table. When specifying parameters, specify:

   No. of Columns=2; No. of Rows=2
2. After inserting the table, create a table inside each of the existing table's cells.
   a. Move the cursor to the left column's cell and press **Set**.
   b. Select Table from the Insert menu and press **Set**.
   c. When specifying parameters, specify:

      No. of Columns=1; No. of Rows=2; Width=290 pixels; Height=500 pixels.

      Select ***OK***.
   d. Repeat steps a-c for the right column.
3. Insert an image box to each table cell.
   a. Move the cursor to the first cell and select Insert -> Image.
   b. Repeat this step for each cell in the 2 tables.

After the template is saved and you are working in the ReportWriter, when you select images to be inserted in the table, they are placed with your column preference.

Inserting Logos

1. Place the cursor where you want to insert the logo and press **Set**.
2. Select Logo from the Insert menu and press **Set**. The Logo Box displays.
3. Select a logo that you want to insert (1) or import a bmp or jpg file from the removable media (2). Scroll the images using the arrow key (3). Specify the appearance (4).

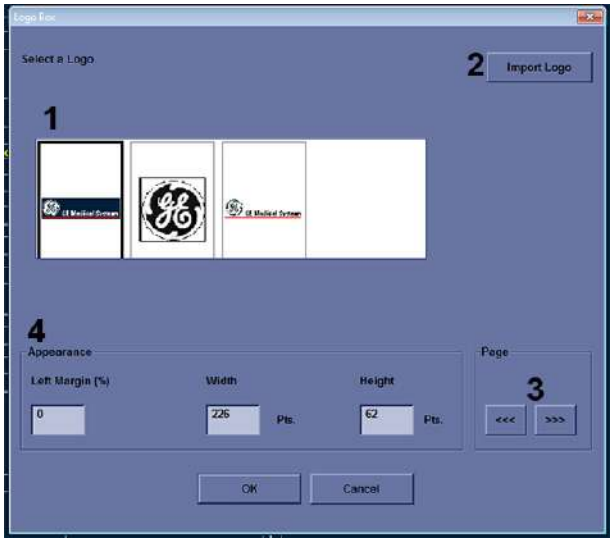


Figure 14-22. Logo box

4. Select ***OK*** to insert the logo or Cancel.

Changing a logo:

1. Place the cursor on the logo to be changed and press **Set** twice. The Logo Box displays.
2. Select a different logo. If the desired logo is not shown, select Import Logo to import a different logo.
3. Specify the appearance.
4. Select ***OK*** or Cancel.

Inserting Archive Information

Archive information contains all the objects from the different information menus (Patient, Exam, and Site Information). This box accumulates different information menu selections that can be grouped together and displayed in one table.

1. Place the cursor where you want to enter the archive information and press **Set**.

   If you use a factory template, double click on the current archive information area to display the Archive Information Box.

2. Select Archive Info from the Insert menu and press **Set**. The Archive Info Box displays.

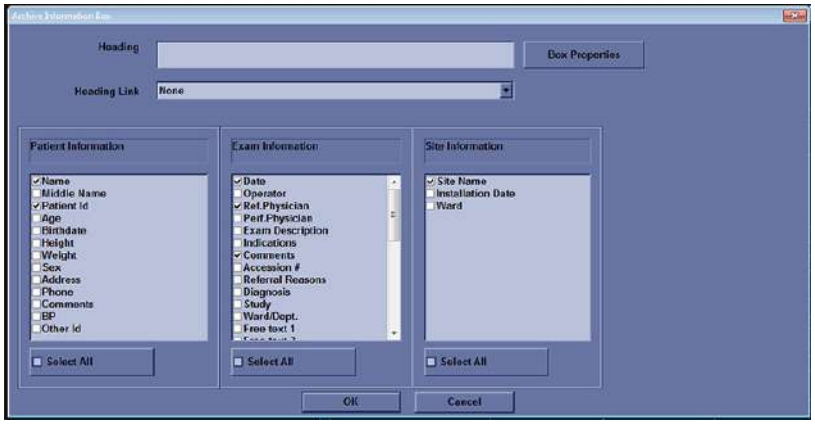


Figure 14-23. Archive Information Box

3. Type the Heading, select a heading link from the pull-down menu, and select the parameters you want to display in the report.

Inserting Archive Information (continued)

4. Select Box Properties to change the Font, Alignment, Appearance, etc.

NOTE: To set the same font to all fields, select Set All fields.

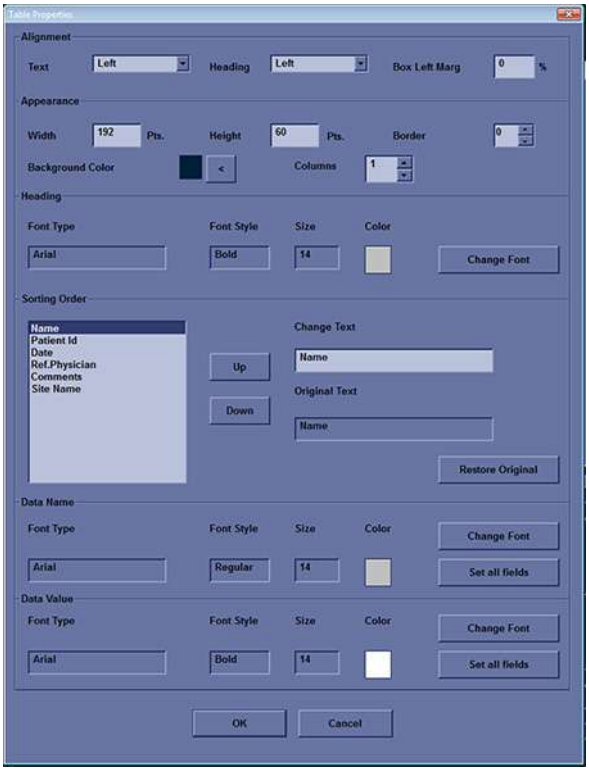


Figure 14-24. Table Properties

5. Select ***OK*** or Cancel. The contents of the Archive Information is inserted to the related page automatically.

Inserting Archive Information (continued)

Editing displayed Archive Information:

1. Select ***Designer***.
2. Move the cursor to Archive Information field to be edited.
3. Press **Set** twice. The Archive Information Box displays.
4. Edit the heading, the Heading Link and Information parameters, as necessary.
5. Select ***OK*** to save or Cancel.

Anatomical graphics

1. Place the cursor where you want to insert the Anatomical Graphics and press **Set**.
2. Select Anatomical Graphics from the Insert menu.

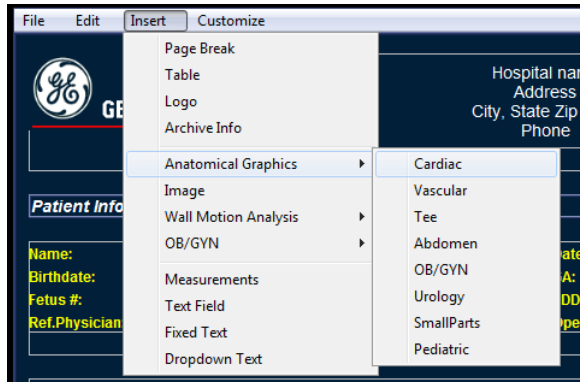


Figure 14-25. Anatomical Graphics Menu Example

3. Select the desired category and press **Set**. The graphic box displays.

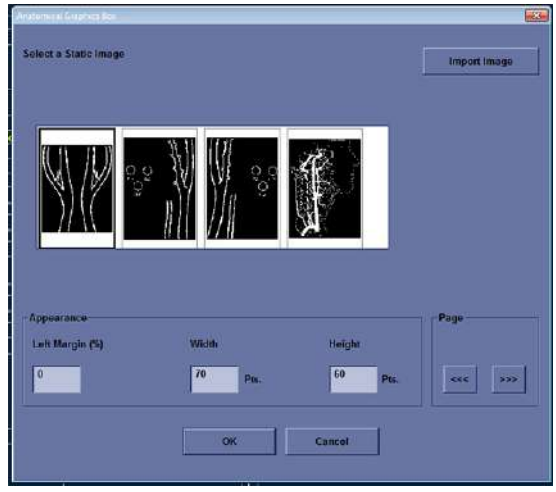


Figure 14-26. Anatomical Graphics Box Example

4. Select the graphic to be inserted to the template or import a bmp or jpg file from the removable media. Scroll the images using the arrow key.
5. Select Appearance.
6. Select ***OK*** or Cancel.

Insert Image

1. Place the cursor where you want to insert the image.
2. Select a image from the Insert menu and press **Set**. The Ultrasound Image Box displays.

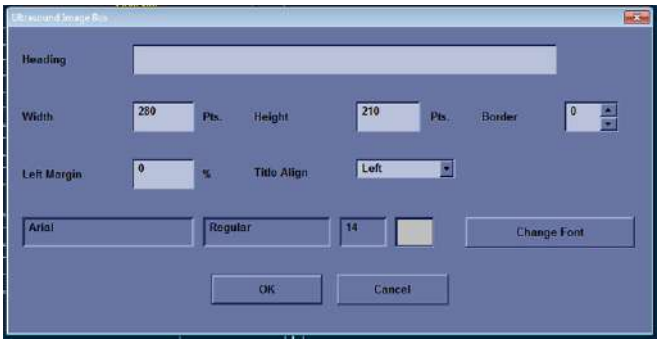


Figure 14-27. Ultrasound Image Box

3. Type the Heading text, modify the box properties, and change the heading text font, as necessary.

NOTE: *For no heading, type a Space in the Heading text.*

To keep the monitor image appearance, the ratio of width to height (W:H) should be 4:3. So, basically 640:480 for large images and 300:225 for two side-by-side images.

4. Select OK or Cancel.

Cardiac Studies Wall Motion Analysis

1. Place the cursor where you want to insert the wall motion analysis and press **Set**.
2. Select Wall Motion Analysis from the Insert menu.
3. Select and set up the desired parameter.
   - Bull's Eye

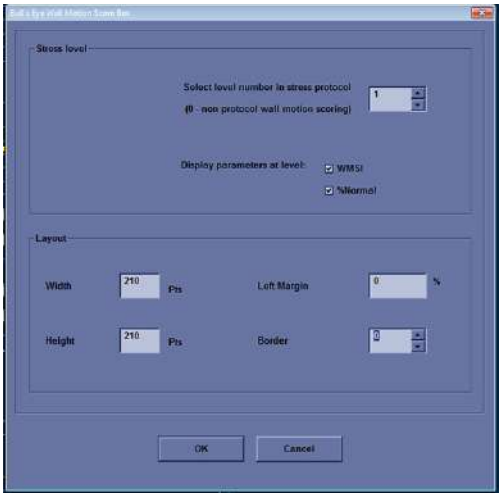


Figure 14-28. Bull's Eye Dialog Box

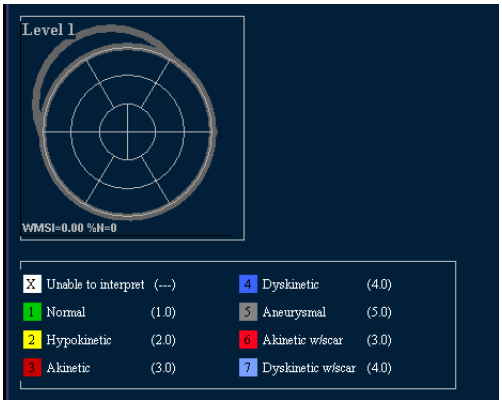


Figure 14-29. Bull's Eye Report Example

Cardiac Studies Wall Motion Analysis (continued)

- Cut Planes

NOTE: The Cut Planes dialog box parameters are similar to the Bull's Eye Dialog Box shown previously.



Figure 14-30. Cut Planes Report Example

- Score Table Box

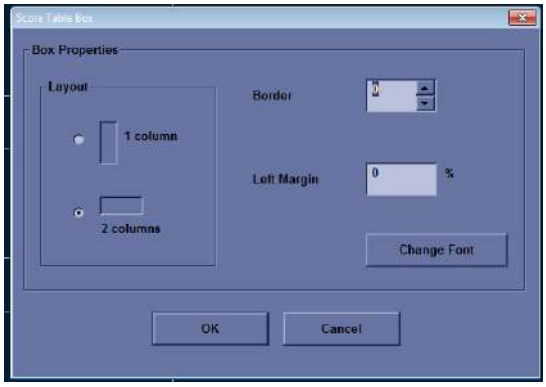


Figure 14-31. Score Table Box Dialog Box

4. After you finish the setup, select OK or Cancel.

OB/GYN (OB and GYN Only)

The OB Graph, Bar Graph and Anatomy can be entered into the Report.

1. Place the cursor where you want to insert the graph or anatomy and press **Set**.
2. From the Insert menu, select OB/GYN. The selection menu displays.

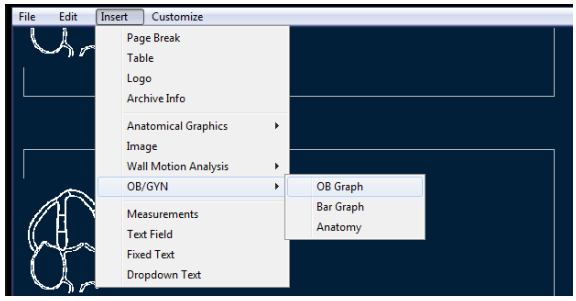


Figure 14-32. Selection Menu

3. Select the appropriate item as necessary. A dialog box displays.
   - OB Graph

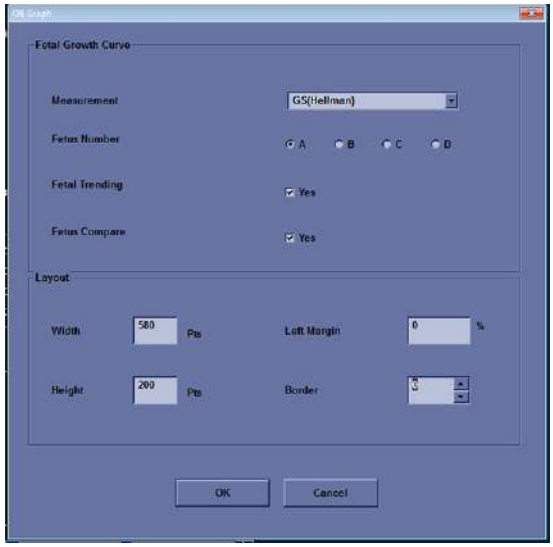


Figure 14-33. OB Graph Dialog Box

OB/GYN (OB and GYN Only) (continued)

a. Select the Measurement and Fetus Number.
b. Check Fetus Trending and Fetus Compare, if appropriate.
c. Modify the Layout, if necessary.
d. Select OK.

- Bar Graph

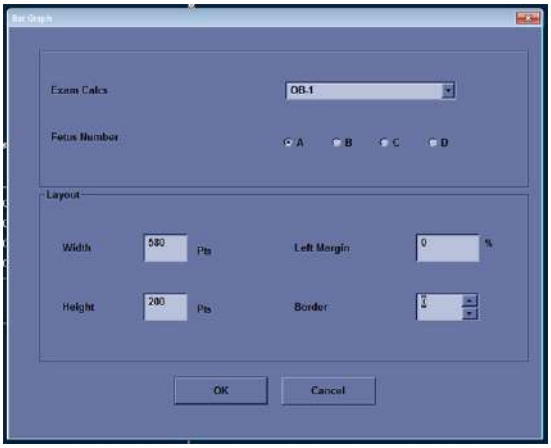


Figure 14-34. Bar Graph Dialog Box

a. Select the exam and fetus number.
b. Modify the Layout, if necessary.
c. Select OK.

NOTE: The Bar Graph already contains default application measurements.

OB/GYN (OB and GYN Only) (continued)

- Anatomy

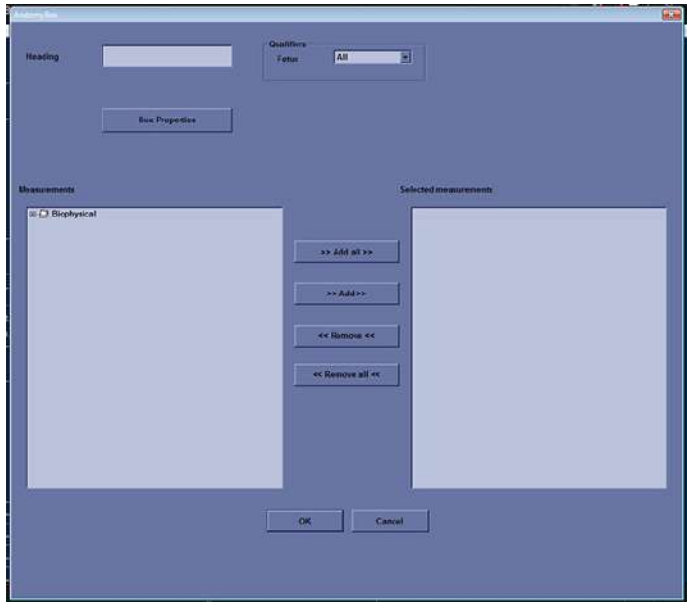


Figure 14-35. Anatomy Dialog Box

a. Type the Heading.
b. Select qualifiers from the pull-down menu.
c. Select “Add all” to copy all measurements to the right column
d. Check the box in front of the measurement you need in the left column and select “Add”. The select measurements copy to the right column.
e. To remove measurements you do not need, check the boxes in front of those measurements in the right column, and select “Remove” or “Remove all”.
f. If you want to modify the properties, select Box Properties and set required parameters.

Measurements

Insert a field to display the measurements. The measured parameters displayed in the measurement display field are configured.

1. Place the cursor where you want to insert the measurement and press **Set**.
2. Select Measurements from the Insert menu and press **Set**. The Measurements Box displays.

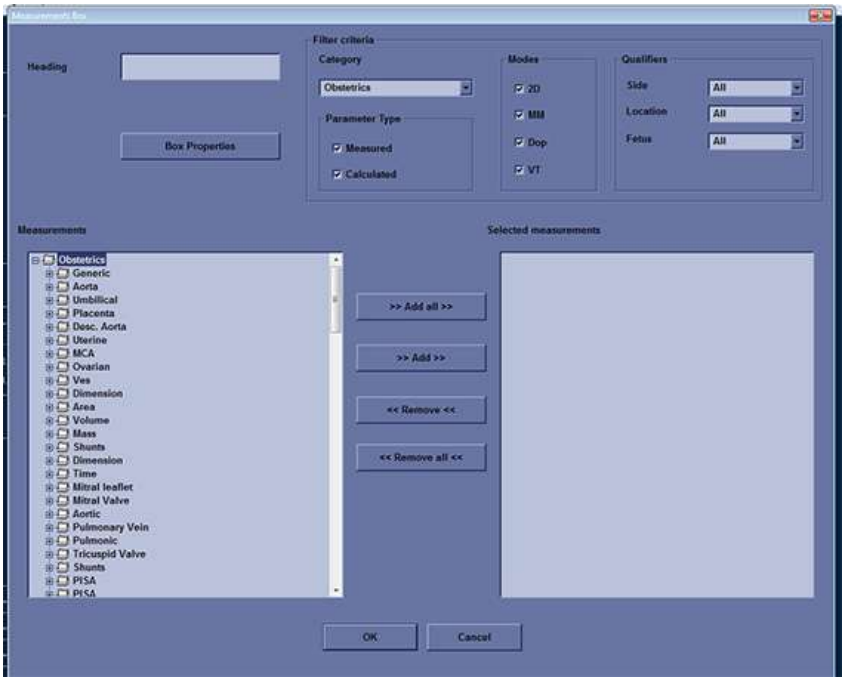


Figure 14-36. Measurement Box

3. Type the Heading text, select the Filter Criteria and measurements from the tree, as necessary.
4. Select OK or Cancel.

Text Fields

1. Place the cursor where you want to insert the text and press **Set**.
2. Select Text Field from the Insert menu and press **Set**. The Text Field dialog box displays.

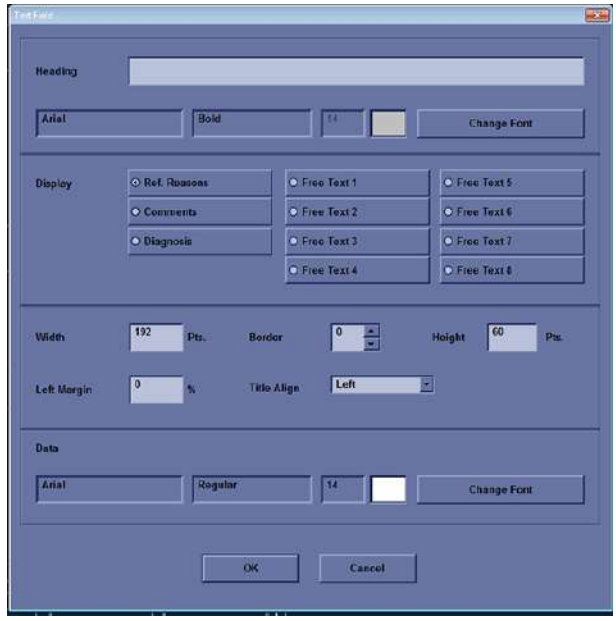


Figure 14-37. Text Field Dialog Box

3. Type the Heading Text. If you do not need the heading, type a space.
4. Select Display item.
   - Ref.Reason: Reason for Referral.
   - Comments: Gets information from the Comment field of the Patient screen and the Exam Comment field of the Worksheet.
   - Diagnosis.
   - Free Text: 1 - 8
5. Specify the border of the Text Field and Font as necessary.
6. Select OK or Cancel.

The text is saved automatically into the corresponding area selected on this dialog box.

Text Fields (continued)

Editing an existing text field:

1. Move the cursor to the Text Field to be edited.
2. Press **Set** twice. The Text Field dialog box displays.
3. Edit the heading, the settings, or font, as necessary.
4. Select OK or Cancel.

Fixed Text

1. Place the cursor where you want to insert the fixed text and press **Set**.
2. Select Fixed Text from the Insert menu and press **Set**. The Fixed Text dialog box displays.

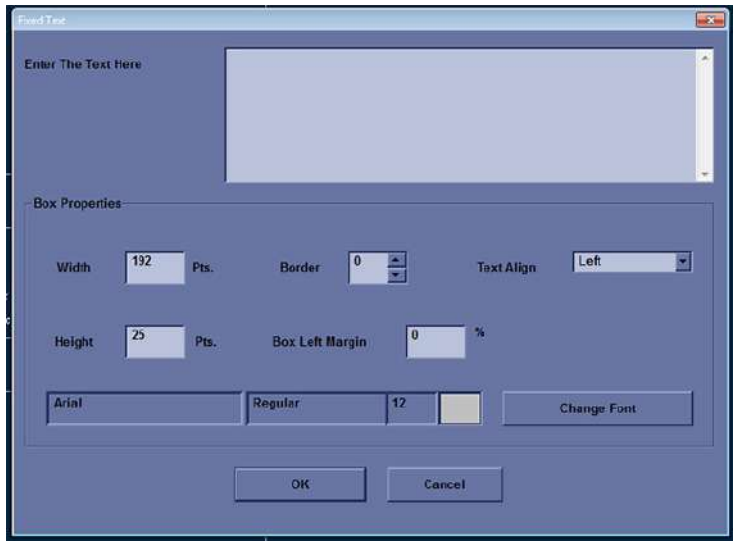


Figure 14-38. Fixed Text Dialog Box

3. Type the text (e.g. hospital information, report title, or table title) and specify the border and font.
4. Select OK or Cancel.

Editing existing Fixed Text:

1. Move the cursor to the Fixed Text to be edited.
2. Press **Set** twice. The Fixed Text dialog box displays.
3. Edit the text, the border or font, as necessary.
4. Select OK or Cancel.

Dropdown Text

1. Place the cursor where you want to insert the dropdown text and press **Set**.
2. Select dropdown Text from the Insert menu and press **Set**. The dropdown Text dialog box displays.

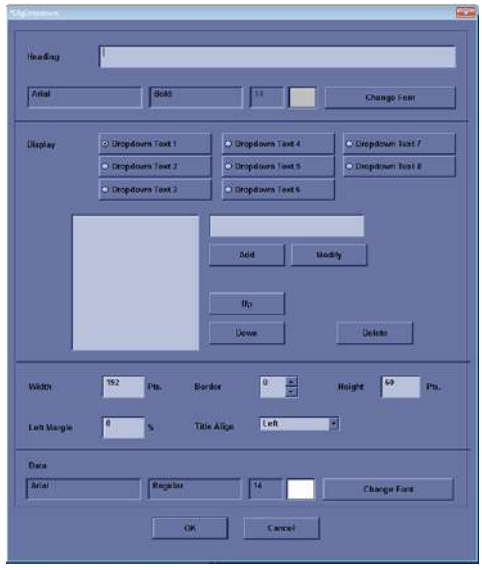


Figure 14-39. Dropdown Text Dialog Box

3. Select the appropriate display items:
   - Dropdown Text 1 - 8
4. Type the heading Text.
5. Modify box properties, the heading text and font, and data.
6. Select OK or Cancel.
7. Save the template.

   To keep the same template name:
   - Select Save from the File menu, and press Set. The Save Template dialog box opens.
   - Select Yes. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:
   - Select Save As from the File menu, and press Set. The Save Template As dialog box opens.
   - Enter the name of the new template, and press Set. The template receives the new name and adds “[user]”. For example, NewReport[user].

Customize Menu

Table 14-6: Customize Menu

	Description
Page Color	Changes the template color.
Preference	The Preference menu for Archive Information field displays.

Page Color

1. To change the page color, select Page Color from the Customize Menu and press **Set**. The Color dialog box displays.

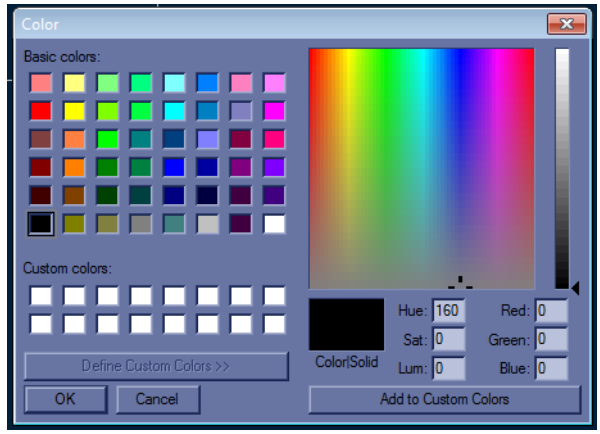


Figure 14-40. Color Dialog

2. Choose the desired color or create a new color.
3. Select OK or Cancel.

Setting Preferences

To set preferences for the Archive Information:

1. Select Preferences from the Customize menu and press **Set**. The Preference Box displays.

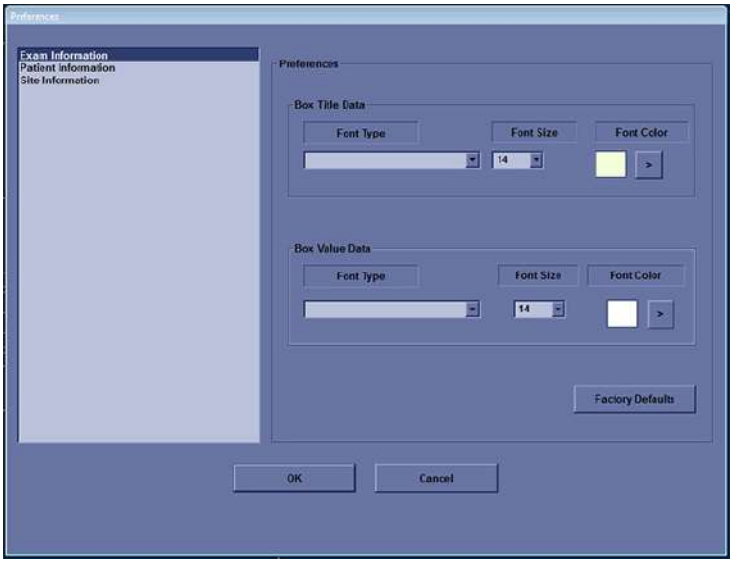


Figure 14-41. Preferences Box

2. Select the information to be modified and set the desired preferences.
3. Select OK or Cancel.
4. Save the template.

Report Presets

Utility Report Page

You can edit the report template and text on the Utility Reports page.

Templates

Left Column: The list of all templates (Factory Default, User defined, etc.)

Right Column: The list of templates displayed on the template list.

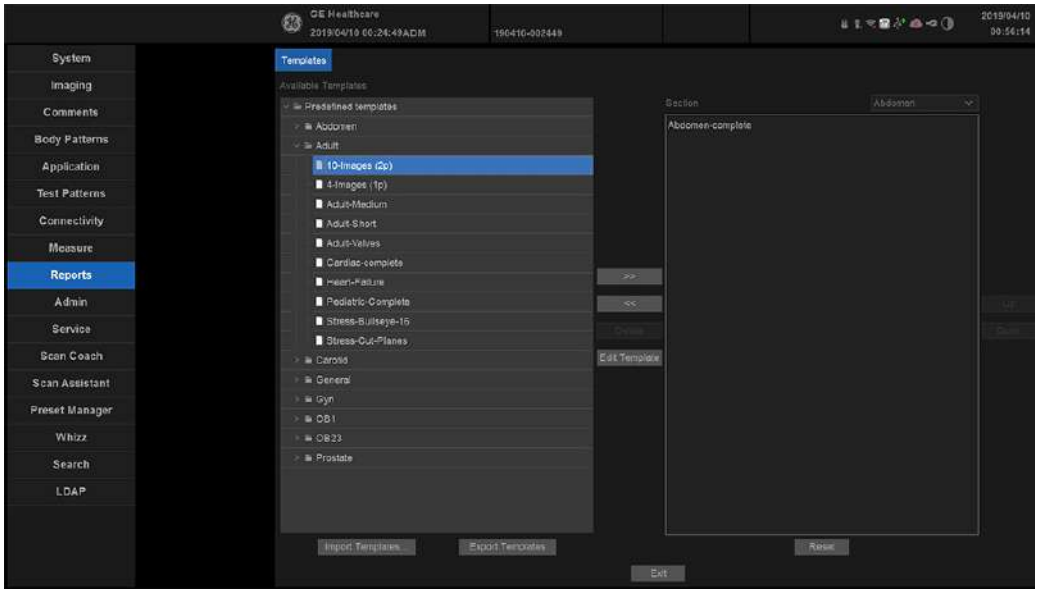


Figure 14-42. Report Template Tab

Templates (continued)

- To insert the template on the template list:
  a. Select the application which you want to insert into the template from the pull-down menu above the right column.
  b. Select the category (categories) and/or the template(s) in the left column.
  c. Select the right arrow to copy the template to the right column.
- To remove the template from the template list but not from the system):
  a. Select the template in the right column.
  b. Use the left arrow to remove the template from the right column.
- To edit the template or to make a new template:
  a. Enter Utility -> Reports -> Templates tab.
  b. Select the appropriate template in the left column.
  c. Select ***Edit Template***. The Template Designer page displays.
  d. Edit the template and save or save as with a new name.

  If you use Save As with a new name, the new template is added to the left column. See 'Designing Your Own Template' on *page 14-27 for more information.*
- To delete the template:
  a. Select the template to be deleted.
  b. Press ***Delete***.

NOTE: The Predefined templates can not be deleted.

Templates (continued)

- To export the template:

HINTS

Export templates to removable media (CDs, DVDs, USBs) so, at a later time, you can import those templates to a system. Export only works on templates, not data.

a. Insert the removable media in the drive.
b. Move the cursor to “Export Templates” and press **Set**. The available user-defined templates display in the Export Templates window.

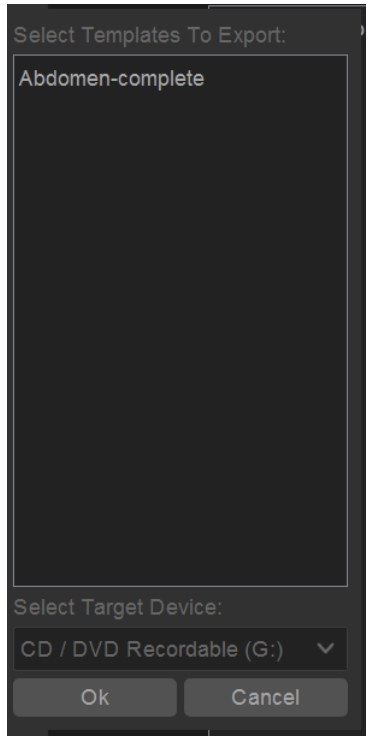


Figure 14-43. Export Templates

c. Select the template(s) to be exported.

*NOTE: To select multiple templates, use the **Ctrl** or **Shift** keys.*

d. Select the desired removable media under the Select Target Device field.
e. Select ***OK***.
f. Press ***F3*** to eject the media.

Templates (continued)

- To import the template:

NOTE: Import only works on templates, not data.

a. Insert the removable media with the report template(s) to be imported.

b. Select ***Import Templates***. The Import Template window displays.

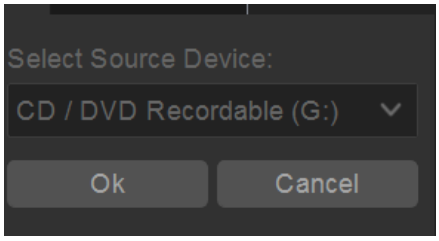


Figure 14-44. Import Templates

c. Select the Source Device from the pull-down menu. Select ***OK***.

d. Press ***F3*** to eject the media.

NOTE: Imported templates are stored in the User defined templates\General directory.

- To move the template from the left column to the right, or from the right to the left:

a. Select the template to be moved.

b. Select the Right Arrow or Left Arrow button.

- To move the template up or down in the right column:

a. Select the template to be moved.

b. Press the Up Arrow or Down Arrow button.

Chapter 15

Recording Images

Describes how to record images.

Introduction

Overview

A typical workflow for connectivity might be as follows (this setup varies by each user setup):

1. Select the dataflow, worklist for example.
2. Start a new exam. Select the patient.
3. Perform the patient scan.
4. Store images as multi-frame CINE Loops and Raw DICOM data via the assigned print key.
5. Check the DICOM Job Spooler via ***F4*** to verify delivery.
6. End the exam.
7. Permanently store images via the Patient menu.

Overview (continued)

During an examination, the operator stores data, images and cineloops for immediate purposes. The Versana Active includes an integrated patient archiving system for data and image storage.

The Versana Active enables also storing of data and images to external databases (Network Server, removable media).

Dataflow combines archive, data, DICOM, and onboard records into one coherent workflow. Destination devices are configured and assigned to the print keys. You select the appropriate dataflow (Portable, etc.) according to your requirements. You manage the patient database (local, shared, or via a worklist broker).

- DO NOT use the internal hard drive for long-term image storage. Daily backup is recommended. External storage media is recommended for image archive.

NOTE: *DICOM images are stored to external media storage devices separately from patient data, which also needs to be backed up to a dedicated database-formatted external storage media.*

- If working off-line with a dataflow pointing to a DICOM server, the images stored during the examination may have to be manually resent in the DICOM spooler when reconnecting the unit. Resend all jobs that failed or are on hold.

  In addition, stored images and cineloops can be saved to a removable media in the standard formats JPEG, MPEG, AVI and DICOM.
- You need to set up a protocol for locating images stored to external storage media for easy recall.
- GE IS NOT responsible for lost data if you do not follow suggested back-up procedures. GE WILL NOT aid in the recovery of lost data.

Refer to Chapter 16 Customizing your system for instructions on setting up your system’s connectivity.

Adding Devices

To add a destination device (printer, worklist server, etc.) to this system, see ‘Device’ on *page 16-77*.

To verify a DICOM device, see ‘Device’ on *page 16-77*.

Adding a Dataflow

To add a new dataflow to this system, see ‘Dataflow’ on *page 16-97*.

Adding Devices to a Print Button

To add devices/dataflows to a print button, see ‘Button’ on *page 16-98*.

Formatting Removable Media

To format removable media, see ‘Formatting removable media’ on *page 16-101*.

Storing Images and Cineloops

Overview

Images and cineloops that are stored during a current examination are displayed as thumbnails on the clipboard.

When an image is stored, all the additional information that is displayed is saved with it (i.e. probe and application selected, image setting, annotations or measurements).

See ‘Print Control’ on *page 16-63* for detailed settings related storing image/Cine.

The image archive is set by the dataflow selected (See ‘Dataflow’ on *page 16-97 for more information.*)

Storing an image

To store an image,

1. While scanning, press **Freeze**.
2. Scroll through the CINE Loop and select the desired image.
3. Press the Store key.

   The selected image is stored (per your preset instructions) and a thumbnail is displayed on the clipboard.

Storing a CINE Loop

A CINE Loop is a sequence of images recorded over a certain time frame. The stored CINE Loops are displayed chronologically on the clipboard.

CINE Loops can be stored at any time during scanning. You can choose to preview the CINE Loop before storage and save the CINE Loop directly, as described below.

Refer to ‘Print Control’ on *page 16-63* about the setting.

Previewing and Storing a CINE Loop

1. While scanning, press **Freeze**.
2. Determine the best CINE Loop to store.
3. Play the CINE Loop to review it.
4. Press the Store key.

Depending on whether the system has been configured to enable or disable “Preview Loop before store” (see ‘Print Control’ on *page 16-63*), the following procedures enable the CINE Loop to be stored directly.

Storing a CINE Loop Without Preview

If “Preview clip before store” is disabled,

1. While scanning, press the Store key.
2. The last valid CINE Loop is stored in the archive and a thumbnail is displayed on the clipboard.
3. Scanning resumes immediately.

Storing a CINE Loop With Preview

If “Preview clip before store” is enabled,

1. While scanning, press the Store key.
2. The last valid CINE Loop is previewed.
3. Adjust the CINE Loop, as necessary.
4. Press the Store key.

   The movie clip thumbnail is displayed on the clipboard.

Image/Data Management

Reviewing Patient Images

Please refer to ‘Retrieving and editing archived information’ on *page 4-20* for detailed information on the following:

- Retrieving and editing archived information
  - Searching for a patient
  - Reviewing a patient exam
  - Reviewing an image
  - Deleting a patient, exam, or image

Backup/Restore Images

Please refer to ‘Backup and Restore’ on *page 16-25* and ‘EZBackup and EZMove’ on *page 16-29* for detailed information.

Clipboard

The clipboard displays thumbnail images of the acquired data for the current exam. Images from other exams are not displayed on the current patient's clipboard.

All of the images can be viewed in the Active Images screen, available from the display or from the Archive menu.

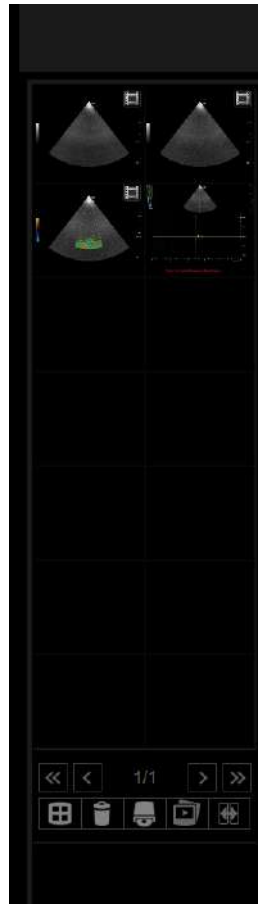


Figure 15-1. Clipboard

Saving the image /cine to the Clipboard

The active image/cine is stored and placed on the clipboard when you press the Store key. The clipboard contains preview images with enough resolution to clearly indicate the contents of the image. CINE Loops are indicated by a movie clip icon.

Previewing Clipboard Images

1. Select the ***Cursor*** key to obtain a cursor arrow.
2. Move the **Trackball** to position the pointer over the clipboard image you want to recall.
3. An enlarged preview of the image is displayed on the left-hand side of the monitor.

Recalling Images from the Clipboard

To recall images from the clipboard,

1. Select the ***Cursor*** key to obtain a cursor arrow.
2. Move the **Trackball** to position the pointer over the clipboard image you want to recall.
3. Press **Set** to recall the image.

To delete an image from the clipboard

1. Select the ***Cursor*** key to obtain a cursor arrow.
2. Place the cursor on the clipboard image you want to delete, then press **Set** to select the image.
3. Place the cursor on the Delete icon and press **Set**.

   A warning message is displayed asking the user to confirm the action to perform.
4. Select ***Yes***.

Save As

Images and cineloops can be saved to a removable media or Network storage to View on a **Windows PC** in the following standard formats:

- Still images: JPEG, JPEG2000, DICOM and RawDICOM (Raw data + DICOM)
- Cineloops: WMV, AVI, DICOM and RawDICOM (Raw data + DICOM)

Images can also be stored as MPEG format as described on ‘MPEGvue’ on *page 15-24*

To save images:

1. Insert the media into the drive or connect the USB drive to the system.

NOTE: If you have not formatted the media, the media will be formatted when you select Save As.

2. On the scan screen, press the **Cursor** key. The arrow cursor displays.
3. Place the cursor on the image or CINE Loop in the clipboard to be saved and press **Set**. The image displays on the screen.

Save As (continued)

4. Select save as icon in the lower, right-hand corner of the screen. The SAVE AS menu appears.

NOTE: If you save the image as an .avi file or .wmv file, run the CINE Loop before you select Menu.

NOTE: You can not save 2D cineloop image as a .jpeg file.

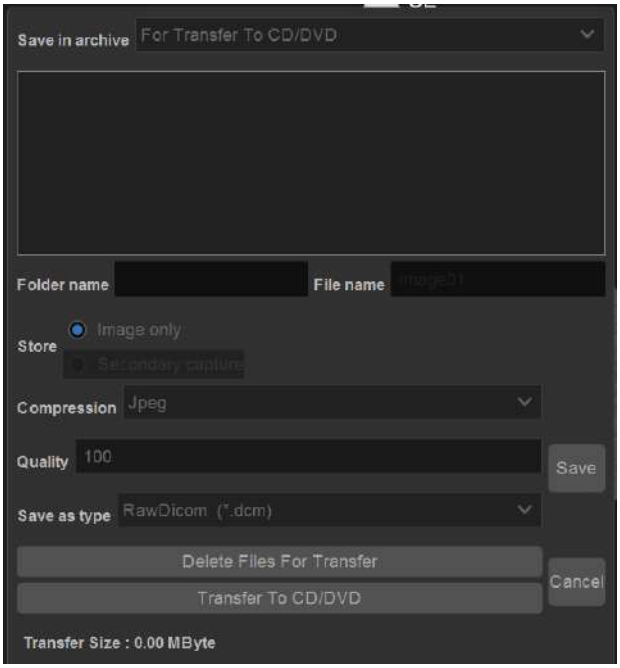


Figure 15-2. Save As Menu

5. Select the media from the Save in archive pull-down menu.
6. Folder name: You can create the folder for the saved file.
   - Default is blank (The folder is not created)

NOTE: You can not edit the folder name when the folder is opened.

7. File name: The name of the file is automatically filled in, but you can change the file name in the File name field.

*NOTE: DO NOT use the following special characters when saving images: !, @, #, $, %, ^, &, *, (,), |, :, ;, <, >, ?, /, ~, [,], {, }.*

Save As (continued)

8. Store: Select Image only or Secondary capture.
   - Image only: Saves only the ultrasound image area.
   - Secondary capture: Saves the ultrasound image area, title bar, and scan information area. Not available for DICOM or RawDICOM images.

NOTE: If you select "WMV" for Save as type, Secondary capture is disabled.

9. Compression: Specify Compression.
   - None
   - Rle
   - Jpeg
   - Jpeg2000

NOTE: If you select "WMV" for Save as type, Compression is disabled.

10. Quality: Specify image quality (between 10-100). A high quality setting gives a lower compression.

NOTE: If you select "WMV" for Save as type, Quality is disabled.

11. Save as type: Select one of the following.
    - RawDICOM: saves the still image or CINE Loop in both GE raw format and DICOM format.
    - DICOM: saves the still image or CINE Loop in pure DICOM format.
    - AVI: Saves the CINE Loop in avi format.

NOTE: Store "Image Only" is available if you select AVI for Type.

    - JPEG: Saves the still image in jpeg format.
    - WMV: Saves the CINE Loop in wmv format

NOTE: WMV type is only available with CINE loop image.

    - JPEG2000: Saves the still image in JPEG2000 format.

    If you want to see all data saved onto the SSD, select "AllFiles(.*)". All the data names display in the window.

NOTE: The Save button is disabled when you select "AllFiles". Select each Save as type when you want to save data.

Save As (continued)

12. Press ***Save***.

    The images are saved directly to the USB drives or Network storage whenever you press Save.

    If you select “Transfer to CD/DVD”, the images are saved to the SSD buffer.

    - If free space of the destination is not enough to save all selected images, then warning dialog appears.
    - If the same file name is existed in the destination, the warning dialog displays.

      OK: Overwrite file and continue to save selected images.

      Cancel: Do not save images.

13. Repeat this step for as many images/clips to be saved.
14. After you have added all of the images/loops you want to save and are ready to write to the CD/DVD, transfer all the images at the same time. Press ***Save As*** --> Transfer To CD/DVD.

    A progress bar lets you know that the “Media transfer is in progress.”

    If total transfer size is bigger than CD/DVD free space size, then only the files that can be copied to CD/DVD are transferred. After the copy is finished, the warning dialog displays. Warning dialog shows total required file size and transferred file size. Press ***OK*** and you need to change CD/DVD and press ***Transfer to CD/DVD*** again.

Save As (continued)

15. If you do not want to save the image to CD/DVD, select "***Delete Files for Transfer***" All images are deleted.
16. Press **F3** to eject the media. Select CD/DVD Recordable or USB drive.

NOTE: The Report Save As feature is somewhat different. As soon as you select to save a report, the report is saved. (CD/DVD)

NOTE: If you save 3D image as an AVI file, an annotation text "COMP" appears at the top of the saved image which represents the compressed image.

Table 15-1: Image Format

	.avi format	.wmv format	MPEGvue in Data Transfer
B, B+CF	Multi frames	Multi frames	Multi frames
B+Dopploer	Single frame	Multi frames	Single frame
B+M	Single frame	Multi frames	Single frame
3D	Multi frames	N/A	Single frame

NOTE: Verify the saved image works correctly on the Windows PC. If the image does not work, please save it again on the Versana Active.

’SaveAs’ Images

You can select the images at one time which you want store by SaveAs in the Active Image screen.

Features are almost same as usual SaveAs. See ‘Save As’ on *page 15-10 for more information.*

NOTE: We suggest that you save the images page by page with “SaveAs” Images in Active Images. It takes time if you have many images or raw data.

NOTE: If the image has a filmstrip icon, this indicates a CINE Loop, which gets saved as a .wmv file; single images are saved as a jpeg file.

NOTE: ’SaveAs’ Images function doesn't support images which are query/retrieved.

1. In the Active Image screen, place the cursor on the image or CINE Loop to be saved and press **Set**. You can select multi images with multi pages.
2. Press ***’SaveAs’ Images*** on the monitor display. The SaveAs menu appears.

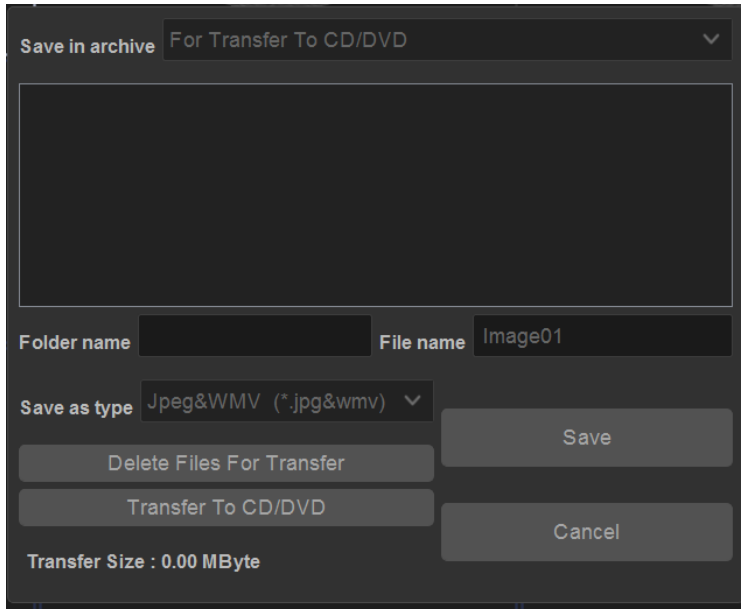


Figure 15-3. ’SaveAs’ Images Menu

'SaveAs' Images (continued)

3. Ensure that Jpeg&WMV is selected, then press ***Save***.

   If you are saving to USB, images are transferred as soon as you press Save; if you are saving via Transfer to CD/DVD, you need to save images to the hard drive, then images are transferred when you select Transfer to CD/DVD. See below.

Storing Images with More Resolution

To store images with more resolution than is available with the JPEG selection, select Save As and select AVI as the Save As Type. You can save single images as .avi files.

Table 15-2: Store Options

Image Type	Store as Image Only	Store as Secondary Capture
CINE Loop	Gives you a loop of just the image (no title bar and scan information).	Gives you a single image of the video area. DO NOT DO THIS BECAUSE YOU DO NOT KNOW WHICH IMAGE FROM THE LOOP THAT YOU ARE GETTING.
Still Image	Gives you a single image (no title bar and scan information).	Gives you a single image of the video area.

Data Transfer

Overview

The user can select and access the Exam Transfer services from the Exam Data Transfer screen.

- Import
- Export
- Worklist
- MPEGvue
- Q/R (Query/Retrieve)

NOTE: Ensure that all patients are exported or backed up BEFORE deleting them.

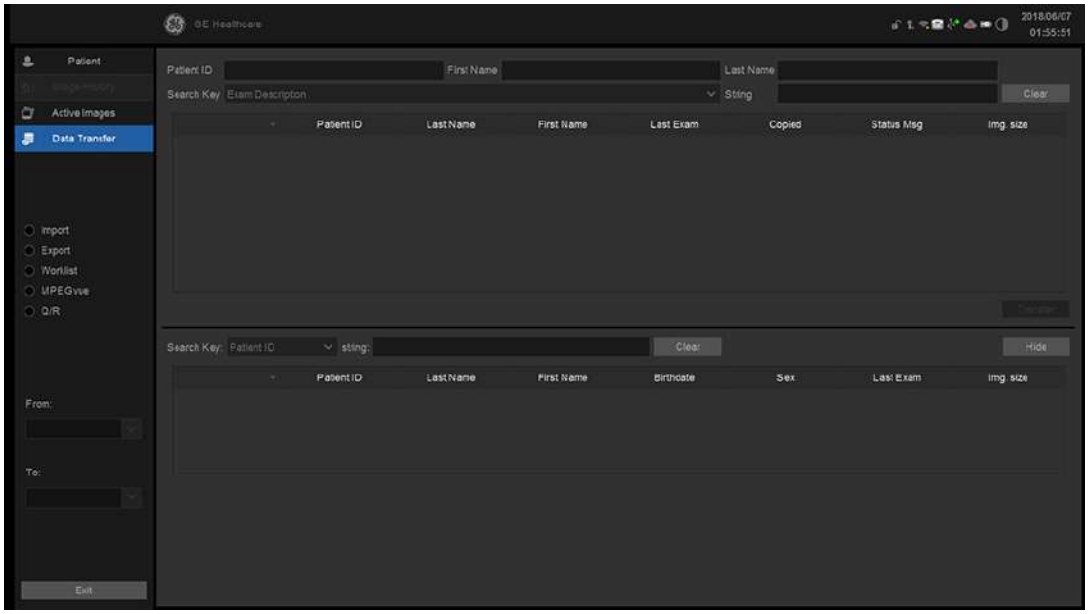


Figure 15-4. Exam Data Transfer Screen

Export/Import

To move exams from one Ultrasound system to another system or to back up/retrieve exam information, you need to export/import exam information.

NOTE: Both database information and images are exported. No data is deleted from the local archive when exporting data.

NOTE: Export/Import patient records may take more than ten (10) minutes. Please allow sufficient time to export/import patients.

NOTE: You MUST verify the media you use BEFORE performing Export/Import. You must do this once each session. If you encounter problems, eject the media and then re-insert the media; then try the Export/Import again.

NOTE: We STRONGLY recommend that you verify files on Eject when using Export.

Exporting Data

To export an exam(s) to a compatible Ultrasound system:

1. Format and label the removable media. Answer Yes/OK to the messages.

NOTE: The system formats the unformatted CD-R/DVD-R automatically when you select Export on the data transfer screen.

2. Press **Active Images** and select ***Data Transfer***.
3. The Data Transfer screen is displayed. Select Export.
4. “Local Archive-Int.HD” displays on the Transfer From pull-down menu and the patient list included in the Local Archive displays.

Exporting Data (continued)

5. Select the destination at the Transfer To pull-down menu.
6. Select the patient(s) to export by using the Transfer From search field (the upper field).

   You can use Windows commands to select more than one patient.

   To select a consecutive list of patients, click the cursor on the first name, move the cursor to the last name, then press and hold down the Shift+right Set key to select all the names.

   To select a non-consecutive list of patients, click the cursor at the first name, move the cursor to the next name, then press and hold down the Ctrl+right Set key, move the cursor to the next name, then press and hold down the Ctrl+right Set key again, etc.

   You can also search for patients via the Search key and string.

   Or, use Select All to select all patient.

NOTE: You need to use your best judgment when moving patients' images. If there are lots of images or loops, then only move a few patients at a time.

7. Press ***Transfer***. The progress bar displays during the transfer.
8. Once the transfer is complete, press ***F3*** to eject the media. Specify that you want to finalize the media.

NOTE: To display exported DICOM or Raw DICOM images on a PC, you need the dedicated viewer.

Importing Data

To import an exam(s) to another Ultrasound system:

1. At the other Ultrasound system, insert the media.
2. Press **Active Images** and select ***Data Transfer***.
3. The Data Transfer screen displays. Press Import.
4. Select the media from the Transfer From pull-down menu.
5. The Transfer From search field shows the patients available for import from the removable media you just loaded onto the system.
6. Select the patient(s) or the exam(s) from the list to be imported.
7. Press Transfer. The progress bar displays during the transfer.
8. Please wait for the patient information to be copied to this Ultrasound system. Informational messages appear while the import is taking place.
9. Press ***F3*** to eject the media.

NOTE: Use Import to restore EZBacked up and/or EZ Moved images.

NOTE: You can retrieve from the media to the Local SSD, playback, or process exam information on the system as Raw Data.

NOTE: L6-12-RS/12L-RS Thyroid/Breast Color raw data is not compatible on High and Low configuration. L6-12-RS/12L-RS Thyroid/Breast Color raw data acquired from High configuration cannot be used on Low configuration (will have artifact), and vice versa.

Query/Retrieve (Search and retrieve the data from DICOM device)

NOTE: For Query/Retrieve to find a patient, the patient MUST have a Patient ID.

NOTE: Before you retrieve data from the Worklist server, make sure that default IP address is input in the Default Gateway field in Utility -> Connectivity -> TCP/IP.

Query

1. Press **Active Images** and select ***Data Transfer***. The Data Transfer screen displays.
2. Select Q/R. The patient/exam list in the Local Archive displays in the Transfer To section.

NOTE: Only "Local Archive - Int.HD" is enabled for Transfer To.

3. Select the Query/Retrieve server from the Transfer From pull-down menu.

NOTE: The server is configured in the Utility screen. Multiple servers are able to be configured.

4. Press ***Query*** in the Transfer From section. The Query is performed.
5. The server's patient list displays.

*NOTE: Press **Query** again to refresh the list.*

Retrieve

1. Select the patient(s) or the exam(s) to be retrieved from the patient list.
2. Select ***Transfer***. Retrieve the data from the Query/Retrieve Server. The progress bar displays during the transfer.

Worklist (Search and retrieve the Patient/Exam information)

NOTE: Before you retrieve data from the Worklist server, make sure that default IP address is input in the Default Gateway field in Utility -> Connectivity -> TCP/IP.

1. Press **Active Images** and select ***Data Transfer***. The Data Transfer screen displays.
2. Select Worklist. The patient/exam list in the Local Archive displays in the Transfer To section.

NOTE: Only "Local Archive - Int.HD" is enabled for Transfer To.

3. The Worklist used last time is displayed on the monitor display. Press Query to refresh the list or select another Worklist server from the Transfer From pull-down menu.

NOTE: The worklist server is configured in the Utility screen. Multiple servers are able to be configured.

NOTE: You can configure whether the auto-refresh worklist has been enabled/disabled in the Utility screen. The system automatically refreshes the list when the exam data transfer accesses the Worklist server or changes the Worklist server.

4. Select the patient(s) or the exam(s) from the list.
5. Press Transfer. The progress bar displays during the transfer.

MPEGvue

You can see the exam data on the **Windows PC** by using MPEGvue.



DO NOT transfer more than 50 patients at one time.



DO NOT use lossy compression images, such as JPG or MPEG images, for diagnosis.



MPEGvue function is NOT compatible with other LOGIQ series products. Do NOT share the same USB Drive for MPEGvue between Versana Active and other LOGIQ series products.

NOTE: If you want to label the removable media, format it before use. The system formats the unformatted CD-R/DVD-R automatically when you select MPEGvue on the data transfer screen.

1. Insert the removable media.
2. Select **Patient** and select ***Data Transfer***. The Data Transfer screen displays.
3. Select MPEGvue. The Patient list, which has images in the Local Archive, displays in the Transfer From section.

   Start the media formatting automatically except USB HDD. Label the media with “YYYYMMDD_#”.

NOTE: Only “Local Archive - Int.HD” is enabled for the Transfer From.

4. Select the media from the Transfer To pull-down menu.

NOTE: Select Removable CD Archive if you use CD-R or DVD-R.

MPEGvue (continued)

5. Select the patient(s) or the exam(s) from the list.

NOTE: If you press Clear in the Transfer From and Transfer To section, all the search criteria clears and the list is refreshed accordingly.

NOTE: Trying to save 3D loops using MPEGvue, the 3D loops are saved as still images. Use "Save As" to save 3D loops.

6. Press ***Transfer***, then select ***OK*** to continue. The progress bar displays during the transfer.

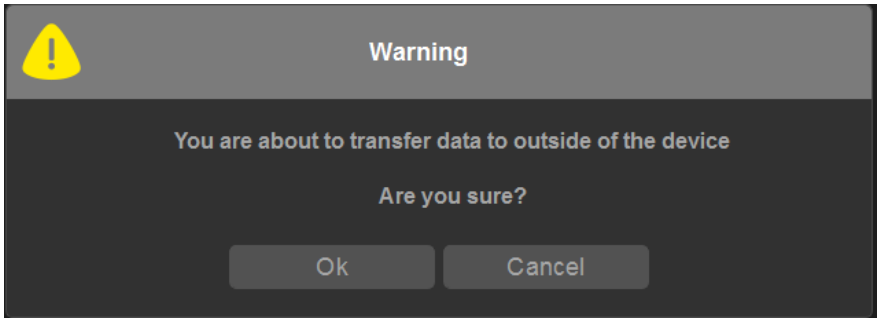


Figure 15-5. Warning message

MPEGvue (continued)

When the transfer complete, the message OK displays in the Status Msg field and Operation completed message displays on the bottom of the screen.

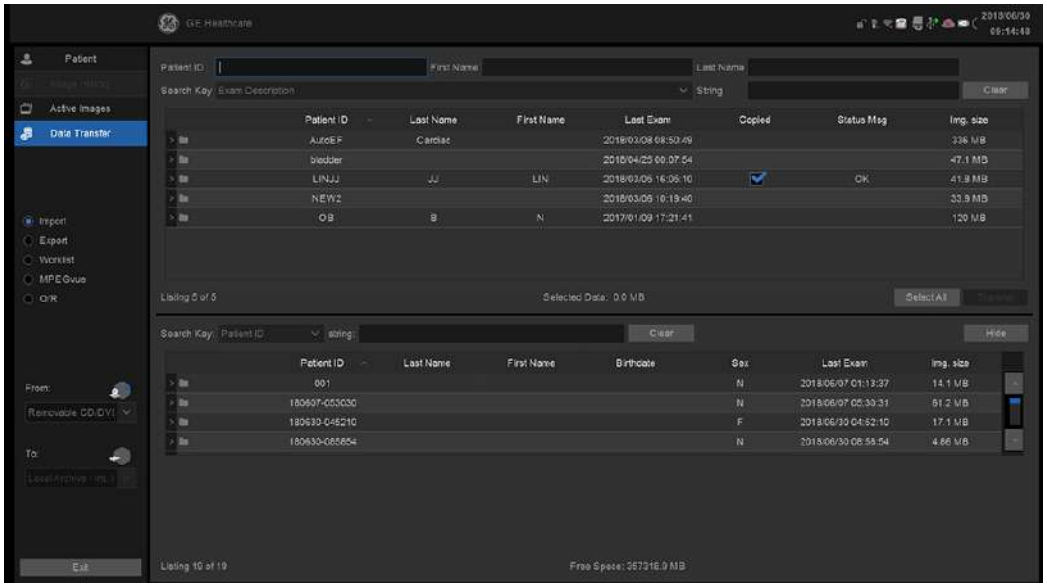


Figure 15-6. Completed patient

When the message “Not enough free space” displays during MPEGvue,

- CD-R/DVD-R: Please change to a new media.
- USB HDD/USB Flash Drive: Backup the current data in the USB device to the other media and clear the USB device.

MPEGvue (continued)

NOTE: *If an error dialogue and message displays during MPEGvue, reduce the number of exams to gain space, and perform MPEGVue once again to a new media (CD-R/ DVD-R) or the USB device.*

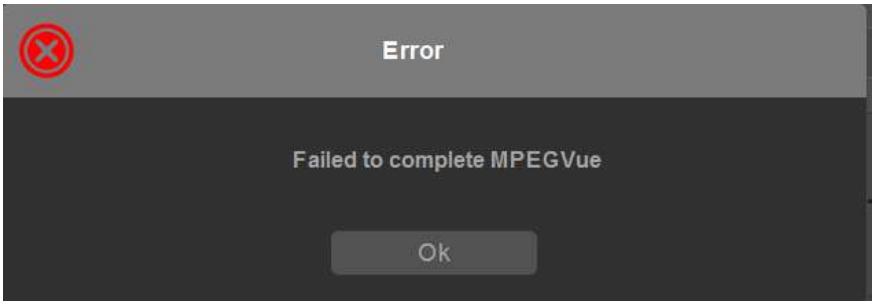


Figure 15-7. Error Dialogue

7. When the transfer is completed, press ***Exit*** to return to the scan screen and then eject the media.

NOTE: *The capacity of media (number of patients) and the writing time depends on the data size of each patient. If you try to save an image larger than 1GB using MPEGvue, it may take a few hours to save the image.*

NOTE: *Before you read the media on the PC, finalize the media on the Versana Active.*

NOTE: *Measurement graphics from the exam performed on the system are maintained with the MPEG exam.*

CAUTION

DO NOT use “Verify” when ejecting the CD/DVD if you transferred multiple patients to the media using MPEGVue.

MPEGvue (continued)

CAUTION

DO NOT modify the folder name and the folder configuration of MPEGvue which is created in the media.

NOTE: Select "MPEG4 Windows Media Format (.wmv)" when you save the Cine image from CD/DVD to the SSD while reviewing it on your PC.*

NOTE: Measurement graphics from the exam performed on the system are maintained with the MPEG exam.

1. To read MPEG exams stored on a CD-R/DVD-R:
   - Insert the MPEGVue CD-R/DVD-R in the computer DVD drive. The MPEGVue Patient list is displayed.

   To read MPEGVue exams stored on other media:
   - Insert the media containing the MPEG exams and double-click on the file Start_MPEGvue.bat. The MPEGVue Patient list is displayed.

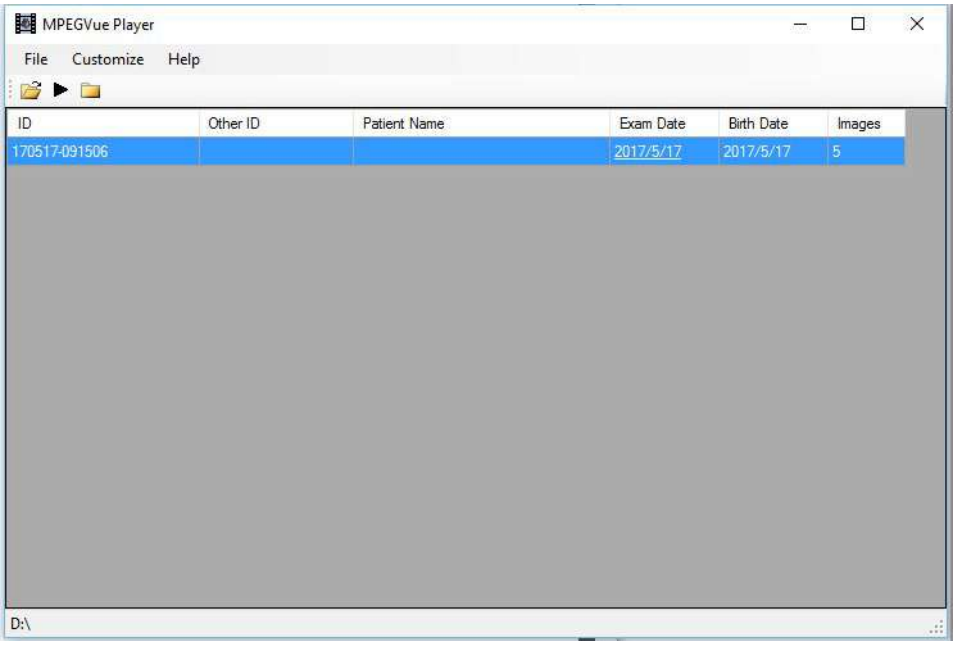


Figure 15-8. Patient list

MPEGvue (continued)

2. Select the desired examination date to display the images. The MPEGVue screen is displayed.

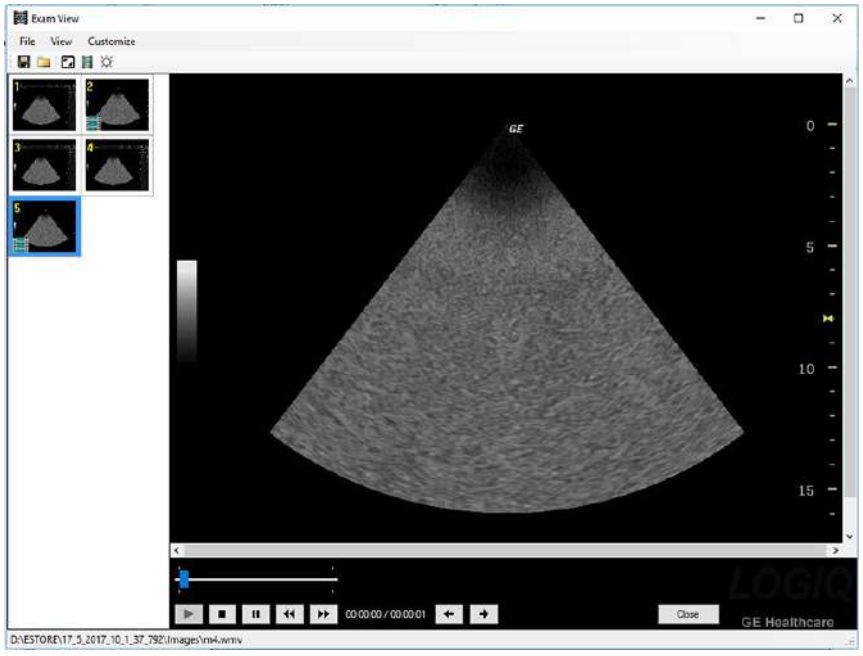


Figure 15-9. MPEGvue screen

1. Freeze/run cineloop
2. Scrolling tool when in Freeze
3. Display full screen
4. Save images as .wmv, .bmp, jpeg or .avi
5. E-mail support
6. Video Setting Adjustment
7. Display previous/next image
8. Display the MPEGVue patient list

MPEGvue (continued)

E-mail support

Sending images or examinations by e-mail.

NOTE: E-mail support and a desktop icon cannot be used on a non-English PC.

The selected image or the entire examination can be sent by e-mail as an attachment, providing the computer has a mail client application (e.g. MS Outlook, MS Outlook Express).

To send an image

1. Select the image to send on the clipboard and select the e-mail button. The e-mail dialogue window displays.
2. Check Send current image. The e-mail address window displays.
3. Select an existing address or enter a new address. Up to 10 addresses can be stored.
4. Select Send.
5. The e-mail with the image is sent and a Confirmation window displays. Select OK.

The person receiving the e-mail can open the image in Windows Media Player.

E-mail support (continued)

To send an examination

Examinations sent by e-mail as attachments are zip-compressed, encrypted and password protected. If the size of the exam is too large to be sent as a single attachment, it is divided into several zip file attachments and sent in several e-mails.

1. Open the examination to send in MPEG viewer and select the e-mail button. The e-mail dialogue window displays.
2. Check Send current exam. The e-mail address window displays.
3. Select an existing address or enter a new address.
4. Select ***Send***. The Password window displays.
5. Enter a password and select ***OK***. The exam is sent and a confirmation window displays. Select ***OK***.

To open an MPEGvue exam from an e-mail

1. In the MPEG viewer press the E-mail button. The E-mail dialogue window is displayed.
2. Check Receive exam. The Password window is displayed.
3. Enter the password and select ***OK***. The exam is uncompressed and opened in the viewer and the E-mail(s) containing the MPEG examination is deleted.

Send To (Send the image to the DICOM Device)

"Send To" sends the selected exam for a patient and to interactively Send-To the exam to a destination DICOM device configured on the system. An exam in this case includes its images and any corresponding Structured Report.

1. Search and select the patient and press ***Review***. The Exam View screen displays.
2. Select the exam which has the images and press ***Send to***.

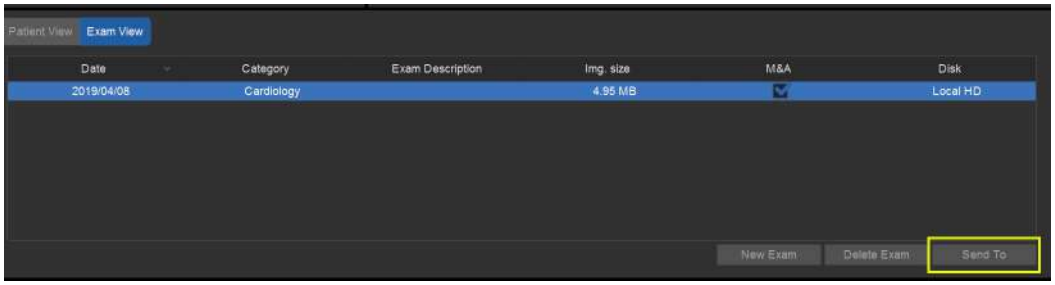


Figure 15-10. Send To

NOTE: You can only select "Local Archive - Int.HD" for Workflow.

3. The "Send To" Dialogue box displays.

   Select the destination device and press ***OK***.

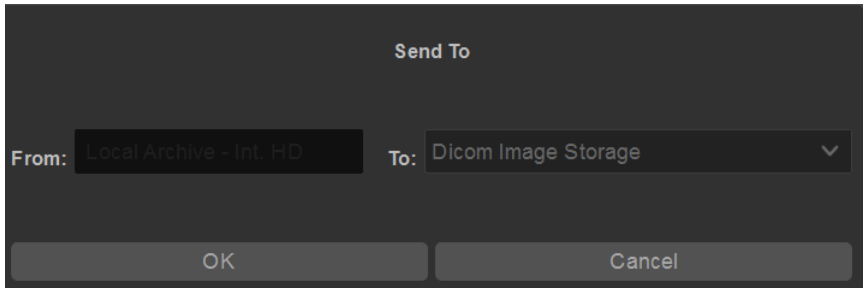


Figure 15-11. Send To Dialogue Box

NOTE: The destination device is configured in the Utility screen. Multiple devices are able to be configured.

The successful/unsuccessful message is displayed at the bottom of the screen.

Selectable Send To

"Selectable Send To" sends the selected images for an exam and to interactively Send-To the exam from Local Archive or DICOM Read to a destination DICOM device configured on the system.

1. Select a patient or an exam in the Archive menu.
2. Go to Active Images.
3. Select an image (images) and press ***Send To***. Send To Dialogue displays

NOTE: If the image is not selected, warning dialog is displayed and no image is sent.

4. Select a destination from pull-down menu and press ***OK***.

   "Selected image(s) is (are) send to" message displays on the status bar.

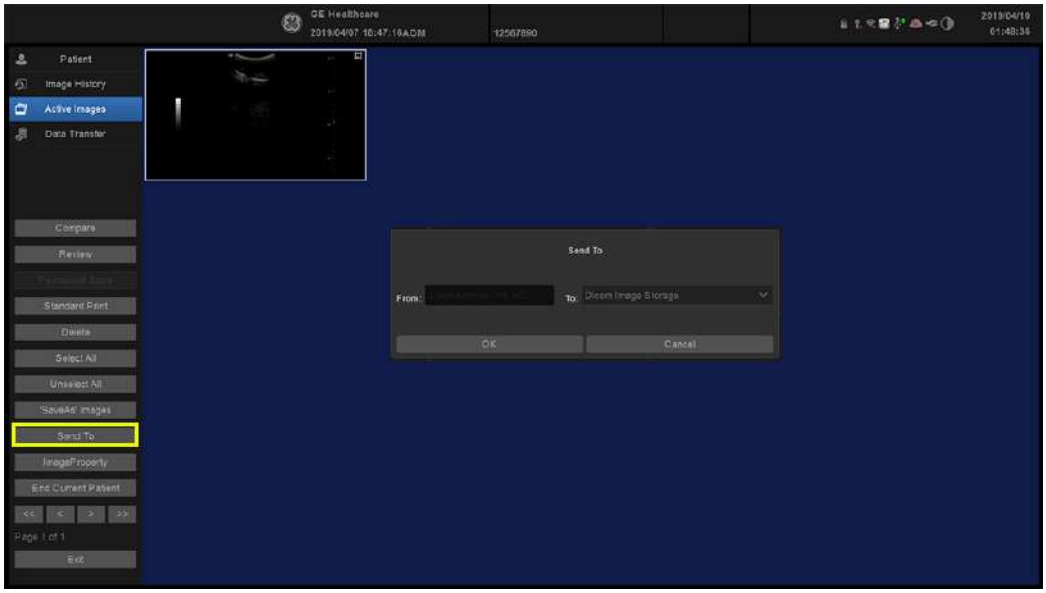


Figure 15-12. Selectable Send To Dialogue Box

Using the DICOM Spooler

To monitor/control DICOM jobs, press ***F4***. You can view, resend, redirect, and delete images from the DICOM spooler by selecting a job, then specifying the action to be performed on this job.

NOTE: If you find a failed job(s) in the Spooler, please remove the failed job(s) from the Spooler.

Table 15-3: Spooler status description

Status	Description
Hold	Waiting for user activity. Select Resend or Send-To to complete the job.
Pending	Waiting for the previous job(s) to finish (a previous job may be Active or Pending). No user interaction required.
Append	Not completed. Example 1: Direct Storing job. Waiting for more images or the end of the exam (by selecting New Patient or End Current Patient). Example 2: Print job with 3x3 images has only 8 images. Waiting for one more image or the end of the exam (by selecting New Patient or End Current Patient).
Active	Signifies network activity (or connection attempt).
Success	Sent successfully.
Failed	Unsuccessful job attempt. Job stays in spooler. Select Retry or Delete to complete the job.
Done	Finished successfully.

External drives

Removable media

Removable media can be used for the following purposes:

- Long-term image storage: the final destination of the images, after they are moved out of the system hard disk by using the EZBackup/EZMove (see ‘EZBackup and EZMove’ on *page 16-29*).
- Backup of patient database and system configuration presets (see ‘Backup procedure’ on *page 16-26*)
- Export to copy a set of patient records to a third party DICOM review station.
- MPEGVue: review exported images on a Windows computer (see ‘MPEGvue’ on *page 15-24*).
- Copy of system configuration presets between to units using the Backup/Restore feature (see ‘Preset synchronization’ on *page 16-28*).
- SaveAs: Save images as JPEG, WMV, AVI, DICOM and RawDICOM for review on a standard Windows computer.

About removable media and long-term image storage

If CD/DVD is used, it is recommended to use Archive Grade or Medical Grade CD/DVD.

No matter which media is used, it is always highly recommended to make a backup of the media, which is the responsibility of the customer.



HINTS

Keeping your media disc in an original media case or caddy all the time will prevent it from becoming dirty or damaged.

DVD Drive

The DVD drive (Standard) is located at the top of the cabinet.

You can use these to perform software upgrades, image archiving and service diagnostics.

You can use the following media for the multi-drive:

- CD-R (maximum writing speed: 48x)
- DVD-R (maximum writing speed: 16x)



DO NOT use or attempt to format CD-RW, DVD+R, DVD+RW or DVD-RW on the Versana Active DVD Multi-Drive.



Due to the variety of disk types, we cannot guarantee that every media is available.

Recommendation concerning CD and DVD handling

To avoid data loss, never touch the recordable surface of a disk. Handle the disk only by the outer edge. Do not place it face down on a hard surface. Fingerprints or scratches will make the disk unusable. Before usage, verify that the disk surface has no visible scratches. If there are any scratches, do NOT use the disk.

Insert a media

Insert a media with the eject button on the DVD drive.



When you put a media into the DVD drive, please make sure the media is placed in the right position. If the media is not placed in the right position, the media may be damaged.



Make sure that the Disk tray is securely placed in each device during system operation. Mechanical damage may occur if other objects hit the tray.

Eject a media

1. To eject a media, always press ***F3***. **DO NOT** use the eject button on the drive.
2. The Eject device menu is displayed. Select ***CD/DVD Recordable***.
3. When ejecting a media, you are prompted if you wish to finalize the disk. If you do not finalize the disk, you can add files to the media at a later time. However, you may not be able to view the files stored on this disk with a standard PC. Finalizing a media, allows you to view these files using most standard PCs.

   To verify that the data was successfully transferred to the media, Press ***F3***, then select “Finalize” --> “Yes and Verify Files.” If there was a corruption to the media during an operation, the message, “An error occurred on the last disk. Please discard it and start over.” appears. In this case, please redo the operation with new media.

*NOTE: When you press **F3** with a blank media inside the DVD drive, the finalization menu displays. You can select “Yes” or “Yes and Verify Files”, but the system ejects the media without doing anything.*

USB Hard Disk Drive and USB Flash Drive

Cautions and Warnings



DO NOT use the USB Hard Disk Drive for patient storage. The USB HDD is not considered a permanent storage device.



If you connect the USB HDD to a virus-infected computer, the USB HDD may also be infected with a computer virus.



DO NOT plug in TWO Bus-powered USB Drives at the same time.



When exporting a large quantity of patient data to the USB-HDD, the system may crash. If this occurs, the export is not completed properly. First, delete the data remaining in the USB-HDD, and then try again with a smaller number of patients.



Disconnect the USB HDD when performing EZMove on the system.



DO NOT use “Select All” when you export the patient data to the USB-HDD.

Cautions and Warnings (continued)

NOTE: Do not insert USB Memory devices (hard drives or flash drives) that contain multiple partitions into the scanner. Use single partitioned USB Drives.

NOTE: Some USB memory device manufacturers allow for executable partitions or ship pre-formatted new USB memory devices with multiple partitions pre-configured. BEFORE inserting any memory device into the scanner, insert it into a PC or MAC to verify that there is only a single partition. If multiple partitions exist, contact the USB manufacturer for the steps in reformatting the memory to a single partition.

USB Ports

You can use the USB port next to the control panel for USB flash drives.

Formatting the USB Flash Drive

NOTE: Before using the USB flash drive, format it in Utility -> Connectivity -> Removable media.

To format the USB Flash Drive

1. Insert the USB Flash Drive into the front USB port.
2. Select Utility--> Connectivity--> Removable Media.
3. Select USB Drive from the Removable Media pull-down menu.
4. Type the USB Flash Drive label.
5. Press ***Format***.

Eject a USB Flash Drive/USB HDD

1. To eject a removable media, always press ***F3***. **DO NOT** use the eject button on the drive.
2. The Eject device menu is displayed. Select the relevant media.
3. Select USB Drive from the pull-down menu to disconnect the USB Drive. Disconnect the USB drive after the success dialogue is displayed.

   Remove the USB Drive from the USB port.

NOTE: *If the unsuccessful dialogue is displayed, retry after a while.*

NOTE: *Verify is NOT available on Flash Drives or Hard Disk Drive media.*

MPEGvue (Data Transfer)

To transfer a patient/exam to the USB Flash Drive or USB HDD,

1. Insert the USB Drive into the front USB port.
2. On the Active Images menu, select ***Data Transfer***, then ***MPEGvue***. Specify USB Drive in the transfer To: pull-down menu. Select the patient/exam you want to transfer. Press ***Transfer***.
3. When the transfer has been completed, press ***Eject (F3)***.



After transferring images to a USB Drive using MPEGVue, verify that the images have actually transferred to the USB drive.

Backup/Restore

To Backup/Restore to/from a USB Flash Drive or USB HDD,

1. Insert the USB Drive into the front USB port.
2. Press Utility -> Syetem ->Backup/Restore. Select the USB Drive as the media.
3. Follow instructions for Backup/Restore. See ‘Backup and Restore’ on *page 16-25 for more information.*
4. When the Backup has been completed, press ***Eject (F3)***.

SaveAs

NOTE: See 'Save As' on page 15-10 for more information.

To save images to the USB Flash Drive or USB HDD,

1. Insert the USB Drive into the front USB port.
2. Select the image(s) to be saved.
3. Select ***Save As*** menu in the lower, right-hand corner of the screen. Select the USB Drive as the archive media.
4. Specify: Image only or Secondary Capture, type of compression, quality, and image save format (Raw DICOM, DICOM, Avi, Jpeg, or WMV).
5. Press ***Save***. When the images have been saved, press ***Eject (F3)***.

NOTE: If you perform the SaveAs function to the USB drive (:\Export) by RawDICOM format and review the data on your PC, the title of the data appears as ":\GEMS_IMG\2006_Oct\08(date)\xxxxx(PatientID)".

Direct SaveAs

You can save the image directly to the USB Drive just by pressing a **Print** key.

NOTE: "Direct SaveAs" doesn't supports WMV type.

1. Insert the USB Drive into the USB port.
2. Select ***Save As*** from the pull-down menu in Utility -> Connectivity -> Service. Press ***Add***.
3. Select ***Save As*** in the list. Rename it in the Name field if needed.
4. Select USB Drive in the Destination field.
5. Verify the service.
6. Press ***Save***.
7. Assign Save As to the appropriate print key in Button tab.
8. Display the image on the monitor and press the print key.

Export/Import

To export/import exams using the USB Flash Drive or USB HDD,

NOTE: Before you export exams to the USB HDD, check "Export to USB HDD: Create DICOMDIR" in Utility -> Connectivity -> Miscellaneous. If you uncheck this parameter, you must import the data to review.

1. Insert the USB Drive into the front USB port.
2. On the Patient menu, select Data Transfer, then Export/Import. Specify USB Drive in the transfer To: pull-down menu. Select the patient/exam you want to transfer. Press ***Transfer***.
3. When Export/Import has completed, press ***F3***.

EZBackup (USB HDD only)

1. Select "USB Drive" on the Utility -> System -> Backup/Restore -> EZBackup/Move -> Media.
2. Follow instructions for EZBackup. See 'EZBackup and EZMove' on *page 16-29 for more information.*
3. When EZBackup has completed, press ***F3***.

NOTE: "Media capacity for estimate (MB)" in Utility -> System -> Backup/Restore -> EZBackup and EZMove are not effective when the Media is "USB HDD". It only applies to the CD and DVD.

Network Storage Service

You can save patient data/images to the PC directly with the following functions, if you select Network Storage service.

- Save As
- Export/Import
- MPEGvue
- DICOM Read

NOTE: DO NOT share the folder used for Export/Import with other ultrasound systems. It causes loss of data if two or more systems access to the same folder. Please create the unique folder for each system.

NOTE: Before you export patient data/images using Network Storage, check "Export to Network Storage: Create DICOMDIR" in Utility -> Connectivity -> Miscellaneous. If you uncheck this parameter, you must import the data to review.



CAUTION

After MPEGVue to Network Storage, the MPEGVue patient may not be listed in the To list. Make sure to confirm on the destination to storage whether the copy of data succeeded.

Potential risk

- Patient/Image data might not be sent at all with inaccurate network configuration.
- Patient/Image data might be lost by disconnecting the network.
- Patient/Image data might be damaged by unstable network/ data coupling.
- Patient/Image data might be mixed up by network/data coupling.
- Patient/Image data might be sent to wrong destination if network configuration is not inaccurate.
- The system might be attacked by a virus and vulnerable infection.
- Network is not connected by IP address conflict.

Versana Active Setup

NOTE: Create a Share folder on your PC on the network before continuing with this setup.

1. Select ***Utility -> Connectivity -> Device***.
2. Select ***Add***.
3. Type the computer name in the Name field and Static IP address in the IP Address field.

NOTE: Only use alphanumeric characters for the name.

NOTE: If you change Static IP Address after export, you cannot import patient data/image. In this case, type previous IP address again before import.

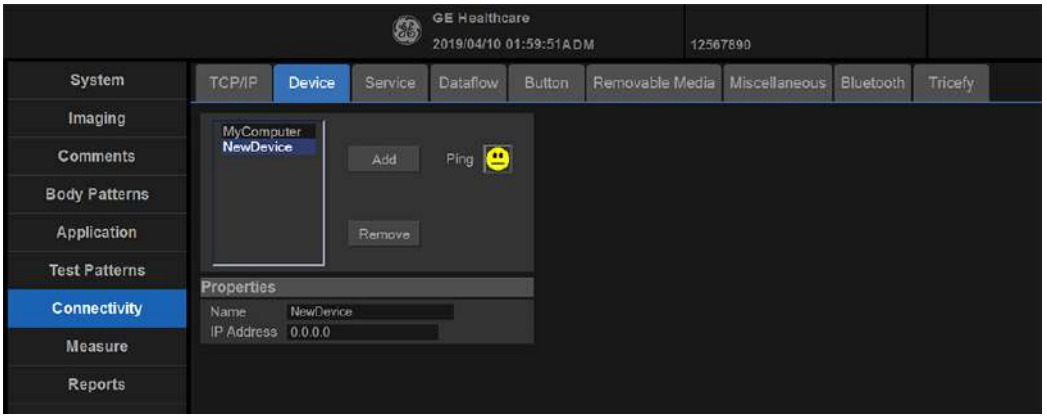


Figure 15-13. Network Storage Service setup - Device

Network Storage Service (continued)

4. Select ***Ping*** to verify the icon changes (smiley face appears).
5. Select Service.

   Select the ***Network Storage*** from the pull-down menu. Select ***Add***.

   Specify the properties for this service.

   - Name: Enter unique name that identifies this service.

   NOTE: Do not use the same name for any other Service or device.

   - Password: Enter the password used for logging onto the PC.
   - User name: Enter the user name used for logging onto the PC.
   - Shared Dir: Enter the Share name of the folder.

   NOTE: Only use alphameric characters for the Shared Dir.

6. Select ***Save*** and select ***Verify*** to verify the icon changes (smiley face appears).

   It takes a long time to access Network Storage Service by the condition of the network.

Setup on your PC

Check with your network administrator about the LAN connection and setting method of the shared folder.

Printing Options

Setting up Digital Peripherals

You set up digital peripherals from the Utility --> System --> Peripherals menu.

NOTE: Printing using a standard printing service overrides the orientation and N-up feature of the printer preferences. Printer preferences are set up in the printer folder (via Utility-->System -->Peripherals. Select Properties under Standard Printer Properties).

Digital Printer Setup

There are two steps to do when setting up a digital printer: 1) follow the procedure below for each printer, then 2) set up specific properties for each printer if you need.

Follow this procedure for each printer:

1. Select Utility--> Connectivity--> Service. Add the Standard Print. Highlight Standard Print in the Service list. Select the printer from the Printer pull-down Properties menu. For the UP-D898 printer, select “Portrait” as orientation.
2. Type the printer name in the Name field. This name is used on the Button screen. After you select the printer from the Printer pull-down Properties menu again, it turns white. Press ***Save***.
3. Select ***Button***. Select the appropriate print key (Print1, Print2, Print3) from the Physical Print Buttons section as shown in the figure below. Select the printer from the MyComputer column and press >> to move it to the Printflow View column. Press ***Save***.

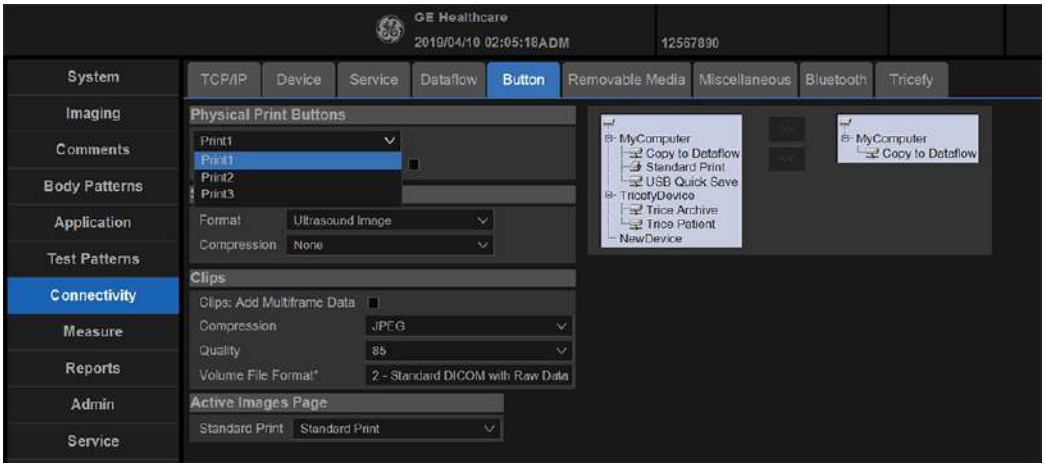


Figure 15-14. Print buttons

Sony UP-D898 Instructions

Follow these steps to set up the paper size of Sony UP-D898 printer.

1. Press Utility-->System-->Peripherals. Select the UP-D898 from the pull-down menu under Standard Printer Properties. Click ***Properties***.

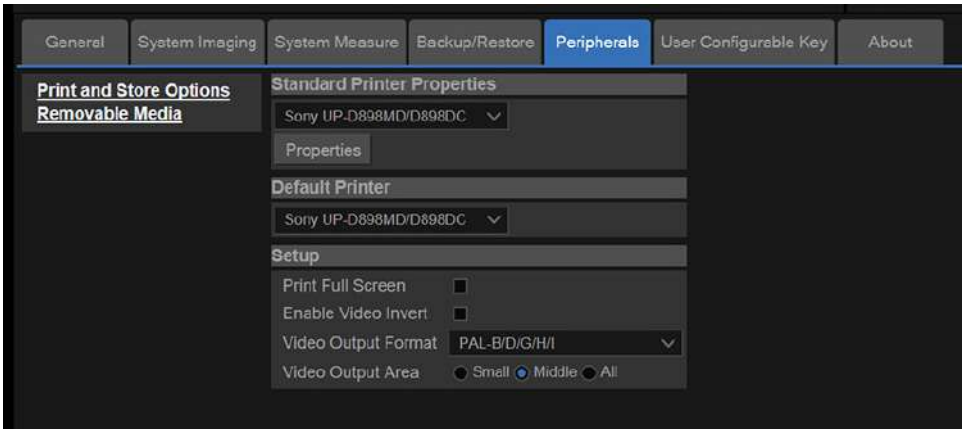


Figure 15-15. Properties

2. Click Print -> Printing Preferences at the menu of Properties Window.

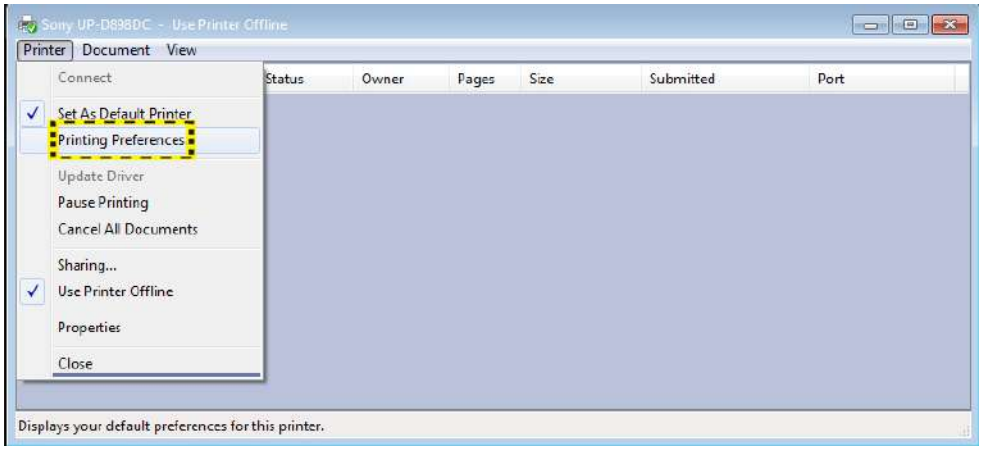


Figure 15-16. Properties

Sony UP-D898 Instructions (continued)

3. Select Paper Size. Press ***Apply***. Press ***OK***.

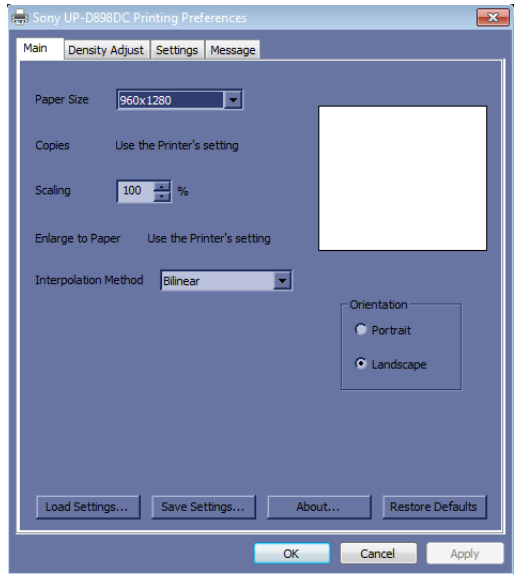


Figure 15-17. Printing Preferences

4. Press ***Save***, then ***Exit***.

Setting up the Off-Line Paper Printer

You can connect an off-line paper printer via the USB connection.

CAUTION

When using external commercial printers, the PUI (Printer USB Isolator) shall be used to provide safety protection.

CAUTION

ONLY plug in devices to the USB ports located at the side of the system WHILE the Versana Active is NOT powered up. If you plug in a device while the Versana Active is powered on, your system may become unusable.

CAUTION

DO NOT place an off-line paper printer inside the patient environment. This assures compliance to leakage current.

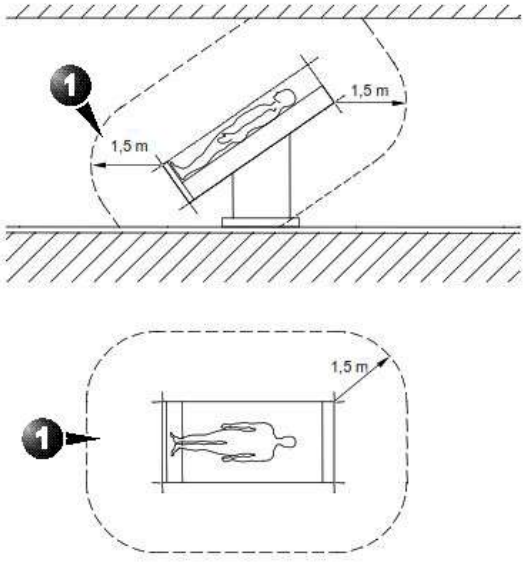


Figure 15-18. Patient Environment

Setting up the off-line paper printer

NOTE: The printer driver is customized for the Versana Active at the factory; you do not need to change the settings.

1. Connect the printer to the USB port.
2. Select ***Utility***--> ***Connectivity***--> ***Service***. **Add** the *Standard Print* service.



Figure 15-19. Connectivity -> Service Screen

3. Select the printer from the Printer pull-down Properties menu.

NOTE: After selecting the printer, the field turns white.

4. Set the following parameters in Properties:
   - *Rows*=3
   - *Columns*=2
   - *Orientation*=Portrait
   - *Right Margin (mm)*=10
5. Type the printer name in the *Name* field.

NOTE: This name is used on the Button screen.

Setting up the off-line paper printer (continued)

6. Press ***Save***, then select the Button tab.
7. Select the Print key from the control panel.
8. Select the printer from the MyComputer column and press ">>" to move it to the Printflow View column.

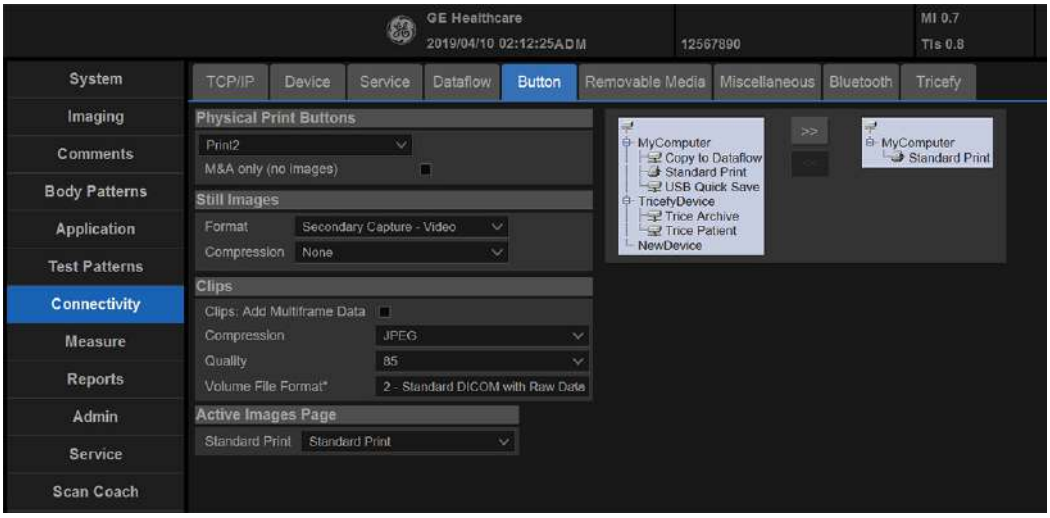


Figure 15-20. Connectivity -> Button Screen

9. If you want to assign this printer to the Standard Print Button on the Active Image Screen, select this printer at the Active Image Printer section.
10. Press ***Save***.

NOTE: If you want settings other than 1 image per sheet, or 2x3 sheet, or to improve the image quality, refer to the manual that came with the printer.

Setting up the Printer to Print Reports

To set up the Off-Line Printer to print reports,

1. Enter ***Utility***--> ***System***--> ***Peripherals***.
2. Select the printer from Default Printer pull-down menu.

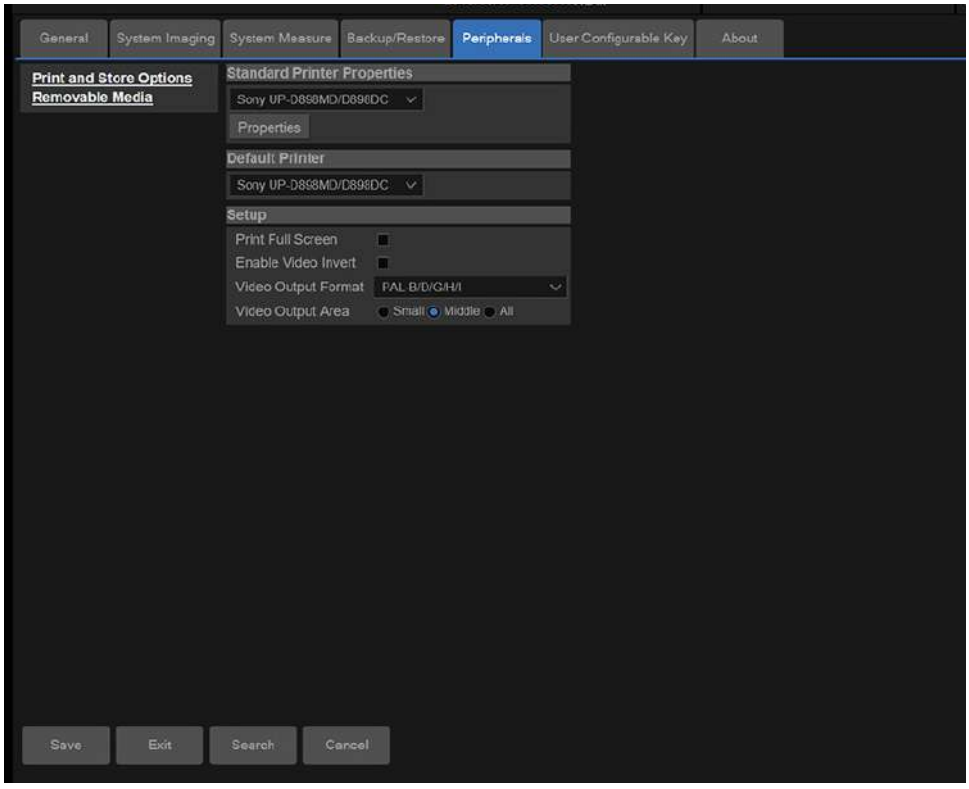


Figure 15-21. Report Printer Setup

3. Press **Save**.
4. Press ***Print*** on the Report screen to print the report.

Chapter 16

Customizing Your System

Describes how to create system, user, and exam presets.

Preset

Overview

Preset Menus provides the following functionality:

- **System presets**. View and update general system configuration settings, measurement settings, backup and restore data and configuration files.
- **Imaging presets**. View and update exam and imaging parameters.
- **Comments presets**. Set up comment libraries by application.
- **Body Patterns presets**. Set up body pattern libraries by application.
- **Application presets**. Configure application- and user-specific settings.
- **Test Patterns presets**. Helps configure system settings.
- **Connectivity Setup**. Define connection and communication setup, including exam dataflow information.
- **Measure presets**. Customize exam studies, create measurements, set up manual sequencing, and create OB Tables.
- **Reports presets**. Allows you to edit report template, diagnosis codes, and report comments. Please refer to Chapter 14 for more information.
- **Admin presets**. Perform system administrator activities such as setting up user IDs and logon formats.
- **Service**. Activates the Service Browser.
- **Scan Coach**. Create, import/export, and manage Scan Coach programs.
- **Scan Assistant**. Create, import/export, and manage Scan Assistant programs.
- **Preset Manager**. Activates the imaging preset to create, edit, import and export user imaging presets.
- **Search**. You can search for a parameter on the Utility pages (Measure, Reports, and Service pages cannot be searched.)

To access these functions, select the ***Utility*** on the keyboard, then select the appropriate menu key.

System Presets

Overview

System presets allows you to view or change the following parameters:

- **General** – Location, Date/Time, General User Interface, Ttile bar, Trackball, Key Usage, Utility, Scan Coach and Audio configuration
- **System Imaging** – Biopsy Guides, Automatic Wide Screen, QAnalysis Statistics Value Display, Image Control and Display configuration
- **System Measure** – Measurement, Cursor and Results Window configuration, SonoBiometry (AFB)
- **Backup/Restore** – Backup, Media, EZBackup/EZMove, Restore, Detailed Restore of User Defined.
- **Peripherals** – Print and Store Options, Standard Printer properties, Default Printer and Setup configuration
- **User Configurable Key** – User Defined keys, Keyboard key.
- **About** – System software, patent, and image information

Changing system parameters

To change system parameters:

1. Select ***Utility*** on the keyboard.
2. Then select ***System***.

   The System screen is displayed.
3. On the monitor display, move the **Trackball** to select the tab that has the information you want to change.
4. Select values for the parameters you want to change.
5. To save the changes, select the ***Save*** button. Select ***Exit*** to return to scanning. In some cases, you may need to reboot the system for the change to take effect.

System/General Preset Menu

The System/General screen allows you to specify hospital name and system date and time.

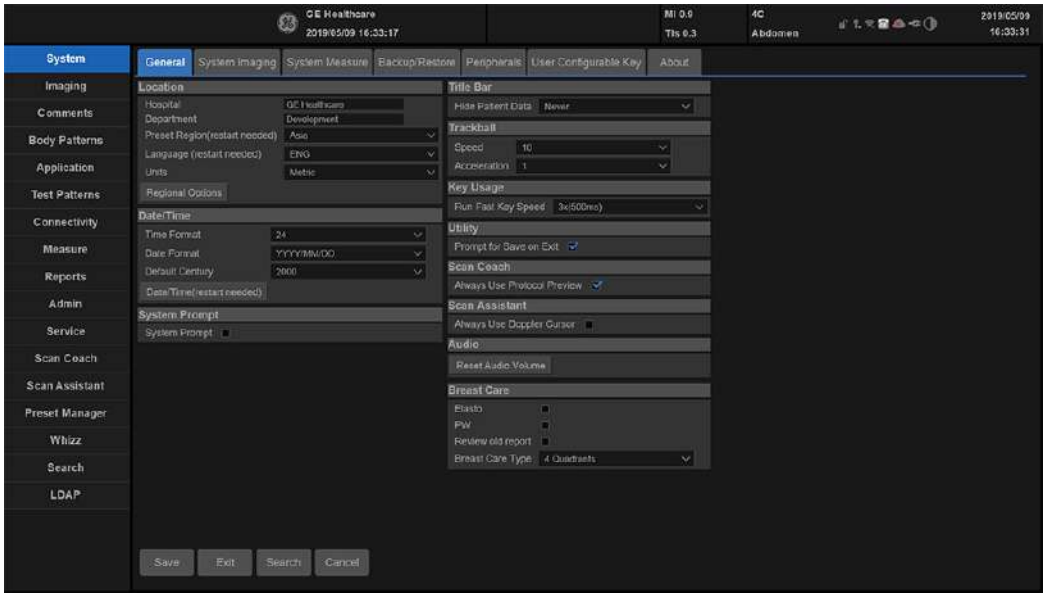


Figure 16-1. System/General Preset Menu

System/General Preset Menu (continued)

Table 16-1: Location

Preset Parameter	Description
Hospital	Type the *institution*'s name.
Department	Type the institution's department name.
Preset Region (restart needed)	Select region (None, Asia, EU, China, India, USA_LA, EAGM).
Language (restart needed)	Select the appropriate language from the drop-down list.
Units	Select metric or US units of measurement.
Regional Options	Select to set up the keyboard.

Table 16-2: Date and Time

Preset Parameter	Description
Time Format	Select the time format: 12 Hr. AM/PM or 24 Hr.
Date Format	Select the date format: dd/mm/yyyy, mm/dd/yyyy, or yyyy/mm/dd.
Default Century	Select the default century for the system to use.
Date/Time	Select to display the Date/Time Properties window, to specify the system date, time, time zone, and to auto adjust for daylight savings time.

Table 16-3: Title Bar

Preset Parameter	Description
Hide Patient Data	When set to Always, patient information is removed from the scanning screen Title bar and when storing images; or you can set this to remove patient information only when storing the image (On Store); or Never. Note: Upon recall of images with measurements, Dual image, the DICOM image is recalled. In this case, there is no patient data burned into the DICOM image. If you DO NOT want this to occur, set this to Never.

Table 16-4: Trackball

Preset Parameter	Description
Speed	Set how fast you want the Trackball to move while performing actions such as tracing the anatomy. 0=Slow; 20=Very Fast
Acceleration	Set how fast you want to trackball to move across the display. 0, 1, and 2 with 0 being the slowest acceleration.

System/General Preset Menu (continued)

Table 16-5: Key Usage

Preset Parameter	Description
Run Fast Key speed	Select the maximum value of the key interval when running Fast Key.

Table 16-6: Utility

Preset Parameter	Description
Prompt for Save on Exit	If selected, the system prompts you to save data when you select exit without saving.

Table 16-7: Scan Coach

Preset Parameter	Description
Always Use Protocol Preview	Show the protocol preview before the Scan Coach starts.

Table 16-8: Scan Assistant

Preset Parameter	Description
Always Use Doppler Cursor	Use the Doppler Cursor when you activate Scan Assistant.

Table 16-9: Audio

Preset Parameter	Description
Reset Audio Volume	Resets audio volume to default configuration.

Language Keyboard Setup

NOTE: You must apply the changes on each setup page before moving to the next page.

1. In **Utility** -> **System** -> **General**, select Regional Options.

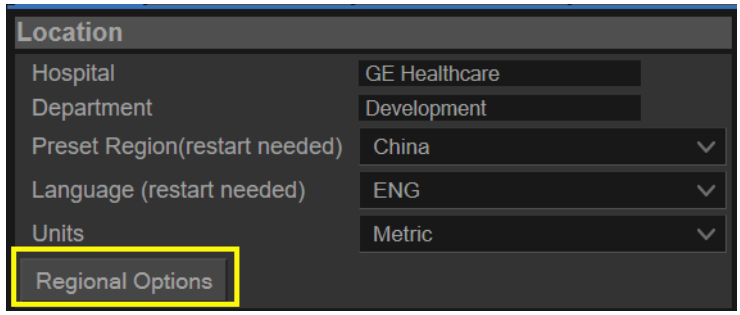


Figure 16-2. Region Option

2. Under Formats select desired language.

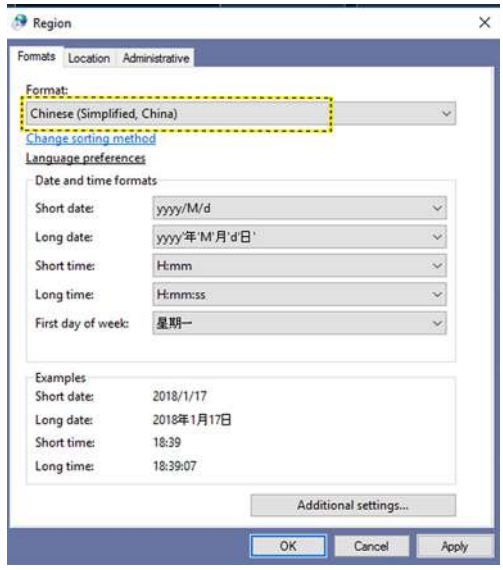


Figure 16-3. Formats selection

Language Keyboard Setup (continued)

3. Under Location select desired location.

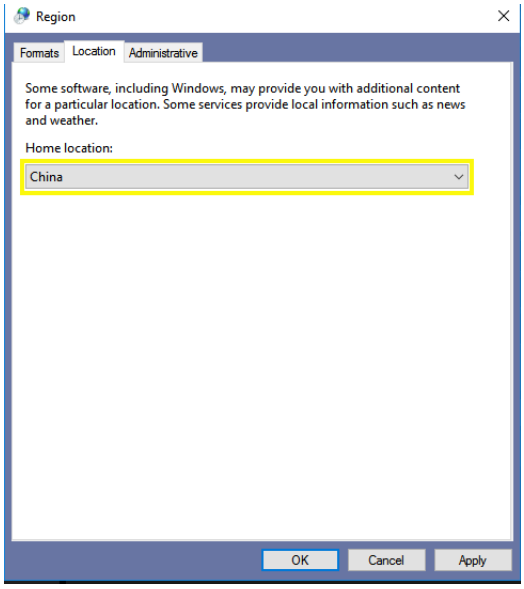


Figure 16-4. Regional Options

4. Under **Administrative**, select **Change system locale...**.

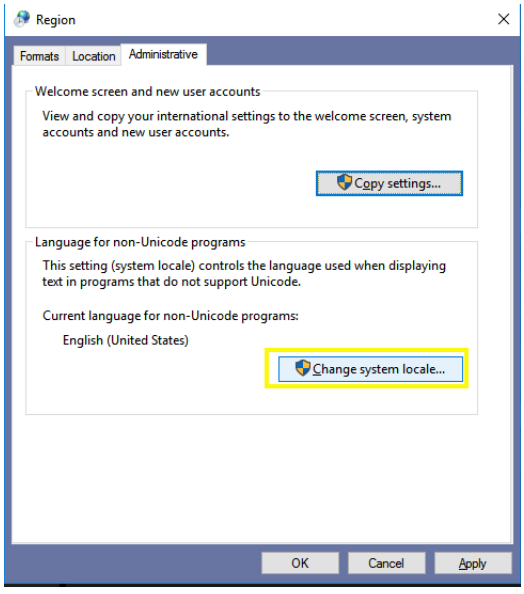


Figure 16-5. Administrative

Language Keyboard Setup (continued)

5. Select **Apply** when below message displays.



Figure 16-6. Change Regional Options

6. Select the language under **Current system locale**, then select **OK**.

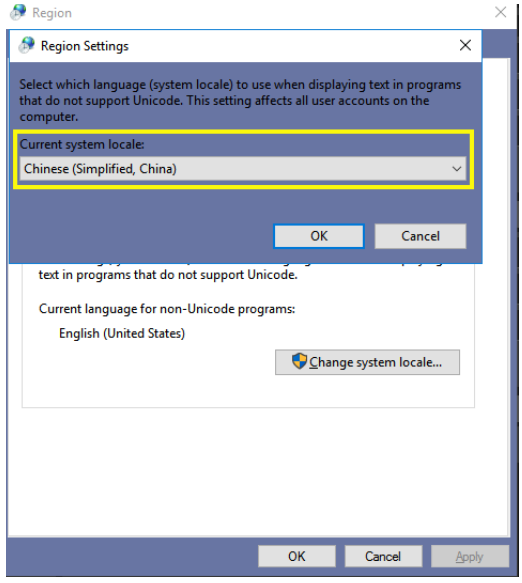


Figure 16-7. Set Language

Language Keyboard Setup (continued)

7. Select **Cancel** not to restart the system.

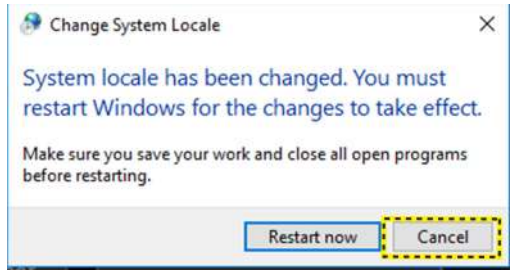


Figure 16-8. Restart Request

8. Select Close to close the window.

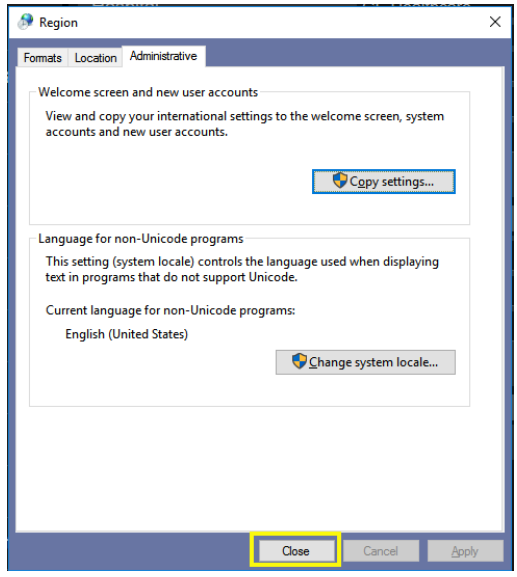


Figure 16-9. Close Window

Language Keyboard Setup (continued)

9. Select **Cancel** to return to the system setting.

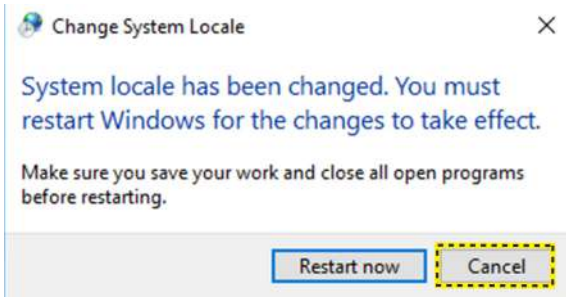


Figure 16-10. Restart Request

10. In **Utility** -> **System** -> **General**, select the language as desired, and then select **Save**.



Figure 16-11. Change the System Language

11. Click **OK** to restart the system.

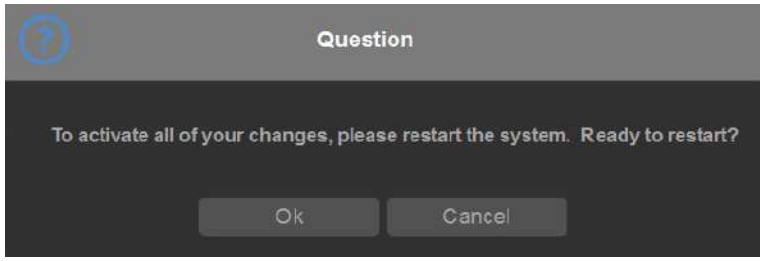


Figure 16-12. Restart Request

12. When the system boots up, the system appears in the selected language.

*NOTE: To have the settings take effect, you **MUST** restart the system.*

NOTE: Press Alt+Shift to change the input language.

System/System Imaging Preset Menu

The System/System Imaging screen allows you to specify parameters for biopsy guides, automatic wide screen, QAnalysis statistic value display and image control and display.

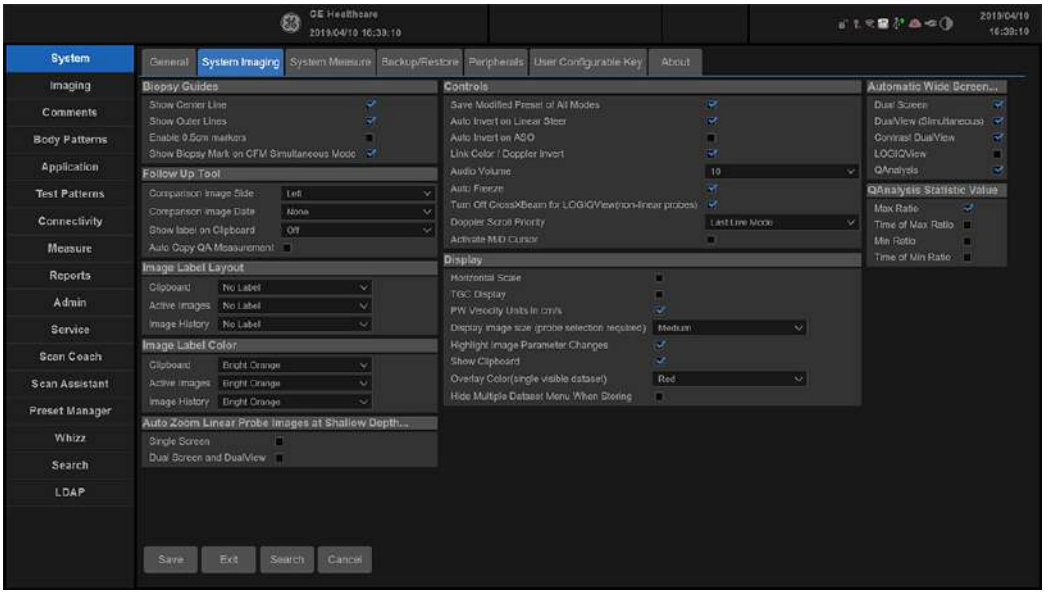


Figure 16-13. System/System Imaging Preset Menu

Table 16-10: Biopsy Guides

Preset Parameter	Description
Show Center Line	Displays center biopsy guideline.
Show Outer Lines	Displays outer biopsy guidelines.
Enable 0.5cm markers	Activates biopsy depth markers every 0.5cm.
Show Biopsy Mark on CFM Simultaneous Mode	Displays the Biopsy Guideline on the image while in Simultaneous Mode.

System/System Imaging Preset Menu (continued)

Table 16-11: Automatic Wide Screen...

Preset Parameter	Description
Dual Screen	Automatically switch to Wide Screen when in Dual Screen.
DualView (Simultaneous)	Automatically switch to Wide Screen when in Simultaneous DualView Screen.
Contrast DualView	Automatically switch to Wide Screen when in Contrast DualView Screen.
LOGIQ View	Automatically switch to Wide Screen when in LOGIQ View.
QAnalysis	Automatically switch to Wide Screen when in QAnalysis.

Table 16-12: QAnalysis Statistic Value Display

Preset Parameter	Description
Max Ratio	When selected, the system displays the maximum Ratio of Color (Power) Doppler pixels in each ROI in Statistics result.
Time of Max Ratio	When selected, the system displays in which frame the maximum Ratio of Color (Power) Doppler pixels occurs in Statistics result.
Min Ratio	When selected, the system displays the minimum Ratio of Color (Power) Doppler pixels in each ROI in Statistics result.
Time of Min Ratio	When selected, the system displays in which frame the minimum Ratio of Color (Power) Doppler pixels occurs in Statistics result.

Table 16-13: Controls

Preset Parameter	Description
Save Modified Preset of All Modes	Save all modes preset after modified
Auto Invert on Linear Steer	When selected, for auto calcs, automatically inverts the timeline if needed when using ASO.
Auto Invert on ASO	Automatically inverts the spectrum with ASO.
Link Color/Doppler Invert	When selected, the Doppler timeline scale inverts along with the color ROI.
Audio Volume	Adjusts the Audio Volume.
Auto Freeze	Automatically freezes the system after 120 seconds of inactivity.
Turn Off CrossXBeam for LOGIQView (non-linear probe)	Deactivates CrossXBeam when you activate LOGIQView.
Doppler Scroll Priority	Set to 2D, Doppler, or Last Live Mode.

Table 16-14: Display

Preset Parameter	Description
Horizontal Scale	Select to display width markers.
TGC Display	Select to display TGC curve.
PW Velocity Units in cm/s	Select to change scale on timeline from meters per second to centimeters per second.
Display image size (probe selection required)	Select Default or Large.
Highlight Image Parameter Changes	Select if you want the display to indicate which controls you adjusted by highlighting the new value on the display.
Show Clipboard	Deselect to hide the clipboard.
Overlay Color (single visible dataset)	Select Red, Green, Blue or BW.
Hide Multiple Dataset Menu When Storing	Select to hide the Multiple Dataset Menu when storing.

Table 16-15: Auto Zoom Linear Probe Images at Shallow Depth...

Preset Parameter	Description
Single Screen	Automatically zoom linear probe images at a shallow depth on a single screen.
Dual Screen and DualView	Automatically zoom linear probe images at a shallow depth on the dual and DualView screen.

System/System Measure Preset Menu

The System/System Measure screen allows you to specify measurement parameters such as the type of default OB measurements and calculations. You can also define cursor and Results Window default functionality.

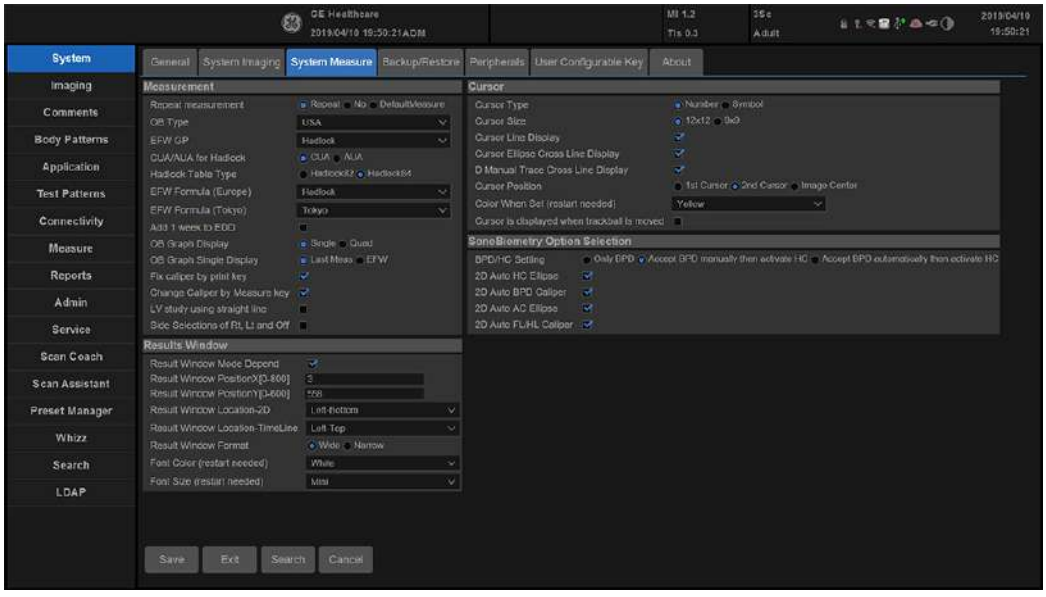


Figure 16-14. System/System Measure Preset Menu

System/System Measure Preset Menu (continued)

Table 16-16: Measurement

Preset Parameter	Description
Repeat Measurement	Select No, Repeat, DefaultMeasure
OB Type	Select which OB measurements and calculations studies to use: USA, Europe, Tokyo, Osaka, or ASUM.
EFW GP	Select the source used to calculate EFW-GP Estimated Fetal Weight-Growth Percentile)
CUA/AUA for Hadlock	Select to use CUA (Composite Ultrasound Age) or AUA (Average Ultrasound Age) as the default
Hadlock Table Type	Select Hadlock 82 or Hadlock 84 tables
EFW Formula (Europe)	Select the source used to calculate EFW (Europe) (Estimated Fetal Weight)
EFW Formula (Tokyo)	Select the source used to calculate EFW (Tokyo) (Estimated Fetal Weight)
Add 1 week to EDD	Select to add additional week to estimated date of delivery
OB Graph Display	Select Single or Quad for displaying OB Graphs.
OB Graph Single Display	Select Last Meas or EFW Single OB Graph displayed by default.
Fix Caliper by Print key	Select to use the Print key like the Set key. *NOTE: If you select this during a generic volume measurement, the print key does not function like the Set key, but instead ends the measurement sequence and initiates the volume calculation based on the number of measurements taken so far.*
Change Caliper by Measure key	Check box to change Caliper by Measure key.
LV Study using straight line	Sets straight line as the default for 2D LV studies.
Side selections of Rt, Lt and Off	Select to use “Rt, Lt and Off” for Side Selection. When not selected, displays only “Rt and Lt”.

System/System Measure Preset Menu (continued)

Table 16-17: SonoBiometry Option Selection

Preset Parameter	Description
BPD/HC Setting	Select Only BPD, Accept BPD manually then activate HC, or Accept Setting BPD automatically then activate HC.
2D Auto HC Ellipse	Select checkboxes to choose SonoBiometry options.
2D Auto BPD Caliper	
2D Auto AC Ellipse	
2D Auto FL/HL Caliper	

Table 16-18: Cursor

Preset Parameter	Description
Cursor Type	Select whether to mark measurements with numbers or symbols.
Cursor Size	Specify 12x12 or 9x9.
Cursor Line Display	If selected, after you press Set to complete a measurement, the cursor line is displayed. If not selected, after you press Set to complete a measurement, only the cursor number or symbol is displayed.
Cursor Ellipse Cross Line Display	Check box to display the cross line in Ellipse.
D Manual Trace Cross Line Display	Check box to display the cross line with the caliper.
Cursor Position	Select 1st Cursor, 2nd Cursor, or Image Center.
Color When Set (restart needed)	Select white, yellow, bright red, or orange.
Color is displayed when trackball is moved	Is selected, color is displayed when trackball is moved.

System/System Measure Preset Menu (continued)

Table 16-19: Results Window

Preset Parameter	Description
Result Window Mode Depend	Select this if you want the measurement result window to be repositioned, depending on the mode.
Result Window Position X[0-800]	You can set the coordinates for the measurement result window when you do not have the result window set to be mode dependent. This is the X coordinate (left/right)
Result Window Position Y[0-600]	You can set the coordinates for the measurement result window when you do not have the result window set to be mode dependent. This is the Y coordinate (up/down)
Result Window Location-2D	Select the Result Window location on the Monitor Display.
Result Window Location-Timeline	Select the Result Window location.
Result Window Format	Select Wide or Narrow.
Font Color (restart needed)	Select White, Off White, Yellow, Bright Red or Orange (reboots the system).
Font Size (restart needed)	Select Mini, Small, Medium, Large or Extra Large (reboots the system).

System/Backup and Restore Preset Menu

The backup and restore procedures described in this section are divided into two parts. The first part describes procedures to backup and restore patient data. The second part describes procedures to backup and restore system and user-defined configurations.

The Backup/Restore function enables the user to:

- Copy/Restore the patient archive.
- Copy/Restore the system configuration. The Copy/Restore system configuration feature enables the user to configure several units with identical presets, providing that the units have the same software version.

Depending on the system, you can use either a CD-R, DVD-R, USB Flash Drive, or USB Hard Disk for system backup/restore. For the sake of simplicity, we have used the CD-R in the following examples.

NOTE: The system ONLY supports CD-R / DVD-R and DOES NOT support CD-RW / DVD+R.



WARNING GE is not responsible for lost data if the suggested backup procedures are not followed and will not aid in the recovery of lost data.



WARNING The Versana Active is not intended to be used as a storage device; backup of the Patient and Image Database is your institution's responsibility. GE is NOT responsible for any lost patient information or for lost images.



WARNING The system crash can cause the SSD corruption.The SSD is not considered a permanent storage device. Backup data on a regular basis.

System/Backup and Restore Preset Menu (continued)



To minimize accidental loss of data, perform EZBackup and Backup on a regular basis.

1. First, perform EZBackup to save the images.
2. Next, perform Backup at ***Utility -> System -> Backup/ Restore***. Enable the following checkboxes under Backup:
   - Patient Archive
   - User defined configuration
   - Service



Archived data is managed at the individual sites. Performing data backup (to any device) is recommended.



Make sure to verify the media after writing of data, such as EZBackup, SaveAs or Export.

Verifying media requires additional time, which varies depending on the amount of data backed up or exported.



Before deleting a patient or image from the patient screen, make sure you have saved the data by EZBackup/Backup or Export and verify that the media transfer of data was successful.

System/Backup and Restore Preset Menu (continued)

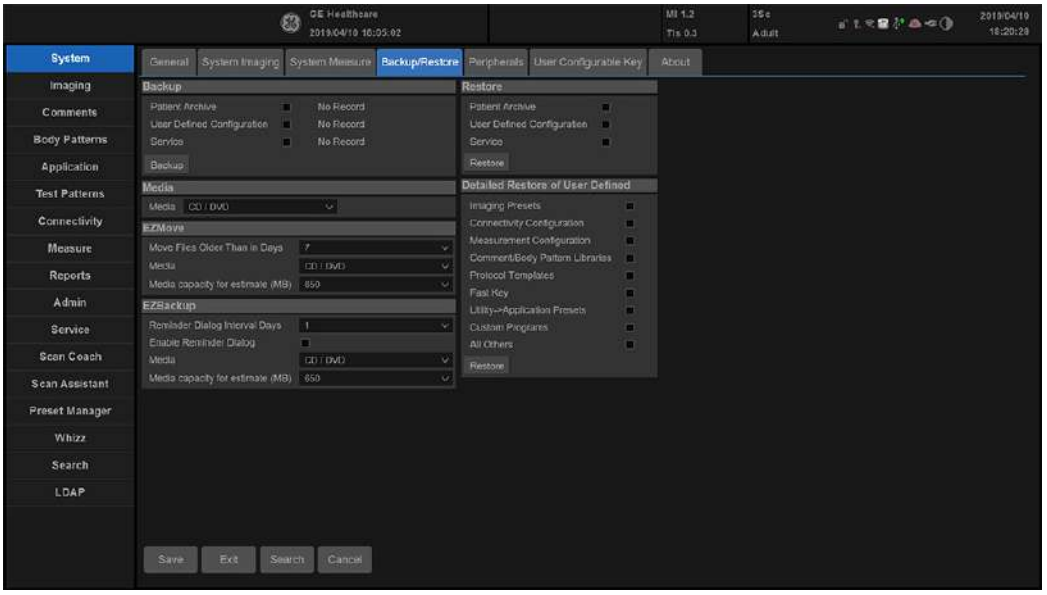


Figure 16-15. System/Backup/Restore Preset Menu

Table 16-20: Backup

Preset Parameter	Description
Patient Archive	Select to back up patient data.
User Defined Configuration	Select to back up the user-defined configuration settings.
Service	Select to back up Service settings.
Backup	Select to begin the backup.

Table 16-21: Media

Preset Parameter	Description
Media	Select media type to use for backup and restore.

System/Backup and Restore Preset Menu (continued)

Table 16-22: EZMove

Preset Parameter	Description
Move Files Older Than in Days	The system will move images older than the number of days specified here. If you enter a zero (0), then all of the images from today on will be moved.
Media	Select media type.
Media capacity for estimate (MB)	Specify the capacity of the backup media.

Table 16-23: EZBackup

Preset Parameter	Description
Reminder Dialog Interval days	Specify the number of days after the last backup that you want the system to prompt you to perform an EZBackup/EZMove procedure (only for moving images).
Enable Reminder Dialog	Select to activate the EZBackup/EZMove reminder pop-up dialog.
Media	Select media type.
Media capacity for estimate (MB)	Specify the capacity of the backup media.

Table 16-24: Restore

Preset Parameter	Description
Patient Archive	Select to restore patient data.
User Defined Configuration	Select to restore the user-defined configuration settings.
Service	Select to restore service iLinq and Network settings. **CAUTION**: DO NOT restore service presets on to a different Versana Active system. Only restore service presets to the same system.
Restore	Select to begin the restore process for the selected configuration files.

System/Backup and Restore Preset Menu (continued)

The detailed section of this menu allows you to restore one area at a time from the user defined configuration. This allows you to selectively restore what you want to restore across multiple machines. Check the box(es) you want to restore, insert the appropriate media, and press Restore.

NOTE: When you restore backup data from the Utility menu, the Versana Active application usually restarts automatically when the restoring is complete.

Table 16-25: Detailed Restore

Preset Parameter	Description
Imaging Presets	Select to restore imaging presets.
Connectivity Configuration	Select to restore connectivity configurations.
Measurement Configuration	Select to restore measurement configurations.
Comment/Body Pattern Libraries	Select to restore comment and body pattern configurations.
Protocol Templates	Select to restore Protocol Templates.
Fast Key	Select to restore Fast Key.
Utility-->Application Presets	Select to restore Utility--> Application presets.
Custom Programs	Select to restore Scan Coach/Assistant programs.
All Others	Select to restore all other configurations not listed in the Detailed Restore section. This includes parameters defined on the System preset menus.
Restore	Select to begin the restore process for the selected configuration files.

Backup and Restore

To minimize accidental loss of data, perform backup of the patient archives stored on the local hard drive **DAILY** as described in this section. Use a formatted Backup/Restore disk to back up patient archives from the hard drive, using the backup procedure described in this section. Data from the Backup/Restore disk may be restored to the local hard drive using the restore procedure.

NOTE: To perform backup and restore procedures, you must login with administrator privileges.

Backup procedure

Back up patient data AFTER you've archived (via EZBackup/ EZMove) images so that the pointers to the patient's images reflect that the images have been moved to removable media and are no longer on the hard drive.

1. Insert a media into the drive or USB device into a USB port.

NOTE: About formatting media, See 'Formatting removable media' on page 16-101 for more information..

2. In the archive screen, select the dataflow Local Archive - Int. HD.
3. Enter **Utility**-> **System**-> **Backup/Restore.**

   The Backup/Restore screen is displayed.
4. In the Backup list,
   - Select **Patient Archive** to backup the patient records.
   - Select **User Defined Configuration** to copy system settings and user presets.
   - Select **Service** to backup service presets.

NOTE: The detailed section of this menu decouples the user defined configuration above. This allows you to selectively restore what you want to restore across multiple machines.

5. Specify where to save data in the media field.
6. Select ***Backup***.

   The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.
7. At the end of the process, the Backup completed message is displayed on the monitor.

   Press **Eject** (F3) for eject media/disconnect USB.
8. Make sure to physically label the media. An identification of the system should also be noted on the media and a backup log should be kept.

   File the media in a safe place.

Restore procedure


CAUTION

The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct media.

You cannot restore the data between systems with different software versions.


CAUTION

To avoid the risk of overwriting the local patient and report archives, DO NOT check Patient Archive when restoring user-defined configurations.

1. Enter **Utility**-> **System**-> **Backup/Restore.**
   The Backup/Restore screen is displayed.
2. In the Restore list,
   - Select **Patient Archive** to restore the patient archive.
   - Select **User Defined Configuration** to restore all system settings and user presets.
     or
     One or several system configuration items to restore parts of the Detailed Restore of User Defined.
   - Select **Service** to backup service presets.
3. In the Media field, select the appropriate Source device.
4. Select ***Restore***.
   The system performs the restore. As it proceeds, status information is displayed on the Backup/Restore screen.
5. The Versana Active restarts automatically when Restore is done.

Backup and restore strategy: user-defined configurations

In addition to generating a safety copy, the backup/restore function of the user-defined configuration (presets) can be used to configure several Versana Active systems with identical presets (preset synchronization).

Preset synchronization

The procedure for preset synchronization of several scanners is as follow:

1. Make a backup of the user-defined configurations on a removable media from a fully configured Versana Active system.
2. Restore user-defined configurations from the removable media to another Versana Active system (you can restore all the user-defined presets or select specific presets to restore via Detailed Restore).

EZBackup and EZMove

EZBackup or EZMove allows you to manage hard disk space (move images off the hard drive) while maintaining the patient database on the scanner, as well as to back up the patient database and images.

- **EZBackup**: Copy the data from the local SSD to the removable media.
- **EZMove**: Copy the data from the local SSD to the removable media. After copying the image file to the media, EZMove deletes the image file from the Local SSD.



HINTS

PLEASE READ THIS

Ensure that you have established a data management protocol for your office/institution. You MUST manage the backup media by keeping a log and by creating a media filing system.

For example, if you need to back up 500 MB/day, or 2.5 GB/week, then you need to back up 5 CDs/s/week, or ~250CDs/year.

Generally speaking, you should back up the system when you have 10 GB of images to back up.

You should assign the person who is in charge of performing the backups. Backups will vary by the volume of your work. You need to track how long it takes your office/institution to get to 10 GB, and set the back-up parameters accordingly.

Your office/institution needs to determine your backup strategy, for instance, backup weekly and move monthly. It should be an easy strategy to perform and to remember. And follow this same strategy/schedule consistently.

It’s also useful to keep your more recent information on the hard drive since it’s easier to recall that way.

EZBackup and EZMove (continued)



You can still do a backup/move daily; but ALWAYS do a patient archive backup after each move.



Only cancel the backup/move in case of an emergency. The system completes backing up the current media and then cancels the operation.



When EZBackup requires more than one disk (CD-R or DVD-R) for backup, a message appears when the first disk is full. If you select “Cancel” to stop the backup procedure and later try EZBackup again, all the data may not be backed up.

Select “Full Backup” on the first EZBackup wizard screen if the last time you were performing EZBackup you selected “Cancel”.



If you use EZBackup or EZMove as a “true” patient archive, you must maintain a separate backup of the patient database (Patient Archive and Report Archive). If for any reason the Local Archive - Int HD gets corrupted or the base system software has to be reloaded, then the patient archive is the ONLY way to rebuild the EZBackup and EZMove patient archive.



DO NOT turn off the power while EZBackup is running. The data may be lost. It may take several hours for EZBackup to finish, depending on the amount of data being backed up.

The following may give the impression of a lockup, but EZBackup is continuing in the background.

- The progress bar does not move.
- The screen may become white.
- The hourglass icon keep turning.

EZBackup and EZMove (continued)



CAUTION NEVER restore the patient archive from media made previous to the last move.

NOTE: EZBackup/EZMove are saved data as RAW data. If you import data to the system, you can modify the image data.

NOTE: To display exported Raw DICOM images on a PC, you need the dedicated viewer.

NOTE: When backing up or moving reports using EZBackup and EZMove, use the USB HDD. DVDs and CDs are not supported for backing up or moving reports using EZBackup and EZMove.

NOTE: "Archived" information is saved to each exam during EZBackup. When you perform EZBackup, the system backs up the exams except for the archived exam.

NOTE: EZBackup/EZMove cannot span a single image across two (2) or more media. Therefore, if EZBackup/EZMove encounters an image that is greater than the capacity of the media, it skips the oversized image.

NOTE: EZBackup/EZMove does not store images to media in sequential order. Instead it maximizes the most amount of images per media.

NOTE: If the system locks up during the media auto format process, shutdown the system by holding down the power button and boot it up again. After the system is up, replace the media to a new one and execute EZBackup or EZMove again. To avoid a trouble such as data loss, do not reuse the failed media for any other function.

NOTE: If you try exporting a previously backed-up exam, the message "Can't Find Source file" displays. The image data had already been removed from the hard disk drive with EZBackup/EZMove.

EZBackup and EZMove (continued)

Basically, when you perform the EZBackup or EZMove procedure, you insert the media (or connect USB HDD if applicable), the system backs up/moves the images, and creates a reference between the patient database and the media's volume.

EZBackup/EZMove can take up to 20 minutes (or longer, depending on the size of the backup). Make sure to schedule this at the same time daily, when no patients are scheduled.

1. Prepare unformatted media or the USB HDD before starting EZBackup/EZMove.
2. Specify the EZBackup/EZMove setup on the **Utility** --> **System** --> **Backup/Restore** page.

EZBackup and EZMove (continued)

3. To start the EZBackup/EZMove procedure, go to the Patient menu and select EZBackup/EZMove. The EZBackup/ EZMove Wizard starts.

NOTE: If you use the USB HDD, some wizards and the pop-up messages DO NOT appear.

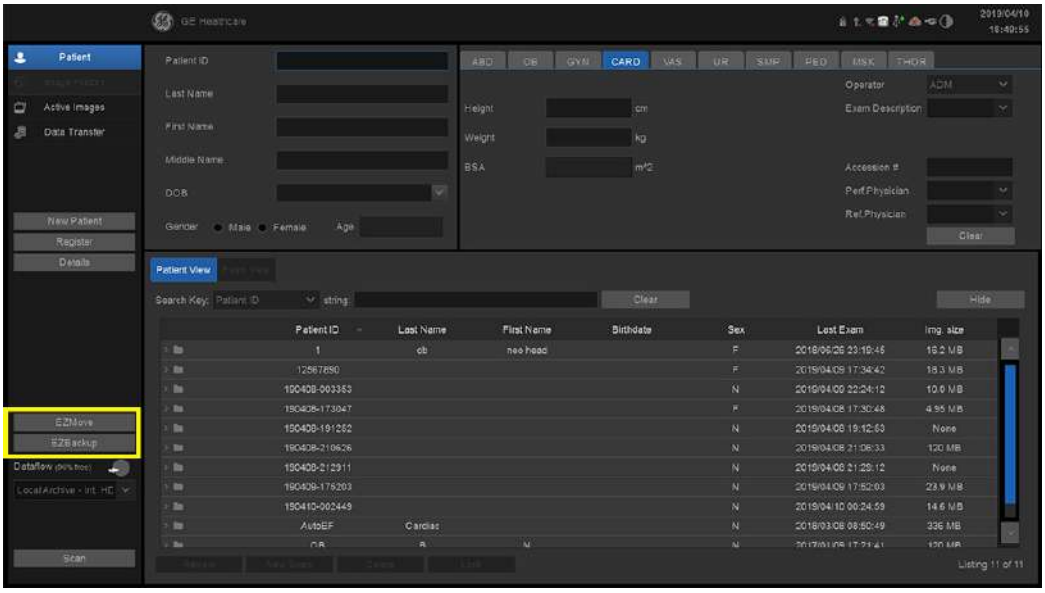


Figure 16-16. Archive Screen

EZBackup and EZMove (continued)

4. Verify the information on the first page of the EZBackup/ EZMove Wizard, then press *Next*.

   Full backup options display on the first page of the EZBackup wizard. If you want to backup all of the exams in the range (even if the exam was previously backed up, check this option). If you uncheck this option, the system only backs up exams which have not yet been backed up.

   EZBackup does not back up the exams which were previously backed up once by EZBackup or Export.

NOTE: *You can set the range in Utility --> System --> Backup/ Restore --> Move files older than in days for EZMove.*

NOTE: *If you update an exam which is already backed up, the exam is also backed up.*

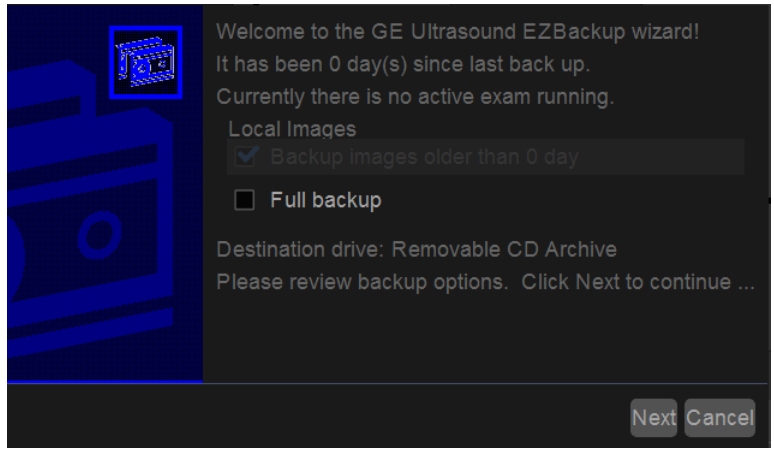


Figure 16-17. EZBackup Wizard, Page 1

EZBackup and EZMove (continued)

5. Verify the information on the EZBackup/EZMove Wizard, Page 2. The backup may span multiple media. This page tells you how many media you need to do this backup. After you have gathered the media (allow for one extra media, just in case), you are ready to begin the backup. Press *Next*.

   If the storage capacity of the USB HD is insufficient, you will see the message, “Selected Location does not have enough free space.”

NOTE: *The calculation for the number of backup CD is only an estimate. Allow for one additional CD when performing an EZBackup/EZMove.*

NOTE: *This message appears if you press Next without inserting the backup media: “Please insert a blank media...”. Insert the media and continue.*

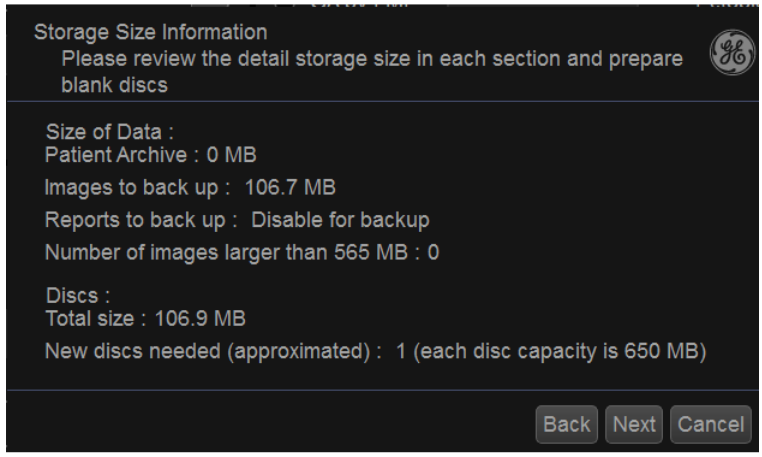


Figure 16-18. EZBackup/EZMove Wizard, Page 2

EZBackup and EZMove (continued)

6. A pop-up message appears that provides you with the media label. Label the media, then insert the media. Press *OK*.

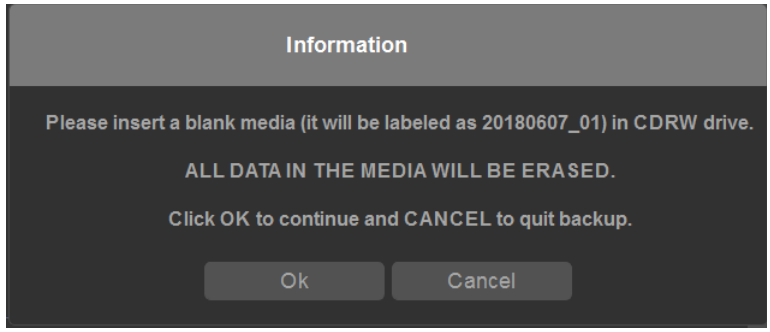


Figure 16-19. Insert Media Message

   a. Ensure that you label the media with not only the volume name indicated on the Insert Media Message, but with the name of the Versana Active system where this backup/move procedure was done.
   b. Update the EZBackup/EZMove log with this information the volume information and the location of the media.
   c. After the backup/move has been completed, file the media.

Table 16-26: Typical EZBackup/EZMove Log

Date	Scanner ID Name	Backup Images Y/N	Older than __ Days	Move Images Y/N	Media Label (and Scanner ID)

EZBackup and EZMove (continued)

7. A pop-up window shows the system is checking whether the media is inside the drive.

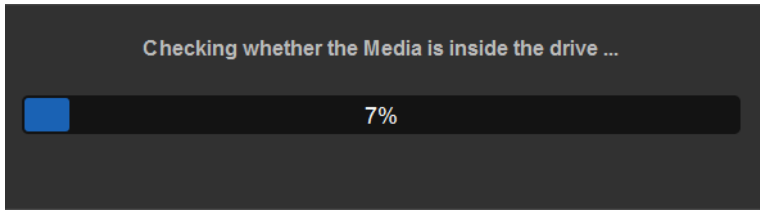


Figure 16-20. Check Media

- If the media is in the drive, the window automatically disappears when the checking is completed. The EZBackup progress then begins.
- If the media is not in the drive, a pop-up message appears notifying that there is no media in the drive. Press OK.

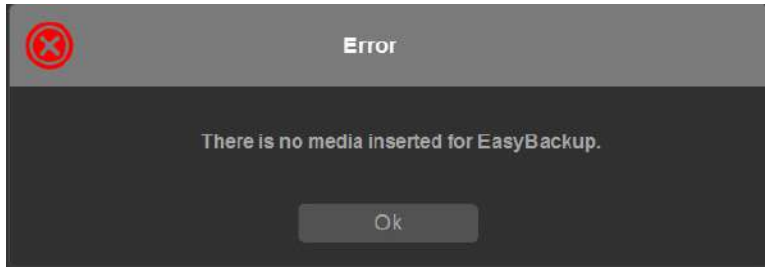


Figure 16-21. Insert Disc Error

A pop-up message appears that provides you with the media label. Label the media, then insert the media. Press *OK*.

EZBackup and EZMove (continued)

8. The status menu appears. When the backup/move has been completed, press ***Next***.

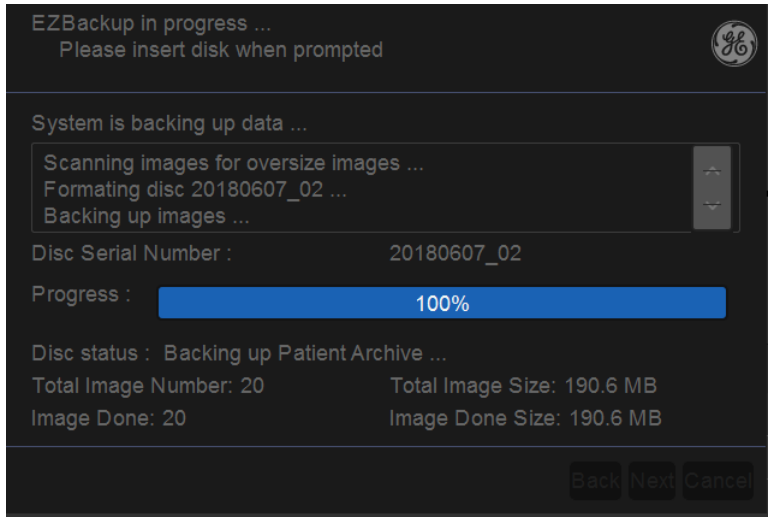


Figure 16-22. EZBackup Wizard Page 3

NOTE: When/if you need to insert the next media, a message appears providing you with the media label. Label the media, then insert the next media and press OK.

EZBackup and EZMove (continued)

9. When the backup is complete, the completed wizard page appears. Press ***Finish***.

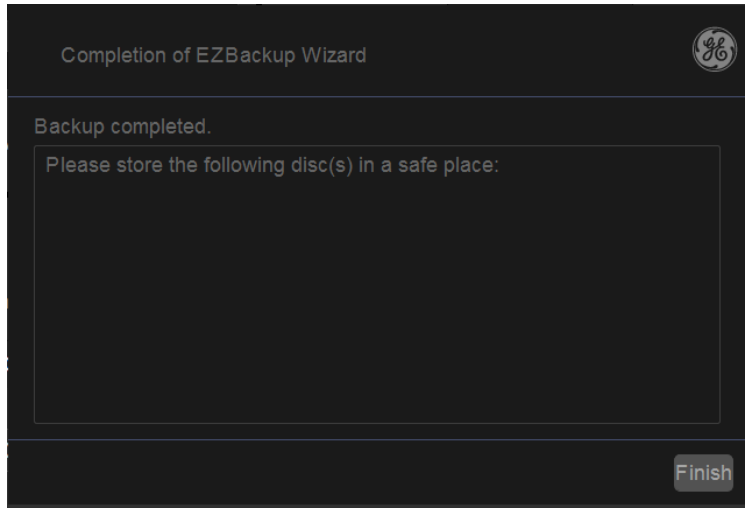


Figure 16-23. EZBackup/EZMove Wizard, Page 4

10. Do a patient archive after each EZBackup/EZMove (move).

    We recommend attaching the patient list to the EZBackup/EZMove media. Insert the media and select DICOM CD Read for dataflow (if you use a USB drive, select DICOM USB Drive Read). Select any patient and press the left Set key to print the patient list on the digital printer.

NOTE: *Use Import to restore EZBackup images.*

To Review EZBackup/EZMove and Export Images

You can review backed up media via the Archive Menu, Import, and the DICOM Read dataflow.

If you review EZMoved image,

1. Select the patient on the Patient Menu (on the same system where the EZMove was performed).
2. Insert the media volume indicated on the Patient Menu.
3. View the exam from the media.

NOTE: You may need to insert a media volume prior to or after the recommended media.

NOTE: If the patient is split over multiple media, images on the previous or next media are displayed as triangles.

NOTE: To view the whole patient on the system, use Import, from as many media as you have for that patient. However, take care not to import studies over existing studies; duplicate or missing images may result. Delete the existing exam first.

System/Peripherals Menu

The System/Peripherals screen allows you to specify parameters for the printers.

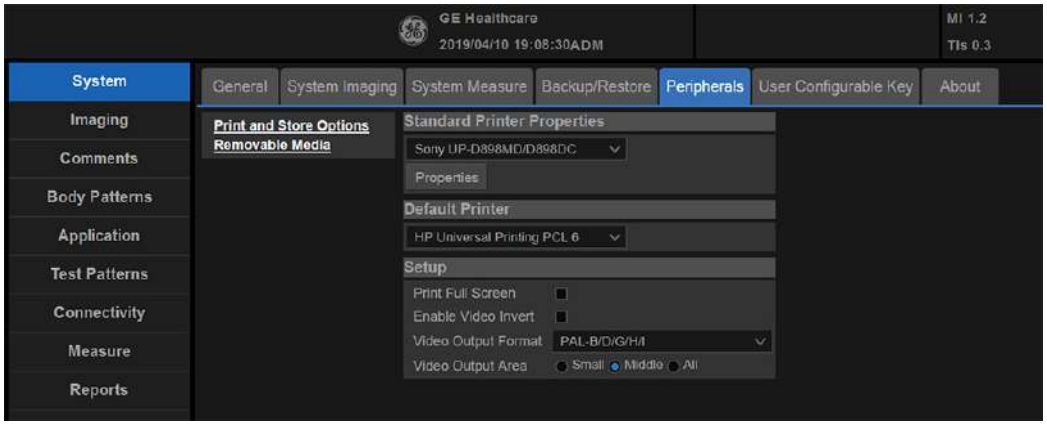


Figure 16-24. System/Peripherals Preset Menu

Print and Store Options. Press Print and Store Options to go to the Utility --> Connectivity --> Miscellaneous setup page.

Removable Media. Press Removable Media to go to the Utility --> Connectivity --> Removable Media page.

Table 16-27: Setup

Preset Parameter	Description
Standard Printer Properties: [Printer] and Properties, and Default Printer	Select to add an additional standard printer via the USB serial port and to configure digital printers. This activates the Windows Add Printer wizard. NOTE: Most printer drivers are available via Windows; however, newer printers may require you to load the manufacturer-supplied print driver (must be on CD-ROM). Refer to the Basic Service Manual for more information.
Print Full Screen	Select for the standard printer to print the full screen.
Enable Video Invert	Select for the standard printer to print black on white rather than white on black.
Video Output Format	Select the video output format, PAL or NTSC.
Video Output Area	Select the video output area, Small or Middle or All.

System/User Configurable Key

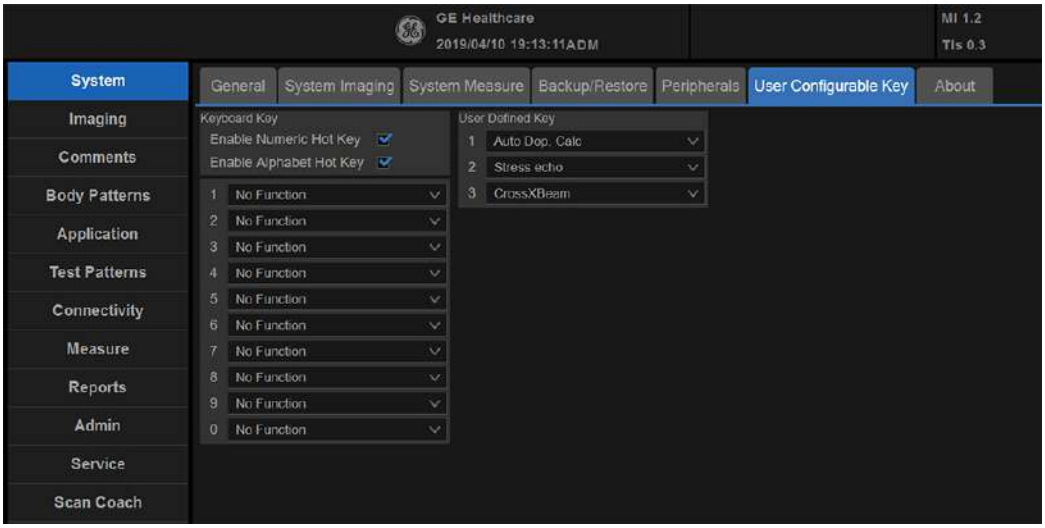


Figure 16-25. User Configurable Key Preset Menu

Table 16-28: Key Configurations

Parameter	Description
0-9	The keys are configurable.

Table 16-29: Enable Hot Key

Parameter	Description
Enable Numeric Hot Key	Select to activate numeric hot key control.
Enable Alphabet Hot Key	Select to activate alphabet hot key control.

User Defined and Keyboard keys

User Defined Keys can be programmed as one of the following functions:

NOTE: Keyboard Keys can be programmed as one of the following functions, but some features are not supported.

Table 16-30: User Defined and Keyboard Keys

Parameter	Description
No Function	No function.
Active Images	Go to Active Images Screen.

Table 16-30: User Defined and Keyboard Keys

Parameter	Description
Auto Dop. Calcs	Turn on/off Auto Calcs in Doppler mode.
Biopsy Guideline	Biopsy Guideline Display/change biopsy guide line.
Bluetooth Save	Turn on/off bluetooth to save images.
CHI	Turn on/off CHI mode.
Clear Saved Measurements	Clear all measurements in the selected measurement category. Display the Confirmation dialogue before delete data.
CrossXBeam	Turn on/off CrossXBeam.
ECG On/Off	Turn on/off ECG.
FollowUp Fusion	Compare scan result with last scan.
My Trainer	Turn on/off My Trainer.
OB Graph Display	Go to OB Graphy page.
Print3	Behave the function assigned to Print3 via Connectivity-> Button.
Probe1	Select Probe1.
Removable media	Go to Media format menu in Utility.
SRI HD	Turn on/off SRI HD.
Save As	Display SAVE AS menu to save image.
Scan Assistant	Turn on/off Scan Assistant.
BFlow	Turn on/off BFlow Mode.
Breast Care	Turn on/off Breast Care.
Contrast	Turn on/off Contrast.
Contrast Triggle	Adjust Contrast Triggle.
Elasto	Turn on/off Elasto.
LOGIQView	Turn on/off LOGIQ View.
Needle	Turn on/off Needle.
Report	Turn on/off Worksheet.
Stress echo	Turn on/off Stress echo.
TVI	Turn on/off TVI mode.

System/About Preset Menu

The System/About screen lists information about the system software.

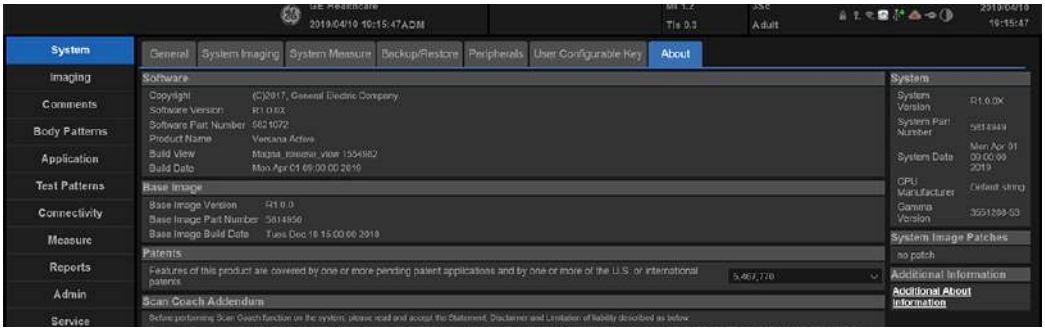


Figure 16-26. System About Menu

Table 16-31: Software

Preset Parameter	Description
Software Version	The current software version on this system.
Software Part Number	The software part number.
Build View	The software build view.
Build Date	The software build date.

Table 16-32: Patents

Preset Parameter	Description
Patents	Lists system patents.

Table 16-33: System

Preset Parameter	Description
System Part Number	The system part number.
System Date	The system date.
CPU Manufacturer	Indicate the CPU Manufacturer.
Gamma Version	Indicate the Gamma Version.

Table 16-34: Additional Information

Preset Parameter	Description
Additional About Information	Select to open Additional About Information for hardware information: Module Name, Revision and Part Number.

Imaging Presets

Overview

Imaging screens allow you to specify parameters for the following:

- B-Mode (B)
- Color Flow Mode (CF)
- Power Doppler Imaging (PDI)
- M-Mode (M)
- Anatomical M-Mode (AMM)
- Pulse Wave Mode (PW)
- Continuous Wave Mode (CW)
- Harmonics (HAR)
- Tissue Velocity Imaging (TVI)
- Tissue Velocity Doppler (TVD)
- General



Figure 16-27. Imaging - Example

1. Model/application dependent setup parameters
2. Probe dependent setup parameters

Changing imaging presets

To change imaging presets:

1. Select ***Utility*** on the keyboard.
2. On the Top/Sub menu, select ***Imaging***.
   The system displays the Imaging screens.

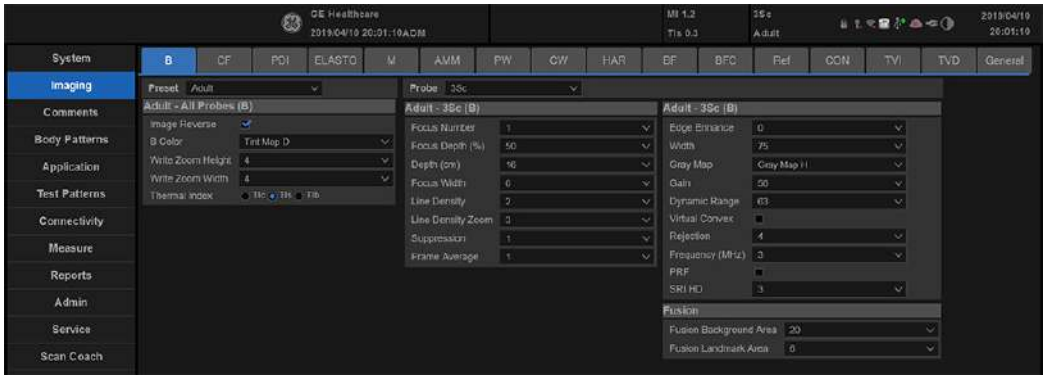


Figure 16-28. Example: B-Mode Preset

3. In the row across the top of the screen, select the mode.
   The system displays two sets of parameters and settings. The left column lists all settings for the exam (for example, Abd). The right column lists settings that apply only to the exam and probe combination.
4. In the Preset list, select the exam.
5. In the Probe list, select the probe.
6. To change a parameter, do one of the following:
   - Select the value from a list.
   - Select one value from a choice of two or more buttons.
   - Select or clear a check box.
7. After changing the parameters, to save the changes, select the ***Save*** button.

NOTE: When you Save changes to imaging parameters, the system saves changes to all modes, not just the mode currently displayed.

Changing imaging presets (continued)

NOTE: If you have problems with imaging, you can return parameters back to the original settings. Select the exam, probe, and mode, and then select Reload Factory Defaults. The system returns the selected parameters to the original settings.

For information about the specific parameters, refer to Chapter 5 Optimizing the Image.

General

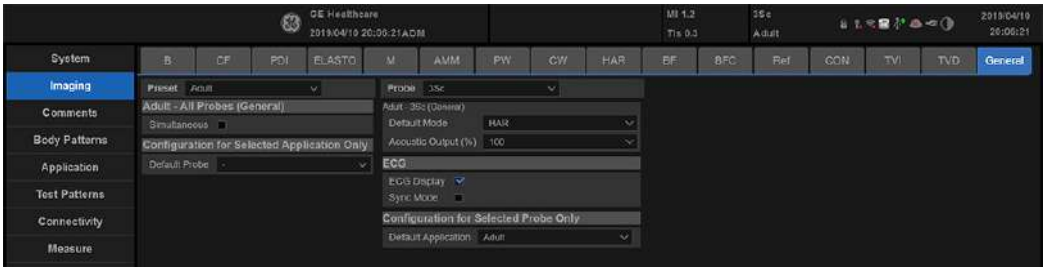


Figure 16-29. General Presets

You can specify a default probe per application and a default application per probe.

Default probe per application

1. To specify a default probe per application, select Utility --> Imaging --> General.
2. Select the default probe from the pull-down menu.

Default mode and application per probe

1. To specify a default application per probe, select Utility --> Imaging --> General.
2. Under Probe, specify the desired application from the pull-down menu.

Other setting

Checkmark the following field when you want the system to activate a certain display:

- Simultaneous
- ECG
  - ECG Display
  - Sync Mode

If your system has the following options, you must assign the option to the button per application and probe.

- B or HAR(Harmonics)
- Acoustic Output (%)

NOTE: If you use the user-defined preset as default preset, re-select the preset in Utility whenever you overwrite the user-defined preset.

Comments Libraries Presets

Overview

Comment screens allow you to specify comment text and pointer options, to define comment libraries, and assign comment libraries to applications.

Comments Libraries/Libraries Preset Menu

1. On the comments *Libraries* tab, you can change and create comment libraries. A comment library is a list of comments that are associated with a specific application. The comments are listed in the library in the order in which they display on the Comment Menu on the screen. For each library, you can define two columns of comments for both left and right sides, with 13 rows available for each column.



Figure 16-30. Comment Libraries Preset Menu

Comments Libraries/Libraries Preset Menu (continued)

Table 16-35: Libraries

Preset Parameter	Description
Library	The name of the comment library.
Left and Right Columns	The list of comments for the selected library seperated by side.
User Defined Library	The name of a new comment library that you want to create/delete.
Add to Existing	You can add to the selection of comments.
Delete from Existing	You can delete from the exsiting selection of comments.

Defining Comments

1. In the *Library* field, select the library you want.

   The system displays all comments for the library. The comments are listed in the order that they are shown when you use comments.
2. To change or add an comment, select the comment or blank location and press **Set**, then do one of the following:
   - Type the comment.
3. To save the changes, select the ***Save*** button.

Creating a new comments library

1. In the *User Defined Library* field, type a name for the library, then select **Create**.

   The system creates a new library.
2. Enter comments as described in step 2 above.
3. To save the changes, select the ***Save*** button.

Deleting a user defined library

1. Select the library name which you want to delete from the pull-down menu.
2. Press ***Delete***.
3. Press ***Save*** to save the changes.

Comments Libraries/Comments Preset Menu

On the Comments tab, you specify text and pointer options.

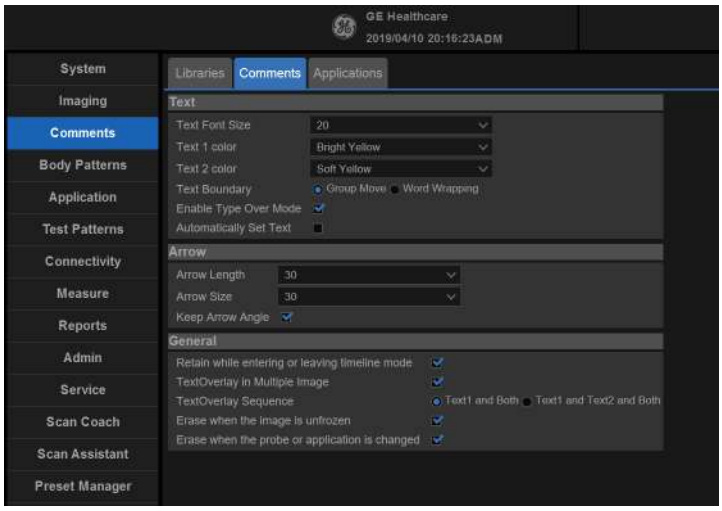


Figure 16-31. Comment/Comments Preset Menu

Table 16-36: Text

Preset Parameter	Description
Text Font Size	Specify the font size. The font size increases as the number increases.
Text color (Text1 and Text2)	Select the color for comment Text1 and Text2.
Text Boundary	Select Group Move or Word Wrapping.
Enable Type Over Mode	Select to type over existing comments. Position the cursor over the text to be changed, then start typing.
Automatically Set Text	If selected, the system sets the comment at the cursor position automatically when text entry is complete.

Comments Libraries/Comments Preset Menu (continued)

Table 16-37: Arrow

Preset Parameter	Description
Arrow Length	Select the default pointer length.
Arrow Size	Select the default pointer size.
Keep Arrow Angle	Keep the angle of arrow pointer head until next change.

Table 16-38: General

Preset Parameter	Description
Retain while entering or leaving timeline mode	If selected, the system keeps the comment(s) on the monitor display when you enter or leave timeline mode.
TextOverlay in Multiple Image	When selected, and you select the F8 key to hide or show comments, if you are in multiple image, the system hides the text in both images. When cleared, the system only hides the text for the active image.
TextOverlay sequence	You can specify to display Text1, Text2, or both. This allows you to have some comments that do not change during the exam while allowing you to change other comments. Toggle the F8 key to cycle through the 3 Text1/ Text12 states.
Erase When the image is unfrozen	Deletes comments when you unfreeze the image. If you check this parameter, Text2 automatically erase when you unfreeze the image.
Erase When the probe or application is changed	Deletes annotations when you change the application or probe.

After you change comment options, select *Save* to save the changes.

NOTE: Only use letters, numbers or underscore "_" when naming the user defined annotation libraries. The name MUST start with either a letter or underscore.

Comments Libraries/Applications Preset Menu

The Comments Libraries/Applications tab is a link to the Applications preset menu. The Applications preset screen allows you to specify which libraries belong to an application. You also specify which is the default library that displays when you use comments.

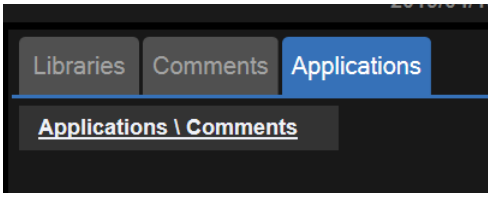


Figure 16-32. Applications/Comments Link

The Applications/Comments screen can be accessed through either the Comments Libraries or Applications key.

Specifying which libraries belong to an application

1. On the Comments tab, in the Preset field, select the application.
2. In the Library Group Tabs fields, select the libraries for this application.

NOTE: When you use comments, the default library is displayed. To use other libraries for the application, press the tab for the library.

3. To save the changes, select the ***Save*** button.

Table 16-39: Applications

Preset Parameter	Description
Preset	The name of the application preset.
Tabs	A list of libraries for the application.

Using comments from a library

To use comments, press the **Comment** key on the Control Panel. Comments are then displayed on the screen.

Body Patterns Presets

Overview

Body patterns screens allow you to specify body pattern options, to define body pattern libraries, and assign body pattern libraries.

Body Pattern Libraries/Libraries Preset Menu

On the Body Patterns Libraries tab, you can change and create body pattern libraries. A body pattern library is a list of body patterns that are associated with a specific application. The body patterns are listed in the library in the order in which they display on the control panel. For each library, you can define three columns of body patterns, with 8 rows in each column.

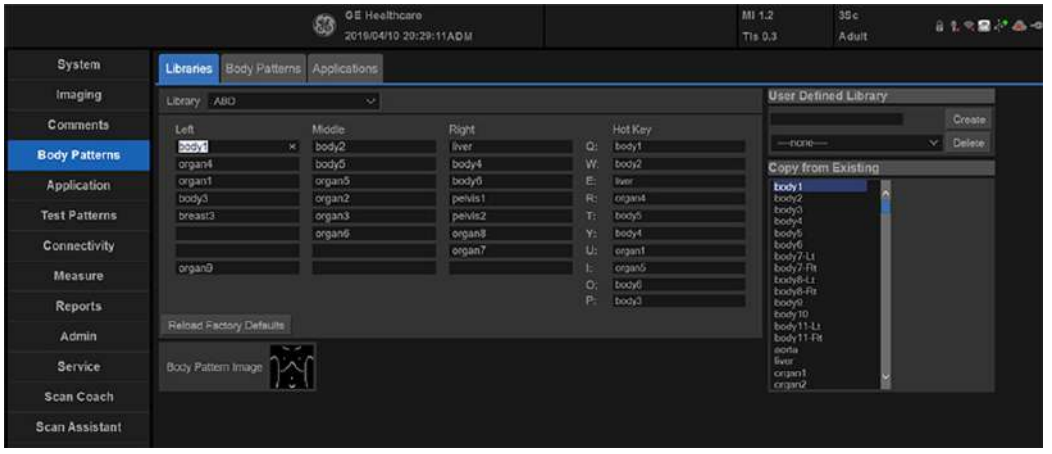


Figure 16-33. Body Patterns Libraries Preset Menu

Body Pattern Libraries/Libraries Preset Menu (continued)

Table 16-40: Body Patterns Libraries

Preset Parameter	Description
Library	The name of the body pattern application library.
Left, Middle and Right Columns	The list of body patterns for the selected library.
Body Pattern Image	Displays the image of the currently selected body pattern.
User Defined Libraries-Create	The name of a new body pattern application library that you want to create.
User Defined Libraries-Delete	Allows the selection of the user defined library to be deleted.
Copy from Existing	A list of body patterns you can use to create an application library.
Hot Key	The list of body patterns for the selected library can be assigned to 10 designated alpanumeric keys as hot keys.

Defining body patterns

1. In the *Library* field, select the application library you want.

   The system displays all body patterns for the library. The body patterns are listed in the order that they are shown on the menu.
2. To change or add a body pattern, select the body pattern or blank location and press **Set**, then do one of the following:
   - Type the body pattern name.
   - Select the body pattern in the *Copy from Existing* list, and press **Set**.

NOTE: When you select a body pattern name on the menu or in the Copy from Existing list, the system displays the pattern in the lower left corner of the screen.

3. To save the changes, select the ***Save*** button.

Creating a new body pattern library

1. In the *User Defined Libraries* field, type a name for the library, then select Create.

   The system creates a new library.
2. Enter body patterns as described in step 2 above.
3. To save the changes, select the ***Save*** button.

Body Pattern Libraries/Body Patterns Preset Menu

On the Body Patterns tab, you specify body pattern options.

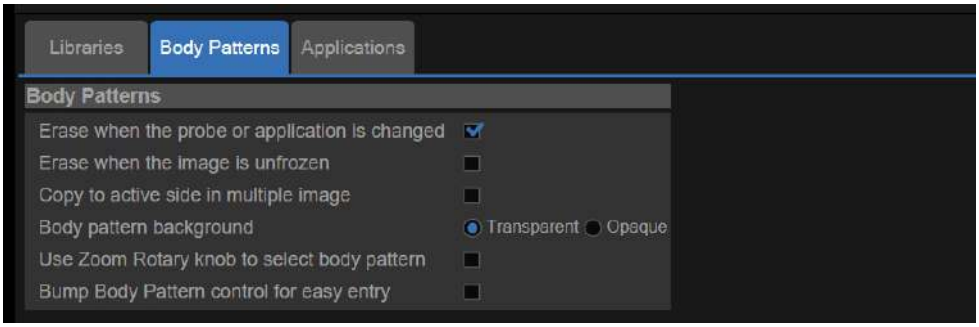


Figure 16-34. Body Patterns General Preset Menu

Table 16-41: Body Patterns

Preset Parameter	Description
Erase When the probe or application is changed	If checked, when you change probes or applications, the system erases the body pattern.
Erase When the image is unfrozen	If checked, when you unfreeze the image, the system erases the body pattern.
Copy to active side in multiple image	If checked, when you use dual B-Mode, the system copies the body pattern to the active side of the dual image.
Body pattern background	Select whether you want the body pattern background to be Transparent or Opaque.
Use Zoom Rotary key to select Body pattern	If selected, you can scroll through the body patterns with the Zoom control.
Bump Body Pattern Control for easy entry	If checked, allows you to quickly add a body pattern by nudging the control.

After you change body pattern options, select Save to save the changes.

Body Pattern Libraries/Applications Preset Menu

The Body Patterns Library/Applications tab is a link to the Applications preset menu. The Body Patterns Applications tab allows you to select body pattern application libraries. You also specify which is the default library that displays when you use body patterns.

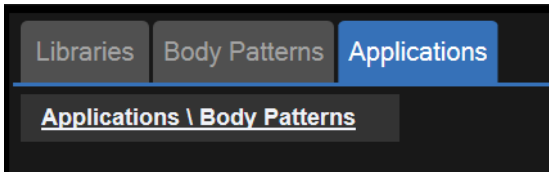


Figure 16-35. Applications/Body Patterns Link

The Applications/Body Patterns screen can be accessed through either the Body Pattern Libraries or Applications keys.

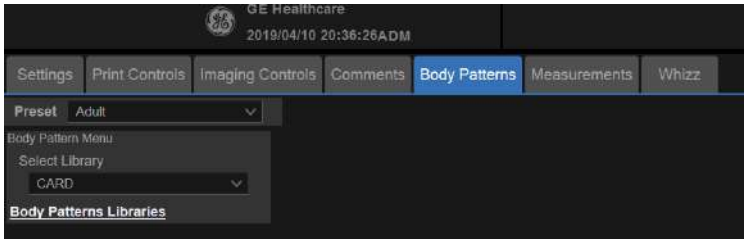


Figure 16-36. Body Patterns Applications Preset Menu

Table 16-42: Applications

Preset Parameter	Description
Preset	Defines the Body Pattern option.
Select Library	A list of body pattern applications.

Selecting body pattern application libraries

1. On the Body Patterns tab, in the Preset field, select the body pattern.
2. In the Library Group Tabs fields, select the application libraries for Body Patterns.
3. To save the changes, select the **Save** button.

NOTE: When you use body patterns, the default library is displayed. To use other application libraries, press the tab for the library.

Using body pattern application libraries

See the following Body Patterns Small Parts.

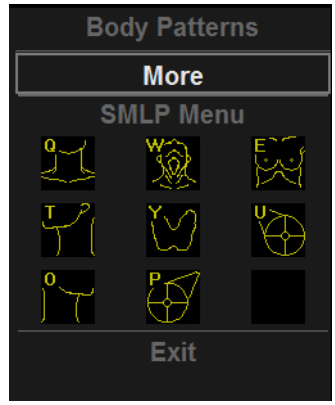


Figure 16-37. Body Patterns Small Parts

To select a body pattern library, select the tabs (for example, ABD or OB).

To select body patterns, use the **Body Pattern** control on the Control Panel.

Application Presets

Overview

Application Settings presets allow you to configure the application-specific settings (presets).

Settings

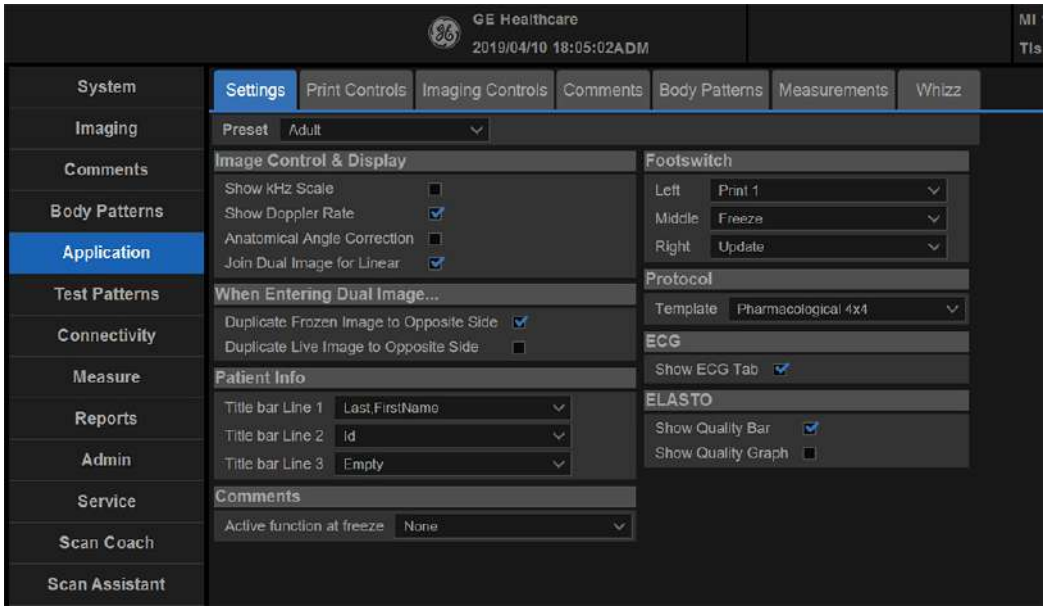


Figure 16-38. Application Settings Preset Menu

Table 16-43: Preset

Preset Parameter	Description
Preset	Select the application that you want to specify the presets.

Table 16-44: Image Control and Display

Preset Parameter	Description
Show kHz scale	When selected, displays the kHz scale on the left side of the Doppler spectrum.

Table 16-44: Image Control and Display

Preset Parameter	Description
Show Doppler Rate	When selected, displays the Doppler rate (mm/s) below the Doppler spectrum.
Anatomical Angle Correction	Select to keep the angle constant with regard to the anatomy.
Join Dual Image for Linear	Select to place linear probe dual images directly next to each other.

Table 16-45: When Entering Dual Image...

Preset Parameter	Description
Duplicate Frozen Image to Opposite Side	When entering Dual Image, duplicate the frozen image to the opposite side.
Duplicate Live Image to Opposite Side	When entering Dual Image, duplicate the live image to the opposite side.

Table 16-46: Patient Info

Preset Parameter	Description
Titlebar Line 1	Select the patient information to display on the scanning screen Title bar.
Titlebar Line 2	Select the patient information to display on the scanning screen Title bar.
Titlebar Line 3	Select the patient information to display on the scanning screen Title bar.

Table 16-47: Comments

Preset Parameter	Description
Active function at Freeze	Select None, Body Pattern, or Comments. If Body Pattern or Comment is selected, the Body Pattern or Comment is activated automatically when freezing the system.

Table 16-48: Footswitch

Function	Description
Left, Middle, Right	Specify from the following for each footswitch pedal: No Function, Freeze, Next Heartcycle, Previous Heartcycle, Print 1,2, Update, Next Step (Scan Coach/ Assistant), Previous Step (Scan Coach/Assistant), or Scan Assistant Pause/Resume.

Table 16-49: Preset

Preset Parameter	Description
Show ECG Tab	Check to the ECG Tab on the Screen.

Print Control

You have to set parameters with each application.

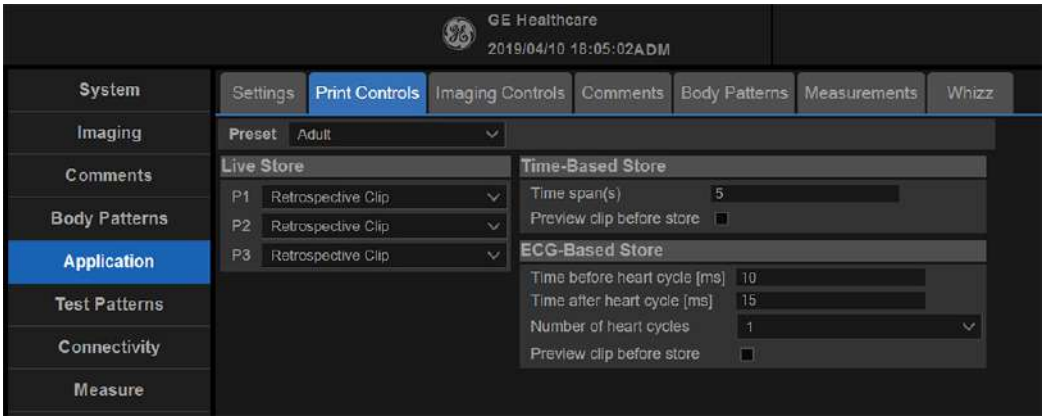


Figure 16-39. Print Control

Table 16-50: Preset

Preset Parameter	Description
Preset	Select Application from pull-down menu. You can set Time span for each application.

Table 16-51: Live Store

Preset Parameter	Description
P1/P2/P3	Select the behavior of Print key during live scan from Retrospective Clip, Single image only or None for each print key. None: Store a still image when you press P-key during Freeze. Retrospective clip: The system stores cine predetermined time before you press the Print button, based on the Time Span setting. Single image only: Store a still image during live scan each time you press P-Key.

Table 16-52: Time-Based Store

Preset Parameter	Description
Time span [s]	Select the number of seconds of CINE Loop storage. The default is 3 seconds.
Preview clip before store	When selected, allows you to review cine loops before storage.

Table 16-53: ECG Based-Store

Preset Parameter	Description
Time before heart cycle [ms]	Sets the storage time span before R-wave of the first heart cycle.
Time after heart cycle [ms]	Sets the storage time span after R-wave of the last heart cycle.
Number of heart cycles	Select the number of heart cycles to store. (Must be de-selected for single frame.)
Preview loop before store	When selected, allows you to review cine loops before storage.

Imaging Controls

For B, M, CF, PDI, PW, CW, CM and Cine mode, you can select which controls you want to be available on the primary menu for the selected application.

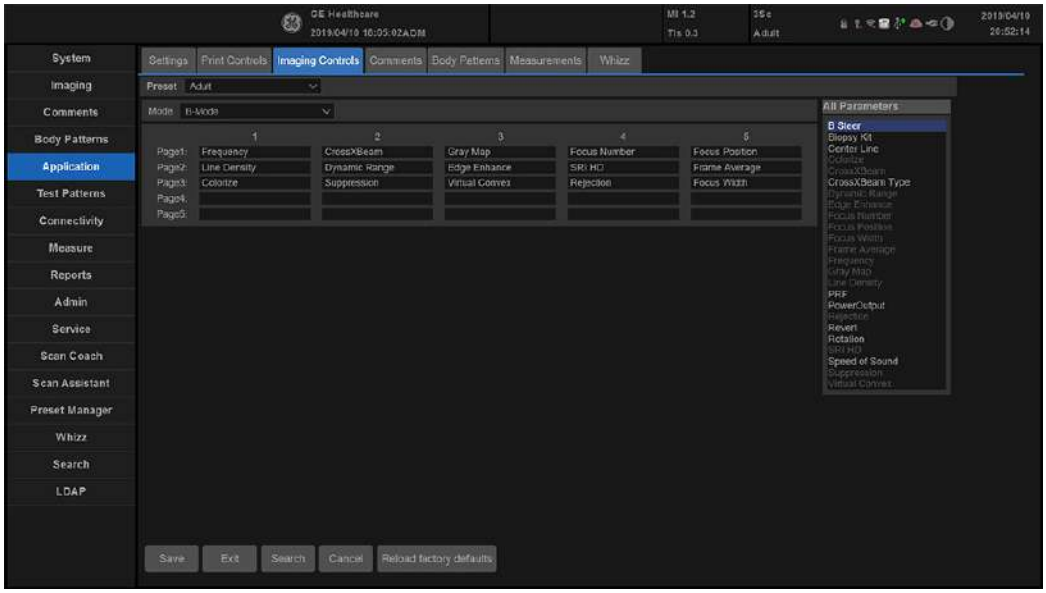


Figure 16-40. Imaging Controls

Comments and Body Patterns

Comments and Body Patterns were described earlier in this chapter.

Measurements

You can set the exam category measurement and calculation package you want to appear when you select the exam category Preset.

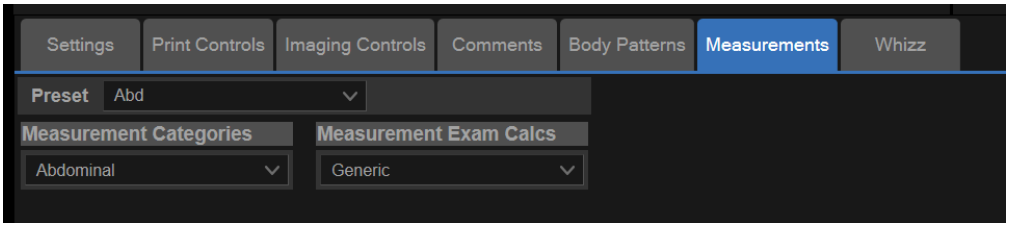


Figure 16-41. Application Measurements Menu

Test Patterns

Overview

There are different test patterns available: Gray Bars, Color Bars, Resolution, Text, Brightness Calibration, White, Gray, Red, Green and Blue.

Configuring Connectivity

Overview

You use Connectivity functionality to set up the connection and communication protocols for the ultrasound system. This section gives an overview of each of the Connectivity functions. Each function is described in detail in the following pages.

Structured Reporting

DICOM Structured Reporting provides the results of a procedure as structured data elements (well-defined fields) as opposed to unstructured data (large amounts of text undifferentiated by individual fields). This greatly improves query capability. DICOM Structured Reporting creates coded clinical data that can be used for clinical research, outcomes analysis, and disease management.

Supported parameters

The DICOM supported parameters are listed in the DICOM Conformance Statement at the following web site under DICOM - Ultrasound:

http://www.gehealthcare.com/usen/interoperability/dicom/

Connectivity Functions

To set up your institution's connectivity, you must login with administrator privileges.

1. **TCPIP**: allows you to configure the Internet Protocol.
2. **Device**. allows you to set up devices.
3. **Service**: allows you to configure a service (for example, DICOM services such as printers, worklist, and other services such as standard print) from the list of supported services. This means that the user can configure a device with the DICOM service(s) that particular device supports.
4. **Dataflow**: allows you to adjust the settings of the selected dataflow and associated services. Selecting a dataflow customizes the ultrasound system to work according to the services associated with the selected dataflow.
5. **Button**: allows you to assign a pre-configured output service (or a set of output services) to the Print keys on the control panel.
6. **Removable Media**: enables formatting (DICOM, database, or blank formatting) and DICOM verification of removable media.
7. **Miscellaneous**: allows you to set up the patient exam menu options, print and store options, and the order of the columns in the examination list on the Patient menu.
8. **Bluetooth**. allows you to set up bluetooth device connection.
9. **Tricefy**. allows you to set up tricefy connection.

Configure these screens from left to right, starting with the Tcpip tab first.

NOTE: The ultrasound system is pre-configured for many services, with default settings selected. You can change these services and settings as needed.



CAUTION

You must restart the Versana Active (shutdown) after making any changes to connectivity settings in the Utility menus. This includes any changes on the TCPIP or dataflow setup screens.

TCPIP

This configuration category enables users with administrative rights to set the TCPIP for the system and connected remote archive.

1. Type the name of the Ultrasound system in the Computer Name field.
2. In the IP settings section, identify the ultrasound system to the rest of the network by one of the following:
   - Dynamic Host Configuration Protocol (DHCP) can be used provided your network supports the DHCP protocol..
   - Type the IP-Address. In this case, uncheck the “Enable DHCP” box and enter the IP address, Subnet Mask and default Gateway. Contact your network administrator if you are unsure what values to enter.

NOTE: Do not set up the system with DHCP. The IP address MUST BE static for the diagnostic and DICOM to function correctly.

3. Select the Network Speed.
4. Select Save settings.
5. Restart the ultrasound system.

NOTE: TCPIP settings do not get restored when restoring backups. This is per system design. The Versana Active IP address MUST BE unique.

TCPIP (continued)

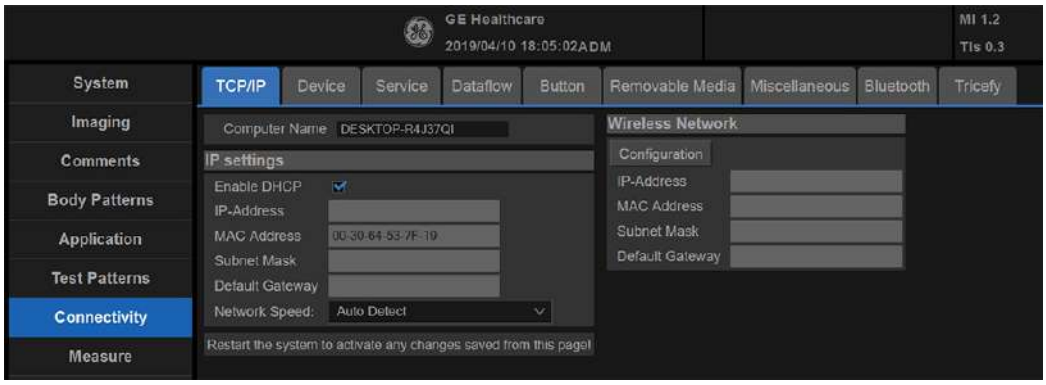


Figure 16-42. Connectivity TCPIP Preset Menu

Table 16-54: Computer Name

Preset Parameter	Description
Computer Name	Type the unique name for the Ultrasound system (no spaces in name).

Table 16-55: IP settings

Preset Parameter	Description
Enable DHCP	DO NOT select this box to enable dynamic IP Address selection. NOTE: The system shall disable IP-Address, Subnet Mask, and Default Gateway when the user chooses to use DHCP.
IP-Address	Type the IP Address of the Ultrasound system. NOTE: IP stands for Internet Protocol. Every device on the network has a unique IP address.
Subnet Mask	Type the subnet mask address. NOTE: The Subnet Mask is an IP address filter that eliminates communication/messages from network devices of no interest to your system.
Default Gateway	Type the default gateway address.
Network Speed	Select the network speed (Auto Detect, 10Mbps/Half/Full Duplex, 100Mbps/ Half/Full Duplex, or 1000Mbps/Auto-negotiate).

Table 16-56: Wireless Network

Preset Parameter	Description
Configuration	Press this button to set up wireless network.
IP-Address	Wireless Network IP Address of the Ultrasound system.
Subnet Mask	Wireless Network subnet mask address.
Default Gateway	Wireless Network default gateway address.

NOTE: Restart the system to activate any changes saved from this page.

Wireless Network Configuration

A wireless network is available on the Versana Active. When the WLAN is actvie, an icon appears in the status bar to indicate whether the WLAN is connected or disconnected.

Connecting to the WLAN

To connect the Versana Active to the WLAN:

1. Enter ***Utility*** -> ***Connectivity*** -> **TCP/IP**, and select **Configuration** under Wireless Network.

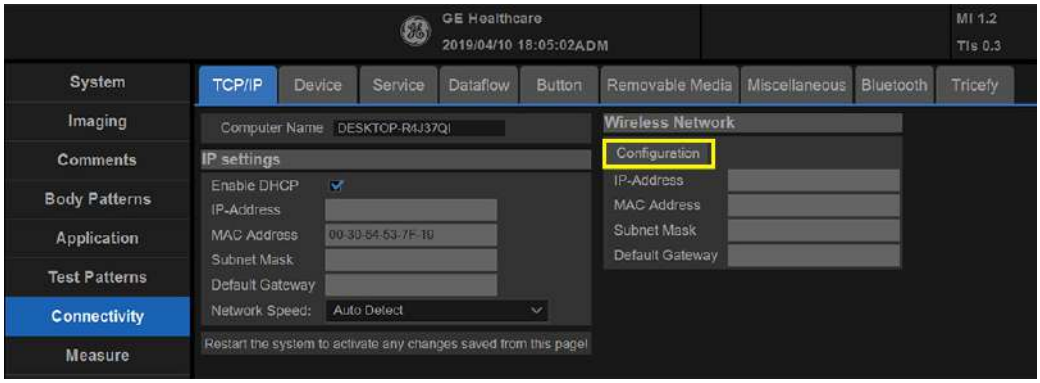


Figure 16-43. WLAN setting on TCP/IP

Connecting to the WLAN (continued)

2. The Wireless Network Configuration tool appears. The wireless networks broadcasting in your area appear in the list.

   Highlight the wireless network you want to connect, and then select **Connect** from the bottom of the configuration page.

NOTE: Check "Enable Wireless Connection" if necessary.

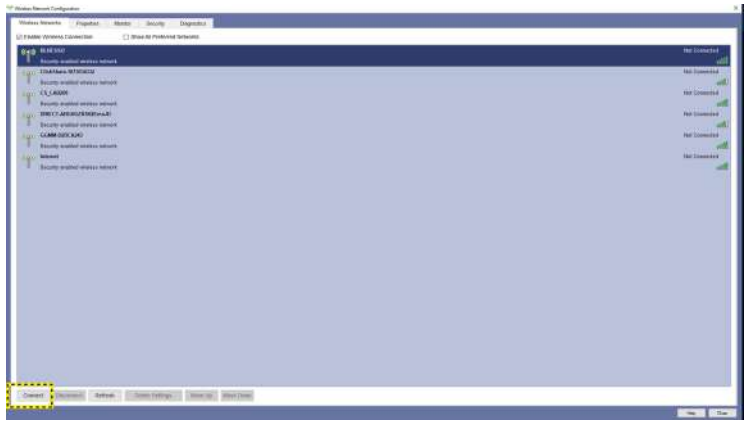


Figure 16-44. Available Wireless Networks

3. A pop-up window appears. Select **OK** to continue.

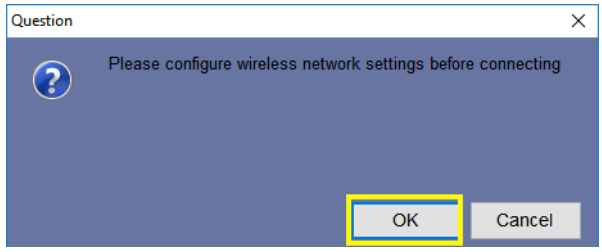


Figure 16-45. Pop-up Window

Connecting to the WLAN (continued)

4. Choose the **Security** tab, select the Security tyoe and Encrption type, and then input the network security key to connect the wireless network.

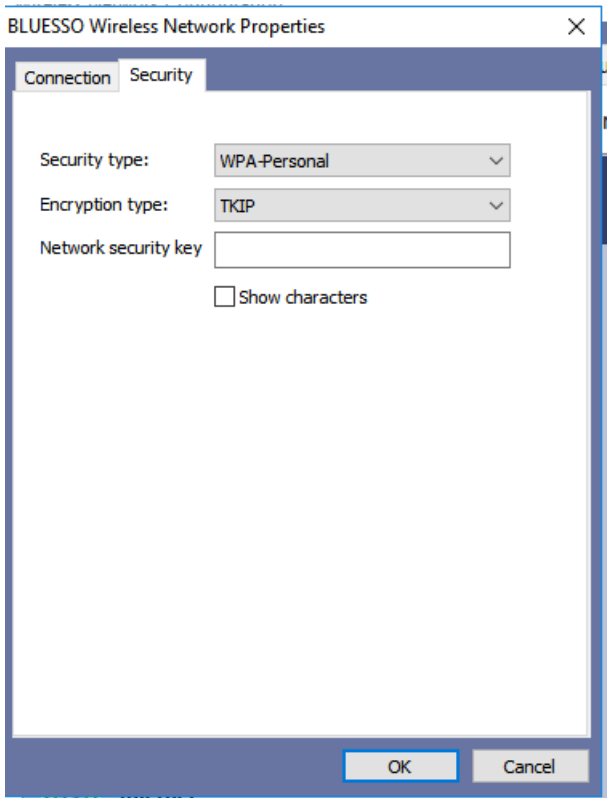


Figure 16-46. Network Properties Tab

5. A process bar is displayed while the system is attempting to connect the wireless network.

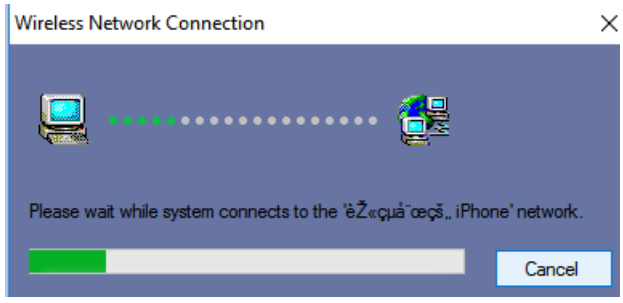


Figure 16-47. Process Bar

Connecting to the WLAN (continued)

6. The wireless network is connected successfully.

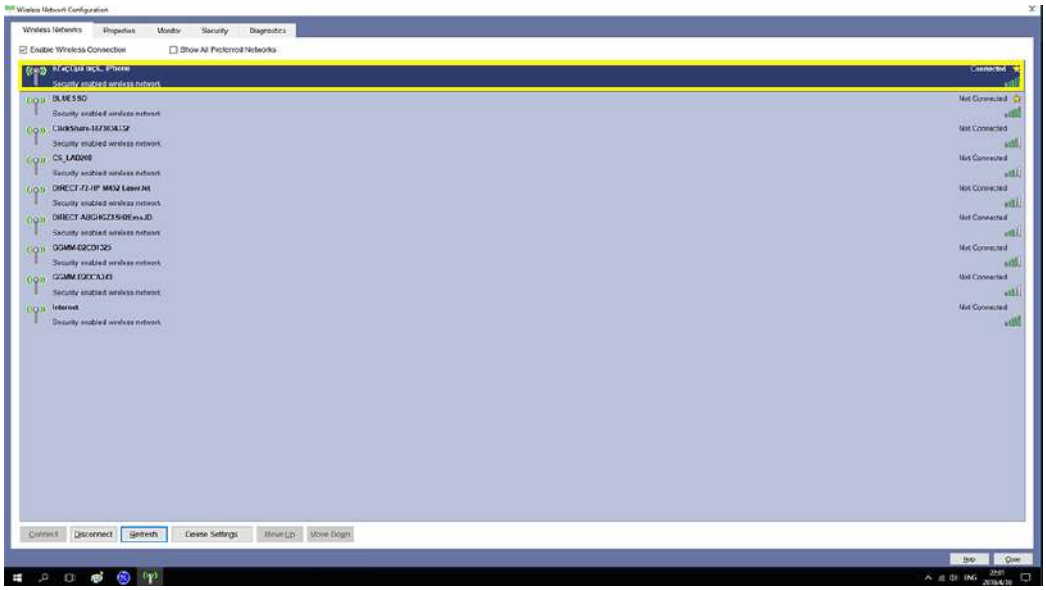


Figure 16-48. Network Configuration

Adding a Wireless Network

To add a WLAN profile (even for a network which is not yet available),

1. Enter ***Utility*** -> ***Connectivity*** -> **TCP/IP**, and select **Configuration** under Wireless Network.

   The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the ***Security*** tab.
3. Select ***Add...***
4. Add the following information to the Wireless Network Properties page:
   - Network Name (SSID)
   - Network Authentication (Open, Shared Key, WPA, WPA PSK, WPA2, or WPA2 PSK).
   - Data Encryption
   - Network Key
   - Key Index
5. After you have filled in all the required information, press ***OK***. To cancel adding this profile, press ***Cancel***.

Removing a WLAN

To remove a WLAN profile (even for a network which is not available),

1. Enter ***Utility*** -> ***Connectivity*** -> **TCP/IP**, and select **Configuration** under Wireless Network.

   The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the ***Security*** tab.
3. Select ***Remove***.

Customizing Wireless Network Settings

To customize an existing WLAN profile,

1. Enter ***Utility*** -> ***Connectivity*** -> **TCP/IP**, and select **Configuration** under Wireless Network.

   The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the ***Security*** tab.
3. Select ***Customize...***
4. Add the following information:
   a. Network Name (SSID)
   b. Network Authentication (Open, Shared Key, WPA PSK, or WPA2 PSK).
   c. Data Encryption
   d. Network Key
   e. Key Index
5. After you have filled in all the required information, press ***OK***. To cancel adding this profile, press ***Cancel***.

Device

To add a new device,

1. Press ***Add***.
2. Type the device name in the Name field.
3. Type the device's IP address in the IP Address field.

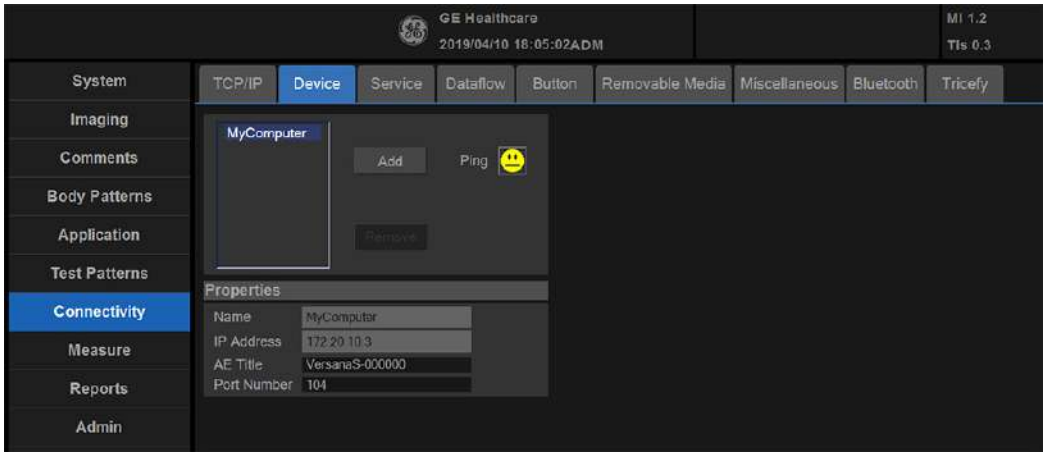


Figure 16-49. Connectivity Device Preset Menu

Table 16-57: Device

Preset Parameter	Description
Add/Remove	Press Add to add a new device; press Remove to delete a device.
Ping	Press Ping to confirm that a device is connected.
Properties: Name	Type the name of the device.
Properties: IP Address	Type the device's IP address.
Properties: AE Title	AE Title of the Versana Active. NOTE: Only available for MyComputer.
Properties: Port Number	IP Port Number Used for DICOM, set by default to 104. NOTE: Only available for MyComputer.

To ping a device,

1. Select the device.
2. Press ***Ping***. If the smiley face smiles, then the connection has been confirmed. If the smiley face frowns, then the connection has not been made. Check the device name and IP address.

Service

For each Device that you added to the system, you need to set up the service(s) that device supports (you must be an administrator to update these screens).

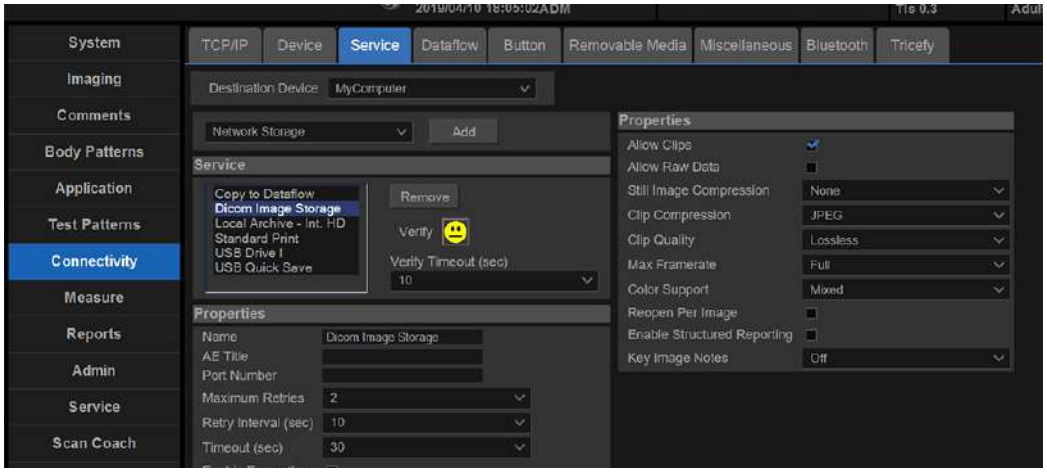


Figure 16-50. Connectivity Services Preset Menu

The Services screen has the following sections of information:

1. **Destination Device** - lists information about destination devices. You can select from a list of currently existing devices.
2. **Service Type to Add** - lists information about services for the destination device. You can add services, select from a list of currently existing services, and remove services.
3. **Service Properties** - lists parameters for the service currently selected in the Services section. The name and parameters in this section change, depending on what service is currently selected.

Adding a service to a destination device

1. Select the service from the pull-down menu. Press ***Add***.
2. Specify the properties for this service. Press ***Save***.
3. Verify the service.

Removing a service

1. Select the service. Press ***Remove***.
2. Press ***Save***.

Changing parameters for a service

There are certain parameters that may need to be set up for each service:

Table 16-58: Service Parameters: Common Service Parameters

Preset Parameter	Description
Name	Free text: give a descriptive name to the device.
AE Title	The Application Entity Title for the service.
Port Number	The port number of the service.
Maximum Retries	Max # – the maximum number of times to try establishing a connection to the service.
Retry Interval (sec)	Specify how often (in seconds) the system should try to establish a connection to the service.
Timeout	The amount of time after which the system will stop trying to establish a connection to the service.

Table 16-58: Service Parameters: Common Service Parameters

Preset Parameter	Description
Enable Encryption	Select to enable encryption on the data during data transfer when the DICOM server requires encryption. The system supports Secure Sockets Layer 3.0 client protocol and Transport Layer Security 1.0 client protocol. Peer authentication is not supported. The following are supported cipher suites: • TLS_RSA_WITH_RC4_128_MD5 • TLS_RSA_WITH_RC4_128_SHA • TLS_RSA_WITH_3DES_EDE_CBC_SHA • TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA • TLS_RSA_WITH_DES_CBC_SHA • TLS_DHE_DSS_WITH_DES_CBC_SHA • TLS_RSA_EXPORT1024_WITH_RC4_56_SHA • TLS_RSA_EXPORT1024_WITH_DES_CBC_SHA • TLS_DHE_ESS_EXPORT1024_WITH_DES_CBC_SHA • TLS_RSA_EXPORT_WITH_RC4_40_MD5 • TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5 • TLS_RSA_WITH_NULL_MD5 • TLS_RSA_WITH_NULL_SHA **NOTE**: Enable Encryption is only available with DICOM Image Storage and DICOM Worklist.

Many service parameters are specific to each type of service. The parameters are described on the following pages:

- DICOM Image Storage
- DICOM Performed Procedure
- DICOM Print
- DICOM Query/Retrieve
- DICOM Storage Commitment
- DICOM Worklist
- Standard Print
- USB Quick Save
- Save As
- Network storage

DICOM Image Storage

DICOM Image Storage allows the system to send or receive ultrasound images in a format that can be interpreted by PACS.

CAUTION

GE does not warrant the operation if the DICOM format of send image (US, USMF, SC) does not correspond with the DICOM Server.

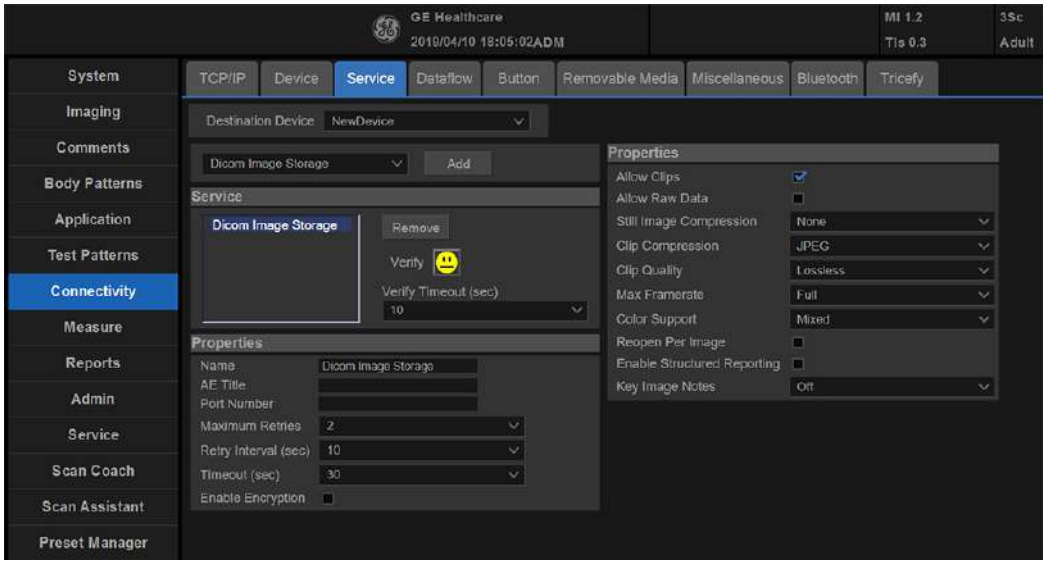


Figure 16-51. DICOM Image Storage Service

Table 16-59: DICOM Image Storage

Preset Parameter	Description
Allow Clips	Select to allow cine loop storage.
Allow raw data	Select to save data in both TruAccess (raw data) and DICOM format. Clear to save in DICOM format only.
Compression	Select the compression type: None, Rle, or Jpeg.
Max Framerate	Select the maximum frame rate: Full, 25, or 30.
Color Support	Select: Mixed, Gray or Color
Reopen per image	Reopen per image
Enable Structured Reporting	Select for Structured Reporting.

Table 16-59: DICOM Image Storage (Continued)

Preset Parameter	Description
Key Image Notes	Image deletion notification. ONLY available for the Direct Store Workflow and ONLY generated when there are images deleted during the exam. Selecting this lets the reader at the PACS system know which images have been deleted. An indicator is placed on deleted images with a reason, “Rejected for Quality Reasons,” for example.

DICOM Performed Procedure

DICOM Performed Procedure provides an acknowledgement that a study has been performed.

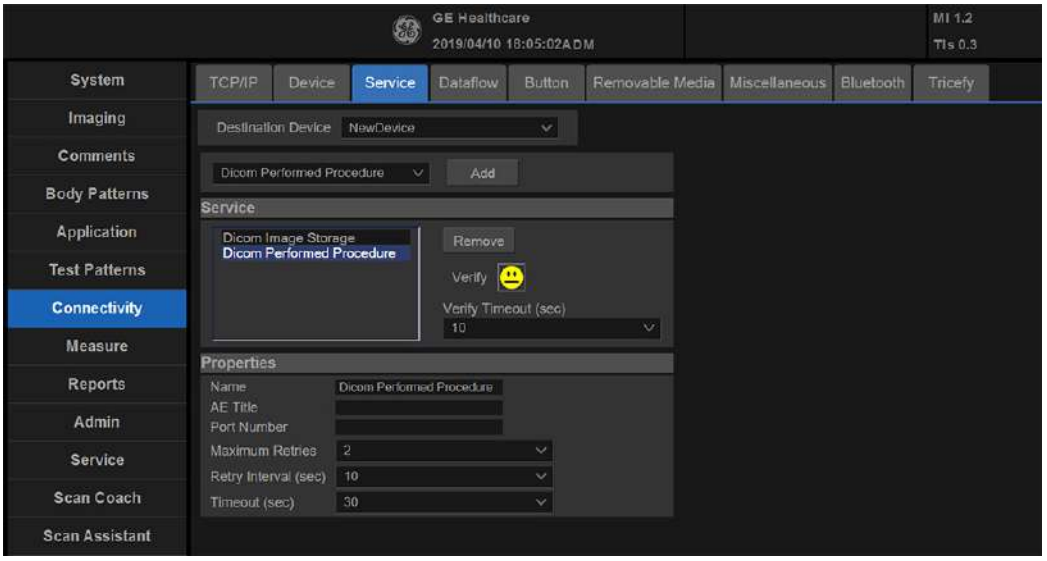


Figure 16-52. DICOM Performed Procedure Service

DICOM Print

DICOM Print provides the ability to send or receive ultrasound image data to DICOM printers.

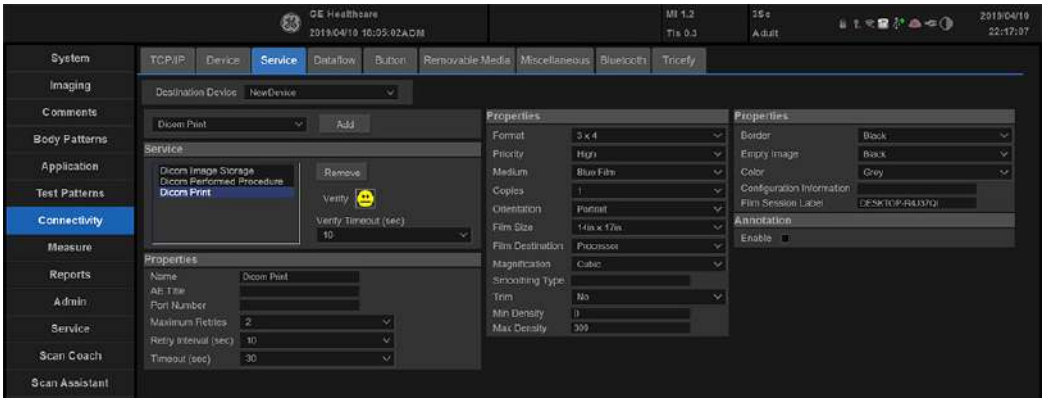


Figure 16-53. DICOM Print Service

Table 16-60: Properties

Preset Parameter	Description
Format	Indicates how many prints to print per page, for example, 1,1, 1,2, 1,3, up to 7,5. Partial prints are displayed as one print job.
Priority	Specify the print job priority: High, Medium, or Low.
Medium	Select the print medium: Clear Film, Paper, or Blue Film.
Copies	Enter the number of copies.
Orientation	Specify whether to print the image Portrait (vertically) or Landscape (horizontally).
Film Size	Specify the dimensions of the film size.
Film Destination	Specify the film destination for the exposed filmMagazine – Store in a film magazineProcessor – Develop in a film processor
Magnification	Specify how the printer magnifies the image to fit it onto the film.Replicate – Interpolated pixel are copies of the adjacent pixelsBilinear – Interpolated pixels are created by bilinear interpolations between the adjacent pixelsCubic – Interpolated pixels are created by cubic interpolations between the adjacent pixelsNone – No interpolation
Smoothing Type	Specify the printer's magnification interpolation for the output.
Trim	Specify whether you want a trim box to be printed around each image on the film: Yes or No.
Min Density	Enter a number indicating the minimum density level of the film.
Max Density	Enter a number indicating the maximum density level of the film.

Table 16-60: Properties (Continued)

Preset Parameter	Description
Border	Select to have the border area surrounding and between the images of the film: Black or White.
Empty Image	Select to have a Black or White empty image.
Color	Select whether to have the image Color or Grey.
Configuration Information	Enter vendor-specific image quality settings.
Film Session Label	Type a name for the group of film labels associated with the print job.

Table 16-61: Annotation

Preset Parameter	Description
Enable	Lets you annotate the image.

DICOM Query/Retrieve

DICOM Query/Retrieve provides a list of patients sorted by query parameters.

NOTE: Some PACS vendors only offer Query/Retrieve as an option. Please confirm that this service is available.

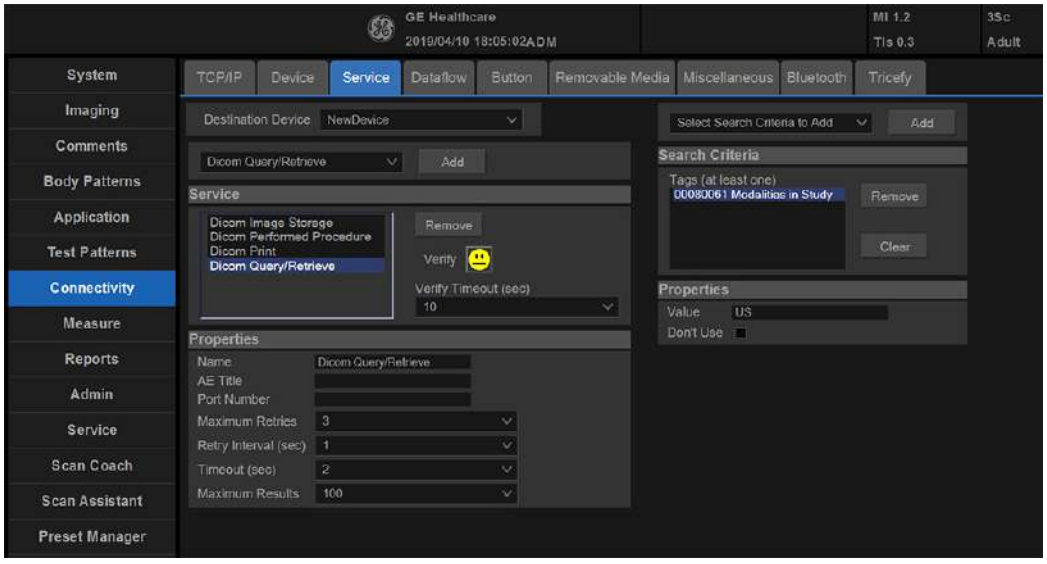


Figure 16-54. DICOM Query/Retrieve Service

Table 16-62: DICOM Query/Retrieve

Preset Parameter	Description
Maximum Result	Specify the maximum number of patient records you want the system to retrieve when searching the patient database.
Search Criteria	Displays the Search Criteria window, where you can enter search parameters for the system to use when searching the patient database.

NOTE: If you are experiencing problems with slow responses from DICOM servers, increase the time-out in the DICOM server properties dialog. (Utility -> Connectivity -> Service -> Properties -> Maximum Retries and Timeout). Problems with slow responses may result in images being re-sent automatically and low transfer rates. The retry settings can be used to make jobs retry on bad networks. When portable (off-line), use minimum time-out and no retries or it will affect shutdown speed.

DICOM Query/Retrieve (continued)

Table 16-63: DICOM Query/Retrieve Search Criteria

Preset Parameter	Description
Select Search Criteria to Add	Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time.
Tags (at least one)	The name of a tag selected to use for search criteria.
Properties: Value	Type the value of the Selected Tag item. For example, if you select Referring Physician's Name in the Select Tag field, you can enter the name of the physician in the Value field.
Properties: Don't Use	Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don't Use and then select Add to List.
Add	Select to add the tag and value to the list of search criteria.
Remove	Select to remove the tag and value from the list of search criteria.
Clear	Clears all tags.

Query/Retrieve Per Series

You can now display/retrieve multiple series by patient on the Patient--> Data Transfer--> Q/R page.

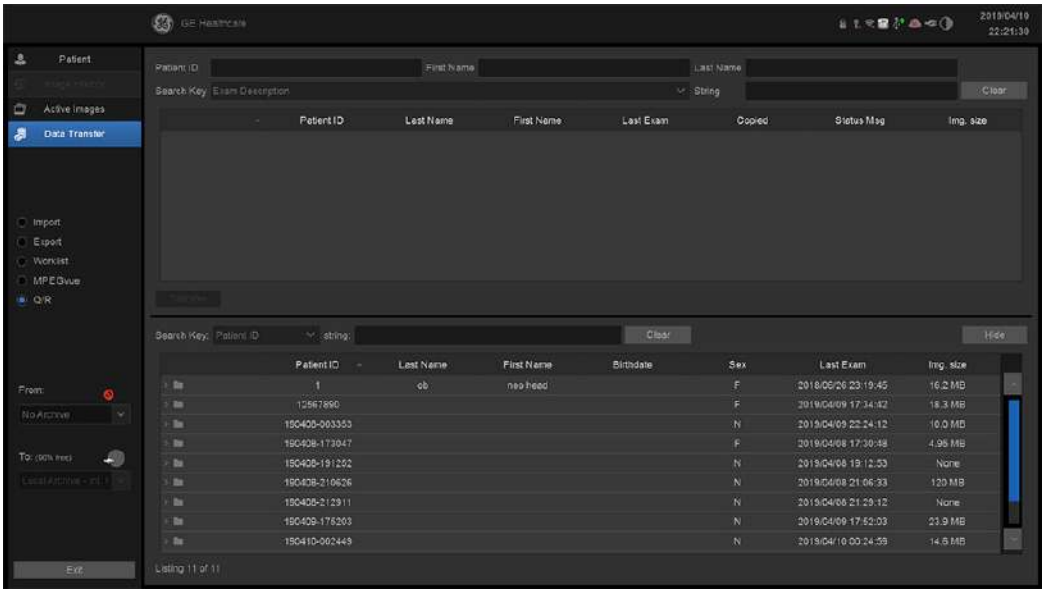


Figure 16-55. Q/R Per Series Example

DICOM Storage Commitment

DICOM Storage Commitment provides acknowledgement from PACS that the study has been accepted into archive.

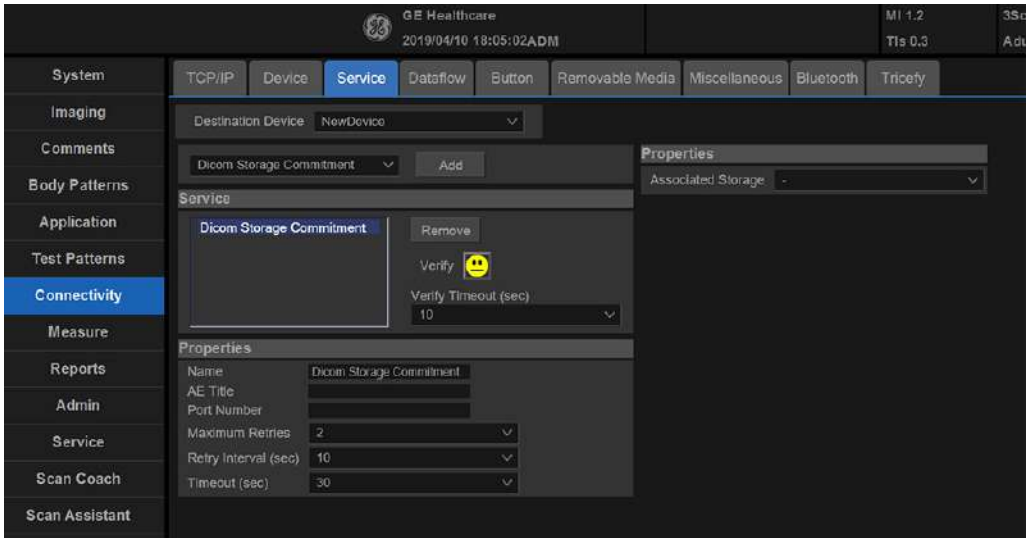


Figure 16-56. DICOM Storage Commitment Service

Table 16-64: DICOM Storage Commitment

Preset Parameter	Description
Associated Storage	This selection is based on the services entered by the user.

DICOM Worklist

DICOM Worklist provides a list of patients sorted by query parameters.

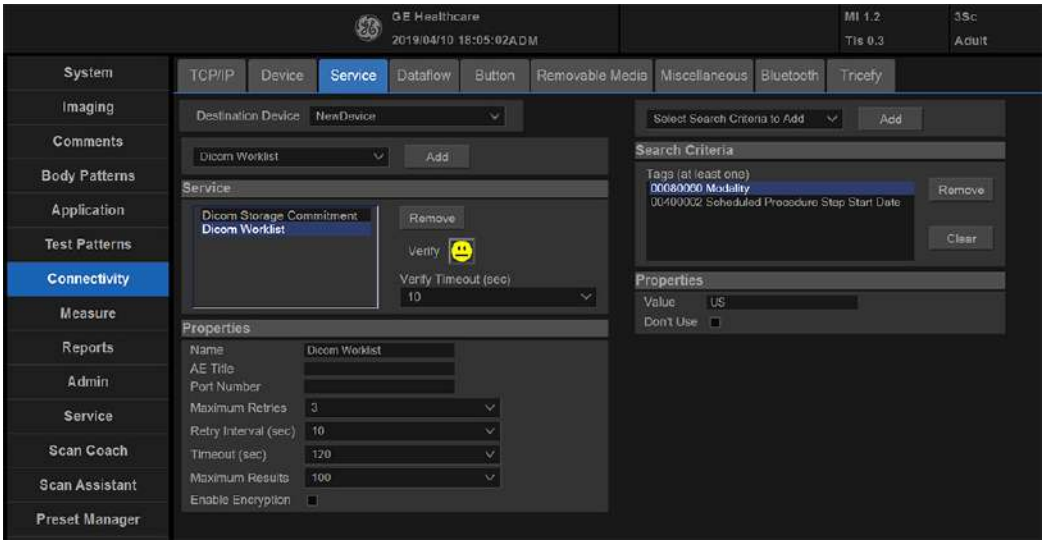


Figure 16-57. DICOM Worklist Service

Table 16-65: DICOM Worklist

Preset Parameter	Description
Maximum Result	Specify the maximum number of patient records you want the system to retrieve when searching the patient database.
Search Criteria	Displays the Search Criteria window, where you can enter search parameters for the system to use when searching the patient database.

DICOM Worklist (continued)

Table 16-66: DICOM Worklist Search Criteria

Preset Parameter	Description
Select Search Criteria to Add	Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time.
Tags (at least one)	The name of a tag selected to use for search criteria.
Properties: Value	Type the value of the Selected Tag item. For example, if you select Referring Physician's Name in the Select Tag field, you can enter the name of the physician in the Value field.
Properties: Don't Use	Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don't Use and then select Add to List.
Add	Select to add the tag and value to the list of search criteria.
Remove	Select to remove the tag and value from the list of search criteria.
Clear	Clears all tags.

Standard Print

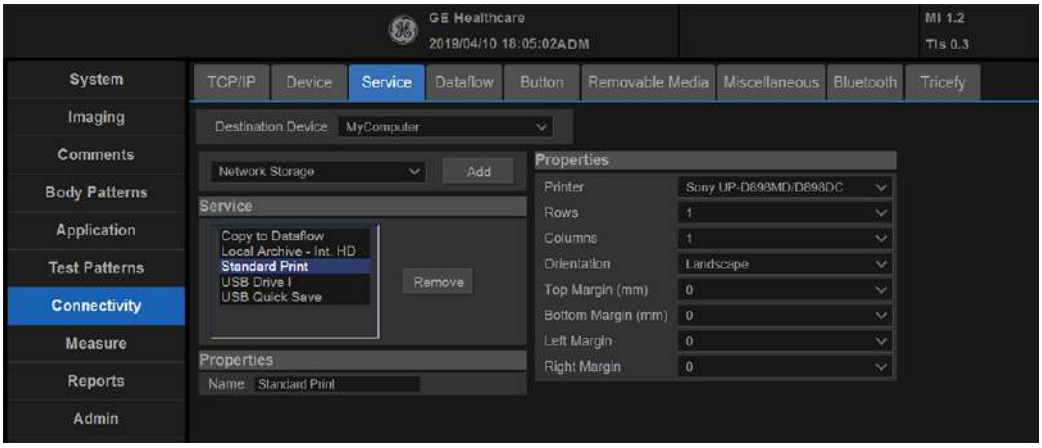


Figure 16-58. Standard Print Service

Table 16-67: Standard Print

Preset Parameter	Description
Printer	Select the printer.
Rows	Specify 1-5.
Columns	Specify 1-5.
Orientation	Specify Landscape/Portrait
Top Margin (mm)	Specify the top margin (0-51mm)
Bottom Margin (mm)	Specify the bottom margin (0-51mm)
Left Margin	Specify the left margin (0-51mm)
Right Margin	Specify the right margin (0-51mm)

Save As

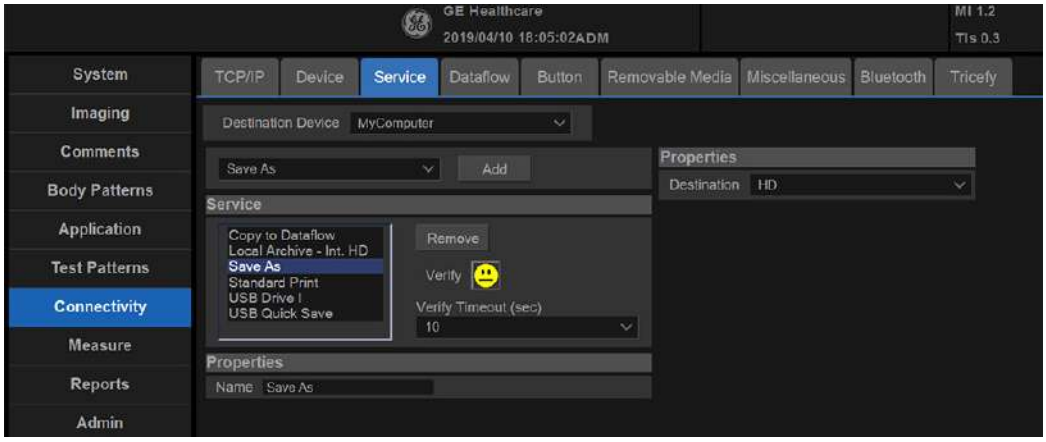


Figure 16-59. Save As

Table 16-68: Save As

Preset Parameter	Description
Destination	Specify destination device, Hard Drive, USB Flash Drive.

USB Quick Save

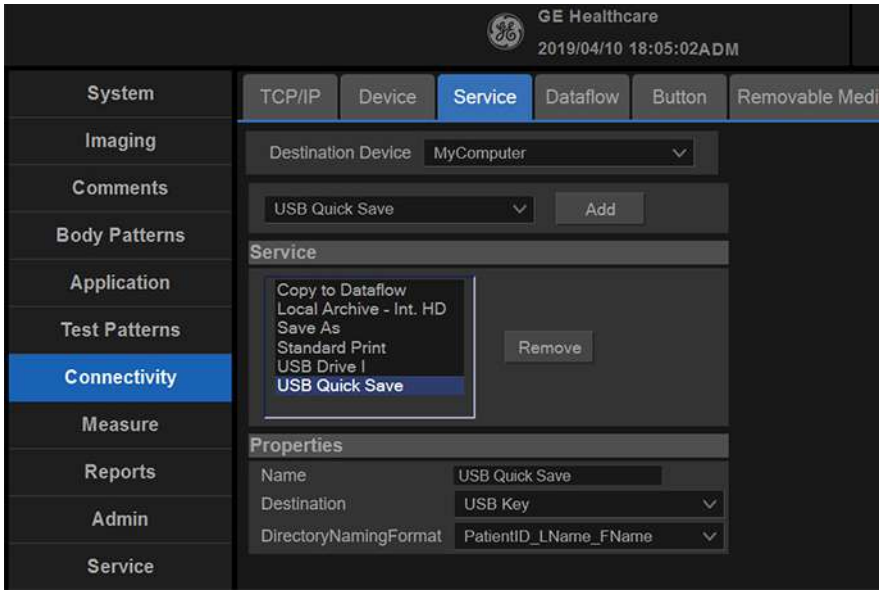


Figure 16-60. USB Quick Save

Table 16-69: USB Quick Save

Preset Parameter	Description
Name	Type the name.
Destination	Specify destination device: USB key or NetworkStorage.
DirectoryNamingFormat	Specify the directory naming format.

Setting up a Printer

Use Standard Print for digital peripherals. These are printers with either a USB interface or Ethernet interface (Sony UP-D898MD, for example).

On the Utility --> Connectivity --> Button page, select the Print key in the upper, left-hand corner of the display. In the middle portion of the page, under Available Input/Outputs, select the printer you want to configure. Next, press the two right arrows (>>) in the upper, right-hand corner of the page to move this printer into the Printflow View.

You can also configure the Standard Print button that appears on the Active Images screen.

Example: For instance a report printer, on the Utility --> Connectivity --> Service page, in the Service Type to Add box, and press ***Add***. In the properties box on the upper, right-hand side, select the type of device and in the Properties box in the lower, left-hand side, type in a unique descriptive name for this device.

Network Storage

The Network Storage service provides the following:

- MPEGvue patient data to a Windows compatible file share.
- Send images (JPEG), video (AVI) and reports (PDF) to a Windows compatible file share with the USB Quick Save service.
- Exporting is allowed to a network storage location.

NOTE: Before setting up the ultrasound system, a Windows compatible file share must be setup on the network to connect to. The user that is connecting to the share must have Full Control rights and permissions to the shared folder. For additional help creating users or configuring file shares, please consult your operating system documentation.

NOTE: Do not connect multiple ultrasound systems to the same share.

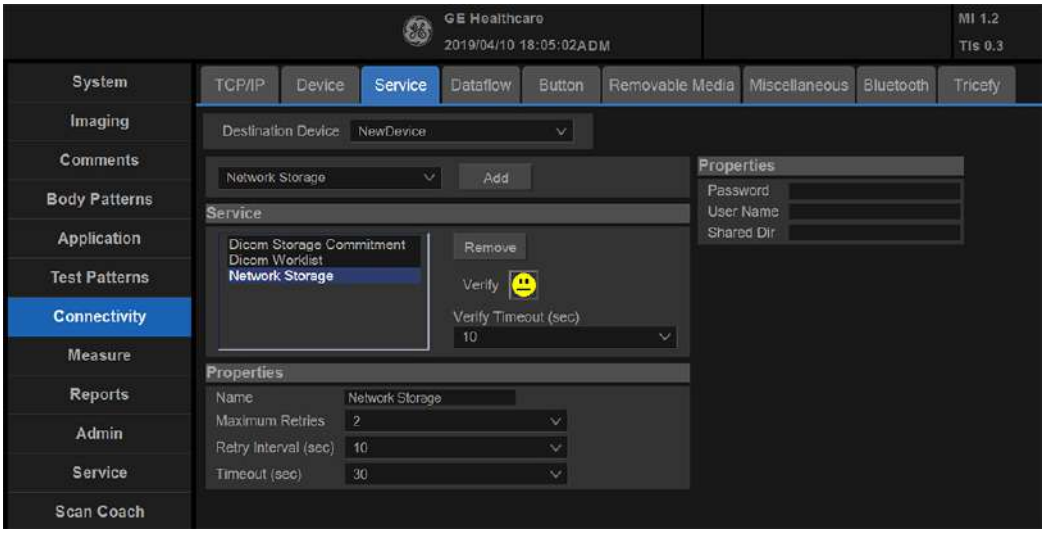


Figure 16-61. Network Storage Service

NOTE: The password used to connect to the shared folder must only contain numbers and letters.

NOTE: The account used to connect to the shared folder must be local to the device hosting the shared folder.

NOTE: If the shared folder exists on a Domain Controller, an active directory account is acceptable to use.

Network Storage (continued)

NOTE: If the device hosting the shared folder is running Windows Server 2008 R2 or later, you will have to enable NTLM in the local security policy on the server.

Table 16-70: Network Storage Service

Preset Parameter	Description
Name	Enter unique name that identifies this service. *NOTE: Do not use the same name for any other Service or device.*
Password	Enter the password used for logging onto the PC.
User Name	Enter the user name used for logging onto the PC.
Shared Dir	Enter the Share name of the folder, not the entire UNC path. For example if the UNC path to the share is \\server\images, you would enter images as the name in the Shared Dir field. *NOTE: Only use alphanumeric characters for the Shared Dir.*

Dataflow

CAUTION DO NOT rename the factory default dataflow.

A dataflow is a set of pre-configured services. When you select a dataflow, the ultrasound system automatically works according to the services associated with the dataflow. The Dataflow tab allows you to select and review information about dataflows. You can also create, change, and remove dataflows.

Set up dataflows for the services.

NOTE: You must be logged on as Administrator to use the Dataflow tab.

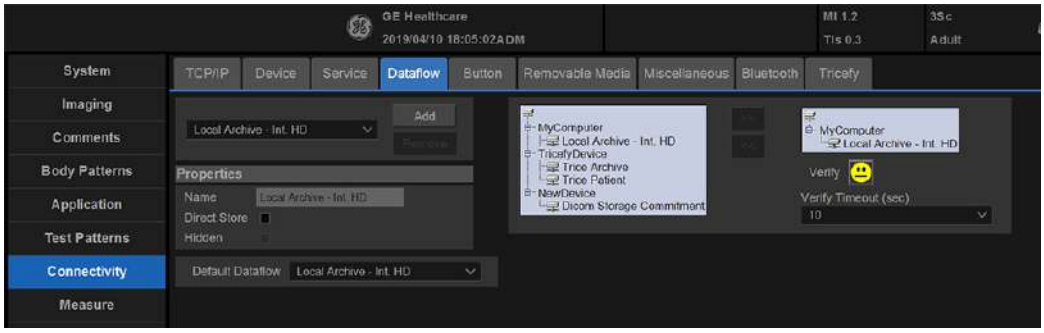


Figure 16-62. Dataflow Preset Menu

Table 16-71: Dataflow

Preset Parameter	Description
Name	Select the dataflow from the list.
Direct Store	Select to store data directly to archive (no buffer storage).
Hidden	Select so that this dataflow does not appear as a Dataflow on the Patient menu.
Default Dataflow	Select to use this dataflow as the default dataflow when you start the system.

Button

You can assign print buttons via the Utility --> Connectivity --> Button page.

Assigning print buttons. First select the print button to configure on the upper, left corner of the page. Then select the device you want to add in the middle part of the page, under Available Input/ Outputs. Then click on the right arrow in the top right corner of the page.

NOTE: You can configure each print key to multiple output devices/ dataflows.

NOTE: Only attach one DICOM service per print key (e.g., PACS and DICOM printer). Multiple DICOM devices should be configured via a dataflow.

NOTE: When using a print key to send an image directly to a DICOM device, this causes a single DICOM association per image. Most devices (all known printers) work fine with this. However, some storage devices, such as ALI, Kodak Access, and Cemax, assume that the end of each association is the end of the exam and can result in a new folder for each image. In the Utility menu, select a single association or open PR for the desired DICOM storage device.

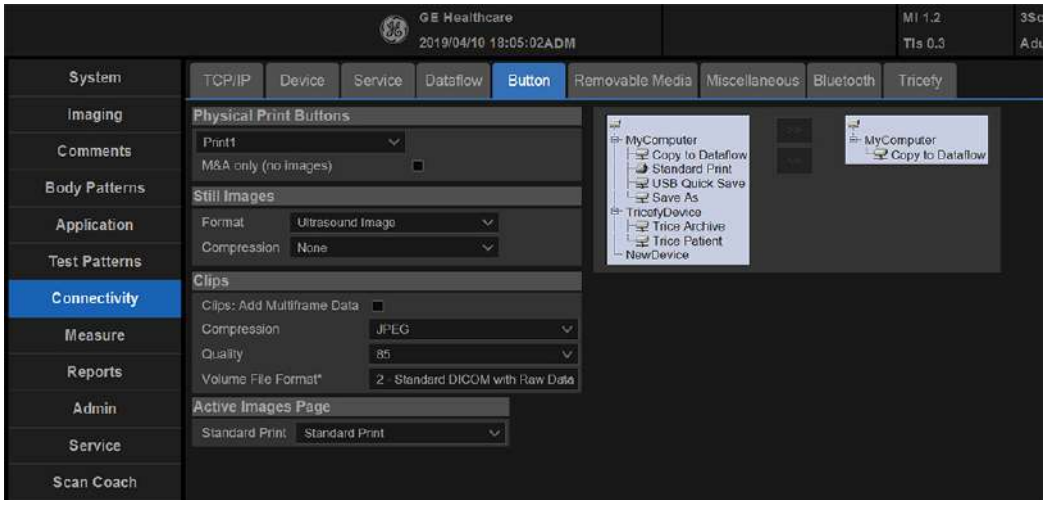


Figure 16-63. Button Preset Menu

Table 16-72: Physical Print Buttons

Preset Parameter	Description
M&A only (no images)	Configures the system to send a DICOM structured report only; no image isgenerated or sent.

Table 16-73: Still Images

Preset Parameter	Description
Format	RawDICOM, DICOM, or M&A.
Compression	Always set to None.

Table 16-74: Cllips/Volumes

Preset Parameter	Description
Cllips: Add Multiframe Data	Checkbox
Compression	None, Rle, Jpeg, Jpeg2000
Quality	Lossless, 99, 98, 97, ... 50 Note: The default Compression for Clips is JPEG85. It is strongly recommended to keep the Compression set to JPEG85.

Table 16-75: Active Images Page

Preset Parameter	Description
Standard Print	Lets you send to a Windows-based printer.

Removable Media

The Removable Media tab allows you to:

- Verify the DICOM directory on removable media.
- Verify the free space of the media.
- Verify that the media is finalized or unfinalized.
- Verify that the media is formatted or unformatted.
- Format removable media (rewritable CD/DVD or USB device).

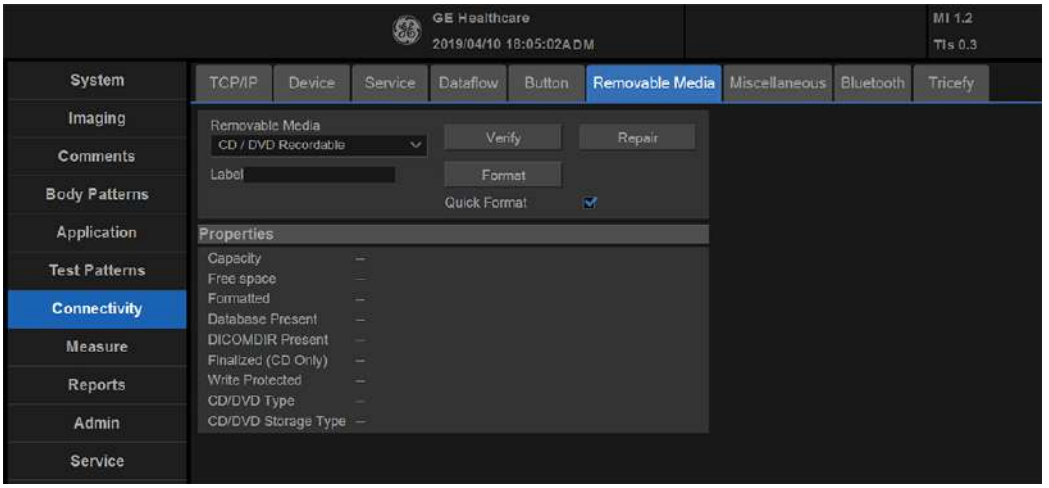


Figure 16-64. Removable Media Preset Menu

Table 16-76: Tools

Preset Parameter	Description
Removable Media	Select the removable media to format or verify.
Label	Type a label for a new removable media (free text).
Verify	• Select to verify DICOM directory on removable DICOM disk. • Verify the free space of the media. • Verify that the media is finalized or unfinalized. • Verify that the media is formatted or unformatted.
Format	Select to format removable media.
Quick Format	To format the media quickly, check this box. If you uncheck this box, the media is formatted with a full format. New media should always be formatted with a full format.

The bottom of the screen lists properties of the selected media.

Removable Media (continued)

Formatting removable media

1. Select the removable media from the Media list.
2. Type a name for the removable media in the Label field.

NOTE: *Do not use the following characters for labelling:*

\ / : ; . , * < > | + = [ ]

3. Select ***Format***. Confirm **OK** or **Cancel**.
4. An information window confirms when the format has been completed. Select **OK** to exit.

Verifying removable media

1. Select the removable media from the Media list.
2. Select ***Verify***.

Miscellaneous

The Miscellaneous tab allows you to configure tools related to patient management and print and store options. You can specify default system functionality, such as whether patient ID is required when you archive data, or if you want the system to automatically search the archive for a patient when you enter patient data.

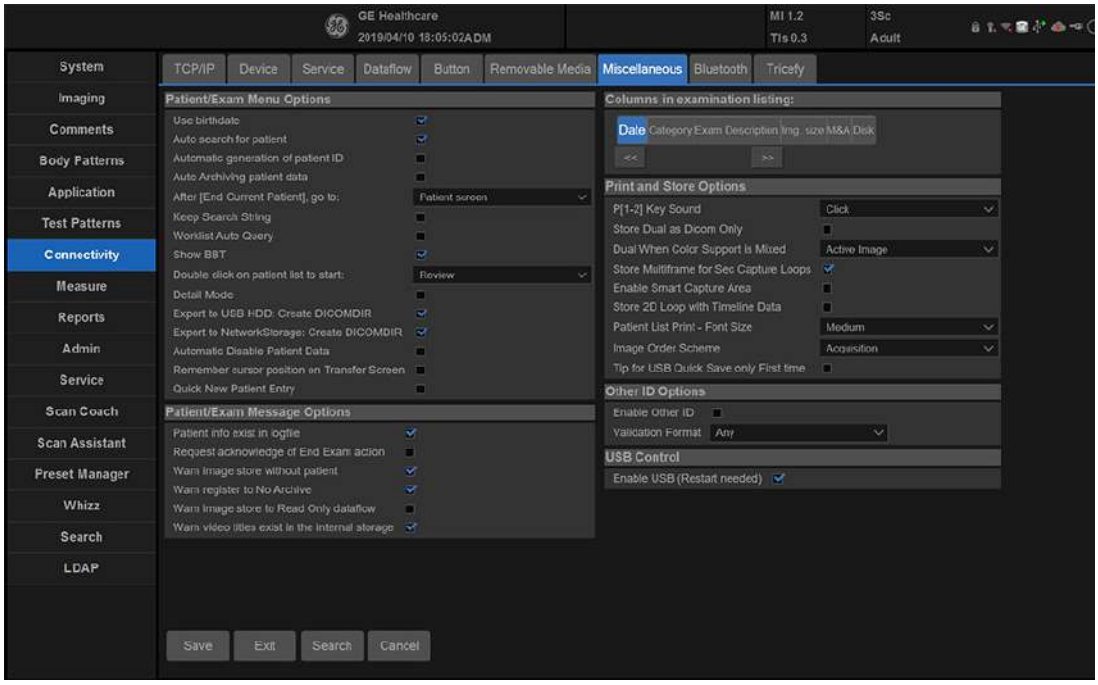


Figure 16-65. Miscellaneous Preset Menu

Table 16-77: Patient/Exam Menu Options

Preset Parameter	Description
Use birthdate	In the Patient information window, enter either the patient age or the birthdate:When selected, enter birth date, then the age is calculated.Whencleared, enter age (birth date field not available).
Auto search for patient	In the Search/Create Patient window: When selected, the system automatically searches through the selected patient archive, while the user enters patient information.When cleared, the automatic search tool is turned off. If you are trying to keep the past patient data confidential, DO NOT use this feature.
Automatic generation ofpatient ID	In the Search/Create Patient window: When selected, the Patient ID is notrequired when entering a new patient in the archive. The systemautomatically generates an ID number. When cleared, the Patient ID isrequired when entering a new patient in the archive.

Table 16-77: Patient/Exam Menu Options (Continued)

Preset Parameter	Description
Auto Archiving patient data	Archives patient data automatically.
After [End Current Patient], go to	Select go to Worklist screen or Patient screen when ending the current patient.
Keep Search String	Search string is kept rather than cleared.
Worklist Auto Query	Automatically queries the worklist server.
Show BBT	Show BBT field on the OB patient screen to input the basal body temperature.
Double click on patient list to start	Select Review or New Exam to display each time you double click on the patient name in the patient list on the Patient menu.
Detail Mode	Select to display Detail Mode, rather than Exam View, when you select the patient name in the patient list on the Patient menu. You can also type comments while in Detail Mode.
Export to USB HDD: Create DICOMDIR	Create DICOMDIR is a DICOM file format which contains how the directory and DICOM files structured for diagnostic portable media behave. It is important for portability between the Versana Active to PACS. If you want to save exams to the USB Hard drive and look at it on the PACS, the DICOMDIR is a must.
Export to Network storage: Create DICOMDIR	
Automatic Disable Patient Data	Select to automatically disable patient data. If selected, locks the patient name, date of birth and gender (like Patient ID). The Factory Default for this preset is unchecked.
Remember Cursor Position on the Transfer Screen	To set a default cursor location on the Data Transfer screen: 1. Select the “Remember cursor position in the Transfer screen” preset and press Save. 2. On the Data Transfer screen, move the cursor to the desired field. 3. Exit out of the Data Transfer screen. When returning to the Data Transfer screen, the cursor location is in the position your selected.
Quick New Patient Entry	Select to store new patient automatically by pressing the Patient key.

Table 16-78: Patient/Exam Message Options

Preset Parameter	Description
Patient info exist in logfile	Check box to select.
Request acknowledge of End Exam action	When selected, the user is asked to confirm action when ending an examination.
Warn Image Store without Patient	Select to receive a warning when you press the Print key without an active patient.
Warn Register to No Archive	Select to receive a warning when you register a patient to the “No Archive” data flow. Select a different data flow for permanent storage of patient data.
Warn image store to Read Only dataflow	The system posts a warning message if you attempt to store images to a read-only Dataflow.

Table 16-78: Patient/Exam Message Options

Preset Parameter	Description
Warn video titles exist in the internal storage	The system posts a warning if the video titles exist on the internal DVR flash memory.

Table 16-79: Print and Store Options

Preset Parameter	Description
P[1-3] Key Sound	Select None, Click, Chimes, Ding, Ding-Dong, or Whoosh.
Store Dual as Dicom Only	Select to always store dual images as a DICOM (secondary capture) store, rather than Raw DICOM.
Dual When Color Support is Mixed	Dataflow Mixed is not available. While transferring dual images to the PACS, send black and white images as gray; send color images as color. Set up 2 services (one gray and one color), set up 2 dataflows, and set up 2 buttons. Each button needs to be tied to a different service. Select if you want to keep the user preset for Color Photometric Interpretation while in Dual mode.
Store Multiframe for Sec Capture Loops	Select if you want the CINE loop stored as secondary capture.
Enable Whizz Capture Area	Check box to select.
Store 2D Loop with Timeline Data	Check box to select.
Patient List Print-Font Size	Select font size.
Image Order Scheme	Select to Direct Store images in Acquisition Order, Scan Coach/Assistant Order, or Off. • **Off**. The clipboard on the Ultrasound system shows the image in the order it was acquired. Therefore, re-stored images appear where you'd expect. However, on the PACS system, images appear in arrival order or in image number order. • **Acquisition Order**. From the Ultrasound system perspective, the same as "Off." But on the PACS system (if based on image number order), images are displayed consistently with the way they are stored on the Ultrasound system. • **Scan Coach/Assistant Order**. You can define the storage order (reading order) via Scan Coach/Assistant Creator. Therefore, based on the order defined in Scan Coach/Assistant, images are re-ordered and displayed in this manner both on the Clipboard and on the PACS system.

Table 16-80: Other ID Options

Preset Parameter	Description
Enable Other ID	Not selected is the Default. If selected, allow entering Other ID, such as Citizen Service Number, Burger Service Number (BSN), National Health System (NHS) number, along with patient ID information on the Patient Screen.

Table 16-80: Other ID Options (Continued)

Preset Parameter	Description
Validation Format	If the Enable Other ID preset is selected, the system validates the format of “Other ID” when an ID is entered. Choose: NHS Number *** ** *****, Letters and Numbers, Numbers, or Any (no restriction)

Bluetooth

To add a new bluetooth device,

1. Press ***Add New Device***.
2. Type the device name in the Name field.

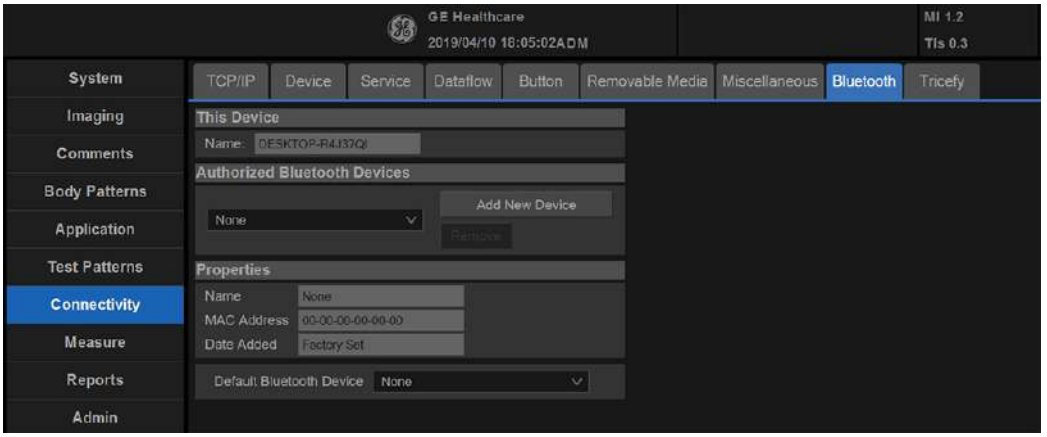


Figure 16-66. Connectivity Bluetooth Preset Menu

Table 16-81: Device

Preset Parameter	Description
Add New Device/Remove	Press Add new device to add a new device; press Remove to delete a device.
Properties: Name	Type the name of the device.
Properties: MAC Address	Unique network card address. NOTE: Only available for MyComputer.
Properties: Enabled	Select to enable bluetooth device.
Properties: Image Transfer Support	Select to enable image transfer.
Properties: Date Added	Display the new device added date.

Tricefy Uplink

New GE Versana ultrasound systems have Tricefy Uplink pre-installed. Additional software is not necessary for using Tricefy Uplink; simply activate your account using the following steps.

1. Press **Utility** -> **Connectivity** -> **Tricefy**.

NOTE: The Tricefy tab is only available on machines that have Tricefy Uplink option.

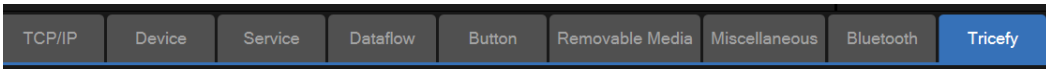


Figure 16-67. Tricefy Menu

2. Enable Tricefy checkbox, and enter the email address to authorize the account. Press **" Activate account"** to activate your account, this process may take up to 30 seconds, and a dialog will pop up if succeeded. And you will receive a notification email, click the link to complete the whole activating process.

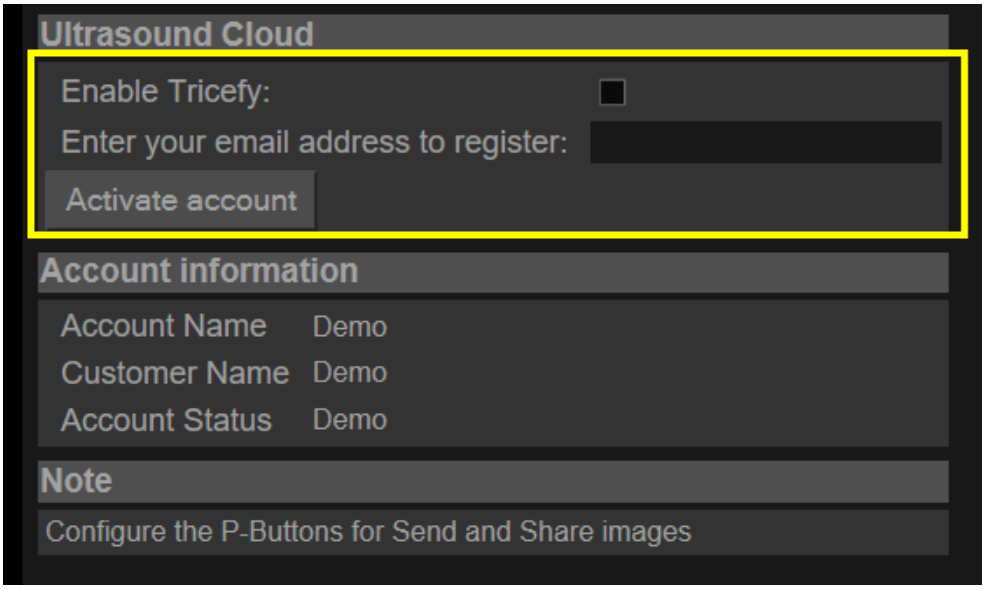


Figure 16-68. Activate Tricefy Account

Tricefy Uplink (continued)

3. Add Tricefy Uplink to Print workflow.
   - Click **Button** to configure the P- Buttons for sending and sharing images.

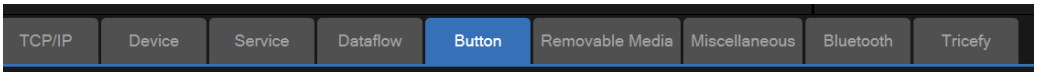


Figure 16-69. Button Menu

   - Select **Print1** (or **Print2**, **Print3**) which you would like to use. Then Select **Trice Archive** and press **>>** button to add it to **Printflow View**, press **Save**. Now when you press the **P1** button, the image will be sent to your Tricefy cloud.

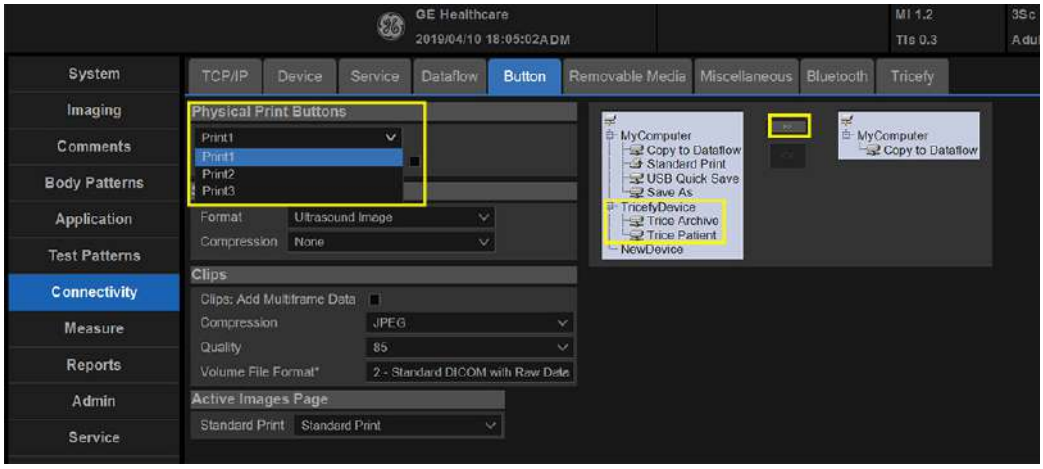


Figure 16-70. Configure the P-Button for Tricefy Uplink

Tricefy Uplink (continued)

4. *If you want to share the images to patient, please add **Trice Patient** to **Printflow View.** And also remember input the patient's Phone number or email address.*

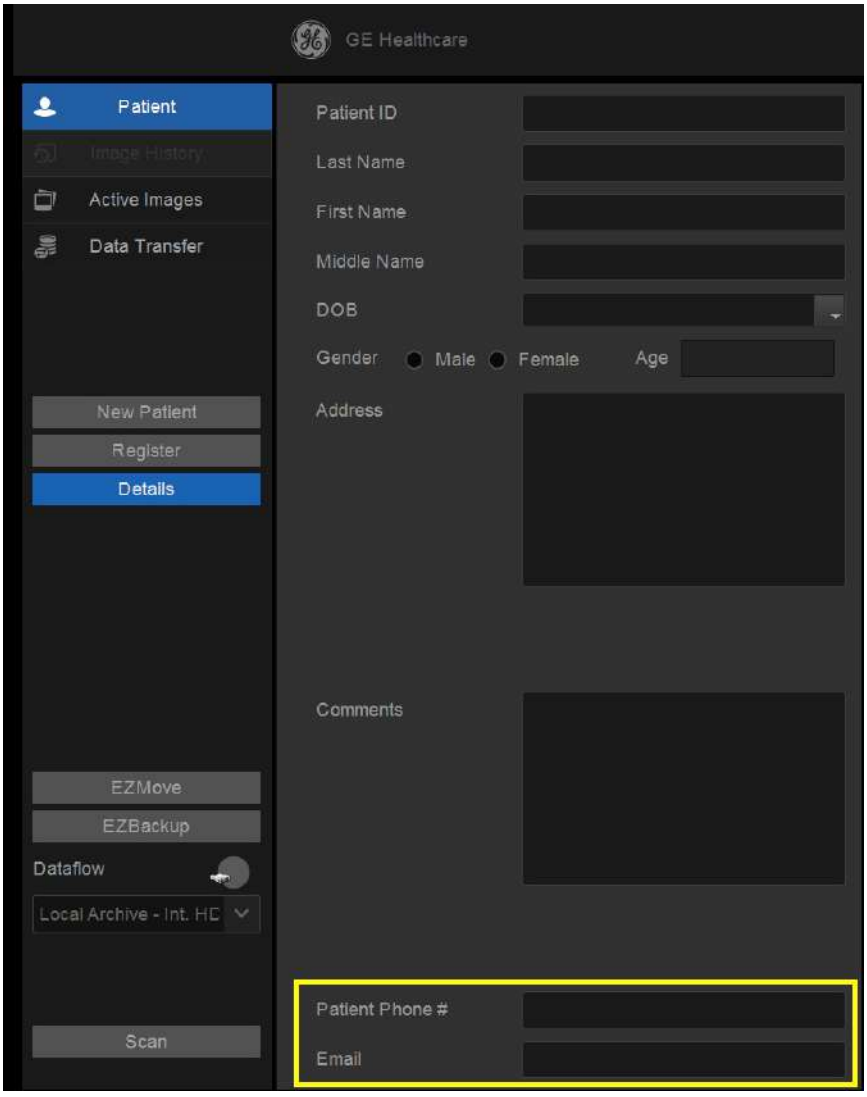


Figure 16-71. Share Images to Patient

NOTE: If you have any problem with Tricefy Uplink settings, please contact your GE service/sales representative.

Tricefy Uplink (continued)

For using Q&R function on Tricefy Uplink, please follow the settings:

- Login to Tricefy.
- Choose Accounts from the top-right dropdown menu (the person icon, see image below).
- If you have multiple account memberships you now select which account to view settings for.
- In the account settings, choose “Uplinks” from the left-hand menu.
- Each Uplink is listed here and there is a checkbox to enable/disable Q/R.

NOTE: The changes take 10-60s to propagate.

Measure

Please refer to Chapter 7, General Measurements and Calculations for more information on setting up Measurement and Analysis Presets.

Reports

Refer to Chapter 14 for more information.

System Admin

Overview

The Admin screen has the following three sections:

- **System Administration** – lists all the options implemented in the system.
- **Users** – allows you to define user IDs, specify operator's registration, operator's rights, and registration of staff related to an examination (for example, referral doctors and sonographers).
- **Logon** – defines logon procedures.
- **User policies** – defines user name policy and password policy.

System Admin

The System Admin screen has information about any options implemented for the system.

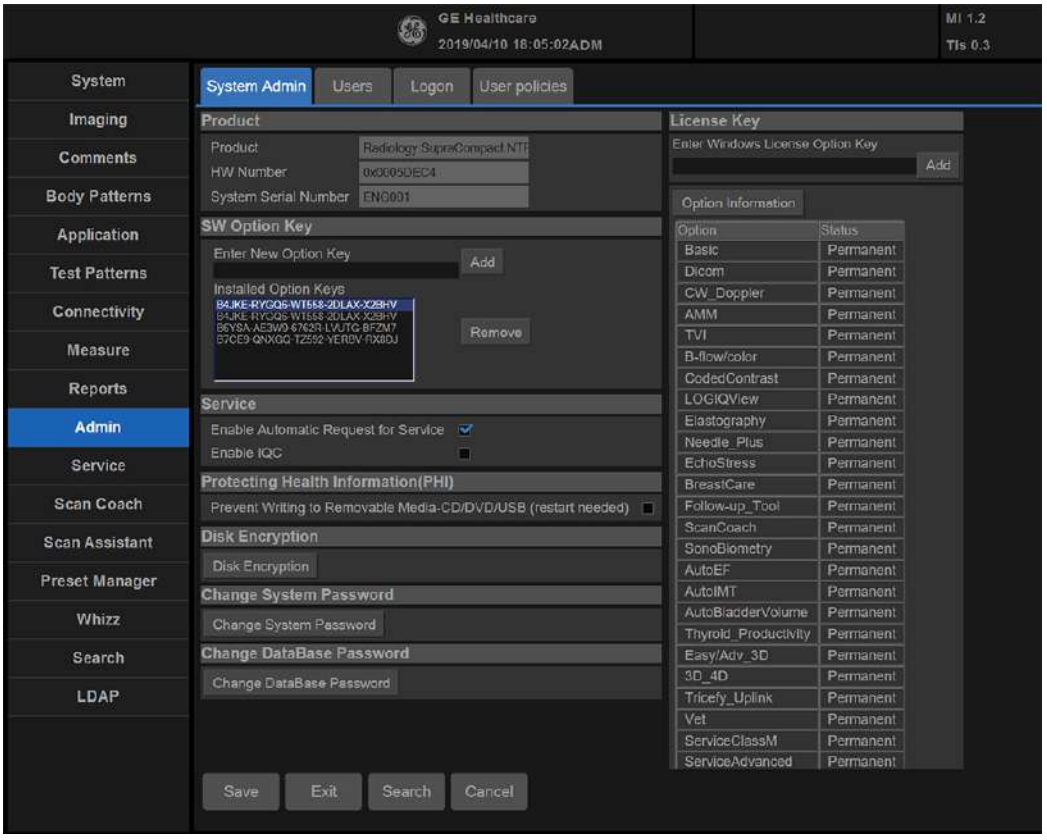


Figure 16-72. System Admin Preset Menu

Table 16-82: System Administration

Preset Parameter	Description
Product	The name of the product.
HW Number	The hardware number of the product.
System Serial Number	The serial number of the product.
SW Option Key	The software option key section.
Enter New Option Key	Type the key for the option you wish to add and press Add.
Installed Option Keys	Lists the key for the installed options.
Remove	To remove a software option key, select the key in the SW Option Key list, and then select Remove.

Table 16-82: System Administration

Preset Parameter	Description
Options	A list of the option name and status.
Status	Lists each option's effectivity.

Table 16-83: Service

Preset Parameter	Description
Enable Automatic Request for Service	Check this box to enable the system to send system-generated requests for service, without your intervention.
Enable IQC	Check this box to enable the Image Quality Check function.

Table 16-84: Protecting Health Information (PHI)

Preset Parameter	Description
Prevent Writing to Removable Media-CD/ DVD/USB (requires reboot)	Prevent from copying data including Patient Information to external storage device. Media: USB Memory / USB HDD / CD-R / DVD-R Function: Export / MPEGVue / EzBackup / EzMove / Save As / Save As Images / Report Save As / Backup Patient Archive and Report Archive from Utility

Table 16-85: Disk Encryption

Preset Parameter	Description
Disk Encryption	Select to encrypt the local patient data drive or removable media.

Table 16-86: Change System Password

Preset Parameter	Description
Change System Password	Select to configure system password.

Table 16-87: Change DataBase Password

Preset Parameter	Description
Change DataBase Password	Select to configure database password.

Disk Encryption

Disk Encryption is a function to protect the patient information on the device and prevent unauthorized access to PI/PHI, especially when the device is stolen. The encryption AES is 256 bit.

NOTE: Disk Encryption can also protect the user data stored on removable device.

NOTE: The steps for Removable Media Encryption and Local Patient Data Drive Encryption are the same.



CAUTION

The user must make backups and take care of the encryption keys. It is the customer's responsibility for storing the keys. GE will have no back door or any responsibility or possibility of recovering the data.

Disk Encryption (continued)

1. Login as administrator. Press **Utility** -> **Admin** -> **System Admin** -> **Disk Encryption**.

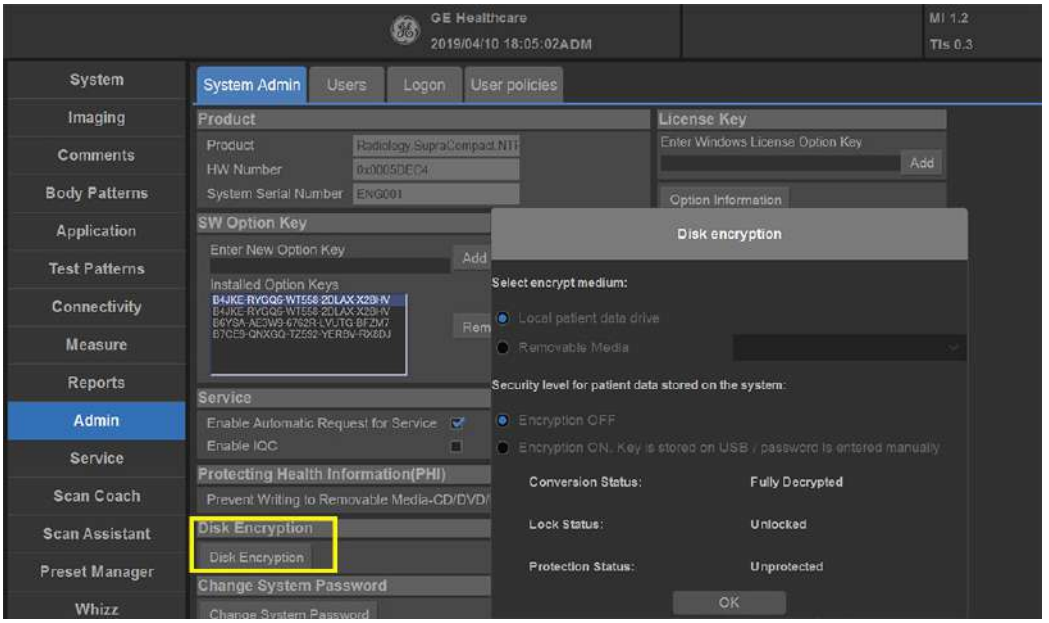


Figure 16-73. Disk Encryption 1

2. Select **Encryption ON.** A confirmation message pops up, press **Continue** to continue the encryption process.



Figure 16-74. Disk Encryption 2

Disk Encryption (continued)

3. Enter a password or a passphrase and re-enter to confirm. Press **Continue**.

NOTE: *A valid password must be at least 8 characters long and has a maximum length of 256 characters.*



Figure 16-75. Disk Encryption 3

4. Insert a USB and select it to record the recovery key. You can also press **Print recovery key** to print the recovery key, or you can press **Hide recovery key** to hide the recovery key.

   Press **Continue**.



Figure 16-76. Disk Encryption 4

Disk Encryption (continued)

5. When the recording process is completed, a confirmation dialog pops up, press **OK**.

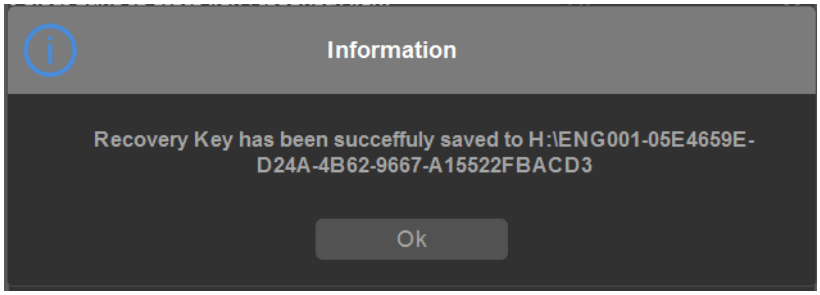


Figure 16-77. Disk Encryption 5

6. Encryption process begins.
   You can press **Pause** to pause the encryption process.



Figure 16-78. Disk Encryption 6

7. When the encryption process completes, press **Finish**.

CAUTION

Make sure to keep the password/passphrase, recovery key and any back up of these in secure place, not accessible for unintented audience.

Pause Encryption

1. During encryption process, you can press Pause to stop the encryption process.

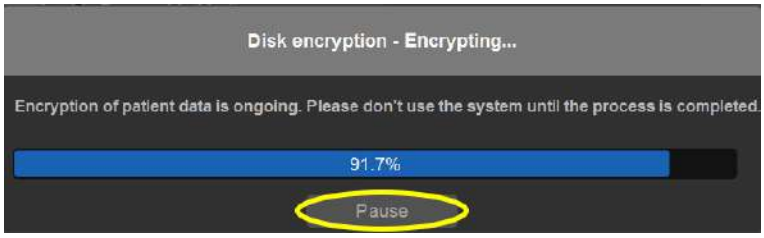


Figure 16-79. Encryption Pause 1

2. A confirmation dialog pops up, press **Yes** to continue or **No** to cancel.

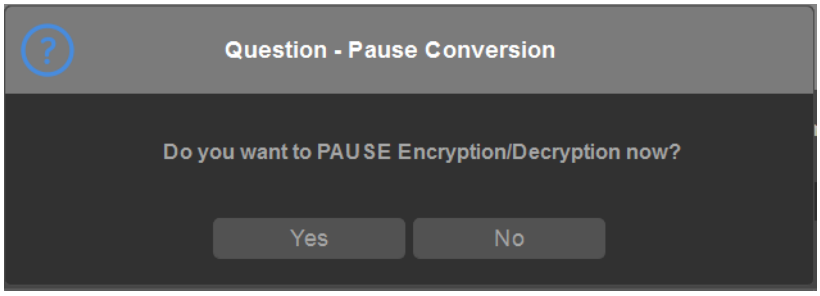


Figure 16-80. Encryption Pause 2

Resume Encryption

1. Press **Utility** -> **Admin** -> **System Admin** -> **Disk Encryption**. Press Resume.

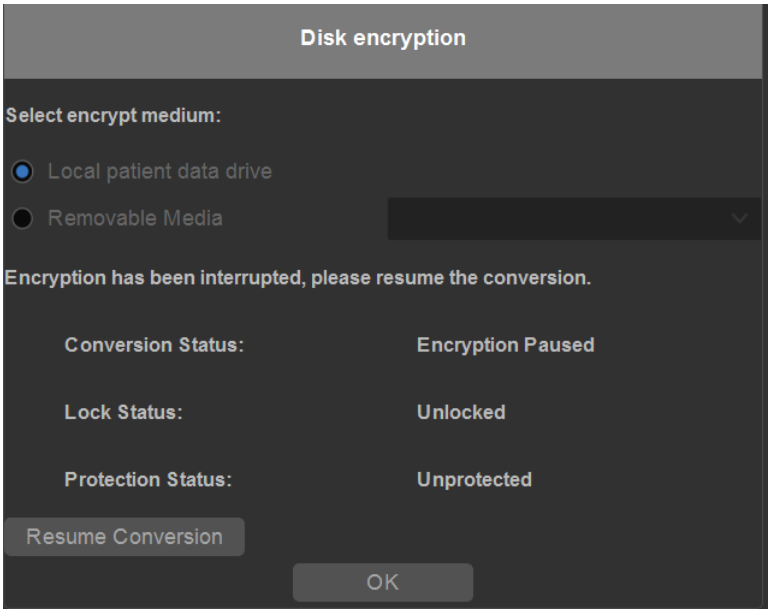


Figure 16-81. Encryption Resume 1

2. A confirmation dialog pops up, press **Yes** to rusume conversion or press **No** to cancel.



Figure 16-82. Encryption Resume 2

Resume Encryption (continued)

3. Encryption of patient data is ongoing. Please do not use the system until the process is completed.



Figure 16-83. Encryption Resume 3

Change Password

After the encryption process is completed, you can change the password as you wish.

1. Press **Utility** -> **Admin** -> **System Admin** -> **Disk Encryption**. Press **Change Password**.



Figure 16-84. Change Password 1

Change Password (continued)

2. Enter new password/passphrase, and re-enter it to confirm.

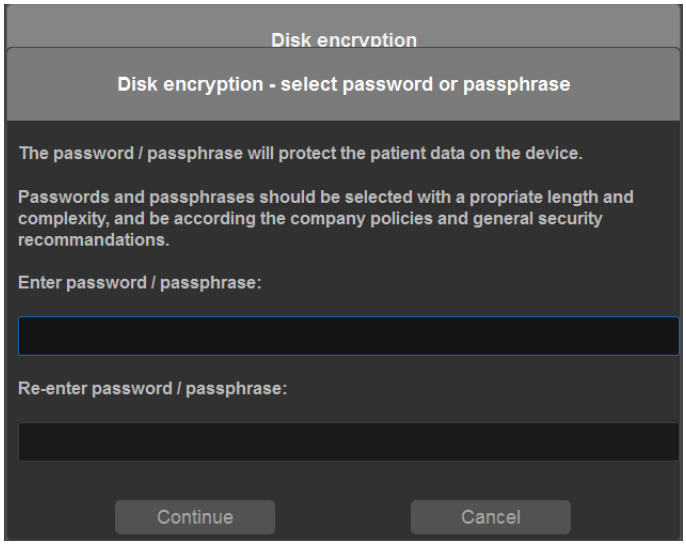


Figure 16-85. Change Password 2

3. Press OK.

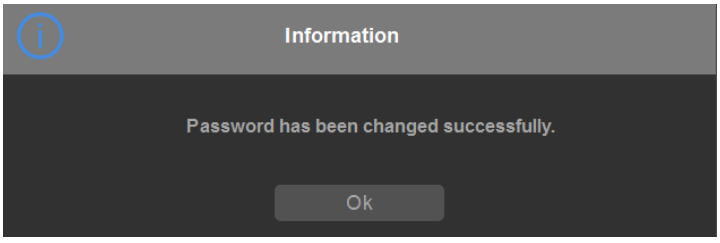


Figure 16-86. Change Password 3

Change Recovery Key

After the encryption process is completed, you can change the recovery key as you wish.

1. Press **Utility** -> **Admin** -> **System Admin** -> **Disk Encryption**. Press **Save/Change Recovery Key**.



Figure 16-87. Change Recovery Key 1

2. Insert a USB to store the new recovery key.



Figure 16-88. Change Recovery Key 2

Change Recovery Key (continued)

3. Press OK.

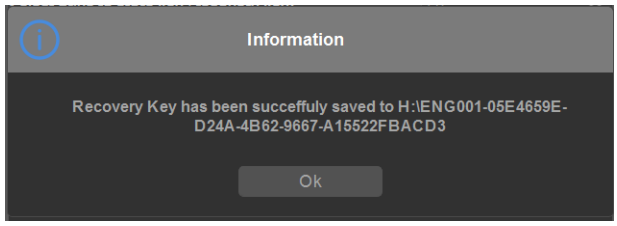


Figure 16-89. Change Recovery Key 3

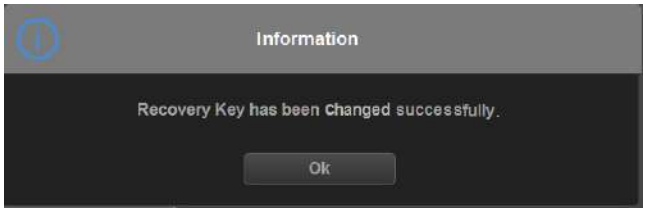


Figure 16-90. Change Recovery Key 4

Unlock with user entered key & recovery key

When the patient data is in locked status, you can unlock it with user entered key and recovery key.

You can insert the USB with recovery key, or you can input the password or recovery key manually to unlock the system.

*NOTE: If you press **Cancel**, the system will stay in locked status and some of the functions will be not available.*



Figure 16-91. Unlock Dialog

Disk Decryption

1. If you want to decrypt the patient data, you can press **Utility -> Admin -> System Admin -> Disk Encryption**. Select **Encryption Off**.



Figure 16-92. Decryption 1

2. A confirmation dialog pops up, press **Yes** to continue.
3. Decryption of patient data is ongoing. Please don't use the system until the process is completed.

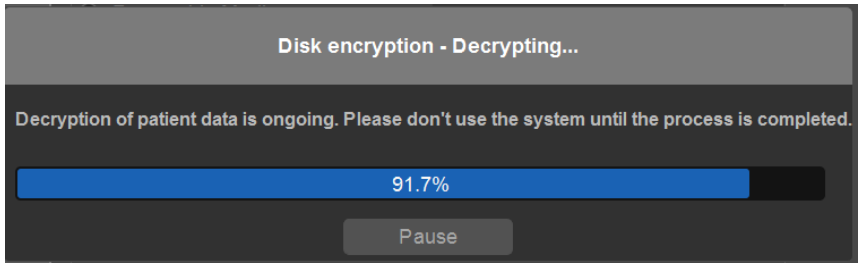


Figure 16-93. Decryption 2

4. When the decryption process is completed, press **Finish**.

Change System Password

Change System Password is a function to protect the privacy and prevent unauthorized access to the system especially when the user is not nearby.

To configure the system password, select ***Utility -> Admin -> System Admin -> Change System Password.***

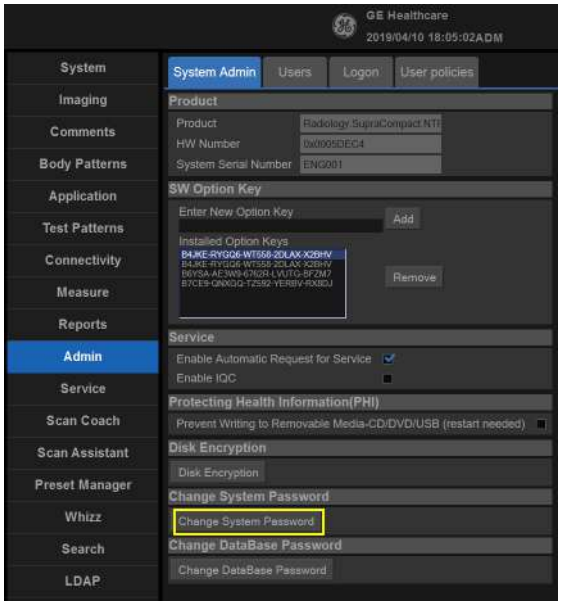


Figure 16-94. Change System Password 1

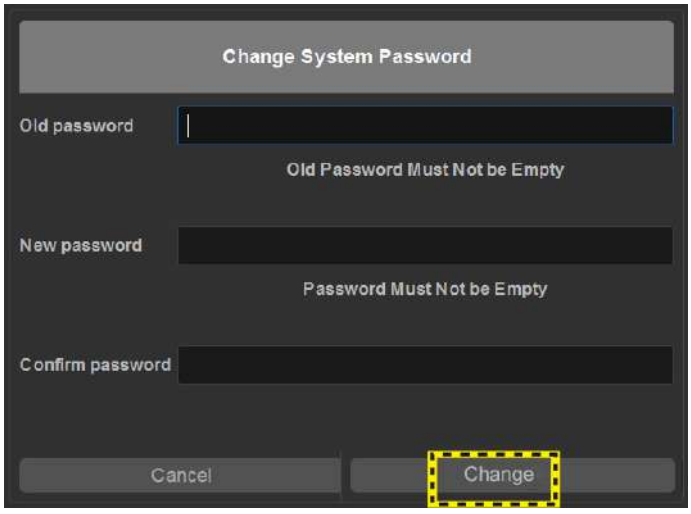


Figure 16-95. Change System Password 2

Users

The Users screen allows you to define user IDs. It also allows you to specify operators registration, operator's rights setting, and registration of staff related to an examination (for example, referring and interpreting physicians).

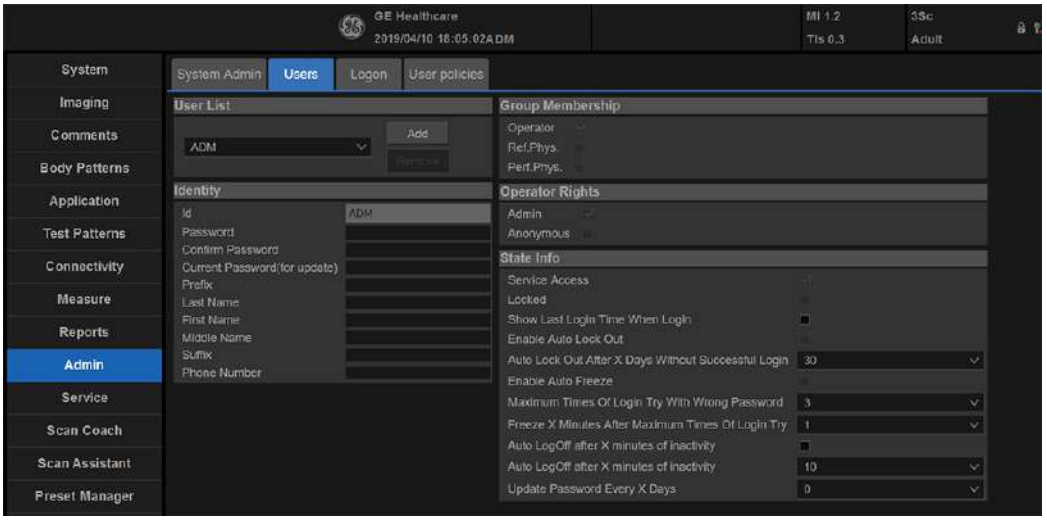


Figure 16-96. Users Preset Menu

Table 16-88: User List

Preset Parameter	Description
User List	Lists the user ID for all system users.
Identity	Type the operator's user ID, Password, Prefix, Last Name, First Name, Middle Name, Suffix, Phone Number.
Group Membership	Select the user's group:Operator (sonographers, doctors, or any person using the ultrasound system); Ref.Phys. (referring physician can be associated to the patient examination in the extended Patient information window(; Perf.Phys. – physician performing the exam can be associated to the patient examination in the extended Patient information window.
Operator Rights	Admin – If selected, the operator has extended rights with access to the administrative setup functionality. The operator can also perform advanced operations
State Info	Lists the state information for the selected operator.

Creating a user

1. Select **Add**.
2. Type the user ID. ENSURE that you DO NOT include the following characters in a user's ID: slash (/), dash (-), asterisk (*), question mark (?), an underscore (_), or blank spaces. Also, DO NOT set up a user with the same initials/ signifier.
3. Type the user's information in the Identity section.
4. Select the user's group(s).
5. If the user needs full configuration and advanced operations access, select Admin.
6. Press Save.

NOTE: DO NOT add users with the same initials/signifier. The system allows you to do this; however, the first user is erased and only the second remains.

NOTE: When adding a new user, press Add first. Then edit the ID from the default of "NewUser" and edit the other fields. DO NOT press Add again unless you actually want to create another user. Press Save after adding one or more users. The user listed as NewUser on the list will be updated with the edited ID when you re-enter this screen.

Changing a user configuration

1. Move the **Trackball** to a user ID in the User List.
2. Make the desired changes.

Deleting a user

1. Move the **Trackball** to a user ID in the User List.
2. Select Remove.

   The user is removed from the User List.

Logon

The Logon section defines log on procedures.

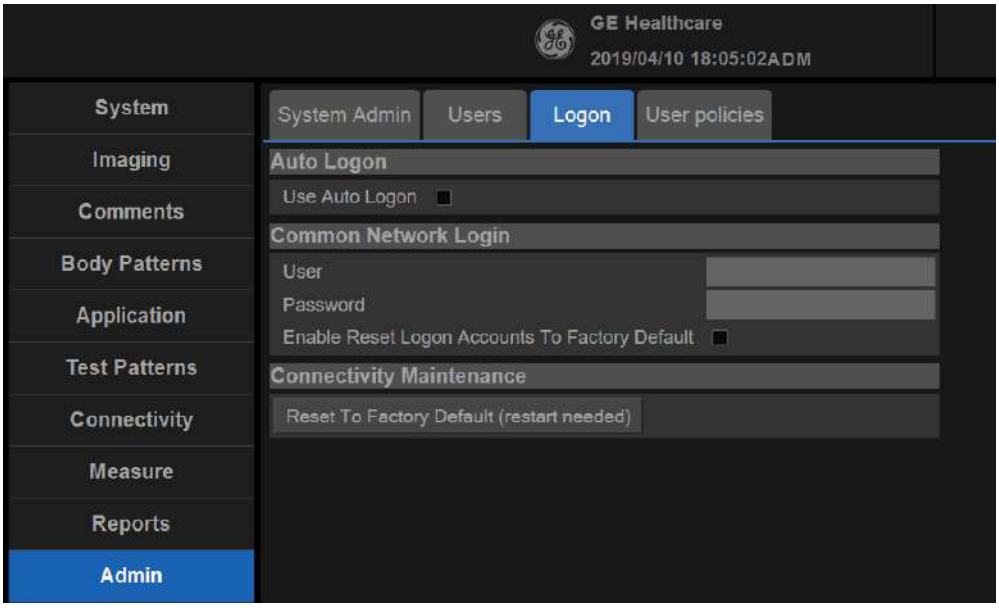


Figure 16-97. Administrative Logon Preset Menu

Table 16-89: Logon

Preset Parameter	Description
Auto Logon	Specifies logon procedures: • When blank, the user must select a user ID and enter a password when logging on. • When selected, the system is started automatically, using the last user logon.
Common Network Login	Specifies the user ID and password used to access the network.User – User ID for network accessPassword – Password for network access
Connectivity Maintenance	Reset to factory default.

User policies

The user policies section defines user policies procedures.

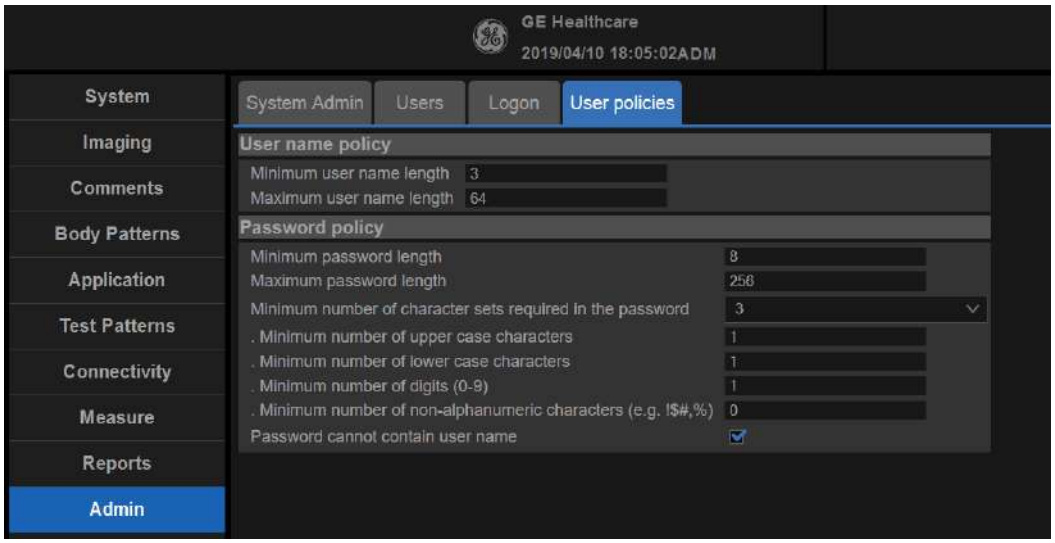


Figure 16-98. Administrative User policies Preset Menu

Table 16-90: User policies

Preset Parameter	Description
User name policy	Specifies minimum and maximum user name length.

Password policy	Specifies minimum and maximum password length, minimum number of character sets required in the password and password history.
	• Minimum number of character sets required (upper case/lower case/digits/ non-alphanumeric):
	  • Minimum number of upper case characters: 1 characters.
	  • Minimum number of lower case characters: 1 characters.
	  • Minimum number of digits(0-9): 1 characters.
	  • Minimum number of non-alphanumeric chars: 0 characters.
	• Password cannot contain user name option.

Service

Press ***Service*** to activate the Service browser interface.

Scan Coach

Scan Coach Manager

Please refer to Chapter 5 for information on using the Scan Coach Manager to Import and Export Scan Coach Programs. This section covers how to use the Scan Coach Creator and how to export the Scan Coach Creator from the Versana Active to a PC.

Activating the Scan Coach Creator

To activate the Scan Coach Creator on the Versana Active, press the Creator key.

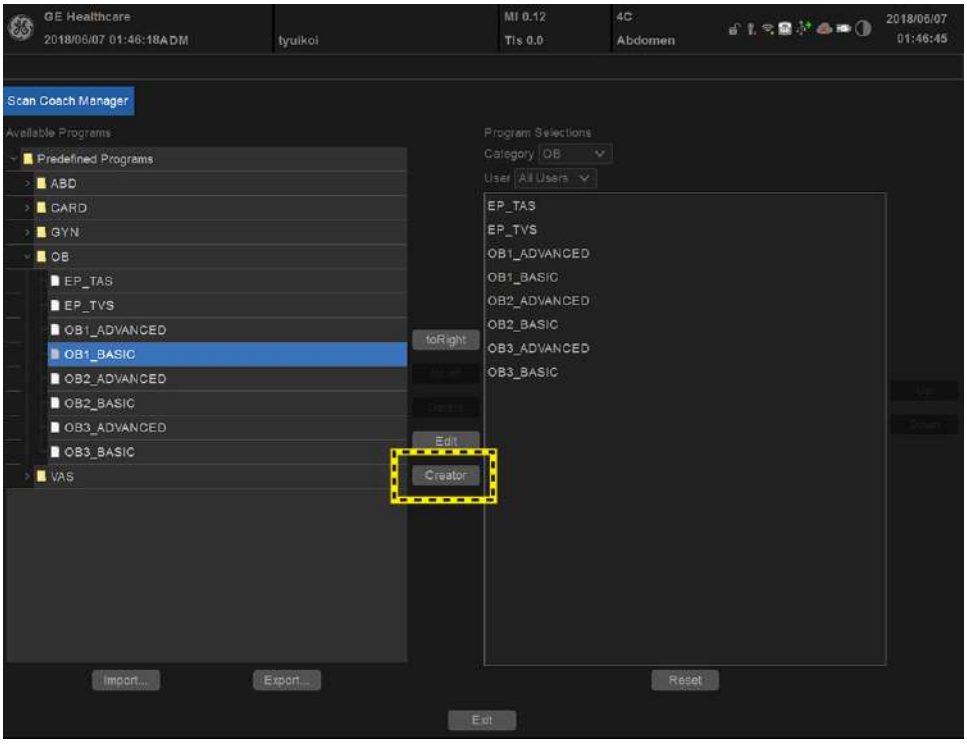


Figure 16-99. Scan Coach Manager

Scan Coach Creator

Overview

The Scan Coach Creator is used to build customized Programs that can be imported onto the Versana Active. These Programs automate many of the steps normally performed manually by the user, thereby reducing the number of user actions and the amount of time to perform an exam.

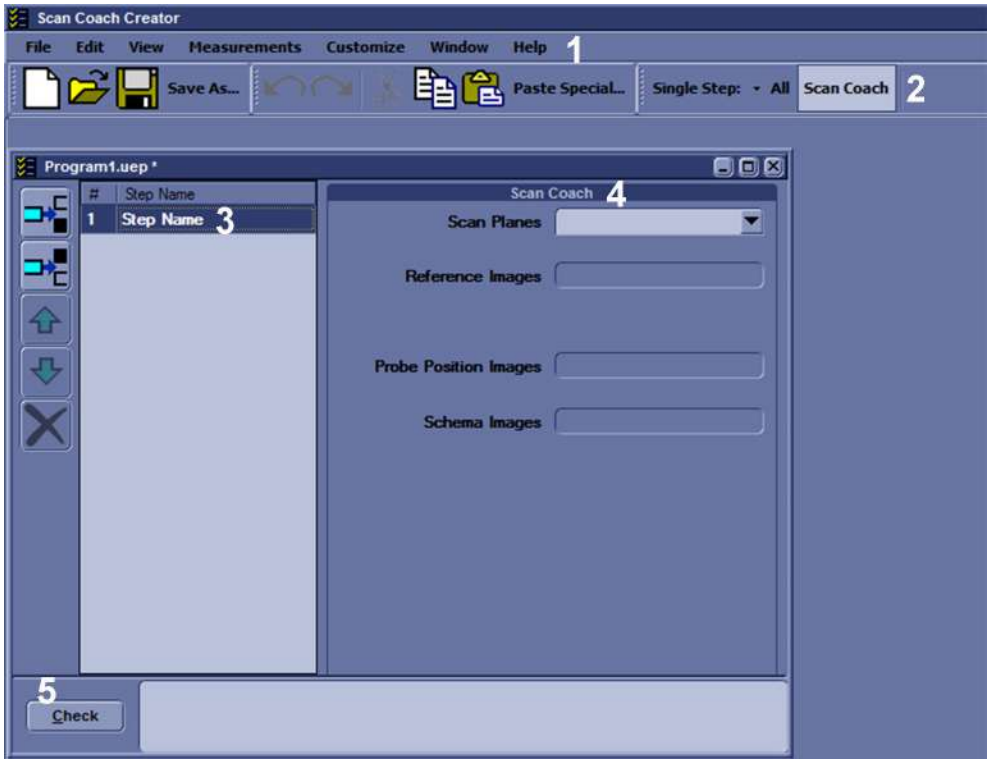


Figure 16-100. Tool Layout Overview

1. Menu and ToolBars
2. Scan Coach Button
3. Steps
4. Scan Coach Attributes
5. Rule Checking

NOTE: Scan Coach Button is not available for Scan Assistant, only for Scan Coach.

Overview (continued)

The Scan Coach Creator tool can be used both on the scanner and as an off scanner tool. Where there are differences in behavior, this user's guide uses the term 'on scanner' to indicate when the tool is running on the scanner and 'off scanner' to indicate when the tool is running off the scanner.

File Handling

When using Scan Coach Creator off the scanner, it is very important to organize the programs in a way that will make it easy to import the programs onto the scanner. Each Program is a computer file. While these computer files can be copied, pasted and deleted like any other computer file, the Program files are only viewable using the Scan Coach Creator.

Off-Scanner Directory Structure

The Scan Coach Creator organizes the Programs in a directory structure that allows easy importing into the Versana Active. In order to be imported, all Programs must be stored in a LOGIQ_SCAN_COACH Programs Directory. Within this directory, one or more user-specified directories are created. Within each of these user-specified directories are the category directories (VAS, ABD, etc.) that hold the actual Programs.

The dialog in the figure below allows the user to specify the location of the LOGIQ_SCAN_COACH directory (root directory) and to either select an existing User Program Directory or create a new one.



Figure 16-101. Directory Structure

Off-Scanner Directory Structure (continued)

The Directory Structure dialog can be accessed via the File menu.



Figure 16-102. File Menu



Figure 16-103. File Toolbar

File Extensions

Factory defined Programs have an .ep (exam Program) extension while user-defined Programs have an .uep (user exam Program) extension. Both factory and user-defined Programs can be read into the Scan Coach Creator, but only user-defined Programs are created. If a factory Program is read into the Scan Coach Creator and then edited, it is saved as a user-defined Program.

Upon installation of the Scan Coach Creator, files with a .ep or .uep extension are automatically associated with the Scan Coach Creator.

Exporting Programs from Versana Active

Factory or user-defined Programs on the Versana Active are easily exported for editing with the Scan Coach Creator.

On the Versana Active:

1. Insert a USB storage device (or CD/DVD).
2. Select ***Utility*** -> ***Scan Coach***.
3. Select **Export**.
4. Select the media type and specify a directory. If a directory is specified that already exists, the Export adds the Programs along with any existing Programs. If the names of Programs are the same, use the resulting dialog to decide how to continue.
5. Select the Program to be exported and export them.

Importing Programs to Versana Active

Programs created with the Scan Coach Creator are easily imported to the Versana Active.

Copy the complete LOGIQ_SCAN_COACH directory from the system to a USB device (or CD/DVD). The LOGIQ_SCAN_COACH directory needs to be at the top level (not in a subdirectory) on the USB device (or CD/DVD).

Example of Directory structure:

LOGIQ_SCAN_COACH

MyUserNameDirectory

ABD

CARD

GYN

OB

VAS

On the Versana Active:

1. Insert the USB device (or CD/DVD).
2. Select ***Utility*** -> ***Scan Coach***.
3. Select **Import**.
4. Select the media type.
5. Select the Programs to be imported and import them. If you attempt to import Programs that already exist with the same name, use the resulting dialog to decide how to continue.

Creating New Programs

A new Program is created by selecting File -> New, by clicking on the New document icon in the Toolbar, or by using the keyboard shortcut Ctrl+N.

1. Before creating a New Program, select ***Single Step*** in the Toolbar.



Figure 16-104. File Toolbar

2. Proceed to add/update your settings for the Step: Step Name, Instructions, etc.
3. Once finished, highlight the finished Step.

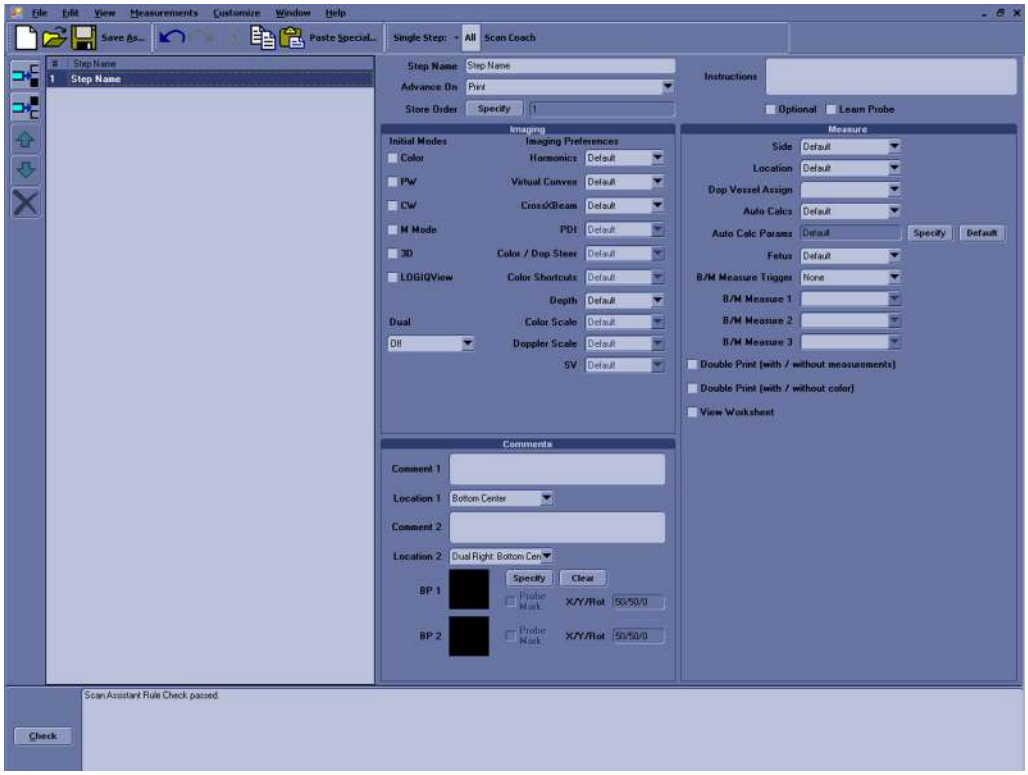


Figure 16-105. Highlight Step to Copy

Creating New Programs (continued)

4. Select **Edit** -> **Copy**



Figure 16-106. Edit -> Copy

5. In the Toolbar along the left, select **Insert Step Before Selected** or **Insert Step After Selected**.

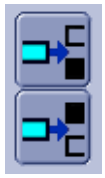


Figure 16-107. Insert Step

6. Highlight the copied step and proceed to edit accordingly.
7. Proceed to follow the same procedure to add more steps to your Program.
8. When you are done, select **Check** to verify your Steps.



Figure 16-108. Rule Check and results area

9. The results are listed as to whether the Scan Coach Rule Check Passed or if any Issues were detected. Issues found when running the check do not mean the Program is unusable.

NOTE: The rule check may report an unequal number of left and right steps. This may or may not be the expected result. If a change is made in response to the rule check results, a new rule check can be run to see if the issue has been resolved.

Opening New Programs

Multiple Programs can be open at the same time by selecting File -> Open. Each Program will open within the primary Scan Coach Creator window.

Opening Existing Programs

An existing Program is opened by selecting File -> Open, by clicking on the File -> Open icon in the Toolbar, or by using the the shortcut Ctrl+O. Finding the Program file (.ep or .uep) and opening the file automatically opens the file in the Scan Coach Creator. Multiple Programs can be opened at the same time.

Saving Programs

Programs are saved via the Save or Save As functions available on the File Menu and the File Toolbar. Save is also available via the Ctrl+S keyboard shortcut. “Save” saves the Program using its current name and file location. “Save As” allows the name and file locations to be edited.

When Saving a Program, the Scan Coach Creator provides an opportunity to run a rule check on the Program before saving it as shown in the following figure. **Yes** runs the rule check, **No** bypasses the rule check and **Cancel** cancels the Save request. See ‘Rule Checking’ on *page 16-169* for more details on Rule Checking Programs.

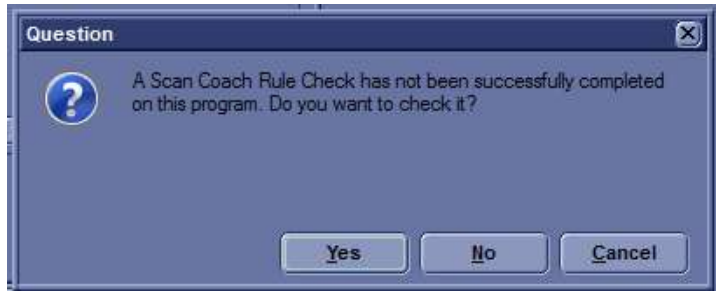


Figure 16-109. Program Rule Check Reminder

NOTE: The name of a Program is appended with an asterisk (*) when the Program has been changed, but those changes have not yet been saved.

A Program can be closed without saving it using the Close selection on the File Menu or by using the “X” in the upper right corner of the Program window.

Sharing Programs

If you want to share a program with someone else, the file can simply be sent via e-mail as an attachment or copied onto a media. If the person receiving the program has the Scan Coach Creator tool installed, he can simply open the file and then use “Save As” to save it to an appropriate directory. See Section 3.1. If the person receiving the program does not have the Scan Coach Creator tool installed, he can still load the program onto a scanner by creating the following directory structure on a media device, copying the file to one of the category directories and then importing the protocol onto the scanner.

Top Level Directory on media: LOGIQ_SCAN_COACH User Program Directory: Any user nameCategory Directories: Abd, Card, Gyn, OB, Ped, SMP, UR, Vas.

Views

A Program is made up of a series of steps. Each step is made up of various step attributes. The step and step attribute data can be viewed in many ways using the Scan Coach Creator. The different ways to look at the data are called Views. The view of choice is selected from the View Selection Menu or the View Toolbar Menu.



Figure 16-110. View Selection Menu



Figure 16-111. View Toolbar Menu

Single Step Views

There are two Single Step views: Basic and All. The Basic view shows the most common attributes of the selected step. The All view shows all of the attributes of a given step.

For both views, the step names are shown on the left with the active step highlighted. The step attributes appear on the right and are separated into four groupings:

General attributes at the top

Imaging and Comment attributes on the left

Measure attributes on the right.

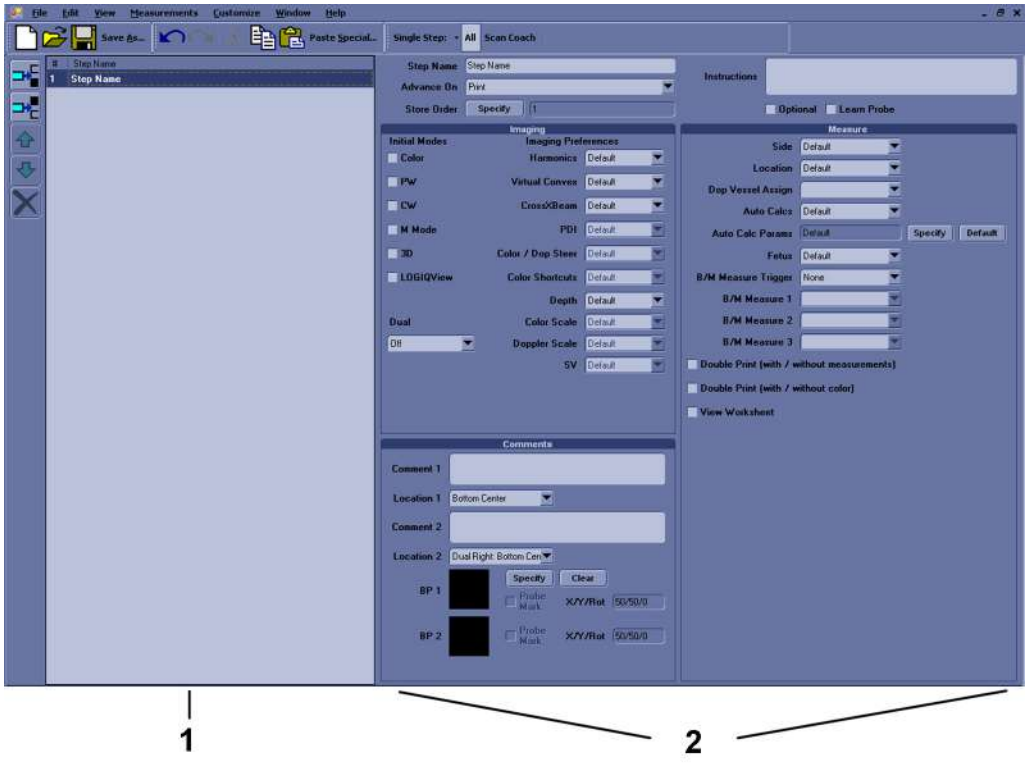


Figure 16-112. Basic Single Step View

1. Steps
2. Step Attributes

Scan Coach Features

Scan Coach allows the user to program the steps in an exam and to program certain attributes for each step. The attributes are what give the Scan Coach Program behavior. The tables below provide the names of all attributes along with a description of how each one is interpreted by the Scan Coach feature.

General Attributes

Table 16-91: General Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Store Order	(Not Applicable)	Button used to enable the Store Order Definition dialog so that the Store Order can be set		
Advance On	Store	Advance to the next step and go live after Print / Image Store (e.g P1 key). This can be a single image store or a loop store.	Print	Same as previous step
	Store & Unfreeze	Advance to the next step after Print / Image Store (e.g. P1 key) and unfreeze. This can be a single image store or a loop store.		
	User Selection	Advance to next step only after next step is manually selected (e.g. down arrow)		
Instructions	[Any Text]	User notes displayed in the Scan Coach Navigation menu when the step is active	Blank	Same as previous step
Optional	Optional (checked)	An optional step is given a check mark during Program execution even if no image is acquired	Mandatory	Same as previous step
	Mandatory (unchecked)	A mandatory step is given a check mark only if an image is acquired for the step		
Learn Probe	On (checked)	Learn and change the probe for the user	Off	Off
	Off (unchecked)	No probe change		

Comment Attributes

Table 16-92: Comment Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Comment 1, Comment 2	[Any Text]	User annotation associated with the step. When editing in a Multi Step View, use Alt+Enter to create a new line.	Same as Step Name attribute	Same as Step Name attribute
Location 1, Location 2	Top Left	Annotation is placed in the top left corner of the image area	Location 1: Bottom Center	Same as previous step
	Middle Left	Annotation is placed in the middle left side of the image area		
	Bottom Left	Annotation is placed in the bottom left corner of the image area	Location 2: Dual Right: Bottom Center	
	Top Center	Annotation is placed in the top center of the image area		
	Bottom Center	Annotation is placed in the bottom center of the image area		
	Top Right	Annotation is placed in the top right corner of the image area		
	Mid Right	Annotation is placed in the middle right side of the image area		
	Bottom Right	Annotation is placed in the bottom right corner of the image area		
	Dual Left: Bottom Center	Annotation is placed on the bottom center of the left image in dual screen		
	Dual Left: Top Left	Annotation is placed on the top left of the left image in dual screen		

Table 16-92: Comment Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
	Dual Right: Bottom Center	Annotation is placed on the bottom center of the right image in dual screen		
	Dual Right: Top Left	Annotation is placed on the top left of the right image in dual screen		
BP1, 2	Blank	Body Pattern not specified. Scan Coach does not set Body Pattern.	Blank	Same as previous step
BP1, 2	Body pattern graphics with or without probe position	Selected Body Pattern with or without probe position will be set.	Blank	Same as previous step
BP Specify	(Not applicable)	Button used to enable the Body Pattern Selection dialog so that the Body Pattern graphic can be selected and probe position can be set		
BP Clear	(Not applicable)	Clears BP1, BP2 defined for the step		
BP Probe	On (checked)	BP Probe mark will be set by Scan Coach	Off	Same as previous step
	Off (unchecked)	Probe mark not specified. Scan Coach does not set Probe mark.		

Imaging Mode Attributes

The probe and application associated with a program is not configurable. Instead, the scanner remembers the last probe and application used for a given Scan Coach program and automatically selects them the next time the program is started.

Table 16-93: Imaging Mode Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Color Mode	On (checked)	Color Doppler is on	Off	Same as previous step
	Off (unchecked)	Color Doppler is off		
PW Doppler Mode	On (checked)	PW Doppler is on. If PW Doppler is not on and the new activated step indicates that Doppler should be on, the Mode Cursor is displayed or, if the Mode Cursor is already displayed, then PW Doppler is turned on.	Off	Same as previous step
	Off (unchecked)	PW Doppler is off		
M Mode	On (checked)	M-Mode is on	Off	Same as previous step
	Off (unchecked)	M-mode is off		
CW Mode	On (checked)	CW Mode is on	Off	Same as previous step
	Off (unchecked)	CW Mode is off		

Table 16-93: Imaging Mode Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Dual	Off	Dual screen not in use	Off	Same as previous step
	Left Active	Dual screen is active and the left image is the active image.		
	Right Active	Dual screen is active and the right image is the active image.		
	DualView (simul)	DualView is active (both left and right images are live)		
	Dual on Freeze	DualView is active on freeze		
3D	On (checked)	3D on	Off	Same as previous step
	Off (unchecked)	3D off		
LOGIQView	On (checked)	LOGIQView on	Off	Same as previous step
	Off (unchecked)	LOGIQView off		

Imaging Preference Attributes

Imaging Preferences work slightly different than other attributes. For example, if an abdomen Program has 20 steps and all steps have the Harmonics attribute set to Default, then Scan Coach will not affect the harmonics setting. Now, assume that steps 10-12 are gallbladder steps and that the harmonics attribute has been set to on for these steps. When transitioning into this group of steps (step 9 to step 10, e.g.), harmonics will be turned on (or remain on if it was previously on). If harmonics is then manually turned off in step 10 then Scan Coach will not turn it back on when advancing to step 11. In other words, a group of consecutive steps with the same Imaging Preference are treated as a group by Scan Coach and not as individual steps.

Table 16-94: Imaging Preference Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Harmonics	Off	Harmonics off	Default	Same as previous step
	On	Harmonics on		
	Default	Harmonics not specified. Scan Coach does not set Harmonics on or off.		
Virtual Convex	Off	Virtual Convex off	Default	Same as previous step
	On	Virtual Convex on		
	Default	Virtual Convex not specified. Scan Coach does not set Virtual Convex on or off.		
CrossXBeam	Off	CrossXBeam off	Default	Same as previous step
	On	CrossXBeam on		
	Default	CrossXBeam not specified. Scan Coach does not set CrossXBeam on or off.		

Table 16-94: Imaging Preference Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
PDI	Off	PDI off	Default	Same as previous step
	On	PDI on		
	Default	PDI not specified. Scan Coach does not set PDI on or off.		
Color/Doppler Steer	Left	Color/Doppler steered to the left	Center	Same as previous step
	Center	Color/Doppler not steered		
	Right	Color/Doppler steered to the right		

Measurement Attributes

Table 16-95: Measure Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
B/M Measure Trigger	Measure Key	Initiate “Measure 1" attribute when the Measure key is manually selected.	None	None
	Freeze Key	Initiate “Measure 1" attribute when the image is frozen.		
	Store Image	Initiate “Measure 1" attribute when the Measure key is manually selected or the image is stored. This is used to store / print an image and then measure on it and then store it again. Therefore, the Advance On Print attribute is ignored on the first store / print when the Measure Trigger attribute is set to Image Store.		
	None	Measurements are not triggered by Scan Coach. The “Measure 1" attribute is ignored.		
Side	Rt	The side measurement qualifier is set to Right side of the body	Rt	Derived from Step Name attribute if possible. Otherwise, same as previous step
	Lt	The side measurement qualifier is set to Right side of the body		
	None	The side measurement qualifier is not used (neither Right nor Left)		

Table 16-95: Measure Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Fetus	A	The fetus measurement qualifier is set to Fetus A	A	Same as previous step
	B	The fetus measurement qualifier is set to Fetus B		
	C	The fetus measurement qualifier is set to Fetus C		
	D	The fetus measurement qualifier is set to Fetus D		
Location	Prox	The location measurement qualifier is set to Proximal	Prox	Same as previous step
	Mid	The location measurement qualifier is set to Middle		
	Dist	The location measurement qualifier is set to Distal		
	None	The location measurement qualifier is not used		
Measure 1	Various 2D or M-mode measurements	Specifies the first 2D or M-mode measurement to be initiated. The point at which the measurement is initiated is based upon the Measure Trigger attribute. See Section 6 for more information.	Blank	Blank

Table 16-95: Measure Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Measure 2	Various 2D or M-mode measurements	Specifies the second 2D or M-mode measurement to be initiated after the measurement associated with the Measure 1 attribute is completed. See Section 6 for more information	Blank	Blank
Measure 3	Various 2D or M-mode measurements	Specifies the second 2D or M-mode measurement to be initiated after the measurement associated with the Measure 2 attribute is completed. See Section 6 for more information.	Blank	Blank
Dop Vessel Assign	Various Doppler measurement Vessel folders	Specifies the Vessel folder to assign auto calcs to. The assignment happens when the image is stored / printed (P1 key, e.g.). See Section 6 for more information.	Blank	Blank
Auto Calcs	Default	Auto Calcs state not specified. Scan Coach does not set Auto Calcs state.	Default	Same as previous step
	Off	Auto Calcs state set to Off		
	Frozen	Auto Calcs state set to Frozen		
	Live	Auto Calcs state set to Live		

Table 16-95: Measure Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Auto Calc Params	Various Auto Calc parameters	Specifies the auto calc parameters to be used.	Default	Same as previous step
	Default	Auto Calc parameters are not specified. Scan Coach does not set the Auto Calc parameters.		
Auto Calc Specify	[Not Applicable]	Button used to enable the Auto Calcs Parameter Selection dialog so that the Auto Calc Params attribute can be set	[Not Applicable]	[Not Applicable]
Auto Calc Default	[Not Applicable]	Button used to set the Auto Calcs Params attribute to Default.	[Not Applicable]	[Not Applicable]
Double Print	On (checked)	If an Image Store / Print (P1 key, e.g.) is performed on an image with measurements, the image is stored / printed two times, once with the measurements and once without.	Off	Same as previous step
	Off (unchecked)	No special Store / Print behavior.		

Table 16-95: Measure Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Double Print	On (checked)	If an Image Store / Print (P1 key, e.g.) is performed on an image with color, the image is stored / printed two times, once with color and once without. If double print on color and double print on measurements are both configured to be on, the image is stored / printed two times, once with the measurements and once without.		
	Off (unchecked)	No special Store / Print behavior.		
View Worksheet	On (checked)	The worksheet is turned on	Off	Off
	Off (unchecked)	The worksheet is not turned on		

Measurements

Because there are many measurements available on the Versana Active and because the measurement package is highly customizable, there is some special handling for measurements. The Measurement attributes affected by this special handling are Measure 1-3 and Vessel.

Selecting a Measurement Package

The Measurement selection menu can be used to specify which measurement package is to be used for the Program. The Measurements packages are organized by category and subcategory. The choices for the Measure 1-3 and Vessel attributes are limited by the selection of category and subcategory. To select a subcategory, select a category, move to the subcategory list and select a subcategory. To select all subcategories for a given category, select the category and then reselect the Measurements menu item to remove the menu.

A single Program is not allowed to have measurements from multiple categories, but it may have measurements from multiple subcategories.

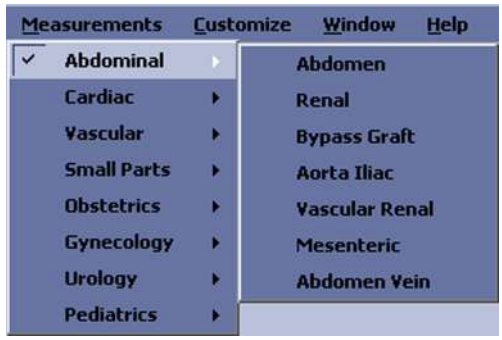


Figure 16-113. Measurements Menu

User-Defined Measurements

User-defined subcategories and individual measurements can be used with the Scan Coach feature. To do so, the Scan Coach Creator needs to know about the user-defined measurements on the Versana Active.

On the Versana Active, use the Scan Coach utility menu to Export Programs to a USB storage device (or CD/DVD). On the export menu, check the “Export user config data” checkbox to store the user-defined measurement information to the Program User Directory on the media. The name of the file is UserConfigSystemFile.res. When this file exists in the Program User Directory, then it is used. Otherwise, the default file installed with the Scan Coach Creator is used.

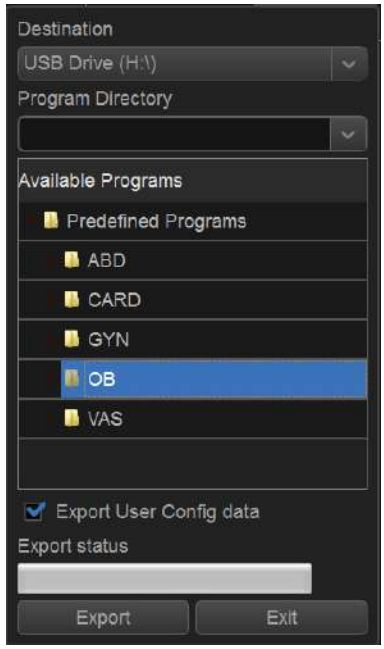


Figure 16-114. Program Export Menu on Versana Active

Navigating Programs

In addition to moving the windows pointer and selecting an item, there are several keyboard controls that navigate a Program.

Table 16-96: Keyboard Program Navigation

Keyboard Entry	Step Selected	Step Attribute Selected
Up Arrow	Moves to previous step	Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to same step attribute in the previous step.
Down Arrow	Moves to next step	Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to same step attribute in the next step.
0~9	Press Arabic numeral button, then the program will jump to the correspondent step. If the step is higher than 9, please press two key rapidly.	Single Step View: Varies based on the step attribute selected.Multi Step View: Moves to the previous step attribute.

Editing Programs

When editing Programs, changes can be made at both the step level and the step attribute level. Steps can be added, inserted, moved, deleted, copied and pasted. Step attributes can be modified for a given step or across multiple steps.

Editing Steps

The step toolbar allows steps to be inserted, moved up and down, and deleted. For steps to be moved, one or more consecutive steps must be selected. Some of the controls have shortcuts (Control Key + another key).

When the last step in a Program is selected, the Enter key automatically appends a new step to the end of the Program and selects the new step. When the Enter key is pressed on any other step, the next step is activated. The up and down arrows can also be used to move between steps.

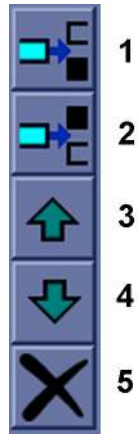


Figure 16-115. Step Toolbar

1. Insert Step above selected step (Ctrl+I)
2. Insert Step below selected step
3. Move selected step(s) up (Ctrl+Up Arrow)
4. Move selected step(s) down (Ctrl+Down Arrow)
5. Delete selected step(s)

Editing Steps (continued)

The Edit Menu and Edit toolbar provides access to the Cut, Copy, Paste and Paste Special features. The Undo and Redo actions also appear on Edit Menu and Edit Toolbar.



Figure 16-116. Edit Menu



Figure 16-117. Edit Toolbar

When selecting multiple steps for Cutting or Copying, the Shift + Left Mouse and Ctrl + Left Mouse key combinations can be used. Multiple steps are also selected by holding the Left Mouse key and dragging across the steps of interest. When pasting steps they are added after the currently selected step.

The Paste Special control allows copied steps to be pasted with some modification. For example, the steps associated with the Right Kidney can be Copied and Pasted so that they are converted into Left Kidney steps during the paste. The Paste Special dialog is shown in the figure below. Simply select the desired Conversion and choose the “Paste” key.

Editing Steps (continued)

- Step Name (Text)
- Comment 1 (Text)
- Comment 2 (Text)
- Side (Measurement qualifier)
- Location (Measurement qualifier)
- Fetus (Measurement qualifier)

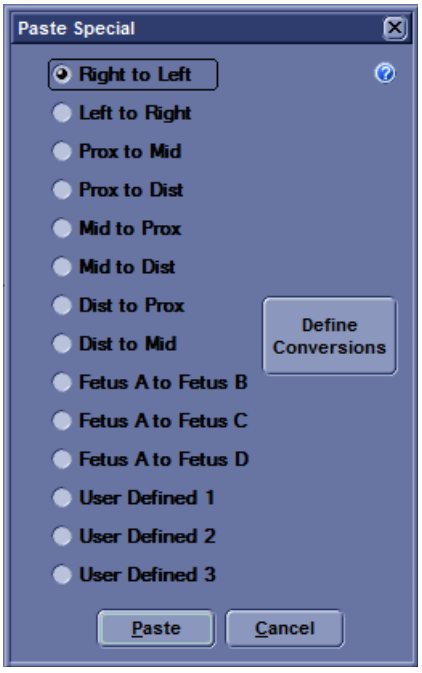


Figure 16-118. Paste Special Dialog

Editing Steps (continued)

The Define Conversions key is used to define the text that is converted. An example is shown in the figure below. If an exact case match is found, it is used for the conversion. If there is a match, but with different case, it is used only if there is not an exact case match.

There are 3 user-defined conversions that can be edited and named. These user-defined conversions can also be used to perform a find and replace capability.

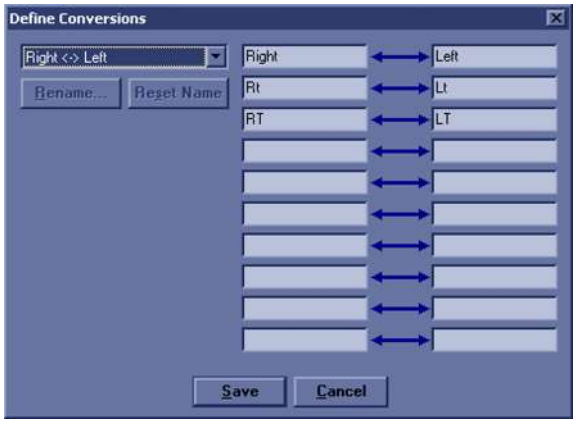


Figure 16-119. Define Conversions Dialog

Editing Step Attributes

To edit a step attribute simply select the step attribute and edit it, such as picking from a drop down menu, checking or unchecking a box or typing in text.

This will take the original step's content and copy it down the highlighted steps. This is also available when multiple attributes are selected within the same step.

If a step attribute is not editable, it may be because the attribute requires a different attribute to be set a particular way in order to become enabled. These dependencies are outlined below.

Table 16-97: Step Attribute Dependencies

Step Attribute	Dependency
PDI	Color step attribute must be checked
Color / Dop Steer	Color or PW step attribute must be checked
Measure 1	Measure Trigger must not be set to None
Measure 2	Measure 1 must be set
Measure 3	Measure 1 and Measure 2 must be set

Undo/Redo

The Undo feature allows the previous action to be undone. For example, pressing undo 6 times will undo the last 6 changes. Redo cancels the Undo of an action. For example, pressing undo 6 times will undo the last 6 changes and then pressing Undo 2 times will cause only the last 4 actions to be undone.

Editing the Current Program on the Scanner

If you are currently using a Scan Coach program and choose to edit that program while using it, the program will be reloaded when scanning is restarted. If the number of steps is changed, the checkmarks that were in place before editing are cleared. If the number of steps in the program has not changed, the checkmarks that were in place before editing are maintained.

The current program can be restarted at any time by selecting the Stop button on the Scan Coach navigation window and selecting restart.

Editing Predefined Programs

1. Enter **Utility**->**Scan Coach**->**Scan Coach Manager**->**Predefined Programs**. Select preferred predefined program.
2. Press **Edit** to display the Scan Coach Creator window. Edit the predefined program via the toolbar at the left side.
3. Save the program.
4. Enter **Utility** -> **Scan Coach** ->**Scan Coach Manager** -> **Custom Programs**. Press arrow button to move the edited program to the Program Selections column.
5. Press Scan Coach key on the control panel to activate the Scan Coach function.
6. Select the edited program.

You can follow the procedure below to edit the Predefined Program while using it:

1. Press Stop Button, then select **Edit** and the system will open the Scan Coach Creator window.
2. Edit the predefined program via the toolbar at the left side.
3. Save the program. Press Stop button, then exit the Scan Coach.
4. Enter **Utility** -> **Scan Coach** ->**Scan Coach Manager** -> **Custom Programs**. Press arrow button to move the edited program to the Program Selections column.
5. Press Scan Coach key on the control panel to activate the Scan Coach function.
6. Select the edited program.

Editing the Custom Programs

1. Enter **Utility**->**Scan Coach**->**Scan Coach Manager**->**Custom Programs**. Select preferred custom program.
2. Press **Edit** to display the Scan Coach Creator window. Edit the custom program via the toolbar at the left side.
3. Save the programs.
4. Enter **Utility** -> **Scan Coach** ->**Scan Coach Manager** -> **Custom Programs**. Press arrow button to move the edited program to the Program Selections column.
5. Press Scan Coach key on the control panel to activate the Scan Coach function.
6. Select the edited program.

You can follow the procedure below to edit the Custom Program while using it:

1. Press Stop Button, then select **Edit** and the system will open the Scan Coach Creator window.
2. Edit the predefined program via the toolbar at the left side.
3. Save the program.
4. Press Stop Button, then select **Restart**. The edited program is activated.

Rule Checking

Scan Coach Creator allows Programs to be checked. During a rule check, Scan Coach Creator applies a series of rules against the Program being checked and reports any inconsistencies between the rules and the Program. This rule check is intended to find potential issues in the Program before it is tested on a Versana Active. Issues found when running the check do not mean the Program is unusable. It means that if there happens to be a problem with running the Program, the first place to look would be at the Issue noted when you ran the Check.

For example, if there is a step name Right Kidney and the Measurement Location is set to “Left”, the rule check would report this inconsistency.

Running a Rule Check

The “Check” button below the Program area is used to initiate a rule check. The results are displayed in the Rule Check Results window to the right of the button. A rule check is also initiated when attempting to save a Program that has not previously passed a rule check.

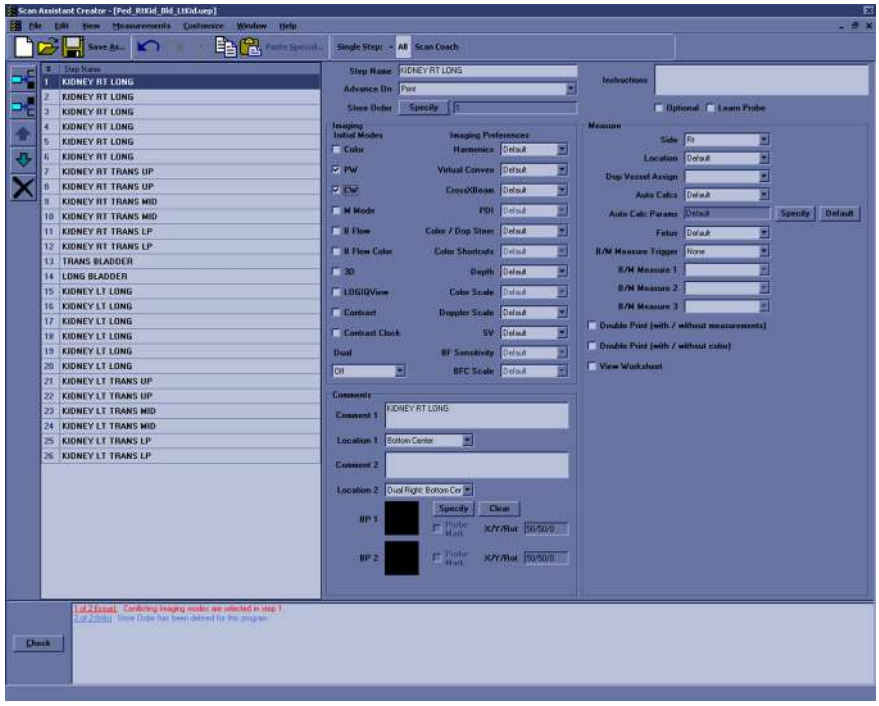


Figure 16-120. Rule Check Button and Rule Check Results

Rule Check Results

If the issue is specific to a particular step, double-clicking on the issue number in the Rule Check Results window selects the step associated with the issue. The results are intended to be potential issues and therefore may be ignored at the discretion of the user. For example, the rule check may report that there are an unequal number of left and right steps. For a particular Program, this may be the expected result. If a change is made in response to the rule check results, a new rule check can be run to see if the issue has been resolved.

Customization

The Customize Menu is shown below:



Figure 16-121. Customize Menu

The column widths of the steps and step attributes are customizable. The desired width is set by selecting and dragging the line separating column headers. These adjustments are remembered for the next time the Scan Coach Creator is used.

The locations of the toolbars are customizable. The location is set by selecting and dragging the toolbar gripper as shown in the figure below. The toolbars can be placed at the top, left, right or bottom of the Scan Coach Creator.



Figure 16-122. Gripper used for Toolbar placement

1. Toolbar Gripper

Help

Help is available via the About Menu or the F1 key.

Scan Assistant

Scan Assistant Manager

Please refer to Chapter 6 for information about how to use Scan Assistant and how to use the Scan Assistant Manager to Export Scan Assistant Programs. Please refer to ‘Scan Coach’ on *page 16-133* about how to use the Scan Assistant Creator and how to export the Scan Assistant Creator from the Versana Active.

Activating the Scan Assistant Creator

To activate the Scan Assistant Creator on the Versana Active, press the Creator key.

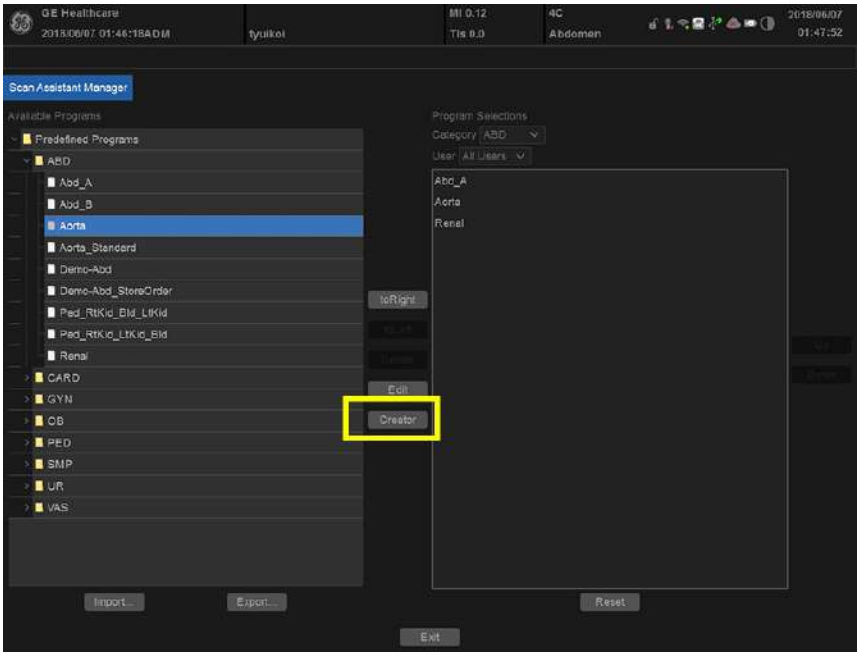


Figure 16-123. Scan Assistant Manager

Search

Opens up a search window to find a parameter on the utility pages.

To search for a utility parameter,

1. Select ***Search***.
2. Type in the search string. For instance, if you're searching for ***Patient info***, you could just type 'patient'.

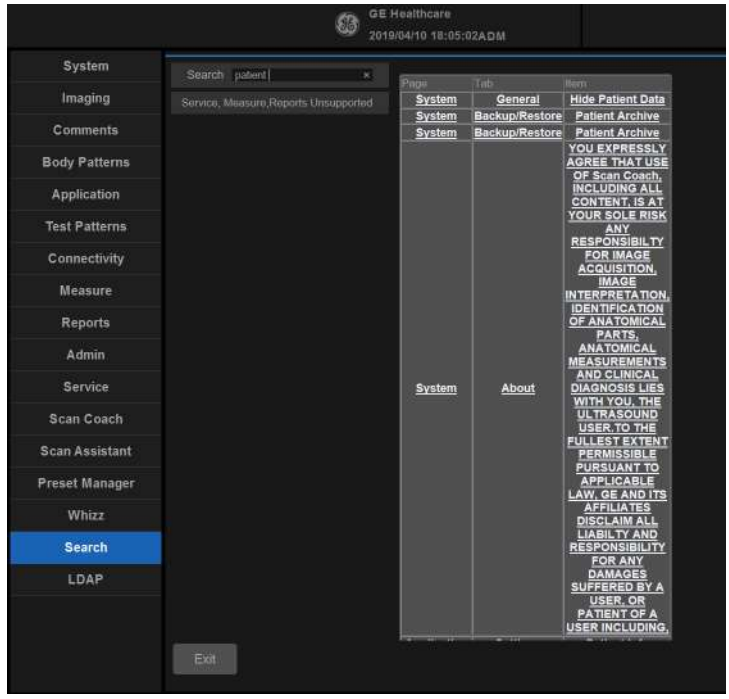


Figure 16-124. Search Example

3. A list of possible matches appears to the right. Select the correct match.

NOTE: You cannot perform a search on the Measure, Reports, or Service utility pages.

Chapter 17

Probes and Biopsy

This chapter consists of the information of each probe and describes some special concerns, biopsy kits and accessories as well as basic procedures for attaching a biopsy guide to the different types of probes.

Probe Overview

Ergonomics

Probes have been ergonomically designed to:

- Handle and manipulate with ease.
- Connect to the system with one hand.
- Be lightweight and balanced.
- Have rounded edges and smooth surfaces.
- Stand up to typical wear by cleaning and disinfectant agents, contact with approved gel, etc.

Cables have been designed to:

- Connect to system with appropriate cable length.

Cable handling

Take the following precautions with probe cables:

- Keep free from wheels.
- Do not bend the cable acutely.
- Avoid crossing cables between probes.

Probe orientation

Each probe is provided with an orientation marking. This mark is used to identify the end of the probe corresponding to the side of the image having the orientation mark on the display.

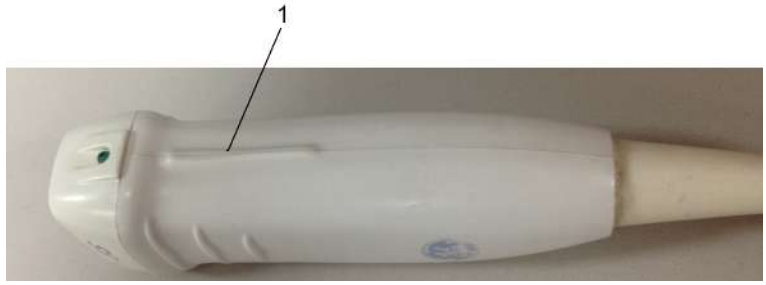


Figure 17-1. Orientation Marking on Probe (Example)

1. Orientation Mark

Labeling

Each probe is labeled with the following information:

- Seller's name and manufacturer
- GE part number
- Probe serial number
- Month and year of manufacture
- Probe designation-provided on the probe grip and the top of the connector housing, so it is easily read when mounted on the system and is also automatically displayed on the screen when the probe is selected.



Figure 17-2. Displayed Probe Information

Probe Naming Conventions

Table 17-1: Probe Naming Convention

Type	Frequency	Connector Type
C = Convex L = Linear S = Sector	“4” in 4C-RS	RS

Probe Usage

For details on connecting, activating, deactivating, disconnecting, transporting and storing the probes, See ‘Probes’ on *page 3-33 for more information.*

Care and Maintenance

Environmental Requirements

Probes should be operated, stored, or transported within the parameters outlined below.



Ensure that the probe face temperature does not exceed the normal operation temperature range.

Table 17-2: Probe Environmental Requirements

	Operational	Storage	Transport
Temperature	10° - 40° C 50° - 104° F	0° - 55° C 32° - 131° F	-40° - 55° C -40° - 131° F
Humidity	5 - 85% non-condensing	5 - 85% non-condensing	5 - 85% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa



Check the room temperature before you use the probe.



Ensure that the probe face temperature does not exceed the normal operation temperature range.

Planned maintenance program



Improper handling can lead to early probe failure and electric shock hazards.

DO follow the specific cleaning and disinfection procedures provided in this chapter and the chemical manufacturers instructions.

Failure to do so will void probe warranty.



Transesophageal, endocavity and intraoperative probes require a special handling. Refer to the user documentation enclosed with these probes.

It is recommended to keep a maintenance log and note all probe malfunctions. Follow the maintenance schedule below to ensure optimum operation and safety:

After each use:

- Inspect the probe.
- Clean the probe.
- Disinfect the probe.

Before each use:

- Inspect the probe.

Inspecting the probe

CAUTION

If any damage is found, DO NOT use the probe until it has been inspected and released for further use by a GE service representative.

After each use:

1. Inspect the probe's lens, cable, casing, and connector for cracks, cuts, tears, and other signs of physical damage. Look for any damage that would allow liquid to enter the probe. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative.
2. Look for damage that might allow liquid into the probe.

Before each use:

1. Inspect the probe.

CAUTION

Inspect the probes for sharp edge or rough surfaces that could injure sensitive tissue.

Inspect the probe's lens, cable, casing, and connector for cracks, cuts, tears, and other signs of physical damage.

2. Look for damage that might allow liquid into the probe.
3. Test the functionality of the probe.

1. Housing
2. Strain relief
3. Seal
4. Lens

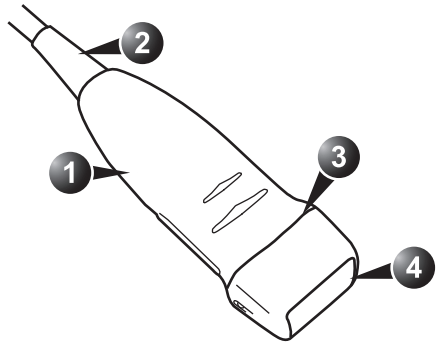


Figure 17-3. Probe parts

Probe Care Cards

The Probe Care Card contains a list of chemicals that have been tested for compatibility with GE Ultrasound probes. The reprocessing instructions provided in this document have been validated with the chemicals specified in Table 17-8 *on page 17-29*.

The Probe Care Card is supplied with every probe and can also be downloaded from:

Table 17-3: Documentation Web Site

Documentation Web Site
Support Documentation Library Web Site:
http://www3.gehealthcare.com/en/Support/Support_Documentation_Library

Adequate cleaning and disinfection between patient cases are necessary to prevent disease transmission. All probes must be thoroughly cleaned prior to disinfection. The level of disinfection required is based on patient contact.

- Probes that contact mucosal or non-intact skin require cleaning followed by High-Level Disinfection by either soaking or use of a Trophon EPR. Verify probe compatibility on the GE probe website shown below.
- Probes that contact intact skin require cleaning followed by Intermediate-Level Disinfection (wipe or spray).

Table 17-4: Probe Web Site

Probe Web Site
Ultrasound Probe Web Site
http://www.gehealthcare.com/transducers

Probe Care Cards (continued)

With the exception of the chemicals listed in Table 17-8, the chemicals listed in Table 17-10, Table 17-11 and Table 17-12 have been validated for compatibility only. Therefore, only those agents listed in Table 17-8 are recommended due to validated efficacy, and any reprocessing performed using chemicals not listed in Table 17-8 must be validated by the user.

- Verify probe compatibility using Table 17-5, Table 17-8, Table 17-10, Table 17-11, and Table 17-12, as well as the Ultrasound Probe Website listed above.

Table 17-5: Automated High-level Disinfectants Compatible with Non-TEE probes

Chemical Name	Manufacturer	3Sc-RS	6S-RS	12S-RS	12L-RS	L8-18i-RS	4C-RS	E8C-RS	E8Cs-RS	LK760-RS	9L-RS	8C-RS	L6-12-RS
trophon EPR	Nanosonics Limited	X	X	X	X	X	X	X	X		X	X	X
trophon2	Nanosonics Limited	X	X	X	X	X	X	X	X		X	X	X



CAUTION

CREUTZFIELD-JACOB DISEASE

This device is not indicated for neurological use. Neurological contact on patients with this disease MUST BE avoided. If a device/probe becomes contaminated, there is no adequate means to disinfect it. In this case, the contaminated device/ probe MUST BE discarded in accordance with local biologic waste hazard procedures.



Biological Hazard

Probe Pre-Treatment at the Point of Use (Rquired for All Probes)

The pre-treatment step is for removal of gel and gross contamination.

1. After each use, remove protective sheath from the probe and gently remove all coupling gel from the probe by wiping with soft, lint-free cloth.

CAUTION

DO NOT use abrasive paper products when cleaning or wiping a GE Ultrasound probe. The use of abrasive wipes can damage the soft lens (acoustic window).

2. Wipe the probe with one of the wipes listed in Probe Care Card from the strain relief to the lens. Use a second wipe and wipe from the strain relief, down the cable. Wipe the cable with a lint-free cloth dampened with potable water to remove chemical residue. Dispose of the cloth, wipe and gloves in the clinical trash.

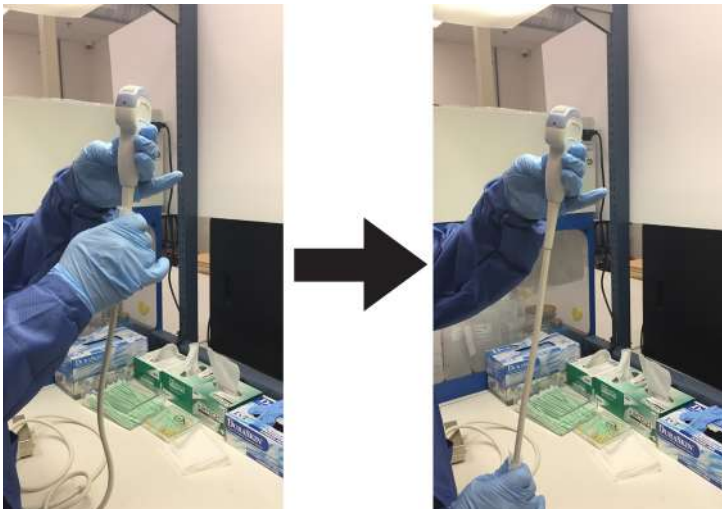


Figure 17-4. Cleaning the Probe Cable

NOTE: Use of wipes listed in the Probe Care Card may result in discoloration of the cable.

Probe Pre-Treatment at the Point of Use (Rquired for All Probes) (continued)

WARNING

Use caution when cleaning the connector. This cable connector should only be cleaned with a slightly dampened cloth or wipe. Exposure to excessive moisture will result in damage to the probe and possibly the ultrasound console. DO NOT wet the connector/console interface surface or labels.

3. After each use, inspect the lens, cable, and housing of the probe. Look for any damage that would allow liquid to enter the probe. If the probe is damaged, do not place it into any liquid (e.g. for disinfection) and do not use it until it has been inspected and repaired/replaced by a GE Service Representative.

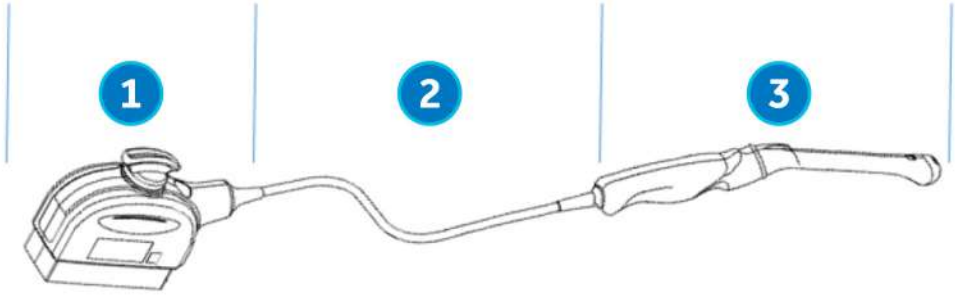


Figure 17-5. Inspect the Lens, Cable, and Probe House After Each Use

1. Cleaning only portion
2. Cleaning only or cleaning and disinfection portion
3. Cleaning followed by appropriate level of disinfection

Cleaning with Wipes

Manual cleaning is required to ensure the probes are cleaned to the extent necessary for further processing. Choose the most appropriate method, either the wipe or enzymatic soak.

1. Hold the probe at the proximal end near the strain relief cable. **DO NOT** suspend or hold the probe by the cable as this may damage the probe.
2. Dispense a cleaning wipe from the wipe canister.
3. Gently wipe the probe with a cleaning wipe from the cable strain relief to the distal end. Gently wipe the probe's lens.

NOTE: *Pay special attention to lens, edges, and groves.*

4. Turn the probe and continue wiping until the entire surface of the probe has been cleaned. As the wipe becomes visibly soiled, discard the wipe into clinical trash and dispense fresh wipes as needed.
5. Wrap a clean wipe around a soft nylon bristle brush to access crevasses, such as biopsy notches, on the surface of the probe.
6. Visually inspect the probe for any remaining soil and, if necessary, repeat steps 3 through 5 until the probe is visibly clean.

Probe Manual Cleaning Instructions – Enzymatic Detergent

1. Ensure the probe has been disconnected from the console. Put on a clean pair of gloves and fill a sink or basin with warm potable water (30 - 40°C) to a level allowing immersion of the probe up to the immersion line shown in the user manual.
2. Prepare the cleaning solution in accordance with the detergent manufacturer's instructions.
3. Immerse the probe in the prepared cleaning solution up to the immersion line and ensure no air bubbles are trapped on the surface. Do not submerge probe beyond the immersion line shown in the user manual and in Figure 17-13 *on page 17-24*.
4. Brushing with a clean, soft, nylon bristle brush from the base of the cable strain relief to the distal tip is critical to ensure cleaning and disinfection efficacy.



Figure 17-6. Cleaning the probe using a brush

CAUTION Do not use the brush on the probe lens.

Probe Manual Cleaning Instructions – Enzymatic Detergent (continued)

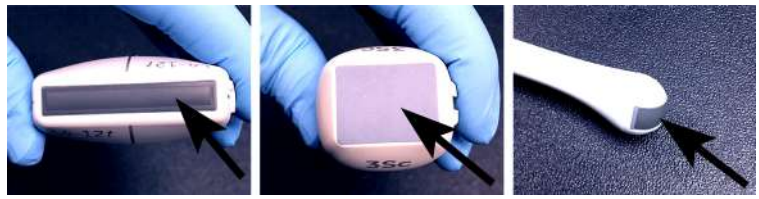


Figure 17-7. Probe Lens Examples

5. Continue brushing the probe for not less than the minimum contact time listed on the detergent manufacturer's label.
6. Visually inspect the probe for soil. Repeat Steps 3 through 5 until all visible soil has been removed from the surface of the probe.
7. Rinse the probe under running warm potable water (30 - 40°C) for not less than 2 minutes. Scrub the surface of the probe with a clean, soft, nylon bristle brush from the base of the cable strain relief to the distal tip.

CAUTION

DO NOT use the brush on the probe lens.

8. Visually inspect the device in a well-lit area to ensure all surfaces are free from residual cleaning solution. Repeat Step 7 if visible cleaning solution is observed.
9. Thoroughly dry the probe using a clean lint-free soft and dry cloth or wipe.

CAUTION

DO NOT use a twisting motion or abrasive paper products when wiping the probe as this may damage the soft lens.

Cable and Connector Manual Cleaning

WARNING

Use caution when cleaning the connector. This cable connector should only be cleaned with a slightly dampened cloth or wipe. Exposure to excessive moisture will result in damage to the probe and possibly the ultrasound console. DO NOT wet the connector/console interface surface or labels.

1. The cable and connector surfaces can be cleaned with the cleaners or wipes listed in the Probe Care Card.

NOTE: Use of wipes listed in the Probe Care Card may result in discoloration of the cable.

2. Wipe the cable with a lint-free cloth dampened with potable water to remove chemical residue.

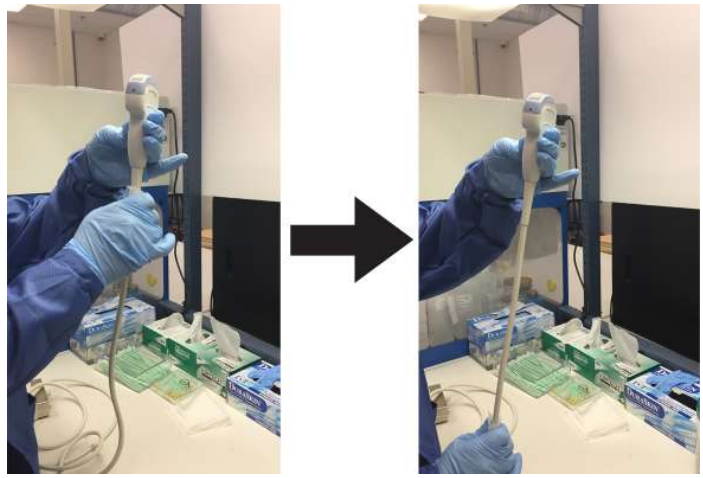


Figure 17-8. Cleaning the Probe Cable

Probe Intermediate-Level Disinfection - Spray

For Intermediate-Level Disinfection of surface-contacting probes, choose either the spray or wipe method.

NOTE: Probes that contact only intact skin may be disinfected in this manner. All probes that contact non-intact skin or mucous membranes (e.g., endocavitary, Transesophageal) require High-Level Disinfection.

CAUTION

After each use, inspect the lens, cable, and housing of the probe. Look for any damage that would allow liquid to enter the probe. If the probe is damaged, do not place it into any liquid (e.g. for disinfection) and do not use it until it has been inspected and repaired/replaced by a GE Service Representative.

1. Put on a new pair of gloves and spray enough disinfectant solution to saturate a new disposable lint-free wipe or cloth.
2. Holding the probe near the strain relief, apply the dampened cloth to the patient contacting lens. Wipe the probe from the lens to the strain relief, slightly rotating the probe after each wiping pass.
3. After the probe has been completely wiped, dampen a second wipe with disinfectant and starting at the probe lens begin wiping the probe in a rotating motion moving down towards the strain relief. Spray disinfectant directly on the recessed areas and ridges to saturate.

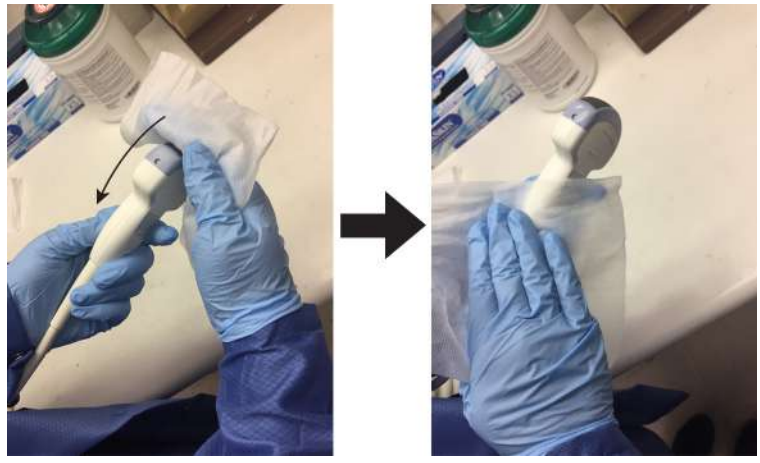


Figure 17-9. Disinfecting the Probe Moving from Lens to Strain Relief

Probe Intermediate-Level Disinfection - Spray (continued)

4. Once the probe has been completely wiped, dampen a third wipe with disinfectant and continue wiping the probe as needed to ensure the surface remains wet for the required exposure time. Use as many wipes as needed and respray disinfectant on recessed areas and ridges, to ensure all surfaces remain wet for the minimum required contact time listed in the disinfectant manufacturer's instructions for use.
5. Dry all surfaces of the probe using a soft, lint-free wipe or cloth.
6. Saturate a soft, lint-free wipe with de-ionized or purified water (remove excess water, wipe should be damp but not dripping) and thoroughly wipe all surfaces of the probe to remove chemical residue. Discard the wipe.
7. A total of three (3) rinses are required. Repeat Step 6 two additional times using new wipes and water.



Failure to properly rinse probes with water following disinfection may cause skin irritation.

8. Thoroughly dry all surfaces of the probe using a soft, lint-free wipe or cloth, changing wipes/cloths when necessary to ensure the probe is completely dry. Visually inspect the probe to ensure all surfaces are dry. Repeat drying steps if any moisture is visible.
9. If the probe is not immediately reused, store the probe in a manner that will protect and keep the probe from being recontaminated. This may be accomplished by placing the probe in a storage cabinet with filtered air flow and/or by using a disposable storage cover placed over the probe.

Probe Intermediate-Level Disinfection - Disinfectant Wipe

CAUTION

After each use, inspect the lens, cable, and housing of the probe. Look for any damage that would allow liquid to enter the probe. If the probe is damaged, do not place it into any liquid (e.g. for disinfection) and do not use it until it has been inspected and repaired/replaced by a GE Service Representative.

1. Put on a new pair of gloves. Holding the probe near the strain relief, apply the wipe to the patient contacting lens. Wipe the probe from the lens to the strain relief, slightly rotating the probe after each wiping pass.
2. After the probe has been completely wiped, use a second wipe and starting at the probe lens begin wiping the probe in a rotating motion moving down towards the strain relief. Wring the wipe above recessed areas, seams, and ridges to drip disinfectant directly onto these less accessible surfaces.

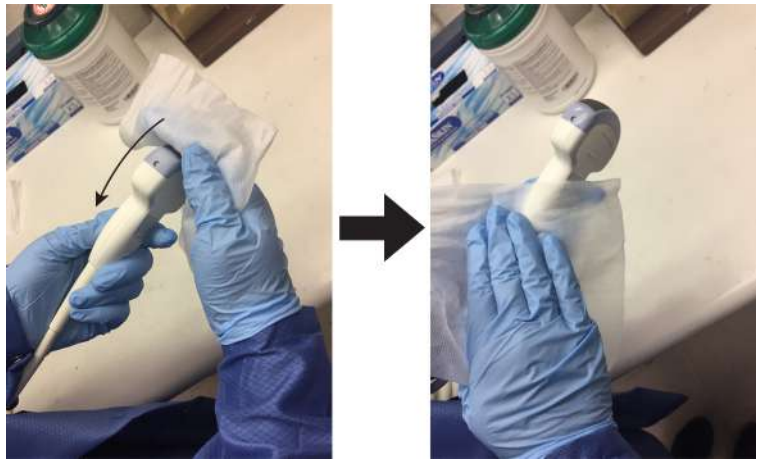


Figure 17-10. Disinfecting the Probe Moving from Lens to Strain Relief

NOTE: Probes that contact only intact skin may be disinfected in this manner. All probes that contact mucous membranes (e.g., endocavitary, Transesophageal) require High-Level Disinfection.

Probe Intermediate-Level Disinfection - Disinfectant Wipe (continued)

3. Once the probe has been completely wiped, use a third wipe and continue wiping the probe as needed to ensure the surface remains wet for the required exposure time. Use as many wipes as needed and drip additional disinfectant on recessed areas and ridges, to ensure all surfaces remain wet for the minimum required contact time listed in the disinfectant manufacturer's instructions for use.

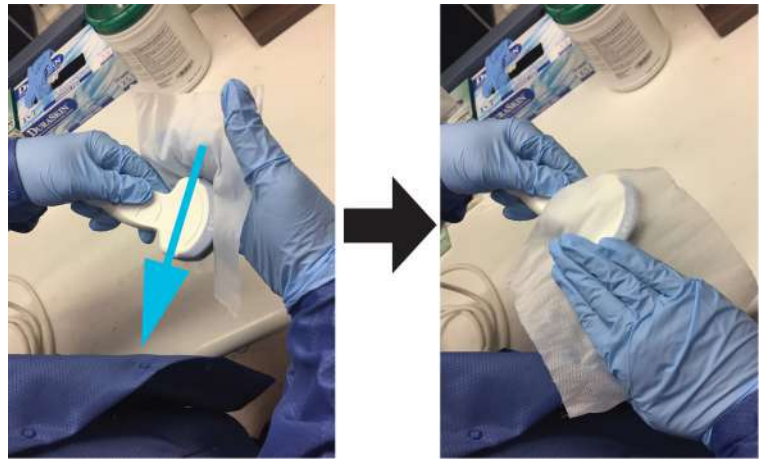


Figure 17-11. Disinfecting the Probe

4. Dry all surfaces of the probe using a soft, lint-free wipe or cloth.
5. Saturate a soft, lint-free wipe with de-ionized or purified water (remove excess water, wipe should be damp but not dripping) and thoroughly wipe all surfaces of the probe to remove chemical residue. Discard the wipe.
6. A total of three (3) rinses are required. Repeat Step 5 two additional times using new wipes and water.



Failure to properly rinse probes with water following disinfection may cause skin irritation.

Probe Intermediate-Level Disinfection - Disinfectant Wipe (continued)

7. Thoroughly dry all surfaces of the probe using a soft, lint-free wipe or cloth, changing wipes/cloths when necessary to ensure the probe is completely dry. Visually inspect the probe to ensure all surfaces are dry. Repeat drying steps if any moisture is visible.
8. If the probe is not immediately reused, store the probe in a manner that will protect and keep the probe from being recontaminated. This may be accomplished by placing the probe in a storage cabinet with filtered air flow and/or by using a disposable storage cover placed over the probe.

Probe High Level Disinfection – Soak

High-Level Disinfection is required for devices that contact intact mucous membranes or non-intact skin. High Level Disinfection can be performed using either a disinfectant soaking method or an automated system such as Trophon® EPR.



After each use, inspect the lens, cable, and housing of the probe. Look for any damage that would allow liquid to enter the probe. If the probe is damaged, do not place it into any liquid (e.g. for disinfection) and do not use it until it has been inspected and repaired/replaced by a GE Service Representative.

1. Ensure the probe has been disconnected from the console. Put on a clean pair of gloves and fill a sink or basin with High-Level Disinfectant diluted in accordance with the disinfectant manufacturers instructions to a level allowing immersion of the probe up to immersion line shown in the Ultrasound console's user manual.

NOTE: *Cleaning and disinfection instructions for Transesophageal probes are documented in the Transesophageal Probe Care Card and User Manual.*

NOTE: *All semi-critical probes* that contact mucous membranes require High-Level Disinfection.*

*Semi-critical probes are probes that contact mucous membranes or non-intact skin.

NOTE: *Handles of semi-critical probes that are not submerged during High-Level Disinfection require low or Intermediate-Level Disinfection to avoid cross contamination.*

Probe High Level Disinfection – Soak (continued)

2. Immerse probe in the disinfectant up to the immersion line and ensure no air bubbles are trapped. Ensure the probe remains in the disinfectant for at least the minimum contact time listed in the disinfectant manufacturer's instructions for use.

NOTE: Over-exposing ultrasound probes to high-level disinfectants may damage the ultrasound probe. NEVER exceed the disinfectant manufacture's maximum exposure time.

CAUTION

Ensure that the probe is suspended. The probe face should not be resting against the tank/basin surface and should be in full contact with the liquid. Carefully place the probe in the basin, taking care not to damage the transducer lens.



Figure 17-12. Probe suspended in disinfectant basin

3. Thoroughly rinse the probe by immersing it in a large volume of critical (purified) water for a minimum of 1 (one) minute. Remove the probe and discard the rinse water.

   Do not reuse the water. Always use fresh volumes of water for each rinse. Repeat Step 3 two additional times, for a total of 3 (three) rinses.

WARNING

Failure to properly rinse probes with water following disinfection may cause skin irritation.

Probe High Level Disinfection – Soak (continued)

4. Thoroughly dry all surfaces of the probe using a soft, lint-free wipe or cloth, changing wipes' cloths when necessary to ensure the probe is completely dry. Visually inspect the probe to ensure all surfaces are clean and dry. Repeat drying steps if any moisture is visible.
5. If the probe is not immediately reused, store the probe in a manner that will protect and keep the probe from being recontaminated. This may be accomplished by placing the probe in a storage cabinet with filtered air flow and/or by using a disposable storage cover placed over the probe.

The instructions provided above have been validated to properly prepare GE Ultrasound probes for re-use. It remains the responsibility of the processor to ensure that the processing is performed as specified in this document. This may require verification and routine monitoring of the process.

Probe High Level Disinfection – Soak (continued)

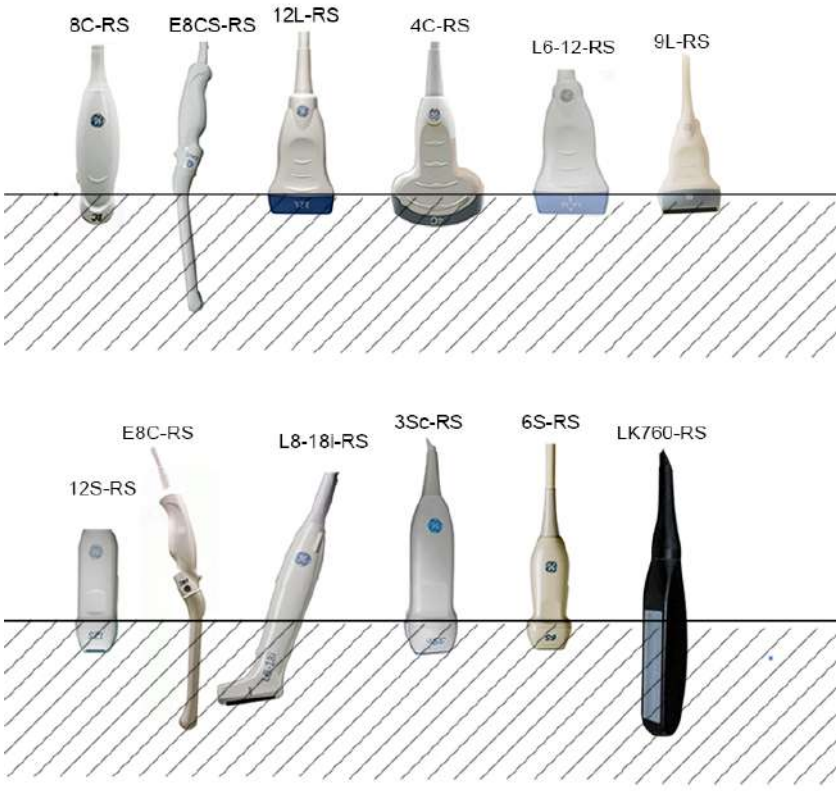


Figure 17-13. Probe Immersion Levels, 1=Fluid Level

Table 17-6: Description of Pictogram for Probe Immersion Levels

Pictogram	Description
	Fluid Level

Probe High Level Disinfection – Soak (continued)

WARNING

Use only high-level disinfectants that are listed in the Probe Care Card enclosed with the probe. In addition, refer to the local / national regulations.

Do not steam autoclave or subject the probe to Ethylene Oxide (ETO).

WARNING

Do not immerse the probe in liquid beyond the level specified for that probe (see Figure 17-13).

Never immerse the probe connector or probe adapters in liquid.

The probe should not be exposed to the disinfectant longer than specified to achieve the desired effect.

DO NOT soak or saturate probes with solutions containing alcohol, bleach, ammonium chloride compounds or hydrogen peroxide.

WARNING

CREUTZFELDT-JACOB DISEASE

Neurological use on patients with this disease must be avoided. If a probe becomes contaminated, there is no adequate disinfecting means.

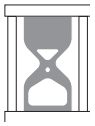
CAUTION

Ensure that you follow the probe disinfection procedure provided by GE.

Table 17-7: Description of Pictogram on Probe Care Cards

Pictogram	Description	Standard
	“ATTENTION” - Consult accompanying documents” is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.	ISO 7000-0434A
	“CAUTION” - Dangerous voltage (the lightning flash with arrowhead) is used to indicate electric shock hazards.	IEC 60417-6042

Table 17-7: Description of Pictogram on Probe Care Cards (Continued)

Pictogram	Description	Standard
	Biohazard - Patient/user infection due to contaminated equipment. Usage • Cleaning and care instructions • Sheath and glove guidelines	ISO7000-0659
	Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use.	N/A-by GE Healthcare
	Do not immerse the probe into any liquid beyond the level specified for that probe. Refer to the user manual of the ultrasound system.	N/A-by GE Healthcare
	Since there is a possibility of having negative effects on the probe, observe the specified immersing time by the germicide manufacturer strictly. Do not immerse the probe in liquid chemical germicides more than the time prescribed in the care card.	N/A-by GE Healthcare
	“Consult accompany document” - Refer to the ultrasound system user manual for important probe care and cleaning instruction.	ISO 7010-M002


CAUTION

Review the probe care card that is packed with each probe.


CAUTION

Please refer to the probe care card for GE approved probe disinfectants.

Probe High-Level Disinfection - Trophon® EPR

When performing High-Level Disinfection of GE ultrasound probes with the Trophon® EPR, it is not necessary to disconnect the probe from the ultrasound system. The probe must be inactive (not selected) during the disinfection cycle.

1. Upon completion of probe cleaning, ensure the probe has been thoroughly dried with a clean, lint-free soft and dry cloth or wipe. Carefully dry the probe by wiping from the distal tip to the strain relief.



DO NOT use abrasive paper products when cleaning or wiping a GE Ultrasound Probe. The use of abrasive wipes can damage the soft lens (acoustic window).



DO NOT use a twisting motion when wiping the probes as this may damage the soft lens.

2. Visually inspect the probe to ensure the probe is visibly clean.
3. Follow the Trophon instructions for probe placement and operation of the Trophon system. Incorrect positioning of the probe may lead to High-Level Disinfection not being achieved.



Damage to the probe may occur if the probe is placed in contact with the Trophon chamber wall. Curved probes must be correctly positioned in the chamber using the Curved Probe Positioner (CPP) supplied with the Trophon system.

4. Once the Trophon High-Level Disinfection cycle is complete, don a new set of gloves and promptly remove the probe from the Trophon machine. DO NOT allow the probe to remain in the machine for extended periods of time.

Probe High-Level Disinfection - Trophon® EPR (continued)

5. Hold the probe at the proximal end near the strain relief cable. DO NOT suspend or hold the probe by the cable, as this may damage the probe.
6. Wipe the probe from the distal end to the proximal end with a clean, lint-free soft and dry cloth or wipe to remove any residual hydrogen peroxide from the probe surface.



DO NOT use a twisting motion or abrasive paper products when wiping the probe.

7. If the probe is not immediately reused, store the probe in a manner that will protect and keep the probe from being recontaminated. This may be accomplished by placing the probe in a storage cabinet with filtered air flow and/or by using a disposable storage cover placed over the probe.

Chemicals Used for Efficacy Validation

The table below lists the products and intended use (clean, Intermediate-Level Disinfection, High-Level Disinfection) that were validated.

Table 17-8: Chemicals used for Efficacy Validation

Product Type	Trade Name	Manufacturer	Minimum Contact Time	Active Ingredient
Cleaning (Wipe)	Oxivir® Tb	Diversey	N/A	Hydrogen Peroxide
Enzymatic Detergent (Soak)	Enzol® (Cidezyme®)	Advanced Sterilization Products® (J&J)	1-Minute Soak	Proteolytic Enzymes
	MetriZyme™	Metrex™		
	Prolystica® 2X Concentrate Presoak & Cleaner	Steris		
Intermediate-level Disinfectant (wipe)	Oxivir® Tb	Diversey	10-Minute Exposure	Hydrogen Peroxide
High-level Disinfectant (Soak)	Cidex® OPA	Advanced Sterilization Products (J&J)	10-Minute Soak	Ortho-phthalaldehyde
	McKessen OPA/28	McKesson		

A full list of chemicals tested for compatibility is available at the GE Probe Web Site:

Table 17-9: Probe Web Site

Probe Web Site
Ultrasound Probe Web Site
http://www.gehealthcare.com/transducers

Table 17-10: Cleaners Compatible with Non-TEE probes

Trade Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
AniosClean Excel D	Laboratoires Anios	X	X	X	X	X	X	X	X	X	X	X	X
Aniosyme X3	Laboratoires Anios	X	X	X	X	X	X	X	X	X	X	X	X
Aniosyme DD1	Laboratoires Anios	X	X	X	X	X	X	X	X	X		X	X
Bodedex Forte	BODE Chemie GmbH (HARTMANN)	X	X	X	X	X	X	X	X	X		X	X
Cidezyme / Enzol	Advanced Sterilization Products	X	X	X	X	X	X	X	X	X		X	X
EmPower	Metrex	X	X	X	X	X	X	X	X	X		X	X
Endozime	The Ruhof Corporation	X	X	X	X	X	X	X	X	X		X	X
Endozime Sponge	The Ruhof Corporation	X	X	X	X	X	X	X	X	X		X	X
Endozime AW Triple Plus with APA	The Ruhof Corporation	X	X	X		X	X	X	X	X		X	X
Endozime SLR	The Ruhof Corporation	X	X	X		X	X	X	X	X		X	X
Endozime SLR Sponge	The Ruhof Corporation	X	X	X		X	X	X	X	X		X	X
Enzyclean II Dual Enzyme Detergent	Micro-Scientific (Weiman)	X	X	X	X	X	X	X	X	X	X	X	X
gigasept AF	Schulke & Mayr GmbH	X	X	X	X	X	X	X	X	X		X	X
gigasept AF Forte	Schulke & Mayr GmbH												
gigazyme	Schulke & Mayr GmbH	X	X	X	X	X	X	X	X	X		X	X
gigazyme X-tra	Schulke & Mayr GmbH	X	X	X	X	X	X	X	X	X		X	X
Intercept Detergent	Mediavators	X	X	X	X	X	X	X	X	X		X	X
KlenZyme	STERIS Corporation												
Matrix	Whiteley Medical	X	X	X	X	X	X	X	X	X		X	X
Metrizyme	Metrex	X	X	X			X	X	X	X		X	X
Prolystica	STERIS Corporation	X	X	X	X	X	X	X	X	X		X	X
Pure Enzymatic Detergent	EndoChoice	X	X	X	X	X	X	X	X	X		X	X
Revital-ox Enzymatic Detergents	STERIS Corporation	X	X	X	X	X	X	X	X	X	X	X	X
Septanios MD	Laboratoires Anios	X	X	X	X	X	X	X	X	X		X	X

Table 17-10: Cleaners Compatible with Non-TEE probes

Trade Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
Simple2 Multi-Tiered Enzymatic Detergent (bottle or sponge kits)	Cygnus Medical	X	X	X	X	X	X	X	X	X		X	X
Soft Soap	All manufacturer	X	X	X	X	X	X	X	X	X		X	X
Valsure Enzymatic Cleaner	STERIS Corporation	X	X	X	X	X	X	X	X	X	X	X	X

Table 17-11: Low and Intermediate-level Disinfectants Compatible with Non-TEE probes

Product type	Chemical Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
Liquid/ Spray	Accel INTERVention RTU	Diversey (Sealed Air)	X	X	X			X	X	X	X		X	X
	Accel TB RTU	Diversey (Sealed Air)	X	X	X			X	X	X	X		X	X
	Acryl-Des	Schulke & Mayr GmbH	X	X	X	X	X	X	X	X	X		X	X
	Acrylan	Antiseptica Chem. Phar. Produkte	X	X	X	X	X	X	X	X	X		X	X
	Alcohol 70% Ethanol on a wipe	All manufacturer	X	X	X	X	X	X	X	X	X		X	X
	Alcohol 70% Isopropanol on a wipe	All manufacturer	X	X	X	X	X	X	X	X	X		X	X
	Bacillol 30 Foam	BODE Chemie GmbH (HARTMANN)	X	X	X	X	X	X	X	X	X		X	X
	Bacillol AF	BODE Chemie GmbH (HARTMANN)	X	X	X	X	X	X	X	X	X		X	X
	Bacillol plus	BODE Chemie GmbH (HARTMANN)	X	X	X	X	X	X	X	X	X		X	X
	Biguacid-S	Antiseptica Chem. Phar. Produkte	X	X	X	X	X	X	X	X	X		X	X
	CaviCide	Metrex	X	X	X	X	X	X	X	X	X		X	X
	CaviCide 1	Metrex	X	X	X	X	X	X	X	X	X		X	X
	CaviCide AF	Metrex	X	X	X	X	X	X	X	X	X	X	X	X
	Cidalkan	Alkapharm	X	X	X	X	X	X	X	X	X		X	X
	Clinell Universal Spray	GAMA Healthcare Ltd	X	X	X	X	X	X	X	X	X		X	X
	Clorox broad spectrum quaternary disinfectant cleaner	Clorox Professtional Products Company	X	X	X	X	X	X	X	X	X		X	X

Table 17-11: Low and Intermediate-level Disinfectants Compatible with Non-TEE probes

Product type	Chemical Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
Liquid/ Spray	Clorox Healthcare Hydrogen Peroxide Cleaner Disinfectant Liquids and Spray	Clorox Professtional Products Company	X	X	X			X	X	X	X		X	X
	Hibitane (5% Chlorhexidine gluconate)	All manufacturer		X					X	X	X		X	
	Mikrozid sensitive liquid	Schulke & Mayr GmbH	X	X	X	X	X	X	X	X	X		X	X
	Optim 33TB RTU	SciCan	X	X	X			X	X	X	X		X	X
	Oxivir Tb RTU	Diversey (Sealed Air)	X	X	X			X	X	X	X		X	X
	PCS 1000 Oxidizing Disinfectant/ Disinfectant Cleaner	Process Cleaning Solutions Ltd	X	X	X	X	X	X	X	X	X	X	X	X
	Protex disinfectant spray	Parker Laboratoires Inc.	X	X	X	X		X	X	X	X		X	X
	Surfa'Safe	Laboratoires Anios	X	X	X	X		X	X	X	X		X	X
	Surfa'Safe Premium	Laboratoires Anios	X	X	X	X		X	X	X	X	X	X	X
	Transeptic Spray	Parker Laboratoires Inc.		X					X	X				
Liquid/ Spray	Tristel Duo for Ultrasound	Tristel Solutions Limited	X	X	X	X	X	X	X	X	X		X	X

Table 17-11: Low and Intermediate-level Disinfectants Compatible with Non-TEE probes

Product type	Chemical Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
Wipes	Accel INTERVention Wipes	Diversey (Sealed air)	X	X	X			X	X	X	X		X	X
	Accel TB Wipes	Diversey (Sealed air)	X	X	X			X	X	X	X		X	X
	Anios Quick Wipes	Laboratoires Anios	X	X	X	X	X	X	X	X	X		X	X
	Asepti-Wipes II	Ecolab	X	X	X	X	X	X	X	X	X	X	X	X
	Bacillol 30 Tissues	BODE Chemie GmbH (HARTMANN)	X	X	X	X	X	X	X	X	X		X	X
	Bacillol AF Tissues	BODE Chemie GmbH (HARTMANN)	X	X	X	X	X	X	X	X	X		X	X
	Bactinyl Lingettes desinfectantes inodores	Laboratoire Garcin-Bactinyl	X	X	X	X	X	X	X	X	X		X	X
	CaviWipes	Metrex	X	X	X	X	X	X	X	X	X	X	X	X
	CaviWipes 1	Metrex	X	X	X	X	X	X	X	X	X		X	X
	CaviWipes AF	Metrex	X	X	X	X	X	X	X	X	X	X	X	X
	Cidalkan Wipes	Alkapharm	X	X	X	X	X	X	X	X	X		X	X
	Cleanisept Wipes	Dr. Schumacher GmbH	X	X	X	X	X	X	X	X	X	X	X	X
	Cleanisept Wipes forte	Dr. Schumacher GmbH	X	X	X	X	X	X	X	X	X	X	X	X
	Clinell Clorox Wipes	GAMA Healthcare Ltd	X	X	X	X	X	X	X	X	X		X	X
	Clinell Universal Sanitising wipes or Clinell Universal wipes	GAMA Healthcare Ltd	X	X	X	X	X	X	X	X	X		X	X

Table 17-11: Low and Intermediate-level Disinfectants Compatible with Non-TEE probes

Product type	Chemical Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
Wipes	Clorox Healthcare Bleach Germicidal wipes	Clorox Professional Products Company	X	X	X	X	X	X	X	X	X		X	X
	Clorox Healthcare Hydrogen Peroxide Cleaner Disinfectant Wipes	Clorox Professional Products Company	X	X	X			X	X	X	X		X	X
	Clorox Healthcare Multi-Surface Quat Alcohol Cleaner Disinfectant Wipes	Clorox Professional Products Company	X	X	X	X	X	X	X	X	X		X	X
	Dispatch hospital cleaner disinfectant towels with bleach	Clorox Professional Products Company	X	X	X	X	X	X	X	X	X		X	X
	General purpose disinfectant wipes	Total Solutions	X	X	X	X	X	X	X	X	X		X	X
	Intercept Wipes	Medivators	X	X	X	X	X	X	X	X	X		X	X
	Matrix Wipes	Whiteley Medical	X	X	X	X	X	X	X	X	X		X	X
	Mikrobac tissues	BODE Chemie GmbH (HARTMANN)	X	X	X	X	X	X	X	X	X		X	X
	Mikrozid sensitive wipes	Schulke & Mayr GmbH	X	X	X	X	X	X	X	X	X		X	X
	Mikrozid universal liquid and Mikrozid universal wipes	Schulke & Mayr GmbH	X	X	X	X	X	X	X	X	X		X	X
	Optim 33TB Wipes	SciCan	X	X	X			X	X	X	X		X	X

Table 17-11: Low and Intermediate-level Disinfectants Compatible with Non-TEE probes

Product type	Chemical Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
Wipes	Oxivir Tb Wipes	Diversey (Sealed Air)	X	X	X			X	X	X	X		X	X
	PCS 1000 Oxidizing Disinfectant/ Disinfectant Cleaner Wipes	Process Cleaning Solutions Ltd	X	X	X	X	X	X	X	X	X	X	X	X
	Protex disinfectant wipes	Parker Laboratories Inc.	X	X	X	X	X	X	X	X	X		X	X
	Protex ULTRA Disinfectant Wipes	Parker Laboratories Inc.	X	X	X	X	X	X	X	X	X	X	X	X
	Sani-Cloth Active	Ecolab	X	X	X	X	X	X	X	X	X	X	X	X
	Sani-Cloth Active	PDI	X	X	X	X	X	X	X	X	X		X	X
	Sani-Cloth AF Germicidal Disposable Wipe	PDI	X	X	X	X	X	X	X	X	X		X	X
	Sani-Cloth AF3 Germicidal Disposable Wipe	PDI	X	X	X	X	X	X	X	X	X		X	X
	Sani-Cloth Bleach Germicidal Disposable Wipe	PDI	X	X	X	X	X	X	X	X	X		X	X
	Sani-Cloth HB Germicidal Disposable Wipe	PDI	X	X	X	X	X	X	X	X	X	X	X	X
	Sani-Cloth Plus Germicidal Disposable Cloth	PDI	X	X	X	X	X	X	X	X	X	X	X	X

Table 17-11: Low and Intermediate-level Disinfectants Compatible with Non-TEE probes

Product type	Chemical Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
Wipes	Sani-Cloth Prime Germicidal Disposable Wipe	PDI	X	X	X	X	X	X	X	X	X		X	X
	Septiwipes	Dr. Schumacher GmbH	X	X	X	X	X	X	X	X	X	X	X	X
	Sofuraito disinfecting wipes	Asahi Kasei Chemicals Corporation	X	X	X	X	X	X	X	X	X		X	X
	SONO Ultrasound Wipes	Advanced Ultrasound Solutions Inc.	X	X	X	X	X	X	X	X	X		X	X
	Sukitto-Cloth wipes	Osaki Medical Corporation	X	X	X	X	X	X	X	X	X		X	X
	Sukitto-Cloth wipes refill	Osaki Medical Corporation	X	X	X	X	X	X	X	X	X		X	X
	Super Sani-Cloth Germicidal Disposable Wipe	PDI	X	X	X	X	X	X	X	X	X		X	X
	Tristel Pre-Clean Wipes	Tristel Solutions Limited	X	X	X	X	X	X	X	X	X		X	X
	Tristel Rinse Wipes	Tristel Solutions Limited	X	X	X	X	X	X	X	X	X		X	X
	Tristel Sporicidal Wipe - Activated Wipe	Tristel Solutions Limited	X	X	X	X	X	X	X	X	X		X	X
	trophon Companion Cleaning Wipes	Nanosonics Limited	X	X	X	X	X	X	X	X	X		X	X
	trophon Companion Drying Wipes	Nanosonics Limited	X	X	X	X	X	X	X	X	X		X	X
	Tuffle 5	Vernacare Ltd	X	X	X	X	X	X	X	X	X		X	X

Table 17-11: Low and Intermediate-level Disinfectants Compatible with Non-TEE probes

Product type	Chemical Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
Wipes	V Wipes	Whiteley Medical	X	X	X	X	X	X	X	X	X		X	X
	Wet Wipe Chlorine Disinfection	Wet Wipe A/S	X	X	X	X	X	X	X	X	X		X	X
	Wet Wipe PHMB Disinfection	Wet Wipe A/S	X	X	X	X	X	X	X	X	X		X	X
	Wet Wipe Triamin Disinfection	Wet Wipe A/S	X	X	X	X	X	X	X	X	X	X	X	X
	Wet Wipe Universal	Wet Wipe A/S	X	X	X	X	X	X	X	X	X		X	X
	Wip'Anios Excel	Laboratoires Anios	X	X	X	X	X	X	X	X	X	X	X	X
	Wip'Anios Premium	Laboratoires Anios	X	X	X	X	X	X	X	X	X		X	X

Table 17-12: High-level Disinfectants Compatible with Non-TEE probes

Product type	Chemical Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
High-Level Disinfectant	Aidal Plus (Only HLD, not sterilization)	Whiteley Medical	X	X	X	X	X	X	X	X	X		X	X
	Anioxy-Twin	Laboratoires Anios		X					X	X	X		X	X
	Anioxyde 1000	Laboratoires Anios		X					X	X	X		X	X
	Bacillocid rasant	BODE Chemie GmbH (HARTMANN)	X	X	X	X	X	X	X	X	X		X	X
	Cidex	Advanced Sterilization Products	X	X	X	X	X	X	X	X	X		X	X
	Cidex OPA	Advanced Sterilization Products	X	X	X	X	X	X	X	X	X		X	X
	Cidex Plus	Advanced Sterilization Products	X	X	X	X	X	X	X	X	X		X	X
	gigasept FF neu	Schulke & Mayr GmbH	X	X	X			X	X	X	X		X	
	gigasept PAA Concentrate	Schulke & Mayr GmbH		X					X	X	X		X	X
	McKesson OPA 28	McKesson	X	X	X	X	X	X	X	X	X		X	X
	Metricide 14	Metrex	X	X	X	X	X	X	X	X	X		X	X
	Metricide 28	Metrex	X	X	X	X	X	X	X	X	X		X	X
	Metricide Plus 30	Metrex	X	X	X	X	X	X	X	X	X		X	X
	Metricide OPA Plus	Metrex	X	X	X			X	X	X	X		X	X
	Nu-Cidex	Advanced Sterilization Products												
	Opal	Whiteley Medical	X	X	X	X	X	X	X	X	X		X	X

Table 17-12: High-level Disinfectants Compatible with Non-TEE probes

Product type	Chemical Name	Manufacturer	4C-RS	E8C-RS	3Sc-RS	6S-RS	12S-RS	L6-12-RS	9L-RS	12L-RS	L8-18i-RS	LK760-RS	E8Cs-RS	8C-RS
High-Level Disinfectant	Opaster'Anios	Laboratoires Anios	X	X	X	X	X	X	X	X	X		X	X
	Rapicide High-Level Disinfectant and Sterilant (use as HLD only)	Medivators Inc	X	X	X	X	X	X	X	X	X		X	X
	Rapicide OPA 28	Medivators Inc	X	X	X	X	X	X	X	X	X		X	X
	Revital-Ox Resert High Level Disinfectant	STERIS Corporation		X					X	X	X		X	X
	Sporox II	DSHealthcare Inc.												
	Steranios 2% (use as HLD only)	Laboratoires Anios	X	X	X	X	X	X	X	X	X		X	X
	Wavicide-01	Medical Chemical Corporation	X	X	X	X	X	X	X	X	X		X	X
	Tristel Trio Wipes System	Tristel Solutions Limited	X	X	X	X	X	X	X	X	X		X	X
Powder	Gigasept pearls	Schulke & Mayr GmbH		X					X	X	X		X	X
	Rely+On PeraSafe	The Chemours Company		X					X	X	X		X	X
	Sekusept Aktiv	Ecolab		X					X	X	X		X	X
	Sekusept Easy	Ecolab		X					X	X	X		X	X

Covering the Transducer using a Sterile, Protective Sheath

CAUTION

Protective barriers may be required to minimize disease transmission. Probe sheaths are available for use with all clinical situations where infection is a concern. Use of legally marketed, sterile probe sheaths is mandatory for intra-cavitary and intra-operative procedures.

1. Place an appropriate amount of gel inside the protective sheath and/or on the transducer face.

NOTE: Failure to use imaging gel may result in poor image quality.

2. Insert transducer into sheath, making sure to use proper sterile technique. Pull cover tightly over transducer face to remove wrinkles and air bubbles, taking care to avoid puncturing the sheath.



Figure 17-14. Applying the Sheath

1. Secure the Sheath with a rubber band.
2. The probe sheath should extend past the end of the probe to the probe's cable.

NOTE: No gel was applied to the probe in this photo.

3. Secure the sheath in place.

NOTE: Failure to use a sheath that fully covers the transducer to the cable strain relief may lead to cross-contamination of the transducer.

4. Inspect the sheath to ensure there are no holes or tears. If the sheath becomes compromised, stop the procedure and replace immediately.

Probe Safety

Handling precautions



Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. DO NOT use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

Electrical shock hazard



The probe is driven with electrical energy that can injure the patient or user if live internal parts are contacted by conductive solution:

- **DO NOT** immerse the probe into any liquid beyond the level indicated by the immersion level diagram. Refer to the immersion illustration in the Probe Cleaning Process section. Never immerse the probe connector or probe adaptors into any liquid.
- **DO NOT** drop the probes or subject them to other types of mechanical shock or impact. Degraded performance or damage such as cracks or chips in the housing may result.
- Prior to each use, visually inspect the probe lens and case area for cracks, cuts, tears, and other signs of physical damage. DO NOT use a probe which appears to be damaged until you verify functional and safe performance. You must perform a more thorough inspection, including the cable, strain relief, and connector, each time you clean and disinfect the probe.
- Before inserting the connector into the probe port, inspect the probe connector pins. If a pin is bent, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative.
- **DO NOT** kink, tightly coil, or apply excessive force on the probe cable. Insulation failure may result.
- Electrical leakage checks should be performed on a routine basis by GE Service or qualified hospital personnel. Refer to the service manual for leakage check procedures.

Mechanical hazards



A defective probe or excessive force can cause patient injury or probe damage:

- Observe depth markings and do not apply excessive force when inserting or manipulating intracavitary probes.
- Inspect probes for sharp edges or rough surfaces that could injure sensitive tissue.
- DO NOT apply excessive force to the probe connector when inserting into the probe port. The pin of a probe connector may bend.

Special handling instructions

Using protective sheaths



Protective barriers may be required to minimize disease transmission. Probe sheaths are available for use with all clinical situations where infection is a concern. Use of legally marketed, sterile probe sheaths is mandatory for intra-cavitary and intra-operative procedures.

Instructions. Custom made sheaths are available for each probe. Each probe sheath kit consists of a flexible sheath used to cover the probe and cable and elastic bands used to secure the sheath.

Sterile probe sheaths are supplied as part of biopsy kits for those probes intended for use in biopsy procedures. In addition to the sheath and elastic bands, there are associated accessories for performing a biopsy procedure which are included in the kit. Refer to the biopsy instructions for the specific probes in the Discussion section of this chapter for further information.

Reordering. To reorder sheaths, please contact your local distributor or the appropriate support resource.



Devices containing latex may cause severe allergic reaction in latex sensitive individuals. Refer to FDA's March 29, 1991 Medical Alert on latex products.



Do not use pre-lubricated condoms as a sheath. In some cases, they may damage the probe. Lubricants in these condoms may not be compatible with probe construction.



DO NOT use an expired probe sheath. Before using probe sheaths, verify whether the term of validity has expired.

Endocavitary Probe Handling Precautions

If there is disinfectant leaking from the probe, DO NOT use the probe until it has been inspected and released for further use by a GE service representative.



Sterile/sanitary sheaths are to be used on the probe during its actual use with patients. Wearing gloves protects the patient and operator.



Disinfectant Exposure to Patient: contact with a disinfectant to the patient's skin or mucous membrane may cause an inflammation. If this happens, refer to the disinfectant's instruction manual.

Disinfectant Exposure from Probe Handle to Patient: DO NOT allow the disinfectant to contact the patient. Only immerse the probe to its specified level. Ensure that no solution has entered the probe's handle before scanning the patient. If disinfectant comes into contact with the patient, refer to the disinfectant's instruction manual.

Disinfectant Exposure from Probe Connector to Patient: DO NOT allow the disinfectant to contact the patient. Only immerse the probe to its specified level. Ensure that no solution has entered the probe's connector before scanning the patient. If disinfectant comes into contact with the patient, refer to the disinfectant's instruction manual.

Probe handling and infection control

This information is intended to increase user awareness of the risks of disease transmission associated with using this equipment and provide guidance in making decisions directly affecting the safety of the patient as well as the equipment user.

Diagnostic ultrasound systems utilize ultrasound energy that must be coupled to the patient by direct physical contact. Depending on the type of examination, this contact occurs with a variety of tissues ranging from intact skin in a routine exam to recirculating blood in a surgical procedure. The level of risk of infection varies greatly with the type of contact.

One of the most effective ways to prevent transmission between patients is with single use or disposable devices. However, ultrasound transducers are complex and expensive devices that must be reused between patients. It is very important, therefore, to minimize the risk of disease transmission by using barriers and through proper processing between patients.



CAUTION

Risk of Infection. ALWAYS clean and disinfect the probe between patients to the level appropriate for the type of examination and use FDA-cleared probe sheaths where appropriate.



CAUTION

Adequate cleaning and disinfection are necessary to prevent disease transmission. It is the responsibility of the equipment user to verify and maintain the effectiveness of the infection control procedures in use. Always use sterile, legally marketed probe sheaths for intra-cavitary and intra-operative procedures.

Probe handling and infection control (continued)


CAUTION

In order for liquid chemical disinfectants to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described earlier before attempting disinfection.

You MUST disconnect the probe from the Versana Active prior to cleaning/disinfecting the probe. Failure to do so could damage the system.

DO NOT soak probes in liquid chemical disinfectant for longer than is stated by the disinfectant instructions for use. Extended soaking may cause probe damage and early failure of the enclosure, resulting in possible electric shock hazard.


WARNING

Ultrasound transducers can easily be damaged by improper handling and by contact with certain chemicals. Failure to follow these precautions can result in serious injury and equipment damage.

- Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector or probe adapters into any liquid.
- Avoid mechanical shock or impact to the transducer and do not apply excessive bending or pulling force to the cable.
- Transducer damage can result from contact with inappropriate coupling or cleaning agents:
  - Do not soak or saturate transducers with solutions containing alcohol, bleach, ammonium chloride compounds or hydrogen peroxide
  - Avoid contact with solutions or coupling gels containing mineral oil or lanolin
  - Avoid temperatures above 50°C.
- Inspect the probe prior to use and after use for damage or degeneration to the housing, strain relief, lens and seal. Do not use a damaged or defective probe.

Coupling gels



Do not use unrecommended gels (lubricants). They may damage the probe and void the warranty. Please refer to the probe care card for GE approved probe gels.

Applying

In order to assure optimal transmission of energy between the patient and probe, a conductive gel or couplant must be applied liberally to the patient where scanning will be performed.



Do not apply gel to the eyes. If there is gel contact to the eye, flush eye thoroughly with water.

Precautions

Coupling gels should not contain the following ingredients as they are known to cause probe damage:

- Methanol, ethanol, isopropanol, or any other alcohol-based product
- Mineral oil
- Iodine
- Lotions
- Lanolin
- Aloe Vera
- Olive Oil
- Methyl or Ethyl Parabens (para hydroxybenzoic acid)
- Dimethylsilicone
- Polyether glycol based
- Petroleum



User should select the Non-toxic and nonirritating GEL.

Planned Maintenance

The following maintenance schedule is suggested for the system and probes to ensure optimum operation and safety.

Table 17-13: Planned Maintenance Program

Do the Following	Daily	After Each Use	As Necessary
Inspect the Probes	X	X	X
Clean the Probes		X	X
Disinfect Probes		X	X

Returning/Shipping Probes and Repair Parts

US Department of Transportation and GE policy requires that equipment returned for service MUST be clean and free of blood and other infectious substances.

When you return a probe or part for service (Field Engineer or customer), you need to clean and disinfect the probe or part prior to packing and shipping the equipment.

Ensure that you follow probe cleaning and disinfection instructions provided in the Basic User Manual/User Guide.

This ensures that employees in the transportation industry as well as the people who receive the package are protected from any risk.

Sterile Ultrasound Procedures

ONLY ultrasound gel that is labeled as sterile, is sterile.

Ensure you always use sterile ultrasound gel for those procedures that require sterile ultrasound gel.

Once a container of sterile ultrasound gel is opened, it is no longer sterile and contamination during subsequent use is possible.

Probe Discussion

Introduction

The Versana Active supports the following types of probes:

- **Convex Array.** Convex Array probes.
- **Linear Array.** Linear Array probes.
- **Sector Phased Array.** Sector Phased Array probes.



Probes for transvaginal and transrectal applications require special handling. Transvaginal/transrectal examinations and probe insertions should be performed only by personnel with adequate training. Refer to the user documentation enclosed with these probes.

Application

Table 17-14: Probe Indications for Use

Probe Application	4C-RS	E8Cs-RS	3Sc-RS	L6-12-RS	12L-RS	6S-RS	12S-RS	LK760-RS	E8C-RS	8C-RS	9L-RS	L8-18i-RS
Abdomen	X		X								X	
Obstetrics	X	X							X			
Gynecology	X	X							X			
Cardiac			X			X	X			X		
Vascular/Peripheral Vascular	X		X	X	X	X	X				X	X
Urology	X	X							X			
Pediatrics/Neonatal	X			X	X	X	X			X	X	
Small Parts				X	X						X	X
Musculoskeletal Conventional and Superficial	X			X	X			X		X	X	X
Thoracic	X		X	X	X						X	
Transcranial			X			X	X			X		
Transrectal		X							X			
Transvaginal		X							X			

Features

Table 17-15: Probe Features

Probe Application	4C-RS	E8Cs-RS	3Sc-RS	L6-12-RS	12L-RS	9L-RS	6S-RS	12S-RS	LK760-RS	E8C-RS	8C-RS	L8-18i-RS
Breast care				X	X	X						X
Strain Elastography				X	X	X						
Contrast	X											
LOGIQ View	X	X	X	X	X	X	X	X	X	X	X	X
Easy 3D	X	X	X	X	X	X	X	X	X	X	X	X
Auto IMT				X	X	X						X
Scan Assistant	X	X	X	X	X	X	X	X	X	X	X	X
Scan Coach	X	X	X	X	X	X	X	X	X	X	X	X
AMM	X		X				X	X			X	
CAMM			X				X	X				
TVM			X				X	X				
Color M Mode			X				X	X				
TVI/ TVD			X				X	X				
Stress Echo			X									
B Flow/B Flow Color	X			X	X	X						
Sono Biometry	X											
Advanced 3D	X	X	X	X	X	X	X	X	X	X	X	X
Auto EF			X									
Breast productivity				X	X	X						X
Thyroid productivity				X	X	X						X
Auto Bladder	X	X								X		
Follow-up tool	X	X	X	X	X	X	X	X	X	X	X	X
Needle Recg.	X			X	X	X						
Whizz	X	X	X	X	X	X	X	X	X	X	X	X
My Trainer												
Biopsy	X	X	X	X	X	X				X		

Features (continued)

NOTE: Not all features, products, probes or peripherals described in this document may be available or cleared for sale in all markets. Please contact your local GE Ultrasound representative to get the latest information.

Specifications

Table 17-16: System Probe Definitions

Probe Designation	Center Image Frequency (MHz)	Frequency Range (MHz)	Doppler Frequency Range (MHz)
4C-RS	3.1 MHz ± 10%	2.0~5.0	2.0~3.3
E8Cs-RS	6.5 MHz ± 20%	4.0~10.0	4.0~6.0
3Sc-RS	2.75 MHz ± 10%	1.7~4.0	1.7~3.3
L6-12-RS	7.75 MHz ± 20%	4.0~13.0	4.0~6.0
12L-RS	7.5 MHz ± 20%	4.2~13.0	4.2~7.7
6S-RS	4.5 MHz ± 10%	3.0~7.0	3.0~4.5
12S-RS	7.75 MHz ± 10%	4.2~12.0	4.2~6.7
LK760-RS	7.15 MHz ± 10%	3.5~10.0	3.5~5.0
E8C-RS	6.5 MHz ± 20%	4.2~10.0	4.2~6.3
8C-RS	6.5 MHz ± 20%	4.2~10.0	4.2~6.3
9L-RS	5.3 MHz ± 20%	3.0~9.0	3.0~5.0
L8-18i-RS	9.5 MHz ± 20%	6.7~18.0	6.7~10.0

Slice Thickness Specification

Table 17-17: Slice Thickness Specification

Probe Designation	Probe Slice Thickness Specification [mm]
4C-RS	<= 12.0mm
E8Cs-RS	<= 13.0mm
3Sc-RS	<= 16.0mm
L6-12-RS	<= 8.0mm
12L-RS	<= 8.0mm
6S-RS	<= 8.0mm
12S-RS	<= 8.0mm
LK760-RS	<= 12.0mm
E8C-RS	<= 13.0mm
8C-RS	<= 13.0mm
9L-RS	<= 8.0mm
L8-18i-RS	<= 8.0mm

Probe Illustration

Convex Probe

Table 17-18: Convex Probe Illustration

Probe	Illustration	Probe	Illustration
4C-RS		E8C-RS	
8C-RS		E8Cs-RS	

Linear Probe

Table 17-19: Linear Probe Illustration

Probe	Illustration	Probe	Illustration
L6-12-RS		12L-RS	
L8-18i-RS		LK760-RS	
9L-RS			

Sector Probe

Table 17-20: Sector Probe Illustration

Probe	Illustration	Probe	Illustration
3Sc-RS		6S-RS	
12S-RS			

Biopsy Special Concerns

Precautions Concerning the Use of Biopsy Procedures



WARNING

Do not freeze the image during a biopsy procedure. The image must be live to avoid a positioning error.

Biopsy guidezones are intended to assist the user in determining optimal probe placement and approximate the needle path. However, actual needle movement is likely to deviate from the guideline. Always monitor the relative positions of the biopsy needle and the subject mass during the procedure.



CAUTION

The use of biopsy devices and accessories that have not been evaluated for use with this equipment may not be compatible and could result in injury.



CAUTION

The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure prior to use.

- Follow the probe cleaning and disinfection procedures and precautions to properly prepare the probe.
- Follow the manufacturer's instructions for the reprocessing of biopsy devices and accessories.
- Use protective barriers such as gloves and probe sheaths.
- After use, follow proper procedures for decontamination, cleaning, and waste disposal.

Precautions Concerning the Use of Biopsy Procedures (continued)



Improper reprocessing methods and the use of certain cleaning and disinfecting agents can cause damage to the plastic components that will degrade imaging performance or increase the risk of electric shock.

See ‘Probe Safety’ on *page 17-42 for more information.*



NEVER reuse the TR5° disposable biopsy guide attachment and Disposable sterile Ultra-Pro II Needle guide kits.



Wear sterile gloves during the biopsy procedure. Be mindful of touching any non-sterilized surfaces to avoid cross contamination.

Preparing for a Biopsy

Displaying the Guidezone

Activate the Biopsy Kit by selecting it from the B-Mode.

The available biopsy options appear when Biopsy Kit is selected. There are fixed and adjustable angle biopsy kits and plastic/disposable and reusable biopsy guides available with the Versana Active depending on the probe. Select the desired biopsy kit.

Displaying the Guidezone (continued)

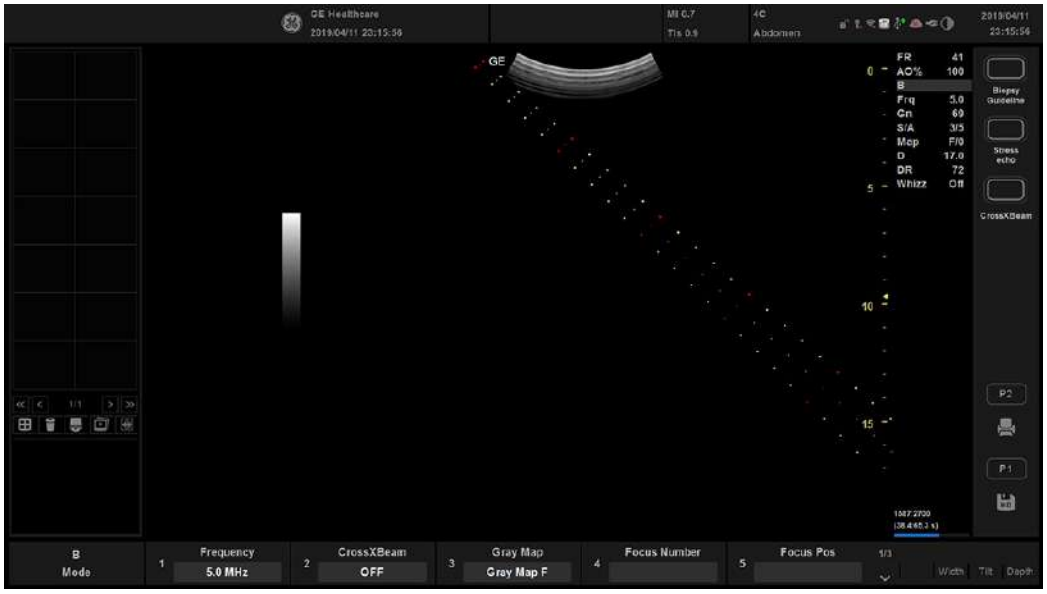


Figure 17-15. Biopsy Guidezones for the 4C-RS Probe

The biopsy guidezone represents a path of the needle. The dots which make up the guidezones is the depth readout where:

- Yellow represent 1 cm increments.
- Red represents 5 cm increments.

The display should be carefully monitored during a biopsy for any needle deviation from the center line or guidezone.

Before scanning, verify the needle can be visualized within the imaging plane. User appropriate needle length to reach target area.

Displaying the Guidezone (continued)

The Biopsy Guidezone adjusts along with image adjustments, such as image inversion/rotations, zoom and depth changes.

The needle may vary from the center line or guidezone for various reasons:

- Needle barrel to needle clearance or strength.
- Bracket manufacturing tolerance.
- Needle deflection due to tissue resistance.
- Needle size chosen. Thinner needles may deflect more.

Table 17-21: Biopsy Guide Availability

Probe	Fixed Angle	Multi-Angle		
		MBX1 (cm)	MBX2 (cm)	MBX3 (cm)
4C-RS		4	6	10
E8Cs-RS	TR5: 85 Degree (15.3 cm) RU: 90 Degree			
3Sc-RS		4.2	5.7	8.2
L6-12-RS		1.5	2.5	3.5
12L-RS		1.5	2.5	3.5
E8C-RS	TR5: 85 Degree (15.3 cm) RU: 90 Degree			
9L-RS		4	5.5	7



DANGER

Failure to match the guidezone displayed to the guide may cause the needle to track a path outside the zone.

It is extremely important that when using the adjustable angle biopsy guides, the angle displayed on the screen matches the angle set on the guide, otherwise the needle will not follow the displayed guidezone which could result in repeated biopsies or patient injury.

Preparing the Biopsy Guide Attachment

Convex, Sector and Linear probes have optional biopsy guide attachments for each probe. The guide consists of a reusable bracket to attach to the probe, disposable needle clip to attach to the bracket, sheath, gel (sterile gel if necessary) and disposable needle barrels.

The disposable needle barrels are available for a variety of needle sizes.



Please refer to the manufacturer's instructions included in the biopsy kit.

The bracket is packaged non-sterile and is reusable. To avoid possible patient contamination, ensure bracket is properly cleaned, sterilized or disinfected before each use.

Disposable components are packaged sterile and are single-use only. Do not use if integrity of packing is violated or if expiration date has passed.

Fixed Needle Biopsy Guide Assembly

WARNING

DO NOT use the needle with the catheter (soft tube). There is a possibility of breaking the catheter in the body.

CAUTION

Before inserting the needle, scan the patient to determine the correct puncture depth and site. Only the sterile/sanitary sheath and rubber band are on the probe during the pre-needle placement scanning.

Preparation

To prepare the endocavitary probe for use:

1. Remove the probe from the box and carefully examine it for any damage.
2. If the biopsy guide is to be attached, use the filling removal tool to clean out the attachment area on the probe head.

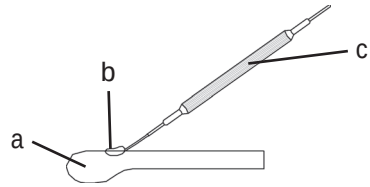


Figure 17-16. Attachment Filling Removal

a. Probe Head
b. Attachment
c. Filling Removal Tool

3. Clean, then disinfect the probe.

NOTE: Ensure that protective gloves are worn.

Installing the sheath

To install the sheath:

1. Remove the sheath from its package. Do not unroll the sheath.

NOTE: Remember to rinse all sanitary probe sheaths of powder before placing on the probe. Powder can degrade the displayed image.

2. Place an adequate amount of ultrasound gel inside the sheath tip (the gel is between the sheath inner surface and the probe aperture).

NOTE: Ensure that only acoustic coupling gel is used for this purpose.

3. Place the sheath tip over the probe aperture and then pull the sheath end toward the probe handle.
4. Inspect the sheath for nicks, cuts or tears.

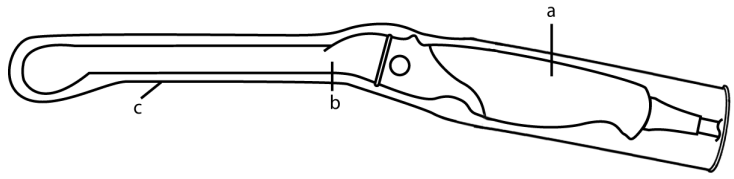


Figure 17-17. E8C-RS Probe with Sheath

a. Probe Handle
b. Probe Body
c. Sanitary Sheath

5. Rub a finger over the tip of the probe to ensure all air bubbles have been removed.

Biopsy Guide Preparation

1. If a biopsy is to be performed, snap the metal or plastic biopsy guide on to the probe over the sheath.

CAUTION

Patient injury or repeated biopsies may result. The needle placement will not be as intended if the needle guide is not properly seated and secure.

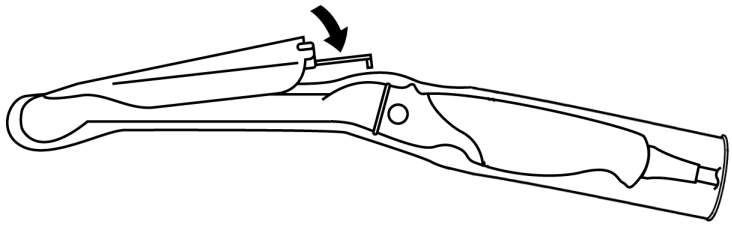


Figure 17-18. Disposable Biopsy Guide 5 degree Angle

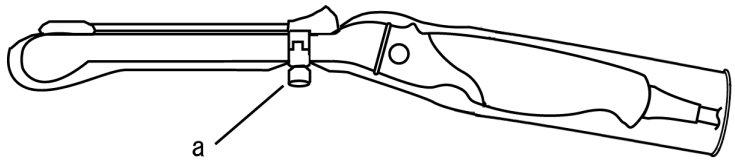


Figure 17-19. Reusable Biopsy Guide

a. Fix with a screw

2. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.
3. Ensure the guide is properly seated and secure by pushing forward on the needle insertion end of the guide until the attachment node is firmly in place in it's hole.

Multi Angle Biopsy Guide Assembly

WARNING

DO NOT attempt to use the biopsy bracket and needle guide until the manufacturer's instructions, provided with the biopsy bracket and needle guide in the kit, have been read and thoroughly understood.

1. Scan the patient and identify the target for biopsy. Move the probe to locate the target to the center of the image. Enable the system biopsy guidezone and try guidezone angles MBX1 to MBX3 to decide the best angle setting for needle path.



Figure 17-20. Example

2. Pull up on the knob (Figure 17-21 a) to freely move the needle guide attachment. Align the knob with the selected position of the needle guide attachment.

   Push the knob down (Figure 17-21 b) into the desired slot to secure the angle position of the needle guide attachment.



Figure 17-21. Pull up and push down the knob

Multi Angle Biopsy Guide Assembly (continued)

3. Fit a convex of the biopsy bracket (a) in a concave of the probe (b).

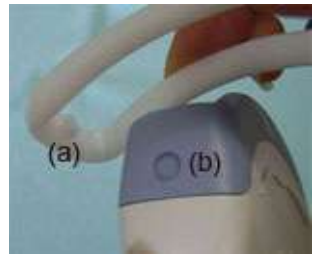


Figure 17-22. Probe/Bracket Alignment

Hold the side (a) and tuck down the needle guide side (b) until it clicks or locks in place.

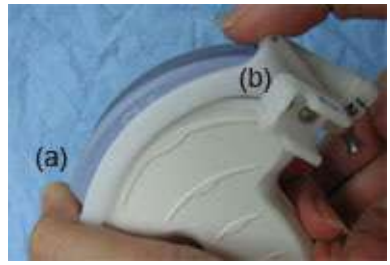


Figure 17-23. Probe/Multi-angle Bracket Alignment 2

4. Place an adequate amount of coupling gel on the face of the probe.

Multi Angle Biopsy Guide Assembly (continued)

5. Place the proper sanitary sheath tightly over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

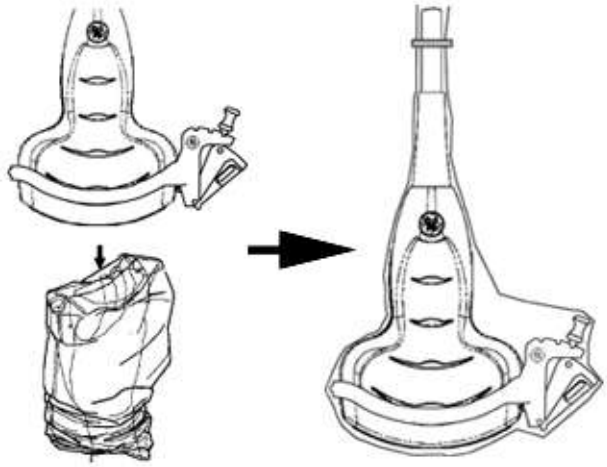


Figure 17-24. Applying Sanitary Sheath

6. Snap the needle guide onto the biopsy guide bracket.

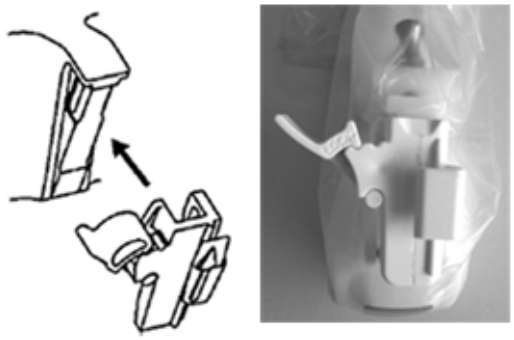


Figure 17-25. Snap the needle guide

Multi Angle Biopsy Guide Assembly (continued)

7. Push the locking mechanism towards the bracket to secure the lock (a). Make sure the needle guide is firmly attached to the bracket.



Figure 17-26. Lock the Needle guide

8. Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

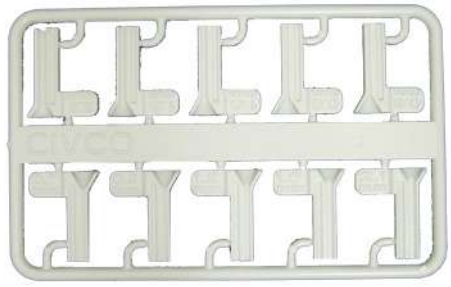


Figure 17-27. Needle Barrel

9. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

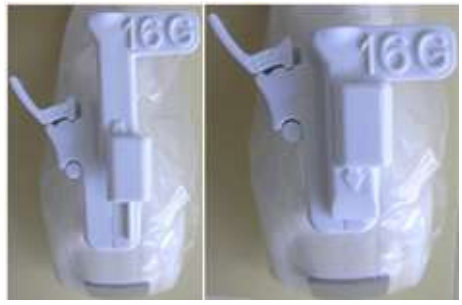


Figure 17-28. Needle Barrel Installation

Multi Angle Biopsy Guide Assembly (continued)

Remove the biopsy guide

1. Hold the other side and push out the needle clip attachment side. See Figure 17-29.



Figure 17-29. Remove the biopsy guide

CAUTION Prevent damage to the probe lens with finger nails.

Releasing the needle

According to the following procedure, you remove the needle from a probe and an assembly without moving the needle.

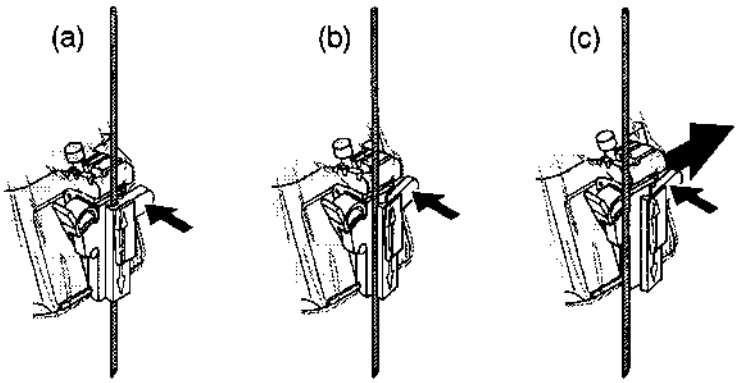


Figure 17-30. Release the needle from assembly

a. Push the knob portion of a sleeve in the direction of the arrow.
b. The needle is released from the assembly.
c. Push the probe and the assembly in the direction of the larger arrow to remove the needle.

Biopsy Needle Path Verification

To verify that the path of the needle is accurately indicated within the guidezone on the system monitor, perform the following:

- Properly install the bracket and biopsy guide.
- Scan in a container filled with water (47° C).
- Display the biopsy guidezone on the monitor.
- Ensure that the needle echo falls within the guidezone markers.

The Biopsy Procedure


WARNING

Biopsy procedures must only be performed on live images.

1. Place coupling gel on the scanning surface of the probe/ sheath/biopsy guide assembly.
2. Activate the biopsy guidezone on the system through the B-Mode menu. When using multi-angle guides, ensure that the proper guidezone angle is displayed.
3. Scan to locate the target. Center the target in the electronic guidezone path.

NOTE: *Enabling color flow would allow for visualization of the vascular structure around the area to be biopsied.*

4. Place the needle in the guide between the needle barrel and needle clip. Direct it into the area of interest for specimen retrieval.


WARNING

Please wear sterilized gloves during the biopsy procedure, meanwhile do not operate the console and any non-sterilized area in case any cross infection.


WARNING

Please wear sterilized gloves during scanning with TV+TR probe and cover the probe with a sterile sheath to avoid cross contamination.


CAUTION

For surgery/intra-operative procedures, a sterile environment is required. Therefore, both the operator and probe sheath need to be sterile.

Post Biopsy

When the biopsy is complete, remove the needle barrel, needle clip and probe sheath. Properly dispose of these items in accordance with current facility guidelines.

Clean and disinfect the probe.See ‘Care and Maintenance’ on *page 17-5 for more information.*

The biopsy bracket can be cleaned and disinfected in a recommended disinfecting agent and reused.



When the biopsy needle guide kit is opened, all parts must be discarded after the procedure whether they have been used or not.

Chapter 18

User Maintenance

This chapter supplies assistance information, system care and maintenance instructions, Quality Assurance and Privacy and Security.

Clinical Measurement Accuracy

Basic Measurements

The following information is intended to provide guidance to the user in determining the amount of variation or measurement error that should be considered when performing clinical measurements with this equipment. Error can be contributed by equipment limitations and improper user technique. Be sure to follow all measurement instructions and develop uniform measurement techniques among all users to minimize the potential operator error. Also, in order to detect possible equipment malfunctions that could affect measurement accuracy, a quality assurance (QA) plan should be established for the equipment that includes routine accuracy checks with tissue mimicking phantoms.

Please be advised that all distance and Doppler related measurements through tissue are dependent upon the propagation velocity of sound within the tissue. The propagation velocity usually varies with the type of tissue, but an average velocity for soft tissue is assumed. This equipment is designed for, and the accuracy statements listed on are based on, an assumed average velocity of 1540 m/s. The percent accuracy when stated applies to the measurement obtained (not the full scale range). Where the accuracy is stated as a percent with a fixed value, the expected inaccuracy is the greater of the two.

Basic Measurements (continued)

Table 18-1: System Measurements and Accuracies

Measurement	Units	Useful Range	Accuracy	Limitations or Conditions
Depth	mm	Full Screen	<=10%	
Angle	degree	Full Screen	<=5%	
Distance:				
Axial	mm	Full Screen	<5%	
Lateral	mm	Full Screen	<5%	Linear Probes
Lateral	mm	Full Screen	<5%	Convex Probes
Lateral	mm	Full Screen	<5%	Sector Probes
Circumference:				
Trace	mm	Full Screen	<=10%	Linear Probes, Convex Probes, Sector Probes
Ellipse	mm	Full Screen	<=5%	Linear Probes, Convex Probes, Sector Probes
Area:				
Trace	mm^2	Full Screen	<=5%	Linear Probes, Convex Probes, Sector Probes
Ellipse	mm^2	Full Screen	<=5%	Linear Probes, Convex Probes, Sector Probes
Time	s	Timeline Display	<5%	M mode, AM mode, CM mode, PWD mode, CWD mode
Slope	mm/s	Timeline Display	<=10%	M mode, AM mode, CM mode,
Doppler SV Position	mm	Full Screen	<=2 mm	PWD mode
Doppler Velocity	cm/s	From 0 to 100 cm/s From 100 to 130 cm/s	<15% <10%	PWD mode, CWD mode
Doppler Angle Correction	cm/s	From 0-80°	<=5%	PWD mode

Clinical Calculation Accuracy

Estimate the overall inaccuracy of a combined measurement and calculation by including the stated inaccuracy from the basic measurement accuracy statements.


CAUTION

Diagnostic errors may result from the inappropriate use of clinical calculations. Review the referenced source of the stated formula or method to become familiar with the intended uses and possible limitations of the calculation.

Calculation formulas and databases are provided as a tool to assist the user, but should not be considered an undisputed database, in making a clinical diagnosis. The user is encouraged to research the literature and judge the equipment capabilities on an ongoing basis in order to assess its utility as a clinical tool.

Anti-Virus Software Note

Anti-virus software IS NOT present on the Versana Active system. Since the Versana Active is already protected against attack by the measures listed below, no Anti-virus software is deemed necessary.

- Only communication ports required for system operation are enabled.
- Only operating system services required by system application software are enabled.
- Software programs CANNOT be loaded onto the Versana Active (e.g., e-mail, web browser, etc.).
- An auto-executable file CANNOT be run automatically on the Versana Active.
- The Versana Active software includes the latest MS Windows security protection.

We have worked diligently to develop a combination of the safety measures noted above and the security standards of Windows 10 Enterprise 2016 LTSB to provide a degree of safety against Viruses, Worms, Trojan Horses, etc., especially for a system used in a professional hospital grade networking environment that also typically features its own sufficient safety measures.

System Care and Maintenance

Overview

The user must ensure that safety inspections are performed at least every 12 months according to the requirements of the patient safety standard IEC 60601-1 (1988). Refer to the Service manual, Chapter 10.

Only trained persons are allowed to perform the safety inspections mentioned above.

Technical descriptions are available on request.

To ensure that the unit constantly operates at maximum efficiency we recommend that the following procedures be observed as part of the customer's internal routine maintenance program.

Contact the local Service Representative for parts or periodic maintenance inspections.



Do not perform system care and maintenance in the patient environment.

Expected Service Life Description

The expected service life for the Versana Active system and probes is identified in this table:

Table 18-2: Expected Service Life

Equipment/Accessory	Expected Service Life
Versana Active system	The expected service life for the Versana Active is at least seven (7) years from the manufacturing date under the provision of regular maintenance by authorized service personnel.
Versana Active probes	The expected service life for the Versana Active probes meets or exceeds five (5) years from the date the probe is placed in service, under the provision that the customer follows the care instructions provided on the Probe Care Card that accompanies the Versana Active instructions for Use.

Inspecting the System



To avoid electrical shock hazard, do not remove panels or covers from console. This servicing must be performed by qualified service personnel. Failure to do so could cause serious injury.

Monthly Maintenance

Examine the following on a monthly basis (or whenever there is a reason to assume that any issue may have occurred):

- Connectors on cables for any mechanical defects.
- Entire length of electrical and power cables for cuts or abrasions.
- Equipment for loose or missing hardware.
- Control panel and keyboard for defects.
- Trackball movement.

Weekly Maintenance

The system requires weekly care and maintenance to function safely and properly. Clean the following:

- System Cabinet
- Monitor
- Operator control panel
- Footswitch
- Air filter (weekly, or as needed)

  If the air filter is dusty, please clean it. See ‘Cleaning the air filter’ on *page 18-12 for more information.*

Failure to perform required maintenance may result in unnecessary service calls.

Disinfection

Effective Disinfection is always a balance between safe inactivation of infectious agents and undesirable side effects. Due to the generally uneven and irregular surface of Ultrasound consoles, a comprehensive surface disinfection process cannot be recommended by the manufacturer.

Cleaning the system

Prior to cleaning any part of the system:

1. Turn off the system power, disconnect the power cord and all the peripherals. See ‘Power Off’ on *page 3-26 for more information.*



Ensure that you follow the cleaning procedure and use the cleaning agents provided in this manual.

Compatible Chemicals for Cleaning

Table 18-3: Compatible Chemicals for Cleaning

	System Cabinet	Operator Control Panel	Main display
Cleaning agents			
PDI Easy Screen Cleaning Wipe	X	X	X
70% isopropyl alcohol	X	X	X
Wet Wipe	X	X	X
Disinfectants [1]			
PDI Sani-Cloth Plus	X	X	X
Protex	X	X	X
Tristel Wipes	X	X	X
Sono Ultrasound Wipes	X	X	X
Clorox wipes	X	X	X
CaviWipes	X	X	X
PDI Sani-Cloth HB	X	X	X
PDI Super Sani-Cloth Plus	X	X	X
[1]: Effective Disinfection is always a balance between safe inactivation of infectious agents and undesirable side effects. Due to the generally uneven and irregular surface of Ultrasound consoles, a comprehensive surface disinfection process cannot be recommended by the manufacturer.			



Do not use T-Spray I (Original T-Spray) or SaniCloth Plus (red cap).

System Cabinet

To clean the system cabinet:

1. Apply cleaning agent to a soft, non-abrasive folded cloth. The cloth should be damp, not dripping wet.
2. Wipe down the top, front, back, and both sides of the system cabinet.

NOTE: Do not spray any liquid directly into the unit.

Operator Control Panel

To clean the operator control panel:

1. Apply cleaning agent to a soft, non-abrasive folded cloth. The cloth should be damp, not dripping wet.
2. Wipe down operator control panel.
3. Use a cotton swab to clean around keys or controls. Use a toothpick to remove solids from between keys and controls.

NOTE: When cleaning the operator control panel, make sure not to spill or spray any liquid on the controls, into the system cabinet, or in the probe connection receptacle.

Monitor

To clean the monitor frame

1. Apply cleaning agent to a soft, non-abrasive folded cloth. The cloth should be damp, not dripping wet.
2. Wipe down the top, front, back and both sides of the display frame. Do not spray any liquid directly onto the screen.
3. Wipe off excess cleaning agent and allow to dry.

To clean the monitor display

1. Apply cleaning agent to a soft, non-abrasive folded cloth. The cloth should be damp, not dripping wet
2. Gently wipe the surface of the monitor display.
3. Wipe off excess cleaning agent and allow to dry.

NOTE: When cleaning the screen, make sure not to scratch the monitor.

Trackball

1. Power off the system.
2. Rotate the retainer counterclockwise until it can be removed from the keyboard.

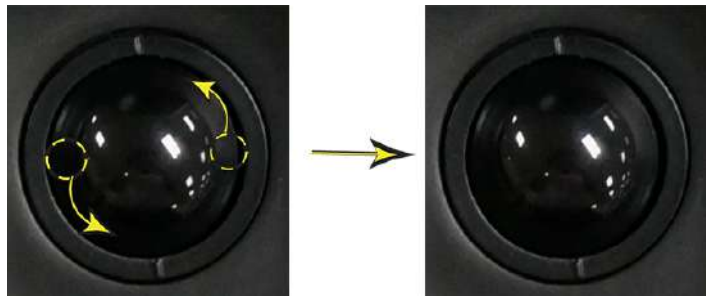


Figure 18-1. Rotate the retainer

3. Separate the trackball and the retainer. Wipe off any oil or dust from the trackball, retainer and the trackball housing using a cleaner or cotton swab.
4. Assemble the trackball and retainer, then put it into the housing and rotate it clockwise until its notches are set in position.



CAUTION

When cleaning, make sure not to spill or spray any liquid into the trackball housing (keyboard or system).

Cleaning the air filter

Clean the system's air filter to ensure that a clogged filter does not cause the system to overheat and reduce system performance and reliability. It is recommended the filter be cleaned every two weeks, but the requirements will vary due to your system use.

CAUTION

DO NOT operate the unit without the air filter in place.

Allow the air filter to dry thoroughly before re-installing it on the unit.

Cleaning

1. Power off the system.
2. Remove the air filter with hand.

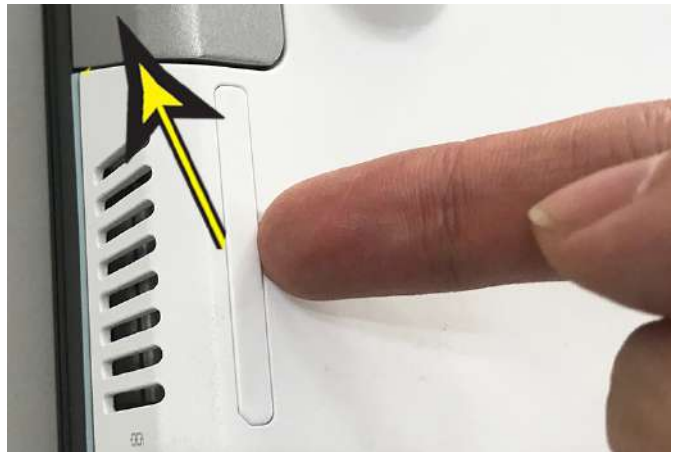


Figure 18-2. Remove the Air Filter

Cleaning (continued)

3. Dust the filter with a vacuum cleaner and/or wash it with a mild soapy solution.

   If washed, rinse and dry the filter before re-installation.

4. Put back the air filter.

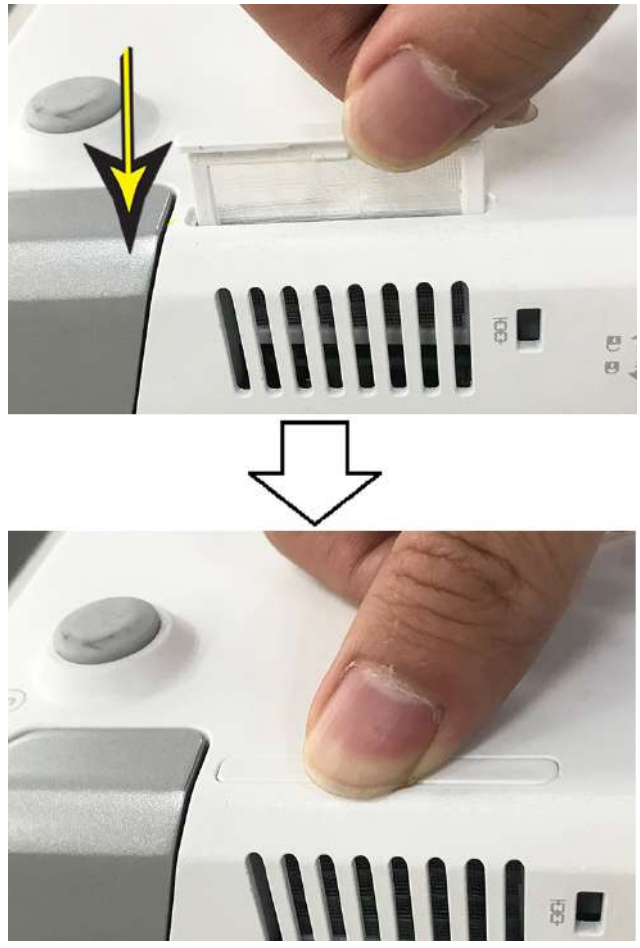


Figure 18-3. Install the Air Filter

Other Maintenance

Replacing illuminated key caps/lamps

Contact a local Service Representative when a key cap or lamp needs to be replaced.

Battery Replacement and Disposal

Battery replacement every three years is recommended.

Contact a local Service Representative for the replacement of the battery. Used batteries will be discarded appropriately by GE.

NOTE: Disposing of the battery should meet local law and regulatory requirements.

Prevention of static electricity interference

Interference from static electricity can damage electronic components in the system. The following measures help to reduce the likelihood of electrostatic discharge:

- Wipe the alphanumeric keyboard and monitor with lint-free tissue or a soft cloth dampened with anti-static spray on a monthly basis.
- Spray carpets with anti-static spray because constant walking on carpets in or near the scanning room may be a source of static electricity.

Disposal

Table 18-4: WEEE symbol

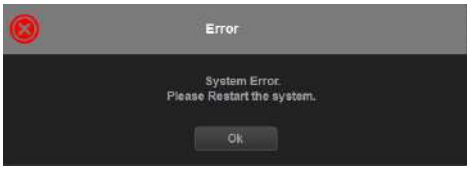
	Rear of the system and Probe connector

This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.

Troubleshooting

Please refer Service Manual if other messages appear on the monitor display.

Table 18-5: Error messages

	The system has detected the lower air filter requires cleaning. Please clean the lower air filter. 1. Shutdown the system. 2. Clean the air filter according to 'Cleaning the air filter' on *page 18-12*.
	System temperature is too high. System will shut down. 1. Shutdown the system. 2. Clean the air filter according to 'Cleaning the air filter' on *page 18-12*.
	System voltage fault. System will shut down. 1. Select ***OK*** and reboot the system. 2. If the same message appears after reboot, shut down the system. Then turn on the system according to 'Power On' on *page 3-22*.
	System Error. Please reboot the system. 1. Select ***OK*** and reboot the system. 2. If the same message appears after reboot, shut down the system. Then turn on the system according to 'Power On' on *page 3-22*.

Assistance

Supplies/Accessories



DO NOT connect any probes or accessories without approval by GE.



Use only GE approved internal equipment when replacing an internal peripheral.

The user or the operator should never install/replace the internal peripheral. Service representatives authorized by GEHC will install/replace the internal peripheral.

Not all features, products, probes or peripherals described in this document may be available or cleared for sale in all markets. Please contact your local GE Ultrasound representative to get the latest information.

Contact the distributor, GE affiliate or sales representative for approved peripherals. For HCATs, contact your sales person.

The following supplies/accessories have been verified to be compatible with the system:

Peripherals

Table 18-6: Peripherals and Accessories

Accessory	Units
Wireless Adaptor	Each
SONY UPD25 Color Printer	Each
Footswitch MKF 2-MED USB GP26	Each
1-Pedal type footswitch ‘Whanam FSU-1000’	Each
USB Stick	Each
UP-D898MD Printer	Each
1TB mobile USB HDD	Each
898 printer paper	Each
HP200 Printer	Each
Transcend TS8XDVDS-K DVDRW kit with software	Each
USB ECG Module with Cables	Each
Bluetooth adaptor	Each
Isolation USB for commercial printer	Each
Battery	Each
AN Keyboard film	Each
Power adapter wo cord (ACDC only)	Each
Cart	Each

Probe

Table 18-7: Probes and Accessories

Probe	HCAT	Biopsy Guide	Biopsy Guide HCAT	Biopsy Guide HCAT
4C-RS Convex	H4000SR	Multi-angle, disposable needle guide with a reusable plastic bracket	E8385NA	
8C-RS Convex	H40402LS	Not Available	N/A	N/A
E8C-RS Convex	H40402LN	Fixed angle, disposable needle guide with a reusable plastic bracket	E8385MJ	
		Fixed angle, reusable with a stainless steel bracket	H40412LN	
E8Cs-RS Convex	H48062AF	Fixed angle, disposable needle guide with a reusable plastic bracket	E8385MJ	
		Fixed angle, reusable with a stainless steel bracket	H40412LN	
3Sc-RS Sector	H45041DL	Multi-angle, disposable needle guide with a reusable plastic bracket	H46222LC	
6S-RS Sector	H45021RP	Not Available	N/A	N/A
12S-RS Sector	H44901AB	Not Available	N/A	N/A

Table 18-7: Probes and Accessories

Probe	HCAT	Biopsy Guide	Biopsy Guide HCAT	Biopsy Guide HCAT
L6-12-RS Linear	H48062AC	Multi-angle (in plane biopsy kit), disposable needle guide with a reusable plastic bracket	H40432LC	
12L-RS Linear	H40402LY	Multi-angle (in plane biopsy kit), disposable needle guide with a reusable plastic bracket	H40432LC	
		Infinite-angle (in plane biopsy kit), disposable needle guide with a reusable plastic bracket	H48392LT	
		Transverse bracket (out of plane biopsy kit), disposable needle guide with a reusable plastic bracket	H48392LL	
LK760-RS Linear	H44901AF	Not Available	N/A	N/A
L8-18i-RS Linear	H40462LF	Not Available	N/A	N/A
9L-RS Linear	H40442LL	Multi-angle, disposable needle guide, with a reuseable plastic bracket	H4906BK	N/A

System Data

Features/Specifications

Table 18-8: Physical Attributes

Dimensions and Weight • Height: within 58 ± 5 mm • Width: within 362 ± 5 mm • Length: within 390 ± 5 mm • Weight: less than 6 kg with battery, but without any probes or peripherals • Console Design • SSD (At least 200GB) • 1T SSD (option) • Integrated speakers • User adjustable audio output control on keyboard • Ergonomic design • Handle Keyboard • Alphanumeric keyboard • Interactive back-lighting • Protective film	15.6” Monitor • High-Resolution monitor • Opening angle adjustment: 170 degrees. • Horizontal/Vertical View angle: 80 degrees • Brightness and contrast adjustment Electrical Power • Voltage:100-240 VAC (+/-10%) • Frequency: 50/60 Hz • Power: Consumption less than 200VA with on-board peripherals Cart Design • Wheels • Integrated transducer cable management facility • Handle • Gel Holder • Probe Holder

Table 18-9: Inputs and Outputs Signal

External Inputs and Outputs • HDMI port • Ethernet port • USB ports	

Table 18-10: System Overview

Operating Modes	System Options
• B-Mode • Harmonic Imaging (Phase Invension Harmonic) • M-Mode • Color Flow Mode (CFM) • Power Doppler Imaging (PDI) • Directional Power Doppler Imaging • PW Doppler (with HPRF) • Cine Mode • Anatomical M-Mode • Color M-Mode • CW (Continued Wave) Doppler (option) • TVI(Tissue Velocity Imaging),TVD(Tissue Velocity Doppler) and TVM(Tissue Velocity M Mode image)	• DICOM • LOGIQ View • Auto-IMT • SonoBiometry (AFB) • Auto EF (ejection fraction) measurement • Stress Echo • Advanced 3D/ Easy 3D • B-Flow/ B Flow color • Needle recognition • Follow-up tool • Auto Bladder Volume measurement • Thyroid productivity • Breast productivity • Breast care • Elastography • Contrast Imaging • Scan Coach • Tricefy Peripheral Options • B/W image printer • Color image printer • Report printer • ECG • Wireless adapter • Removable storage medium • Footswitch • Battery • CD/DVD drive • Bluetooth adapter • Cart

Quality Assurance

Introduction

A good Quality Assurance Evaluation program consists of periodic systematic actions that provide the user with adequate confidence that their diagnostic ultrasound system will produce consistently high quality images and quantitative information.

Therefore, it is in the best interests of every ultrasound user to routinely monitor equipment performance.

The frequency of Quality Assurance evaluations should be based on user's specific needs and clinical practice.

Periodic monitoring is essential in order to detect the performance changes that occur through normal aging of system components. Routine equipment evaluations may also reduce the duration of exams, number of repeat exams, and maintenance time required.

For details on system and peripheral routine preventive maintenance instructions, See ‘System Care and Maintenance’ on *page 18-6 for more information.*

Typical Tests to Perform

Quality assurance measurements provide results relating to system performance. Typically these are:

- Axial Measurement Accuracy
- Lateral Measurement Accuracy
- Axial and Lateral Resolution
- Penetration
- Functional & Contrast Resolution
- Gray Scale Photography.

With these tests, a performance baseline can be set at installation with the phantom in your department. Future test results can be compared to the baseline in order to maintain a record of system performance trends.

Frequency of tests

Quality assurance tests are used to determine whether a scanner is providing the same level of performance from day to day.

The frequency of testing varies with the amount of system usage and modes to be tested. It is recommended that the user perform quality assurance tests at least every three months or every 400 patient studies. Tests should also be performed when a question about system performance exists.

A mobile system may require more frequent tests.

Image quality should also be tested immediately after the following events:

- Service calls
- System upgrades/modifications
- Dropped probe, power surge, etc.

Phantoms

Quality Assurance Evaluations should be done with phantoms and test objects that are applicable to the parameters being evaluated or to the user's clinical practice.

Typical phantoms are composed of material that acoustically mimic human tissue. Pins, anechoic and echogenic targets are physically positioned to provide information for a variety of tests.

Doppler phantoms are currently expensive and complicated to deal with on the user level. If a problem with any Doppler parameters or measurement is suspected, contact a local service representative for evaluation.

The RMI 403GS phantom is still available. Due to the superior penetration and resolution capabilities of GE ultrasound systems, the RMI 405GSX is recommended. It is the most current one available to our field service personnel and will provide the targets and extended life necessary for consistent system testing.

Phantoms (continued)

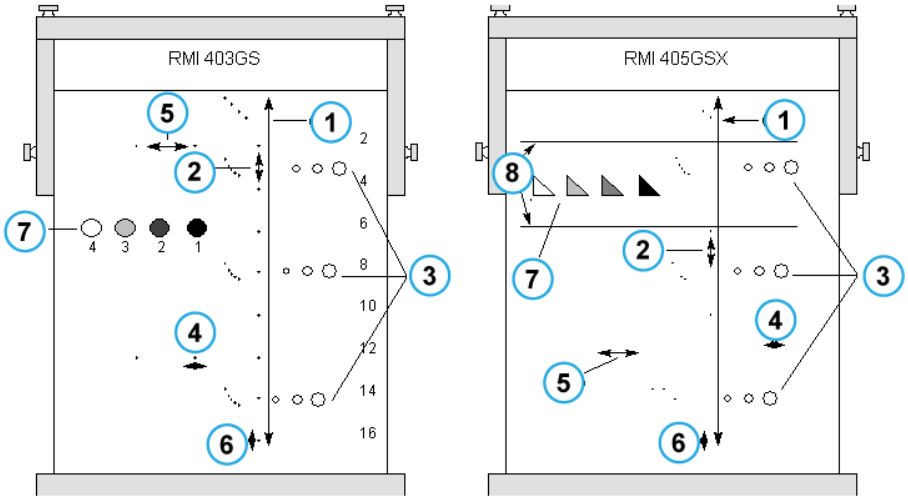


Figure 18-4. Phantoms

1. Penetration
2. Axial Distance Measurement
3. Functional Resolution
4. Lateral Resolution
5. Lateral Distance Measurement
6. Axial Resolution
7. Contrast Resolution and Gray Scale Photography
8. Gray Scale Plane Targets

Baselines

An absolute necessity for a quality assurance program is establishing baselines for each test or check. Baselines are established after the system has been verified to be working properly at installation or after a repair. If a probe or major assembly is replaced, new baselines should be generated.

Baselines can be made by adjusting system parameters to prescribed levels or to the best possible image. The key factor to remember is reproducibility. The same conditions must be reproduced for each periodic check.

All system parameters not displayed on the monitor should be recorded for the permanent record.

Periodic Checks

Periodic checks should be performed in accordance with your facility's quality assurance requirements. For the data to be valid, periodic checks should mimic the baseline setup parameters.

The resulting image, when scanning the phantom exactly as before, should be recorded and compared to the baseline. When a matching image is obtained, it can be assumed that the system performance has not degraded from the baseline.

If a significant difference between the baseline and periodic check is noted, double check the system setup and repeat the test. If the difference between the baseline and periodic check persists, contact a local Service Representative.

Failing to reproduce the control settings as in the baselines will introduce errors in the data and potentially invalidate the results.

Results

Lack of standardization among test instruments, the wide range of acceptance criteria, and incomplete knowledge regarding the significance of certain performance parameters prohibit the establishment of absolute performance criteria for these tests.

Quality Assurance Evaluation results should be compared to previously-recorded results.

Performance trends can then be detected. Unacceptable performance or diminishing trends should be identified for maintenance or repair before a malfunction or inappropriate diagnosis occurs.

The user should determine the best method for recording and archiving the baseline and periodic checks. In most cases the choice is hard copy.

It is important to maintain good consistent records for inspections that may arise, as well as to detect system performance trends.

System Setup

The user should tailor the tests to their particular needs. It is certainly not necessary to make all checks with all probes. A representative example, with the probes used most often by the customer, should be adequate in judging system performance trends.

Use a gray scale phantom as the scan object for the tests. Commercial phantoms are supplied with its own operator manual. Be familiar with proper phantom operating procedures prior to use for quality assurance evaluations.

1. Adjust image monitor. Brightness and contrast should be set to the normal viewing of a good gray scale image.
2. Check all recording devices for proper duplication of image monitor. Ensure that what is seen is what is recorded.
3. Annotate non-displayed image processing controls.
4. Set TGC slide pots to center (detent) position.
5. Place focal zone marker(s) in area of interest for an optimum image.

Test Procedures

The following are recommended Quality Assurance tests. A brief description of the test, the benefit it provides and steps to accomplish the test are supplied.

The importance of recording scan parameters and consistent record keeping cannot be stressed enough. Reproducibility to monitor system trends is the key to quality assurance evaluations.

Using the system's dual image display format is often very convenient and saves recording media.

Axial distance measurements

Description

Axial measurements are the distance measurements obtained along the sound beam. See Figure 18-4 for more information.

Benefit

The accurate measurement of the size, depth and volume of a structure is a critical factor in determining a proper diagnosis. Most imaging systems use depth markers and/or electronic calipers for this purpose.

Method

Axial distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths or fields of view can be tested.

Procedure

To measure axial distance:

1. Scan a test phantom with precisely-spaced vertical pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.
2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.
3. Scan the vertical pins in zoom or at different depth/scale factors.
4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.
5. Document the measurements for reference and future comparison.

Contact a Service Engineer if vertical measurements differ by more than 1.50% of the actual distance.

Lateral distance measurements

Description

Lateral measurements are distance measurements obtained perpendicular to the axis of the sound beam. See Figure 18-4 *on page 18-26* for more information.

Benefit

The purpose is the same as vertical measurements. Precisely-spaced horizontal pin targets are scanned and results compared to the known distance in the phantom.

Method

Lateral distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths of fields of view can be tested.

Procedure

To measure lateral distance:

1. Scan a test phantom with precisely-spaced horizontal pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets from side to side.
2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.
3. Scan the horizontal pins in zoom or at different depth/scale factors.
4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.
5. Document the measurements for reference and future comparison.

Contact a Service Engineer if horizontal measurements differ by more than 3mm or 3% of that depth, whichever is greater.

Axial resolution

Description

Axial resolution is the minimum reflector separation between two closely-spaced objects to produce discrete reflections along the axis of the sound beam. It can also be monitored by checking the vertical size of known pin targets. See Figure 18-4 *on page 18-26* for more information.

Axial resolution is affected by the transmitting section of the system and the probe.

Benefit

In clinical imaging, poor axial resolution displays small structures lying close together as a single dot. This may lead to improper interpretation of the ultrasound image.

Procedure

To measure Axial resolution:

1. Scan a test phantom with precisely-spaced vertical pin targets.
2. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.
3. Press **Freeze** to stop image acquisition.
4. Perform a standard distance measurement of the pin vertical thickness at different points in the image. Record all images for archiving.
5. Scan the vertical pins in zoom or at different depth/scale factors.
6. Press **Freeze** to stop image acquisition; repeat the vertical thickness measurements of the pins and record the images for archiving.
7. Document the measurements for reference and future comparison.

Axial resolution should remain stable over time. Contact a Service Engineer if any changes are observed.

Lateral resolution

Description

Lateral resolution is the minimum reflector separation between two closely spaced objects to produce discrete reflections perpendicular to the axis of the sound beam. It can also be monitored by checking the horizontal size of known pin targets. See Figure 18-4 *on page 18-26* for more information.

Lateral resolution is dependent upon the beam width produced by the probe. The narrower the beam, the better the lateral resolution.

The beam width is affected by the frequency, degree of focusing, and distance of the object from the face of the probe.

Benefit

Clinically, poor lateral resolution will display small structures lying close together as a single dot. This may lead to improper interpretation of the ultrasound image.

Procedure

To measure lateral resolution:

1. Scan a test phantom with precisely-spaced horizontal pin targets.
2. Adjust all scan controls, as necessary, for the best image of the pin targets from side to side.
3. Press **Freeze** to stop image acquisition and perform a standard distance measurement of the horizontal thickness of a pin at different points in the image. Record all images for archiving.
4. Scan the horizontal pins in zoom or at different depth/scale factors.
5. Press **Freeze** to stop image acquisition; repeat the horizontal thickness measurements of the pins and record the images for archiving.
6. Document the measurements for reference and future comparison.

Pin width should remain relatively constant over time (“1mm). Dramatic changes in pin width may indicate beam forming problems. Contact a Service Engineer if beam width changes consistently over 2 to 3 periodic tests.

Penetration

Description

Penetration is the ability of an imaging system to detect and display weak echoes from small objects at large depths. See Figure 18-4 *on page 18-26* for more information.

Penetration can be affected by the system's:

- Transmitter/receiver
- Degree of probe focusing
- Attenuation of the medium
- Depth and shape of reflecting object
- Electromagnetic interference from local surroundings.

Benefit

Weak reflecting echoes are commonly produced from the internal structure of organs. Definition of this tissue texture is important in the interpretation of the ultrasound findings.

Method

Scan a phantom to see how echoes begin to fade as depth is increased. The maximum depth of penetration is the point at which homogeneous material in the phantom begins to lose brightness.

Procedure

To measure penetration:

1. Set the front panel TGC slide pots to their center (detent) position.
2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.
3. Scan a test phantom along the vertical pin targets to typical depths for the probe being used.
4. Perform a standard distance measurement from the top of the image displayed to the point at which homogeneous material in the phantom begins to lose brightness.
5. Document the depth measurement for reference and future comparison.

Contact a Service Engineer if the depth of penetration shifts more than one centimeter (1cm) when using the same probe and same system settings.

Functional resolution

Description

Functional resolution is an imaging system's ability to detect and display the size, shape, and depth of an anechoic structure, as opposed to a pin target. See Figure 18-4 *on page 18-26* for more information.

The very best possible image is somewhat less important than reproducibility and stability over time. Routine tests at the same settings should produce the same results.

Benefit

The data obtained will give a relative indication of the smallest structure the system is capable of resolving at a given depth.

Procedure

To measure functional resolution:

1. Set the front panel TGC slide pots to their center (detent) position.
2. Gain and acoustic output can be adjusted as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with a vertical row of anechoic cyst targets to typical depths for the probe being used.
4. Evaluate the cysts at various depths for a good (round) shape, well-defined borders and no fill in. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide optimal cystic clearing.
5. Document all results for future reference and comparison.

Contact a Service Engineer if a greatly distorted image is obtained.

Contrast resolution

Description

Contrast resolution is the ability of an imaging system to detect and display the shape and echogenic characteristics of a structure. See Figure 18-4 *on page 18-26* for more information.

Specific values measured are less important than stability over time. Routine tests at the same settings should produce the same results.

Benefit

A correct diagnosis is dependent upon an imaging system's ability to differentiate between a cystic or solid structure versus echo patterns from normal surrounding tissue.

Method

A phantom with echogenic targets of different sizes and depths should be used.

Procedure

To measure contrast resolution:

1. Set the front panel TGC slide pots to their center (detent) position. Set dynamic range to 54 db.
2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with echogenic targets at the depths available.
4. Evaluate the echogenic targets for contrast between each other and between the surrounding phantom material. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide an optimal scan image.
5. Document all results for future reference and comparison.

Contact a Service Engineer if the echogenic characteristics or shapes of the targets appear distorted.

Gray Scale photography

Description

Poor photography will cause loss of low level echoes and the lack of contrast between large amplitude echoes. See Figure 18-4 *on page 18-26* for more information.

Benefit

When photographic controls and film processors are properly adjusted, weak echoes, as well as strong echoes, are accurately recorded on film.

Procedure

1. Adjust the camera according to the manufacturer's instructions until the hard copy and video display are equal.
2. Scan the phantom and it's echogenic contrast targets.
3. Make a hard copy photograph of the display and compare it to the image on the video monitor for contrast and weak echo display.
4. Document all results for future reference and comparison.

Contact a Service Engineer if camera cannot duplicate what is on the image monitor.

NOTE: Optimization of brightness/contrast controls on the display monitor is imperative in order to make sure that the hardcopy and monitor look alike.

The display monitor is adjusted first. The hardcopy camera or printer is adjusted to match the display monitor.

Setting up a Record Keeping System

Preparation

The following is needed:

- Quality Assurance binder.
- Hard copy or electronic file of images.
- Quality Assurance Checklists.
- Display the following information while testing quality assurance:
  - Acoustic Output
  - Gain
  - Depth
  - Probe
  - Dynamic Range
  - Set up new patient to be the name of the test.
- Annotate the following:
  - Any control where its value is **NOT** displayed.
  - Significant phantom information.

Record Keeping

Complete the following:

1. Fill out the Ultrasound Quality Assurance Checklist for each probe, as scheduled.
2. Make a hard copy or archive the image.
3. Compare images to baseline images and acceptable values.
4. Evaluate trends over previous test periods.
5. File hard copy or electronic file of images and checklist in Quality Assurance binder.

Ultrasound Quality Assurance Checklist

Table 18-11: Ultrasound Quality Assurance Checklist (Part 1)

Performed By		Date
System		Serial Number
Probe Type	Probe Model	Serial Number
Phantom Model	Serial Number	Room Temperature
Acoustic Output	Gain	Focal Zone
Gray Map	TGC	Depth
Monitor Setting		
Peripheral Settings		
Other Image Processing Control Settings		

Table 18-12: (Part 2)

Test	Baseline Value Range	Tested Value	Image Hardcopy/ Archived	Acceptable? Yes/No	Service Called (Date)	Date Resolved
Vertical Measurement Accuracy						
Horizontal Measurement Accuracy						
Axial Resolution						
Lateral Resolution						
Penetration						
Functional Resolution						
Contrast Resolution						
Gray Scale Photography						

Privacy and Security

Introduction

This section describes Privacy & Security considerations for Ultrasound System of Versana Active, the Privacy & Security capabilities, and how they are configured and used appropriately.

For general usage of the system and how to access the configuration of the Privacy & Security features described, please refer to ‘Customizing Your System’ on *page 16-1*.

This manual assumes that the reader understands the concepts of Privacy & Security. Privacy is the property of protecting the personal private interests of patients. Security protects both system and information from risks to confidentiality, integrity, and availability. Security protects Privacy but also protects more broadly against these risks. Privacy requires security. In Healthcare one must balance privacy, security, and safety. Most of the time there isn’t a conflict between these three domains of risk. The healthcare provider organization is encouraged to use risk management procedures to assess and prioritize privacy, security, and safety risks. Through the use of risk management, one can determine how to best leverage the capabilities provided in the Versana Active products.

Abbreviations and Definitions

Abbreviations

Table 18-13: Abbreviations

DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communication in Medicine
DNS	Dynamic Name System
DS	Directory Server
GE	General Electric
GEHC	GE Healthcare
ID	Identity
LAN	Local Area Network
MDS2	Manufacturer Disclosure Statement for Medical Device Security
OS	Operating System
PACS	Picture Archiving and Communication System
PHI	Protected Health Information
PI	Personal Information
SOP	Service-Object Pair (DICOM)
SSL	Secure Socket Layer
TLS	Transport Layer Security
UID	Unique Identifier (DICOM)
USB	Universal Serial Bus
XML	Extensible Markup Language

Definitions

Table 18-14: Definitions

Data flow	Communication between the Versana Active product and other information providers on the network takes the form of dataflows. Each dataflow defines the transfer of patient information and images between the system and the input/ output sources.
Encryption at rest	Encryption of patient data stored on the system.
Encryption in transit	Encryption of patient data when in transit between the device and an external device, like a PACS.
InSite Agent	The client part of the InSite ExC service platform. The Agent is integrated in the Ultrasound System.
InSite ExC	A GE Healthcare remote service platform.
InSite Server	The server part of the InSite ExC service platform.
Local Archive	Archive containing images and patient information, residing locally on the Ultrasound System.
System administrator	A user having an Ultrasound System user account with administrator privileges.
Versana Active Ultrasound System	A GE Healthcare ultrasound scanner.

Privacy and Security Environment

The GE Healthcare Versana Active Ultrasound Systems has been designed for an intended use with the following expectations of Privacy & Security protections included in the environment where this product will be used:

- The system should be connected to a secured network, not open to unintended users.
- The Versana Active Ultrasound System computer should be physically secured in a way that it is not accessible for unintended users.
- External media containing images, patient data, reports and logs should be secured. When no longer used, the data should be securely deleted and/or the media should be securely deleted.
- The monitors of the Versana Active Ultrasound System computer should be placed in a way limiting the visibility of the screen content to the user only.

Privacy and Security Capabilities

The GE Healthcare Versana Active Ultrasound System Software incorporate a broad assortment of capabilities to enable Privacy & Security. This section describes the capability and use of these Privacy & Security capabilities.

Access Controls

The access control features may be used to help control access to sensitive information. Access control includes user account creation and assigning privileges.

It is supported for access control by local user management on the device.

Local user management on the system

It describes the user management and access control integrated on the system.

Identity Provisioning

The provisioning of user accounts includes the steps of account creation, maintenance, and suspension of the account when it is no longer needed. A user account is created for the use by a specific individual. It is associated with access rights and is recorded in security audit logging.

Identity Provisioning (continued)

Management of user accounts

User accounts are created, maintained and suspended by users with administrator privileges (see User manual for details).

When received from factory the system has two predefined user accounts:

- “ADM”: An administrative user account.
- “USER”: A normal user account without administrative privileges.

When receiving the Versana Active Ultrasound System, it is recommended to do the following steps to ensure control of the user accounts on the system:

- Set password of the “ADM” account.
- Create user accounts for each individual user of the system:
  - Give each user the needed privileges.
  - Make sure to give administrative privileges only to users intended to do administrative tasks on the system, like configuring dataflows, managing users on the system, inspecting audit logs etc. As administrative privileges give the user access to privacy and security related configurations on the system, there should be a limited number of users with these privileges.
  - It is recommended to create individual users for each person going to use the system. This is essential for the audit logging, to associate actions performed on the system with individual persons.

Maintenance of user accounts

It is recommended to establish administrative routines for removing user accounts no longer being used.

Identity Provisioning (continued)

User information stored on the system

The following information can be entered for a user defined on the system:

- ID (Mandatory)
- Password (Mandatory)
- Prefix (Optional)
- Last name (Optional)
- First name (Optional)
- Middle name (Optional)
- Suffix (Optional)
- Phone number (Optional)

The user password is not stored in cleartext on the system.

Username and password restrictions

The restrictions for usernames and passwords are:

- Usernames can be 3 - 64 characters long.
- Password can be 6- 64 characters long.

It is recommended to enable and configure username and password policies to ensure sufficient user name length and to force usage of strong password. See ‘Username and password policies’ on *page 18-49*.

Identity provisioning by use of Backup/Restore

Users defined on a system cannot be copied from one system to another by use of the systemís build in Backup/Restore functionality (See ‘System/Backup and Restore Preset Menu’ on *page 16-20* for more details about Backup/Restore functionality).

Username and password policies

Rules for the local user accounts can be set by enabling the username and password policies from Config/Admin/User Policies, and by customizing these policy settings.

The following settings are available:

- Maximum Times Of Login Try with Wrong Password: 3/5/10.
- Auto Lock Out After X Days Without Successful Login: 30/60/90.
- Minimum number of character sets (upper case/lower case/digits/non-alphanumeric):
  - Minimum upper case characters: 1 character.
  - Minimum lower case characters: 1 character.
  - Minimum digits: 1 character.
  - Minimum non-alphanumeric chars: 0 character.
- Update Password Every X Days: 0/30/60/90 (0=disabled).

The defined username and passwords policies cannot be backed-up and restored by use of the normal Backup/Restore functionality.

User Authentication

The user authentication verifies that the user attempting to use the system is indeed the user associated with the account given.

To be authenticated on the system, the username and password entered in the login dialog must match what is registered in the system's local user management system. A successful user authentication will grant the user access to the system.

Assigning Access Rights

The assigning of access rights is the administrative process to associate permissions with user accounts.

On the Versana Active Ultrasound System Software this is done by granting the user account membership to zero or more role based groups in the system. Each of these groups has a set of predefined user rights assigned.

Only users with the “Admin” rights have access to manage user accounts.

See User Manual for details about user groups and the rights/permissions associated with each user group.

Blocking / unblocking of users

If configured, a user account can be blocked for a time limited period due to the user entering incorrect password multiple times. In addition, a system administrator can manually block a user account.

User accounts being blocked manually must be unblocked manually. User accounts blocked due to consecutive incorrect passwords will be blocked for preconfigured time, according to the settings in the User Policies. These accounts can also be unblocked manually by a system administrator.

Change user password

User's password can be changed by the user himself at login, or by a system administrator from Utility/Admin/Users.

Automatic logon

The Versana Active Ultrasound System has an "Autologon" feature. If enabled, this will automatically log in the last logged in user or a predefined user to the system, without any access control.

For privacy and security reasons, it is recommended NOT to use this functionality on the Versana Active Ultrasound System.

LDAP

Versana Active Ultrasound System support integration with LDAP compliant directory servers. If the system is configured to use LDAP (Utility/LDAP), the access control and user authentication is performed with use of services from the connected directory server. The authentication will be done by the directory server, while the access control to the system is done with data received from the directory server.

Identity Provisioning

Management of user accounts

When using LDAP, the user accounts on the directory server (DS) must be managed outside the Versana Active Ultrasound System. It will not be possible to change user passwords or any other properties of the user accounts from the Versana Active Ultrasound System.

User information stored on the system

In general, there should be no user information stored on the system if LDAP is used. Users that are defined in the local user management system will remain on the system, with exception of the ADM user, these accounts will not be active.

To be able to log on to the system with no network connectivity, the system has an option for caching of LDAP user information. This can be enabled by a system administrator.

If caching is enabled, the system will have time limited storage of user information received from the DS. See ‘Caching of users’ on *page 18-50* for more information.

Username and password restrictions

The systems restrictions for usernames and passwords are:

- Usernames can be 1 - 32 characters long.
- Password can be 0 - 256 characters long.

Username and password policies

When using LDAP, username and password policies are managed by the DS. The local username and password policy on the system will then have no effect on LDAP users.

User Authentication

When a user is logging in, the system will send an authentication request with the entered user credentials to the configured DS. If the authentication is successful and the user has access rights to the system, the user will be granted access.

Assigning Access Rights

The access right to the system is controlled by the DS authentication of the user, together with use of the user's DS group membership. To get access to a system, a user must be a member of one or more DS groups specified on the Versana Active Ultrasound system.

DS group membership is used to assign the user privileges on the system.

When configuring a Versana Active Ultrasound System to use LDAP, proper user groups must be created or identified on the DS. The users of the system must be assigned the proper DS group membership.

For example, users that are going to use the system as "Sonographer" can be part of a "Versana_Active_Utrasound_Sonographers" DS group, while users going to be have "Sys admin" rights could be part of a "SysAdmin" group.

There is a group mapping tool in the system's Utility/LDAP page. Use this tool to map DS groups to operator groups on the Versana Ultrasound system.

Caching of users

To enable off line usage, the systems support caching of user information and off-line authentication. The caching can be turned on / off by a system administrator.

For a user to be able to log on when off line, he/she must previously have performed a successful logon on the system when on-line, and still have valid (i.e. not timed out) cached user information on the system.

The caching is time-limited per individual user. The lifetime of the cached information is configurable. If the lifetime has expired, the user will not be able to log on when offline. The time stamp is reset when a successful on-line authentication is done by the user.

Service access

An on-site GE service engineer can gain special access to the Versana Active Ultrasound System by the use of a Secure Service Access. Secure Service Access is a secure service key platform for GE medical devices. It is intended to provide increased protection of GE's proprietary service tools and also to eliminate the need for periodic replacement of service keys. With the service access the service engineer will gain access to the system, including access to the Windows desktop and the systemís file system.

If configured and accepted by a user of the Versana Active Ultrasound System, a GE service engineer can access the system remotely via the InSite remote service platform. A remote service session must be initiated by a user of the system.

Patient Privacy Consent Management

Patient Privacy Consent Management is the process of supporting the patient expressing their privacy requirements. This is distinct from other forms of consent such as the consent to treat.

There is no integrated functionality in the system for Patient Privacy Consent Management. If needed operational routines must be established.

Privacy & Security Audit Logging and Accountability Controls

Privacy & Security Audit Logging and Accountability Controls support security surveillance, privacy investigations and reporting.

The Versana Active Ultrasound System Software have integrated functionality for audit logging, including audit logging of privacy related events. The audit log functionality includes search and display capabilities for logged events on the system.

Access to audit logging information

Both system administrators and users can access the audit log information.

Audit logging content

The following events are captured by the audit logging of the Versana Active Ultrasound System Software:

- User login and logout of the system
- Images added and removed
- Save As

Information elements of the audit log:

- Event type
- User ID
- Time stamp, including date and time
- System name
- Dataflow name
- Study or Series Instance UID
- SOP instance UID

The information elements are logged for the events where they are applicable.

Management of Audit logs

Back up of audit logs

Back up of audit logs can be done by exporting audit logs to an external device. User shall have Service Access before performing the exportation. Press Alt + D to request the audit log exporting. If user have the Operator Right of Anonymous, he/she can choose whether to Anonymous the audit logs in the dialog.

Remember that audit logs and exported audit log files do contain Personal Information (PI) if Anonymous is not chosen and must be handle according to applicable regulations and guidelines for handling of PI / PHI.

Note that exported audit log files are stored unencrypted as text files (*.txt) and compressed as zip files.

Audit log retention

There is no limitation in the audit log retention, except the available disk space on the system.

Information Protection

This section of the manual focuses on Privacy & Security operations, and contains information to guide in the preparation of a secure environment for the Versana Active Ultrasound Systems.

Security operations is best implemented as part of an overall “defense in depth” information assurance strategy are used throughout an Information Technology system that addresses personnel, physical security and technology. The layered approach of defense in depth limits the risk that the failure of a single security safeguard will allow compromise of the system.

System interconnections

Network connectivity is required for several of the system’s features:

- DICOM connectivity to other DICOM devices.
- Remote archive storage on another networked, compatible GE system.
- Image storage via the “Save As” feature to network share.
- Patient data XML export to network share.
- Viewing external video stream on the Versana Active Ultrasound System.
- Remote service capabilities given by GE’s InSite ExC remote service platform.

The interconnections are described in more detail in Table 1, and illustrated in Figure 1. For a particular installation, typically a subset of the interconnections is utilized.

Table 18-15: System interconnections

Source/ Destination	Network Service	Description
PACS / DICOM server	DICOM	Optional connection to PACS / DICOM server for patient and image archiving / retrieval. DICOM storage, DICOM Query/Retrieve and DICOM Worklist are supported.
Image Vault	Remote Sybase connection and Network file sharing	Optional connection to Image Vault archive, for patient and image archiving / retrieval.
Network file share	Network file sharing	Save As dataflows can be configured to use a network share as output.

Table 18-15: System interconnections

Source/ Destination	Network Service	Description
InSite server	HTTPS - initiated from the Versana Active Ultrasound System.	Optional connection to InSite remote service server.
DICOM printer	DICOM	Optional connection to DICOM printer.
Printer	N/A	Optional connection to Windows/network printer.
CD/DVD	Optional internal CDC/DVD player	Optional DVD player can be used for reading and writing of images and patient data.
USB storage device	USB	If feature is enabled, an USB storage device can be connected for reading and writing of images and patient data.
Bluetooth	Bluetooth	Optional bluetooth usb dongle can be used for sending images to paired devices.
Tricefy	Remote archive	Optional connection to tricefy server for patient and image archiving / retrieval.

For details regarding protocols, port numbers and firewall configurations, please see ‘Inbound firewall configuration’ on *page 18-57* and ‘Outbound firewall configuration’ on *page 18-57*

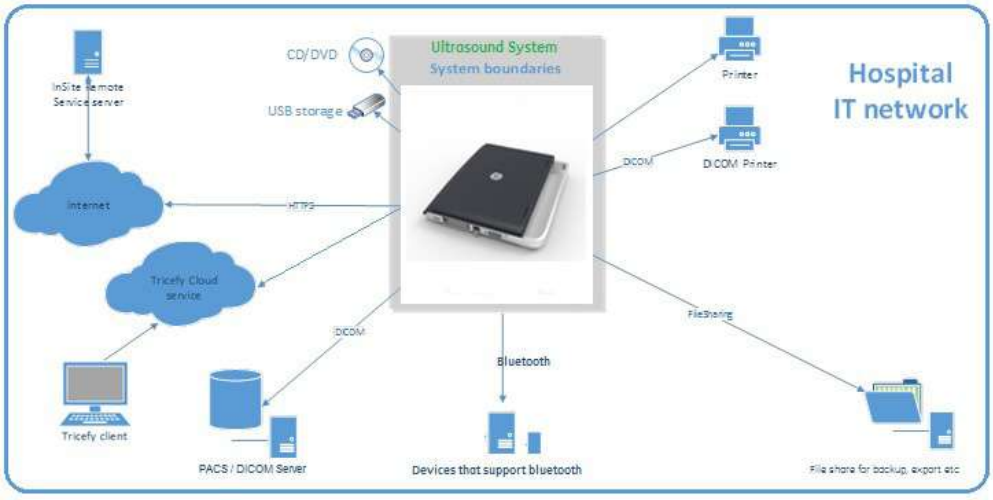


Figure 18-5. System Interconnections

Network Requirements

Minimum Throughput

- Response time 50 ms maximum.
- Recommended minimum 100 Mbit/sec for wired network for large image file transfer.

Host Characteristic

- TCP/IP network.
- Both DHCP and static IP allocation are supported.
- The Versana Active Ultrasound Systems cannot be a Windows Domain member.

Network Protocols

Physical and Link Layer Interface

- Ethernet IEEE 802.3 10BASE-T, 100BASE-TX and 1000BASE-T.
- Isolated LAN connection (to prevent increased leakage current).

Internet Protocol Version

- IPv4.

Network Security

GE strongly recommends that medical information systems are operated in a secure network environment that is protected from unauthorized intrusion. There are many effective techniques for isolating and protecting medical information systems, including implementing firewall protection, demilitarized zones (DMZs), Virtual Local Area Networks (VLANs) and network enclaves.

The Versana Active Ultrasound System is supported with an internal firewall. The following two chapters describe the configuration of the firewall and the guidance for configuring the IT infrastructure where it is connected.

Inbound firewall configuration

All inbound connections are blocked by the Versana Active Ultrasound System's internal firewall, with the exemptions listed in the table below.

Table 18-16: Inbound firewall exemption for the system

Local port	Remote port	Protocol	Application Controlled
Any	Any	ICMPv4	Any
Any	Any	UDP	EchoLoader MFC Application
Any	Any	TCP	EchoLoader MFC Application
3306	Any	TCP	Any

Outbound firewall configuration

All outbound connections are blocked by the Versana Active Ultrasound System’s internal firewall, with the exemptions listed in the table below..

Table 18-17: Outbound firewall configuration for the system

Local port	Remote port	Protocol	Application Controlled
Any	Any	Any	python
Any	Any	ICMPv4	Any
Any	445	TCP	Any
Any	80	TCP	Any
Any	515, 9100	TCP	Any
Any	123	UDP	Any
Any	161	UDP	Any
Any	80, 443	TCP	svchost

Local Archive - Security capabilities

The Versana Active Ultrasound System Software are provided with an internal archive, for storing images and patient data locally on the system. The Local Archive's file repository and patient database are not supporting file sharing or remote connection. These can only be accessed locally. The patient database is in addition to having no remote access possibilities, also protected by database authentication.

DICOM connections - Security capabilities

The DICOM connection works as defined by DICOM guidelines. The application accepts connection only to/from DICOM entities with IP-address, AE Title and port number matching the configured parameters in the Versana Active Ultrasound System Software.

The communication sessions are on demand, always initiated locally from the system.

The Versana Active Ultrasound System's internal firewall will have exemptions for ports used by the defined DICOM dataflows in the system. Defining a new DICOM dataflow, or changing an existing, will cause the internal firewall configuration to change automatically. This will ensure that only ports configured for a dataflow will have an exemption in the internal firewall.

Transport Layer Security (TLS) protocol provides privacy and data integrity between two or more communicating computer applications. The user can enable this feature for DICOM by checking on the "Enable Encryption" in Utility/Connectivity/ Service.

Network shares

Network file share access can be secured by a defining a dedicated user on the server side. The user credentials for the network share user must be entered in the configuration UI on the Versana Active Ultrasound System Software. If no user credentials are configured, the system will try connecting with default credentials.

Remote Service - Security capabilities

See 'Remote Service' on *page 18-71* for description of the Remote Service and the Remote Service security capabilities.

Wireless Security

Due to the broadcast nature of wireless communication, wireless devices require special security consideration. There are effective techniques and tools for improving the security of wireless communication devices.

Wireless protocols on the System

The following wireless protocols are supported:

- IEEE 802.11a
- IEEE 802.11b
- IEEE 802.11g
- IEEE 802.11n
- IEEE 802.11ac

The following security protocols are supported on the wireless interface:

- None
- WEP
- WPA/WPA2 Personal
- WPA/WPA2 Enterprise

To increase the wireless security, it is recommended to use WPA2 Enterprise with AES encryption.

Wireless Adaptor is an optional device of the Versana Active systems.

Removable Media Security

PI/PHI stored on removable media

USB storage device can be set as encrypted by system while CDs and DVDs does not support the encryption. Users with the Operator Right of Admin can access the Disk Encryption configuration page and set the security level for patient data stored on the removable USB storage device to Encryption ON. Key is stored on USB /password is entered manually.

Data stored on removable media as USB storage devices (Security level for patient data is Encryption OFF), CDs and DVDs, is stored unencrypted on the media. The data could contain personal information (PI) / personal health information (PHI). As a result, these storage devices and the content on the storage device must be physically protected and handled according to applicable regulations and guidelines for handling personal information (PI) / protected health information (PHI).

If not in conflict with the purpose of storing data to removable media, it is strongly recommended to anonymize the data when storing data to external media. See ‘De-Identification Capabilities’ on *page 18-65*. This reduces the risk of disclosing PI/PHI if the media is lost, left unattended etc.

If data containing PI/PHI is to be stored on removable media, it is recommended to consider the use of removable USB storage device with the setting of security level for patient data as Encryption ON, or other USB storage media with build in security functionality, like encrypted USB drives with integrated keypad.

Removable media on the System

The Versana Active Ultrasound System supports removable CD/DVD drive (optional) and it supports USB connected storage devices. CD/DVD discs and USB storage device are used for:

- Exporting and importing patient data and images.
- System back-up and export of audit logs.
- Upgrading system and application software.
- Storing service logs during service sessions.

Optional CD/DVD drive

Removable CD/DVD drive is an option for the Versana Active Ultrasound System.

Data stored on CD/DVD media is stored unencrypted.

AutoPlay disabled

AutoPlay (known as “AutoRun” on older OS) is disabled on the system to prevent automatic execution of software stored on removable media connected to the Versana Active Ultrasound System.

Data destruction

Versana Active Ultrasound Software does not have internal functionality for secure deletion of data stored on the removable devices.

Approved procedures and tools should be used for secure removal of data stored on removable media, according to applicable regulations and guidelines for handling patient information / personal information (PI) / protected health information (PHI).

Data at Rest Security

Versana Active Ultrasound System

The Versana Active Ultrasound System supports encryption of patient data stored on the system.

By default, the User Partition is Encryption ON and other partitions encryption are OFF.

To improve the protection and confidentiality of patient data stored on the system, it is strongly recommended to enable the “Disk Encryption” feature on the Local Patient Data Drive before starting using the system.

Encryption at rest

A system administrator can enable “Disk Encryption” from the system’s configuration page. When enabling disk encryption for the local patient data drive, the user has to set a user defined password to be used to unlock the encrypted patient information. Before starting the encryption process the system will generate a recovery key, which can be used to unlock the encrypted disk in case the password is forgotten.

The selected encryption password and the recovery key must be stored and managed in a safe and secure manner. It is the responsibility of the user and the owner of the system to take care of these keys. If the keys are lost, the patient data stored on the system will be lost. There is no way for GE Healthcare to recover the data if the keys are lost.

The disk encryption is using 256-bit encryption key length for protecting patient data stored on the system. The encrypted data includes both the patient data and the ultrasound images stored on the system.

The security of the system, with respect to encryption at rest, relies on the user’s protection of the recovery key and the encryption password. If adversary gets hold on an encrypted system, or the system’s hard-disk, together with either of these keys, the encryption at rest will have no effect and give no protection of the data.

For those using automatic unlock with recovery key stored on USB, it is recommended to remove the USB when the system is not used.

Versana Active Ultrasound System (continued)

Unlocking an encrypted system

When starting up a system with encryption enabled, the encrypted patient information must be unlocked. This can be done in three ways:

- The user enters the encryption password.
- The user enters the recovery key.
- A USB storage device containing the recovery key is connected to the system and the system unlocks the encrypted patient data automatically at startup.

NOTE: When an encrypted system is unlocked, it will remain unlocked until the system is restarted.

Encryption password is lost

If the encryption password is lost, the patient information can be unlocked by use of the recovery key. When unlocked, a system administrator can set a new encryption password on the system from the configuration page on the system.

Changing the keys

The encryption password can be changed by both system administrator and user.

Encryption at rest is disabled

If the disk encryption is disabled, data is stored unencrypted on the system.

File system protection

Access to the systems Windows desktop and the file system is prevented for both users with and without system administrative privileges. To access Windows desktop and the systems file system, service access is required see ‘Service access’ on *page 18-51*.

Back-up

The Versana Active Ultrasound System Software back-up feature stores data unencrypted to the back-up target. This includes back-up of images and patient information. The back-up data will be unencrypted even if the “Security level for Patient data stored on the system” is Encryption ON on the Versana Active system.

The target for the back-up, either removable media or servers, must be secured to ensure the privacy and security of the backed-up data.

External dataflows

The Versana Active Ultrasound System supports interconnections to external storage systems (DICOM servers). The privacy and security of data stored on the external system are outside the scope of this document.

Data Integrity Capabilities

Integrity assurance is implemented to software updates packages for the Versana Active Ultrasound System. Software Upgrade USB flash is of USB CD ROM format to prevent from malicious modifications, and the installation of the malicious software will be prohibited.

De-Identification Capabilities

The Versana Active Ultrasound System Software contain de-identification (anonymization and pseudonymizing) capabilities to limit privacy and security risks to sensitive information.

When exporting images by the Save As function, there is an option to anonymize the image. Check the check box to activate de-identification when saving. The check box is unchecked by default. After generation of the new patient, the anonymized patient data can be transferred to removable storage device.

De-identification is done by clearing or overwriting all meta data containing PI / PHI in the image files. Note that the image itself (the pixel data) may still contain PI / PHI, e.g. in labels or captions in the image.

Business Continuity

To ensure business continuity several options must be considered related to the data storage. The target for the images and patient archive must be chosen to ensure safe storage of the data. Both internal and external alternatives are supported.

Patient archive solutions

The Versana Active Ultrasound System supports several alternatives for storing images and patient information, both internal and external:

- Local Archive: local storage on the Versana Active Ultrasound System Software computer.
- DICOM storage: storage on DICOM / PACS server.

See ‘System interconnections’ on *page 18-54* for overview of the Versana Active Ultrasound System Software interconnections, and the user manual for further details about the available dataflows.

Securing data on Local Archive

If Local Archive is used on the Versana Active Ultrasound System, backup and/or transfer procedures must be established for the Local Archive.

Securing data on DICOM/PACS servers

If external archive is used, make sure to establish backup procedures for the external archive. The business contingency planning of data stored on DICOM / PACS servers is outside the scope of this document.

Secure Wipe

Secure wipe is intended to erase all the patient data with the software on the system before the system will be shipped for service.

System Protection

The System needs to be configured and maintained in a way that continually protects Privacy & Security.

Malicious Software Protection

The computing environment is increasingly hostile, and threats continue to grow from malicious software, including computer viruses, worms, Trojan horses, denial of service attacks, and other malware. Vigilant defense on many levels is required to keep systems free from compromise by malicious software. In most cases, effective protection requires cooperation and partnership between GE and our customers.

The Versana Active Ultrasound System

Commercial Anti-virus software is commonly used on general-purpose computers to detect the presence of malicious software (virus, Trojan horse, worm, etc.). Anti-virus software is useful on general-purpose computers as they typically cannot be sufficiently hardened against the attack vectors used by malicious software.

The Versana Active Ultrasound Systems however, are single purpose (dedicated) devices that have controlled intended use. For the Versana Active Ultrasound Systems, “whitelisting” protection is a better solution for protecting the systems against malware. The Versana Active systems utilizes the “DeviceGuard” whitelisting provided with Windows 10. Only binaries trusted by the Versana Active white-list (the “CI Policy”) will run. All other binaries will be blocked by DeviceGuard.

UEFI “SecureBoot” is enabled on the systems to prevent adversary from booting the system from a not trusted, bootable media. SecureBoot and Windows “TrustedBoot” will protect the system from malware targeting the systems boot process.

Additional reading

For more information on Malicious Software Protection, refer to the following two whitepapers by the Joint NEMA/COCIR/JIRA Security and Privacy Committee:

- “Defending Medical Information Systems Against Malicious Software”, December 2003, http://www.medicalimaging.org/policy-and-positions/joint-security-and-privacy-committee-2/
- “Patching Off-the-Shelf Software Used in Medical Information Systems”, October 2004, http://www.medicalimaging.org/policy-and-positions/joint-security-and-privacy-committee-2/

The Versana Active Ultrasound System - system protection

The Versana Active Ultrasound System contains additional features to improve local operational security.

No Windows desktop access

Users of the Versana Active Ultrasound System do not have access to the Windows desktop nor to the Windows file system on the Versana Active Ultrasound System.

The users will have no access to internet web-browsing, e-mail clients, installing any software on the system nor adding files (except for application related files through the application).

Windows features disabled

The following Windows features are disabled:

- Remote Desktop Connection
- Remote Assistance
- Windows AutoPlay feature
- Administrative Shares (the Administrative Shares are hidden)
- C: drive visibility

Windows services disabled

Many Windows services are unused and disabled on the Versana Active Ultrasound System.

See full list of disabled Windows services in Appendix B.

GE Healthcare service access

To access the Versana Active Ultrasound System in service mode, an SSA USB service dongle and a service password are required. A GE Healthcare field engineer will be needed for accessing the system in service mode.

When in service mode the field engineer will have access to Windows desktop and file system.

The Versana Active Ultrasound System - system protection (continued)

Automatic screen lock

The Versana Active Ultrasound System has a configurable inactivity screen feature. It can be configured to lock the screen after a predefined inactivity time. The inactivity time can be configured to 10 minutes or higher. When screen is locked, no patient information is visible on the screen. To unlock, the user must enter the password of the current logged in user.

It is recommended to enable screen lock after minimum time of inactivity.

Windows user and password

To access the Windows OS functionality of the Versana Active Ultrasound System, a service dongle and password are required. However, a system administrator can still change the password of the underlying Windows user from Utility/Admin/ System Password. Users of the system will never need to use this password. The only reason to change the password will be if the user, for security reasons, prefer to define his own password instead of the factory defined default password.

The Versana Active Ultrasound System Change Management

Versana Active Ultrasound System operative system

Table 18-18: Operative system

FAMILY	PRODUCT Description and Version
Windows 10 IoT	Windows 10 IoT Enterprise 2016 LTSB High End (ESD), 64 Bit

The Versana Active Ultrasound System is based on Microsoft Windows 10 IoT.

Windows 10 IoT Enterprise is a full version of Windows 10 with specialized features to create dedicated devices locked down to a specific set of applications and peripherals. Windows 10 IoT LTSB has a different lifecycle plan than standard Windows 10.

Security updates / patches

GE Healthcare is constantly monitoring for security vulnerabilities applicable for the products. This includes vulnerabilities in the application software, third party components and the underlying operative system. For the operative system, this includes regular review of vulnerability announcements from Microsoft.

Announced vulnerabilities in the operative system or other third-party components, are assessed based on the Versana Active Ultrasound Systemís configuration and use.

When needed, GE Healthcare release security updates / patches for the products and makes these available to customers through GE Healthcare Service.

How to contact GE

For privacy and security concerns regarding GE products, please see:

http://www.ge.com/security

Remote Service

Often the fastest, most efficient and cost-effective manner to provide service is to connect to the Versana Active Ultrasound System remotely. Every effort is made to ensure that this connection is as secure as possible.

The GE Healthcare InSite ExC remote service platform is integrated in Versana Active Ultrasound System. InSite ExC enables real-time application support, problem diagnosis and repair.

InSite ExC remote service

The two major technical components of InSite are the Agent and the Server. The Agent is installed on the Versana Active Ultrasound system, while the Server resides within GE Healthcare. The Agent establishes secure communications to the Server via the Internet.

Key Security Features

The key security features of the InSite platform include the following:

- Communication from the Agent to the Server is initiated by the on-site user securely via an outbound connection over port 443 (HTTPS). No fixed IP address is required on the device.
- The Agent always connects to a known IP address (the Server). The ability to identify the Server is therefore guaranteed, because the Server is visible to the Agent only via a known IP address.
- The Agent communicates with the Server via transmissions that require password authentication. Data transmissions are encrypted using the Secure Socket Layer (SSL) protocol over port 443.
- Inbound Firewall on the Versana Active Ultrasound System is not compromised. Web services standard protocol using only outbound HTTPS Port 443.

Data Privacy

In some cases, GE Healthcare may encounter personal information (PI) / protected health information (PHI) as part of the troubleshooting procedures or under data access rights granted to GE Healthcare. Access to this data is limited to GE Healthcare authorized personnel only. Personal information (PI) / protected health information (PHI) encountered as part of remote service sessions will be handled according to GE Healthcareís standards for handling personal information (PI) / protected health information (PHI).

Personal Information Collected by the Product

Information collection and use

The Versana Active Ultrasound System Software are collecting patient demographic information, personal or protected health information for the use within the system.

Information entered for user accounts defined in the systems local user management is also stored on the system.

The following types of information are collected for the purposes of patient medical diagnosis, user management, audit logging and/or debug logging:

- Patient demographics.
- Medical diagnostics and measurements.
- Ultrasound images.
- Facility information.
- Provider information.
- Device data

Patient information collected is either entered manually by the user of the system, or it is received through one or more of the system's dataflows.

Details on what data is collected, used and disclosed can be achieved by contacting GE Healthcare.

Manual information collection

Only PI needed for the purpose of treatment or healthcare operations should be collected. The system supports collection of PI that is related for such usage only. However, the system might support collection of more data than will be used for a particular installation. The user should limit the collect of PI to what is really needed.

The user should be careful not entering personal identifiable information in free text fields in the system, as this information is not anonymized by the de-identification procedure, see 'De-Identification Capabilities' on *page 18-65*.

Information disclosure

If the Versana Active Ultrasound System are connected to remote network shares and external media, like CD/DVD and USB storage devices, patient demographics, medical diagnostics, measurements and ultrasound images will be communicated to/from the connected device, see 'System interconnections' on *page 18-54*.

Retention and destruction of personal information

Retention and destruction of patient data

The information collected is stored on the system until it is manually removed.

Requirements and policies for limited collection and/or destruction of Patient Information on the system must be implemented by establishing appropriate operational procedures.

Patients and exams can be deleted from the Local Archive on the system by a system administrator manually selecting and deleting patients / exams.

Retention and destruction of user information, local user accounts

User information for user accounts created and managed locally on the system will remain on the system until manually removed.

Requirements and policies for limited collection and/or destruction of user information on the system must be implemented by establishing appropriate operational procedures.

User accounts can be deleted from the system by a system administrator manually selecting and deleting user accounts.

Retention and destruction of user information, LDAP user accounts

See ‘Caching of users’ on *page 18-50* for caching of LDAP user information.

Secure deletion of PI / PHI

GEHC Service has procedures and tools for secure deletion all PI / PHI on the system.

Individuals authorization for collection, use and disclosure of PI/PHI

Some users of Versana Active systems might face requirements and policies for letting individuals (the patients) authorize the collection, use and disclosure of PI/PHI. There is no support for such functionality in the system. Such requirements can only be implemented by operational procedures.

Information to individuals of collection, use and disclosure of PI/PHI

Some users of Versana Active systems might face requirements and policies for informing individuals (the patients) about the collection, use and disclosure of PI/PHI. There is no support for such functionality in the system. Such requirements can only be implemented by operational procedures.

Security Vulnerability Scanning

Potential security vulnerabilities of the Versana Active Ultrasound System are revealed using “Nessus” from Tenable Network Security. This is a security scanning tool that United States Department of Defense and Hospital IT organizations use to check for vulnerabilities on their networks. Identified vulnerabilities are mitigated as appropriate based on risk assessment of the product.

Security scanning is performed during the development of the Versana Active Ultrasound Products.

Potential Hazardous Situations Resulting from Failures of the IT Network

Hazardous situations

The following general hazardous situations have been identified as potentially hazardous as a result of the IT network failing to provide the required characteristics specified above.

- Delayed or impaired access to images or other exam information or patient data.
- Permanent loss of images or other exam information or patient data.
- Corruption of images or other exam information or patient data.
- LAN connection loss during operation may cause loss of data, and damage data integrity.

Warning

In addition to the hazardous situations identified above, connection of the Versana Active Ultrasound System Software to a network that includes other equipment could result in other unidentified risks to patients, operators or third parties. The responsible organization should identify, analyze, evaluate and control these risks on an ongoing basis including after changes to the network such as those listed below, which could introduce new risks and require additional analysis.

- Changes in network configuration.
- Connection of additional items to the network.
- Disconnecting items from the network.
- Update of equipment connected to the network.
- Upgrade of equipment connected to the network

MDS^2

The “Manufacturer Disclosure Statement for Medical Device Security” MDS^2 is provided as a statement of the security and privacy capabilities using a well-known standard disclosure format.

Please see MDS^2 for Versana Active as below:

MDS2 (continued)

Manufacturer Disclosure Statement for Medical Device Security – MDS²

DEVICE DESCRIPTION

Device Category	Manufacturer	Document ID	Document Release Date
15976 Scanning	GE Healthcare	DOC2111350	2019/4/11
Device Model	**Software Revision**		**Software Release Date**
Versana Balance/Versana Active	Version R1.X.X		2019/3/26

	Company Name	Manufacturer Contact Information
Manufacturer or Representative Contact Information	GE Healthcare	Phone:800-437-1171 Web:http://apps.gehealthcare.com/usen/security/index.html
	Representative Name/Position	
	Zhou Yuan/Program Manager	

Intended use of **device** in network-connected environment:

This is an ultrasound diagnostic imaging system, which is used to create a patient image, present the image for diagnostic purposes, and/or transmit the image to a storage device, remote reading workstation or filming device.

MANAGEMENT OF PRIVATE DATA

	Refer to Section 2.3.2 of this standard for the proper interpretation of information requested in this form.	Yes, No, N/A, or See Note	Note #
A	Can this **device** display, transmit, or maintain **private data** (including **electronic Protected Health Information** [ePHI])?	Yes	—
B	Types of **private data** elements that can be maintained by the **device**:		
B.1	Demographic (e.g., name, address, location, unique identification number)?	Yes	—
B.2	Medical record (e.g., medical record #, account #, test or treatment date, **device** identification number)?	Yes	—
B.3	Diagnostic/therapeutic (e.g., photo/radiograph, test results, or physiologic data with identifying characteristics)?	Yes	—
B.4	Open, unstructured text entered by **device user/operator**?	Yes	—
B.5	**Biometric data**?	No	—
B.6	Personal financial information?	No	—
C	Maintaining **private data** - Can the **device**:		
C.1	Maintain **private data** temporarily in volatile memory (i.e., until cleared by power-off or reset)?	Yes	—
C.2	Store **private data** persistently on local media?	Yes	—
C.3	Import/export **private data** with other systems?	Yes	—
C.4	Maintain **private data** during power service interruptions?	Yes	1
D	Mechanisms used for the transmitting, importing/exporting of **private data** – Can the **device**:		
D.1	Display private data (e.g., video display, etc.)?	Yes	—
D.2	Generate hardcopy reports or images containing **private data**?	Yes	—
D.3	Retrieve **private data** from or record **private data** to **removable media** (e.g., disk, DVD, CD-ROM, tape, CF/SD card, memory stick, etc.)?	Yes	—
D.4	Transmit/receive or import/export **private data** via dedicated cable connection (e.g., IEEE 1073, serial port, USB, FireWire, etc.)?	Yes	2
D.5	Transmit/receive **private data** via a wired network connection (e.g., LAN, WAN, VPN, intranet, Internet, etc.)?	Yes	—
D.6	Transmit/receive **private data** via an integrated wireless network connection (e.g., WiFi, Bluetooth, infrared, etc.)?	Yes	3
D.7	Import **private data** via scanning?	No	—
D.8	Other?	No	—

Management of Private Data notes:

1:Privacy data can be stored in different destinations, locally on the device or in a network destination, depending of the configuration of the device. Newly entered privacy data, not yet stored, will not be maintained after a power interruption. Privacy data stored will be maintained.
2:Import/export to a USB storage is supported.
3:Device support wifi, Bluetooth

Figure 18-6. Versana Active MDS²

MDS2 (continued)

Device Category	Manufacturer	Document ID	Document Release Date
15976 Scanning	GE Healthcare	DOC2111350	2019/4/11
Device Model	**Software Revision**		**Software Release Date**
Versana Balance/Versana Active	Version R1.X.X		2019/3/26

SECURITY CAPABILITIES

	Refer to Section 2.3.2 of this standard for the proper interpretation of information requested in this form.	Yes, No, N/A, or See Note	Note #
1	**AUTOMATIC LOGOFF (ALOF)**		
	The **device**'s ability to prevent access and misuse by unauthorized **users** if **device** is left idle for a period of time.		
1-1	Can the **device** be configured to force reauthorization of logged-in **user**(s) after a predetermined length of inactivity (e.g., auto-logoff, session lock, password protected screen saver)?	Yes	—
1-1.1	Is the length of inactivity time before auto-logoff/screen lock **user** or administrator configurable? (Indicate time [fixed or configurable range] in notes.)	Yes	—
1-1.2	Can auto-logoff/screen lock be manually invoked (e.g., via a shortcut key or proximity sensor, etc.) by the **user**?	No	—
ALOF notes:			
2	**AUDIT CONTROLS (AUDT)**		
	The ability to reliably audit activity on the **device**.		
2-1	Can the **medical device** create an **audit trail**?	Yes	—
2-2	Indicate which of the following events are recorded in the audit log:		
2-2.1	Login/logout	Yes	—
2-2.2	Display/presentation of data	No	—
2-2.3	Creation/modification/deletion of data	Yes	—
2-2.4	Import/export of data from **removable media**	Yes	—
2-2.5	Receipt/transmission of data from/to external (e.g., network) connection	No	—
2-2.5.1	**Remote service** activity	Yes	—
2-2.6	Other events? (describe in the notes section)	No	—
2-3	Indicate what information is used to identify individual events recorded in the audit log:		
2-3.1	**User** ID	No	—
2-3.2	Date/time	Yes	—
AUDT notes:			
3	**AUTHORIZATION (AUTH)**		
	The ability of the device to determine the authorization of users.		
3-1	Can the **device** prevent access to unauthorized **users** through **user** login requirements or other mechanism?	Yes	—
3-2	Can **users** be assigned different privilege levels within an application based on 'roles' (e.g., guests, regular **users**, power **users**, administrators, etc.)?	Yes	—
3-3	Can the **device** owner/**operator** obtain unrestricted administrative privileges (e.g., access operating system or application via local root or admin account)?	No	—
AUTH notes:			

Figure 18-7. Versana Active MDS[2]

MDS2 (continued)

Device Category	Manufacturer	Document ID	Document Release Date
15976 Scanning	GE Healthcare	DOC2111350	2019/4/11
Device Model	**Software Revision**		**Software Release Date**
Versana Balance/Versana Active	Version R1.X.X		2019/3/26

	Refer to Section 2.3.2 of this standard for the proper interpretation of information requested in this form.	Yes, No, N/A, or See Note	Note #
4	**CONFIGURATION OF SECURITY FEATURES (CNFS)**		
	The ability to configure/re-configure **device security capabilities** to meet **users'** needs.		
4-1	Can the **device** owner/operator reconfigure product **security capabilities**?	See Note	4
CNFS notes:	4:Certain functions can be restricted to administrators or allowed to all users by the administrator		
5	**CYBER SECURITY PRODUCT UPGRADES (CSUP)**		
	The ability of on-site service staff, remote service staff, or authorized customer staff to install/upgrade **device**'s security patches.		
5-1	Can relevant OS and **device** security patches be applied to the **device** as they become available?	Yes	5
5-1.1	Can security patches or other software be installed remotely?	Yes	
CSUP notes:	5:GEHC validated and supplied updates can be applied when they become available		
6	**HEALTH DATA DE-IDENTIFICATION (DIDT)**		
	The ability of the **device** to directly remove information that allows identification of a person.		
6-1	Does the **device** provide an integral capability to de-identify **private data**?	Yes	__
DIDT notes:			
7	**DATA BACKUP AND DISASTER RECOVERY (DTBK)**		
	The ability to recover after damage or destruction of **device** data, hardware, or software.		
7-1	Does the **device** have an integral data backup capability (i.e., backup to remote storage or **removable media** such as tape, disk)?	Yes	__
DTBK notes:			
8	**EMERGENCY ACCESS (EMRG)**		
	The ability of **device users** to access **private data** in case of an emergency situation that requires immediate access to stored **private data**.		
8-1	Does the **device** incorporate an **emergency access** ("break-glass") feature?	No	__
EMRG notes:			
9	**HEALTH DATA INTEGRITY AND AUTHENTICITY (IGAU)**		
	How the **device** ensures that data processed by the **device** has not been altered or destroyed in an unauthorized manner and is from the originator.		
9-1	Does the **device** ensure the integrity of stored data with implicit or explicit error detection/correction technology?	No	__
IGAU notes:			

Figure 18-8. Versana Active MDS^2

MDS2 (continued)

Device Category	Manufacturer	Document ID	Document Release Date
15976 Scanning	GE Healthcare	DOC2111350	2019/4/11
Device Model	**Software Revision**		**Software Release Date**
Versana Balance/Versana Active	Version R1.X.X		2019/3/26

	Refer to Section 2.3.2 of this standard for the proper interpretation of information requested in this form.	Yes, No, N/A, or See Note	Note #
10	**MALWARE DETECTION/PROTECTION (MLDP)**		
	The ability of the **device** to effectively prevent, detect and remove malicious software (**malware**).		
10-1	Does the **device** support the use of **anti-malware** software (or other **anti-malware** mechanism)?	Yes	
	10-1.1 Can the **user** independently re-configure **anti-malware** settings?	No	
	10-1.2 Does notification of **malware** detection occur in the **device user** interface?	No	
	10-1.3 Can only manufacturer-authorized persons repair systems when **malware** has been detected?	No	
10-2	Can the device owner install or update **anti-virus software**?	No	
10-3	Can the device owner/**operator** (technically/physically) update virus definitions on manufacturer-installed **anti-virus software**?	No	
MLDP notes:			
11	**NODE AUTHENTICATION (NAUT)**		
	The ability of the **device** to authenticate communication partners/nodes.		
11-1	Does the **device** provide/support any means of node authentication that assures both the sender and the recipient of data are known to each other and are authorized to receive transferred information?	No	
NAUT notes:			
12	**PERSON AUTHENTICATION (PAUT)**		
	Ability of the **device** to authenticate **users**		
12-1	Does the **device** support **user/operator**-specific username(s) and password(s) for at least one **user**?	Yes	
	12-1.1 Does the device support unique **user/operator**-specific IDs and passwords for multiple users?	Yes	
12-2	Can the **device** be configured to authenticate **users** through an external authentication service (e.g., MS Active Directory, NDS, LDAP, etc.)?	No	
12-3	Can the **device** be configured to lock out a **user** after a certain number of unsuccessful logon attempts?	Yes	
12-4	Can default passwords be changed at/prior to installation?	Yes	
12-5	Are any shared **user** IDs used in this system?	See Note	6
12-6	Can the **device** be configured to enforce creation of **user** account passwords that meet established complexity rules?	Yes	
12-7	Can the **device** be configured so that account passwords expire periodically?	Yes	
PAUT notes:	6:Creation, allocation and usage of user IDs is at the discretion of the customer		
13	**PHYSICAL LOCKS (PLOK)**		
	Physical locks can prevent unauthorized **users** with physical access to the **device** from compromising the integrity and confidentiality of **private data** stored on the **device** or on **removable media**.		
13-1	Are all **device** components maintaining **private data** (other than **removable media**) physically secure (i.e., cannot remove without tools)?	Yes	
PLOK notes:			

Figure 18-9. Versana Active MDS^2

MDS2 (continued)

Device Category	Manufacturer	Document ID	Document Release Date
15976 Scanning	GE Healthcare	DOC2111350	2019/4/11
Device Model	**Software Revision**		**Software Release Date**
Versana Balance/Versana Active	Version R1.X.X		2019/3/26

	Refer to Section 2.3.2 of this standard for the proper interpretation of information requested in this form.	Yes, No, N/A, or See Note	Note #
14	**ROADMAP FOR THIRD PARTY COMPONENTS IN DEVICE LIFE CYCLE (RDMP)**		
	Manufacturer's plans for security support of 3rd party components within **device** life cycle.		
14-1	In the notes section, list the provided or required (separately purchased and/or delivered) operating system(s) - including version number(s).	See Note	7
14-2	Is a list of other third party applications provided by the manufacturer available?	No	—
RDMP notes:	7:Windows 10 LTSB 1607		
15	**SYSTEM AND APPLICATION HARDENING (SAHD)**		
	The **device**'s resistance to cyber attacks and **malware**.		
15-1	Does the **device** employ any hardening measures? Please indicate in the notes the level of conformance to any industry-recognized hardening standards.	Yes	8
15-2	Does the **device** employ any mechanism (e.g., release-specific hash key, checksums, etc.) to ensure the installed program/update is the manufacturer-authorized program or software update?	No	—
15-3	Does the **device** have external communication capability (e.g., network, modem, etc.)?	Yes	—
15-4	Does the file system allow the implementation of file-level access controls (e.g., New Technology File System (NTFS) for MS Windows platforms)?	Yes	—
15-5	Are all accounts which are not required for the **intended use** of the **device** disabled or deleted, for both **users** and applications?	Yes	—
15-6	Are all shared resources (e.g., file shares) which are not required for the **intended use** of the **device**, disabled?	Yes	—
15-7	Are all communication ports which are not required for the **intended use** of the **device** closed/disabled?	Yes	—
15-8	Are all services (e.g., telnet, file transfer protocol [FTP], internet information server [IIS], etc.), which are not required for the **intended use** of the **device** deleted/disabled?	Yes	—
15-9	Are all applications (COTS applications as well as OS-included applications, e.g., MS Internet Explorer, etc.) which are not required for the **intended use** of the **device** deleted/disabled?	Yes	—
15-10	Can the **device** boot from uncontrolled or **removable media** (i.e., a source other than an internal drive or memory component)?	Yes	—
15-11	Can software or hardware not authorized by the **device** manufacturer be installed on the device without the use of tools?	No	—
SAHD notes:	8:All unneeded ports, software, and services are removed and/or disabled by default.		
16	**SECURITY GUIDANCE (SGUD)**		
	The availability of security guidance for **operator** and administrator of the system and manufacturer sales and service.		
16-1	Are security-related features documented for the **device user**?	Yes	—
16-2	Are instructions available for **device**/media sanitization (i.e., instructions for how to achieve the permanent deletion of personal or other sensitive data)?	Yes	—
SGUD notes:			

Figure 18-10. Versana Active MDS[2]

MDS2 (continued)

Device Category	Manufacturer	Document ID	Document Release Date
15976 Scanning	GE Healthcare	DOC2111350	2019/4/11
Device Model	**Software Revision**		**Software Release Date**
Versana Balance/Versana Active	Version R1.X.X		2019/3/26

	Refer to Section 2.3.2 of this standard for the proper interpretation of information requested in this form.	Yes, No, N/A, or See Note	Note #
17	**HEALTH DATA STORAGE CONFIDENTIALITY (STCF)**		
	The ability of the **device** to ensure unauthorized access does not compromise the integrity and confidentiality of **private data** stored on **device** or **removable media**.		
17-1	Can the **device** encrypt data at rest?	Yes	—
STCF notes:			
18	**TRANSMISSION CONFIDENTIALITY (TXCF)**		
	The ability of the **device** to ensure the confidentiality of transmitted **private data**.		
18-1	Can **private data** be transmitted only via a point-to-point dedicated cable?	No	—
18-2	Is **private data** encrypted prior to transmission via a network or **removable media**? (If yes, indicate in the notes which encryption standard is implemented.)	See Note	9
18-3	Is **private data** transmission restricted to a fixed list of network destinations?	See Note	10
TXCF notes:	9:DICOM communication on network support encryption. 10:External device must be explicit defined in the workflow. This function can be limited to administrator.		
19	**TRANSMISSION INTEGRITY (TXIG)**		
	The ability of the **device** to ensure the integrity of transmitted **private data**.		
19-1	Does the **device** support any mechanism intended to ensure data is not modified during transmission? (If yes, describe in the notes section how this is achieved.)	Yes	11
TXIG notes:	11:DICOM communication is sent over the TCP protocol which has data integrity mechanisms included in the protocol.		
20	**OTHER SECURITY CONSIDERATIONS (OTHR)**		
	Additional security considerations/notes regarding **medical device** security.		
20-1	Can the **device** be serviced remotely?	Yes	—
20-2	Can the **device** restrict remote access to/from specified devices or **users** or network locations (e.g., specific IP addresses)?	Yes	—
20-2.1	Can the **device** be configured to require the local **user** to accept or initiate remote access?	Yes	—
OTHR notes:			

Figure 18-11. Versana Active MDS[2]

Disabled Windows Services

The following Windows services are unused and disabled on the Versana Active Ultrasound System:

Table 18-19:

Name	Description	Startup Type
Auto Time Zone Updater	Automatically sets the system time zone.	Disabled
Internet Connection Sharing (ICS)	Provides network address translation, addressing, name resolution and/or intrusion prevention services for a home or small office network.	Disabled
Microsoft App-V Client	Manages App-V users and virtual applications.	Disabled
Net.Tcp Port Sharing Service	Provides ability to share TCP ports over the net.tcp protocol.	Disabled
Remote Registry	Enables remote users to modify registry settings on this computer. If this service is stopped, the registry can be modified only by users on this computer. If this service is disabled, any services that explicitly depend on it will fail to start.	Disabled
Routing and Remote Access	Offers routing services to businesses in local area and wide area network environments.	Disabled
Shared PC Account Manager	Manages profiles and accounts on a SharedPC configured device.	Disabled
Smart Card	Manages access to smart cards read by this computer. If this service is stopped, this computer will be unable to read smart cards. If this service is disabled, any services that explicitly depend on it will fail to start.	Disabled
User Experience Virtualization Service	Provides support for application and OS settings roaming	Disabled
Windows Time	Maintains date and time synchronization on all clients and servers in the network. If this service is stopped, date and time synchronization will be unavailable. If this service is disabled, any services that explicitly depend on it will fail to start.	Disabled

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