



Technical Publications

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Rev. 3



LOGIQ Fortis™ Basic User Manual

Version R3

[Operating Documentation](#)

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Regulatory Requirement

LOGIQ Fortis complies with regulatory requirements of the following European Regulation 2017/745 EU concerning medical devices.



First CE Marked in 2021.

This Basic User Manual is a reference for the LOGIQ Fortis. It applies to Version R3 software for the LOGIQ Fortis ultrasound system.



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Revision History

Reason for Change

| REV | DATE (YYYY/MM/DD) | REASON FOR CHANGE |
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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. 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

The following classifications are in accordance with the IEC/EN 60601-1:6.8.1:

- According to 2017/745 EU Medical Device Regulations, this is Class IIa Medical Device.
- According to IEC/EN 60601-1,
 - Equipment is Class I, Type B with BF or CF Applied Parts.
- According to CISPR 11,
 - Equipment is Group 1, Class A ISM Equipment.

This product complies with the regulatory requirement of the following:

- The LOGIQ Fortis console and related probes are an Active Diagnostic Medical Product belonging to Class IIa according to the MDR - REGULATION (EU) 2017/745 for use on human patients.
- Medical Device Regulation (EU) 2017/745: the CE label affixed to the product testifies compliance to the Regulation.

The location of the CE marking is shown in the Safety chapter of this manual.

Authorized EU Representative

European registered place of business:

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Conformance Standards (continued)

- International Electrotechnical Commission (IEC).
 - IEC/EN 60601-1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
 - IEC/EN 60601-1-2 Electromagnetic disturbances - Requirements and tests.
 - IEC 60601-1-6 (Usability), EN 1041 (Information supplied with medical devices)
 - IEC 60601-2-37 Medical electrical equipment. Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment.
- International Organization of Standards (ISO)
 - ISO 10993-1 Biological evaluation of medical devices.
- Underwriters' Laboratories, Inc. (UL), an independent testing laboratory.
 - UL 60601-1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
- ANSI/AAMI ES60601-1:2005/(R)2012 Medical electrical equipment -Part 1: General requirements for basic safety and essential performance
- Canadian Standards Association (CSA).
 - CSA 22.2, 60601-1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
- Medical Device Good Manufacturing Practice Manual issued by the FDA (Food and Drug Administration, Department of Health, USA).
- EN/ISO 15223-1 Medical devices -- Symbols to be used with medical device labels, labelling and information to be supplied -- Part 1: General requirements

Certifications

- General Electric Medical Systems is ISO 13485 certified.

Original Documentation

- The original document was written in English.

Importer Information

- Turkey
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Chapter 1

Introduction

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

System Overview

Attention

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 this manual before attempting to use the LOGIQ Fortis system.

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

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 at the time of publication of the user manual.

Documentation

Safety instructions must be reviewed before operating the system.

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

Documentation is provided in the following ways:

- Online Help on the system
- Electronic Media viewable on a Windows PC
- On the internet at the GE Customer Documentation Portal
- Paper copies (orderable via H-Cat)

Table 1-1: Documentation

| Publication | Translated | Available via F1 | Available via Media in the eIFU Kit | Available on Paper (if purchased via H-Cat) |
|---|------------------------------|------------------|-------------------------------------|---|
| Basic User Manual Provides information needed by the user to operate the system safely. | Yes (all required languages) | Yes | Yes | Yes |
| Release Notes Provides precautions and instructions that supplement the Basic User Manual | Yes | No | Yes | Yes |
| Advanced Reference Manual Provides Acoustic Output Data and System Measurement and Analysis Tables and Formulas. | English and French | No | Yes | Yes |
| Privacy and Security Manual Describes Privacy and Security considerations and capabilities, and how they may be configured and used appropriately on the system. | Yes (all required languages) | No | No | No |
| Basic Service Manual Supplies block diagrams, spare parts, adjustments, instructions to help qualified technical personnel repair the system. | No | No | No | Yes |

NOTE: *The Basic Service Manual referenced in this manual is part number 5874373.*

Documentation (continued)

NOTE: An AIUM Booklet is shipped with systems shipped in the United States and Canada.

NOTE: Dates on screenshots are represented in MM/DD/YYYY format throughout the manual. Information on how to change the system's date can be found in Customizing Your System.

NOTE: The screen graphics in this manual are only for illustrational purposes. Actual screen output may differ.

Online Help

Online Help is available on the system by pressing the F1 key or via the eIFU icon on the second Utility Page. The Help screen is divided into three sections: navigational tools on the top, the left portion of the screen (Hide, Back, Forward), the 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.

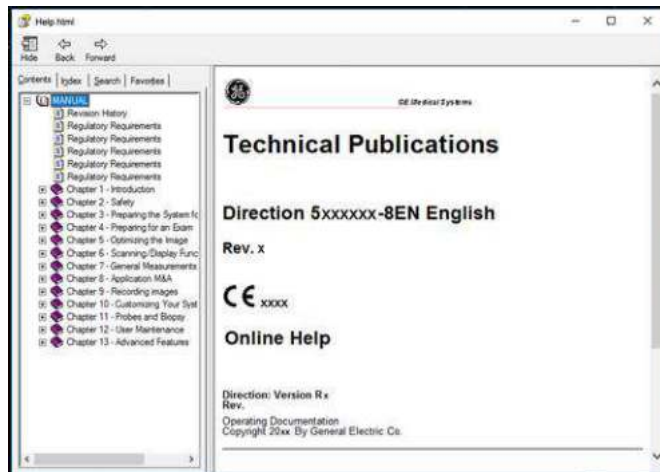


Figure 1-1. Opening Help Screen

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 chapter you want to view to open up that section. Open up the page to view that page's information.

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.

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.

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 view this topic quickly by going to the Favorites help tab.

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.

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 to the Touch Panel display, position and hold down the cursor at the very top of the Help window while moving the Trackball to the Touch Panel display.

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 Windows PC

To view user documentation on a Windows PC,

1. Insert the media into the media drive.
2. Open the media drive on your desktop.
3. Double click on the 'LOGIQ Fortis.html' document.
4. Select the item you want to view (click on the blue, underlined link in the File Name column).

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 website at <http://www.adobe.com>.*

Updating Documentation on the Ultrasound Scanner Via the USB

The latest version of the Online Help is located on the USB flash drive. To update to the latest version:

1. Power down the LOGIQ Fortis and insert the eIFU USB flash drive into a rear USB port.

NOTE: Ensure that the system is USB Device Enabled (check setting on System Admin Utility Page).

2. Power on the LOGIQ Fortis and follow the screen prompts.
 - a. Select Install SW ... on the Start Application screen.
 - b. Select OK on the first StartLoader screen.
 - c. Select the package and then select Install on the second StartLoader screen; software installation begins. After "Installation has completed" message appears and system restarts, remove USB flash drive.
 - d. As you verify each feature works correctly, select "Passed." If all features work correctly and "Passed" is selected for all features, the signature field is enabled at the bottom of the New Software Verification Checklist. Type your signature (minimum of three characters) and press OK. The system is now ready for use.

NOTE: You can search through a document, use hyperlinks in the Table of Contents and Index to locate topics, and navigate via bookmarks.

NOTE: In addition to viewing documentation on the Ultrasound system, the Documentation media can be read on any PC.

To exit, press the 'X' in the upper, right-hand corner of the documentation window.

Viewing Online Help in a Language Different from the System Language

On the Utility--> System--> Online Help Language page, select the language you wish to view Online Help.

If the translated Online Help is not available, you will be directed to select a different language.

Translated Online Help files can be updated via the eIFU USB Flash Drive. Please contact your Applications/Field Service Representative to order an updated eIFU Kit.

Online Customer Documentation Portal

Documentation is available in the Customer Documentation Portal on the internet at the GE Healthcare Support Documentation Library at:

<https://www.gehealthcare.com/support/documentation>

Navigate to the Customer Documentation Portal on the website and enter the following information to search for the desired manual:

- Document Number

OR

- Modality
- Product(s)
- Document Type
- Keyword

You can download the desired manual from the website or copy the manual url to share the link.

Paper Documentation

Paper manuals can be ordered via H-Cat.

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.

Indications for Use

The LOGIQ Fortis is intended to be used in a hospital or medical clinic.

US Indications for Use Statement

The LOGIQ Fortis is a general purpose diagnostic ultrasound system intended for use by qualified and trained healthcare professionals for ultrasound imaging, measurement, display and analysis of the human body and fluid. LOGIQ Fortis clinical applications include : Fetal / Obstetrics; Abdominal (including Renal, Gynecology/Pelvic); Pediatric; Small Organ (Breast, Testes, Thyroid); Neonatal Cephalic; Adult Cephalic; Cardiac (Adult and Pediatric); Peripheral Vascular; Musculo-skeletal Conventional and Superficial; Urology (including Prostate); Transrectal; Transvaginal; Transesophageal and Intraoperative (Vascular).

Modes of operation include: B, M, PW Doppler, CW Doppler, Color Doppler, Color M Doppler, Power Doppler, Harmonic Imaging, Coded Pulse, 3D/4D Imaging mode, Elastography, Shear Wave Elastography, Attenuation Imaging and Combined modes: B/M, B/Color, B/PWD, B/Color/PWD, B/Power/PWD.

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.

Frequency of Use

Daily (Typically 8 hours)

Contraindication

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

Prescription Device



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

Clinical Benefit

The clinical benefit of a diagnostic ultrasound device is to help healthcare professionals provide accurate diagnostic information (visualize human tissue/internal structure) that enhances the diagnostic and treatment care pathways of the patient for a variety of diseases and conditions.

Patient Population

- Age: all ages (including embryos and fetuses)
- Location: worldwide
- Sex: male and female
- Weight: all weight categories
- Height: no limitations



Do not cross-use the ultrasound system between human and veterinary/animal use.

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>

<https://cleaning.gehealthcare.com>

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.

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 Technologies Contact Center.

TEL: (1) 800-558-5102

In other locations, contact your local Applications, Sales, or Service Representative.

Contacting GE Ultrasound (continued)

Table 1-2: Americas

| | | |
|-----------------------|---|--|
| ARGENTINA | GE Healthcare Argentina Nicolas de Vedia 3616 piso 5 Buenos Aires - 1307 | TEL: (+54) 11-5298-2200 |
| BRAZIL | GE Healthcare do Brasil Comércio e Serviços para Equipamentos Médicos - Hospitalares Ltda. Av. Magalhães de Castro, 4800, Andar 11 Conj. 111 e 112, Andar 12 Conj. 121 e 122, Torre 3 - Cidade Jardim - CEP: 05676-120 - São Paulo/SP - Brasil CNPJ : 00.029.372/0001-40 Responsável Técnico: Renata Bellentani Brandão - CRF/SP nº 36.198 | TEL: 3004 2525 (Capitals and Metropolitan Regions) 08000 165 799 (Other Locations) |
| CANADA | GE Ultrasound 9900 Innovation Drive Wauwatosa, WI 53226 | TEL: (1) 800-668-0732 Customer Answer Center TEL: (1) 262-524-5698 |
| LATIN & SOUTH AMERICA | GE Ultrasound 9900 Innovation Drive Wauwatosa, WI 53226 | TEL: (1) 262-524-5300 Customer Answer Center TEL: (1) 262-524-5698 |
| MEXICO | GE Sistemas Medicos de Mexico S.A. de C.V. Rio Lerma #302, 1° y 2° Pisos Colonia Cuauhtemoc 06500-Mexico, D.F. | TEL: (5) 228-9600 FAX: (5) 211-4631 |
| USA | GE Ultrasound 9900 Innovation Drive Wauwatosa, WI 53226 | TEL: (1) 800-437-1171 FAX: (1) 414-721-3865 |

Table 1-3: Asia

| | | |
|-----------------------|--|---|
| ASIA PACIFIC JAPAN | GE Healthcare Asia Pacific 4-7-127, Asahigaoka Hinoshi, Tokyo 191-8503, Japan | TEL: +81 42 585 5111 |
| AUSTRALIA | 32 Phillip Street Parramatta 2150 Sydney, NSW, Australia | TEL: 1800 659 465 |
| CHINA | GE Healthcare - Asia No. 1, Yongchang North Road Beijing Economic & Technology Development Area Beijing 100176, China | TEL: (8610) 5806 8888 FAX: (8610) 6787 1162 Service: 4008128188 (24h) |
| INDIA | Wipro GE Healthcare Pvt Ltd No. 4, Kadugodi Industrial Area Sadaramangala, Whitefield Bangalore, 560067 | TEL: +(91) 1-800-425-8025 |

Table 1-3: Asia (Continued)

| | | |
|-------------|--|--|
| KOREA | 15F, 416 Hangang Dae ro, Chung-gu Seoul 04637, Korea | TEL: +82 2 6201 3114 |
| NEW ZEALAND | Level 7 Vero Centre 48 Shortland St, Auckland, 1010 New Zealand | TEL: 0800 659 465 |
| SINGAPORE | GE Healthcare ASEAN (Singapore) 11 North Buona Vista Drive #11-07 The Metropolis Tower 2 Singapore 138589 | TEL: +65 6291 8528 FAX: +65 6291 7006 |

Table 1-4: Africa

| | | |
|-------------------------|---|--|
| EGYPT | GE Medical Systems Egypt, LLC Plot 44 Tesseen El Shamaly Street Al Salam Axis First Sector City Centre, 5th settlement Cairo, Egypt | TEL: +20 2 25354200 FAX: +20 2 25370031 |
| KENYA | GE East Africa Services Limited General Mathenge Drive, Courtyard Building Westlands Nairobi 30 00100 KE | TEL: +254 719 093 044 |
| NIGERIA | GE International Operations (Nig) Ltd Bishop Aboyade Cole Street No. 927/928 Mansard Place, PO Box 54255 Victoria Island Lagos LA NG | TEL: +234 (01) 4607101 TEL: +234 (01) 4607102 |
| KINGDOM OF SAUDI ARABIA | GE Healthcare Arabia Co. Ltd Platinum Centre, Building 1 Salahuddin Ayoubi Road Riyadh-12811 Kingdom of Saudi Arabia | TEL: +966 (11) 494 5779 FAX: +966 (11) 207 3946 |
| SOUTH AFRICA | General Electric South Africa (Pty) Ltd. 60 Glenhove Road Green on Glenhove Customer Innovation Centre Johannesburg GP 2196 ZA | TEL: +270100725000 FAX: +27 0862958385 |

Table 1-5: Europe

| | | |
|---------------------|---|---|
| AUSTRIA | GE Healthcare Austria GmbH & Co OG EURO PLAZA, Gebäude E Technologiestrasse 10 A-1120 Vienna | TEL: (+43) 1 97272 0 FAX: (+43) 1 97272 2222 |
| BELGIUM & LUXEMBURG | GE Healthcare BVBA/SPRL Kouterveldstraat 20 1831 DIEGEM | TEL: (+32) 2 719 7204 FAX: (+32) 2 719 7205 |

Table 1-5: Europe (Continued)

| | | |
|-------------------|---|--|
| CZECH REPUBLIC | GE Medical Systems Česká Republika, s.r.o. Bucharova 2641/14 158 00 Praha 5 Česká republika | TEL: (+420) 224 446 162 FAX: (+420) 224 446 161 |
| DENMARK | GE Healthcare Park Allè 295 DK-2605 Brøndby, Denmark | TEL: (+45) 43 295 400 FAX: (+45) 43 295 399 |
| ESTONIA & FINLAND | GE Healthcare Finland Oy Kuortaneenkatu 2, 000510 Helsinki P.O.Box 330, 00031 GE Finland | TEL: (+358) 10 39 48 220 FAX: (+358) 10 39 48 221 |
| FRANCE | GE Medical Systems SCS Division Ultrasound 24 Avenue de l'Europe - CS20529 78457 Vélizy Villacoublay Cedex | TEL: (+33) 1 34 49 52 70 FAX: (+33) 13 44 95 202 |
| GERMANY | GE Healthcare GmbH Beethovenstrasse 239 42655 Solingen | TEL: (+49) 212-28 02-0 FAX: (+49) 212-28 02-380 |
| GREECE | GE Healthcare 8-10 Sorou Str. Marousi Athens 15125 Hellas | TEL: (+30) 210 8930600 FAX: (+30) 210 9625931 |
| HUNGARY | GE Hungary Zft. Bence utca 3 Budapest BU 1138 HU | TEL: (+36) 23 410 314 FAX: (+36) 23 410 390 |
| IRELAND | NORTHERN IRELAND GE Healthcare Victoria Business Park 9, Westbank Road Belfast BT3 9JL. REPUBLIC OF IRELAND GE Healthcare 3050 Lake Drive Citywest Business Campus Dublin 24 | TEL: (+44) 028 90229900 TEL: 1800 460 550 FAX: (+353) 1 686 5327 |
| ITALY | GE Medical Systems Italia spa Via Galeno, 36, 20126 Milano | TEL: (+39) 02 2600 1111 FAX: (+39) 02 2600 1417 |
| KAZAKHSTAN | «Дженерал Электрик Қазақстан» ЖШС Қазақстан, Алматы қаласы 050040, Тимирязев көшесі, 28В ү., 307 кеңсе. | T +7 727 3560020 |
| LUXEMBORG | See Belgium. | |
| NETHERLANDS | GE Healthcare De Wel 18 B, 3871 MV Hoevelaken PO Box 22, 3870 CA Hoevelaken | TEL: (+31) 33 254 1290 FAX: (+31) 33 254 1292 |

Table 1-5: Europe (Continued)

| | | |
|--|--|---|
| NORWAY | GE Vingmed Ultrasound AS Sandakerveien 100C 0484 Oslo, Norway | TEL: (+47) 23 18 50 50 FAX: (+47) 23 18 60 35 |
| | GE Vingmed Ultrasound Strandpromenaden 45 P.O. Box 141, 3191 Horten | TEL: (+47) 33 02 11 16 |
| POLAND | GE Medical Systems Polska Sp. z o.o., ul. Woloska 9 02-583 Warszawa, Poland | TEL: (+48) 22 330 83 00 FAX: (+48) 22 330 83 83 |
| PORTUGAL | General Electric Portuguesa SA Avenida do Forte 6 - 6A Edifício Ramazzotti 2790-072 CARNAXIDE | TEL: (+351) 21 425 1300 FAX: (+351) 21 425 1343 |
| RUSSIA | GE Healthcare Presnenskaya nab. 10 Block C, 12 floor 123317 Moscow, Russia | TEL: (+7) 4957 396931 FAX: (+7) 4957 396932 |
| SPAIN | GE Healthcare España C/ Gobelos 35-37 28023 Madrid | TEL: (+34) 91 663 2500 FAX: (+34) 91 663 2501 |
| SWEDEN | GE Healthcare Sverige AB FE 314, 182 82 Stockholm Besöksadr: Vendeavagen 89 Danderyd, Sverige | TEL: (+46) 08 559 500 10 FAX: (+46) 08 559 500 15 Service Center (+46) 020-120 14 36 |
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Manufacturer



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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.

For USA only

Federal law restricts this device to use by, or on the orders of, a physician.

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.

Reporting

In the case of a serious incident occurring in relation to LOGIQ Fortis ultrasound products, the incident should be reported to GE Healthcare and the competent Authority.

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.



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

- Severe or fatal personal injury



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

- Minor personal injury
- Substantial property damage



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

- Property damage

NOTE: *Substantial property damage is defined as system requires service to function.*

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 |
|---|--|--|
|  | <p>Biological Hazard Describes precautions necessary to prevent the risk of disease transmission or infections.</p> <ul style="list-style-type: none"> • Patient/user infection due to contaminated equipment. | <ul style="list-style-type: none"> • Cleaning and care instructions • Sheath and glove guidelines |
|  | <p>Electrical Hazard Describes precautions necessary to prevent the risk of injury through electric hazards.</p> <ul style="list-style-type: none"> • Electrical micro-shock to patient, e.g., ventricular | <ul style="list-style-type: none"> • Probes • ECG, if applicable • Connections to back panel |
|  | <p>Moving Hazard Describes precautions necessary to prevent the risk of injury through moving or tipping hazard!</p> <ul style="list-style-type: none"> • 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. | <ul style="list-style-type: none"> • Moving • Using brakes • Transporting |
|  | <p>Acoustic Output Hazard</p> <ul style="list-style-type: none"> • Patient injury or tissue damage from ultrasound radiation. | <ul style="list-style-type: none"> • ALARA, the use of Power Output following the 'as low as reasonably achievable' principle |
|  | <p>Explosion Hazard Describes precautions necessary to prevent the risk of injury through explosion hazard!</p> <ul style="list-style-type: none"> • Risk of explosion if used in the presence of flammable anesthetics. | <ul style="list-style-type: none"> • Flammable anesthetic |
|  | <p>Fire and Smoke Hazard</p> <ul style="list-style-type: none"> • Patient/user injury or adverse reaction from fire or smoke. • Patient/user injury from explosion and fire. | <ul style="list-style-type: none"> • 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.



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.

Following are potential risks inherent to technology:

- Ultrasonic energy delivered to non-targeted tissue with the use of Ultrasound devices, and the interaction of sound energy with tissue at sufficiently high levels can produce biological effects.
- Monitoring the Mechanical Index (MI) can be a tool to help monitor the probability that cavitation could occur.

Patient Safety

Related Hazards



The concerns listed can 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 users, as a diagnostic tool. They are explicitly not to be regarded as the sole, irrefutable basis for clinical diagnosis. Users are encouraged to study the literature and reach their own professional conclusions regarding the clinical utility of the system.

The user 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.



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 authorized user should consider proper indications 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.



Features that facilitate measurements such as VOCAL or SonoNT must be used with extreme care. The measurement results are a suggestion of the system, if in doubt verify with manual measurement methods.

The user is responsible for the diagnostic interpretation of the measurement results.

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.

The use of damaged 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.



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*.



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.

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.

Training

It is recommended that all users receive proper training in applications before performing them in a clinical setting. Please contact the local GE representative for training assistance.

ALARA training is provided in the Medical Ultrasound Safety booklet shipped in the eDOCs kit. The ALARA education program for the clinical end-user covers basic ultrasound principles, possible biological effects, the derivation and meaning of the indices, ALARA principles, and examples of specific applications of the ALARA principle.

Equipment and Personnel Safety

The concerns listed in the Related Hazards section can seriously affect the safety of equipment and personnel during a diagnostic ultrasound examination.

Related Hazards



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 serviceable components inside the console. Refer all servicing to qualified service personnel only.

Ensure that unauthorized personnel do not tamper with the unit.



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.
- In North America, a 220-240V installation requires the use of a center-tapped AC power source.

Related Hazards (continued)



DANGER

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



Explosion
Hazard

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

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.



Smoke &
Fire Hazard

The system must be supplied from an adequately rated electrical circuit. The capacity of the supply circuit must be as specified.



DANGER

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 or sterilize as needed. 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, equipment and accessories.

Related Hazards (continued)



DANGER

Do not unpack the LOGIQ Fortis. This must be performed by qualified service personnel only. Improper unpacking could lead to injury.



DANGER

GE recommends dedicated probes for use on humans only or animals only. Mark probes dedicated for animals with special labels.

Observe any country specific rules and regulations for handling equipment used on both animals and humans. Such national restrictions may prohibit transfer of probes used on animals to humans and vice-versa.

Failure to follow these instructions could lead to exposure to infectious agents.



WARNING

- Make sure to verify the media after writing 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 data transfer was successful. Not following the instructions could result in the loss of data requiring a rescan.



WARNING

When you move the Control Panel up/down with the monitor, place BOTH hands on the Control Panel. Touching other moving parts other than the Control Panel may cause personal injury.



WARNING

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.



WARNING

The LOGIQ Fortis 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. Loss of image data may require a rescan.

Related Hazards (continued)



WARNING

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 -> Backup/Restore. Enable the following checkboxes under Backup:
 - User defined configuration
 - Service



CAUTION

Only approved and recommended peripherals and accessories should be used.

All peripherals and accessories must be securely mounted to the LOGIQ Fortis. Failure to follow these instructions could lead to unexpected diagnostic performance.



CAUTION

Non-supported peripheral devices that use their own AC power source CANNOT be attached to the LOGIQ Fortis. DO NOT connect the peripheral device's power cord into the LOGIQ Fortis system. Only peripheral devices purchased from GE with the purpose of being used with the LOGIQ Fortis system should be used.

Use a USB printer cable that is less than 3 meters in length.

Failure to follow these instructions could lead to unexpected diagnostic performance.



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)



CAUTION

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

Material Safe Data

Rubber part

Material: EPDM

Where Used: Probe holder/Gel holder/Keyboard bumper/Front and Rear Foot Pedal/System bumper at the four corners.

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.
- To avoid injury or damage, make sure nothing is within the range of motion before moving the monitor and monitor arm. This includes both objects and people.
- Pay attention to the monitor arm position to avoid hitting it against anyone or anything.
- Before moving the system to another location, be sure to lock the monitor arm in the transport position.
- 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 has a 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.

Related Hazards (Volume Navigation)



DO NOT use the Volume Navigation feature on any patient relying on life-sustaining electronic equipment, such as a pacemaker or defibrillator. Failure to follow this instruction could lead to interference with patient electronic device(s).

Related Hazards (Specific modes and features)



- Be aware that diagnostic conclusions must not be drawn from a specific mode, such as Render Mode or LOGIQView Mode. Always check with other diagnostic procedures.
- The accuracy of measurements in specific modes such as Render Mode, LOGIQView, STIC or VOCAL is limited and can be lower than measurements in B-images.
- Do not diagnose based on 3D/4D Acquisition Mode. Always check and confirm diagnostic findings in B-Mode.

Classifications

Type of protection against electric shock

Class I Equipment (*1)

Degree of protection against electric shock

Type BF Applied part (*2) (for Probes marked with BF symbol)

Type CF Applied part (*3) (for ECG, PCG, AUX, eTRAX needle marked with CF symbol)

Continuous Operation

System is Ordinary Equipment (IPX0)

Footswitch is IPX8; Probes are IPX6 or greater

NOTE: *Probe connector is not waterproof.*

***1. Class I Equipment**

EQUIPMENT in which protection against electric shock does not rely on BASIC INSULATION only, but includes an earth ground. This additional safety precaution prevents exposed metal parts from becoming LIVE in the event of an insulation failure.

***2. Type BF Applied Part**

TYPE BF APPLIED PART providing a specified degree of protection against electric shock, with particular regard to allowable LEAKAGE CURRENT.

Table 2-2: Type BF Equipment

| | Normal Mode | Single fault condition |
|-------------------------|----------------------|------------------------|
| Patient leakage current | Less than 100 microA | Less than 500 microA |

***3. Type CF Applied Part**

TYPE CF APPLIED PART providing a degree of protection higher than that for Type BF Applied Part against electric shock particularly regarding allowable LEAKAGE CURRENTS.

Table 2-3: Type CF Equipment

| | Normal Mode | Single fault condition |
|-------------------------|---------------------|------------------------|
| Patient leakage current | Less than 10 microA | Less than 50 microA |

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. To provide reasonable protection against such interference, 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.*



Unexpected diagnostic system performance or failure from interference broadcasted by device due to electromagnetic incompatibility with cauterizing knife causing obvious deterioration of image quality.

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, 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.*



Portable RF communications equipment (including peripherals such as antenna cables and external antennas) at frequencies noted in Table 2-4 on page 2-23 should be used no closer than 30cm (12 inches) to any part of the LOGIQ Fortis, including cables specified by GE.

Otherwise, degradation of the performance of this equipment could result.

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.

EMC Performance

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 4.2, Notice upon Installation of Product.



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. Failure to follow these instruction could lead to unexpected diagnostic performance.

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.

EMC Performance (continued)



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) unless intended for use with this system, in the vicinity of this equipment as it may cause performance outside the published specifications.

Keep power to these devices turned off when near this equipment.

Medical staff in charge of this equipment is required to instruct technicians, patients and other people who may be around this equipment to fully comply with the above regulation.

Portable and mobile radio communications equipment (e.g. two-way radio, cellular/cordless telephones, wireless computer networks) should be used no closer to any part of this system, including cables, than determined according to the following method:

EMC Performance (continued)

Table 2-4: Recommended separation distances between portable and mobile RF communications equipment and this system

| | | | |
|--|---|---|--|
| <p>This system is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of this system can help prevent electromagnetic Interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and this system as recommended below, according to the maximum output power of the communications equipment.</p> | | | |
| <p>Rated Maximum Output Power (P) of Transmitter Watts (W)</p> | <p>Separation distance according to transmitter frequency</p> | | |
| | <p>150 kHz - 80 MHz d=[3.5/3] square root of P</p> | <p>80 MHz - 800 MHz d = [3.5/3] square root of P</p> | <p>800 MHz - 2.5 GHz d = [7/3] square root of P</p> |
| | <p>Where: d= separation distance in meters, P = rated power of the transmitter.</p> | | |
| | <p>The separation distance in meters should be</p> | | |
| 0.01 | 0.12 | 0.12 | 0.23 |
| 0.1 | 0.37 | 0.37 | 0.74 |
| 1 | 1.17 | 1.17 | 2.33 |
| 10 | 3.69 | 3.69 | 7.38 |
| 100 | 11.7 | 11.7 | 23.3 |
| <p>For transmitters rated at a maximum output power not listed above, the separation distance can be estimated using the equation in the corresponding column, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. NOTE: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.</p> | | | |

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 Healthcare or ones designated by GE Healthcare. 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 Healthcare. 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 Option Installation manuals.

General Notice



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

Probe cables

Table 2-5: Probe cables

| Probe | Length (m) | CableType |
|----------|------------|-----------|
| L2-9VN-D | 2.4 | Shielded |
| L2-9-D | 2.4 | Shielded |
| L3-12-D | 2.2 | Shielded |
| ML6-15-D | 2.2 | Shielded |
| L6-24-D | 3.0 | Shielded |
| L8-18i-D | 3.0 | Shielded |
| M5Sc-D | 2.2 | Shielded |
| 6S-D | 2.2 | Shielded |
| BE9CS-D | 2.2 | Shielded |
| C1-6-D | 2.2 | Shielded |
| C1-6VN-D | 2.2 | Shielded |
| C2-7-D | 2.2 | Shielded |
| C2-7VN-D | 2.2 | Shielded |
| C2-9-D | 2.2 | Shielded |
| C2-9VN-D | 2.2 | Shielded |
| C3-10-D | 2.0 | Shielded |
| IC5-9-D | 2.5 | Shielded |
| 6Tc-RS | 2.1 | Shielded |
| RAB6-D | 2.5 | Shielded |
| RIC5-9-D | 2.2 | Shielded |
| P2D | 2.0 | Shielded |
| P6D | 2.0 | Shielded |

General Notice (continued)

Other cables

Table 2-6: Other cables

| Model name | Length (m) | Cable Type |
|------------------------|-------------------|-------------------|
| Power cable | 4.0 | Non-Shielded |
| ECG cable | 3.6 | Shielded |
| ECG lead wire | 0.7 | Shielded |
| V-Nav transmitter | 3.3 | Shielded |
| V-Nav Dual 10mm sensor | 2.5 | Shielded |
| V-Nav Needle Sensor | 2.5 | Shielded |
| V-Nav OmniTrax sensor | 2.5 | Shielded |
| Footswitch | 2.9 | Shielded |

General Notice (continued)

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 LOGIQ Fortis to image recording and other devices or communication networks.

Peripherals used in the patient environment

The LOGIQ Fortis has been verified for overall safety, compatibility and compliance with the following image recording devices:

- Sony UP-D898DC Digital Printer
- Sony UP-D25 Digital Printer
- Sony UP-DR80MD Color Printer
- Drive Bay (for Tru3D and Volume Navigation)
- USB 2.0/3.0 Flash Drive
- USB Hard Disk Drive

NOTE: *The LOGIQ Fortis supports the USB 3.0 standard (on the Operator Panel and Peripheral/Accessory Connector Panel) and the USB 2.0 standard on the Monitor.*

The LOGIQ Fortis 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 and IEC/EN 62368 compliant.

A Wireless LAN option is available. See 'Configuring the Wireless Network' on *page 13-480 for more information*. Conforms to IEEE 802.11 ac/a/b/g/n WiFi with Bluetooth 4.0 Standard.

The LOGIQ Fortis 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.

Peripherals used in the patient environment (continued)

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 LOGIQ Fortis system configures a medical system, and is therefore responsible to ensure that the system complies with the requirements of the valid version of IEC60601-1. If in doubt, consult the technical service department or your local GE representative.

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

1. The added device must have appropriate safety standard conformance and CE Marking.
2. The total power consumption of the added devices, which connect to the LOGIQ Fortis and are used simultaneously, must be less than or equal to the rated supply of the LOGIQ Fortis.
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.

Peripherals used in the patient environment (continued)

General precautions for installing an alternate off-board, remote device or a network 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.

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 2-7: 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, provided the following warning is heeded: WARNING: 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 reorienting the equipment. |
| 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 ensure that the system is used according to the specified guidance and only in the electromagnetic environment listed.

Table 2-8: Declaration of Immunity Compliance Statement Supporting

| Guidance and manufacturer's declaration - electromagnetic immunity | | | |
|--|---|--|---|
| This system is intended for use in the electromagnetic environment specified below. The customer or the user of this system should assure that it is used in such an environment. | | | |
| Environments of INTENDED USE | Professional healthcare facility environment | | |
| Immunity Type | IEC 60601-1-2 test level | IEC 60601-1-2 Compliance Level | Electromagnetic Environment Guidance |
| IEC 61000-4-2 Static discharge (ESD) | ± 8 kV contact ± 15 kV air | Edition 4 series ± 8 kV air ± 15 kV contact | Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%. |
| IEC 61000-4-4 Electrical fast transient/burst | ±2 kV for power supply lines 100 kHz rate ± 1 kV for input/output lines 100 kHz rate | Edition 4 series ± 2 kV for power supply lines 100 kHz rate ± 1 kV for input/output lines 100 kHz rate | Mains power quality should be that of a typical commercial and/or hospital environment. |
| IEC 61000-4-5 Surge Immunity | ± 1 kV line-line ± 2 kV line-earth | Edition 4 series ± 1 kV line-line ± 2 kV line-earth | Mains power quality should be that of a typical commercial and/or hospital environment. |
| IEC 61000-4-11 Voltage dips and short interruptions and voltage variations on power supply input lines | 0 % UT; 0.5cycle, Phase: 0,45,90,135,180,225,270,315° 0 % UT; 1cycle, Phase: 0° 70 % UT; 25/30cycle, Phase: 0° 0 % UT; 250/300 cycle Note: Apply IEC 60601-2-37 (202.6.2.7) | Edition 4 series 0 % UT; 0.5cycle, Phase: 0,45,90,135,180,225,270, 315° 0 % UT; 1cycle, Phase: 0° 70 % UT; 25/30cycle, Phase: 0° 0 % UT; 250/300 cycle Note: Apply IEC 60601-2-37 (202.6.2.7) | 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 option. |

Table 2-8: Declaration of Immunity Compliance Statement Supporting (Continued)

| Guidance and manufacturer's declaration - electromagnetic immunity | | | |
|--|---|---------------------------------------|---|
| This system is intended for use in the electromagnetic environment specified below. The customer or the user of this system should assure that it is used in such an environment. | | | |
| Environments of INTENDED USE | Professional healthcare facility environment | | |
| Immunity Type | IEC 60601-1-2 test level | IEC 60601-1-2 Compliance Level | Electromagnetic Environment Guidance |
| IEC 61000-4-8 Power frequency (50/60 Hz) magnetic field | 30 A/m | Edition 4 series 30 A/m | Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial and/or hospital environment. |
| NOTE: UT is the AC mains voltage prior to application of the test level. | | | |

Table 2-8: Declaration of Immunity Compliance Statement Supporting (Continued)


| Guidance and manufacturer's declaration - electromagnetic immunity | | | |
|---|---|---|--|
| This system is intended for use in the electromagnetic environment specified below. The customer or the user of this system should assure that it is used in such an environment. | | | |
| Environments of INTENDED USE | Professional healthcare facility environment | | |
| Immunity Type | IEC 60601-1-2 test level | IEC 60601-1-2 Compliance Level | Electromagnetic Environment Guidance |
| IEC 61000-4-6 Conducted RF | 3 Vrms 150kHz to 80MHz 6 Vrms in ISM bands between 150 kHz to 80MHz | Edition 4 series 3 Vrms 150kHz to 80MHz 6 Vrms in ISM bands between 150 kHz to 80MHz | Portable and mobile RF communications equipment should be used no closer to any part of this system, including cables, than the recommended separation distance calculated from the equation appropriate for the frequency of the transmitter. Recommended Separation Distance (see Table 2-4) |
| IEC 61000-4-3 Radiated RF EM fields | 3 V/m 80 MHz - 2.7 GHz 80% AM 1 kHz | 3 V/m 80 MHz - 2.7 GHz 80% AM 1 kHz | $d = \left[\frac{3.5}{3} \right] \sqrt{P}$ <p>(80 MHz to 800 MHz (see Table 2-4))</p> $d = \left[\frac{3.5}{3} \right] \sqrt{P}$ <p>(800 MHz to 2.7 GHz (see Table 2-4))</p> $d = \left[\frac{7}{3} \right] \sqrt{P}$ <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range b. Interference may occur in the vicinity of equipment marked with the symbol:</p>  |

Table 2-8: Declaration of Immunity Compliance Statement Supporting (Continued)

| Guidance and manufacturer's declaration - electromagnetic immunity | | | |
|---|---|---|--|
| This system is intended for use in the electromagnetic environment specified below. The customer or the user of this system should assure that it is used in such an environment. | | | |
| Environments of INTENDED USE | Professional healthcare facility environment | | |
| Immunity Type | IEC 60601-1-2 test level | IEC 60601-1-2 Compliance Level | Electromagnetic Environment Guidance |
| IEC 61000-4-3 Proximity fields from RF wireless communications equipment | 9 V/m to 28 V/m spot frequencies 385 MHz: 27 V/m 450 MHz: 28 V/m 710 MHz: 9 V/m 745 MHz: 9 V/m 780 MHz: 9 V/m 810 MHz: 28 V/m 870 MHz: 28 V/m 930 MHz: 28 V/m 1720 MHz: 28 V/m 1845 MHz: 28 V/m 1970 MHz: 28 V/m 2450 MHz: 28 V/m 5240 MHz: 9 V/m 5500 MHz: 9 V/m 5785 MHz: 9 V/m PM 18 Hz or 217 Hz (50% duty cycle) | 9 V/m to 28 V/m spot frequencies 385 MHz: 27 V/m 450 MHz: 28 V/m 710 MHz: 9 V/m 745 MHz: 9 V/m 780 MHz: 9 V/m 810 MHz: 28 V/m 870 MHz: 28 V/m 930 MHz: 28 V/m 1720 MHz: 28 V/m 1845 MHz: 28 V/m 1970 MHz: 28 V/m 2450 MHz: 28 V/m 5240 MHz: 9 V/m 5500 MHz: 9 V/m 5785 MHz: 9 V/m PM 18 Hz or 217 Hz (50% duty cycle) | Minimum separation distances for higher IMMUNITY TEST LEVELS shall be calculated using the following equation: $E = \frac{6}{d} \sqrt{P}$ Where P is the maximum power in W, d is the minimum separation distance in m, and E is the IMMUNITY TEST LEVEL in V/m. |
| <p>a. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which this system is used exceeds the applicable RF compliance level above, this system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating this system.</p> <p>b. Over the frequency range 150 kHz to 80 MHz field strengths should be less than 3 V/m.</p> <p>c. As an alternative to FM modulation, 50 % pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be worst case.</p> <p>NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.</p> | | | |

Declaration of Immunity (continued)

Table 2-9: Spot Frequencies for IEC 61000-4-3 Proximity fields from RF wireless communications equipment

| Test Frequency (MHz) | Band (MHz) | Service | Modulation | Maximum Power (W) | Distance (m) | Immunity Test Level (V/m) |
|----------------------|----------------|--|---|-------------------|--------------|---------------------------|
| 385 | 380 - 390 | TETRA 400 | Pulse modulation 18 Hz | 1.8 | 0.3 | 27 |
| 450 | 430 - 470 | GMRS 460, FRS 460 | FM \pm 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, W LAN, 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 | | | | | | |

Essential performance

The essential performance of the ultrasound unit is:

- The ability to display B-mode image as input for diagnosis.
- The ability to display M-mode image as input for diagnosis.
- The ability to display Doppler-mode image as input for diagnosis.
- The ability to display Color Flow-mode image as input for diagnosis.
- The display of acoustic power indexes as an aid for safe use of ultrasound diagnostic (MI, TIS, TIB, TIC).

Patient Environmental Devices

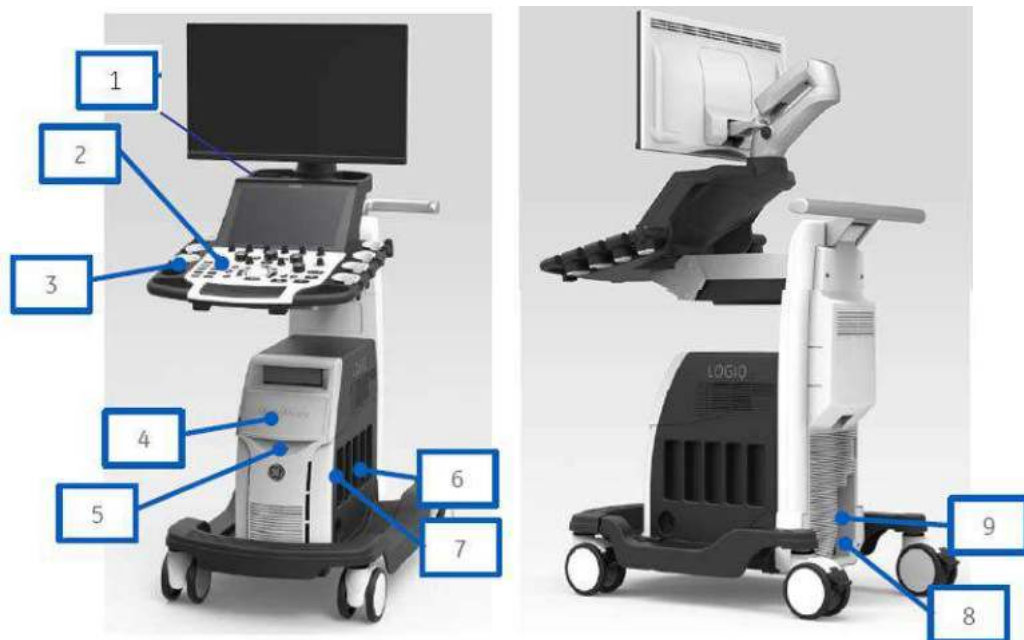


Figure 2-1. Patient Environmental Devices

- | | |
|---|--|
| <ol style="list-style-type: none">1. USB port2. Front Panel3. Gel warmer4. Peripheral Devices DVD Multi Drive (CD, DVD, DVR), Black/White Printer, Patient I/O (ECG), VNav Connectors5. Network/Disk Indicators6. Probe Ports (4) Probe Ports with CW Option | <ol style="list-style-type: none">7. Probe Storage8. Power In/Out Power Line (AC~) Ground Line Power Cable with Protective Earth9. Signals I/O Port (USB 3.0 Port, Ethernet Connector, HDMI Connector, S-Video Option Connector) |
|---|--|

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 'Peripheral Update for EC countries' on *page 2-28 for more information.*

Any device connected to the LOGIQ Fortis must conform to one or more of the requirements listed below:

1. IEC standard or equivalent standards appropriate to devices.
2. The devices shall be connected to PROTECTIVE EARTH (GROUND).

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 Ultrasound System must conform to one or more of the requirements listed below:

1. IEC standard or equivalent standards appropriate to devices.
2. The devices shall be connected to PROTECTIVE EARTH (GROUND).

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

When the “Auto Freeze Time (probe selection required)” preset is selected on the Utility -> System -> System Imaging screen, the system auto freezes after the time specified (10 or 30 minutes, 1 hour, or Never) of scanning 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.

Acoustic Output Display Specifications

The display consists of three parts: Thermal Index (TI), Mechanical Index (MI), and a relative Acoustic Output (AO) value.

The TI and MI are displayed at all times. The TI display starts at a value of 0.0, increments in steps of 0.1 and accuracy is $\pm 50\%$. For MI display values between 0 and 0.4, the display increments in steps of 0.01 and for values greater than 0.4, increments in steps of 0.1. The MI accuracy is $\pm 25\%$.

The AO percentage (AO%) value informs the user of where the system is operating within the range of available output. Accuracy of the AO% is $\pm 10\%$.

Acoustic Output Display Specifications (continued)

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.

Mechanical Index

MI recognizes the importance of non-thermal processes, cavitation in particular. The Index is a relative indicator of the likelihood of mechanical bioeffect 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.

Controls Affecting Acoustic Output

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

Direct. The Power 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.*



DANGER

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 affect Acoustic Output. During a screening and diagnostic ultrasound examination, high frequency sound penetrates and interacts with tissue in and around the area of anatomy to be imaged. Only a small portion of this sound energy is reflected back to the transducer for use in constructing the image, while the remainder is dissipated within the tissue. The interaction of sound energy with tissue at sufficiently high levels can produce biological effects (aka bioeffects) of either a mechanical or thermal nature. Although the generation of bioeffect is intentional with therapeutic ultrasound, it is generally undesired in screening and diagnostic applications and may be harmful in some conditions.



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 LOGIQ Fortis 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 **New Patient** is selected.

To modify acoustic output, adjust the Power Output level on the Touch Panel.

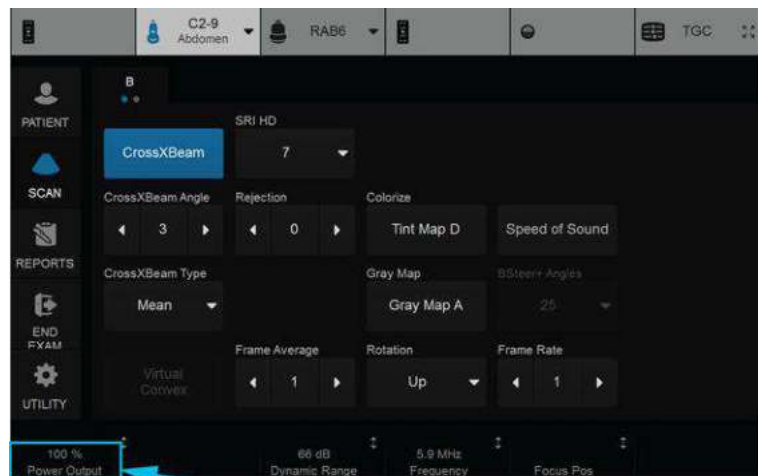


Figure 2-2. Location of Power Output control

Acoustic Output on Pleural Preset

The U.S. Food and Drug Administration (FDA) recommends that MI levels should be lower than 1.4 when scanning lungs.

Select the Pleural preset when performing a lung exam. The displayed MI will not exceed 0.8 with Pleural preset selected. Differences in MI values are a result of probe to probe variation as well as the calculation accuracy of the displayed MI value.

RoHS LOGIQ Fortis 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 Concentration Limits for Certain Hazardous Substances in Electronic Information Products. The number in the symbol is the Environment-friendly Use Period (EFUP), which indicates the period during which the hazardous substances or elements 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.”

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 2-10: Table of hazardous substances' name and concentration for LOGIQ Fortis

| Component Name | Hazardous substances' name | | | | | |
|---|----------------------------|----|----|---------|-----|------|
| | Pb | Hg | Cd | Cr (VI) | PBB | PBDE |
| HDU Display | O | O | O | O | O | O |
| LCD Display | O | O | O | O | O | O |
| Circuit Boards | O | O | O | O | O | O |
| Touch Panel | O | O | O | O | O | O |
| Ultrasound Probes | O | O | O | O | O | O |
| Console Cabinet | O | O | O | O | O | O |
| Operator Panel | O | O | O | O | O | O |
| Console Frame (Base Casting, Castings, Card Rack) | O | O | O | O | O | O |
| System Covers | O | O | O | O | O | O |
| System Cables | O | 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

Note: Options may not be present on every system.

WEEE Passport

The WEEE (Waste Electrical and Electronic Equipment) Passport describes product recycling information. To access the WEEE passport for GE Healthcare products:

1. Go to the GE Healthcare Support Documentation Library at:
<https://www.gehealthcare.com/support/documentation>
2. Select the modality "Ultrasound (UL)."
3. Enter the document name or the keyword "WEEE."
4. Press "Search."
5. Select the desired WEEE passport.

Safe Product and Packaging Disposal

This product and package should be disposed of according to hospital disposal practices, and local environmental and waste disposal regulations. Components and accessories of the LOGIQ Fortis which have come into direct or indirect contact with the patient may be biohazardous, and should be disposed of according to facility guidelines for biohazardous material. The waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the disposal/ decommissioning of equipment.

Device Labels

Label Icon Description

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

NOTE: *This machine should be used in compliance with law. Some jurisdictions restrict certain uses, such as gender determination (shown for country specific label).*



Figure 2-3. Rear Panel Label Location

Label Icon Description (continued)

Table 2-11: Label Icons (Rear of Console)







| No. | Label/Icon | Purpose/Meaning |
|-----------|--|---|
| 1. |  | <p>Monitor Label: GE created</p> |
| |  | <p>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.</p> |
| 1. and 3. |  | <p>Follow instruction for use. IEC 60601-1:2005+A1:2012 Annex D.1 and ISO 7010-M002</p> |
| 1. and 3. | <p>RoHS Label—China systems only (shown for country specific label)</p>  | <p>Indicates the presence of hazardous substance(s) above the maximum concentration value. Maximum concentration values for electronic information products, as set by the People’s Republic of China Electronic Industry Standard SJ/T11364-2006, include the hazardous substances of lead, mercury, hexavalent chromium, cadmium, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE). “20” indicates the number of years during which the hazardous substance(s) will not leak or mutate so that the use of this product will not result in any severe environmental pollution, bodily injury, or damage to any assets.</p> <p>China Electronic Industry Standard SJ/T11364-2014</p> |
| 1 and 3. |  | <p>This WEEE 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. Standard: EN 50419.</p> <p>WEEE Directive 2012/19/EU</p> |
| 1. and 3. |  | <p>“General Warning Sign” Possible shock hazard. Do not remove covers or panels. No user serviceable parts are inside. Refer servicing to qualified service personnel. Standard: ISO 7010-W001.</p> |

Table 2-11: Label Icons (Rear of Console) (Continued)







| No. | Label/Icon | Purpose/Meaning |
|-----|---|--|
| 2. |  | |
| | <p>THIS SYSTEM CONTAINS THE FOLLOWING WIRELESS MODULE : INTEL 9260NGW/</p> | <p>The system contains the following wireless module: INTEL 9260NGW.</p> |
| |  | <p>Non-Ionizing Electromagnetic Radiation IEC 60417-5140 IEC TR 60878-5140</p> |
| | <p>FCC ID: PD99260NG</p> | <p>Federal Communications Commission Identification label - on LOGIQ Fortis equipped with Wireless LAN</p> |
| | <p>IC: 1000M-9260NG</p> | <p>Canada Certification label - on LOGIQ Fortis equipped with Wireless LAN</p> |
| |  | <p>Malaysian Communications and Multimedia Commission symbol. Number correspond to GE importing company (GEHC) - on LOGIQ Fortis equipped with Wireless LAN</p> |
| |  | <p>ANATEL Certification label for Brazil - on LOGIQ Fortis equipped with Wireless LAN</p> |
| |  | <p>Infocomm Development Authority of Singapore (IDA) standard - on LOGIQ Fortis equipped with Wireless LAN</p> |
| 3. |  | <p>The CE Mark of Conformity indicates this equipment conforms with the European Medical Device Regulation 2017/745</p> <p>European Medical Device Regulation 2017/745</p> |

Table 2-11: Label Icons (Rear of Console) (Continued)









| No. | Label/Icon | Purpose/Meaning |
|-----|---|--|
| 3. |  | <p>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.</p> <p>ISO 7010-P013</p> |
| 3. |  | <p>DO NOT push the system. 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.</p> <p>IEC 60601-1:2005+A1:2012 Annex D.2 and ISO 7010-P017</p> |
| 3. |  | <p>United States only Prescription Device label 21 CFR 801.109 and Alternative to Certain Prescription Device Labeling Requirements Guidance to Industry 1/2/2000 U.S. Food&Drug Administration modified by General Electric for clarity that this is for the USA</p> |
| 3. |  | <p>Type BF Applied Part (man in the box) symbol is in accordance with IEC 60417-5333.</p> |
| 3. |  | <p>Symbol indicating that the Instructions for Use are supplied in electronic form. ISO 7000-3500</p> |
| 3. |  | <p>UL conformity mark according to ANSI/AAMI ES60601-1:2005/(R)2012, CAN/CSA-C22.2 No. 60601-1:14. N/A- by certification body</p> |
| 3. |  | <p>Use two people to transport system on inclines. This label also indicates the system weight. To avoid possible injury and equipment damage when transporting from one area of use to another:</p> <ul style="list-style-type: none"> • Be sure the pathway is clear. • Limit movement to a slow careful walk. • Use two or more persons to move the equipment on inclines or long distance. <p>GE created</p> |
| 3. |  | <p>This product is a medical device.</p> |

Table 2-11: Label Icons (Rear of Console) (Continued)






| No. | Label/Icon | Purpose/Meaning |
|-----|---|--|
| 3. |  | Unlock/Lock the monitor arm GE created |
| 4. |  | Possible shock hazard. Do not remove covers or panels. No user serviceable parts are inside. Refer servicing to qualified service personnel. <ul style="list-style-type: none"> • USB 3.0 Ports • Ethernet Connection • S-Video Connector • HDMI Connector |
| |  | "Equipotentiality" indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment. 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. IEC60417-5021 IEC 60601-1:2005+A1:2012 Annex D.1 and IEC 60417-5021 |
| |  | Mains OFF: indicates the power off position of the mains power breaker. IEC 60601-1:2005+A1:2012 Annex D.1 and IEC 60417-5008 |
| |  | Mains ON: indicates the power on position of the mains power breaker. IEC 60601-1:2005+A1:2012 Annex D.1 and IEC 60417-5007 |

Table 2-11: Label Icons (Rear of Console) (Continued)









| No. | Label/Icon | Purpose/Meaning |
|-----|---|--|
| 5. |  | <p>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 LOGIQ Fortis 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.</p> |
| | <p>(01)0000000000000000 (11)000000(21)00000000</p> | <p>UDI Human Readable Label Text: Global Trade Item Number, GTIN, Manufacturing Date, Serial Number</p> |
| |  | <p>UDI Symbol and Data Matrix</p> |
| 5. | <p>100-240V~, 50/60Hz, 900-900VA</p> | <p>System Voltage (~100-240VAC) Frequency Power Rating</p> |
| |  | <p>Alternating Current symbol is in accordance with IEC 60417-5032</p> |
| |  | <p>Catalog/Model Number. Standard: ISO 7000-2493.</p> |
| |  | <p>Serial Number. Standard: ISO 7000-2498.</p> |
| |  | <p>Legal Manufacturer's name and address. Standard: ISO 7000-3082.</p> |
| |  | <p>Date of manufacture YYYY-MM. Standard: ISO 7000-2497.</p> |
| |  | <p>Eurasian Conformity mark; the single conformity mark for circulation of products on the markets of member-states of the Customs Union. This product passed all conformity assessment (approval) procedures that correspond to the requirements of applicable technical regulations of the Customs Union. National standards of the Russian Federation and CIS countries</p> |

Table 2-11: Label Icons (Rear of Console) (Continued)

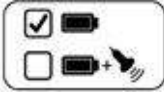
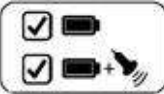
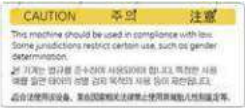













| No. | Label/Icon | Purpose/Meaning |
|--------|--|---|
| 6. |  | This system has Power Assistant option, GE created |
| |  | This system has Scan on Battery option, GE created |
| 7. |  | Gender Caution (only for India, China, Korea) |
| 8. |  | GE Cares Label (US/Canada systems only) |
| 10. 9. | <p>Country-Specific Labels</p>  | <p>Example:</p> <p>INMETRO Certification: TUV Rheinland Brazil</p> |
| |  | Rating label for Japan |
| |  | Rating label for Korea |
| 11. |  | Authorized European Representative address |
| ECG |  | eTRAX needle, PCG, AUX Type CF Applied Part (heart in the box) symbol is in accordance with IEC 60417-5335. |
| ECG |  | ECG Type CF Defib-Proof Applied Part (heart in the box with paddle) symbol is in accordance with IEC 60417-5336. |

Table 2-11: Label Icons (Rear of Console) (Continued)

| No. | Label/Icon | Purpose/Meaning |
|-----------------------------|---|---|
| Monitor Arm |  | <p>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. GE created</p> |
| V-Nav |  | <p>ISO 7010 - P007 Volume Navigation Pacemaker Warning</p> |
| Op Panel |  | <p>Power On/Off. Standard: IEC 60417-5010</p> |
| Op Panel |  | <p>To avoid injury, DO NOT place a finger, hand or any object below the operator panel when it is lowered.</p> |
| Foot Pedal and Battery Pack |  | <p>The product has been tested and approved in UL Laboratories, based on UL and CSA standards, through mutual approval activities.</p> |
| Battery Pack |  | <p>Battery Pack if contains Pb/Cd/Hg 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.</p> <p>WEEE Directive 2012/19/EU</p> |

Probe Labeling

Each probe is labeled with the following information:

- Seller's name and manufacturer
- Operating frequency (not shown on all probes)
- 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.
- UDI Symbol and Data Matrix
- DI Human Readable LabelText: Global Trade Item Number, GTIN

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



Figure 2-4. Probe Label

- | | |
|--|--|
| 1. GE Logo | 9. CE Mark and Notified Body Number |
| 2. Probe Model (Name) | 10. REF: Catalog/model number |
| 3. UDI Symbol and Data Matrix | 11. Serial Number |
| 4. UDI Human Readable LabelText: Global Trade Item Number, GTIN, (01), Manufacturing Date (11), Serial Number (21) | 12. Manufacturer's site country of origin |
| 5. Type BF/CF Applied Part | 13. Legal Manufacturer's Name and Address |
| 6. Caution: Consult the Manual. | 14. Date of Manufacture, as YYYY-MM |
| 7. WEEE Waste Symbol | 15. Product Marketing Indicator information may appear here. |
| 8. Chinese RoHS Hazardous Substance Symbol | 16. IP Classification |
| | 17. Symbol indicates the item is a medical device. |

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

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

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

Do not attempt to set up the system alone. General Electric, Affiliate, or Distributor Field Engineers and Application Specialists will install and setup the system. See 'Contact Information' on *page 1-12 for more information*.

The LOGIQ Fortis 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 12-32 for more information*.

Maintain a clean environment. Turn off, and if possible, disconnect the system before cleaning the unit. See 'Cleaning and Disinfecting the System' on *page 12-34 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

NOTICE

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:

- A separate power outlet with a 15 amp circuit breaker for 120 VAC for 120 V area, 7.5 amp circuit breaker for 220-240 VAC for 220/240 V area or 15 amp circuit breaker for 100 VAC for Japan.
- Take precautions to ensure that the console is protected from electromagnetic interference.

Precautions include:

- Operate the console at least 5 meters (15 feet) away from motors, typewriters, elevators, and other sources of strong electromagnetic radiation (non-medical grade UPS must be at least 2 meters (6 feet) away from console).
- 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.

Environmental Requirements

LOGIQ Fortis

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 | Storage | Transport (<16hrs.) |
|-------------|--------------------------|----------------------------|----------------------------|
| Temperature | 10° - 35°C 50° - 95°F | -10° - 50°C 14° - 122°F | -10° - 50°C 14° - 122°F |
| Humidity | 30 - 80% non-condensing | 30 - 80% non-condensing | 30 - 80% non-condensing |
| Pressure | 70 - 106kPa | 70 - 106kPa | 70 - 106kPa |

Probe



CAUTION

Note that the environmental conditions of the ultrasound system and the probe may differ.



CAUTION

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



CAUTION

Check the room temperature before you use the 4D probe.

Probe (continued)

Probes should be operated, stored, or transported within the parameters outlined below.

NOTE: See provided TEE probe user manual for the environmental requirements of the TEE probe.

Table 3-2: 2D Probe Environmental Requirements

| | Operational | Storage | Transport |
|--------------------|--|--|--|
| Temperature | 10 to 35 degrees C 50 to 95 degrees F | 0 to 50 degrees C 32 to 122 degrees F | 0 to 50 degrees C 32 to 122 degrees F |
| Humidity | 30 - 85% non-condensing | 30 - 85% non-condensing | 30 - 85% non-condensing |
| Pressure | 700 - 1060hPa | 700 - 1060hPa | 700 - 1060hPa |

Table 3-3: L2-9-D and L2-9VN-D Probe Environmental Requirements

| | Operational | Storage | Transport |
|--------------------|--|---|---|
| Temperature | 5 to 40 degrees C 41 to 104 degrees F | -40 to 55 degrees C -40 to 131 degrees F | -40 to 55 degrees C -40 to 131 degrees F |
| Humidity | 10 - 90% non-condensing | 5 - 95% non-condensing | 5 - 95% non-condensing |
| Pressure | 700 - 1060hPa | 500 - 1060hPa | 500 - 1060hPa |

Table 3-4: 4D Probe Environmental Requirements

| | Operational | Storage | Transport |
|--------------------|--|--|---|
| Temperature | 18 to 30 degrees C 64 to 86 degrees F | -10 to 50 degrees C 14 to 122 degrees F | -10 to 50 degrees C -40 to 122 degrees F |
| Humidity | Max 75% non-condensing | Max 90% non-condensing | Max 90% non-condensing |
| Pressure | 700 - 1060hPa | 700 - 1060hPa | 700 - 1060hPa |

Console Overview

Console Graphics

The following are illustrations of the console:



Figure 3-1. LOGIQ Fortis System

- | | |
|---|--|
| 1. Monitor | 11. Probe Ports (4) |
| 2. Operator Panel with power on/off button, probe holders, gel warmer | 12. Parking probe port (1) |
| 3. Touch Panel with USB 3.0 Ports | 13. CW Probe Port |
| 4. Control panel swivel lever | 14. Rear Handle |
| 5. Control panel up/down lever | 15. Power Cord Wrap Hook |
| 6. Probe Cable Management Hooks (underneath Operator Panel) | 16. Peripheral USB 3.0 Ports, Ethernet Connector, S-Video Connector, HDMI Port |
| 7. Probe Holder and Gel warmer | 17. Breaker, Ground and Power Cord |
| 8. DVD Drive, Blind cover, B/W printer, V-Nav controller, ECG connector | 18. Air Filter (Inside the front cover) |
| 9. Audio speaker | 19. Wheel Brake (with each caster) |
| 10. Storage bin (Option) | 20. External battery (Option) |
| | 21. Physical A/N keyboard (Option) |

Console Graphics (continued)



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 or Audio cables when connecting equipment to the unit. Failure to follow these instruction could lead to electrical shock.







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

DO NOT connect any probes or accessories without approval by GE. Failure to follow these instructions could lead to unexpected diagnostic performance.

Console Graphics (continued)

Type of cabinet

Table 3-5: Cabinet type

| Low cabinet | Mid cabinet |
|---|---|
|  <p>1. DVD Drive</p> |  <p>1. DVD Drive 2. Blind cover, ECG, V Nav controller or , B/W printer</p> |
| High cabinet | Side cabinet |
|  <p>1. DVD Drive 2. Blind cover, ECG, V Nav controller 3. B/W Printer</p> |  <p>1. V-Nav or ECG 2. B/W Printer Only install with Low cabinet or Mid cabinet.</p> |

External drives (CD/DVD Multi Drive, USB Flash Drive, USB HDD)

The external DVD-R/CD-R drive (Standard) is located below the keyboard. Approved USB Hard Disk and USB Flash Drives may also be used for Save As, MPEGVue, and Backup/Restore in the powered system USB ports.

You can use these to perform software upgrades, image archiving, and service diagnostics.

You can use the following media for the multi-drive: DVD-R or CD-R.

USB Drives are an ESD-sensitive device. Only use USB 2.0/3.0 Drives recommended by GE.

NOTE: *When ejecting a CD-R/DVD-R, you are prompted if you wish to finalize the disk. If you do not finalize the disk, you can add files to the CD-R/DVD-R at a later time. However, you may not be able to view the files stored on this disk with a standard PC. Finalizing a CD-R/DVD-R, allows you to view these files using most standard PCs.*



CAUTION

The system **ONLY** supports CD-R/DVD-R and **DOES NOT** support CD-RW/DVD+R/DVD-RW/DVD+RW or DVD-RAM media. **DO NOT** use or attempt to format CD-RWs, DVD+R, DVD-RAM, or DVD-RWs.



CAUTION

Make sure that the CD/DVD Multi Drive Disk tray is securely retracted during system operation. Mechanical damage may occur if other objects hit the tray.



CAUTION

When you put 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.

Speakers

Audio is provided via internal speakers.

NOTE: You make volume adjustments on the Utility Touch Panel (Master Volume, Effects Volume).

- Audio Doppler operation
- Audio playback of recorded scan sessions
- Audio error notification.

Storage areas

Storage areas are available and can be used to store gel, options, probe cables, accessories, etc.



Figure 3-2. Storage area

1. Small tray
2. Probe Holder

Install the TVTR Probe holder (Option)

Push the TVTR Probe holder into the left-side probe holder until it clicks as below graphic.



Figure 3-3. Install TVTR Probe holder



Figure 3-4. TVTR Probe Holder

When you remove the TVTR Probe holder from the system, pull the claw and pull out the probe holder.



Figure 3-5. Pull the claw to remove

Peripheral/Accessory Connection

Peripheral/Accessory Connector Panel

LOGIQ Fortis peripherals CAN ONLY BE properly connected using the Peripheral/Accessory Connector Panel. Available connectors are two USB 3.0 ports, an HDMI Port, and S-Video and Ethernet connectors.



DANGER

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. Equipment modifications and possible resulting malfunctions and electromagnetic interference are the responsibility of the owner.

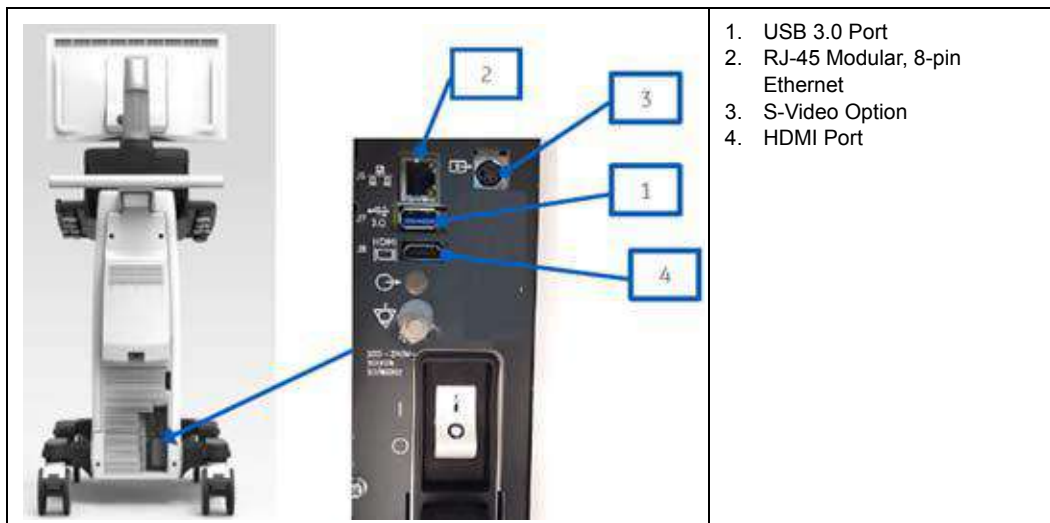


CAUTION

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

DO NOT connect any probes or accessories without approval by GE. Failure to follow these instructions could lead to unexpected diagnostic performance.

Table 3-6: Peripheral/Accessory Connector Panel



LAN protection cable (Option)

To prevent claw breakage of LAN cable, use LAN protection cable as below.

If LAN cable is pulled away from the console, the connection (Figure 3-6 1) will be unplugged first preventing damage to the LAN connector in the unit.



Figure 3-6. LAN protection cable



Figure 3-7. LAN cable with protection cable (example)

Scan Converter Option (S-Video)

The LOGIQ Fortis Scan Converter Option enables the ability for the console to view or record scanning via an S-Video Cable.

NOTE: The S-video image displays a portion of the main display that includes the probe image in both single and dual probe display modes. To provide increased resolution and maintain the proper aspect ratio on the S-video display, the entire main display image is not projected on the S-video monitor. The S-video crop area was selected to optimize the probe image so when the console is not in an imaging mode the S-video will continue to display a cropped portion of the screen which may appear incorrect.

External Monitor

An external monitor can be connected to the LOGIQ Fortis via the HDMI port, under the following guidelines:

- The display resolution must be set to (1080i) 1920x1080 on the external monitor, matching the main system display. Other resolutions are not supported.
- An isolation transformer must be used to power the external monitor to prevent adverse effects on the ultrasound scanner.
- It is the customer's responsibility to ensure leakage current and grounding is tested and complies with electrical leakage standards.

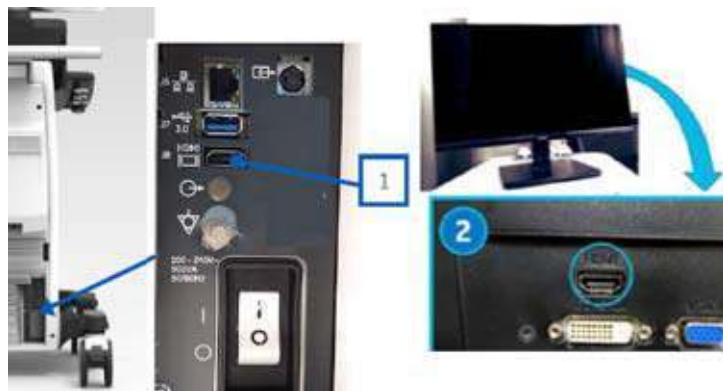


Figure 3-8. Connect HDMI Cable to back of LOGIQ Fortis and External Monitor

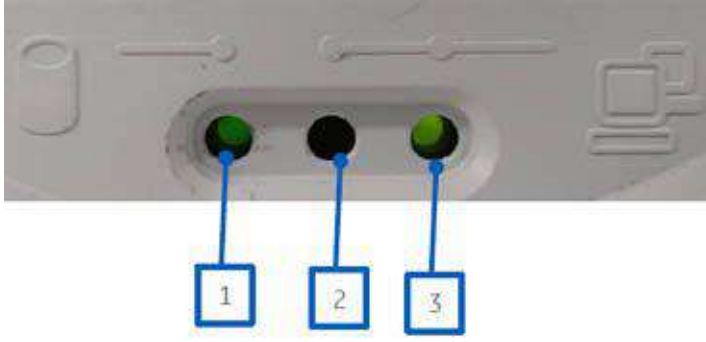
Front Panel Connections and Indicators

There are three sets of connector/indicators on the Front Panel: Hard Disk Drive and Network Status Indicators, CW Probe, Patient Cardiac/ECG Connections, and Volume Navigation (V Nav) Connections/Indicators

Network Status Indicators

There are three front-panel status indicators:

Table 3-7: Local Drive and Network Status

| | |
|---|--|
|  | <ol style="list-style-type: none">1. Local Drive Activity Status2. Network Activity status3. Network Activity status |
|---|--|

Network and Spooler Status Icons

The following icons identify network and spooler statuses. These appear on the display monitor.

Table 3-8: Network and Spooler Status Icons

| | | | | |
|----------------------|----------------------------|------------------------------------|-----------------------------------|--------------------------|
| Ethernet Active | Ethernet Error | Ethernet Active Spooler Active | Ethernet Active Spooler Error | Mobile |
| Mobile Error | Mobile Bluetooth | Mobile Wifi | Spooler Active | Spooler Active Error |
| Spooler Inactive | Spooler Inactive Error | Wifi 1 Bar | Wifi 2 Bars | Wifi 3 Bars |
| Wifi 4 Bars | Wifi Alert | Wifi Spooler Active | Wifi Spooler Error | Wifi Error |

NOTE: The Mobile icons are used for the Smart Device Apps (Tablet and Mobile Phone).

ECG Connections

Table 3-9: ECG connection



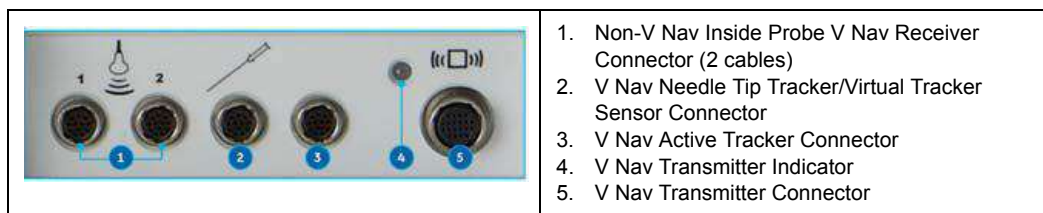
See 'ECG' on page 13-256 for more information.

Table 3-10: ECG Lead Placement

| Lead | Patient Cable Marking | | Position on Patient |
|------|-----------------------|------------|---------------------|
| | AHA | IEC | |
| I | RA (White) | R (Red) | Right Arm |
| II | LA (Black) | L (Yellow) | Left Arm |
| III | LL (Red) | F (Green) | Left Leg |

Volume Navigation Connections/Indicator

Table 3-11: Volume Navigation Connections



Powering the System

Connecting the System



DANGER

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.



DANGER

Use the appropriate power cord provided by or designated by GE. Failure to follow these instructions could lead to exposure to electrical shock.



WARNING

Use caution to ensure that the power cable does not disconnect during system use.

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



WARNING

To avoid leakage current above safety limits as prescribed by IEC 60601-1 and to ensure continuity of protective earth, DO NOT connect LOGIQ Fortis and mains-operated accessories to a single or multiple socket extension cord or power strip.

Connecting the System (continued)

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.
4. Attach the power plug to the system (Figure 3-9 b).
5. Push the power plug securely into the wall outlet.

NOTE: *Do not use an extension cord or adapter plug except for GE approved UPS.*

6. Ensure the circuit breaker is on (Figure 3-9 a). See 'Circuit breaker' on *page 3-21 for more information.*



Figure 3-9. Circuit Breaker (a) and Power Plug (b)

Circuit breaker

The Circuit Breaker is located at the rear panel of the system. On supplies main power to all internal systems. Off removes main power from all internal systems. The circuit breaker automatically shuts off power to the system in case of a power overload.

If a power overload occurs:

1. Turn off all peripheral devices.
2. Reactivate the Circuit Breaker switch.

The Circuit Breaker switch should stay in the **On** position (“I”); **DO NOT** hold the switch in the **On** position. If the Circuit Breaker switch remains **On**, follow the Power On procedure.

*NOTE: If the Circuit Breaker switch does **not** remain in the **On** position or trips again:*

1. Disconnect the Power Cable.
2. Call Service immediately.

DO NOT attempt to use the system.

Power On

Press the Power On/Off switch to turn the power on. The circuit breaker must also be in the on position. See 'Circuit breaker' on page 3-21 for more information.

To turn on the system

1. Ensure that the unit is properly plugged into an AC outlet of sufficient capacity (120V/10A or 240V/5A).
2. Turn on the breaker at the back of the system (refer to Figure 3-9 on page 3-20). At this point, the On/Off switch should be turned off.
3. Momentarily press the On/Off switch. The switch turns on a light. (refer to Figure 3-10 on page 3-22).
4. The system should now go through its boot-up process with no further user intervention (approximately 1 to 2 minutes).



Figure 3-10. 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, controls on the Control Panel backlight and the default B-Mode screen is displayed on the monitor (if a probe is connected).

Password Protection

Login

At login, you are notified that “You are accessing a diagnostic medical device that is provided by authorized usage only. Data stored on this device may be subject to various regulations including but not limited to regulations which govern disclosure and privacy of this data. By using this device you are acknowledging that you are authorized to do so and are trained in appropriate use and regulatory guidelines.”

NOTE: You can change the wording that appears on the Login screen. See ‘Logon Banner’ on page 10-120 for more information.

1. **Operator:** Enter the Operator ID.
2. **Password:** Enter Operator’s password (optional).
3. **Logon or Cancel.**
 - **OK:** Proceed with the logon
 - **Emergency:** Data stored only for the duration of the current exam (EUSR).
4. **Change Password:** Change password, as specified by the Password Policy.

Initial Login to the LOGIQ Fortis

When first logging in to the LOGIQ Fortis:

1. The Administrator should log in, typing “ADM” as the Operator Login.

NOTE: No password is needed for the initial administrator log in.

NOTE: The Touch Keyboard displays when a field is selected. Use the keyboard to enter the Operator ID and Password.

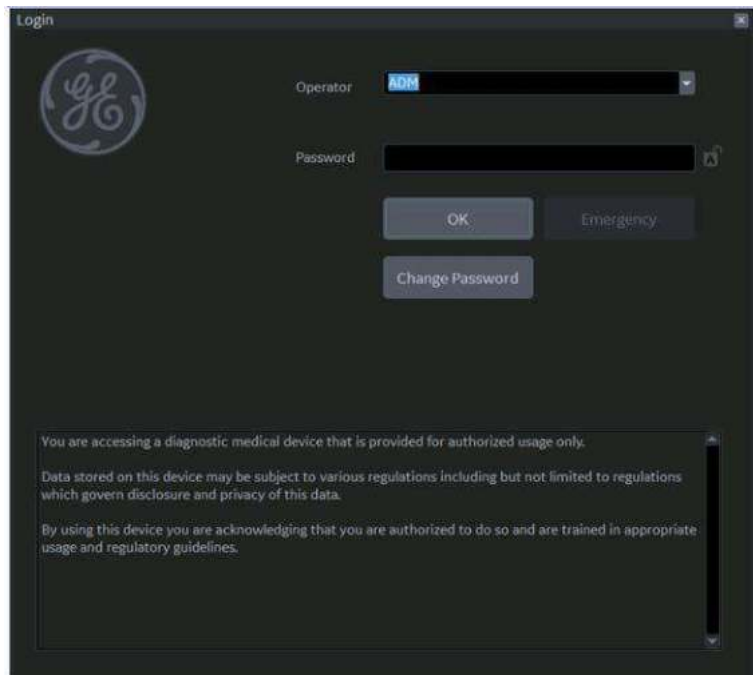


Figure 3-11. First Admin Login to the LOGIQ Fortis

Initial Login to the LOGIQ Fortis (continued)

- Upon ADM Login, specify the institution's Default Security Level for the LOGIQ Fortis: Lowest, Medium, High (Recommended), or Highest, then select **Apply Change**.

NOTE: You may choose *Skip For Now* up to 20 times total to postpone choosing the Security Level. After 20 skips the system will require a Security Level to be chosen.

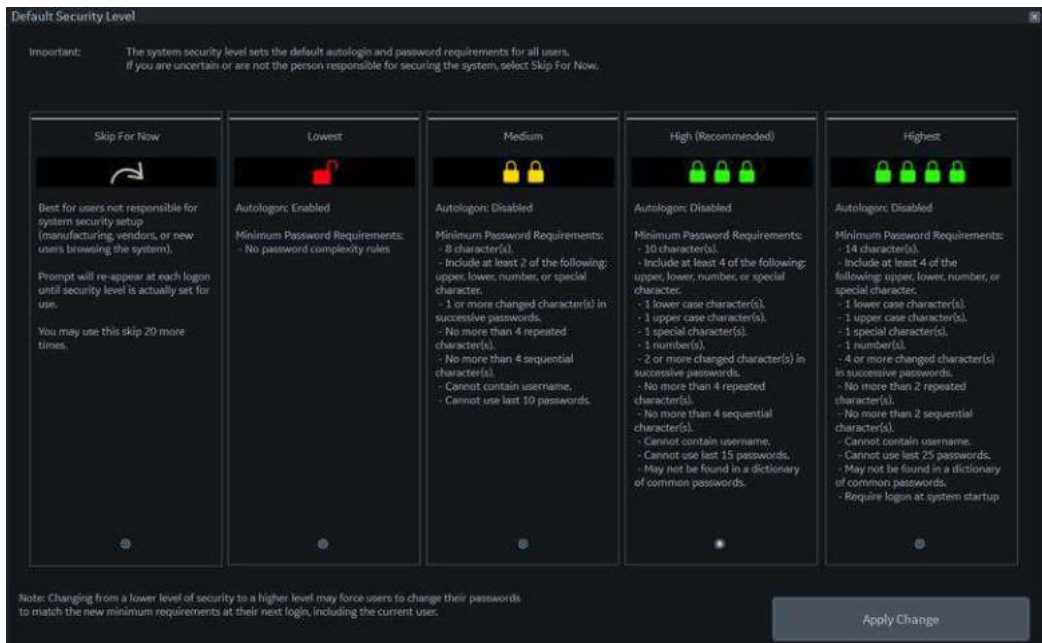


Figure 3-12. Default Security Level

Table 3-12: Security Levels

| Security Level | Complexity Rules |
|----------------|---|
| Skip For Now | Best for users not responsible for system security setup (manufacturing, vendors or new users browsing the system). Prompt will re-appear at each logon until security level is set for use. This skip can be chosen 20 total times before the system will require a security level to be chosen. |
| Lowest | Autologon enabled. No password complexity rules. |
| Medium | Autologon disabled. Minimum Password Requirements: <ul style="list-style-type: none"> • 8 characters. • Include at least two of the following: one upper case character, one lower case character, one number and/or one special character. • One or more changed character(s) in successive passwords. • No more than four repeated characters. • No more than four sequential characters. • Cannot contain username. • Cannot use the last 10 passwords. |

Table 3-12: Security Levels (Continued)

| Security Level | Complexity Rules |
|--------------------|--|
| High (Recommended) | Autologon disabled. Minimum Password Requirements: <ul style="list-style-type: none"> • 10 characters. • One lower case character. • One upper case character. • One special character. • One number. • Two or more changed characters in successive passwords. • No more than four repeated characters. • No more than four sequential characters. • Cannot contain username. • Cannot use last 15 passwords. • May not be found in a dictionary of common passwords. |
| Highest | Autologon disabled. Minimum Password Requirements: <ul style="list-style-type: none"> • 14 characters. • One lower case character. • One upper case character. • One special character. • One number. • Four or more changed characters in successive passwords. • No more than two repeated characters. • No more than two sequential characters. • Cannot contain username. • Cannot use last 25 passwords. • May not be found in a dictionary of common passwords. • Require logon at system startup. |

Initial Login to the LOGIQ Fortis (continued)

3. If a Security Level is chosen, the Confirm Change screen appears.

If *Lowest* or *Medium* Security Level was chosen, you will be prompted to acknowledge that the security setting is lower than GE Healthcare recommends to secure the system. You will not be able to Confirm Change unless the “I Agree” box is selected.

If *Medium*, *High* or *Highest* Security Level was chosen, you can choose to change your password immediately and/or to force all users to change their password at next login.

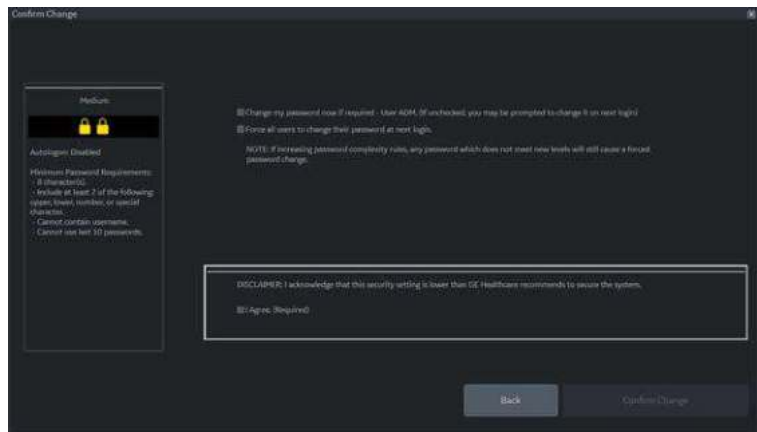


Figure 3-13. Confirm Change Screen

Initial Login to the LOGIQ Fortis (continued)

4. You will be prompted to set up the ADM password, based on the selected Security Level.

NOTE: *If the password you type doesn't meet the selected Security Level's password complexity rules, the screen will prompt you (in red) to correct the password, as shown below.*

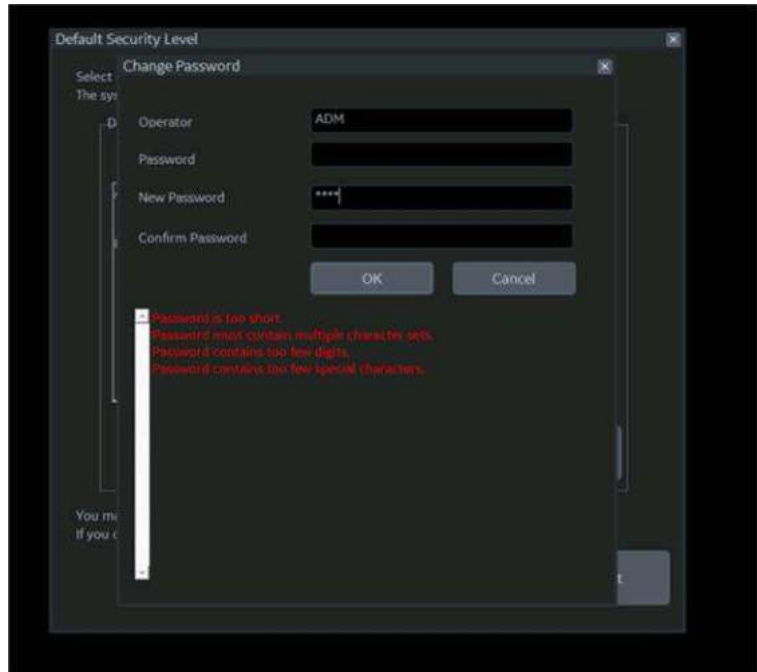


Figure 3-14. Change Password

Initial Login to the LOGIQ Fortis (continued)

5. After logging in, complete the system encryption setup. Navigate to the Disk Encryption Utility, Utility--> Admin--> Disk Encryption page. The system encrypts patient data by default (Encryption On. Disks are unlocked automatically). If you wish to change the default encryption setting, select the desired Encryption Policy, then press Accept.

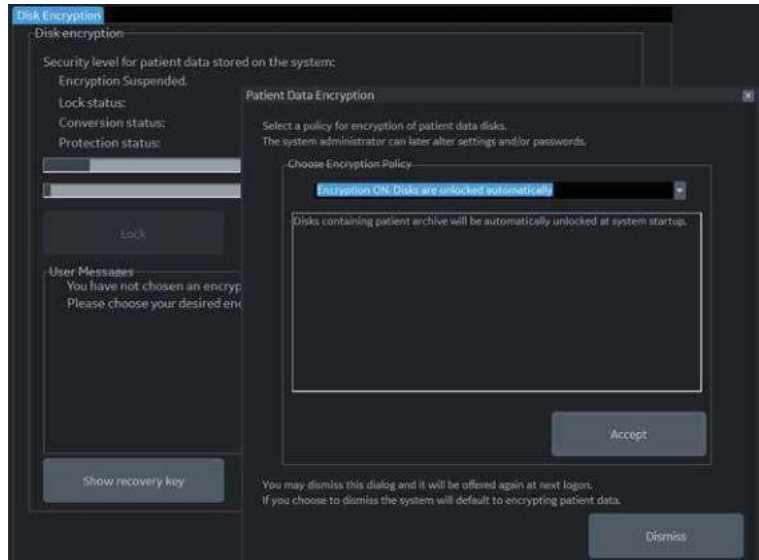


Figure 3-15. Initialize System Encryption

NOTE: *If you (or the Field Service Engineer) reloads system software, you will need to press “Initialize System Encryption” to encrypt the system and reset System Encryption password and preferences.*

Initial Login to the LOGIQ Fortis (continued)

Table 3-13: Encryption Policy Selections

| Encryption Policy | Description |
|---|---|
| Encryption OFF | Patient Data will not be encrypted. Selecting "OFF" will unencrypt the drive. System drive and recovery partition will remain encrypted. |
| Encryption ON. Disks are unlocked automatically | System Default. Patient data is encrypted and unlocked at system boot-up. Recovery Key and Password tied to the hard drive. |
| Encryption ON. Require Pre-Boot PIN/Password before unlocking system drives | The system will not boot until the Pre-Boot PIN or Password has been entered. Unlike other manual key entry configurations, no system functionality is available without the PIN/Password. This encryption policy is intended for high security environments or customers with specific needs. |
| Encryption ON. Key is stored on USB/password is entered manually | The system will request the encryption password or recovery key at system startup. The system is not accessible until this password or a disk recovery key is provided. Requiring a password to access the patient archive may prevent emergency usage of the system. |

NOTE: If you choose to dismiss this dialog, this dialog will be offered to you again at the next logon.

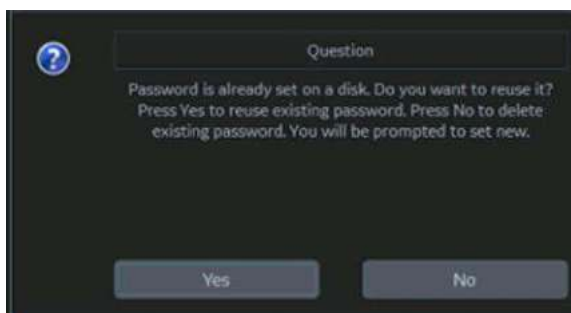
Initial Login to the LOGIQ Fortis (continued)

6. You must set the Encryption Password and record the Recovery Key in order to ensure access to your institution's patient data (required if replacing the system drive, ECB Board, or reformatting the C:\ Drive).

Recovery Keys are not backed up by the system; you must record / archive the Recovery Key in order to retrieve patient data.

- a. Reset the Encryption Password by pressing "Change password".

Reply "**No**" to this Question, "Password is already set on a disk. Do you want to reuse it? Press "**No**" to delete existing password. You will be prompted to set new.

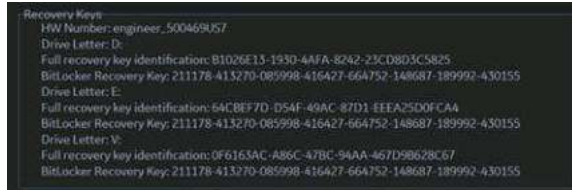


You can now update the encryption password, then press **OK**.



Initial Login to the LOGIQ Fortis (continued)

- b. Record the Recovery Key by pressing “Show recovery key”, then printing it to a local printer or PACS. Or, save the Recovery Key to a USB Flash Drive by pressing “Save recovery keys”.



You can Show or Hide the Encryption key. Store the Recovery Key in a secure location, accessible to the ADM user as necessary.

Encryption Notes

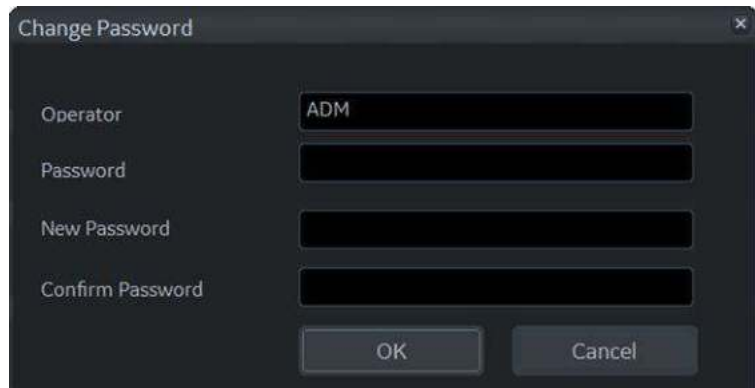
The system is usable while it is being encrypted. Encryption can take between 20 minutes and several hours, depending upon system configuration; a status bar tracks encryption progress. It is a background task. You can scan while the system is being encrypted. You can also power the system down and back on while the disk is being encrypted; disk encryption will pick up where it left off in the encryption process.

Changing Your Password

The System Administrator manages system groups, users, and permissions. After you have been added as a valid user, the System Administrator will assign you a temporary password. When you log into the system for the first time, you will be prompted to change your password.

You can change your password at any time when first logging onto the system. To change your password

1. Type your name in the Operator field.
2. Press the Change Password button. The Change Password pop-up appears.



The image shows a 'Change Password' dialog box with a dark background. It has a title bar with the text 'Change Password' and a close button (X) on the right. Below the title bar are four text input fields. The first field is labeled 'Operator' and contains the text 'ADM'. The second field is labeled 'Password'. The third field is labeled 'New Password'. The fourth field is labeled 'Confirm Password'. At the bottom of the dialog are two buttons: 'OK' and 'Cancel'.

Figure 3-16. Password Change

3. Type the following:
 - **Password:** Type your current password.
 - **New Password:** Type your new password.
 - **Confirm Password:** Retype your new password.

NOTE: If you do not wish to set a password, or to change your password, select OK to continue.

Emergency User

If an Emergency User has been enabled by the Administrator via Utility--> Admin--> Logon, they need to login as “EUSR.”

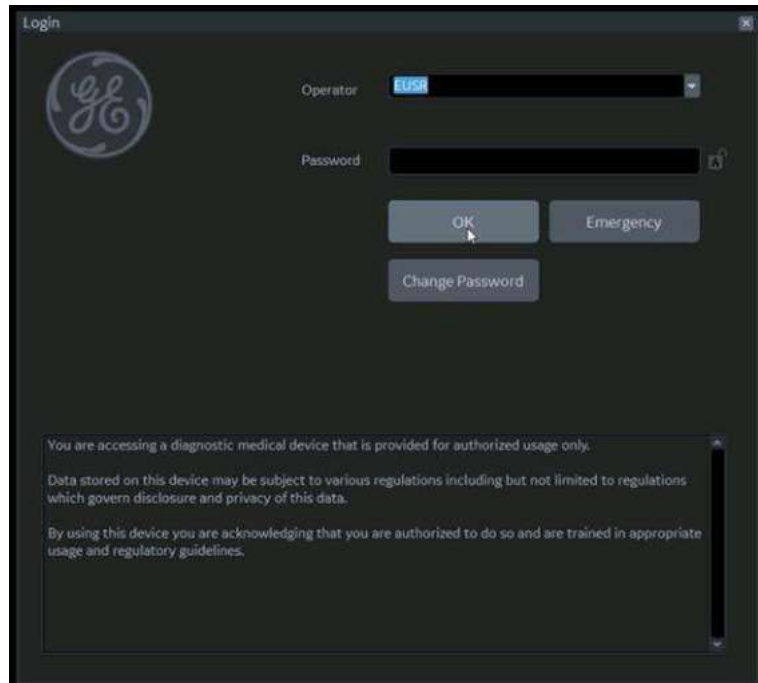


Figure 3-17. Emergency User

User Rights for the Emergency User are set by the Administrator via Utility--> Admin--> Groups. Emergency Users do not have access to your institution’s patient data, as shown in the example below.

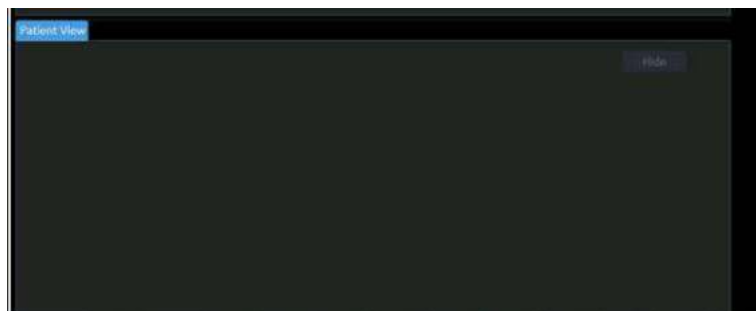


Figure 3-18. Patient Information Not Accessible

Logoff

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

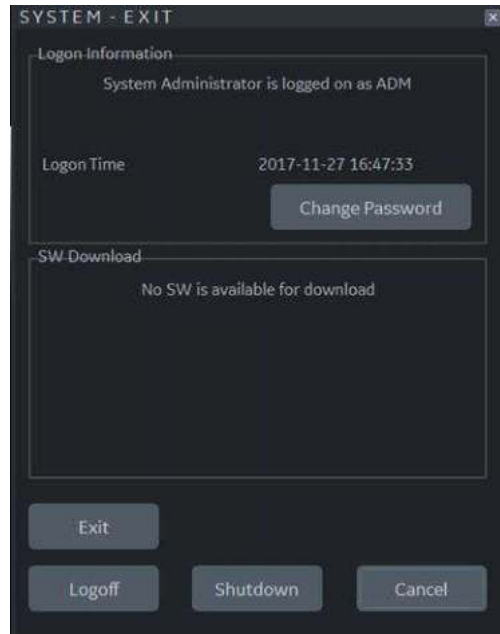


Figure 3-19. System Exit Window

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 avoid losing patient data, ensure that you have properly ended the patient's exam and transferred all exam data / images / clips.

To power off the system:

1. Set the brake and use the operator panel movement controls to lock the control panel in place.



If the Park Lock does not engage when you attempt to dock the Operator Panel in place, reset the Park Brake by selecting "Park Brake Reset" in the Miscellaneous section on the Utility -> System -> General page.

2. When you shutdown the system, enter the scan screen and lightly press the **Power On/Off** switch at the front of the system 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.*

Power Off (continued)

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

The shutdown process may take up to two (2) minutes and is completed when the control panel illumination shuts down.

NOTE: *If a system shutdown is initiated while the system is still processing an incoming or outgoing DICOM job, a dialog box appears, notifying the user to confirm shutdown, check the spooler status or cancel the shutdown (see Figure 3-20).*

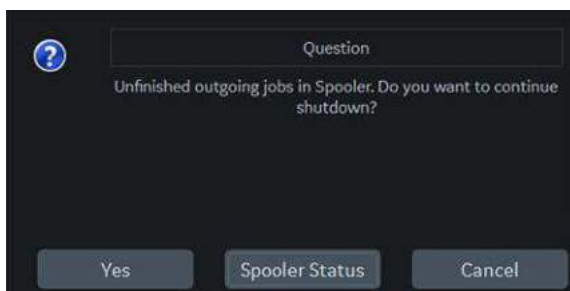


Figure 3-20. Confirm Shutdown

- 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.



DO NOT turn off the circuit breaker before the Power On/Off switch LED is white.

Data may be lost or system software damaged if the circuit breaker is turned off before the Power On LED is white.

NOTE: *When the Power Assistant is installed, Power Assistant battery replacement may be necessary if the circuit breaker is turned off for long periods of time (3 to 6 months).*

Crash Recovery Instructions

In case of a system crash, power cycle the system. Upon boot-up, all images and measurements, except for generic worksheets, are preserved in the system. When the system returns, the system alerts you that unsaved images are still in the system from the previous patient. Respond to the prompt to continue the current patient. Check that all images and measurements have been preserved in the system. Then resume the exam.

If the system fails to respond to your commands within a typical period of time, you need to manually reset the system. Simply hold down the power switch to initiate a normal power down sequence. After the system has completely shut down (power switch white), restart the system using the standard power-up sequence. All images and measurements, except for generic worksheets, are preserved in the system. When the system has fully powered up, the system alerts you that unsaved images are still in the system from the previous patient. Respond to the prompt to continue the current patient. Check that all images and measurements have been preserved in the system. If you do not have any images on the clipboard, the patient must be retrieved from the database. Then resume the exam.

System Language Configuration

Select the System Language and Date/Time Format

The default operating system language and keyboard may be changed from the Utility > System > General page.

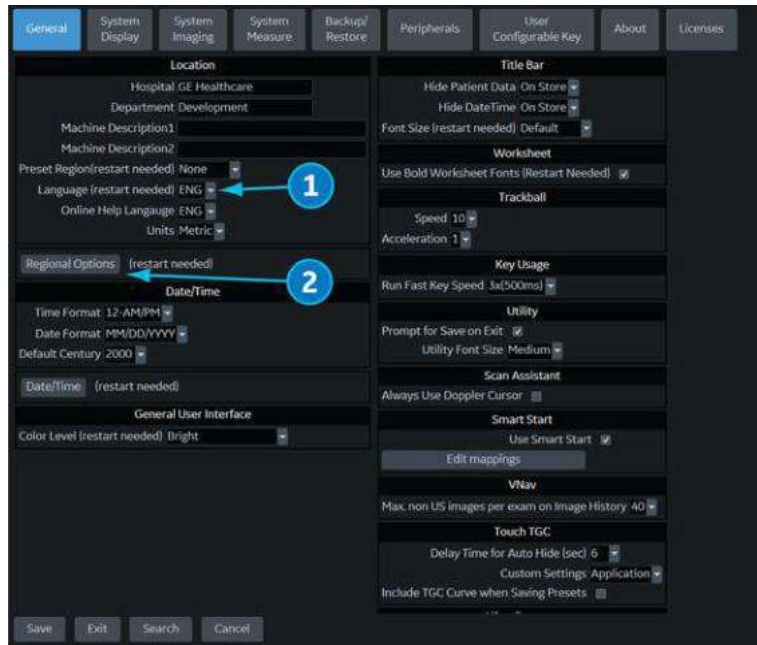


Figure 3-21. Utility System General Screen

1. Select the desired system language from the **Language** dropdown menu (1). Then select **Save** at the bottom left of the screen. Do NOT restart yet.
2. Select **Regional Options** (2) to open the Regional Options Dialogue Box

Select the System Language and Date/Time Format (continued)



Figure 3-22. Regional Options Dialogue Box

3. Select the following Regional Options:
 - **Current OS Language** - Select the language from the dropdown menu (3) to match the system language selected in Step 1.
 - **Keyboard** - Select the keyboard language preference from the dropdown menu (4).
 - **Current Format** - Select the date and time format preference from the dropdown menu (5).
4. After making changes to the Regional Options, select **OK**; when prompted to restart, choose **OK** again to restart system.

NOTE: *For the United Kingdom, it is recommended to use ENG Language (1), English (United States) OS Language (3), and modify "Current Format" time/date settings to English (United Kingdom) (4) (see Figure 3-22 on page 3-41).*

Change the Keyboard Language (Temporary)

To temporarily change the keyboard language, press the left Alt+Shift keys on the keyboard to toggle through all available keyboard languages until you reach the desired language.

NOTE: *When the system is restarted, the keyboard language will return to the keyboard language last set in Regional Options.*

English (International) Keyboard

When the system language is set to English (United States), pressing the Ctrl+Shift on the keyboard toggles between the English (United States) keyboard and the English (International) keyboard.

Apostrophe/Quotation Marks

To type an apostrophe or quotation marks while using the English (International) keyboard, you must press the space key after the apostrophe or quotation mark to display the character.

Special Accented Characters on the English (International) Keyboard

To type special accented characters, from the English (United States) keyboard, press Ctr+Shift to change to the English (International) keyboard, then press the AltGr+appropriate keyboard key listed below.

- [AltGr]+[Q] to type ä
- [AltGr]+[W] to type å
- [AltGr]+[E] to type é
- [AltGr]+[Y] to type ü
- [AltGr]+[I] to type í
- [AltGr]+[P] to type ö
- [AltGr]+[A] to type á
- [AltGr] + [Function Key] + [,] to type ç
- [Shift] + [6] + [a] to type â
- [Shift] + [6] + [e] to type ê
- [Shift] + [6] + [i] to type î
- [Shift] + [6] + [o] to type ô
- [Shift] + [~] + [a] to type ã
- [Shift] + [~] + [n] to type ñ
- [Shift] + ["] + [a] to type ä
- [Shift] + ["] + [e] to type ë
- [Shift] + ["] + [i] to type ï
- [Shift] + ["] + [o] to type ö

Connecting the Probe

Connecting the Probe



Fault conditions can result in electric shock hazard to user/patient. 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.



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.

Probes can be connected at any time, regardless of whether the console is powered on or off. To ensure that the ports are not active, place the system in the image freeze condition.

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

Connecting the Probe (continued)

4. Prior to inserting the probe, ensure that the connector locking handle is positioned to the left.
5. Align the connector with the probe port and carefully push into place.

NOTE: *When connecting the probe, DO NOT turn the locking lever if resistance is felt. If this is the case, remove the probe connector and check for misaligned or damaged pins. Probes with damaged connector pins should be taken out of service immediately.*

6. Turn the connector locking handle to the right to secure the probe connector.
7. Carefully position the probe cord so it is free to move and is not resting on the floor.

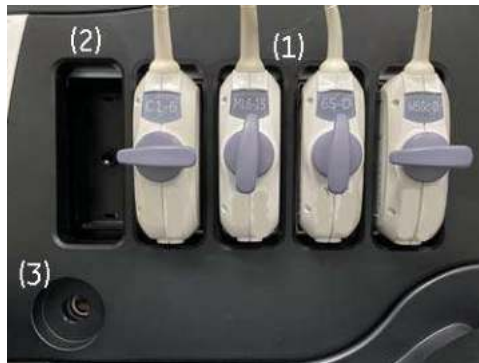


Figure 3-23. Probe port

1. Active probe port
2. Parking probe port (Extra probe can be stored by connecting to this port.)
3. Pencil probe port

Probe port illuminator

The LOGIQ Fortis has Probe port illumination to indicate the Probe port location in the Dark Room.

Brightness of illumination can be controlled on the Touch Panel and in Utility page.



Figure 3-24. Probe port with illumination

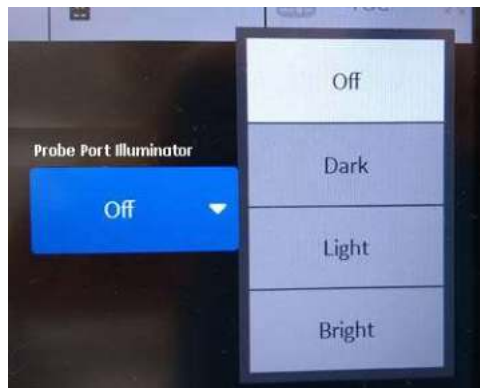


Figure 3-25. Touch panel control

Cable Handling

Take the following precautions with probe cables:

- Keep free from wheels. Use the cable hooks located below the operator panel.
- Do not bend the cable acutely
- Avoid crossing cables between probes.

Selecting probes

To activate the probe, select the appropriate probe from the probe indicators on the Touch Panel.

1. Select the probe that provides optimum focal depths and penetration for the patient size and exam.
2. Select the exam application.
3. Select the application preset.
4. Begin the scan session using the default Power Output setting for the probe and exam.

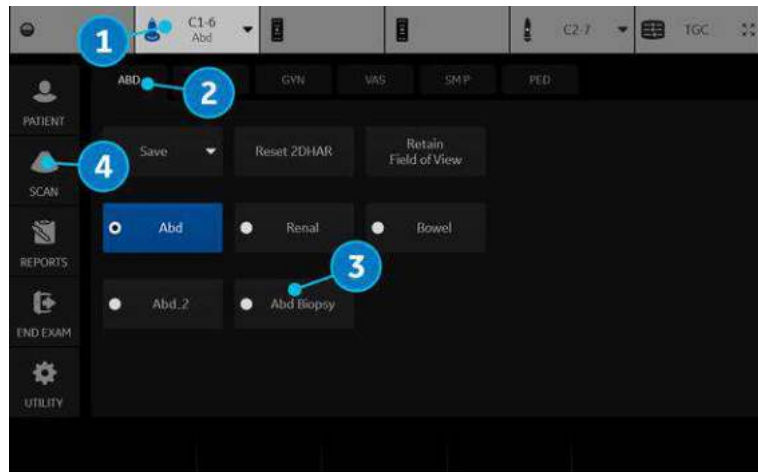


Figure 3-26. Probe Application/Preset Touch Panel

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

NOTE: *Selecting a new probe unfreezes the image.*

Deactivating the Probe

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

To deactivate a probe:

1. Ensure the selected probe is deselected or the LOGIQ Fortis is in freeze mode. If necessary, press the **Freeze** key.
2. Gently wipe the excess gel from the face of the probe.
3. Carefully slide the probe around the right side of the keyboard, toward the probe holder. Ensure that the probe is placed gently in the probe holder.

Disconnecting the Probe



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

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. Move the probe locking handle to the left.
3. Pull the probe connector straight out of the probe port carefully.
4. Carefully slide the probe and connector away from the probe port and around the right side of the keyboard.
5. Ensure the cable is free.
6. Be sure that the probe head is clean before placing the probe in its storage box or wall hanging unit.

Storing the Probe

It is recommended that all probes be stored in the provided carrying case or in the wall rack designed 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 head into the carrying case. DO NOT use excessive force or impact the probe head.

Storage/Transportation



Placing a dirty or contaminated probe in a carrying case or shipping carton will contaminate the foam insert. Failure to follow proper cleaning guidelines could lead to patient exposure to contaminant.

Each probe should be supported in its own probe holder on the console. If a carrying case is provided with the probe, always use the carrying case to transport the probe from one site to another.

Secure the probe in its holder for moving short distances.

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

If possible, use a rigid container with a lid that secures the probe's connector in place so as not to damage the probe head or lens. Place a soft cloth in the bottom of the container to prevent movement during transport.

Operator Controls

Control Panel Map

Controls are grouped together by function for ease of use.



Figure 3-27. Control Panel

- | | |
|---|--|
| 1. Probe Holder and Cable Management | 7. L/R, Start/Stop, Freeze, Simultaneous |
| 2. Touch Panel and Joystick controls | 8. Steer/Width/Depth/Reverse |
| 3. On Screen Keyboard (not display in this graphic) | 9. Auto, CF/PW Auto Positioning |
| 4. User Defined Keys | 10. P1, P2 |
| 5. Mode/Gain/XYZ (3D) Controls | |
| 6. Trackball, Trackball Keys, Pointer, Measure, Comment, Body Pattern, Clear, Zoom, Programmable Keys | |

Control panel adjustment



CAUTION

To avoid injury or damage, make sure nothing is within the range of motion before moving the control panel. This includes both objects and people.

Ensure that the hands of the patient are away from the Control panel arm when moving the Control panel.

To raise/lower the control panel

1. Hold the front handle in two hands.
2. Push and hold down the Up/Down button next to the right front handle.
3. Raise or lower the control panel.
4. Release the Up/Down button at the desired height.



Figure 3-28. Up/Down control button

To swivel the control panel

1. Hold the front handle in two hands.
2. Push and hold down the swivel button next to the left front handle.
3. Move the control panel to the left or the right.
4. Release the swivel button at the desired position.



Figure 3-29. Swivel control button

Keyboard

On Screen Keyboard

You can use "On Screen Keyboard" on touchscreen. Keyboard will show up when you press "Keyboard" User Defined key. And you can hide it with "Exit" button on Keyboard or Keyboard UD key.



Figure 3-30. On Screen Keyboard



Figure 3-31. Keyboard User Defined key

Physical A/N keyboard (Option)

Physical A/N keyboard is under the control panel.



Figure 3-32. Physical A/N keyboard

Push the keyboard to project forward.



Figure 3-33. Push the keyboard

Functional keys

The standard alpha-numeric keyboard has some special functions.

Table 3-14: Special key function

| Keyboard key | Function |
|--------------|---|
| Esc | Exit current display screen. |
| F1 | Help Access Online help/user manual. |
| F2 | Arrow Annotation Arrow. |
| F3 | Eject Eject media. |
| F4 | Spooler Activates DICOM Job Spooler screen. |
| F5 | Creates a Fast Key. |
| F6 | Plays a Fast Key. |
| F7 | Home/Set Home Move annotation cursor to home position; shift+key to set current annotation cursor position as the new home position. |
| F8 | Text1/Text2 Switch between user text annotation overlays. |
| F9 | Grab Last Activate the last selected data for edit. |
| F10 | Word delete Erase word associated with comment cursor. |

If you encounter a problem and cannot collect the logs immediately:

Table 3-15: Key for collecting the log

| Keyboard key | Function |
|----------------|----------------------------|
| Alt+1 or Alt+2 | Place a marker in the log. |
| 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.

Touch Panel

The Touch Panel contains exam function and mode/function specific controls.

Exam Function Controls

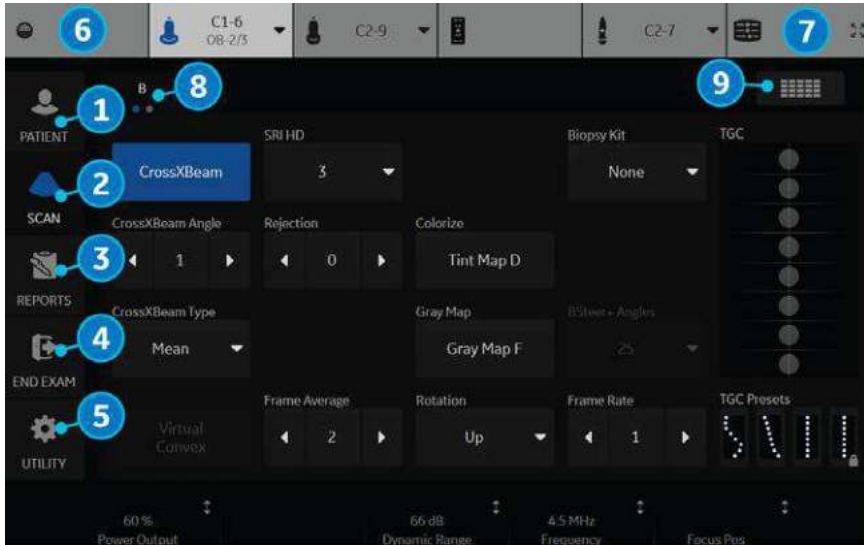


Figure 3-34. Exam Function Controls

- | | |
|---|--|
| 1. Patient: Enters Patient screen | 6. Probe Indicator: Indicates and selects the probes. |
| 2. Scan: Enters scanning mode screen | 7. TGC Control: Activates TGC function. |
| 3. Reports: Activates default report and Touch Panel of report choices. | 8. Indicates the number of pages for this mode. To move to the next page, touch the “dot” or swish your hand from right to left/left to right. |
| 4. End Exam: Activates Image Management and Touch Panel with end of exam options. | 9. To view all/fewer of the controls for this Touch Panel, press this Research/Clinical button. |
| 5. Utility: Activates system configuration menus. | |

NOTE: *Different menus are displayed depending on which Touch Panel Tab is selected.*

At the bottom of the Touch Panel, there are six combination rotary dials/push buttons. The functionality of these rotaries changes, depending upon the currently-displayed menu. Press the button to switch between controls, or rotate the dial to adjust the value, or move the control left/right or up/down to adjust the value.

Mode/Function Specific Controls

In general, the key name is indicated at the top of the key. There are different types of Touch Panel keys as illustrated below:



Figure 3-35. Mode/Function Specific Controls

1. Press to toggle control on/off.
2. Progress/Select keys are used for controls that have three or more choices.
3. Progression keys are used to assess the impact of the control on the image progressively.
4. 3-way functionality knobs (below the Touch Panel): Adjust controls by pressing (dot symbol), rotate (circled arrow symbol), move up/down (vertical line with arrows) or left/right (horizontal line with arrows).

Mode, Display and Print

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 **L** and **R** keys activate the Left or Right displayed image. See 'Split Screen' on *page 6-18 for more information*.
- Auto is used to:
 - initiate auto optimize
 - turn off auto optimize.
- Depth controls the image display depth.
- The Reverse key (via Depth key if preset) toggles the left/right orientation of the scan image.
- Print keys are used to activate/print the designated recording device.
- 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.

Each mode has its own gain control via the larger gray knob surrounding the 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 Touch Panel.
- 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.
- The Body Pattern/Ellipse control has a dual purpose:
 - Press the Body Pattern/Ellipse control, it enables the Body Pattern Touch Panel and displays the default pattern on the screen. When body patterns are active, the knob rotates the probe position indicator.
 - Rotate the Body Pattern/Ellipse control, it activates the ellipse measurement function after the first distance measurement has been set and the second caliper is activated.

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 Touch Panel is displayed.
- The Set key, located on the Trackball on-screen controls, 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.

Adjusting the Monitor Position



CAUTION

DO NOT apply force to the monitor surface by finger or other hard object.

The monitor surface may be damaged and permanently discolored.

- LCD Display



- HDU Display



Adjusting the Monitor Position (continued)



CAUTION

If any defects or damages are observed on the display screen or monitor itself, do not operate the equipment but inform a qualified service person.

Contact a Service Representative for information.

Grab the frame of the monitor with both hands when you adjust the position of the monitor and monitor arm.

Table 3-16: How to grab



| |
|---|
| LCD Display |
| <p>Up/Down/Left/Right</p>  |
| <p>Flip down/Flip up</p>  |
| HDU Display |

Table 3-16: How to grab

Up/Down/Left/Right



Flip down/Flip up



Locking/unlocking the Monitor

1. Turn the release knob clockwise to unlock the monitor. The monitor can be moved freely in all directions (Figure 3-36 1).
2. Turn the release knob clockwise to raise the lock and move the monitor into the parked position, then turn the lock counterclockwise to lock. (Figure 3-36 2).

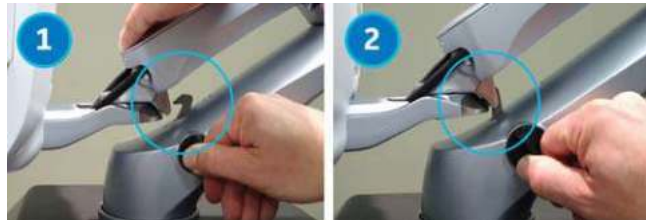


Figure 3-36. Unlock/Lock the monitor arm

1. Unlocked
2. Locked

Adjusting the Monitor

You make adjustments to all monitors via the second Utility Menu page. To view the monitor while making these adjustments

1. Press Utility--> select the second page.
2. Press **Scan Screen**. The scan screen displays on the main display while the Utility Touch Panel is active so you can see the affect your adjustments are making to the monitor.

Table 3-17: Monitor Adjustments

| Monitor Adjustments | Parameters | Affect on the Monitor |
|--|---|--|
| Room Profile: Monitor luminance varies, depending on the room's profile (light, dark, semi-dark). Adjusting this control helps to adapt the monitor to different room lighting conditions. | Set the Room Profile to match the room: | Brightness/Contrast Equivalent: |
| | LCD display | |
| | Dark | 50/85 |
| | Semi-Dark | 70/85 |
| | Light | 90/85 |
| | HDU display | |
| | Dark | 50/40 |
| | Semi-Dark | 50/65 |
| | Light | 50/100 |
| | User Defined | If you select User Defined, adjust the Brightness/Contrast control at the bottom of the Touch Panel. |
| Note: Brightness/Contrast setting is changeable when the Room Profile setting is available and set to "User Defined". | | |
| Color Profile: Color Profile controls color temperature, or overall tint of the monitor. | 0 | 6500K |
| | 1 | 9000K (LCD display) / 9300K (HDU display) |
| | 2 | 11000K |
| | 3 | 13000K |

Table 3-17: Monitor Adjustments (Continued)

| Monitor Adjustments | Parameters | Affect on the Monitor |
|---|---|--|
| Gamma Setting: With Grayscale Standard Display Function (GSDF) enabled, the gamma button on the Touch Panel affects the image, emulating the appearance of that gamma. The system gamma is adjusted to match the GSDF gamma compensation to the new monitor gamma. | Set the Gamma to 2.2 or 2.4 | Note: With GSDF disabled, the monitor still uses a gamma curve that may be selected on the Touch Panel (for backwards compatibility with sites that are happy with their PACS or may have a mix of older systems). |
| Return to Default settings. | Press "Reset Monitor", then restart the system. | |

Wide Screen Monitor Display Settings

Further clarification on three settings on the Utility--> System--> System Display configuration page is provided below:

- Image Size (Default, Large)
- Image Display Area (Default, Large, Extra Large)
- Use Wide Screen For... (On, Off, Auto)

Table 3-18: Wide Screen Monitor Display Settings

| Preset Setting | Description | Choices |
|--------------------|--|--|
| Image Size: | The parameter "Image Size" changes the size of the ultrasound image without changing the screen image, which includes the title bar and the image parameter window. It also does not change the size of comments, measurement cursors and lines, or the measurement result box. With all other settings the same, increasing Image Size from Default to Large creates a larger ultrasound image both on the LOGIQ Fortis display and on PACS' displays. It will not affect the appearance of screen image items like the title bar and the image parameter window. | <ul style="list-style-type: none"> • Default • Large |

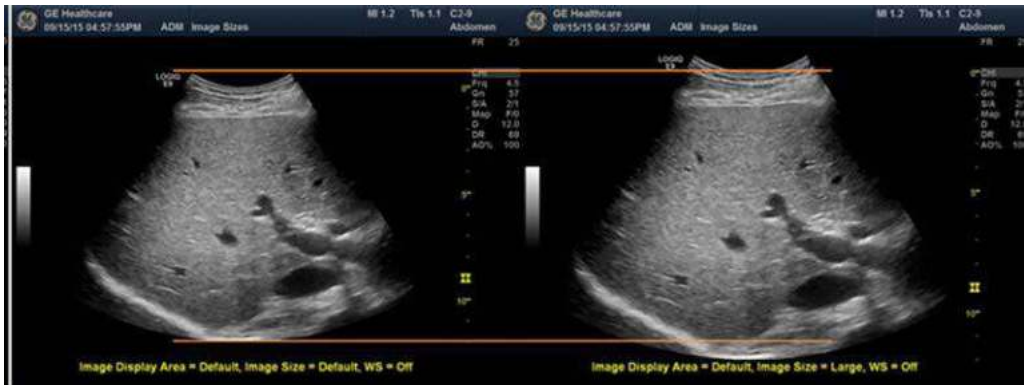


Image Size = Default (Left) and Image Size = Large (Right)

Hint: If you select and save "Last Used" on this page, the system starts with last used Room Profile setting every time.

Table 3-18: Wide Screen Monitor Display Settings (Continued)

| Preset Setting | Description | Choices |
|--------------------|---|---|
| Image Display Area | <p>“Image Display Area” changes the size of the screen image.</p> <p>On the LOGIQ Fortis display, this parameter changes the size of the ultrasound image. It also changes the arrangement of the items like the title bar and image parameter window, but not their individual size.</p> <p>Comments, measurement cursors and lines, and the measurement result box also do not change.</p> <p>This parameter also changes the pixel count of the image. Many PACS software packages scale all images of the same aspect ratio to the same viewing size, regardless of their pixel count. Because the ultrasound image displayed is enlarged as the pixel count is increased, the PACS display size of the ultrasound image does not change. However, items like the title bar, image parameter window, comments, and measurements do not get larger as the pixel count is increased, so they appear smaller on PACS. If text appears too small on PACS, change the Image Display Area to Default (decreasing the screen image pixel count).</p> | <ul style="list-style-type: none"> • Default • Large • Extra Large |



Ultrasound System Image Display Area: Left = Default, Right = Large



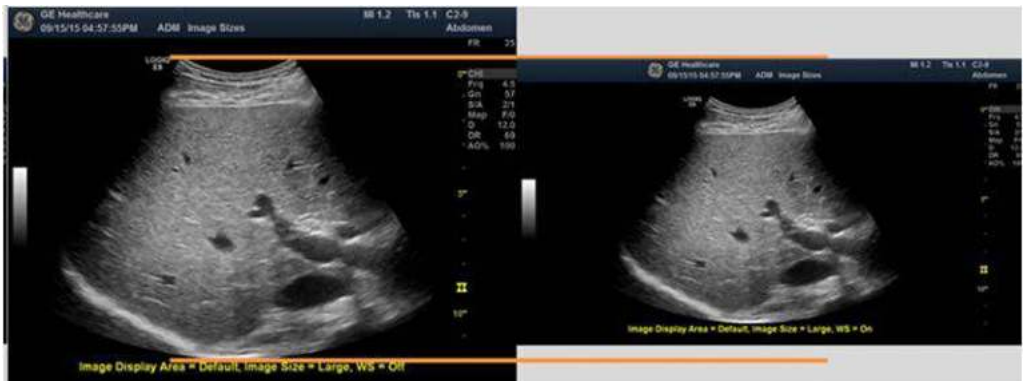
PACS Image Display Area: Left = Default, Right = Large

Table 3-18: Wide Screen Monitor Display Settings (Continued)

| Preset Setting | Description | Choices |
|------------------------|--|---|
| Use Wide Screen For... | <p>“Use Wide Screen for...” determines when the system will use a wide screen aspect ratio (16:9) as opposed to a “standard” aspect ratio (4:3). If “Single Image” under this heading is set to On, then the 16:9 aspect ratio is always used.</p> <p>A third aspect ratio is used if Extra Large is selected under Image Display Area. In this case the Wide Screen display options are not used and a 16:10 aspect ratio is used for all images. The 16:10 aspect ratio will be only modestly different than the 16:9 aspect ratio.</p> <p>Note: PACS display the top and bottom of the image as black bars, just like watching a wide-format movie on a non-wide screen TV.</p> | <ul style="list-style-type: none"> • On • Off • Auto |



Ultrasound System Left&Right: Image Size=Large, Image Display Area=Default; Right: Wide Screen=On



PACS Left&Right: Image Size=Large, Image Display Area=Default; Right: Wide Screen=On

Image Display Area Preset Setting Notes

The following table shows pixel counts (columns × rows) for saved images for all combinations of Image Display Area and Wide Screen on/off.

Table 3-19: Wide Screen Single Image and CINE Clip Pixel Count

| Image Display Area Setting | Single Image | Single Image | CINE Clip* | | Stress Clip |
|----------------------------|--------------|--------------|------------|------------|-------------|
| | On | Off | On* | Off* | |
| Default | 1456 x 819 | 1092 x 819 | 1346 x 748 | 982 x 748 | 1092 x 819 |
| Large | 1552 x 873 | 1164 x 873 | 1442 x 802 | 1054 x 802 | 1164 x 873 |
| Extra Large | 1552 x 970 | 1552 x 970 | 1442 x 899 | 1442 x 899 | 1552 x 970 |

*Under CINE Clip, "On" and "Off" mean Wide Screen Single Image On/Off, **NOT** CINE Clip On/Off.

NOTE: Note the different pixel counts for single frames and cine clips. This is because saved cine clips cut off the title bar and image parameter window.

Use Wide Screen For... Preset Setting Notes

The following table shows the aspect ratio for saved images for all combinations of Image Display Area and Wide Screen on/off. For comparison, it also includes data for the image display on 19" monitors. For CINE clips, the aspect ratios will not be exactly the same as for single frames, but they will be very close.

Table 3-20: Wide Screen Aspect Ratio, Single Image

| Image Display Area Setting | On | Off |
|----------------------------|-------|-------|
| Default | 16:9 | 4:3 |
| Large | 16:9 | 4:3 |
| Extra Large | 16:10 | 16:10 |

Test Patterns

The LOGIQ Fortis monitors follow the DICOM Gray Scale Display Function (GSDF) standard* which uses a GSDF curve to evaluate the health and effectiveness of the monitor. The GSDF standard is what is commonly used for calibrating PACS' monitors. This setting may help to make the image appearance more uniform between the LOGIQ Fortis and PACS.

NOTE: *The monitor is GSDF-compliant with all contrast settings, but not all brightness settings.*

There is a GSDF on/off switch, "Enable DICOM grayscale display mode (GSDF)" via the Utility--> System--> System Display page that allows you to adjust the monitor you are using to the PACS.

Table 3-21: Test Patterns


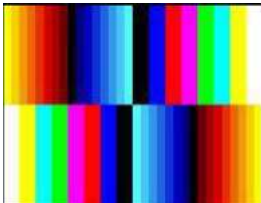
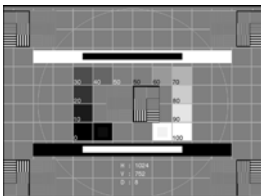

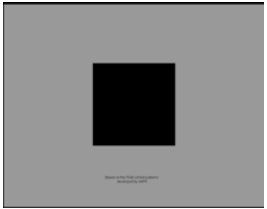

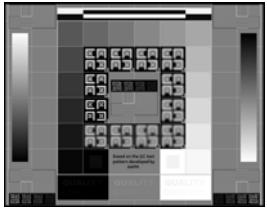
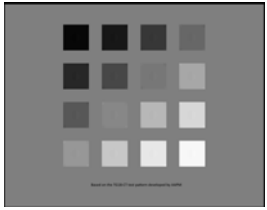
| Test Pattern | Description | Screen Example |
|--------------|--|--|
| Gray Bars | Confirm that you can clearly see all of the different gradations of the grayscale in each gray cell. |  |
| Color Bars | Confirm that you can clearly see all of the different colors in each colored cell. |  |
| Resolution | Confirm that this image is clear and crisp, without jagged edges or lines. |  |

Table 3-21: Test Patterns (Continued)

| Test Pattern | Description | Screen Example |
|---|--|---|
| Brightness Contrast | Before making any adjustments, record the settings for contrast and brightness. In a dimly lit room, adjust the monitor to Brightness 50 & Contrast 40. Increase the contrast until the left most block in the second row from the bottom is just visible. All the remaining blocks in the last 2 rows of the image should now be visible. Reset the contrast and brightness to the recorded levels. |  |
| LN1 to LN18 | Luminance for different grayscale levels. Usually, the facility's Biomed Engineer tests each gray level map on the monitor from LN-1 to LN-18 with a light meter and then graphs these on a scale to ensure that the curve falls within the GSDF's standard. Generally, this is performed yearly. | <p data-bbox="920 535 969 557">LN-1</p>  <p data-bbox="920 771 982 793">LN-18</p>  |
| QC | Quality Control. Confirm that this image is clear and crisp, without jagged edges or lines. |  |
| CT | Contrast. Confirm that you can you detect the circles within the square grayscale boxes. |  |
| <p data-bbox="157 1487 1184 1614">**Assessment of Display Performance for Medical Imaging Systems." Report of the American Association of Physicists in Medicine (AAPM) Task Group 18, Medical Physics Publishing, Madison, WI, AAPM On-Line Report No. 03, April 2005, Samei E, Badano A, Chakraborty D, Compton K, Cornelius C, Corrigan K, Flynn MJ, Hemminger B, Hangiandreou N, Johnson J, Moxley M, Pavlicek W, Roehrig H, Rutz L, Shepard J, Uzenoff R, Wang J, Willis C.</p> <p data-bbox="157 1620 821 1643">*Also see https://www.aapm.org/pubs/reports/OR_03.pdf, section 4.3.</p> | | |

Monitor Display

Monitor Display



Figure 3-37. Monitor Display Tour

Monitor Display (continued)





1. System Date and Time (Note: The date on the monitor may truncate the century when using the YYYY-MM-DD date format.)
2. Caps Lock
3. Network Connection Indicators (Wireless LAN, Wired, Mobile Bluetooth), Battery Status
4. DVR Status
5. InSite Indicator
6. Image Clipboard
7. Image Preview
8. Worksheet/Direct Report
9. Gray/Color Bar
10. Institution/Hospital Name, Date, Time
11. Operator Identification, Patient Name
12. Probe Orientation Marker
13. Measurement Calipers and System Message Bar
14. Color Window
15. Power Output Readout
16. Probe Identifier, Exam Preset
17. Live/Freeze Indicator
18. Imaging Parameters by Mode, Speed of Sound (SoS) Indicator (if applicable)
19. Focus Indicator and Color Flow Focal Zone Marker
20. Depth Scale
21. Image Management Icons and LOGIQ Apps Icon (not shown)
22. Body Pattern
23. CINE Gauge
24. Trackball Controls and Status
25. 6Tc-RS Probe temperature display
26. 6Tc-RS Probe angle display

Live/Freeze Indicator

Live/Freeze Indicator shows active image scan status with Single/Dual/Quad format and has four choices (Live/Not Live/Update/B Pause).

Live/Freeze Indicator display (on/off) is configurable on Utility -> System -> System Display menu.

Table 3-22: Live/Freeze Indicator

| | | | |
|----------|---|---------|--|
| Live |  | Update |  |
| Not Live |  | B Pause |  |

Monitor Display Layout

Monitor Display Layout is configurable on Utility -> System -> System Display menu.

See 'System/System Display Preset Menu' on page 10-12 for more information.



Figure 3-38. Default Image Format (4:3)

1. Title bar
2. Information window 1
3. Information window 2
4. Scan Area
5. Control Window
6. Preview window/User Label
7. Clipboard
8. Trackball mapping and Set keys
9. Status area

Information Window

Measurement Summary, Side Clipboard, Scan Assistant Guide, and My Desktop are displayed options for Info1 or Info2 window.



Figure 3-39. Information Window - Example

1. Measurement Summary
2. Side Clipboard
3. Scan Assistant Guide
4. My Desktop

My Desktop

The user can import graphics (jpeg) and write a caption for that graphic to display on My Desktop in Utility -> User Specific.

Table 3-23: User Specific

| Preset Parameter | Description |
|------------------|---|
| My Desktop Title | Free text |
| Picture 1 and 2 | Browse to load jpeg and type the caption. |
| Background Color | Select Color: Select the background color. Default Color: Reset the background color to factory default. |
| Import | Import the graphic. |

User Label

In Utility -> Application -> Settings -> Label Area, you can enter User Label which displays in the Preview Window as a brief note.

For example, P1 - Stills only, P2 - Stills, Clips (3 sec.), P3 - Volume, P4 Screen Capture.

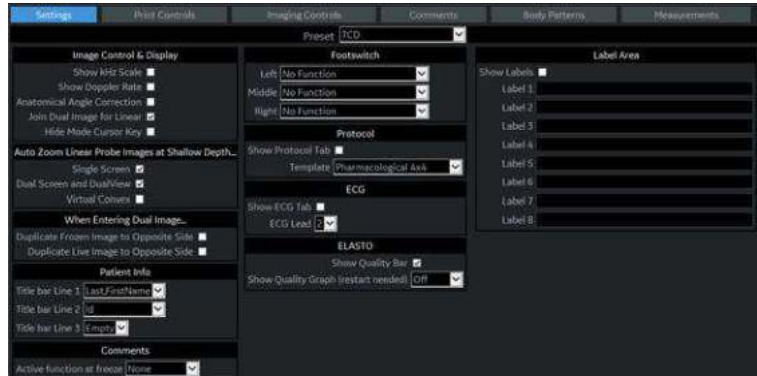


Figure 3-40. Application Settings Preset Menu

Table 3-24: Label Area

| Preset Parameter | Description |
|------------------|--|
| Show labels | If selected, the system displays the User Label in the Preview Window at the left-bottom of the monitor. |
| Label 1 - 8 | User labels have eight text lines. Each User Label is limited to 50 characters. |

Change the Display Image Area

You can change the screen format layout by pressing the lower, right-hand corner of the Display Image Area icon on the display:

Table 3-25: Display Image Area Selections


| | |
|---|--|
| <p>Display Image Area icons</p>  | <p>Click Image Display Area icon to toggle current display area and extra large area.</p> <p>Default Layout</p> <ul style="list-style-type: none"> • (4:3 Layout) Standard • (16:9 Layout) Full Wide <p>Large Image Layout</p> <ul style="list-style-type: none"> • (4:3 Layout) Standard • (16:9 Layout) Full Wide <p>Extra Large Layout</p> <ul style="list-style-type: none"> • (16:10 Layout) Partial Wide |
|---|--|

Table 3-26: Display Image Area Examples

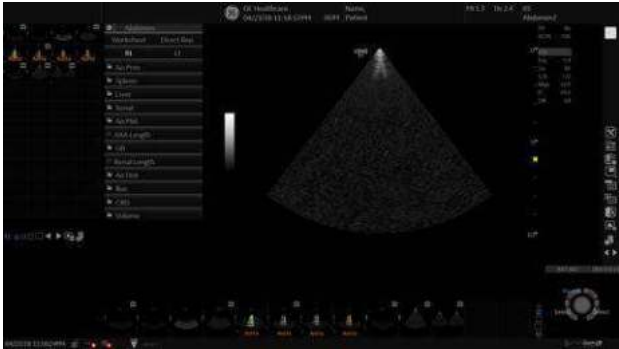

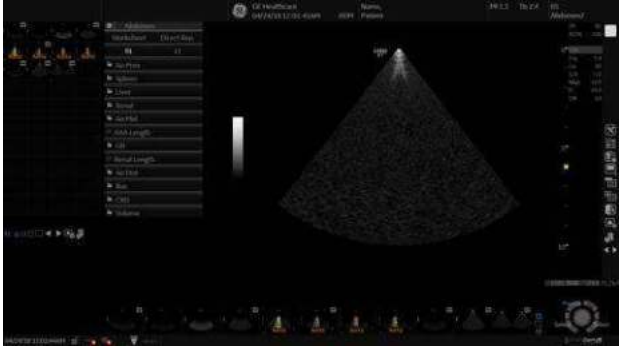

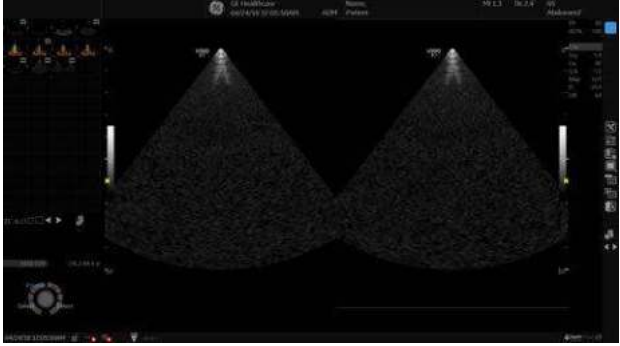
| | |
|---------------------------------|--|
| <p>Default Layout Standard</p> |  |
| <p>Default Layout Full Wide</p> |  |

Table 3-26: Display Image Area Examples (Continued)

| | |
|---------------------------------|---|
| Large Image Layout Standard |  A screenshot of a software interface showing a single large image of a fan-shaped sensor field. The image is centered on the screen. On the left side, there is a vertical menu with various options like 'Map', 'Layers', 'Map Style', etc. On the right side, there are several control buttons and a vertical toolbar. At the bottom, there is a status bar with various indicators and a small circular control element. |
| Large Image Layout Full Wide |  A screenshot of the same software interface, but with two large images of the fan-shaped sensor field side-by-side, filling most of the width of the screen. The vertical menu on the left and the control elements on the right and bottom are still visible. |
| Extra Large Layout Partial Wide |  A screenshot of the same software interface, showing two large images side-by-side. In this configuration, the images are slightly smaller than in the 'Full Wide' configuration, leaving more space for the control elements on the right and bottom. |


NOTE: Even If there are buttons on the rear cover of the monitor, DO NOT use those buttons for adjustment. The LOGIQ Fortis system will override the parameter(s) and the monitor does not have capability to retain parameters.

Using the Monitor Display Controls to Manage Images

Image Management Icons

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

Table 3-27: Image Management Icons

| | |
|--|---|
|  | <p>Image Display Area Press Image Display Area to select Image Display Area - Default/Large/Extra large. See 'Change the Display Image Area' on page 3-77 for more information.</p> |
| | <p>Worksheet Activate the Worksheet.</p> |
| | <p>Active Images Press Active Images to go to the Patient Active Images page.</p> |
| | <p>Compare Assistant Press to activate Compare Assistant.</p> |
| | <p>Activate Save As Menu - Note: Save As Menu icon is displayed only when an image is recalled or scan state is frozen/CINE Loop.</p> |
| | <p>Delete Recalled Image/Delete Last Image - Delete Recalled Image is displayed only when one image is recalled. / Delete last image icon is displayed only when the image is not recalled and there are non-stored images. You can use this to delete an image from the clipboard. Place the cursor on the clipboard image you want to delete, then press Set to select the image. Then place the cursor on the Delete icon and press Set.</p> |
| | <p>Next/Previous Image(s) and Clipboard Slide Show Press the left arrow to move to the previous image; press the right arrow to move to the next image. Clipboard Slide Show The Clipboard Slide Show plays all images on the clipboard and wraps around the ends. To activate, press and hold [Ctrl] + [Previous Arrow] or [Ctrl] + [Next Arrow].</p> <ul style="list-style-type: none"> • Each image recalls for three seconds, or the length of the loop, whichever is longer. • You can manually skip to a new image during the slide show by recalling it, as usual. • To end the slide show manually, press [Ctrl] + [Previous]/[Next] again. • Slide Show ends when you go to live scanning, or if the clipboard is not shown when it's time for the next image to load. |

System Positioning/Transporting

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.



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.



Never move the system with locked wheels.

Before moving the system

1. Press the **Power On/Off** switch to power off the system. See 'Power Off' on page 3-37 for more information.
2. Unplug the power cord.
3. Wind the power cable around the neck of rear handle.



LOOSELY (not twisting tightly) wrap the Power Cord around the neck of rear handle. Occasionally wrap the Power Cord around the neck of rear handle in the opposite direction.

NEVER allow the Power Cord to drag on the floor.

NEVER roll over the Power Cord with the wheels.

Failure to follow these instructions could lead to exposure to electrical shock.

4. All cables from off-board peripheral devices (external Color Digital/Report printer, etc.) and the ethernet connection must be disconnected from the console.
5. Ensure that no loose items are left on the console.
6. Connect all probes to be used while off site. Ensure that probe cables are out of the way from the wheels and not protruding beyond the console. Use the probe management hooks located below the Operator Panel to further secure the probe cables

NOTE: *If more than four (4) probes are intended to be used, store the additional probes securely.*

7. Store all other probes in their original cases or in soft cloth or foam to prevent damage. In addition, on-board storage bins are available as a system option.

Before moving the system (continued)

8. Store sufficient gel and other essential accessories in the provided space.
9. Adjust the monitor and control panel to their lowest positions by using the up/down switch on the front of the operator panel. Make sure the operator panel is locked in place.



To prevent system damage while not in use AND/OR before moving the system, flip down the monitor and lock the monitor arm and operator panel firmly in place.



Figure 3-41. Flip down the monitor and lock the monitor arm

10. Unlock the wheels.

When moving the system



CAUTION

1. Always use the rear handle grips to move the system.
- **DO NOT** attempt to move the console using any cables or fixtures, such as the probe connectors.
- **DO NOT** attempt to move the system with the monitor by pulling cables or belts placed around the monitor and/or monitor arm.
- **DO NOT** restrain the LOGIQ Fortis at the monitor or the monitor neck using a belt. Always secure the monitor at the body part of the console.
2. Take extra care when moving the system long distances and on inclines. Ask for help if necessary.
Avoid ramps that are steeper than ten degrees to avoid tipping over the system. Utilize additional care and personnel when moving on a steep incline (>5 degrees) or loading the system into a vehicle for transport.

NOTE:

Wheel chair ramps are usually less than five degrees.

3. Use the foot brake (pedal), located on the bottom of the system in the front, when necessary.
4. Do not let the system strike walls or door frames.
5. Use extra care when crossing door or elevator thresholds.
6. Once the destination is reached, lock the wheels.



WARNING

To avoid possible injury and equipment damage:

- Be sure the pathway is clear.
- Limit movement to a slow careful walk.
- Use two or more persons to move the system on inclines or long distances.

Failure to follow instructions could lead to possible injury and/or equipment damage.

Wheels

Examine the wheels frequently for any obvious defects that could cause them to break or bind. Each wheel has an independent brake pedal. A left rear wheel also has a swivel lock.

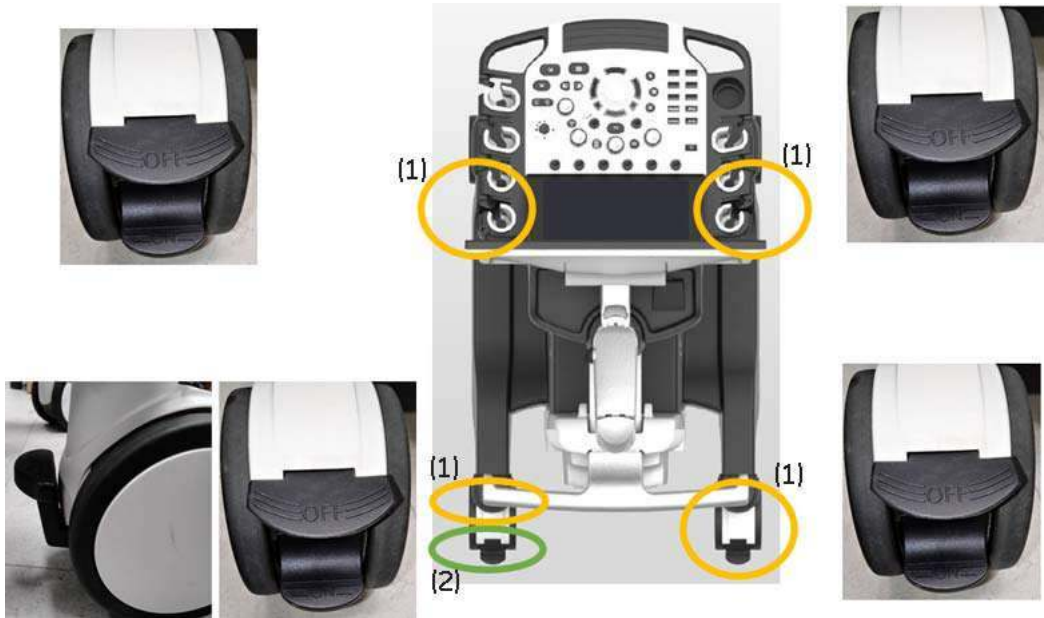


Figure 3-42. Wheel lock and Swivel lock

1. Brake pedal

2. Swivel lock



CAUTION

If you park the system on a slippery slope, you **MUST** use the brakes on the wheel.

Brake pedal



Figure 3-43. Front and right-rear caster

1. Step on Lower side pedal to activate Brake
2. Step on Upper side pedal to release Brake



Figure 3-44. Left-rear caster

1. Step on to activate Brake
2. Raise up to release Brake

Swivel lock



Figure 3-45. Rear-left with Swivel lock

1. Step on Lower side pedal to activate Swivel Lock with clicking sound
2. Step on Lower side pedal to De-activate Swivel Lock

NOTE: *Wheel needs to be straight when you activate Swivel Lock.*



Figure 3-46. Caster position for Swivel lock

Transporting the System

Use extra care when transporting the system using vehicles. In addition to the instructions used when moving the system (see 'Before moving the system' on *page 3-81* for more information), also perform the following:

1. Before transporting, place the system in its special storage case.
2. Only use vehicles that are designed for transport of the LOGIQ Fortis system.
3. Load and unload the system to a vehicle parked on a level surface.
4. Ensure that the transporting vehicle can handle the weight of the system plus the passengers.
5. Ensure that the load capacity of the lift (a minimum of 85 kg [187 lbs] is recommended) is capable of handling the weight of the system and any other items on the lift at the same time.
6. Ensure that the lift is in good working order.
7. Secure the system while it is on the lift so that it cannot roll. Use either wood chocks, restraining straps, or other similar types of constraints. Do not attempt to hold it in place by hand.

NOTE: Strap the system below its handle so that the system does not break loose.

8. Employ two to three persons to load and unload safely from a vehicle.
9. Load the unit aboard the vehicle carefully and over its center of gravity. Keep the unit still and upright.

NOTE: Do not lay the unit down on its side.

10. Ensure that the system is firmly secured while inside the vehicle. Any movement, coupled with the weight of the system, could cause it to break loose.
11. Secure system with straps or as directed otherwise to prevent motion during transport.
12. Prevent vibration damage by driving cautiously. Avoid unpaved roads, excessive speeds, and erratic stops or starts.

Acclimation Time

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

Table 3-28: System Acclimation Time Chart

| | | | | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Degree C | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 |
| Degree F | 140 | 131 | 122 | 113 | 104 | 95 | 86 | 77 | 68 | 59 | 50 |
| hours | 8 | 6 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | |
| Degree C | 5 | 0 | -5 | -10 | -15 | -20 | -25 | -30 | -35 | -40 | |
| Degree F | 41 | 32 | 23 | 14 | 5 | -4 | -13 | -22 | -31 | -40 | |
| hours | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | |

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:

- Dataflow
- Exam category
- Patient ID
- Patient name
- 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.

Patient Screen

Press **Patient** on the Touch Panel to display the Patient Screen on the monitor.

- Enter Patient Data with the alphanumeric keyboard.
- To navigate through the Patient Entry menu, use the **Tab** key or **Trackball** and **Set** to move and fix the cursor.

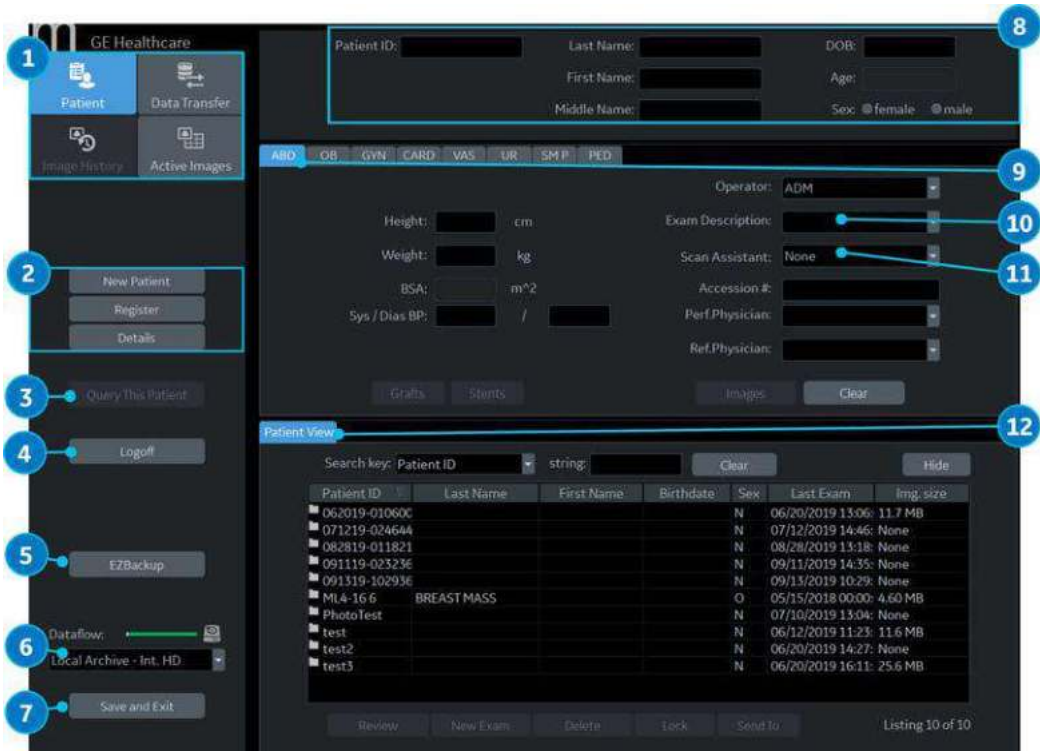


Figure 4-1. Patient Screen (Example: Category ABD)

Table 4-1: Patient Screen

| No. | Function | Description |
|-----|------------------|---|
| 1. | Image Management | <ul style="list-style-type: none"> • Patient–Provides a search and creation of patient. (currently selected) • Image History–Provides a list of images per exam for the currently selected patient. • Active Images–Provides preview of the currently selected exam and Compare Assistant. • Data Transfer–Provides an interface to handle patient data from a remote device. |

Table 4-1: Patient Screen (Continued)

| No. | Function | Description |
|-----|------------------------|--|
| 2. | Function Selection | <ul style="list-style-type: none"> • 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. If you are using the auto-generate Patient ID feature, do not select Register. It is always a good practice to Register all patients. • Details—Select the Details box to activate/deactivate the exam details. The Exam Description pull-down selection is used as the DICOM identifier. |
| 3. | Query This Patient | Allows for One Click Q/R for the current patient. |
| 4. | Logoff | Used to logoff system. |
| 5. | EZBackup | One-step method to backup patient images to an external media. |
| 6. | Dataflow Selection | <p>Select archive and other pre-defined services. 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.</p> |
| 7. | Save and Exit | Used to save all changes and exit the Patient Menu. |
| 8. | Patient Information | <ul style="list-style-type: none"> • Patient ID Number • Alternate (Other, Second) Patient ID Name and Number. The system allows you to enter a second identification number for the same patient, which may be required in certain countries. This is only displayed if enabled on the Connectivity -> Miscellaneous screen. • Patient Name—Last, First and Middle • DOB (Birthdate) • Age (automatically calculated when birthdate is input) • Sex |
| 9. | Category Selection | <p>Select from 8 exam application categories. When a category is selected, the measurement and category presets are displayed.</p> |
| 10. | Exam Information | <p>Shows the Current/Active Exam information. Information pertinent to the selected exam category appears in the window. All possible information needs to be entered.</p> <ul style="list-style-type: none"> • Images—Displays the selected exam's images in the middle of screen. • Clear—Clears existing data. • Past Exam (only for OB)—Input past exam data (register the patient before using). |
| 11. | Scan Assistant Program | The Scan Assistant Program is either selected automatically or manually, depending on the preset as configured on the Utility--> System--> General page. |
| 12. | Patient View/Exam View | Display either patient or examination list. Refer to 'Patient View/Exam View' on page 4-5 for details. |

Patient View/Exam View

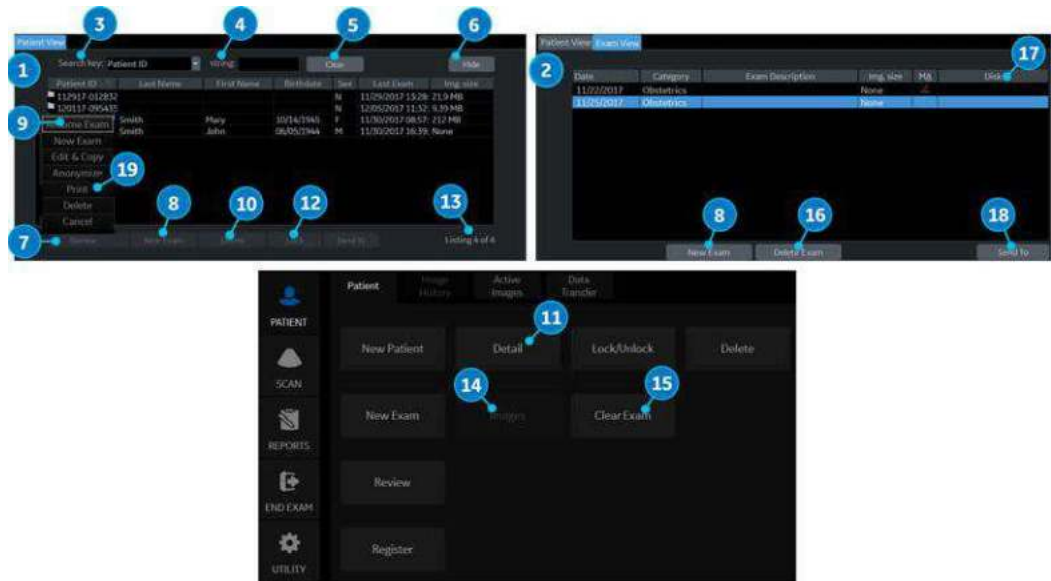


Figure 4-2. Patient View and Exam View

Table 4-2: Patient View/Exam View

| No. | Function | Description |
|-----|--------------|---|
| 1. | Patient View | Lists the patients in the database. When you double-click a patient on the patient list using the Set key, the Review screen or New Exam entry screen displays depending upon how the “Double click on patient list to start” preset is set at Utility -> Connectivity -> Miscellaneous. |
| 2. | Exam View | Displays the list of all the exams for the Current Patient. The system can display the Detail Mode instead of Exam View when you select a patient on the patient list and press Review or Register (to Register, enter a patient ID and select). If the Detail Mode preset on Utility -> Connectivity -> Miscellaneous menu is selected, the Detail Mode displays. |
| 3. | Search | Select a search criteria. Note: Criteria “Img. Archived” means that the exam was backed up to external media by EZBackup or Export. |
| 4. | String | Enter appropriate information for search criteria. Note: If you select Locked (Y, N) or Archived (Y, N) for the Search key, enter Y (Yes) or N (No). |
| 5. | Clear | Clears the entered string. |
| 6. | Hide | Hide the patient view. |

Table 4-2: Patient View/Exam View (Continued)

| No. | Function | Description |
|-----|---------------|---|
| 7. | Review | Highlight the patient and press Review. Exam view is displayed. Note: If the selected patient has a Current Exam or the selected exam is the Current Exam, the Review button changes to "Resume Exam" on Patient List. |
| 8. | New Exam | Creates a new exam for the current patient. |
| 9. | Resume Exam | Continues the exam for that patient if you select the last exam of the day. |
| 10. | Delete | Delete one or more patient record from Patient View. Note: "Delete" is only displayed when you login as Administrator. |
| 11. | Detail | The detail information for the selected category displays. |
| 12. | Lock/Unlock | Locks the exam/patient. Prevents move and delete functions. If you select the patient, all exams are locked. If you select one exam, the selected exam is locked and the lock icon displays in the patient ID cell. |
| 13. | Listing xx/xx | Displays the quantity of patients that match the search criteria in the search window or the quantity of patients in the database. |
| 14. | Images | Display images of the selected exam in the middle of the monitor. |
| 15. | Clear Exam | Clear exam (located on the Touch Panel). |
| 16. | Delete Exam | Delete one or more exams from Exam View. Note: "Delete" is only displayed when you login as Administrator. |
| 17. | 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. |
| 18. | Send To | Send the images to the DICOM Device. |
| 19. | Print | Print the search list to a standard printer. Highlight the patient and press left Set key. Select Print from the pop-up and press the right Set key. |



NOTE: Refer to 'Change Patient ID of the existing patient (Edit & Copy)' on page 4-18 and 'Anonymize the patient' on page 13-407 for more information about Edit&Copy and Anonymize.

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



DANGER

The Ultrasound 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. The interaction of sound energy with tissue at sufficiently high levels and/or longer duration can produce biological effects (aka bioeffects) of either a mechanical or thermal nature.



DANGER

It is prudent to conduct an exam with the minimum amount and duration of acoustic output necessary to optimize the image's diagnostic value. The interaction of sound energy with tissue at sufficiently high levels can produce biological effects (aka bioeffects) of either a mechanical or thermal nature.

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 have to enter the OB-specific information. Obstetric patient fields are listed in the following table.

Table 4-3: 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 slash (/). 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. |
| Accession # | Exam number used with hospital information system (DICOM). This is a tracking number from the worklist. |
| Exam Description | Describe the type of exam. |
| 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. |
| Operator | The person (not a physician) who performs the scan. Choose from the list. |

NOTE: To fill in the following information, move the **Trackball** to highlight the **Detail** button and press **Set**.

Table 4-4: Obstetric fields: Detail

| Field | Description |
|-------------|--|
| Indications | Why the patient needs the ultrasound exam. |
| Comments | Comments about the exam. |

Starting an examination

Cautions and Warnings



WARNING

Imaging functions may be lost without warning. Develop emergency procedures to prepare for such an occurrence. Failure to prepare for unexpected loss of functionality could lead to patient injury.



WARNING

Always ensure you have selected a dataflow. If No Archive is selected, no patient data is saved and a rescan may be required. A Ø appears next to Dataflow if No Archive is selected.



WARNING

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.

Cautions and Warnings (continued)



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 scan region.

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.

Creating a new patient record

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

1. Press **Patient** on the Touch Panel.
2. Press **New Patient** on the Touch Panel or the monitor.
3. Fill in patient information.

NOTE: Press **Tab** or **Enter** on A/N keyboard to move the cursor to next field.

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

“ ‘ \ / : ; . , * < > | + = [] &

4. Choose the exam category.
Enter the required information for the selected exam category.

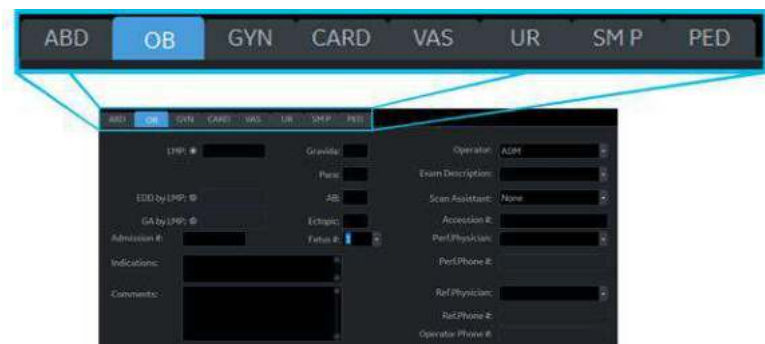


Figure 4-3. Exam category

5. Verify the dataflow.

NOTE: DO NOT use the removable media dataflows on the New Patient menu.

NOTE: The system can 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. A different dataflow for permanent storage of patient data should be selected.

6. Select **Register**.
7. Select the probe to start scanning (or select Save and Exit, Esc, Scan, or Freeze).

Perform an exam

1. Select the probe, exam category, and application.

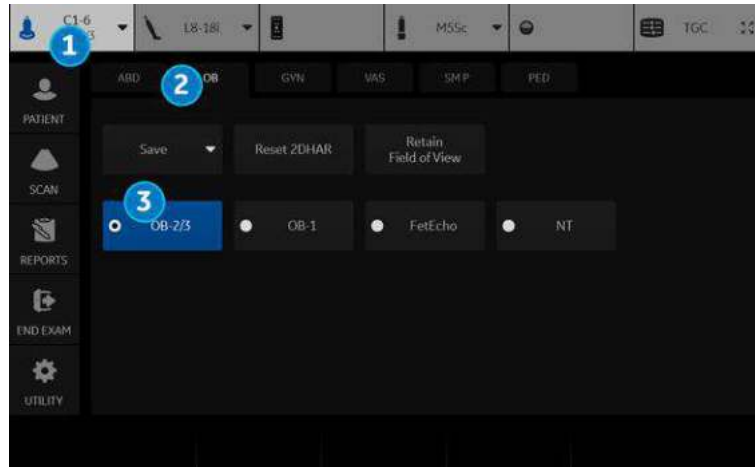


Figure 4-4. OB Preset - example

1. Probe
2. Exam category
3. Application preset

NOTE: See 'Imaging Preset Manager' on page 10-145 if you want create/edit user defined preset.

2. Perform an exam.
3. Store the raw data to the clipboard.

To store the still image, press **Freeze** and run the cineloop using the **Trackball**. Select the frame and press **P1** (or the assigned Print key).

To store the cineloop, press Print key without freezing or press **Freeze** and run the cineloop using the **Trackball**. Select the start/end frame and run the selected loop. Press **P1** (or the assigned Print key).

Ending an exam



WARNING

To ensure correct storage of measurements, verify that the measurement result window is updated before you send or save the image.

1. When you have completed the study, press **End Exam** on the Touch Panel.
2. The image management screen displays. Select the images (still frame or cineloop) you want to store or select **Select All** to store all images. Select **Permanent Store** to store the images permanently.

NOTE: *Return to the patient screen automatically from the scan screen when you select OK from the “ID is not unique” warning message.*

Scanning without entering any patient data

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

1. Press **Scan**.
2. When you scan the patient and save images to clipboard without a patient, you will receive a warning that states, “A patient must be selected for permanent storage of image.” Press OK.
3. Press **Patient** to display the Patient Search screen.
4. Enter the Patient ID.

NOTE: *If you have images or measurements that are not attached to a Patient ID, the message “Unsaved images, measurements or fetus number will be linked to the current patient information, continue?” appears when the patient ID is registered.*

5. Enter patient data and exam information as necessary.
6. Press **Active Images**.
7. Press **Permanent Store**.

Starting a new exam on an existing patient

1. Press **Patient**.
2. Press **New Patient** on the Touch Panel or the monitor.
3. Enter Patient ID or Last name, etc. in the patient information to display the target patient in Patient View.
For example, if you type “v” in Patient ID, only display patients begins with patient ID “v”.
or select Search key and enter a string to search a patient.
4. Highlight the target patient and double click the right **Set** key. Selected patient information displays.
5. Choose the exam category for new exam.
6. Select **New Exam**. A new exam is created in Exam View.
7. Select the probe to start scanning (or select Exit, Esc, Scan, or Freeze).

Retrieve Patient/Exam Information from Worklist

NOTE: Before you retrieve data from the Worklist server, make sure that Network LAN is connected correctly. If the worklist is not displayed, reboot the system.

1. Press **Patient** and select **Data Transfer**. The Data Transfer screen displays.
2. Click on a radio button of **Worklist**. The patient/exam list displays in the Transfer To section.



Figure 4-5. Data Transfer

1. Worklist
 2. Worklist radio button
 3. Transfer button
 4. Worklist server
3. The Worklist used last time is displayed on the monitor display. Press **Refresh** to refresh the list or select another Worklist server from the Transfer From pull-down menu.
 4. Select the patient(s) or the exam(s) from the list.
 5. Press **Transfer**. The progress bar displays during the transfer.
 6. Enter the required items and start an exam.

Sending Multiple Exams and Patients with Single Click to PACS

In the Patient View window, select 1 or multiple patients -- you can select by whole exam or whole patient -- to send to PACS. Select multiple items by using the Shift+Trackball Set Key.



Figure 4-6. Multiple Patient/Exam Send To

Change Patient Information except Patient ID and scan

1. Perform Step 1 to 6 in 'Starting a new exam on an existing patient' on *page 4-15*.
2. You can change Patient information except Patient ID.

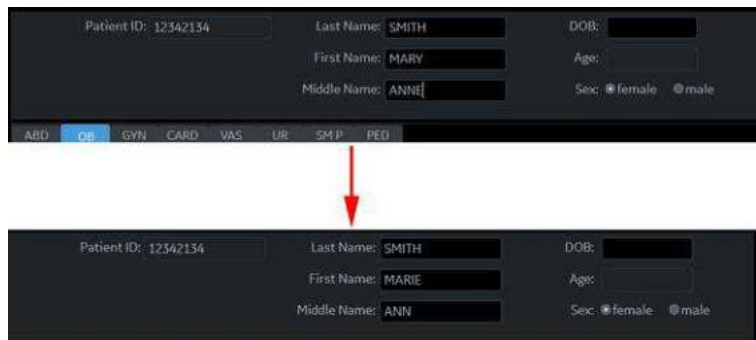


Figure 4-7. Change Patient Information

3. Select the probe to start scanning (or select Exit, Esc, Scan, or Freeze).

Change Patient ID of the existing patient (Edit & Copy)

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

NOTE: *If you do not see the Edit and Copy ID option on the pop up menu, make sure the top half of the patient screen is blank.*

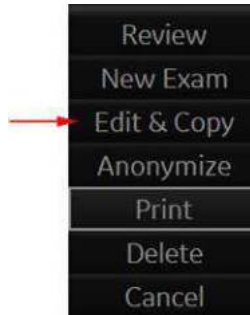


Figure 4-8. Select an Exam to Copy and Edit

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



Figure 4-9. Copy Patient Pop-Up Confirmation

Change Patient ID of the existing patient (Edit & Copy) (continued)

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

Figure 4-10. Edit and Copy 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 “Edit and Copy Patient” function.

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

NOTE: *If the newly 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 4-11. Copy Status Bar

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

Make sure that the patient record with new Patient ID is created.

NOTE: *If you want delete Patient record with old Patient ID, click **Delete** on the Touch Panel.*

Tips



WARNING

Confirm the patient identification prior to deleting/entering/importing any patient data. The user is responsible for patient data, diagnostic information or any other patient-related information entered in the database. Failure to follow instructions could lead to loss of or incorrect patient data.

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: exported, MPEGvue, SaveAs, DICOM Store, or (DICOM) print.*

NOTE: *“Edit and Copy Patient” does not copy the patient’s report.*

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.*

Retrieving and editing archived information

Searching for an existing patient

1. Press **Patient** to display the Patient Screen.
2. Select the search key (Patient ID, First Name, Last Name, etc.). Type the search string.

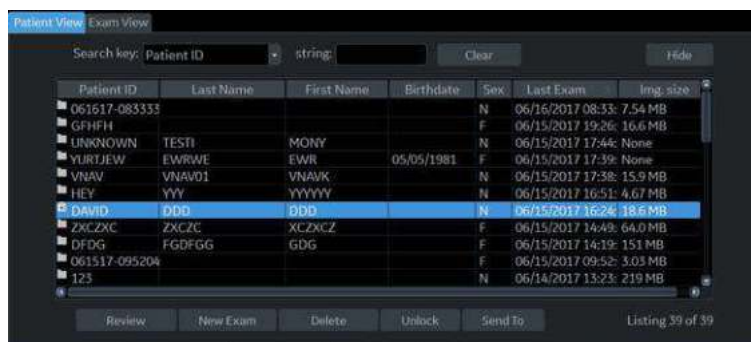
When default configured, the system automatically searches to see if the patient is already in the archive. The result of this search is displayed in the Patients list.

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” preset, found under Patient/Exam Menu Options in Utility -> Connectivity -> Miscellaneous.*
 - *Delete unnecessary patient data.*
3. Highlight the patient in the Patients list.
Select the Exam View tab to display a list of examinations instead of the patient records.

Searching for an existing patient (continued)



1 2 3 4

Figure 4-12. Patient Search Screen

1. Select **Review** to review the exam history of this patient.
If the study was performed on the same day, **Resume Exam** will populate in place of **Review** to continue the exam
2. Select **New Exam** to create a new exam for this patient.
3. Select **Delete** to delete this patient.
4. Lock/Unlock. Use to lock/unlock the exam/patient.

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

Pop-up menu

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

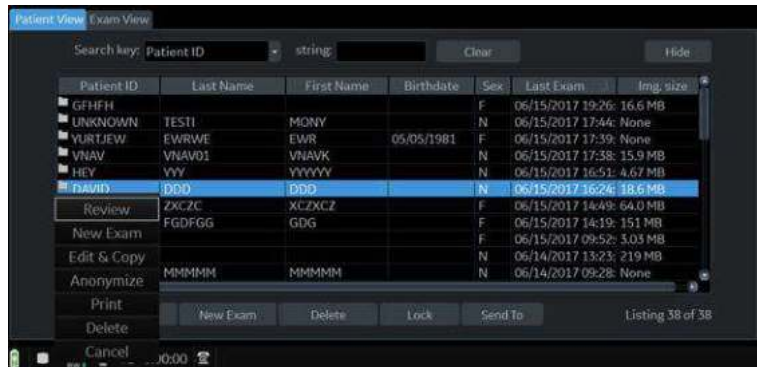


Figure 4-13. Archived Patient

If the study was performed on the same day, **Resume Exam** will populate to continue the exam.

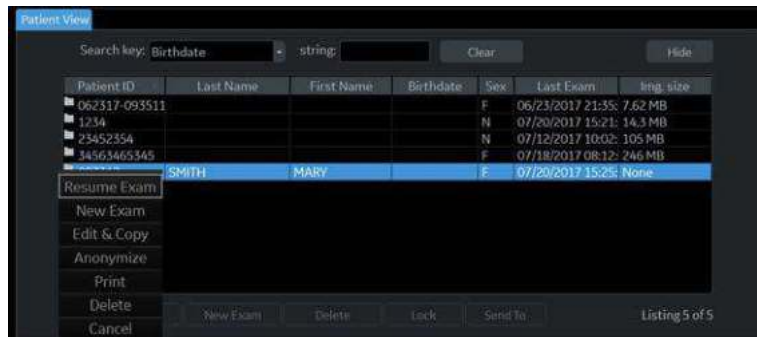


Figure 4-14. Patient of the Day

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.

Changing Patient Information or an Exam

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

If the patient is still active, you can go to the New Patient page to change any field as well as select a different category. 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. The system automatically searches to see if the patient is already in the database.
 - Select Search key (Patient Data: ID, First Name, Last Name, Birthdate, Sex or Exam Date).
 - Enter search string (for example, initial letter of Patient Name)
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.*

Changing Patient Information or an Exam (continued)

4. To have the database shown in its entirety, **Backspace** on the Search string and all patient names appear.
5. Select Register 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.
6. To display the patient information on the title bar, press the **Esc** key, the **B-Mode** key or **Register**.
Select the Model and appropriate probe Touch Panel keys, if necessary.

Deleting the existing patient/exam/image



WARNING

Before deleting a patient or image from the Patient Screen, make sure you have already saved the data with EZBackup, Backup, or Export. Verify the media before deletion. Failure to follow instruction could lead to loss of patient data.

Deleting the existing patient

1. Search and select the patient in the patient list with the **Ctrl** or **Shift** keys.
2. Select **Delete**. The confirmation dialog box displays.
OR
Press the left **Set** key. A pop-up menu displays. Select **Delete**. The confirmation dialog box displays.

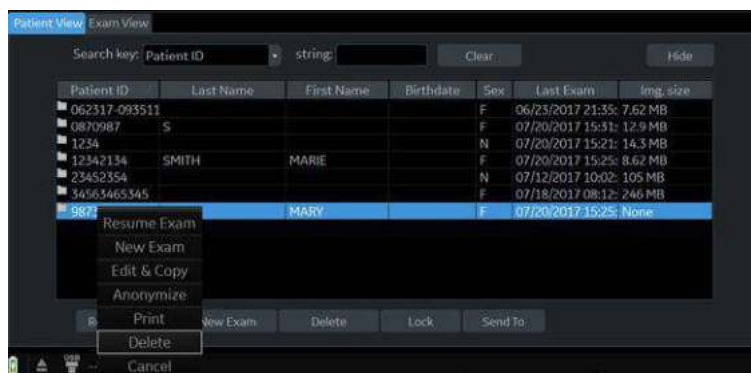


Figure 4-15. Select the patient in the patient list

3. Select **Yes** to delete or **No** to cancel.

Deleting the existing patient/exam/image (continued)

Delete multiple patients from the patient list

1. Select the multiple patients to be deleted from the patient list.
2. Select **Delete**. The confirmation dialog box displays.
OR
Press the left **Set** key. A pop-up menu displays. Select **Delete**. The confirmation dialog box displays.
3. Select **Yes** to delete or **No** to cancel.

Deleting the existing exam

1. Search and select the patient in the patient list.
2. Select **Review**.
3. The patient exam screen displays. Select the exam to be deleted.
4. Select **Delete**. The confirmation dialog box displays.
5. Select **Yes** to delete or **No** to cancel.

Deleting the existing image

1. Search and select the patient in the patient list.
2. Select **Review**. 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 **Yes** to delete or **No** to cancel.

MyPreset

Overview

MyPreset allows you to configure the specific-presets according to the probe.

You can arrange and edit the presets on the Touch Panel in Utility. See 'Arranging MyPreset Tab' on *page 4-29* for more information.

Activating MyPreset

1. Check **Default MyPreset** in Utility > System > System Imaging > Control to start MyPreset.
2. From the Touch Panel, select the active probe icon. MyPreset exam tab displays on the Touch Panel.

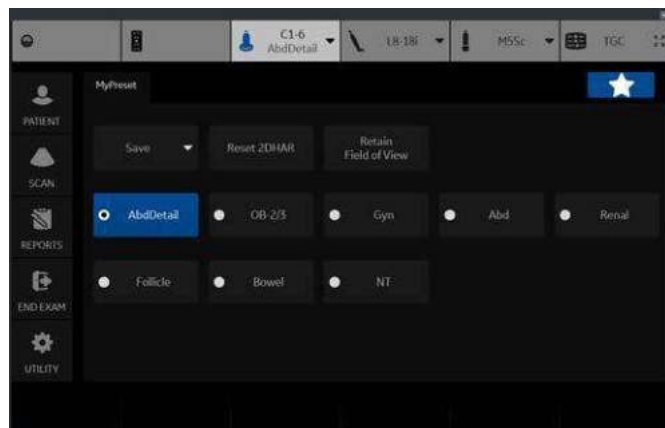


Figure 4-16. MyPreset Tab

NOTE: Select MyPreset (star icon) on the Touch Panel. Conventional exam tab displays.

Activating MyPreset (continued)

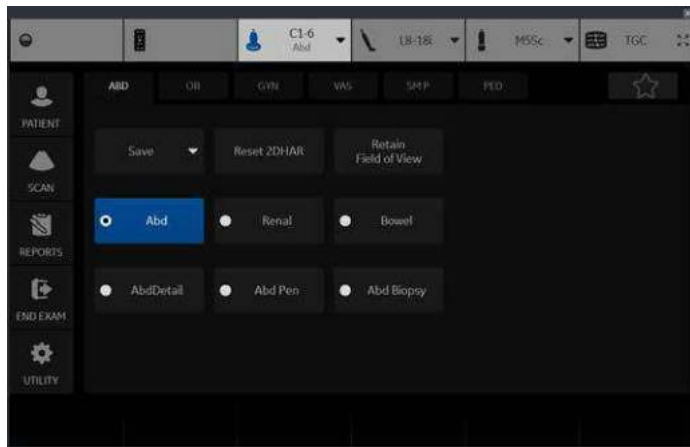


Figure 4-17. Conventional Exam Tab

Arranging MyPreset Tab

You can update MyPreset Configuration for each probe if desired. Need for each probe separately.

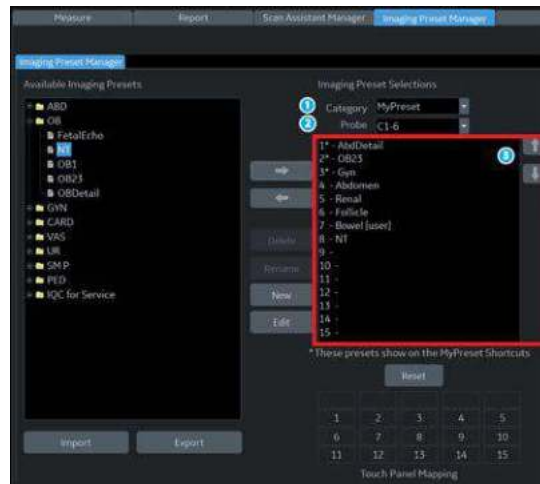


Figure 4-18. Imaging Preset Manager

1. Select MyPreset.
2. Select desired Probe.
3. Select presets from Available Imaging Presets column to be displayed on MyPreset tab. Use the up/down arrow to move the preset to a position.

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, and 3D Mode.

Optimizing B-Mode

Intended Uses

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

Typical B-Mode Exam Protocol

A typical examination using B-Mode might proceed as follows:

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.

B-Mode Scanning Hints



HINTS

These B-Mode controls produce the following results:

Auto Optimize. Automatically improves the contrast resolution of the image by changing the gray scale to match the image data. Available in B-Mode and Doppler Mode.

Coded Harmonics. Improves image clarity and tissue contrast by reducing clutter and artifacts.

B-Flow. Provides a more intuitive representation of non-quantitative hemodynamics in vascular structures.

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

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 onto the same display scale. If you increase the gain, you may want to decrease the Dynamic Range.

Frame Average. Smooths the image by averaging frames. Reduces noise in the image.

TGC. Adjust TGC to adjust Gain in specific areas.

Width. Sizes region of interest. Adjust the Width to the smallest reasonable size to maximize frame rate.

B-Mode Controls

Table 5-1: B-Mode Controls


| Control | Adjusts Acoustic Output | Description/Benefit |
|---|-------------------------|--|
| Depth | Yes | To increase/decrease, adjust Depth . Depth controls the distance over which the B-Mode images anatomy. To visualize deeper structures, increase the depth. If there is a large part of the display which is unused at the bottom, decrease the depth. |
| Gain | No | To decrease/increase, rotate Gain (Mode key). 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. Note: Always optimize gain before increasing the Power Output. |
| Focus  | Yes | In B-Mode, 4D and Contrast (Reference and Contrast) mode, the Focus is applied uniformly across the entire field of view, as indicated by the Focus indicator overlaid on the Depth indicator (see example 1 on the left). In Contrast MVI, CF/PDI/MVI, the Focus position is focused in the Region of Interest, as indicated by the "Dot" indicator overlaid on the Depth indicator (see example 2 on the left). The focus position is assigned to a rotary on the Contrast MVI, CF/PDI/MVI tab. |
| Auto Optimize | No | See 'Auto Optimize' on <i>page 5-8 for more information</i> . |
| ACE | No | Use ACE (Adaptive Contrast Enhancement) to emphasize echoes from real structures while reducing noise/haze. This results in enhanced signal-to-noise ratio. A sub-selection of ACE allows you to adjust how much ACE is applied, including a setting showing the coherence factor. Values are Light, Medium, or High filtering, or None (no filtering). |
| Mode Cursor | No | Displays the M/D-Mode cursor on the B-Mode image. To activate/deactivate the M/D-Mode cursor, press Mode Cursor (left Set key). Trackball to position the M/D-Mode cursor. Adjust the Angle and SV Length as necessary. |
| SRI-HD | No | See 'SRI-HD (High Detection Speckle Reduction Imaging)' on <i>page 5-10 for more information</i> . |

Table 5-1: B-Mode Controls (Continued)

| Control | Adjusts Acoustic Output | Description/Benefit |
|------------------------------|-------------------------|---|
| CrossXBeam | No | CrossXBeam Angle adjusts maximum steering angle of CrossXBeam. Higher values correspond to larger angles. See 'CrossXBeam' on page 5-13 for more information. |
| Coded Harmonic Imaging (CHI) | Yes | To activate Coded Harmonic imaging, press CHI on the control panel. Coded Harmonics enhances near field resolution, diminishes low frequency high amplitude noise and improves imaging technically difficult patients. Coded Harmonics may be especially beneficial when imaging isoechoic lesions in shallow-depth anatomy in the breast, liver, and hard-to-visualize fetal anatomy. |
| Frequency | Yes | Adjust Frequency until the desired frequency is selected. Multi Frequency mode lets you downshift to the probe's next lower frequency or shift up to a higher frequency. |
| Steer | Yes | To slant the linear image to the left/right, select Steer . You can slant the B-Mode or Color Flow linear image left or right to get more information without moving the probe. The angle steer function only applies to linear probes. Linear probes can be steered left, center, or right up to a maximum of 15 degrees, depending on the probe. |
| Virtual Convex | Yes | To activate/deactivate Virtual Convex, select Virtual Convex . On Linear and Sector probes, Virtual Convex provides a larger field of view in the far field. Virtual Convex is defaulted as active with Sector probes. |
| Max Angle | Yes | With IC5-9-D and RIC9-5-D probes, the Virtual Convex control becomes Max Angle. Max Angle toggles the field of view to 179 degrees. |
| TGC | No | 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 pot 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. |
| Width | Yes | To narrow/widen the sector width, rotate the Width control (located on the Depth control). You can widen or narrow the size of the sector angle to maximize the image's region of interest (ROI). |

Table 5-1: B-Mode Controls (Continued)

| Control | Adjusts Acoustic Output | Description/Benefit |
|---------------------|-------------------------|--|
| Tilt | Yes | <p><i>Tilt</i> is available on the Trackball and/or the Rotary control, allowing sector angle adjustment to obtain more information without moving the probe.</p> <p>Trackball Control: When shown as available on the Trackball controls on the display, use the Trackball key and the Trackball to tilt the angle to the left/right.</p> <p>Rotary Control: Rotate the Rotary control to tilt the angle to the left/right. Pressing the control resets Tilt to center.</p> <p><i>Tilt</i> is not available on Linear probes.</p> <p><i>Tilt</i> is not available while in CrossXBeam.</p> |
| Dynamic Range | No | <p>To increase/decrease, adjust Dynamic Range.</p> <p>Dynamic Range controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast. Dynamic Range is useful for optimizing tissue texture for different anatomy. Dynamic Range should be adjusted so that the highest amplitude edges appear as white while lowest levels (such as blood) are just visible.</p> |
| Reverse (if Preset) | No | <p>To flip the image 180 degrees, press the Reverse key.</p> <p>Flips the image 180 degrees left/right.</p> <p>WARNING: When reading a reverse image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal. Failure to follow instructions could result in misinterpretation.</p> |
| Maps | No | <p>To select a map, press the Gray Map on the Touch Panel. A map window displays. The image reflects the map as you go through the selections.</p> <p>The system supplies B, M, and Doppler Mode system maps. Maps are preset-specific and are arranged in order from the softest map on the top of the menu to the map with the most contrast on the bottom of the menu.</p> <p>The only exception is Map J, which is a very soft map.</p> |
| Frame Average | No | <p>Temporal filter that averages frames together, thereby using more information to make up one image. This has the effect of smoothing the image and reducing apparent noise.</p> |
| Colorize | No | <ol style="list-style-type: none"> 1. Select Colorize on the Touch Panel. 2. Trackball to cycle through available maps. 3. Press Set to select. <p>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.</p> <p><i>NOTE: You can colorize realtime or CINE images or Timeline CINE, but not DVR images.</i></p> <p>Colorizes the gray scale image to enhance the eye's discrimination capability.</p> <p>The gray bar displays while Colorize is activated.</p> <p>To deselect, select a gray map.</p> |

Table 5-1: B-Mode Controls (Continued)

| Control | Adjusts Acoustic Output | Description/Benefit |
|----------------|-------------------------|---|
| Rotation | No | Rotates the image 180 degrees. Beneficial in transvaginal and transrectal scanning. WARNING: When reading a rotated image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal. Failure to follow instructions could result in misinterpretation. |
| Frame Rate | Yes | Optimizes frame rate or spatial resolution for the best possible image. High Frame Rate is useful in fetal heartbeat, adult cardiac applications, and clinical radiology applications which require significantly higher frame rates. Low Frame Rate (high resolution) is useful in situations where very small vessels are being imaged, e.g., thyroid, testicles. |
| Rejection | No | Selects a level below which echoes will not be amplified (an echo must have a certain minimum amplitude before it will be processed). Allows for the elimination from the display of low level echoes caused by noise. |
| Suppression | No | Suppresses the noise in the image. |
| Speed of Sound | No | See 'Speed of Sound (SoS) Tissue Imaging' on page 5-23 for more information. |

Auto Optimize

| | |
|---------------------------------|---|
| Description | <p>Auto Optimize (Auto) lets you optimize the image based upon a the actual B Mode image data (Auto Tissue Optimize, ATO). The preset levels (Low, Medium, and High) allow you to pick a preference for the contrast enhancement in the resulting image. Low does the least amount of contrast enhancement, high does the most.</p> <p>Auto is available in single or multi image, on live, frozen or CINE images (in B-Mode only), and while in zoom.</p> <p>Auto in PW Doppler Mode (ASO: Auto Spectral Optimization) optimizes the spectral data. Auto adjusts the Velocity Scale/PRF (live imaging only), baseline shift, dynamic range, and invert (if preset). “Running Auto Spectral Optimization” appears at the bottom of the monitor upon activation. Upon deactivation, the spectrum is still optimized.</p> |
| Benefit | <p>Auto can reduce optimization time and create a more consistent process.</p> |
| Adjusting | <p>To activate, press Right Auto key.</p> <p>Press Left Auto key to turn off Auto.</p> |
| Preset | <p>To set up ATO (Auto Tissue Optimize), preset via Utility --> Imaging --> B-Mode --> Auto Optimize Mode. Specify the ATO Level: Low, Medium, or High.</p> |
| Values | <p>Auto is active until you deactivate it or when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.</p> |
| Affect on other controls | <p>You may need to adjust the Gain.</p> |

Continuous Tissue Optimization (CTO)

| | |
|---------------------|---|
| Description | CTO is intended to optimize the spatial continuous gain adjustment on B-Mode images instead of, or in combination with, ATO. <i>NOTE: The probe orientation mark color is turquoise with an over and under line.</i> |
| Preset | You can select Auto Optimize Mode via Utility--> Imaging--> B--> Auto Optimize Mode. When CTO is selected, CTO works instead of ATO. When Both are selected, both ATO and CTO work. |
| Adjusting | To activate CTO, press the right Auto control. To deactivate CTO, press the left Auto control. To adjust the overall CTO Gain, use “CTO Gain” on the Touch Panel or B-Mode Gain. This can be set via Utility--> Imaging--> B--> CTO Gain. |
| Benefit | CTO can reduce optimization time and create a more consistent process. |
| Availability | For the BE9CS-D, C1-6-D, C1-6VN-D, C2-7-D, C2-7VN-D, C2-9-D, C2-9VN-D, IC5-9-D, L8-18i-D, L2-9-D, L2-9VN-D, L3-12-D, ML6-15-D, M5Sc-D, and RIC5-9-D probes in certain applications. |

SRI-HD (High Detection Speckle Reduction Imaging)

Description SRI-HD (High Detection Speckle Reduction Imaging) is an adaptive algorithm to reduce the unwanted effects of 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 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.

Advanced SRI Type 1 Advanced SRI Type 1 is available in B-Mode for select applications, to produce images with clear borders and reduced speckle while maintaining natural image texture.

Advanced SRI Type 2 Advanced SRI Type 2 is available in B-Mode for OB/GYN applications (as a purchasable option), to produce smoother, cleaner images with enhanced border delineation.

SRI-HD Type 2 is available for the probes and applications listed in Table 5-2.

Table 5-2: Advanced SRI Type 2 OB/GYN Probes and Applications

| Probe | OB1 | OB23 | FetalEcho | NT | GYN | Follicle |
|-----------------|-----|------|-----------|----|-----|----------|
| C1-6-D/C1-6VN-D | X | X | X | X | X | X |
| C2-9-D/C2-9VN-D | X | X | X | X | X | X |
| RAB6-D | X | X | X | X | X | X |
| L2-9-D/L2-9VN-D | X | X | X | X | X | X |
| L3-12-D | X | X | X | X | | |
| IC5-9-D | X | X | | X | X | X |
| RIC5-9-D | X | X | | X | X | X |

NOTE: When available per probe and application, the SRI Type can be chosen on the B-Mode tab, page 2.

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

Adjusting

Adjust SRI-HD levels on the Touch Panel. You can also set presets via Utility-> Imaging-> B-Mode.

NOTE: We recommend selecting 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 L and R keys simultaneously.

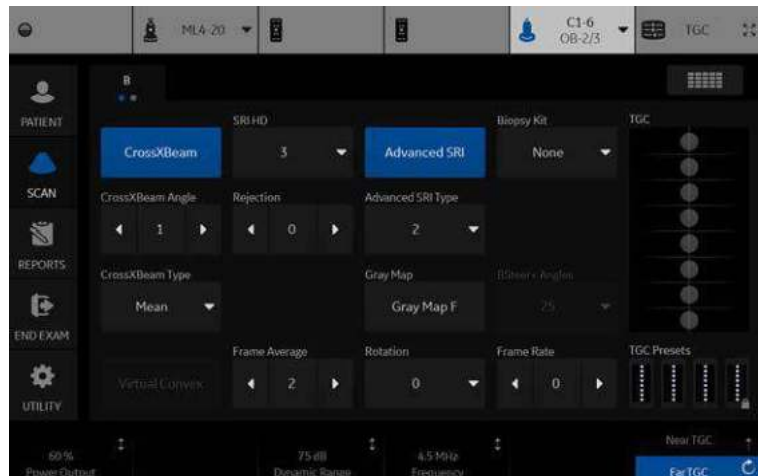


Figure 5-1. SRI-HD Adjustment

Values

Level values vary, depending upon the probe. 0 = Minimal Filtering. Increasing the level value increases the amount of SRI filtering and will result in smoother images.

Benefits

SRI-HD smooths the image when image speckle interferes with the desired image detail.

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

Tips and Notes

When selecting the SRI-HD level, observe the effect of SRI-HD in the desired region of interest and make a real-time comparison with the original image. The optimal level depends on the clinical situation. 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/4D (sectional image and render image).

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

CrossXBeam

| | |
|--------------------|--|
| Description | <p>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.</p> <p>CrossXBeam combines multiple co-planar images from different view angles into a single image at real-time frame rates.</p> <p>CrossXBeam Angle adjusts maximum steering angle of CrossXBeam. Higher values correspond to larger angles.</p> |
| Adjusting | <p>To activate CrossXBeam, press the CrossXBeam key on the Touch Panel; an “X” appears on the display next to “CHI” or “B.”</p> <p>You can also adjust the CrossXBeam Angle and CrossXBeam Type (Mean/Hybrid/Max/MotionCorrection) on the Touch Panel. Max detects maximum values; Mean detects averaged values; Hybrid detects a mix of both average and maximum values; MotionCorrection suppresses blurriness and/or artifacts caused by lateral motion.</p> |
| Values | <p>All linear and convex probes are supported. B-Mode CrossXBeam is available while in B-Mode, Color Flow, or PW Doppler Mode. Steering is optimized by probe.</p> |
| Benefits | <p>The combined single image has the benefits of:</p> <ul style="list-style-type: none"> • reduced speckle noise, • reduced clutter, and • continuity of specular reflectors. <p>Therefore, this technique can improve:</p> <ul style="list-style-type: none"> • contrast resolution with increased conspicuity of low contrast lesions, • better detection of calcifications, • biopsy needle visualization, and • cystic boundary definition. |

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 via Utility--> Imaging--> General--> BF button.

Activating

To activate/deactivate B-Flow, press **B-Flow** on the control panel. The preset default B Flow Mode appears. PW 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 based 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.

Scanning Hints

B-Flow provides an intuitive view of blood flow, acute thrombosis, soft plaque, small vessel perfusion, and high grade stenosis. Compared to Color Doppler, it does not display bleeding, blooming, or aliasing artifacts.

To view high speed jets only for stenosis, use a PRI value of 10 or lower. Use the Background control to display an appropriate amount of tissue background including plaque.

To view slow flow, use a large PRI value while avoiding a PRI value that introduces a bar artifact.

B-Flow (continued)

| | |
|---------------------------------|--|
| 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; but is available in Easy 3D. |
| Bioeffects | Using B-Flow Frequency, Focus Position/Number, Sensitivity/PRI, Line Density, Visualization and Power Output may change the TI and/or MI. Observe the output display for possible effects. |

Background

| | |
|--------------------|--|
| Description | Background and Tissue controls work together to display the amount of background shown on the B-Flow image. Background provides a large change in the amount of tissue displayed; Tissue provides fine tuning to the amount of tissue displayed. Adjusts the amount of tissue displayed on the B-Flow image. Works along with the Tissue control. |
| Value | 0, 1, 2, 3 <ul style="list-style-type: none"> • 0 = Least amount of tissue displayed. • 3 = Most tissue displayed. |

NOTE: Not available for Frozen images or in CINE.

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). |

B-Flow (continued)

Capture

Description

B-Flow Capture provides users the ability to create an accumulated image in B-Flow Live. Maximum intensity projection algorithm to detect the strongest signal between the frames and display the results.

Capture allows the user to represent the dynamic flow situation in the vasculature with a single still image. Adjustments can be made to modify the start and end frames used in the process. Select from the Touch Panel, a “C” will appear in the image parameter list in place of frame average.

NOTE: B-Flow Capture is assigned to the right Trackball key. You can operate B-Flow Capture from the Touch Panel or the right Trackball key. B-Flow Capture is available only while in Research mode.

NOTE: When turning on Live Capture, the cine buffer is cleared of prior data.

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 Exam Category dependent.

Bioeffects

Using B-Flow Sensitivity/PRI may change the TI and/or MI. Observe the output display for possible effects.

B-Flow (continued)

Visualization

Description

Define the display technique.

Values

- **B-Flow.** Displays only B-Flow image.
- **Dual.** Displays B-Mode and B-Flow images simultaneously using dual screen.
- **Hybrid.** Displays the B-Flow image over the B-Mode image using Hybrid Map.

*NOTE: Press **L** and **R** at the same time to switch between Visualization values. The switch sequence can be selected in Utility -> Imaging -> BF -> "L/R Button Sequence".*

NOTE: Available for L2-9-D, L2-9VN-D, ML6-15-D, L8-18i-D, C2-9-D, C2-9VN-D, L6-24-D and C1-6-D, C1-6VN-D probes.

LOGIQView

Description

LOGIQView 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 connective tissues in the arms and legs.

LOGIQView 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.

LOGIQView is not available for the following:

- Multi Image
- Timeline Modes
- B-Flow Mode
- Color Flow Mode
- PDI Mode

Benefits

The user can look at a larger region of interest within one field of view that is wider than any given probe would normally provide.

Clinical Use

LOGIQView is intended for scanning areas too large to fit on one image.

Using LOGIQView

To perform an exam using LOGIQView,

1. Perform a detailed examination of the anatomy/pathology. Optimize parameters for tissue texture and visible window **PRIOR TO** activating LOGIQView.
2. Press the LOGIQView key on the Control Panel.
3. To start acquiring the image, press **Start** (Trackball key).



HINTS

When you scan, start with a strong, quick sweep in the direction of the acquisition and then complete the LOGIQView image with a slow steady sweep. LOGIQView 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 LOGIQView as it is being acquired.

LOGIQView (continued)

4. To restart the scan, press **Start** again. You can back up the probe, realign it, then go forward to redo a portion of the scan.
5. To complete the scan, press **End** or Freeze (or allow the scan to auto complete. The LOGIQView is then displayed, scaled to fit entirely on the screen.
6. Perform measurements and record images.
7. Select Frame Review to move through the LOGIQView one frame at a time. Use the Trackball to scroll.

NOTE: *Measurement error is within 5% of the distance you measured for all linear probes.*

Uniform Motion

The quality and usefulness of LOGIQView 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 LOGIQView has no affect upon Acoustic Output values.

B Steer+

| | |
|--------------------|---|
| Description | B Steer+ helps to enhance biopsy needle visibility without slanting the entire B-Mode image. B Steer+ functionality is only available with linear probes. |
| Preset | <p>To enable/disable B Steer+: Set the “Enable B Steer+” preset via the Utility --> Imaging --> General page.</p> <p>To set the B Steer+ Angle and Needle Gain: Set via the presets on the Utility --> Imaging --> B Tab.</p> |
| Adjustment | <p>To activate B Steer+, adjust the Steer/Width/Depth/Reverse Joystick to the left or right. The B Steer+ symbol and border line display on the image (at the opposite side of product logo).</p> <p><i>NOTE: Make the biopsy and beam angle as perpendicular as possible.</i></p> <p>Needle gain and angle adjustments are available using the:</p> <ul style="list-style-type: none">• Touch Panel controls (B Steer+ Angles and Needle Gain). Select the appropriate beam angle or needle gain via the Touch Panel control.• Steer/Width/Depth/Reverse Joystick (Needle Gain). Rotate the Steer/Width/Depth/Reverse Joystick left/right to adjust the gain.• Auto (B Steer+ Angle). Press Auto left/right to adjust the B Steer+ Angle. <p>Find the best needle visibility by changing the needle gain and needle angle.</p> |
| Values | <p>B Steer+ angle (beam steering angle for needle visualization) is selectable from 15 to 40 degrees. Needle Gain is adjustable from 0 to 100.</p> <p>B Steer values (including enable/disable, B Steer+ angle, and Needle Gain) are returned to factory or user preset values when you change: Probe, Exam Category, Exam Calcs, or New Patient.</p> |
| Benefits | Provides better biopsy needle visualization than normal B-Mode with steered beam angle and post processing. |
| Bioeffects | Activating B Steer+ may change the TI and/or MI. Observe the output display for possible effects. |

Touch 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. A TGC curve may appear on the display (if preset), matching the controls that you have set (except during zoom).

NOTE: TGC adjusts the image 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.

User-Defined Preset There are 4 presets located on and selected via the Touch Panel. The right-most preset is locked and cannot be changed.
TGC Display On/Off -- preset via Utility --> System --> System Display.

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

Adjusting Touch TGC with B-Mode Image Overlay

You can adjust the TGC by overlaying the TGC slidepots over the B-Mode image on the Touch Panel (1), or via the Touch Panel TGC slide pots (2).

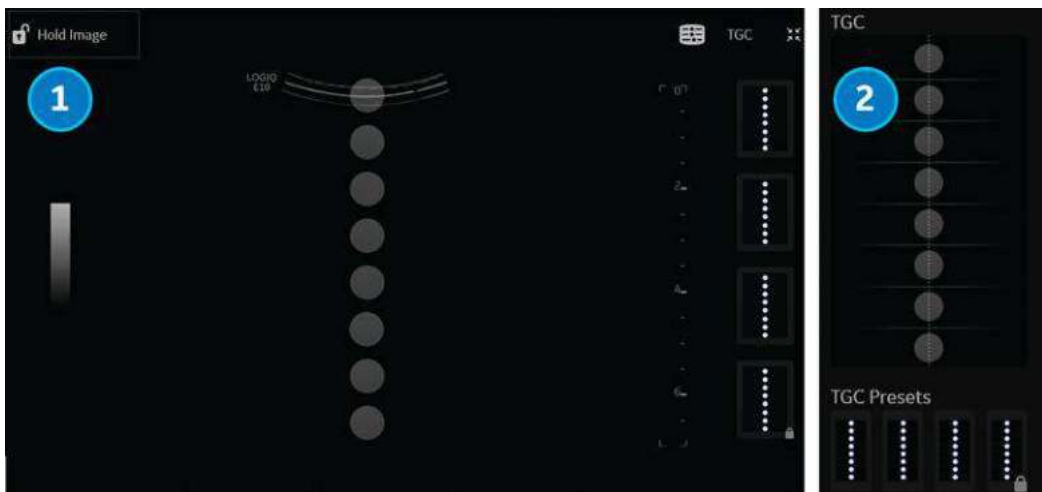


Figure 5-2. Adjusting the TGC

Touch TGC (continued)

Adjusting TGC with the B-Mode Image Overlay

To adjust the TGC interactively with the B-Mode image overlay,



1. Press the TGC control, located in the upper, right-hand corner of the B-Mode Touch Panel. TGC “slidepots” appear over the B-Mode image.

Pressing the bottom, right rotary or bottom, right corner of the Touch Panel also enters Touch TGC and adjusts the image.

2. Adjust these slidepots by sliding each slidepot on the Touch Panel with your finger.



To hold the B-Mode image while adjusting the TGC, select the Hold Image lock located in the upper left-hand corner of the Touch Panel. The Hold Image lock overrides the Utility screen Auto Hide delay timer and hides the TGC slidepots, allowing unobstructed view of the image on the Touch Panel.

When Hold Image is active (or the Auto Hide delay timer is set to Off on the Utility screen), the Full Image button appears. Select the Full Image button to toggle between active B-Mode and the full image area.

NOTE: Though the B-Mode image is locked, you can still adjust the TGC curve while the image lock is active.

3. To save this TGC setting as a preset, press and hold the box on the right until the box displays a blue outline. This TGC setting now appears in the “Custom” window.
4. To reset to the default setting, touch the TGC Presets preset at the bottom of the TGC display on the Touch Panel.

NOTE: *Timeout for TGC display can be set in Utilities --> System ==> General.*

Adjusting TGC using the Touch Panel

You can also adjust the TGC or select a TGC preset directly on the Touch Panel.

1. Adjust these slidepots by sliding each slidepot on the Touch Panel with your finger; or select TGC preset.
2. To save a TGC setting as a preset, press and hold an available TGC preset box on the bottom of the Touch Panel until the box displays a blue outline.

Speed of Sound (SoS) Tissue Imaging

Speed of Sound is available on all probes for the following applications: Abdomen, Abdomen 2, Renal, Bowel, and Breast. The Speed of Sound control is displayed only for these applications and are hidden in all other applications, even when research mode is enabled.

NOTE: Speed of Sound displays on the monitor display as “SoS” with the speed following, “SoS 1500” (when the speed of sound is not equal to 1540).

A control has been added on the Touch Panel to change the transmitted speed of sound for various breast tissue types:

To activate Speed of Sound for Breast, for example,

1. Select Probe --> Small Parts--> Breast--> B-Mode--> Speed of Sound.
2. Press Speed of Sound on the Touch Panel. Speed of Sound selections appear at the bottom of the Touch Panel in place of the Focus Position control.
3. Adjust the Speed of Sound control up/down to achieve the desired image. The system displays the Speed of Sound (SoS) on the Touch Panel in the upper, right-hand corner of the display as “SoS #####”.

SoS settings are returned to the default for an SoS of 1540 (or when the SoS is not displayed on the display).

Minimizing Grating Lobe/Side Lobe Artifacts

Overview

Grating lobes/side lobes often create a spurious structure or clouding within an ultrasound image. Such artifacts are not uncommon in gray scale 2D imaging mode. They are caused by an undesired off-axis ultrasound beam contaminating the main beam.

The ultrasound system presumes that the reflections returning to the transducer always come from the steered direction. However, when these (weaker) off-axis beams encounter a strong specular reflector, the returning reflected energy will be received and "added" to the main beam.

Grating lobe/side lobe artifacts can be especially noticeable within anechoic regions (i.e. fluid, cysts, heart chamber, large blood vessels, etc.).

Corrective Adjustments

On the LOGIQ Fortis, if grating lobe/side lobe artifacts are suspected during the scan, adjustments can be made to reduce such artifacts.

1. Adjust scan window
2. Reduce CrossXBeam Angle
3. Decrease AO

For example, on C3-10-D probe, at default setting for NeoHead, grating lobe/side lobe artifacts are present in Figure 5-3.



Figure 5-3. Image with Grating Lobe Artifact

Corrective Adjustments (continued)

To correct, reduce the CrossXBeam Angle and decrease the AO from 100% to 90%. The grating lobe/side lobe artifacts are removed as shown in Figure 5-4.

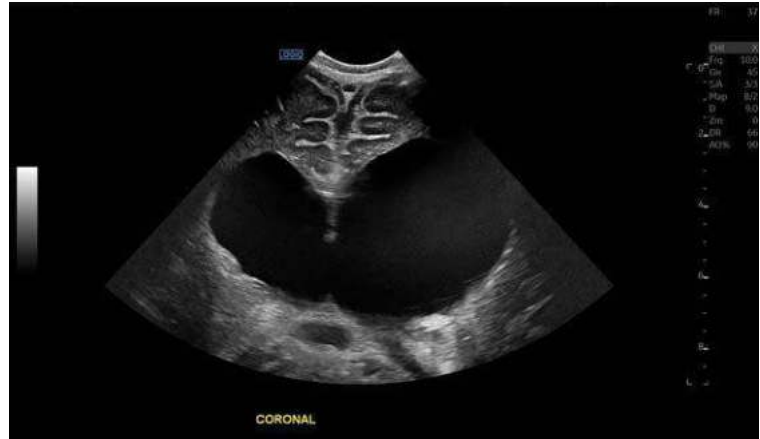


Figure 5-4. Image with Grating Lobe Artifact Removed

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.

LOGIQ Fortis has three types of M-Mode:

- Conventional M-Mode: displays a distance/time plot of a cursor line in the axial plane of the 2D-image. Conventional M-Mode can be combined with Color Mode.
- Anatomical M-Mode (AMM)
- Curved Anatomical M-Mode (CAMM)

M-Mode Display

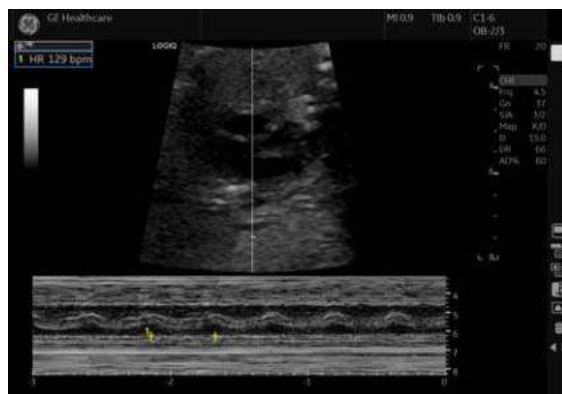


Figure 5-5. M-Mode Display

Typical exam protocol

A typical examination using M-Mode might proceed as follows:

1. Get a good B-Mode image. Survey the anatomy and place the area of interest near the center of the B-Mode image.
2. Press **Mode Cursor**.
3. Trackball to position the mode cursor over the area that you want to display in M-Mode.
4. Press M-Mode.
5. Adjust the Sweep Speed, TGC, Gain, Power Output, as needed.
6. Press **Freeze** to stop the M trace.
7. Record the trace to disk or to the hard copy device.
8. Press **Freeze** to continue imaging.
9. To exit, press M-Mode.

M-Mode Controls

NOTE: You can set default value of each parameter by probe and application on the Utility --> Imaging page. See 'Imaging Presets' on page 10-30 for more information.

Table 5-3: M-Mode Controls

| Control | Adjusts Acoustic Output | Description/Benefit |
|-------------|-------------------------|--|
| Sweep Speed | No | To increase/decrease, select Sweep Speed . Changes the speed at which the timeline is swept. Available in M-Mode, Doppler Mode and M Color Flow Mode. You can speed up or slow down the timeline to see more or fewer occurrences over time. |

Anatomical M-Mode (AMM) and Anatomical Color M-Mode (ACMM)

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.

NOTE: Turn off CrossXBeam before activating AMM/CAMM.



Figure 5-6. Anatomical M Mode

Activating

To activate Anatomical M-Mode, while in M-Mode, press the **Anatomical M** Touch Panel control.

NOTE: AMM is not available on Linear probes.

NOTE: Anatomical M-Mode can also be used with previously acquired digitally stored 2D images. More than one heart cycle should be stored if performing M-Mode in post processing.

To activate Anatomical Color M-Mode, after accessing Anatomical M-Mode, activate Color Flow (CF).

Adjusting

Use Touch Panel Trackball to position the M cursor over the required area of the B-Mode image.

1. Use the trackball (assigned function: Pos) to position the M cursor over the required area of the image.
2. Press the top Trackball key to allow free rotation of the solid arrow line throughout the 2D image (trackball assigned function: Angle).

NOTE: Rotate the Touch Panel control to angle the M cursor at a given angle.

Anatomical M-Mode (AMM) and Anatomical Color M-Mode (ACMM)

(continued)

| | |
|-------------------|--|
| Benefits | 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. |
| Bioeffects | Changing the Packet Size, Scale, 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.

1. Select **Curved AMM** on the Touch Panel.
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.*

NOTE: *Curved Anatomical M-Mode can also be used with previously acquired digitally stored B-Mode images.*

NOTE: *CAMM is not available on Linear probes.*

Optimizing Color Flow

Intended Use



Color Flow Doppler is intended for qualitative studies only.

Color Flow Mode is a Doppler Mode intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-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**.

NOTE: Most parameters are user presettable by probe and application in the preset menu (Utility -> Imaging -> CF).

Activating Color Flow

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.

Color Flow Mode Controls

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.

Table 5-4: Color Flow Mode Controls

| Control | Adjusts Acoustic Output | Description/Benefit |
|-----------------------------------|-------------------------|--|
| Flow Selection | No | In the Lower Extremity Vein (LEV) and Abdominal applications, you can quickly select the flow state via a shortcut on the Color Flow Mode Touch Panel menu. |
| Gain | No | Gain amplifies the overall strength of echoes processed in the Color Flow window or spectral Doppler timeline. Allows you to control the amount of color within a vessel or to fill in or clean out spectral information. |
| Scale (Velocity Scale) | Yes | To raise/lower the velocity scale, adjust Scale . Increases/decreases the Scale on the color bar. Imaging of higher velocity flow requires increased scale values to avoid aliasing. |
| Wall Filter | No | Filters out low flow velocity signals. It helps get rid of motion artifacts caused from breathing and other patient motion. Gets rid of excess, unnecessary low frequency signals caused by motion. |
| Size/Position of the color window | No | Adjust size and position of the color window. To adjust the size, press the top trackball key to select Size then move the Trackball left/right, up/down. To adjust the position, press the top trackball key to select Pos then move the Trackball to position the color window. Increase the color window to see a larger area; decrease the color window to improve frame rate and spatial resolution. |
| Invert (Color Invert) | No | To reverse the color flow, press Invert (Color Invert) . 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. <i>NOTE: Invert reverses the color map, NOT the color Scale.</i> |

Table 5-4: Color Flow Mode Controls (Continued)

| Control | Adjusts Acoustic Output | Description/Benefit |
|-------------------------|-------------------------|---|
| Baseline | No | <p>To adjust the baseline, adjust Baseline up/down, as necessary. 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.</p> <p>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.</p> |
| Angle Steer | Yes | <p>To slant the linear image to the left/right, adjust Angle Steer. 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.</p> <p>Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Peripheral Vascular to image carotids.</p> |
| Accumulation | No | <p>Accumulation enhances the flow in an image. Accumulation detects the maximum signal and holds it for the level specified.</p> <p>Note: If Accumulation is turned off, then Frame Averaging is used.</p> |
| Color Flow Line Density | Yes | <p>Optimizes the Color Flow frame rate or spatial resolution for the best possible color image.</p> <p>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.</p> |
| Map | No | <p>Allows you to select a specific color map. After you have made your selection, the color bar displays the resultant map.</p> <p>Shows the direction of the flow and highlights the higher velocity flows.</p> <p>Velocity Maps (V). Flow shown as blue away/red toward the probe.</p> <p>Velocity Variance Maps (VV). Provides a measure of turbulence (stenosis). Adds green to velocity maps.</p> |
| Map Compress | No | <p>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.</p> |
| Radiantflow | No | <p>Radiantflow provides an easy, fast visualization of tiny vessels, displaying as a 3D effect.</p> |
| Threshold | No | <p>Threshold assigns the gray scale level at which color information stops.</p> <p>Limits color flow overlay to low level echoes inside vessel walls. Helps minimize color 'bleeding' outside vessel walls.</p> |
| Frame Average | No | <p>Averages color frames.</p> <p>Higher frame averaging keeps the color displayed longer for increased flow visualization while lower frame averaging provides greater flow dynamics.</p> |

Table 5-4: Color Flow Mode Controls (Continued)

| Control | Adjusts Acoustic Output | Description/Benefit |
|-----------------------------|-------------------------|--|
| Transparency Map | No | Brings out the tissue behind the color map. Helps demonstrate the tissues behind the color. |
| Spatial Filter | No | Smooths out the color, makes it look less pixelated. |
| Flash Suppression | No | Activates/deactivates Flash Suppression, a motion artifact elimination process. Beneficial to suppress flash. |
| Packet Size | Yes | Controls the number of samples gathered for a single color flow vector. Allows you to improve the color sensitivity and accuracy of color averaging (increase packet size) or frame rate (decrease packet size), as needed. |
| Power Doppler Imaging (PDI) | No | See 'Power Doppler Imaging (PDI)' on <i>page 5-38 for more information.</i> |

Radiantflow



Radiantflow is a display method which uses the amplitude of the Color flow signal. Note that this may alter the appearance of the Ultrasound information displayed. For diagnostic purposes, this must be taken into account or the Region of Interest must be checked without Radiantflow.

Radiantflow is a rendering technique for Color Flow and Power Doppler Imaging, available on all probes. Radiantflow provides an easy, fast visualization of tiny vessels, displaying as a 3D effect. Press Radiantflow on the Color Flow Touch Panel and select the amount of power signal gradient.

- Off. - Normal Color Flow/Power Doppler Imaging.
- Min. - Less gradient.
- Mid. - More gradient.
- Max. - Most gradient.



Figure 5-7. Radiantflow Map

Flow Model Shortcuts

Flow Model Shortcuts values vary by application. You can configure these Shortcuts on the Utility--> Imaging--> CF. Below is an example of the Renal Flow Model Shortcuts and the following table lists all the following Flow Model Shortcuts by application.

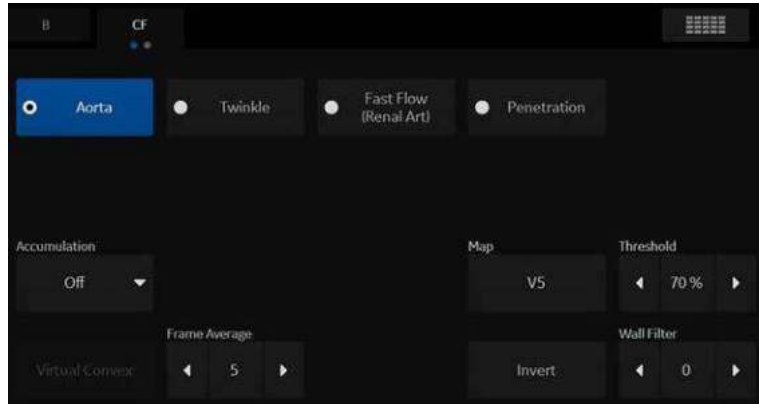


Figure 5-8. Application Flow Model Shortcuts

Flow Model Shortcuts (continued)

Table 5-5: Flow Model Shortcuts

| Application | Flow Model Shortcuts | | | |
|----------------------------|-----------------------------|--------------------------------|-----------------------|-------------|
| ABD, ABD Biopsy | Aorta | Slow Flow (Renal) | Fast Flow (Renal Art) | Penetration |
| Renal | Aorta | Twinkle | Fast Flow (Renal Art) | Penetration |
| OB1, OB23 | Fetal Echo | Ovary | | |
| PedAbd | Slow Flow (Renal) | | Twinkle | Penetration |
| NeoHead | Slow Flow | | | Penetration |
| NeoAbd | Slow Flow (Renal) | | | Penetration |
| Cardiac (Adult, Pediatric) | Fast Frame Rate | Penetration | Slow Flow | |
| Scrotal | Slow Flow | | | |
| Thyroid | Slow Flow | Med Flow | Carotid | |
| Breast, MskGen | Slow Flow | Med Flow | Fast Flow | Penetration |
| MskSup | Slow Flow | Med Flow | Fast Flow | Rheuma |
| LEV | Slow Flow | Fast Flow | | |
| UEV | Slow Flow | | | |
| Carotid | Vascular Surgery | Vertebral Arterial (Vert.Art.) | | |
| UEA | Vascular Surgery | Slow Flow | | |
| GYN | Ovary | | | |

Editing Flow Model Shortcuts

1. Via Utility--> Imaging--> CF, highlight the Flow Model line you want to add/update.

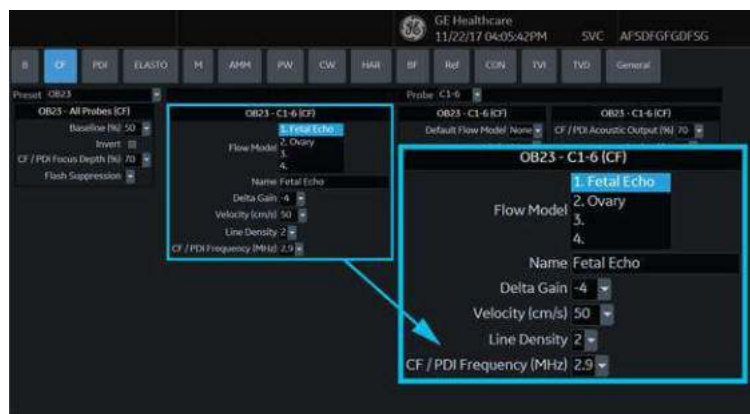


Figure 5-9. Setting up Flow Models

2. Type the Flow Model name in the **Name** field. The Flow Model is updated as you type.
3. Update Delta Gain (increases/decreases Displayed Gain by the dB selected here), Velocity, Line Density, CF/PDI Frequency for this Flow Model.
4. Set Default Flow Model.
5. Press Save, then Exit.

The updated Flow Model is located in the designed position on the Color Flow Touch Panel.

NOTE: *Users can free type custom flow shortcuts into the Scan Assistant Creator to use them within Scan Assistant.*

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. A sub-mode of PDI has been optimized for visualization of small slow flow vessels, called Micro Vascular Imaging (MVI).

Adjusting Press **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.

NOTE: Most parameters are user presettable by probe and application in the preset menu (Utility -> Imaging -> PDI).

Values On/Off.

Twelve power and four directional PDI maps are available.

Benefits Since PDI does not display velocity, it does not alias.

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.

Power Doppler Imaging (PDI) (continued)

Table 5-6: Power Doppler Imaging Controls

| Control | Adjusts Acoustic Output | Description/ Benefit |
|------------|-------------------------|--|
| Map | No | <p>Allows you to select a specific color map. After you have made your selection, the color bar displays the resultant map. Shows the direction of the flow and highlights the higher velocity flows. Power Maps. Assortment of Black/White, Pink, Blue, Yellow, Red, or B-Flow Maps.</p> <p>Directional Maps. Directional Power Doppler Maps from PDI. Note: If the image is aliasing while in Directional MVI Maps, increase the Scale.</p> <p>You can set the default map by probe via Utility -> Imaging -> MVI -> Default Map.</p> |
| Background | No | <p>Displays the amount of background image shown on the MVI image. Use the Background control to display an appropriate amount of tissue background including plaque.</p> <ul style="list-style-type: none"> • 0=Least amount of image displayed • 6=Most amount of image displayed |

Presets

You can set the default PDI imaging mode via Utility -> Imaging -> General -> Default PDI:



Figure 5-10. Set Default PDI

Micro Vascular Imaging (MVI)

Smaller vessels can be imaged using Micro Vascular Imaging (MVI), which is a sub-mode of PDI optimized for visualization of small, slow flow vessels. MVI is available under the Power Doppler Imaging (PDI) Touch Panel. It's available on the C1-6-D, C1-6VN-D, L8-18i-D, L2-9-D, L2-9VN-D, L3-12-D, ML6-15-D and L6-24-D probes. MVI is used to detect and visualize micro-vasculature by providing higher sensitivity and higher spatial resolution.

Activating MVI

Access PDI on the Operator Panel, then select MVI on the Touch Panel.

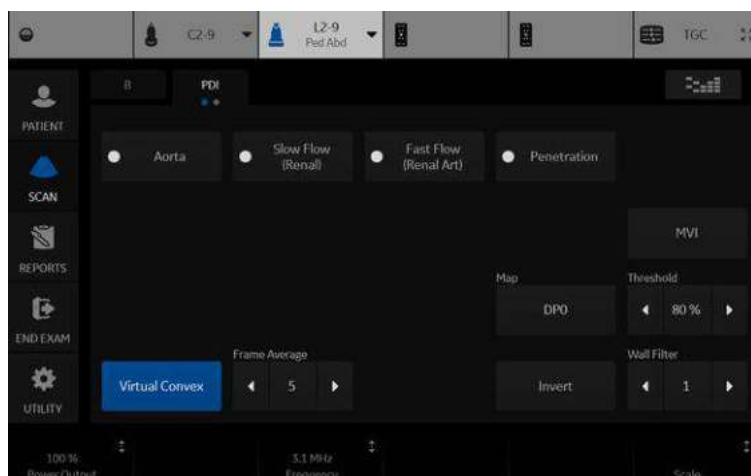


Figure 5-11. Access MVI from the PDI Touch Panel

Directional Power Doppler

You can select the DPO 0, 1, 2, and 3 Directional Power Doppler maps 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.

Optimizing M Color Flow

M Color Flow Mode

| | |
|--------------------|---|
| Description | <p>M Color Flow is used for cardiac applications. There is a cursor on the B-Mode image that determines the extent of the Color.</p> <p>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.</p> <p>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.</p> |
| Activating | <p>To activate M Color Flow Mode, press M (M-Mode). Then press CF (Color Flow) - or - press CF, then press M.</p> <p>To toggle between M Color Flow controls and Color Flow controls, press the appropriate Touch Panel Mode tab.</p> |
| Benefits | <p>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.</p> |
| Bioeffects | <p>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.</p> |

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. Locate the anatomy to be examined. Get a good B Mode image. Press CF to help locate the vessel you wish to examine.
2. Press **Mode Cursor** to display the sample volume cursor and gate.
or
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.
3. 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 clicking **SV Length**.
4. Optimize the PW Doppler spectrum, as necessary. Refer to the *Doppler Optimization* section of this chapter for more information.
5. Press **Update** to toggle between real time B-Mode with Doppler Mode (with audio).
6. 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.
7. Press **Freeze** to hold the trace in memory and stop imaging. Activate CINE Timeline, as necessary. See 'Using CINE' on page 6-3 for more information.
8. Perform measurements and calculations, as necessary. Refer to the Measurements and Calculations chapter for more information.
9. Record results by pressing the appropriate print key, depending on the setup of your recording devices.
10. Press **Freeze** to resume imaging.
11. Repeat the above procedure until all relevant flow sites have been examined.

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.

PW Doppler Mode Display

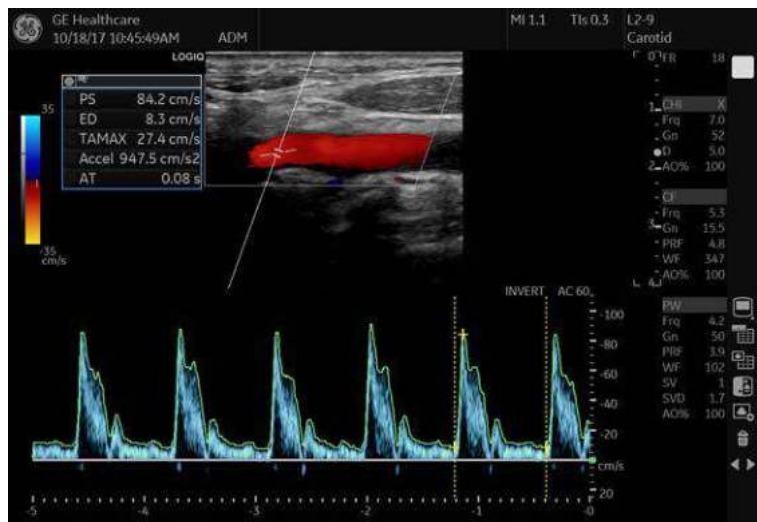


Figure 5-12. PW Doppler Mode Display

Table 5-7: Doppler Mode Display Explanations

| Doppler Display | Description, Format, Values |
|------------------------|---|
| Scale | Velocity Scale, 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. |
| 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 Scale. |

Doppler Mode Controls

NOTE: You can set the default value of each parameter by probe and application on the Utility --> Imaging page. See 'Imaging Presets' on page 10-29 for more information.

Table 5-8: Doppler Mode Controls

| Control | Adjusts Acoustic Output | Description/Benefit |
|---|-------------------------|---|
| Doppler Sample Volume Gate Position (Trackball) | Yes | To move sample volume gate position, press the top trackball key to select Pos , move Trackball up or down until positioned inside the vessel. Moves the sample volume gate on the B-Mode's Doppler Mode cursor. The gate is positioned over a specific position within the vessel. Positions the sample volume gate to sample blood flow. |
| Doppler sample volume length (SV Length) | Yes | To increase/decrease the gate size, adjust SV Length on the Touch Panel. Hold down key to continuously size gate. Sizes the sample volume gate. A smaller gate produces accurate sampling results because it is more sensitive. You can also enlarge the gate for sampling large vessels or areas. |
| Angle Correct/Auto Angle | No | To adjust the angle relative to the probe face, adjust Angle Correct to the left/right. The velocity scale changes when you adjust angle correct. Press Angle Correct to access Auto Angle . 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. Optimizes the accuracy of the flow velocity. This is especially useful in vascular applications where you need to measure velocity. <i>NOTE: When the Doppler Mode Cursor and angle correct indicator are aligned (the angle is 0), you cannot see the angle correct indicator.</i> |
| Quick Angle | No | Quickly adjusts the angle by 60 degrees. Press Quick Angle to toggle between Off, Right and Left. |
| Steer and Fine Steer | Yes | To slant the linear image to the left/right, adjust Steer to the left or right. Press Steer to access Fine Steer . 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. Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Vascular applications. |
| Audio Volume | No | Controls audio output. An audio representation of the flow within a vessel can be used to evaluate proper probe angle and position. |
| Cycles to Average | No | The average value over a number of cycles (from 1-5). |

Table 5-8: Doppler Mode Controls (Continued)

| Control | Adjusts Acoustic Output | Description/Benefit |
|-------------------------------|-------------------------|---|
| Display Format | No | Changes the horizontal/vertical layout between B-Mode and M-Mode, or timeline only. |
| Update | Yes | To activate, press Update 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 signaling a break in the timeline. Toggles between simultaneous and update presentation while viewing the timeline. Update increases the Spectral Doppler display quality. |
| Simultaneous (Duplex/Triplex) | Yes | 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 timeline active. When Duplex/Triplex is OFF, either the image or timeline is active. Update then switches the active side between the image and the timeline. |
| Baseline | No | Adjusts the baseline to accommodate faster or slower blood flows to eliminate aliasing. |
| Compression | No | Compression controls how echo intensities are converted to shades of gray, thereby increasing the range of contrast you can adjust. Optimizes the image's texture and smoothness by increasing or decreasing the amount of gray scale. |
| Invert | No | 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. 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) | Yes | To view signal detail, adjust Scale to enlarge the vertical spectral Doppler trace. Velocity range directly controls the pulse repetition frequency, which is responsible for the setting of the Nyquist limit (the ability to detect maximum velocity without aliasing). 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. |
| Trace Method (Spectral Trace) | No | 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. Traces the average mean and peak velocities in realtime or frozen images. Lets you trace the cardiac cycle. |

Table 5-8: Doppler Mode Controls (Continued)

| Control | Adjusts Acoustic Output | Description/Benefit |
|----------------------|-------------------------|--|
| Trace Sensitivity | No | Adjust the trace to follow the waveform for signal strength. If the signal is very faint, increasing the Trace Sensitivity will allow the system to trace that signal strength. |
| Trace Direction | No | Specifies trace direction. You can select where on the waveform to perform the trace, above, below, or both (above and below). |
| Cursor Moving | No | On Utility--> Imaging, specify No Action, Update 2D/CF-Long, Medium, or Short, or Update Doppler-Slow, Medium, or Fast. Cursor Moving lets you 'walk' Doppler through a vessel while the Doppler gate is moving. Updates are more frequent on Fast vs. Medium vs. Slow. If you set the preset to Update 2D/CF, this causes the B Mode/Color Flow image to go live while you move the Doppler cursor. |
| Time resolution | No | Adjusts image appearance so that if you select a lower setting, the image appears smoother; if you select a higher setting, the image appears sharper. |
| Wall Filter | No | To increase/decrease, select Wall Filter on the Touch Panel. Insulates the Doppler signal from excessive noise caused from vessel movement. 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. |
| Auto (Auto Optimize) | No | To activate, press Right Auto key. Press Left Auto key to turn off Auto. Auto in PW Doppler Mode (ASO: Auto Spectral Optimization) optimizes the spectral data. Auto adjusts the Velocity Scale/PRF (live imaging only), baseline shift, dynamic range, and invert (if preset). "Running Auto Spectral Optimization" appears at the bottom of the monitor upon activation. Upon deactivation, the spectrum is still optimized. See 'Auto Optimize' on page 5-8 for more information. |
| Mode Cursor | No | Displays the Doppler Mode cursor on the B-Mode image. To activate/deactivate the Doppler Mode cursor, press Mode Cursor. Trackball to position sample volume graphic. |
| Modify Auto Calcs | No | Activates the menu to select which calculations are automatically calculated. |
| Auto Calcs | No | Activates the calculation automatically which you select in the Modify Auto Calculation when the system is in a state of freeze or live. <ul style="list-style-type: none"> • Live: Auto calculation activates when the system is in a state of live. • Freeze: Auto calculation activates when you press Freeze. • Off |

Auto Doppler Assist

Auto Doppler Assist automatically positions and steers Color Flow ROI and PW Cursor. This feature is available on all linear probes. Available in Color Flow, Color Flow + PW (Triplex and non-Triplex).

To use Auto Doppler Assist, position the cursor in the Color Flow ROI (the Color Flow ROI has to include the vessel of interest, or part of it). Press the appropriate Touch Panel Auto control (shown below) or press the Auto control to the left for Color Flow or to the right for Pulsed Wave. Manual map the “Auto” controls via Utility--> User Configurable Key.



Figure 5-13. Auto Doppler Assist

Upon pressing the Auto Doppler Assist button, the system will automatically:

- Pick the artery or vein (depending on the selected application).
- Center the Color Flow ROI on the vessel of interest.
- Steer with the direction of the vessel.
- Keeps the Sample Volume in the middle of the ROI.
- Steers the PW Cursor (if existing) to maintain the angle correct set by the operator under Auto Correct on the Utility --> Imaging --> PW --> Angle Correct.

NOTE: *If the angle is set to zero, then the system uses 60 degrees.*

Using 3D

Overview



DANGER

DO NOT use the Volume Navigation feature on any patient relying on life-sustaining electronic equipment, such as a pacemaker or defibrillator. Failure to follow this instruction could lead to interference with patient electronic device(s).

Easy 3D is compatible with every 2D transducer using a freehand acquisition to generate a volume dataset.

3D Volume datasets are allowing the navigation in the 3D cube itself and providing access to the 3 different main planes – axial, sagittal and coronal.

There are three 3D Packages:

Table 5-9: 3D Package Options

| 3D Type | Description | Sensor/No Sensor |
|-------------|--|------------------|
| Easy 3D | Designed for rendering B Mode and Color Flow Mode images, e.g., Baby Face scans. | No sensor |
| Advanced 3D | Designed for rendering B Mode and Color Flow Mode images, e.g., vessel trees. | No sensor |
| Tru3D | Designed for rendering B Mode and Color Flow Mode images, e.g., vessel trees. | Sensor |

3D Acquisition

Acquiring a 3D Scan

To acquire a 3D scan,

1. Optimize the B-Mode image. Ensure even gel coverage.
2. Press the 3D/4D control panel key. Two screens appear.
3. Set appropriate values for Acq Mode and Scan Plane. Also, set the scan distance before scanning.
 - Acquisition mode
Sensorless Parallel is for all acquisitions done with the linear probes and on regular shapes, where you can move the probe parallel on the skin.
Sensorless Sweep is for the sweep acquisition using the curved probe (i.e. intercostal liverscan or kidney).
 - Scan Distance
The Scan Distance is an indicator for the size of the Volume: Have you acquired longer distance than 6 cm, increase the Scan distance. Have you acquired a shorter distance than 6 cm, decrease the Scan distance. For sweep acquisition 6 means a transducer angulation of around 60°.
4. To start acquiring the image, press **Start** (Trackball key).
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 **End** (Trackball key).

NOTE: *You can also press Freeze, but then you need to also press the 3D key to obtain the final render.*

Acquiring a 3D Scan (continued)

3D Notes

- Adjust the 3D dataset brightness with B-Mode or Color Flow Mode Gain.
- Use Colorize to change the color of the active dataset.
- Use Zoom to increase the zoom factor of the active dataset.
- 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.

3D Acquisition Parameter Description

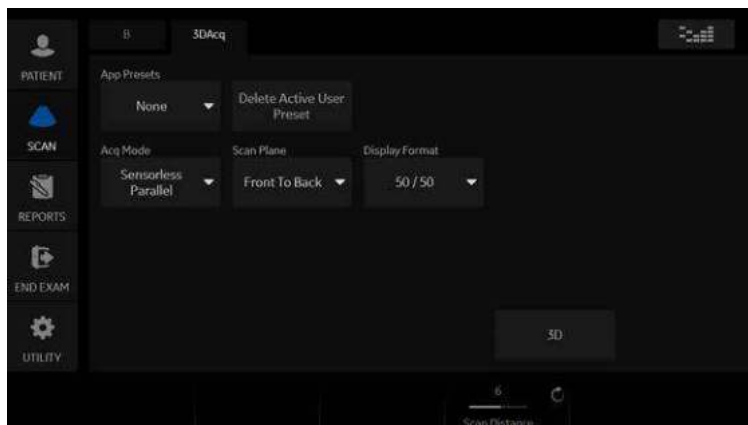


Figure 5-14. 3D Acquisition

Table 5-10: 3D Acquisition Description and Instructions for Use

| 3D Parameter | Description |
|---------------------------|---|
| App (Application) Presets | <p>Selections: None, OB - Baby Face, Vascular, User 1, User 2, User 3</p> <p>None. No application preset applied.</p> <p>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.</p> <p>Vascular. Available only with Advanced 3D or Tru 3D package. After having scanned in this mode, certain rendering parameters are set automatically. The color image is rendered in the texture mode. The values for opacity and threshold of the texture mode are set automatically according to the datasets histogram. The B-Mode image is rendered in the gray surface mode. Opacity and threshold values are defined according to the histogram.</p> |
| Delete Active User Preset | Select to delete a user preset (User 1, User 2, or User 3). |

Table 5-10: 3D Acquisition Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|------------------------------|--|
| Acquisition Mode | <p>Selections: Sensorless Parallel, Sensorless Sweep</p> <p>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.</p> <ul style="list-style-type: none"> • 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. <p>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.</p> <p>Before starting an acquisition, take care that the transmitter is positioned correctly during data acquisition and that the transmitter cannot move.</p> |
| Scan Plane | <p>Selections: Front to Back, Side to Side</p> <p>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.</p> <p>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.</p> |
| Display Format 50/50 Only 2D | <p>50/50. Display in Dual Image (2D and 3D).</p> <p>Only 2D. Display in Single Image.</p> |
| 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; or a fan scan 60 degrees. |

NOTE: *The selection of user presets is effective only while 3D mode is active. Exiting 3D mode and activating 3D mode again resets the 3D presets to the default setting, regardless if Patient or application changes.*

NOTE: *Changing the tab between [Easy] and [Adv3D] changes some parameters that are not common between those tabs.*

NOTE: *When a 3D image is recalled, no 3D presets are active and parameters are recalled from the image file.*

NOTE: *Default Scan Distance, Opacity and Threshold may not be consistent and may change per scan. After the User Preset is saved and recalled, Opacity and Threshold are consistent.*

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.

Table 5-11: Manipulating the Volume of Interest

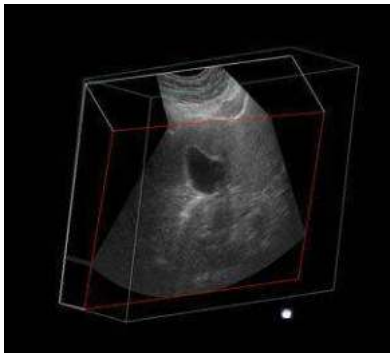
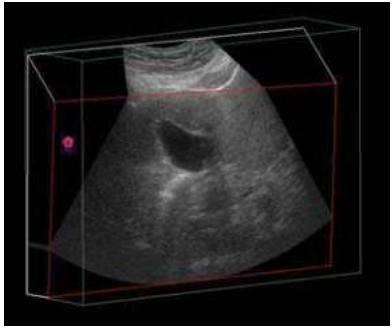
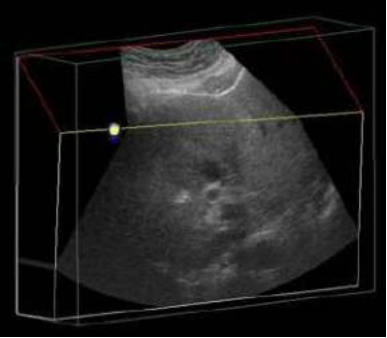
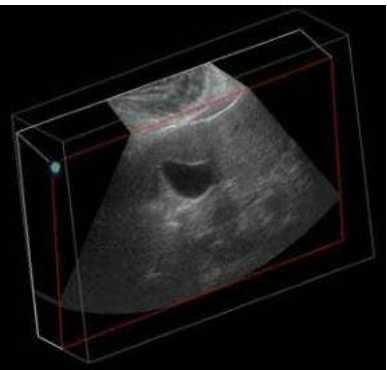
| Procedure | Example |
|---|--|
| <p>Rotating the 3D VOI Left/Right or Forward/Backward You can rotate it left to right or right to left. You can rotate it forward/backward. Press right Set key when the white pointer finger is positioned on the white box. Move the closed white hand to manipulate the 3D VOI.</p> |  |
| <p>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. <i>Note: Any plane in the volume can be made active (highlighted with red box) by clicking on it.</i></p> |  |

Table 5-11: Manipulating the Volume of Interest (Continued)

| Procedure | Example |
|--|--|
| <p>Viewing Specific Portions of the Anatomy</p> <p>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.</p> <p><i>Note: This actually moves an edge. A yellow hand appears only when the pointer is on an edge of the VOI.</i></p> |  |
| <p>Pulling Back a Corner of the VOI to View Specific Anatomy</p> <p>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.</p> |  |

Easy 3D

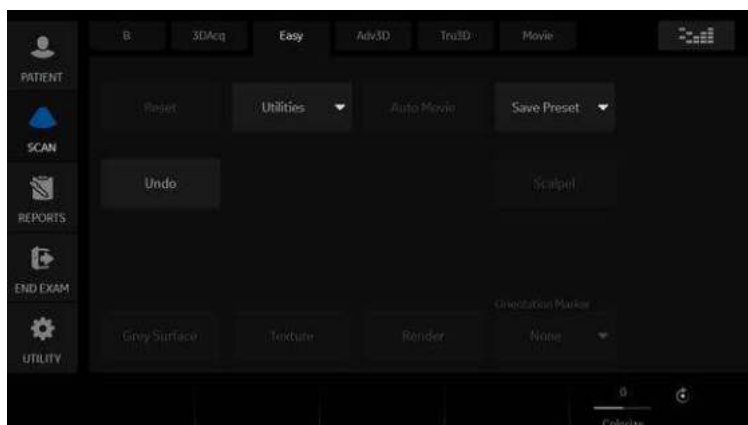


Figure 5-15. Easy 3D

Descriptions and instructions for using Easy 3D follow:

Table 5-12: 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. Use smoothed volume for rendering the 3D volume. 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 (User 1, 2, or 3). |
| Undo | Undoes any manipulation you have done to your 3D dataset. |
| 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 right Set key. To define the contour of the region, press the right Set key for each vertex. To close the contour, double click the right Set 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. |
| 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. |

Table 5-12: Easy 3D Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|--------------------|--|
| 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. |
| Orientation Marker | You can now specify/define, then add the following orientation markers while in 3D via the Orientation Marker key: <ul style="list-style-type: none"> • TRV Sup to Inf • TRV Inf to Sup • SAG Lt to Rt • SAG Rt to Lft • Defined • None |
| 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. |
| 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; or a fan scan 60 degrees. |
| Colorize/Contrast | Colorizes the 3D render or adds contrast to the 3D rendered image. |

Advanced 3D

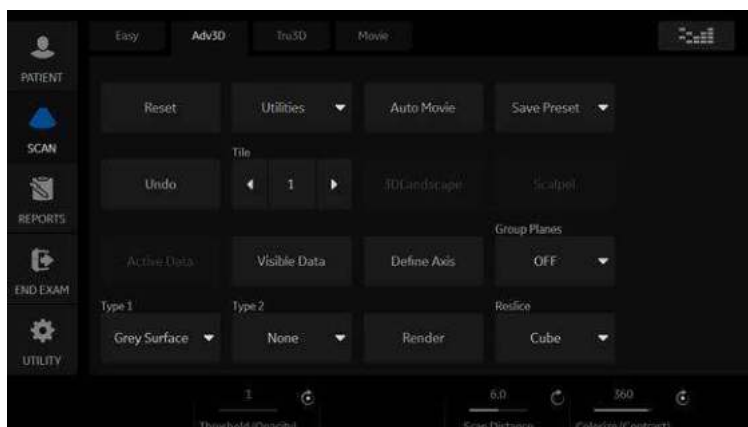


Figure 5-16. Advanced 3D

Descriptions and instructions for using Advanced 3D follow:

Table 5-13: Advanced 3D Description and Instructions for Use

| 3D Parameter | Description |
|--------------|---|
| 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. |
| 3D Landscape | 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 right Set key. The Trackball symbol has to be positioned inside the 2D plane. |
| 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. <i>NOTE: Inversion Mode is only available for Black-and-White mode.</i> |
| 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 right Set key, then positioning the other end of the axis and pressing the right Set key. |

Table 5-13: Advanced 3D Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|--------------|--|
| Group Planes | <p>Selections: Off, Main, Parallel, Angular</p> <p>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.</p> <p>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 right Set key. A plane can be moved parallel in the VOI by pressing the right Set key on the position of the green point and moving the Trackball up and down inside the plane.</p> <p>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.</p> <p>Angular. Before starting the Long Axis Rotation Mode, make sure that a long axis has correctly been defined in the VOI (see Define Axis above). The function starts in the long axis display mode. In the upper, left-hand corner a short axis cut is shown which gives an overview of the orientation of the long axis planes.</p> <p>To move these planes, press and hold down the right Set key while moving the Trackball.</p> |
| Type 1/2 | <p>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.</p> <p>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.</p> <p>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.</p> <p>Maximum Intensity. Transparent appearance of the object. Generated by displaying the maximum gray values in the VOI.</p> <p>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.</p> <p>Average Intensity. Transparent appearance of the object. Generated by a summation of the gray values.</p> <p>None for Type 2. No second rendering mode is used in addition to the Type 1 rendering mode.</p> |
| Render | <p>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.</p> |

Table 5-13: Advanced 3D Description and Instructions for Use (Continued)

| 3D Parameter | Description |
|--------------|--|
| Reslice | <p>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.</p> <p>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.</p> <p>Cubic Plane. Only one cut plane view is shown in a perspective displayed VOI. The cut plane can be moved freely without any limitations.</p> |

Movie 3D

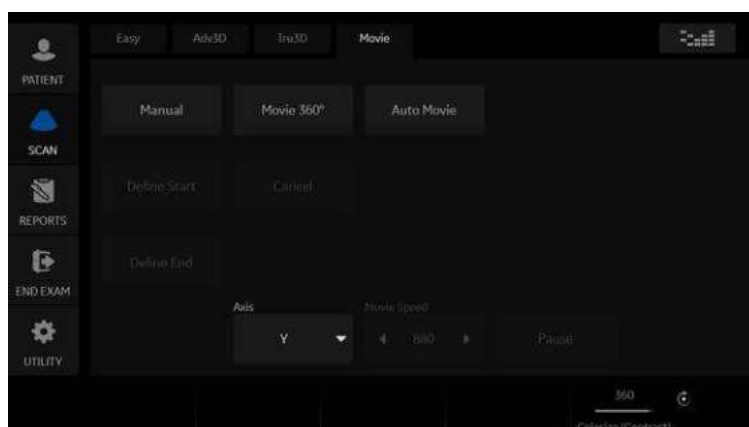


Figure 5-17. Movie 3D

Descriptions and instructions for using Movie 3D follow

Table 5-14: Movie 3D Descriptions and Instructions for Use

| 3D Parameter | Description |
|----------------------------|--|
| Manual Define Start/End | 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, then press Define Start. Move the VOI to the end position and press Define End. |
| Movie 360 Degrees | 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. |

Tru3D and Volume Measurement

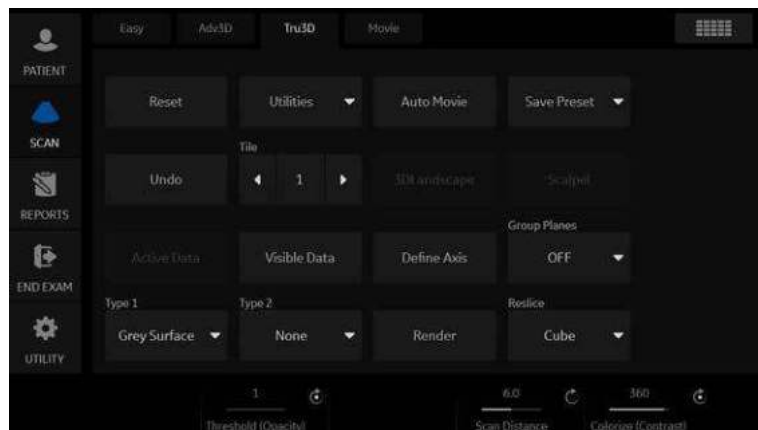


Figure 5-18. Tru3D

Descriptions and instructions for using Tru3D are the same as noted in the Advanced 3D section. See Table 5-13 on page 5-60 for a description of these controls.

Performing a Sensor Scan

To perform a sensor scan,

1. Attach the sensor cables to the front of the Ultrasound system.
2. Attach the probe bracket to the probe, unless using a VNav Inside (VN) probe.
Insert the receiver into the bracket on the probe.
3. Position the magnet near the patient, within 18 inches of the probe, next to the patient on the bed.
4. On the Touch Panel, select With Sensor.
5. Acquire the 3D scan.

Tru3D

Table 5-15: Tru3D Descriptions and Instructions for Use

| 3D Parameter | Description |
|------------------|---|
| Acquisition Mode | <p>With Sensor. Only available if you are using the Tru 3D package. In this mode the probe can be moved in different ways over the object you want to render. The probe can be moved parallel and angled during the same 3D acquisition. The sensor system registers any movement. It is recommended not to move in one direction and back again during one scan. It is also not recommended to turn the probe around its axis. The scanning speed does not have to be constant, but you should not change the velocity too much. In this mode the sensor has to be mounted on the probe.</p> <p>Before starting an acquisition, take care that the transmitter is positioned correctly during data acquisition and that the transmitter cannot move. The transmitter has to be placed in such an orientation that the probe with the receiver attached is always in the forward hemisphere of the transmitter during scanning.</p> <p>The patient MAY NOT move during the acquisition.</p> <p>The sensor device consists of an electromagnetic field transmitter and a field receiver. The field transmitter generates an alternating spheric electromagnetic field in a strength of up to five times the earth's magnetic field, depending on the distance between the transmitter and the receiver.</p> <p>For 3D data acquisition, the probe with the attached position sensor can be moved freely in an area of 70 cm around the transmitter.</p> <p>During data acquisition, the electromagnetic sensor device generates with a frequency of about 100 Hz a set of three translation and three angle values. These values describe the position of the ultrasound probe in space.</p> |

Magnetic field range from the transmitter

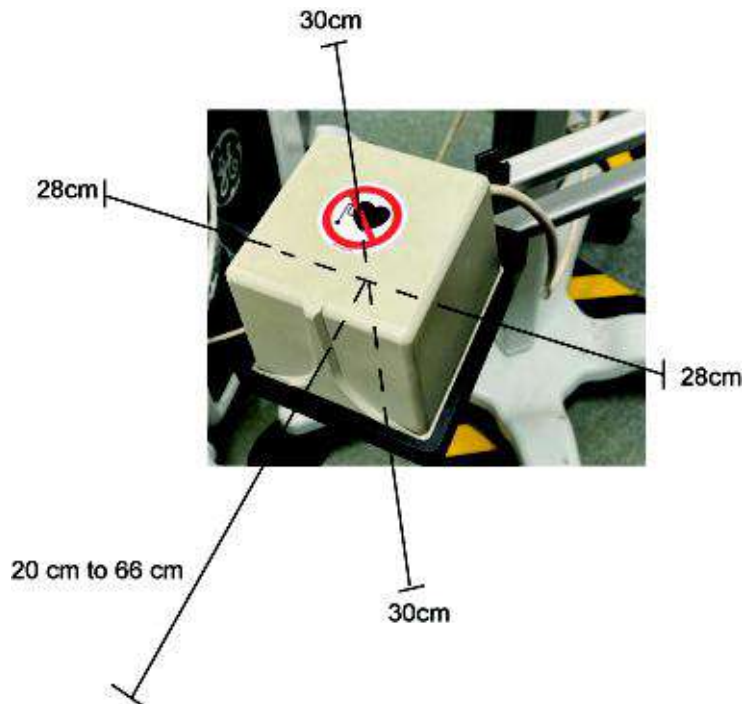


Figure 5-19. Magnetic field range from the transmitter

From the center of the transmitter,

1. 30cm above and below
2. 28cm left and right
3. 20 - 66cm forward

NOTE: *Remove the metal product from the region of the magnetic field to increase accuracy of position detection.*

Volume Measurement

The average measurement error for distance measurements is 5% and for volume measurements is 10%.

Workflow example

NOTE: *If you print out a Volume Measurement image with a B/W printer or store it onto the Clipboard, change the following presets before performing the Volume Measurement. On the Utility -> Connectivity -> Button preset menu in the Volumes section, choose Volume File Format* = 2 - Standard DICOM with Raw Data and in the Still Images section, choose Format = Secondary Capture Image.*

1. Scan in 2D-mode. Select Auto Sweep. Acquire and store the image.
2. Recall Image. Activate **3D/4D**.
3. Select **Vol. Meas** Tab. Select **Angular Method**.

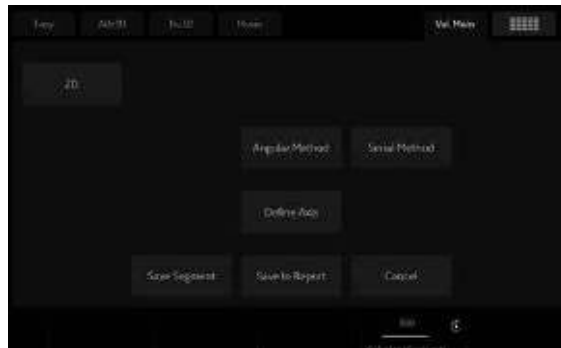


Figure 5-20. 3D Volume Measurement

NOTE: *Angular method is intended for spherical objects. Serial method is intended for rectangular objects.*

Volume Measurement (continued)

4. Define the axis and press **Enter**.
5. Six cut planes are displayed. You measure the volume by marking the contour of the anatomy.
6. When all traces are completed, the system displays the volume in the Results Window.

Measurement examples are shown below:

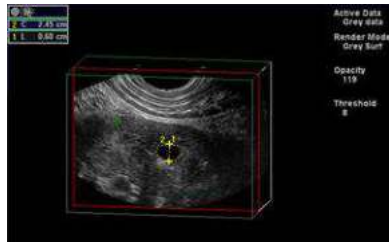


Figure 5-21. 2D Measurement (Example)

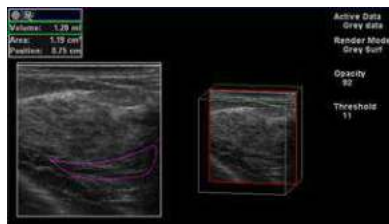


Figure 5-22. Example of Segment Method

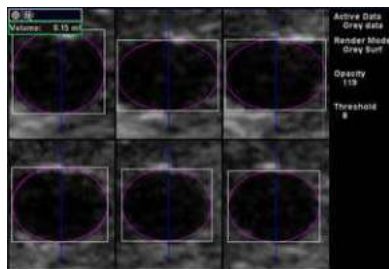


Figure 5-23. Example of Angular Method

Volume Measurement (continued)

Table 5-16: Volume Measurement Descriptions and Instructions for Use

| 3D Parameter | Description |
|----------------|---|
| 2D | <p>Type of 2D measurement: Distance, Angle, Circumference, Area</p> <p>Distance. Set the start and end distance using the right Set key.</p> <p>Angle. An angle is measured by marking two lines. Press the right Set key once marks the beginning of the first line. Press the right Set key again to mark the end of the first line and simultaneously the beginning of the second line (the intersection of two lines). Press the right Set key a third time to close the angle measurement.</p> <p>Circumference. The circumference of an area is measured by marking the contour of the anatomy by a polygon contour. Each point of the polygon is marked by pressing the right Set key. A double click of the right Set key closes the circumference. As long as the contour is not finished, each point can be deleted by a single press of the left Set key.</p> <p>Area. An area is measured by marking the contour of the anatomy by a polygon contour. The area of an area is measured by marking the contour of the anatomy by a polygon contour. Each point of the polygon is marked by pressing the right Set key. A freehand contour can be drawn by pressing and holding down the right Set key and moving the Trackball. Double click the right Set key to complete the area. As long as the contour is not finished, each point can be deleted by a single press of the left Set key.</p> |
| Angular Method | <p>This function allows you to mark any volume of interest in the dataset to measure its volume or to perform a segmentation of the object.</p> <p>The volume of a 3D object is determined by drawing the contour in several planes, which are rotated around an axis defined by the user. The contours are used to calculate the volume of the object.</p> <p>To determine the volume of an object based on the multiplanar Simpson rule, you need to define the rotation axis via Define Axis.</p> <p>When you press Angular Method, six cut planes are displayed. The Long Axis is marked in blue. You measure the volume by marking the contour of the anatomy. The contour can be marked in different ways: Polygon, Spline, Ellipse, Rectangle, or Rotate.</p> <p>Polygon. Each point of the polygon is marked with a single press of the right Set key. A freehand contour can be drawn by pressing and holding down the right Set key and moving the Trackball. Double click the right Set key to complete the area. As long as the contour is not finished, each point can be deleted by a single press of the left Set key.</p> <p>Curve. An area can be marked by single points positioned by pressing the right Set key. A double click on the right Set key closes the spline. The position of the points defining the contour can be changed by clicking on the point and moving it by pressing the right Set key and using the Trackball. As long as the contour is not finished, each point can be deleted by a single press of the left Set key.</p> |

Table 5-16: Volume Measurement Descriptions and Instructions for Use (Continued)

| 3D Parameter | Description |
|----------------|---|
| Angular Method | <p>Ellipse. When you select this mode, a circle is displayed. You can move the circle by pressing and holding down the right Set key while moving the circle with the Trackball. Press the right Set key to set the chosen position. To manipulate the shape of the circle, move the edges of the circle while pressing the right Set key.</p> <p>Rectangle. When you select this mode, a rectangle is displayed. You can move the rectangle by pressing and holding down the right Set key while moving the rectangle with the Trackball. Press the right Set key to set the chosen position. To manipulate the shape of the rectangle, move the edges of the circle while pressing the right Set key.</p> <p>Rotate. Using the rotate function, you can rotate an area around the Z axis. When you select this function, the Trackball symbol changes as soon as it is positioned to an edge of a region. The region can then be rotated by pressing and holding down the right Set key. A region can be selected and deleted by pressing the Clear key. To save a measurement, press Save Segment, Save to Report, or Cancel.</p> |
| Serial Method | <p>The Serial Method allows you to mark any volume of interest in the dataset to measure its volume or perform a segmentation of the object. A volume definition is done by defining areas at different depths. Before starting the volume measurement, you need to select a plane showing a cut in which the object can be clearly defined. When you press Serial Method, the display window shows two different views. The left side displays the active plane as a single plane. The VOI on the right side is displayed in cubic mode. In the right VOI select the cut plane position where the measurement process should start. In the left plane, mark the object of interest by designating one of the area definition modes (Curve, Ellipse, Rectangle, Polygon, Rotate). After you have completed defining the first area, the depth of the VOI should be changed on the right side. To change the depth, position the Trackball symbol inside the plane to be moved. press and hold down the right Set key while moving the Trackball backwards. By defining the contour of an object at different depths, its volume can be calculated by summing up the defined slices. To save a measurement, press Save Segment, Save to Report, or Cancel.</p> |
| Define Axis | <p>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 right Set key, then positioning the other end of the axis and pressing the right Set key.</p> |
| Save Segment | <p>After measuring a volume, you can use the defined volume for segmentation by pressing Save Segment. Segmentation means that a new dataset is created with voxel information based on the defined volume. A dataset containing only voxels inside the measured volume is created. The original dataset is saved additionally to the segmented data. The segmented data can be chosen in the Active Data or Visible Data list.</p> |
| Save to Report | <p>After measuring a volume, press Save to Report to register the measurement result in a database that is used for report generation.</p> |

Chapter 6

Scanning/Display Functions

Describes additional ways in which to adjust the image.

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.

Freezing an image

To freeze an image,

1. Press **Freeze**. The Freeze key backlight turns blue.

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.

NOTE: Selecting a new probe unfreezes the image

NOTE: Deactivating Freeze erases all measurements and calculations from the display (but not from the worksheet).

Use the Trackball to start CINE after pressing Freeze.

Using CINE

Introduction

CINE images are constantly being stored by the system and are available for playback or manual review via CINE.

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.

Cine gauge



Figure 6-1. Cine gauge

1. Loop speed
2. Cine gauge
3. Current frame number/total frame number
The cine gauge indicates which frame you are viewing of the whole loop.
4. Current number of seconds/total number of seconds
The cine gauge indicates which frame you are viewing of the whole loop.
5. Start frame
6. End frame

Touch Panel

The following Touch Panel appears:

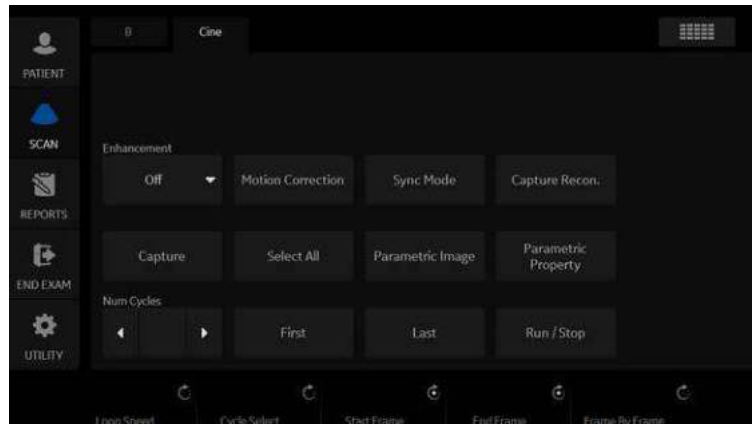


Figure 6-2. Cine Touch Panel

Table 6-1: Cine Touch Panel description

| Parameter | Description |
|-------------------|--|
| Select All | Select all frames of the cineloop. |
| Sync Mode | Phase synchronizes multiple cineloops. |
| Num Cycles | Control the number of heart cycles to be included in the cineloop. |
| First | Move to the first frame of cineloop. |
| Last | Move to the last frame of cineloop. |
| Run/Stop | Start/Stop the cineloop review. |
| Loop Speed | Adjust the cineloop playback speed. |
| Cycle Select | Select the heart cycle to review. |
| Start Frame | Rotate the rotary to select the start frame and push to set the frame. |
| End Frame | Rotate the rotary to select the end frame and push to set the frame. |
| Frame by Frame | Review the cine image frame by frame manually. |
| Capture | Searches through all images between the start frame and end frame and displays each peak or the highest velocity/tissue power. |
| Capture Recon. | Capture Recon. reconstructs small blood vessels in the cine mode. |
| Enhancement | Execute the enhancement to the Cine capture image. Select Off, Shade FW, Shade Rv, Enhance1, Enhance2 or Enhance3. |
| Motion Correction | Motion correction compensates each frame and cancels the motion. |

Using CINE

NOTE: Preset the parameters as necessary.

1. Press **Freeze**.
2. Move the Trackball to activate Cine.
3. Use the trackball or **Frame by Frame** to scroll through the acquisition and find the sequence of interest.
4. Press **Start Frame** or **End Frame** to set the corresponding cineloop boundary to the current frame as necessary.
Rotate **Start Frame** and **End Frame** to trim or expand the cineloop boundaries.
5. Adjust **Cycle Select** to move from heart beat to heart beat and select the heart cycle of interest.
6. Adjust **Num cycles** to select the number of heart beats to play back.
7. Press **Run/Stop** to run the cineloop and then press the print key to store the cineloop.
Cine loops stored on the clipboard are indicated with a movie strip icon.
8. Press **Run/Stop** again to stop the cine loop.
9. Press **Freeze** to return to live scanning.

NOTE: If you don't need edit, only press Run/Stop to run the cineloop and print key to store.

NOTE: Cineloop storage can be configured to store heart cycles with additional time before and after the R-wave and to display a preview before storage. See 'Print Controls' on page 10-48 for more information.

Adjust the cine loop speed

Rotate Loop Speed to set the speed of the cineloop playback.

The speed factor (%) is displayed above the cine gauge.

To view a cineloop frame by frame

In freeze, use the trackball or **Frame by Frame** to scroll through the cineloop frame by frame.

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.

NOTE: This is useful for Hybrid Contrast to display and check Contrast and Hybrid Contrast for example.

Recalling a cine loop

To recall a cine loop, double click on the cine loop on the clipboard.

NOTE: CINE Loops stored on the Clipboard are indicated with a movie strip icon.

Cine Mode Selection

To scroll the B-Mode cine loop only, toggle the top Trackball key and select **Scroll B**.

To scroll the Timeline cine loop only, toggle the top Trackball key and select **Scroll D**.

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.

Mark CINE

Preset

1. Check **Enable Mark Cine Control** via Utility -> Application -> Print Controls.



Figure 6-3. Mark Cine on Print Control

Table 6-2: Mark Cine

| Preset Parameter | Description |
|--------------------------------|---|
| Enable Mark Cine Control | Lets you mark where you want the CINE Loop to start (prospective CINE). |
| Preview Loop Longer than...(s) | When selected, allows you to review cine loops before storage for loops longer than selected time frame (in seconds). |

2. Press **Save**.

How to use

1. Press **Mark Cine** to specify the starting point for loop storing or cine review.
When you press **Mark Cine**, the current image frame is noted as a start frame.
2. Press the appropriate print key while continuing to live scan to store the cine loop.

NOTE: *The Mark CINE control on the Trackball key is available while live scanning in non-timeline modes (B-Mode, B-Flow and Color Flow Mode).*

NOTE: *Selecting Mark CINE when a Mark CINE already exists causes the new Mark CINE to replace the previous one.*

NOTE: *Changing modes or other actions that flush CINE memory causes the Mark CINE to be removed and the image data will not be saved.*

NOTE: *A Print button can be configured to store a Single Image during Mark Cine, without stopping the Cine loop.*

Preview

Loop Preview can be enabled independently for Time-Based Store, ECG-Based Store, and Mark CINE. This is useful for setting preview preferences based on the application.

NOTE: *The Contrast Time Span setting overrides the Time Span when in Contrast Mode.*

Background Store

Live Clips are stored in the background to allow you to continue scanning. This works for both Raw Data and for DICOM Loops (with Direct Store On or Off). Image Ordering is preserved with Background Store.

The benefit of Background Store is that clips are stored with minimal interruption to live scanning.

NOTE: *Background Store IS NOT supported with V Nav, 4D, or with previously-acquired CINE Loops.*

NOTE: *The system may stop acquisition while storing if CINE memory is at least 80% full. Monitor CINE memory while storing CINE loops to ensure continuous live scanning.*

NOTE: *DICOM loops take significantly longer to store. Storage time may approach or exceed loop time. Allow extra space in CINE memory when saving DICOM loops.*

NOTE: *The CINE gauge turns purple to indicate the section of CINE memory that is being stored in the background.*

Image Storage Hints



HINTS

Setup Tips

- Print Button Setup is Application specific. When you access Application--> Print Controls, the current Application is the default Application.
- To apply the same Print Control Settings for all Applications, select All Applications as the preset on the Print Controls Menu. Be sure to re-enter values if the field is green.
- Print button setup for the file format and destinations are still configured via the Connectivity Menus.



HINTS

Usage Tips

- If you select Mark CINE, the next time you press Print completes the Mark CINE Loop Store, independent of its configuration.
- The CINE gauge turns green when a Prospective CINE Clip is pending.
- You can cancel Prospective Store by pressing Freeze/Unfreeze or by changing Modes.

Cine Capture

Selecting **Capture** searches through all images between the start frame and end frame and displays each peak or the highest velocity/tissue power. Adjust the start frame and end frame points to limit the image frames used in the process.

1. Display the CINE loop which is in memory or recalled from archive.

NOTE: Cine Capture applies only to 2D images (B, B Flow, CF, PDI, Contrast, etc.).

NOTE: On 2D duplex modes (B/CF, B/PDI, etc.), Cine Capture is not applied to the background B-Mode image, even if the CF/PDI display is turned off.

2. Run the cineloop.
3. Select **Capture** on the Touch Panel to display the captured image.
A character 'C' displays on the screen instead of the frame average level.
4. If necessary, save the captured image.
5. Press **Capture** again to turn Cine Capture off.

NOTE: Cine Capture can be used on exported files by using the Save As function. You can save the still image (jpeg) and cine loop (avi) by using Save As.

NOTE: Cine Capture does not effect TIC Analysis.

Capture Recon.

Description

Capture Recon. reconstructs small blood vessels in the CINE mode.

It is available in B-Flow, Contrast, CF, PDI, and B-Mode without CrossXBeam.

Capture Recon. shows smaller blood flow information than conventional B-Flow image, which is expected for the characterization of tumor, chronic liver disease, vascular abnormality, etc.

Procedure

1. Scan B-Flow mode in the ordinary way, except:
Sensitivity can be larger (20 (default) to 30 or more).
2. Acquire a short clip, then freeze.
 - Combination of Capture helps to imagine resulting image.
 - 3-dimensional sweep may be efficient to visualize many vessels.
3. Press **Capture Recon** on the CINE Touch Panel. Adjust threshold as necessary.
4. The order of the frames is rearranged by order of smaller artifact. The frame which has motion artifact is rejected. Move the Trackball or assigned rotary to review the image Frame by Frame.

NOTE: *While the Capture Recon, is activated, the color of CINE gauge turns pink.*

Enhancement

Enhancement executes the enhancement process to cine capture images.

1. Display the cine capture image using **Capture**.
- NOTE:** *Enhancement applies only to Cine Capture images.*
2. Select **Enhancement**. A character 'C' displays on the screen instead of the frame average level.
 - Shade Fw/Shade Rv
Select Fw (Forward) that brings start frame or Rv (Reverse) that brings last frame of cine to the front. The system has two thresholds for the Shade process. Comparison will be made frame by frame after the thresholds have been met. If the two thresholds are satisfied, no comparison will be made with the rest of the frame.
Using Shade Fw/RV, lower intensity echoes in the near frame will be masked by higher intensity echoes in the far frame. ShadeFw/Rv makes it possible to show lower intensity echoes in the near frame despite the fact that there may be a higher echo projection in the far frame. Therefore, the anteroposterior position of the blood vessel is clearly displayed.
 - Enhance1/Enhance2/Enhance3
The part corresponding to the data of the selected frame is enhanced and superimposed on the entire cine capture images. This allows you to visualize the spatial relationships with the B-Mode image and the flow appearance.

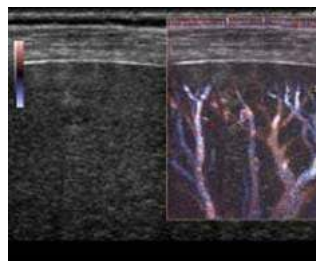


Figure 6-4. Enhancement image example

3. If necessary, save the enhanced image.

NOTE: *You can save the still image (JPEG) and cine loop (WMV) by using Save As.*

Motion Correction

Understanding of the vascular structure is important, for example, with liver cancer. Though, the captured image distorts or blurs due to the patient's breathing. Motion correction compensates each frame and cancels the motion.

NOTE: Motion Correction is activated only for B, CHI, Contrast and B-Flow.

1. Displays the cine capture image using **Capture**.
2. Select **Motion Correction**. The system generates the captured image with motion correction.

The user can store the cine clip with the state of motion correction kept in the raw data.

The user can store the still image as the single frame DICOM image without the raw data.

Image Zoom

Overview

There are three kinds of zoom on the system: Pan Zoom, HD Zoom and Magnification Zoom.

- **HD Zoom** only acquires the image data within the ROI, increasing the density of the image in the ROI. Image adjustments can only be performed during live scanning.
- **Pan Zoom** magnifies the display of the data within the ROI without making any changes to the ultrasound image data acquired. The entire image is acquired and the ROI can be adjusted (moved and resized).
- **Magnification Zoom** magnifies the entire image on the screen (non-ROI zoom).

Location of Zoom Control

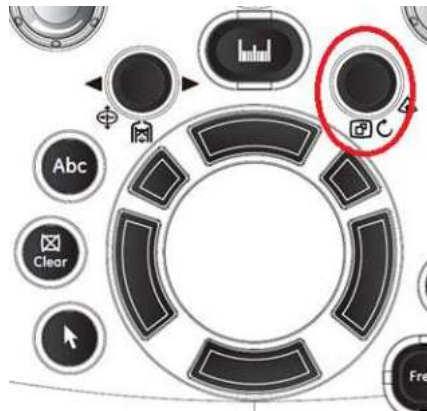


Figure 6-5. Zoom Control Knob

HD Zoom

In HD Zoom, the Ultrasound line density and/or sampling frequency increases, resulting in higher resolution. HD Zoom can be performed on live images.

1. To activate HD Zoom, push the **Zoom** control knob inward while scanning live.

*NOTE: If already in Magnification Zoom, push the **Zoom** control knob inward to first turn off Magnification Zoom, then push again to activate HD Zoom.*

Press the top trackball key to select **Size** for change ROI size or **Pos** for change ROI position.

Use the trackball to position the zoom area over the desired portion of the image.

2. To exit HD Zoom, push the **Zoom** control knob inward again.

NOTE: When HD Zoom is on and the image is live, the right trackball button toggles from HD Zoom to Pan Zoom.

Bioeffect

HD Zooming 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.

Pan Zoom

Pan Zoom can be performed on a live, frozen, CINE or recalled raw data image.

1. To activate Pan Zoom (when frozen or in CINE) push the **Zoom** knob inward.
Press the top trackball key to select **Size** to change ROI size or **Pos** to change ROI position. Use the trackball to change the ROI size or position the zoom area over the desired portion of the image.
2. To deactivate Pan Zoom push the **Zoom** control knob inward again.

NOTE: *When Pan Zoom is on and the image is live, the right trackball button toggles from Pan Zoom to HD Zoom.*



Figure 6-6. Zoomed Image Example

1. Zoom Image
2. Reference Image: Reference image is the small un-zoomed image.
3. Zoom ROI: Zoom ROI indicates the region of the image to zoom.
4. Pos/Size: Use the top trackball key to change position and size of ROI.

Magnification Zoom

Magnification Zoom magnifies the entire image on the screen (non-ROI zoom).

1. To activate Magnification Zoom, rotate the **Zoom** control knob clockwise.
2. There are three ways to deactivate Magnification Zoom:
 - Press Mag Zoom Rest on the trackball button.
 - Rotate the **Zoom** control value to 0.
 - Activate B-Mode (push the B-Mode button on the Front Panel).

Panning in Magnification Zoom

While in Magnification Zoom, you can pan the image across the screen.

1. Press the Top Trackball button to highlight the Position Indicator “Pos.”



Figure 6-7. Position Indicator

2. Move the Trackball to pan the image across the screen.

Split Screen

Overview

LOGIQ Fortis 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 of OB.
- Simultaneous (Dual) (split the module window into 2 areas, with both panes live and active)

NOTE: Recalled dual/quad images can be edited.

Dual screen

1. Press **L** to activate a dual screen. The single image is placed on the left side.

NOTE: When you activate the dual screen by pressing L, the single image is placed on the left side; when you activate by pressing R, the single image is placed on the right side.

2. Press **R**. The left side image is freezed and the image displays in the right side.
3. Press **Freeze** to freeze the image of the right side.
4. Press **Freeze** again to unfreeze the active image which has the gray bar under the image.
To switch between active images, press **L** or **R**.
5. Press **B**-mode key to return to the single screen.

NOTE: To put a copy of the image on the opposite side when entering dual split screen, use the "When Entering Dual Image" preset found on Utility --> Application --> Settings preset page.

Quad screen

1. Press and hold down **L** to activate a quad screen. The single image is placed on the upper left.
- NOTE: When you activate the dual screen by pressing L, the single image is placed on the left side; when you activate by pressing R, the single image is placed on the right side.*
2. Press **R**. The left side image is freezed and the image displays in the upper right.
 3. Press **Freeze**.
 4. Press **Freeze** again to unfreeze the image which has the gray bar under the image.
Press **L** or **R** to move the gray bar to the image of the left side or the right side.
 5. Press **B-mode** key to return to the single screen.

Simultaneous mode

While using CFM or PDI, press **L** and **R** keys simultaneously 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.

NOTE: Simultaneous mode can also be used within B-Mode to view with (Right) and without CrossXBeam (Left) if CrossXBeam is turned on.

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:B-Mode
- Color Flow Mode:Color Flow Mode
- B-Mode:Color Flow Mode
- Simultaneous Mode.
- Contrast
- Elastography
- Volume Navigation

Dual Caliper (continued)

NOTE: *Dual Caliper IS NOT available in B-Mode: B/PW Mode or in B-Mode: B/M Mode, or with different probes.*

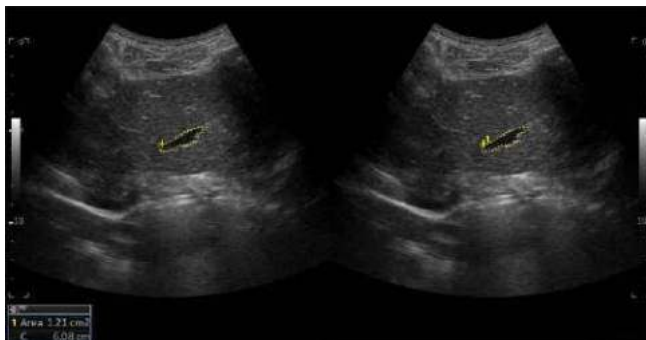


Figure 6-8. Original (Left), Shadow (Right)

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 a 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 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 6-9. Add Measurement

2. Select appropriate dual caliper tool from Tool drop-down menu.

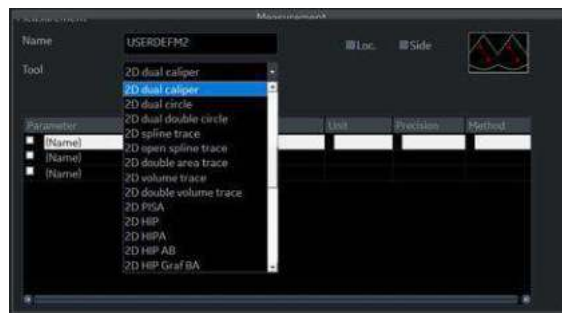


Figure 6-10. Drop-down menu

3. Type the measurement and parameter name as you like.
4. Add the created measurement to the Touch Panel.
5. Display the dual image and press **Measure**.
6. Select an added measurement from the Touch Panel to enable the appropriate measurement. A caliper displays.

NOTE: *When the measurement is selected without dual B images or with different probe images, a warning message displays on the status bar and the selected measurement is cancelled.*

Dual caliper for 2D image (continued)

7. 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.*

8. 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.*

9. To complete the measurement, press **Set**. The system displays the measurement result in the Results Window.

Dual Caliper for V Nav

1. Check **Dual Caliper on VNav** in Utility -> System -> System Measure. Only available distance, area, trace and angle measurement for V-Nav.

NOTE: *You cannot measure on the recalled image.*

NOTE: *Measure is available on the cine image shortly after freezing the image; however, you cannot measure on recalled images.*

2. Select the measurement via the Trackball key for a live scan image. Select the measurement from the Measurement Type table for Volume data.

NOTE: *Numbers are only displayed on the live scan image.*

3. If you want to measure live scan and volume data separately, select **Off** for Dual Caliper using the Touch Panel key.

NOTE: *After the Dual caliper measurement, graphics and measurement results are removed from the Volume dataset when you press **Measure**.*

NOTE: *If you use Zoom after the Dual caliper measurement, graphics and measurement results are removed.*

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 Touch Panel menu.



Figure 6-11. Comment Key on the Front Panel

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 **New Patient**, 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.

To return to the user specified position or factory default position, press the **F7 (Cursor Home)** key or the **Home** control on the Annotation Touch Panel (see Figure 6-13 on page 6-29).

To establish a new cursor home position, place the cursor in the desired position and press **Shift+F7** or press and hold the Home control on the Annotation Touch Panel.

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 blue. Once the comment is set or fixed, the color returns to yellow or to the user selected color.

On the Touch Panel annotations have been color-coded for easy replacement or to easily add annotations. See Annotation Groupings below.

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 or by selecting the **Arrow** control on the Annotation Touch Panel (see Figure 6-13 on page 6-29). When the pointer comes up, it is a blue 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** control.
- To readjust the length and thickness of the pointer, use the **Arrow Resize** rotary control. 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 blue 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 or press and hold the **Arrow** control on the Annotation Touch Panel.

NOTE: To prevent the Trackball from changing the arrow angle, select the "Keep arrow angles" preset at Utility -> Annotation -> 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 or by selecting the **Comment Layer Switch** control on the Annotation Touch Panel (see Figure 6-12). Text1 is the default choice.

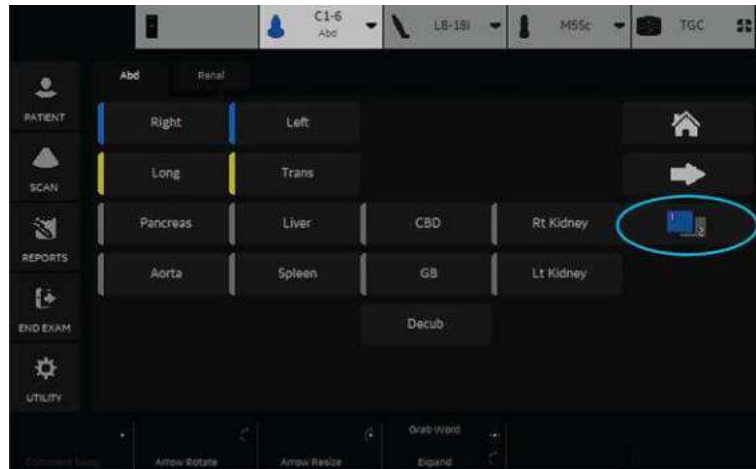


Figure 6-12. Comment Layer Switch Control

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 or **Comment Layer Switch** control to cycle through the three Text 1/Text 2 states:

1. Text 1 Only -- Only Text 1 comments displayed and editable.
2. Text 2 Only -- Only Text 2 comments displayed and editable.
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 -> Comment -> Comment** and select either **Text 1 and Both** or **Text 1 and Text 2 and Both**.

Text Overlays (continued)

The font color for the Text1 and Text2 overlays can be set separately. Go to **Utility -> Comment -> Comment** 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 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 Touch Panel when 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 Touch Panel.

Each Touch Panel key can also be configured to hold a small list of up to 3 comments. The first word in the list is displayed on the Touch Panel and the others can be accessed by toggling the key or pop-up menu. To show the presence of a small list stored under a particular key, a small indicator (>) is placed on the key.

To program your system with specific comments, see 'Comments Libraries Presets' on *page 10-32* for more information.

Annotating an Image by Comment Groupings

Comments can be grouped together for ease of annotating. For example, in the figure below there are blue, yellow, and green groups.

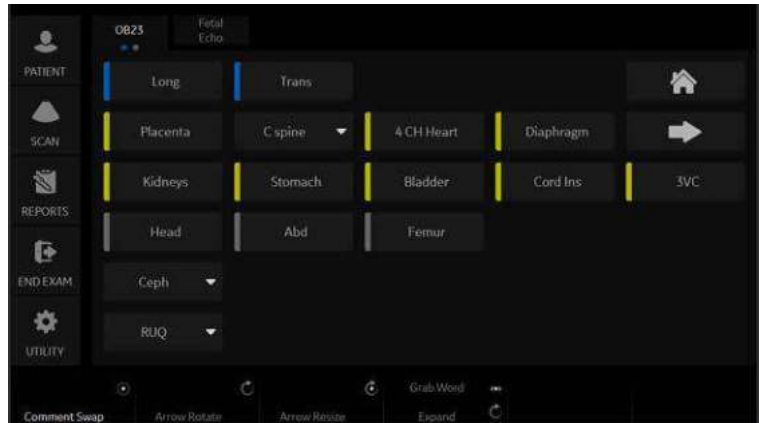


Figure 6-13. Annotation Touch Panel

When you select comments with a different color, the selected comment is added to the existing comment. In the example below, **Right** was selected from the blue group of comments. **Trans** was selected from the yellow group, so it was added to the first comment. **Bowel** was selected from the green group, so it was also added.

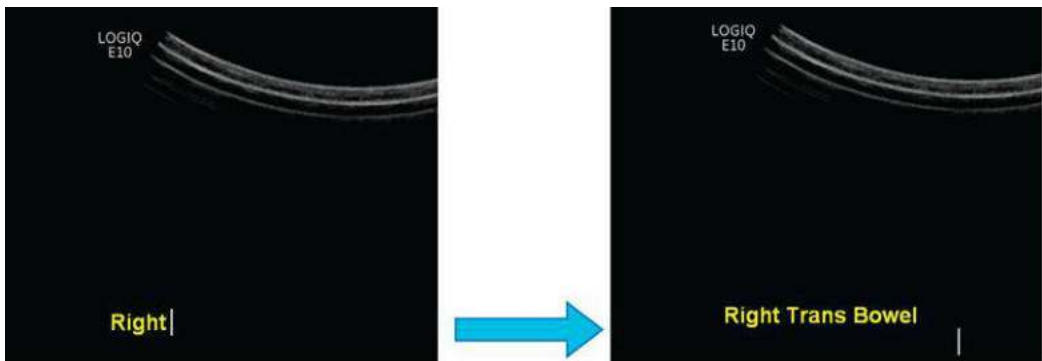


Figure 6-14. Added Comments (Different Color Groups)

Annotating an Image by Comment Groupings (continued)

When you select comments with the same color, the selected comment is overwritten with the new comment. In the example below, **Bowel** was selected from the green group of comments, but then **Appendix** was selected from the same green group, so it replaced **Bowel**.

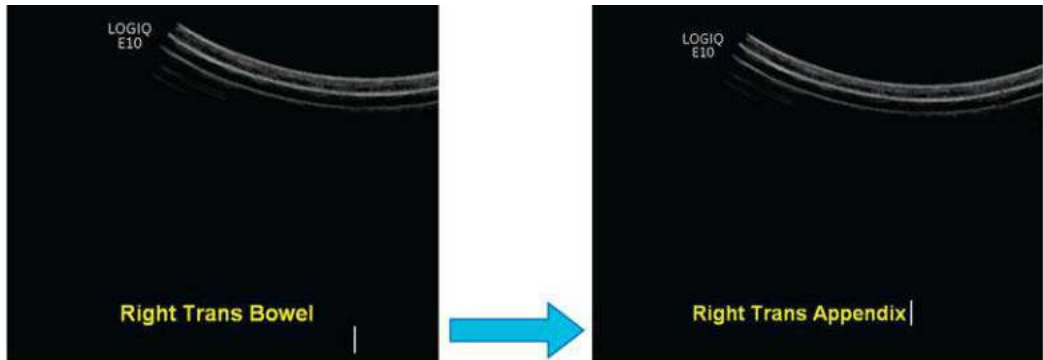


Figure 6-15. Replaced Annotation (Same Color Group)

Annotating an Image by Comment Groupings (continued)

You can configure these Comment color groupings via Utility--> Comments--> Libraries (up to 5 groups). Groups are organized by color. Position the cursor over the rectangular region to the left of the annotation to display the group drop-down selection menu, then select the color that matches your grouping.

NOTE: You can also group annotations by dots (: and .). Dots are for color blindness recognition in groupings.

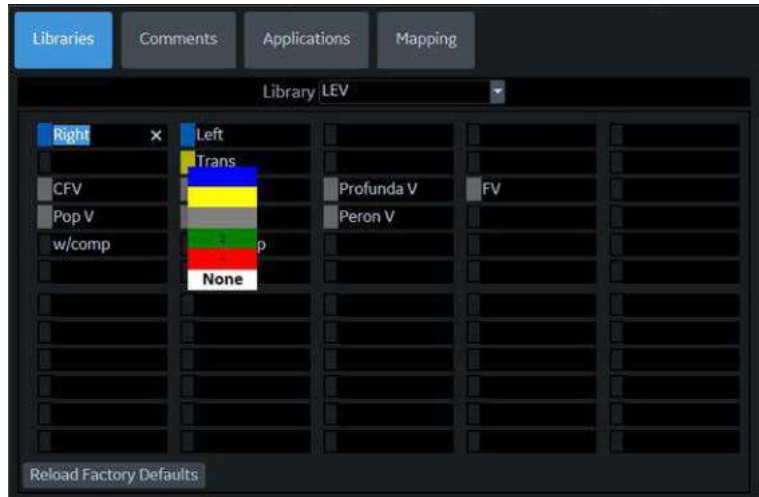


Figure 6-16. Tagging a Group Color to an Annotation

The configured comments are displayed on the Touch Panel.

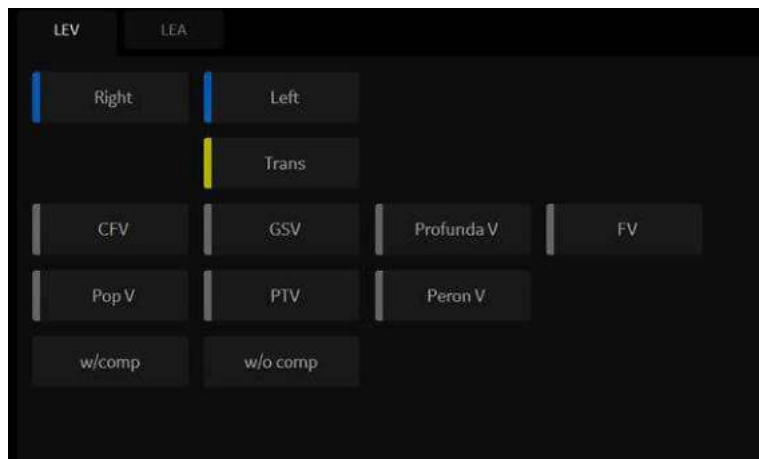





Figure 6-17. Color-Tagged Annotation Touch Panel

Rearranging Touch Panel Comments

You can easily move comments to a new location by selecting the annotation and moving it to the new, empty location.

NOTE: You cannot move a comment to a location with a comment. The new location must be empty.

Table 6-3: Moving Touch Panel Annotations

| Step | Example |
|---|---|
| <p>1. Position the cursor over the annotation you want to move. In the example, we are going to move "Left" to a cell to the right.</p> |  |
| <p>2. Hold and drag the "Left" annotation to the new cell; in this case the empty cell to the right.</p> |  |
| <p>3. Release the cursor when you have the annotation positioned in the new cell location. Then Save and Exit the Utility Page.</p> |  |

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 10-35 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.

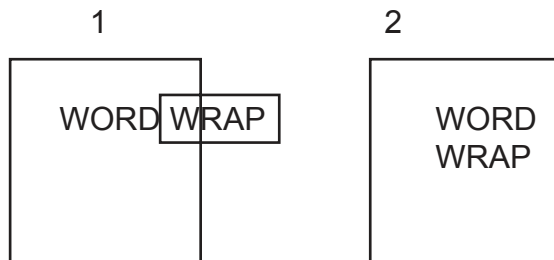


Figure 6-18. Next Line Word Wrap

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.*

Moving Text

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 delete all comments and arrow marks, press the **Clear** key twice immediately after entering the comment mode.

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 use HIGHLIGHT rotary.

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:

- Press **Undo** key.

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 images are archived or scanned.

1. Press **Bodypattern/Ellipse**. Body patterns specific to the current application are displayed.

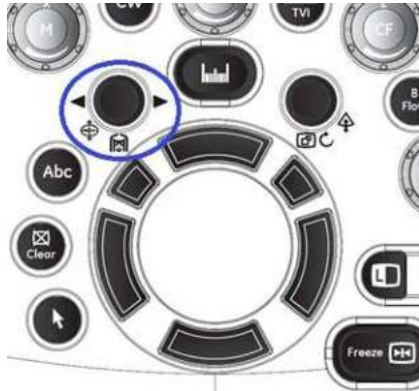


Figure 6-19. Body Pattern/Ellipse Control

2. Touch the body pattern to insert. The selected body pattern with a probe marker is displayed on the scanning screen.
3. Using the trackball, adjust the position of the probe marker.
4. Rotate **Body Pattern/Ellipse** to set the probe marker orientation.
5. To move the body pattern:
 - Press **Move Pattern**.
 - Move the bodymark to a new location with the trackball.
 - Press **Set** to anchor the bodypattern to the new location.
6. Press **Set** on the keyboard or **Scan** on the Touch Panel to exit without erasing the body pattern.
7. To clear the body pattern, press the **Body Pattern/Ellipse** control to activate body patterns and then press the **Clear** key.

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/Applications Preset Menu' on *page 10-44* for more information.

Body Patterns (continued)

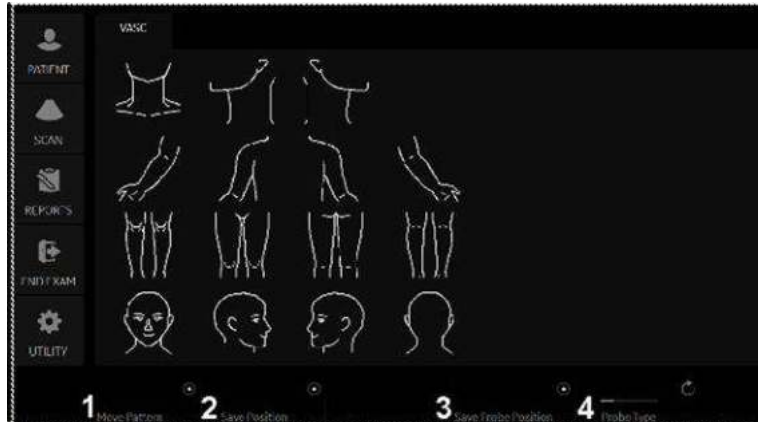


Figure 6-20. Touch Panel displays of Body Pattern - example

Table 6-4: Control Touch Panel

| No. | Function | Description |
|-----|---------------------|--|
| 1. | Move Pattern | Each Touch panel key can also be configured to hold a small list of up to 3 comments. The first word in the list is displayed on the Touch Panel and the others can be accessed by toggling the key. To program your system with specific comments, see 'Creating a small list' on page 10-37 for more information. |
| 2. | Save Position | Move the body pattern to the desired location and press the Save Position . Current position of Body Pattern is saved as a Home Position of current display format. Hold down Save Position to reset the home position to factory default. |
| 3. | Save Probe Position | Rotate the arrow. You can also rotate the arrow by Trackball. |
| 4. | Probe Type | The probe mark type is selectable by rotating the Probe Type control on the Touch Panel. There are different choices available with one being a blank selection. |

To select the active side in dual B-Mode, use the **Active Side** rotary control at the bottom of the Touch Panel.

You can use the **Zoom** control to select the body pattern. If you want to assign the select function to the Zoom control, see See 'Body Pattern Libraries/Libraries Preset Menu' on page 10-41 for more information..

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 Touch Panel 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 on the Touch Panel.
- c. Select a type of probe mark with the **Probe Type** Touch Panel key.
- d. Place the probe mark at the proper location.
- e. Select the **Save Probe Position** Touch Panel key.

NOTE: “Save Probe Position” saves both the Probe Mark position and Probe Type.

- 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.

Notes for Body Pattern (Probe mark) (continued)

- Check the Body Pattern on the Touch Panel if the Probe Mark does not appear on the monitor.

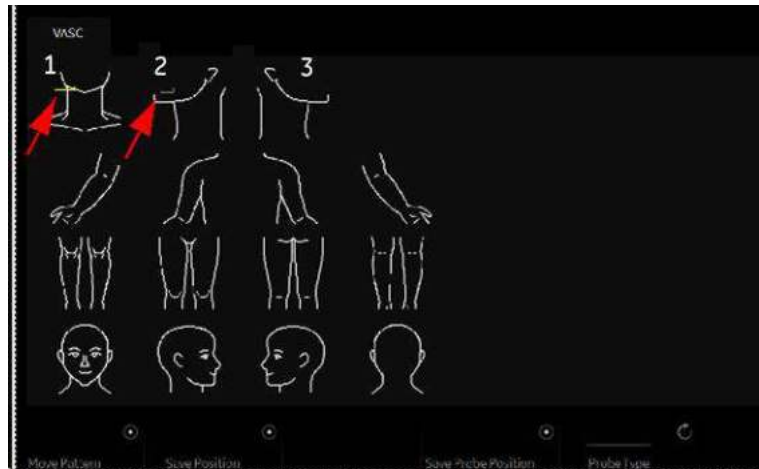


Figure 6-21. Body Pattern Touch Panel

1. When the Probe Mark is saved for the Body Pattern, the Probe Mark is displayed in yellow on the Touch Panel and should also be shown on the monitor.
2. When the Probe Mark is saved with "Probe Type - None", the Probe Mark is displayed in gray on the Touch Panel and is not shown on the monitor. Reselect an appropriate Probe Type and save as necessary.
3. When the Probe Mark is not saved, no Probe Mark is displayed either on the Touch Panel or the monitor. Select an appropriate Probe Type and save as necessary.

Body Patterns (continued)

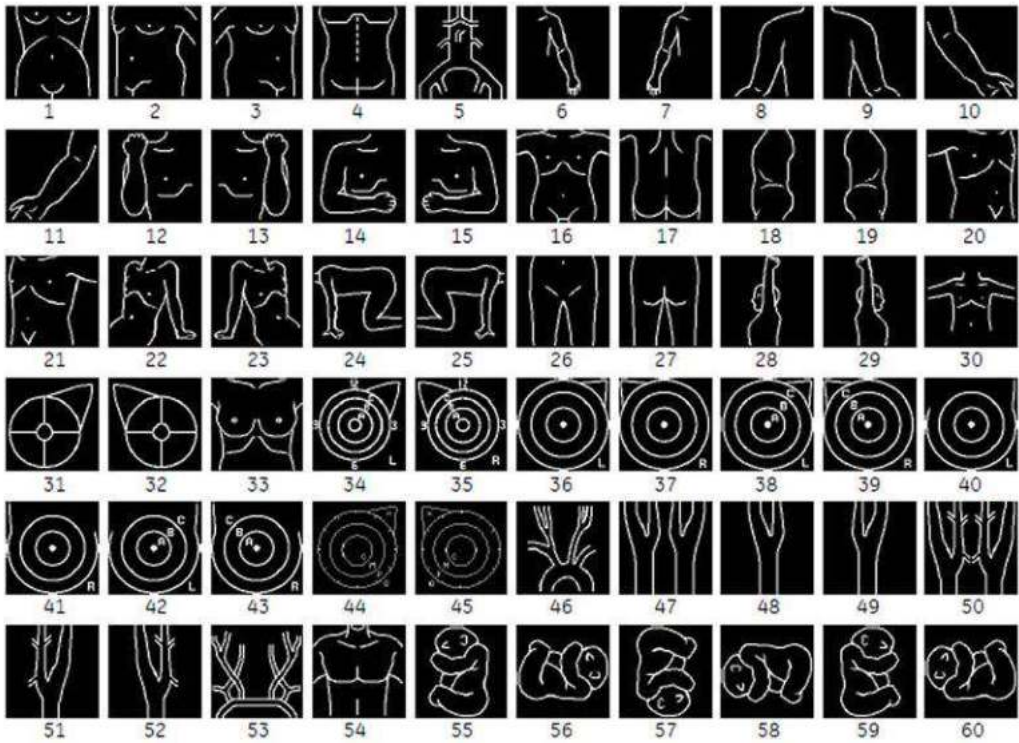


Figure 6-22. Body Patterns Available

- | | | | |
|------------|----------------|-----------------|------------------|
| 1. abdo 1 | 16. body 1 | 31. breast 1 | 46. carotid 1 |
| 2. abdo 2 | 17. body 2 | 32. breast 2 | 47. carotid 2 |
| 3. abdo 3 | 18. body 3 | 33. breast 3 | 48. carotid 3-Lt |
| 4. abdo 4 | 19. body 4 | 34. breast 4-Lt | 49. carotid 3-Rt |
| 5. aorta | 20. body 5 | 35. breast 4-Rt | 50. carotid 4 |
| 6. arm 1 | 21. body 6 | 36. breast 5-Lt | 51. carotid 4-Lt |
| 7. arm 2 | 22. body 7-Lt | 37. breast 5-Rt | 52. carotid 4-Rt |
| 8. arm 3 | 23. body 7-Rt | 38. breast 6-Lt | 53. carotid 5 |
| 9. arm 4 | 24. body 8-Lt | 39. breast 6-Rt | 54. chest 1 |
| 10. arm 5 | 25. body 8-Rt | 40. breast 7-Lt | 55. fetus 1 |
| 11. arm 6 | 26. body 9 | 41. breast 7-Rt | 56. fetus 2 |
| 12. arm 7 | 27. body 10 | 42. breast 8-Lt | 57. fetus 3 |
| 13. arm 8 | 28. body 11-Lt | 43. breast 8-Rt | 58. fetus 4 |
| 14. arm 9 | 29. body 11-Rt | 44. breast 9-Lt | 59. fetus 5 |
| 15. arm 10 | 30. body 12 | 45. breast 9-Rt | 60. fetus 6 |

Body Patterns (continued)

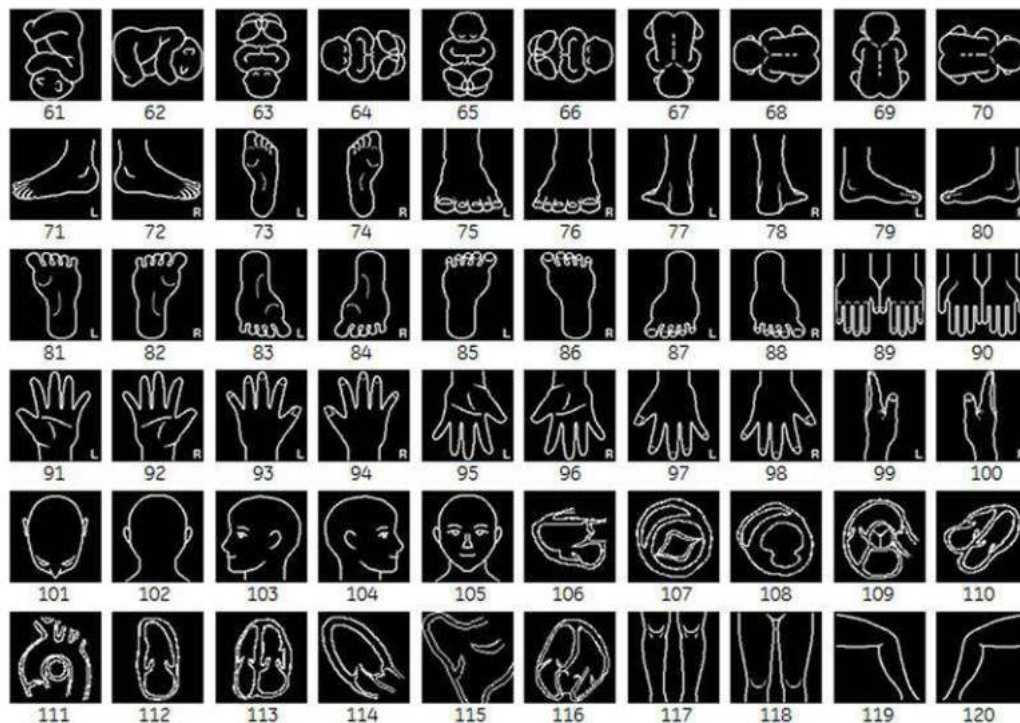


Figure 6-23. Body Patterns Available (continued)

- | | | | |
|---------------|---------------|----------------|---------------|
| 61. fetus 7 | 76. foot 3-Rt | 91. hand 3-Lt | 106. heart 1 |
| 62. fetus 8 | 77. foot 4-Lt | 92. hand 3-Rt | 107. heart 2 |
| 63. fetus 9 | 78. foot 4-Rt | 93. hand 4-Lt | 108. heart 3 |
| 64. fetus 10 | 79. foot 5-Lt | 94. hand 4-Rt | 109. heart 4 |
| 65. fetus 11 | 80. foot 5-Rt | 95. hand 5-Lt | 110. heart 5 |
| 66. fetus 12 | 81. foot 6-Lt | 96. hand 5-Rt | 111. heart 6 |
| 67. fetus 13 | 82. foot 6-Rt | 97. hand 6-Lt | 112. heart 7 |
| 68. fetus 14 | 83. foot 7-Lt | 98. hand 6-Rt | 113. heart 8 |
| 69. fetus 15 | 84. foot 7-Rt | 99. hand 7-Lt | 114. heart 9 |
| 70. fetus 16 | 85. foot 8-Lt | 100. hand 7-Rt | 115. heart 10 |
| 71. foot 1-Lt | 86. foot 8-Rt | 101. head 1 | 116. heart 11 |
| 72. foot 1-Rt | 87. foot 9-Lt | 102. head 2 | 117. legs 1 |
| 73. foot 2-Lt | 88. foot 9-Rt | 103. head 3 | 118. legs 2 |
| 74. foot 2-Rt | 89. hand 1 | 104. head 4 | 119. legs 3 |
| 75. foot 3-Lt | 90. hand 2 | 105. head 5 | 120. legs 4 |

Body Patterns (continued)

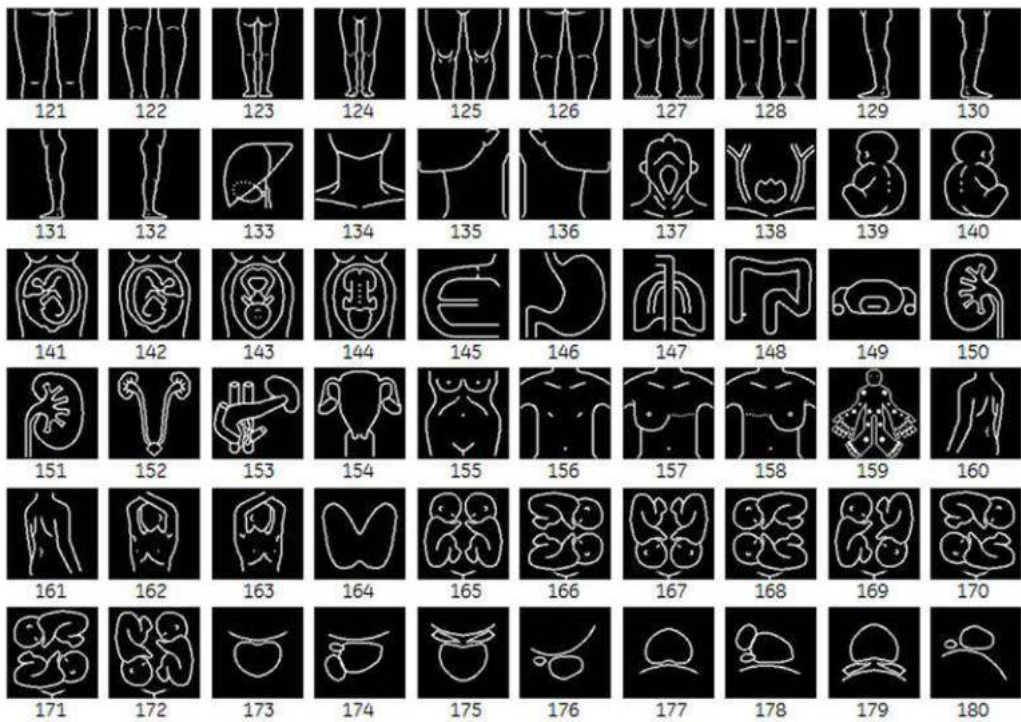


Figure 6-24. Body Patterns Available (continued)

| | | | |
|-------------------|--------------|----------------------------|-------------|
| 121. legs 5 | 136. neck 3 | 151. organ 7 | 166. twin 2 |
| 122. legs 6 | 137. neck 4 | 152. organ 8 | 167. twin 3 |
| 123. legs 7 | 138. neck 5 | 153. organ 9 | 168. twin 4 |
| 124. legs 8 | 139. ob 1 | 154. pelvis 1 | 169. twin 5 |
| 125. legs 9 | 140. ob 2 | 155. pelvis 2 | 170. twin 6 |
| 126. legs 10 | 141. ob 3 | 156. post-breast-bilateral | 171. twin 7 |
| 127. legs 11 | 142. ob 4 | 157. post-breast-Lt | 172. twin 8 |
| 128. legs 12 | 143. ob 5 | 158. post-breast-Rt | 173. uro 1 |
| 129. legs 13-a-Lt | 144. ob 6 | 159. rheuma | 174. uro 2 |
| 130. legs 13-a-Rt | 145. organ 1 | 160. shoulder-back-Lt | 175. uro 3 |
| 131. legs 13-Lt | 146. organ 2 | 161. shoulder-back-Rt | 176. uro 4 |
| 132. legs 13-Rt | 147. organ 3 | 162. shoulder-front-Lt | 177. uro 5 |
| 133. liver | 148. organ 4 | 163. shoulder-front-Rt | 178. uro 6 |
| 134. neck 1 | 149. organ 5 | 164. thyroid | 179. uro 7 |
| 135. neck 2 | 150. organ 6 | 165. twin 1 | 180. uro 8 |

Body Patterns (continued)

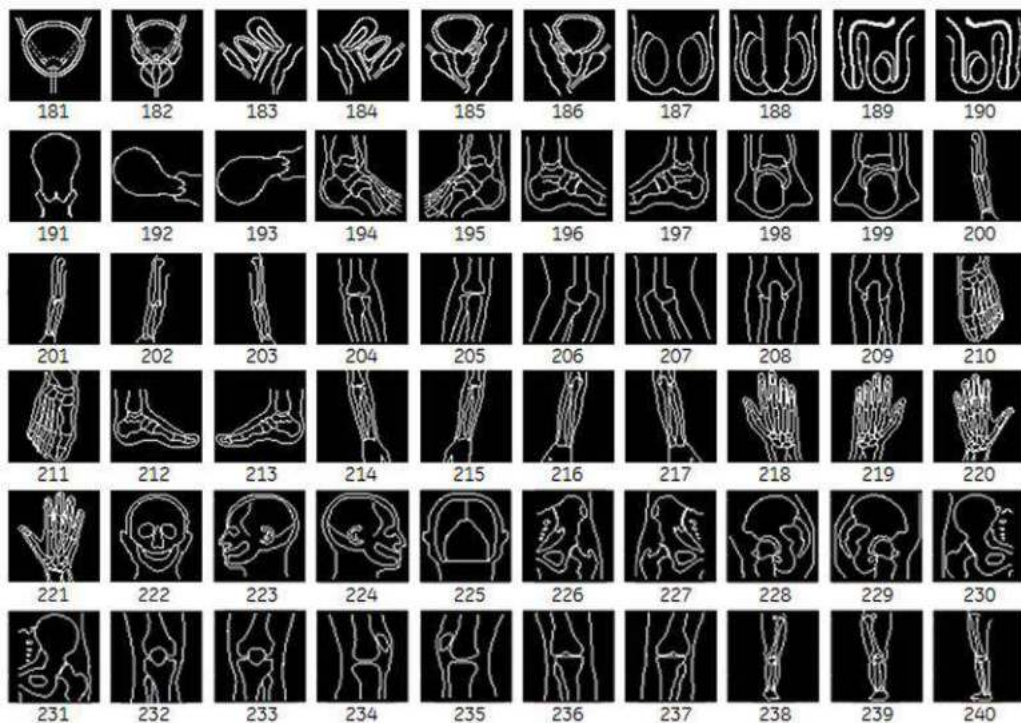


Figure 6-25. Body Patterns Available (continued)

- | | | | |
|-----------------------|--------------------|----------------------|-------------------|
| 181. uro 9 female | 196. ankle lat-Lt | 211. foot-Rt | 226. hip-Lt |
| 182. uro 9 male | 197. ankle lat-Rt | 212. foot lat-Lt | 227. hip-Rt |
| 183. uro 10 female-Lt | 198. ankle post-Lt | 213. foot lat-Rt | 228. hip lat-Lt |
| 184. uro 10 female-Rt | 199. ankle post-Rt | 214. forearm-Lt | 229. hip lat-Rt |
| 185. uro 10 male-Lt | 200. arm-Lt | 215. forearm-Rt | 230. hip post-Lt |
| 186. uro 10 male-Rt | 201. arm-Rt | 216. forearm post-Lt | 231. hip post-Rt |
| 187. uro 11 | 202. arm post-Lt | 217. forearm post-Rt | 232. knee-Lt |
| 188. uro 12 | 203. arm post-Rt | 218. hand-Lt | 233. knee-Rt |
| 189. uro 13-Lt | 204. elbow-Lt | 219. hand-Rt | 234. knee lat-Lt |
| 190. uro 13-Rt | 205. elbow-Rt | 220. hand post-Lt | 235. knee lat-Rt |
| 191. uterus 1 | 206. elbow lat-Lt | 221. hand post-Rt | 236. knee post-Lt |
| 192. uterus 2 | 207. elbow lat-Rt | 222. head | 237. knee post-Rt |
| 193. uterus 3 | 208. elbow post-Lt | 223. head lat-Lt | 238. leg-Lt |
| 194. ankle-Lt | 209. elbow post-Rt | 224. head lat-Rt | 239. leg-Rt |
| 195. ankle-Rt | 210. foot-Lt | 225. head post | 240. leg post-Lt |

Body Patterns (continued)

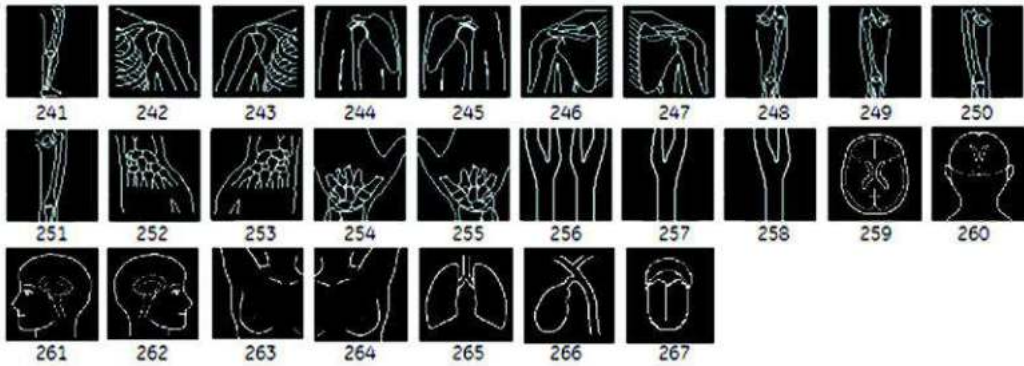


Figure 6-26. Body Patterns Available (continued)

- | | | | |
|-----------------------|--------------------|--------------------|------------------|
| 241. leg post-Rt | 248. thigh-Lt | 255. wrist post-Rt | 262. brain4 |
| 242. shoulder-Lt | 249. thigh-Rt | 256. new carotid 2 | 263. breastSA-Rt |
| 243. shoulder-Rt | 250. thigh post-Lt | 257. carotid2-Lt | 264. breastSA-Lt |
| 244. shoulder lat-Lt | 251. thigh post-Rt | 258. carotid2-Rt | 265. lung1 |
| 245. shoulder lat-Rt | 252. wrist-Lt | 259. brain1 | 266. organ10 |
| 246. shoulder post-Lt | 253. wrist-Rt | 260. brain2 | 267. organ11 |
| 247. shoulder post-Rt | 254. wrist post-Lt | 261. brain3 | |

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 “Do you want to create the Fast Key?” dialog displays. Select OK to continue.
2. Select a key to assign a Fast Key to (a-z, 0-9).

If you select a Front Panel control, a Touch Panel key or 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).*

3. If the selected key is already assigned to a Fast Key, a warning dialog displays.

Select Yes to continue. The Fast Key file is overwritten.

Select No to cancel the Fast Key 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: *If a 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 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 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 Fast Key Speed preset on Utility -> System -> General.

Backup and Restore the Fast Key

You can backup/restore the Fast Key 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.

Chapter 7

General Measurements and Calculations

Describes how to perform general measurements and calculations.

Introduction

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 authorized user should consider proper indications 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.

Basic Operation

Measure and Assign

1. Press **Measure** on the control panel.
2. Select the measurement tool via the upper trackball key.
3. Perform the measurement. Follow the instructions displayed on the message area at the bottom of the screen.
4. To assign a label, select the measurement in the Measurement result window and press **Set**.



Figure 7-1. Label menu

5. Select the required label from the menu. For example, if it is a distance measurement, the list includes all distance calculations for the current study.

or

Select **User Name** from the menu. The dialogue window displays.

Enter the appropriate name and select OK.

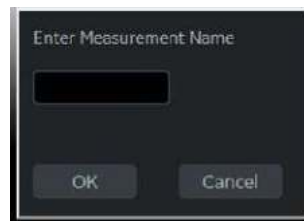


Figure 7-2. Enter Measurement Name

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 upper Trackball keys.

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
- Slope
- Time

M-Mode

- Caliper
- Time
- Slope

Assign and Measure

1. Press **Measure** on the control panel.
2. Select the measurement on the Touch Panel.
If you select the measurement folder, the sub menu tab is displayed. You can select and perform the measurement in the tab.
If the folder is configured with auto-sequence measurement, the next measurement in the study is pre-selected. To skip a pre-selected measurement, select another measurement.
3. Perform the measurement. Follow the instructions displayed on the message area at the bottom of the screen.

Measurement Controls



Figure 7-3. Measurement Controls on the Control panel

Table 7-1: Measurement controls

| Control | Description |
|-------------------|--|
| 1. Cursor | Pointer Key. Select to display a pointer on the monitor. |
| 2. 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. To remove all annotations/body markers/arrows, hold down the Clear button. |
| 3. Annotation | Annotations can be added to measurements on the image. |
| 4. Body Pattern | Body patterns can be added to measurements on the image. |
| 5. Measure | Activates a measurement caliper and the calculation package associated with the currently selected preset. |
| 6. Zoom Rotary | Zoom Rotary controls Pan Zoom, HD Zoom and Magnification Zoom. Pan Zoom magnifies the display of the data without making any changes to the ultrasound image data that is acquired. HD Zoom only acquires the image data within the ROI, and can only be performed during live scanning because of the acquisition adjustments that are done. When preset, you can adjust the Depth by moving the toggle up and down. If preset, you can scroll through the body patterns with the Zoom control. Magnification Zoom magnifies the entire image on the screen (non-ROI zoom). |
| 7. Trackball | Moves the measurement calipers, selects the measurement on the Summary Window. Trackball also selects items on the Touch Panel with the Pointer and Set keys. |
| 8. Trackball keys | The functionality of these keys changes (for example, Set, Change Measure, etc.) depending on the mode or action. Current functionality is displayed on the lower-right corner of the monitor. |

Touch Panel

B/M/Doppler Mode Select Tab

The B, M, or Doppler mode select tab key allows the user to select measurements associated with a particular mode of active study.

The system provides a default mode selection.

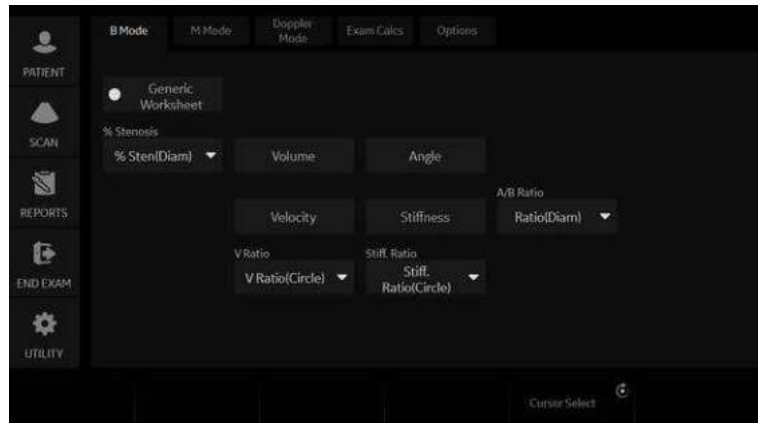


Figure 7-4. B-Mode - Example

Exam Calcs Tab

The Exam Calcs Tab is used for selecting calculations from other study in the selected Exam Category.

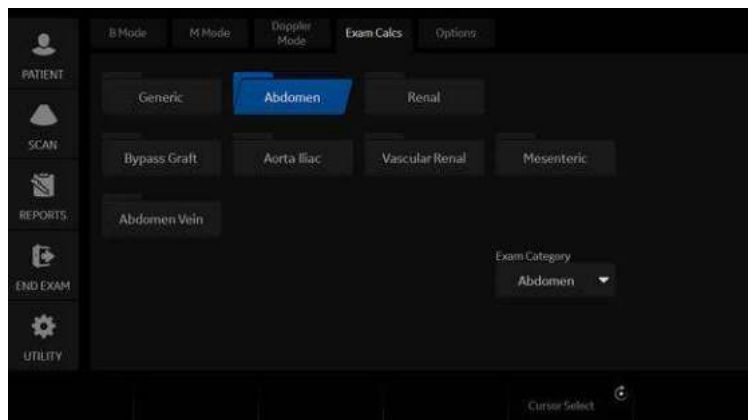


Figure 7-5. Exam Calcs Tab - example

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. In that case, Exam Category allows you to select other calculations without changing application.

1. Select **Exam Calcs** in the measurement mode.
2. Select **Exam Category**.
3. Select the exam category that has the calculation you want to make.
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 worksheet.*

Options tab

The Options tab allows you to specify the following measurement and display options:



Figure 7-6. Measurement and Display Options - Example

Table 7-2: Measurement and Display Options

| No. | Description |
|-----|---|
| 1. | Select Hide Display to hide the Results Window and Summary Window. Hide Display on the Touch Panel key is lit. To re-display them, select Hide Display again. |
| 2. | The system displays the following choices: <ul style="list-style-type: none"> • 12 x 12 • 9 x 9 |
| 3. | Select Heart Rate Cycle to change the number of cycles used in the calculation. The system displays a list of choices from 1 – 10. |
| 4. | You may want to change where the Results Window is positioned on the monitor display. To change the location of the Results Window, select Move Res Win . The system displays a list of choices. |
| 5. | Select Auto or Manual for Doppler Trace. <ul style="list-style-type: none"> • Auto – the system traces the Doppler waveform from the begin time to the end time. • Manual – trace the waveform manually. |
| 6. | After you press Set to complete the measurement, the dotted line remains on the display if the Show Caliper Line is selected. If Show Caliper Line is not selected, the system erases the dotted line and only the measurement calipers with a number or symbol are displayed. Note: The Show Caliper Line on the Options tab takes precedence over the Cursor Line Display preset, found on the System -> System Measure screen. |

Push/Rotary button area

At the bottom of the Touch Panel, there are six (6) combination rotary dials/push buttons. The functionality of these rotaries changes, depending upon the mode, exam category, study, etc.

Side Rt/Lt

The system has measurements for the patient's right and left side. To change side, push or rotate the Side rotary button.

Delete

Delete active caliper.

Cursor select

When there are several measurements on the display, to rotate through and activate previously fixed calipers, push or rotate the Cursor Select rotary button.

Exam category/Study/Measurement

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
- **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 ovarian volume, you need to measure width, length, and height.

General Instructions

General Guidelines

Any measurement can be repeated by selecting that measurement again from the Touch Panel.

The system retains all measurements, but the worksheet retains only the last six measurements of each type.

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.

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 "Keep Graphics with Cine Scroll" 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.*

General Instructions (continued)

Erasing measurements

These 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 worksheets.
- If you select New Patient, the system erases all measurements and calculations on the display and clears the worksheets.
- 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.

These 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, press the top Trackball key 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 worksheet pages, press **Clear**.
- When there are several measurements on the display, to rotate through and activate previously fixed calipers, adjust the **Cursor Select** knob. 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 from the Touch Panel.

Calculation formulas are available in the *Advanced Reference Manual*.

Measurement Cursor

While you are making a measurement, the measurement cursor is either active (open plus sign) or fixed (closed plus sign). An active cursor is green and a fixed cursor is yellow.

The system allows you to identify measurements by number or by unique symbol. 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.



Figure 7-7. Fixed Caliper Symbols

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.

Cursor preset

You can preset the measurement cursor in Utility -> System -> System Measure.

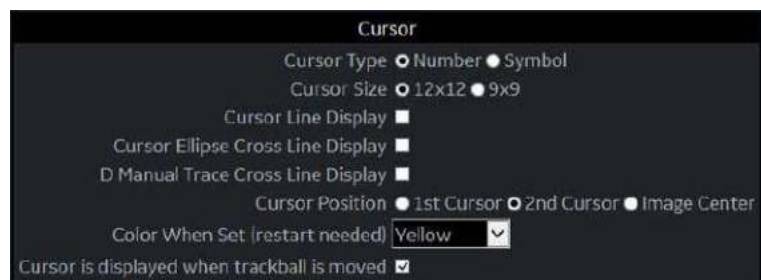


Figure 7-8. System/System Measure Preset Menu

Table 7-3: 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. |

Table 7-3: Cursor (Continued)

| Preset Parameter | Description |
|---|---|
| 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 (reboot) | Select white, yellow, bright red, or orange. |
| Cursor is Displayed when Trackball is Moved | The active cursor does not display until you move the Trackball. This assumes the following presets are set: Repeat Measurement, Repeat, Default Measurement, and Cursor. |

Copy, move and paste measurement tools

You can copy, move and paste the measurement graphic.

NOTE: *This function is supported with trace, area trace, spline trace, volume trace, ellipse, 3-point ellipse, circle and intensity. The Double tools and Dual tools are not supported.*

Copy and Paste

1. Measure the trace.
2. If present, clear the active caliper using the **Clear** key. Press the **Arrow** key to display the green arrow cursor on the screen. Move the cursor to the + mark of the measurement graphic. The selected graphic color changes from yellow to green.
3. Press **Set**. The pop-up menu displays. Select **Copy**.



Figure 7-9. Copy and Move Menu

4. Press **Set** on the outer side of the measurement graphic. The pop-up menu displays.
5. Select **Paste**. The copied graphic displays on top of the original graphic in green. Move it to the desired position using the **Trackball** and press **Set** to fix the location.

NOTE: *If the copied graphic is bigger than the pasted area, "Paste" fails and "The copied graphic cannot be pasted to this area" message displays on the status bar.*

Copy and Move

1. Measure the trace.
2. If present, clear the active caliper using the **Clear** key. Press the **Arrow** key to display the green arrow cursor on the screen. Move the cursor to the + mark of the measurement graphic. The selected graphic color changes from yellow to green.
3. Press **Set**. The pop-up menu displays. Select **Copy&Move**.
4. The copied graphic displays on top of the original graphic in green. Move it to the desired position using the **Trackball** and press **Set** to fix the location.

Move

1. Measure the trace.
2. If present, clear the active caliper using the **Clear** key. Press the **Arrow** key to display the green arrow cursor on the screen. Move the cursor to the + mark of the measurement graphic. The selected graphic color changes from yellow to green.
3. Press **Set**. The pop-up menu displays. Select **Move**.
4. Move the selected graphic to the desired position using the **Trackball** and press **Set** to fix the location.

Performing Measurements on Saved Images

You can perform measurements on recalled images. Select the image, then perform the measurement. If the image was not saved as a raw DICOM image, you need to calibrate the image prior to performing the measurement.

To calibrate the image,

1. Recall the image.
2. Press **Measure**. The Measurement Calibration Touch Panel appears.
3. Select the mode you need to be in to perform the measurement.
4. Press the appropriate mode key on the Touch Panel (**2D calib** for B-Mode, **MM calib** for M-Mode, or **Dop. calib** for Doppler mode). The specified mode calibration pop-up appears.

Performing Measurements on Saved Images (continued)

5. The system prompts you, depending on the mode.

B-Mode:

- a. Place the first point of the caliper on the ruler. Press **Set**.
- b. Position the cursor at the 5 cm point on the ruler. Press **Set**.
- c. Type "5" into the 2D-Mode Calibration pop-up window. Press OK.

M-Mode or Doppler Mode:

- a. Place the cross on zero depth and minimum or zero time.
- b. Place the cross on maximum depth and time.
- c. Type the time (in seconds) and velocity (cm/sec) in the M-Mode/Doppler Mode calibration pop-up window.

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. On the Touch Panel, select ***Exam Calcs***.
3. On the Touch Panel, select the ***Generic*** folder.

Calculation formulas are available in the *Advanced Reference Manual*.

B-Mode Measurements

In B-Mode, the Generic study includes the following measurements:

- % Stenosis
- Volume
- Angle
- Velocity
- Stiffness
- V Ratio
- Stiff. Ratio
- A/B Ratio

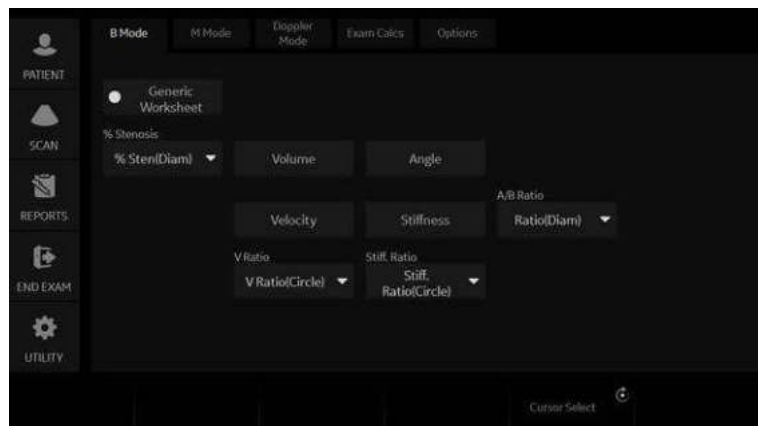


Figure 7-10. B-Mode Generic Study

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 LOGIQ Fortis automatically activates the % Stenosis with the default selection. If another method is preferred, select it from the Touch Panel.*

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 the Generic Touch Panel, 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 7-39 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 the Generic Touch Panel, 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.

Ellipse + Area

To calculate percent stenosis by ellipse and area:

1. From the Generic Touch Panel, 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 7-39 for more information*.

For details on how to make an ellipse measurement, See 'Circumference and area (ellipse) measurement' on *page 7-41 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.*

Volume (continued)

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 **L** or **R** key on front panel.*

2. Select **Volume**.

The system displays the distances and the volume in the Results Window.

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 Worksheet and clear that calculation.

Volume (continued)

Table 7-4: Volume Calculations

| Calc Name | Input Measurements |
|-----------------------------|---|
| Volume (spherical) | One distance |
| Volume (prolate spheroidal) | Two distances, $d_1 > d_2$ |
| 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) |

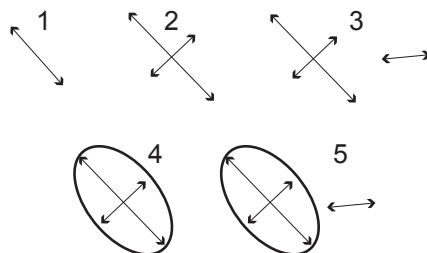


Figure 7-11. Volume Calculation Examples

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.

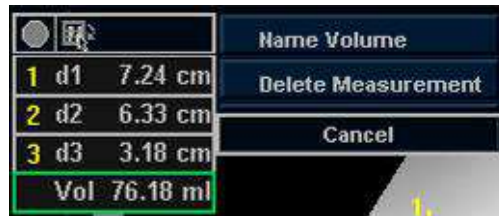


Figure 7-12. Volume Name menu

4. The dialog box displays. Enter a new name or choose the existing name.

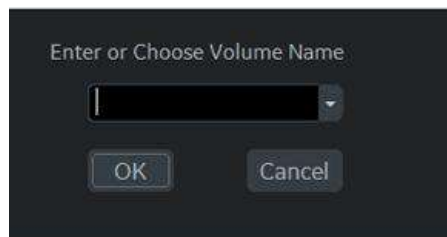


Figure 7-13. Volume Name Dialog box

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 Touch Panel, select **Angle**.
The system displays an active caliper.
2. To position the caliper at the start point, 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 LOGIQ Fortis automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Touch Panel.*

Diameter

1. From the Generic Touch Panel, 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 7-39 for more information.

Area

To calculate A/B ratio by area:

1. From the Generic Touch Panel, 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 7-42 for more information.

Dual Caliper

If “Dual Caliper on VNav and Simultaneous” is checked in Utility--> System--> System Measure menu, then when you enter simultaneous view, there is a “Dual Caliper: On/Off” setting on the Touch Panel. If the setting is on, dual caliper is enabled in simultaneous view.

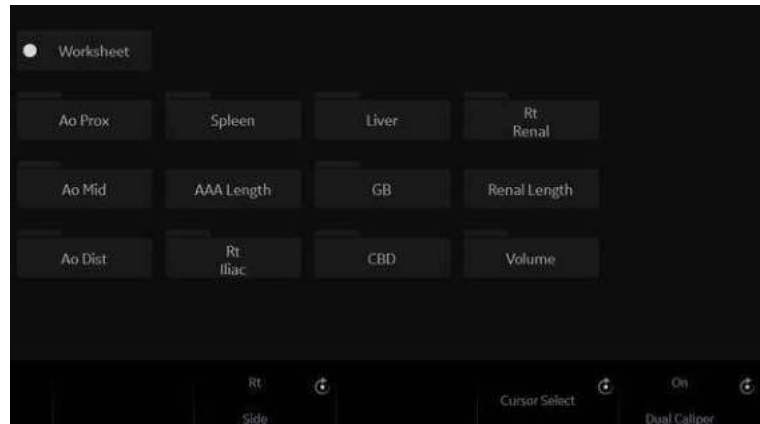


Figure 7-14. Dual Caliper

Velocity and Stiffness Ratios

If set to display via configuration settings, these two measurements appear. Refer to Elastography Option documentation.

M-Mode Measurements

In M-Mode, the Generic study includes the following measurements:

- % Stenosis
- A/B Ratio
- HR (Heart Rate)

% Stenosis

See '% Stenosis' on page 7-20 for more information.

A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity.

NOTE: The LOGIQ Fortis automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Touch Panel.

Diameter

See 'Diameter' on page 7-27 for more information.

Time

To calculate A/B ratio by time:

1. Select **A/B**.
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.

A/B Ratio (continued)

Velocity

To calculate AB ratio by velocity:

1. Select **A/B**.
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.*

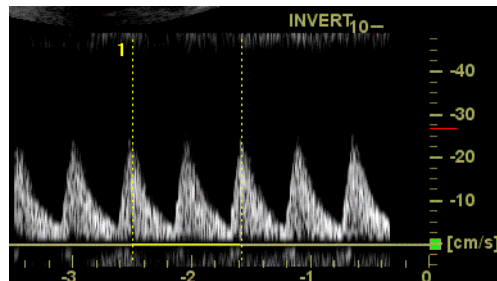


Figure 7-15. Two Heart Beat Reference (example in Doppler mode)

5. To complete the measurement and transfer the calculation to the worksheet, press **Set**.

NOTE: *For information about how to specify the number of heart beats that the system will use, See 'Options tab' on page 7-9 for more information.*

Doppler Mode Measurements

In Doppler Mode, the Generic study includes the following measurements:

- PI (Pulsatility Index)
- RI (Resistive Index)
- PS/ED Ratio or ED/PS Ratio
- A/B Ratio
- HR (Heart Rate)

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 Worksheet and Report page.

When Cancel Transfer occurs, a message appears on the screen to indicate the value was erased from Worksheet and 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 Touch Panel control.

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 Touch Panel, 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 7-31 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 LOGIQ Fortis automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Touch Panel.

Velocity

See 'Velocity' on page 7-30 for more information.

Time

See 'Time' on page 7-29 for more information.

Acceleration

To measure A/B ratio by acceleration:

1. Select **A/B**.
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.

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.

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.

Mode Measurements

B-Mode Measurements

The following measurements can be made in B-Mode.

- Distance
- Circumference
- Circumference and Area
 - Ellipse Method
 - Trace Method
 - Spline Method
 - Intensity (Echo level) Method

NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.



DO NOT perform a depth measurement using 4D probes.

Distance measurement

To make a distance measurement:

1. Press **Measure** once; 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, if preset accordingly.
5. To complete the measurement, press **Set**.

The system displays the distance value in the Results Window.



HINTS

- **Before** you complete a measurement:
 - To toggle between active calipers, press the top Trackball key.
 - 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 worksheets, press **Clear**.

Circumference measurement

Open Trace

To trace the circumference of a portion of the anatomy and calculate its length:

*NOTE: Set **OpenTrace** to the Touch Panel in Utility -> Measure before perform the measurement. See 'Display/hide a folder or a measurement in the Touch Panel' on page 7-80 for more information.*

1. Press **Measure**.
2. Select **Open Trace** from the Touch Panel.
3. Position the caliper at the start point.
4. To fix the trace start point, press **Set**. The caliper changes to an active caliper.
5. Move the **Trackball** to trace the measurement area. A dotted line shows the traced area.
6. To complete the measurement, press **Set**. The system displays the circumference in the Results Window.

Circumference and area (ellipse) measurement

You can use an ellipse to measure circumference and area. To measure with an ellipse:

1. Press **Measure** once; 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.
6. To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
7. To increase the size, adjust the **Ellipse** control in a clockwise direction. To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
8. To toggle between active calipers, press the top **Trackball key**.
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

To trace the circumference of a portion of the anatomy and calculate its area:

1. Press **Measure**.
2. Press the top **Trackball key** to select Trace; a caliper displays.
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.



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:

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 menu.*

1. Press **Measure**.
2. Press the top **Trackball key** to select Spline Trace; a caliper displays.
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.

NOTE: *Pressing **Set** twice finishes the trace 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.*

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.*

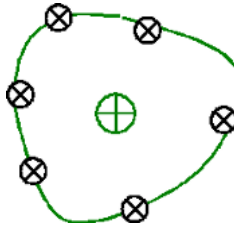


Figure 7-16. Edit spline trace

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**.
2. Press the top Trackball key to select Intensity. A caliper displays.
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, as EL __ dB, 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.

Doppler Mode Measurements

Four 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**; 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.

Slope (Velocity, Time Interval and Acceleration)

To measure two velocity values, the time interval (ms), and acceleration (m/s^2):

1. Press **Measure**. Press the top Trackball key to select Slope; an active caliper with vertical and horizontal dotted lines 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**. Press the top Trackball key to select Time; an active caliper with vertical and horizontal dotted lines 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**. Press the top Trackball key to select Trace; a caliper displays. Select **Manual** on the Touch Panel.
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 velocity spectrum boundary, 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.

Auto Trace

The value measured depends upon the Vol Flow Method preset. The two selections available are: Peak (TAMAX) and Mean (TAMEAN).

To auto trace TAMAX:

1. Press **Measure**. Press the top Trackball key to select Trace; an active caliper with a vertical dotted line displays. Select **Auto** on the Touch Panel.
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.

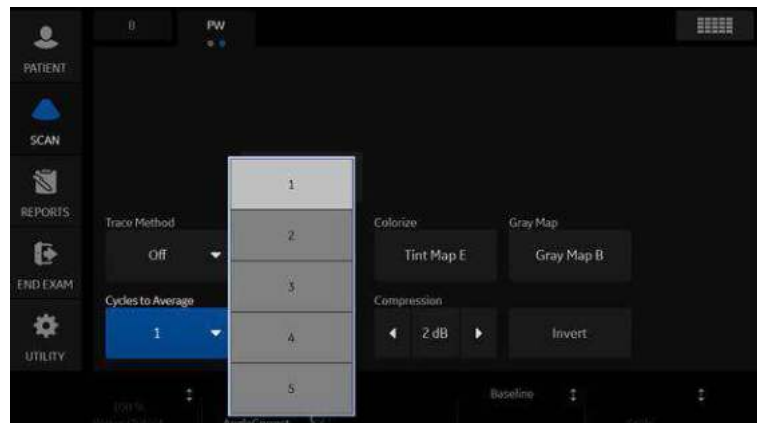


Figure 7-17. PW Touch Panel

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 = TAMEANOR, 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 Touch Panel.
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.

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 tab of the Touch Panel.
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.

Auto Calcs

To perform auto calcs:

1. Ensure that the auto calcs function is on by choosing **Auto Calcs -> Frozen or Live** on the Doppler tab of the Touch Panel.
 - Live: Auto calculation activates when the system is in real-time.
 - Frozen: 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 worksheet.

To modify auto calcs:

1. Select **Modify Auto Calcs** on the Touch Panel.
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.

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.

Modify Auto Calcs

When you select this 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 Touch Panel screen.

If you select **PV**, all selected parameters are turned off. When you deselect **PV**, the system returns to the previously selected calculation.

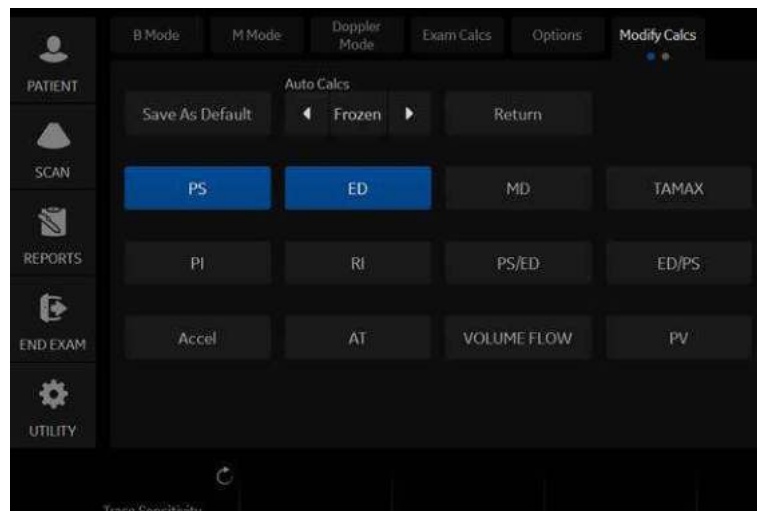


Figure 7-18. Modify Auto Calculation Menu

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



CAUTION

DO NOT perform a depth measurement using 4D probes.

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** once; 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**. Press the top Trackball key to select Time; an active caliper with vertical and horizontal dotted lines 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**. Press the top Trackball key to select Slope; an active caliper with vertical and horizontal dotted lines 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.

Worksheet

Introduction

The worksheet function enables the user to review, edit, delete or print data independently of a report. All measurements and calculations taken during the examination can be viewed at any time using the worksheet.

As you complete measurements, the system puts measurement data in the appropriate worksheets.

NOTE: Worksheets are not saved if the system crashes.

To view a worksheet

To view a worksheet, select **Worksheet** on the Touch Panel.

OR

Select **Worksheet** on the measurement summary window.

The system displays the worksheet for the current study.

| GE Healthcare | | | | | | |
|----------------------------|-------------------------------------|---------------|----------------|-----------------------|---------------------|---------------------|
| 10/14/06 2:53:17 PM | ADM | Pt ID | GA(EDD)=39w3d | | --- | |
| Origin | EDD | LMP | BBT | GA | 39w3d | EDD(OPE) 10/18/2006 |
| Fetus A/1 | CUA | | 16w2d+- 1w0d | | EDD(CUA) 03/29/2007 | |
| FetusPos | PLAC | | Ref.Physician | | Page 1/1 | |
| B Mode Measurements | | | | | | |
| BPD(Hadlock) | <input checked="" type="checkbox"/> | 3.10 cm | 3.23 | 2.97 | Avg. | 16w5d 14w4d-17w0d |
| HC(Hadlock) | <input checked="" type="checkbox"/> | 11.43 cm | 12.93 | 9.92 | Avg. | 16w4d 14w3d-16w6d |
| OFD(HC) | | 4.13 cm | 4.91 | 3.35 | Avg. | |
| AC(Hadlock) | <input checked="" type="checkbox"/> | 10.49 cm | 10.49 | | Avg. | 16w3d 14w5d-16w1d |
| FL(Hadlock) | <input checked="" type="checkbox"/> | 2.25 cm | 2.25 | | Avg. | 16w5d 15w3d-16w1d |
| 2D Calculations | | | | | | |
| EFW(AC,BPD,FL,HC) | 157.70g+/-23.66g | | (5oz) | | | |
| EFW(Hadlock)-GP | <3% | | | | | |
| CI(Hadlock) | 75.01 | (70.00-95.00) | FL/AC(Hadlock) | 21.47 (-) | | |
| FL/BPD(Hohler) | 72.69 | (-) | FL/HC(Hadlock) | > 19.71 (13.67-16.81) | | |
| HC/AC(Campbell) | 1.09 | (1.05-1.33) | | | | |

Figure 7-19. OB Worksheet

The OB Worksheet has three sections of information:

1. Patient data
2. Measurement information
3. Calculation information

To return to scanning, do one of the following:

- Select **Worksheet**.
- Press **Esc**.
- Select the **Exit** button.

To view a worksheet (continued)

To view a different worksheet, select the worksheet key for the desired exam.

To view worksheet data for a particular mode, select the key for that mode. To view a worksheet with data for more than one mode, select **Expand**. When Expand is selected, it defaults to view all measurements, noted by mode, on the worksheet.

If a worksheet has more data on a second page, to view the next page, adjust the **Page Change** control.

To edit a worksheet



Some fields on the worksheet 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.

Change data

1. Select **Worksheet** from any page of the Vascular Calculation Touch Panel.
2. Position the cursor at the field you want to change by moving the **Trackball**.
The cell is highlighted. Press **Set**. The field backlights.
3. Type the new data in the field and move the cursor to another place. Press **Set**. The new data, displayed in blue with an asterisk, is appended to the updated 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.

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 was made.*

To edit a worksheet (continued)

Exclude data

When the user selects a particular value on the Worksheet 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. To position the cursor at the field you want to delete or exclude, move the **Trackball**. The field is highlighted.
2. Do one of the following:
 - To exclude the field, select **Exclude Value**.
The data in the field is not visible and is not included in worksheet calculations.
 - To include a value that you previously excluded, select **Exclude Value**.

Delete data

1. Select **Worksheet** from any page of the Vascular Calculation Touch Panel Menu.
2. Position the cursor at the field you want to delete or exclude by moving the **Trackball**.
The field is highlighted.
3. Select **Delete Value** from the Touch Panel.

For Example:

1. If the user measured RI 4 times, the latest 3 sets of RI measurements are displayed in the worksheet.

Table 7-5: Example of Latest Measurements in Worksheet

| 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 |

To edit a worksheet (continued)

2. Then, the user deleted PS value of #3 from the worksheet.
3. Then, if the user deletes the PS value in column #3 from the worksheet, the whole set of measurements from column #3 is deleted from the worksheet and measurements from column #1 are shifted and displayed, as below.

Table 7-6: Example of Latest Measurements in Worksheet

| Result Number | #1 | #2 | #4 |
|---------------|-------|-------|-------|
| PS | 0.500 | 0.600 | 0.700 |
| ED | 0.100 | 0.200 | 0.300 |
| RI | 0.800 | 0.667 | 0.571 |

Examiner's comment

To type a comment on a worksheet:

1. Select **Examiner's Comments**. The Examiner's Comments window opens.
2. Type comments about the exam.
3. To close the Examiner's Comments window, select **Examiner's Comments**.

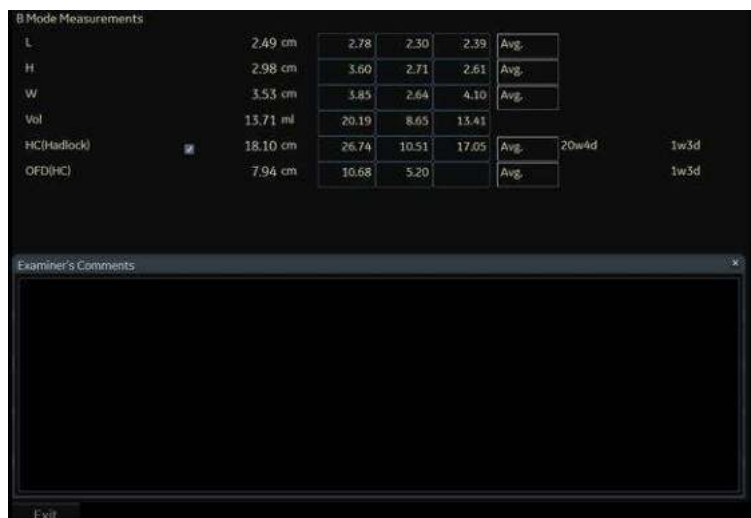


Figure 7-20. Examiner's comments field

To edit a worksheet (continued)

Volume measurement value off

1. Select the method type **Off**. The value field becomes blank.

To select a method

1. Move the cursor over the value in the method column and press **Set**.
2. The pull-down menu displays. Move the cursor to select the method and press **Set**. The selected method is displayed in the column.

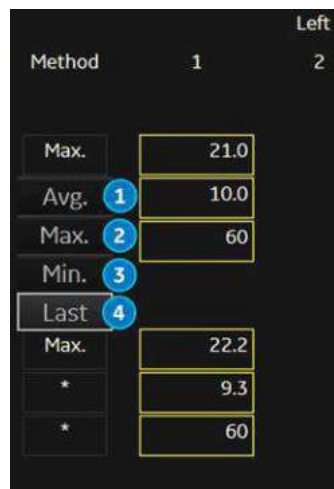


Figure 7-21. Pop-up menu of methods - example

1. Avg.: Average of the measurements taken
2. Max.: Maximum measurement
3. Min.: Minimum measurement
4. Last: Last measurement that was taken

Delete All Worksheet Values

You can delete all worksheet values on a worksheet.

1. When the Worksheet is displayed on the monitor, press the **Clear** key; the following warning message appears:

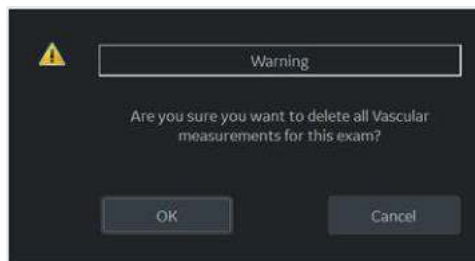


Figure 7-22. Delete All Warning Message

2. Select **OK** to delete all.
Select **Cancel** to cancel the deletion.

Recording Worksheet

The worksheet 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, or placed on regular paper with a line printer.

OB Worksheet

Patient data

The Patient data section, at the top of the worksheet, 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 the 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.

Calculation information

This section of the worksheet 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 worksheet 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 worksheet, see 'Worksheet' on page 7-58 for more information.

Vascular Worksheet

Intravessel ratio

On the Vessel Worksheet page, to calculate the Intravessel ratio, you need a measurement of assessing pressure and stenotic velocities.

1. Select **Intrav. Ratio** from the Touch Panel. The Intravessel Ratio pop-up window displays in the header section of the worksheet.

| | Right | | | Method |
|-----------------|-------|------|---|--------|
| | 1 | 2 | 3 | |
| Prox CCA | | | | |
| PS (cm/s) | 8.1 | | | Last |
| ED (cm/s) | 1.8 | | | * |
| AC (deg) | 60 | | | * |
| Mid CCA | | | | |
| PS (cm/s) | 22.9 | | | Last |
| ED (cm/s) | 13.7 | | | * |
| AC (deg) | 60 | | | * |
| Dist CCA | | | | |
| PS (cm/s) | 19.7 | 20.3 | | Last |
| ED (cm/s) | 14.7 | 8.4 | | * |
| AC (deg) | 60 | | | * |

Figure 7-23. Intravessel Pop-up Window

2. Select the first velocity. The value displays in the window. The value is displayed in the window.

Intravessel Ratio:
Select Vprox: 8.1 / Clear Save Cancel

Figure 7-24. Intravessel ratio one

Intravessel ratio (continued)

3. Select the second velocity.

The second value and Result value display in the window.

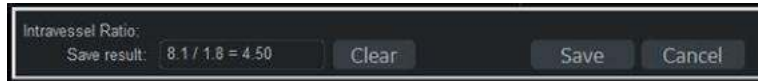


Figure 7-25. Intravessel ratio two

- 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 Vessel Summary is designed to automatically display measurements made at specific anatomical sites. Calculated ratios are automatically summarized and displayed.

The Vessel Summary can be displayed at any time during the exam by selecting **Vessel Summary** from the Vascular Worksheet Touch Panel.

| | Right | | | Left | | |
|-------------|----------|----------|-------|----------|----------|-------|
| | PS | ED | AC | PS | ED | AC |
| Prox CCA | 8.1cm/s | 1.8cm/s | 60deg | 21.0cm/s | 10.0cm/s | 60deg |
| Mid CCA | 22.9cm/s | 13.7cm/s | 60deg | 22.2cm/s | 9.3cm/s | 60deg |
| Dist CCA | 20.3cm/s | 8.4cm/s | 60deg | 19.4cm/s | 11.5cm/s | 60deg |
| Intra-Ratio | 4.57 | | | | | |

Figure 7-26. 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.

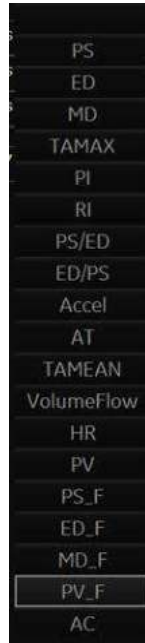


Figure 7-27. Pop-up menu

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 worksheet only if used.

Recording Worksheet

The worksheet 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, or placed on regular paper with a line printer.

Print All Pages

When there are multiple pages, a "Print All Pages" button is displayed on the Touch Panel Default is ON. If Print All Pages is set to ON, press the Print button; then all pages are stored/printed, depending on the how the print button is configured.

Anatomical Survey

Overview

The Anatomical Survey page provides a checklist that indicates which anatomy was imaged and its appearance.



Figure 7-28. OB Anatomical Survey



Figure 7-29. Abdominal Anatomical Survey

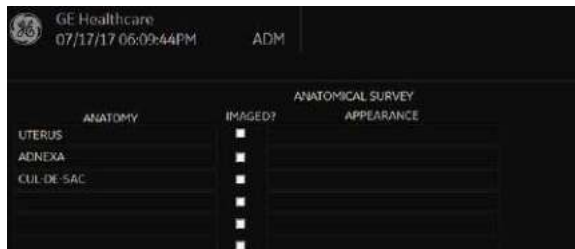


Figure 7-30. GYN Anatomical Survey

Editing

1. To activate the Anatomical Survey, select **Anatomy** on the Worksheet Touch Panel.
2. Fill the required field.

Table 7-7: Abdomen Anatomical Survey

| Field | Description |
|----------|--|
| ANATOMY | Enter the following information for each part of the anatomy imaged: 1. Imaged?: Check the box that you did image this part of the anatomy. 2. Appearance: If you checked the Imaged? box, indicate whether the appearance was normal or abnormal. |
| | You can add additional anatomy to this worksheet. Up to 9 additional items can be added. Move the Trackball to the blank field. Enter the anatomy name. |
| COMMENTS | Free text |

Table 7-8: OB Anatomical Survey

| Field | Description |
|-------------|--|
| Fetus Pos | Indicate the fetal position within the uterus. |
| PLAC | Identify the location of the placenta. |
| ANATOMY | Enter the following information for each part of the anatomy imaged: 1. Imaged? : Check the box that you did image this part of the anatomy. 2. Appearance : If you checked the Imaged? box, indicate whether the appearance was normal or abnormal. |
| | You can add additional anatomy to this worksheet. Up to 9 additional items can be added. Move the Trackball to the blank field. Enter the anatomy name. |
| BIOPHYSICAL | The score is _ of 10 possible total points, depending upon the number of parameters entered. Enter the following information to assess the fetus's biophysical well-being. |
| Movement | Type 0, 1 or 2 |
| Tone | Type 0, 1 or 2 |
| Breathing | Type 0, 1 or 2 |
| Fluid | Type 0, 1 or 2 |

Table 7-8: OB Anatomical Survey (Continued)

| Field | Description |
|---|----------------|
| Reactive NST (Reactive non-stress test) | Type 0, 1 or 2 |
| COMMENTS | Free text |

Table 7-9: GYN Anatomical Survey

| Field | Description |
|----------|---|
| ANATOMY | <p>Enter the following information for each part of the anatomy imaged:</p> <ol style="list-style-type: none"> 1. Imaged?: Check the box that you did image this part of the anatomy. 2. Appearance: If you checked the Imaged? box, indicate whether the appearance was normal or abnormal. <p>You can add additional anatomy to this worksheet. Up to 9 additional items can be added.</p> <p>Move the Trackball to the blank field.</p> <p>Enter the anatomy name.</p> |
| COMMENTS | Free text |

3. Select **Exit** to return to the Scan screen.

Select **Worksheet** to return to the Worksheet.

NOTE: *The patient specific contents input on the Anatomical Survey page are returned to the factory default settings after starting a new patient.*

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 on the Touch Panel. The LOGIQ Fortis 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. On the Touch Panel, select **Utility**.
2. On the Touch Panel, select **Measure**.
3. The system displays the Measurement & Analysis screen on the monitor display.

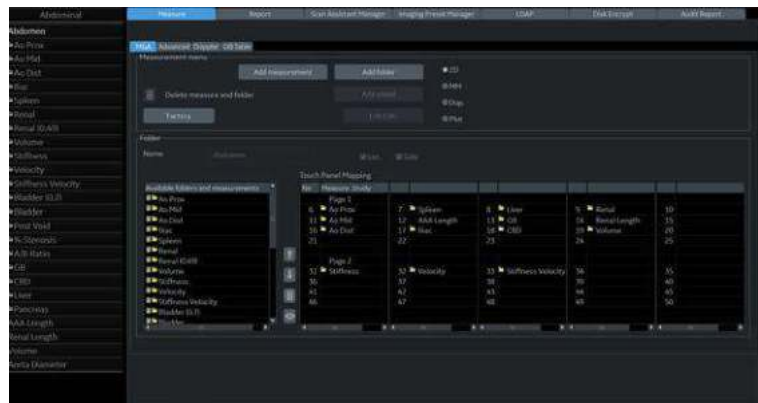


Figure 7-31. Measurement & Analysis screen

- **Selection menu:** select exam category, study, or measurement folder/measurement.
- **Folder or measurement:** define studies and measurements. This section changes between Folder and Measurement, depending on what you select in the Selection menu.
- **Measurement menu:** add and delete studies (folders) and measurements; select mode.

Select the exam category

To select the exam category you want to work with:

1. Move the cursor to the exam category at the top of the Selection menu.
2. Press **Set**.
The system displays a list of exam categories.
3. Move the cursor to the desired exam category.
4. Press **Set**.

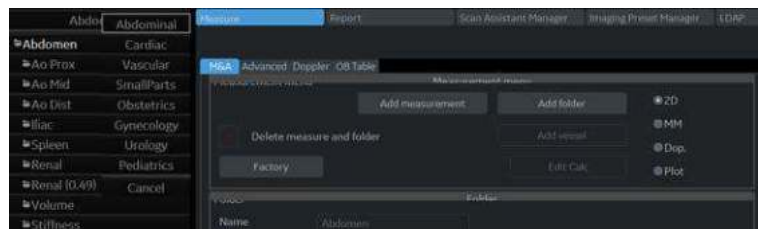


Figure 7-32. Select the exam category

Select the study

1. Move the cursor to the current study in the Selection menu.

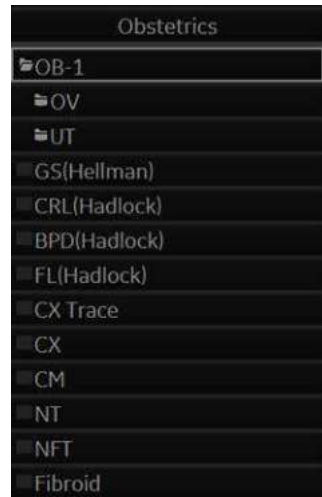


Figure 7-33. Select the study

2. Press **Set**. All study displays.

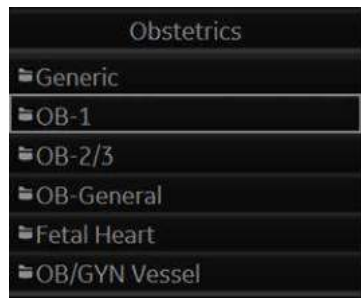


Figure 7-34. Select the study

3. Move the cursor to the desired study you want to open.
4. Press **Set**.

Select a measurement folder or a measurement

1. Move the cursor to the desired measurement folder or the desired measurement in the Selection menu.
2. Press **Set**.
 - If you select a measurement folder, the Folder section displays information about the selected folder.



Figure 7-35. Folder - example

- If you select a measurement, the Measurement section displays information about the selected measurement.

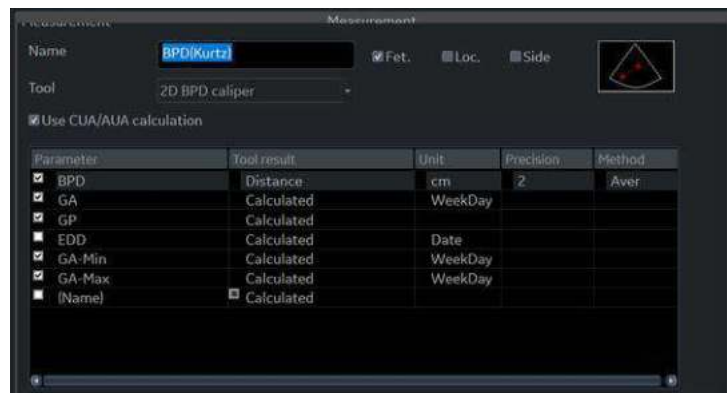


Figure 7-36. Measurement - example

Select the measurement mode

In the Measurement menu, select the measurement mode which you work with.

- 2D (B-Mode)
- MM (M-Mode)
- Dop (Doppler Mode)
- Plot (Plot Mode—The measurement on the plot graph of the TIC/QAnalysis)

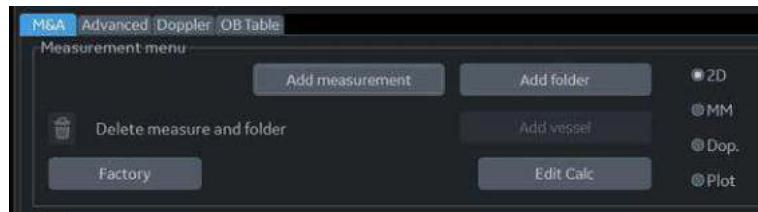


Figure 7-37. Measurement menu

Display/hide a folder or a measurement in the Touch Panel

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 list contains all possible folders and measurements for the selected study or folder.
- **Measure & Study.** The list defines where the folder or measurement is located on the Touch Panel.

To display an item in the Touch Panel:

1. In the Measure & Study list, move the **Trackball** to highlight which folder you want to put the item in, and press **Set**.
2. Move the **Trackball** to highlight an item in the Available folders and measurements list, and press **Set**. The selected item is assigned to the Touch Panel.



Figure 7-38. Select the position and an item

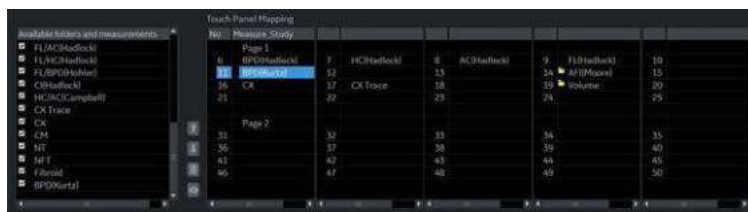


Figure 7-39. Measure & Study list: New item added

The selected item is now displayed in the Touch Panel and the Summary Window.

Touch Panel positions

Each Touch Panel has 25 positions, five across and five down. The items in the first row across are numbered 1–5, in the second row 6-10, and so on. Positions 1-5 are system programmed and cannot be edited.



Figure 7-40. Measure & Study display with Touch Panel positions, Page 1

Touch Panel positions (continued)

Page 2 of the Touch Panel has 25 positions, five across and five down. The items in the first row across are numbered 26-30, in the second row 31-35, and so on. Positions 26-30 are system programmed and cannot be edited.



Figure 7-41. Measure & Study display with Touch Panel positions, Page 2

Move, Remove or Hide Touch Panel Items

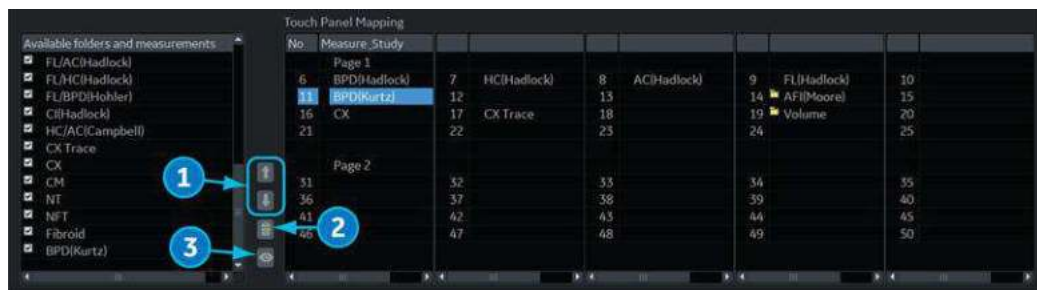


Figure 7-42. Move (1), Remove (2) and Hide (3) Icons

Move Touch Panel Items

To move items on the Touch Panel, change the item position in the Measure & Study list.

1. Highlight an item in the Measure & Study list.
2. Move the cursor to the Up or Down Arrow Icon and press **Set** (see 1 in Figure 7-42 on page 7-83).

The item is displayed at the selected position on the Touch Panel.

Remove Touch Panel Items

To remove items from the Touch Panel, remove the item from the Measure & Study list.

1. Move the **Trackball** to highlight the item in the Measure & Study list and press **Set**.
2. Select the Trash Icon to the right of the list (see 2 in Figure 7-42 on page 7-83).

The system removes the item from the Measure & Study list and from the Touch Panel. The item is still listed in the Available folders and measurements list.

Hide Touch Panel Items

Modifiers for Stenosis, as well as Prox, Mid, Distal and Origin location identifiers, can be hidden on the Touch Panel using the Hide command in the Measure & Study list.

1. Move the **Trackball** to highlight the item in the Measure & Study list and press **Set**.
2. Select the Hide Icon to the right of the list (see **3** in Figure 7-42 on page 7-83).

The system hides the modifier from the Measure & Study list and from the Touch Panel. Once a modifier is hidden, another measurement can be assigned to the Touch Panel location.

To reestablish the hidden modifier, highlight the hidden modifier in the Measure & Study list, press **Set** and select the Hide Icon.

NOTE: If a modifier is hidden in either 2D or Doppler mode, it will be hidden in both modes.

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.
2. In the Folder section, select Auto sequence.



Figure 7-43. Measurement & Analysis screen: Auto sequence

Change the tool used to make a measurement

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 select the measurement tool you want to use.

1. Select the measurement you want to change in Selection menu.
2. In the Measurement section, select the desired tool from the Tool list.

NOTE: *If the Tool field is gray, it cannot be changed.*

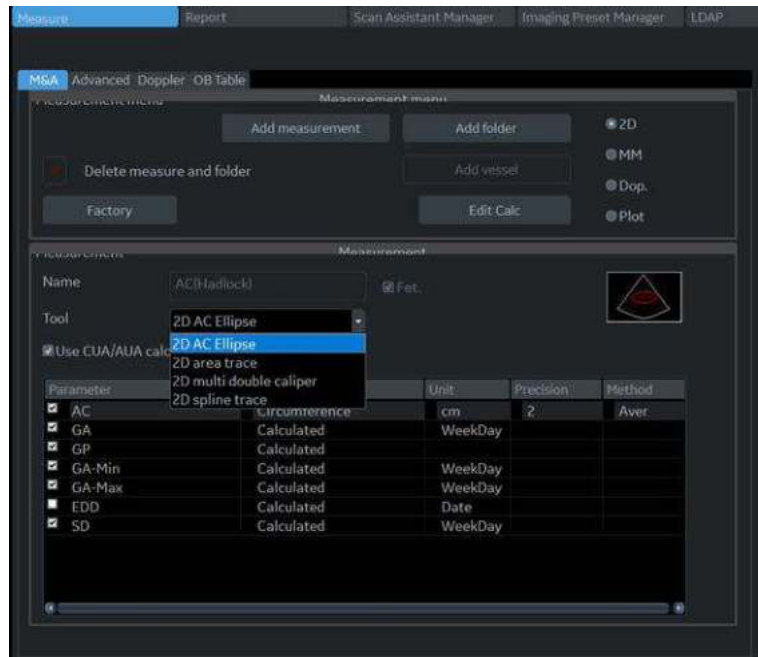


Figure 7-44. Change the tool

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.*

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.



Figure 7-45. Measurement & Analysis: Add folder

1. In the Selection menu, select the study or folder where you want to add the folder.
2. Select the mode in the Measurement menu.

Adding a folder (continued)

3. 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.

NOTE: *For Generic study, you can only use Blank.*

- If you want to use an existing folder, select Insert, and then select a folder from the list.



Figure 7-46. Add folder Window

4. Select the user-defined folder in the Selection menu.
5. Move the **Trackball** to the Name field and press **Set** twice.
Type the name.

NOTE: *DO NOT use "single quotes" for a parameter name, a measurement name, a folder name or an author name.*

6. Add a measurement to the folder.

Adding a Measurement



DANGER

Please remember that you are responsible for confirming the correctness and accuracy of the user input formula that you enter or is entered into the system on your behalf. Failure to confirm the correctness and accuracy of user defined calculations could lead to patient injury.

You can add a measurement to the folder.

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 7-47. 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 Measurement (continued)

4. Select OK.
 - If you created a blank measurement, the system adds a measurement with a name such as USERDEFM3.
 - 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.

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.*

Changing measurement parameters



Please remember that you are responsible for confirming the correctness and accuracy of the user input formula that you enter or is entered into the system on your behalf. Failure to confirm the correctness and accuracy of user defined calculations could lead to patient injury.

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.

Adding measurement parameters

To add a measurement parameter:

1. In the Selection menu, select the measurement.
2. 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.

3. If necessary, check Fetus (OB only), Location (Loc), or Side:
 - Fetus: If this is an OB measurement, check this box. (Default ON).
 - Location: If this measurement includes a Prox, Mid, or Dist location, check this box.
 - Side: If this measurement includes a Left or Right side, check this box.
4. In the Measurement section, move the **Trackball** to an empty line at the bottom of the Parameter list. Press **Set**.
The system adds a parameter with a name of (Name).

Adding measurement parameters (continued)

5. To change the name of the Parameter, move the Trackball to the (Name) and press **Set** twice. Type a name for the parameter.
6. Move the **Trackball** to the Tool result field, and double click the **Set** key.

The Edit Formula window is displayed.



Figure 7-48. Edit Formula

7. To create a formula:
 - a. In the Value Type field, select a value.
 - b. Do one of the following:
 - Type a formula in the Formula field.
 - Select formula components from the Operators, Parameters, and Functions drop-down lists. When you select a component, the system displays it in the Formula field.
8. To test the formula, select Check.

If there are no problems, the system displays “Syntax OK!”.

If there are any problems with the formula, the system displays an Error message in place of the Formula field label.
9. When the formula is correct, select OK to save it.

The Edit Formula window closes. The formula is displayed in the Tool result field.

Formula Unit Conversion

When you create a formula, the system changes the calculation result into an output unit as defined in the following table.

Table 7-10: Formula Unit Conversion

| Unit | | Conversion (coefficient value) |
|-----------|------------|-----------------------------------|
| Time | | |
| | s | x1 |
| | ms | x1,000 |
| | min | x0.0167 |
| | h | x0.00027778 |
| Ratio | | |
| | % | x100 |
| Frequency | | |
| | bpm or BPM | x1.0 |
| Angle | | |
| | rad | x1.0 |
| | deg | x57.2958 |
| | grad | x63.6620 |
| Distance | | |
| | cm | x100 |
| | m | x1 |
| | dm | x10 |
| | mm | x1,000 |
| | inch | x39.37 |
| | feet | x3.281 |
| | pixels | x1 |
| Velocity | | |

General Measurements and Calculations

Table 7-10: Formula Unit Conversion (Continued)

| Unit | | Conversion (coefficient value) |
|--------------|------------------------------------|-----------------------------------|
| | m/s | x1 |
| | dm/s | x10 |
| | cm/s | x100 |
| | mm/s | x1,000 |
| | inch/s | x39.37 |
| Acceleration | | |
| | m/s ² | x1 |
| | dm/s ² | x10 |
| | cm/s ² | x100 |
| | mm/s ² | x1,000 |
| | inch/s ² | x39.37 |
| Area | | |
| | m ² or m ² | x1 |
| | dm ² | x100 |
| | cm ² or cm ² | x10,000 |
| | mm ² or mm ² | x1,000,000 |
| | inch ² | x1550 |
| Volume | | |
| | m ³ | x1 |
| | dm ³ | x1,000 |
| | cm ³ | x1,000,000 |
| | l | x1,000 |
| | dl | x10,000 |
| | cl | x100,000 |
| | ml | x1,000,000 |
| | gallon | x264,178 |
| | quart | x1056.71 |
| Volume Flow | | |

Table 7-10: Formula Unit Conversion (Continued)

| Unit | | Conversion (coefficient value) |
|---------------|----------------------|-----------------------------------|
| | m ³ /s | x1 |
| | dm ³ /s | x1,000 |
| | cm ³ /s | x1,000,000 |
| | mm ³ /s | x1,000,000,000 |
| | l/s | x1,000 |
| | dl/s | x10,000 |
| | cl/s | x100,000 |
| | ml/s | x1,000,000 |
| | m ³ /min | x60 |
| | dm ³ /min | x60,000 |
| | cm ³ /min | x60,000,000 |
| | mm ³ /min | x60,000,000,000 |
| | l/min or L/min | x60,000 |
| | dl/min | x600,000 |
| | cl/min | x6,000,000 |
| | ml/min | x60,000,000 |
| | ml/m ² | x1,000,000 |
| Pressure | | |
| | mmHg | x1 |
| | Pa | x133.322 |
| | kPa | x0.133322 |
| | bar | x0.00133322 |
| Pressure/Time | | |
| | mmHg/s | x1 |
| Mass | | |
| | kg | x1 |
| | g | x1,000 |
| | ounce | x35.273962 |
| | pound | x2.2046226 |

Table 7-10: Formula Unit Conversion (Continued)

| Unit | | Conversion (coefficient value) |
|--------|---------------------------------|-----------------------------------|
| Others | | |
| | l/minm ² | x60000.0 |
| | g/m ² | x1000.0 |
| | cm/m ² | x100.0 |
| | cm ² /m ² | x10000.0 |
| | ml/kg/min | x60000000.0 |

For example, when a Volume formula is created:

$$\text{Vol [ml or cm}^3\text{]} = 0.523598 \cdot \{D1\} \cdot \{D2\} \cdot \{D3\}$$

(D1, D2, and D3 indicate a measurement result.)

In this case, the measurement (D1, D2, and D3) is a distance measurement, so the measured data is a meter [m] unit according to the above table.

To change into a milliliter, the system multiplies each measurement value by 100. As a result, it multiplies a formula by 1,000,000.

The standard unit of volume is a cube meter, so the system multiplies the result by 1,000,000.

The system multiplies the calculation result by the coefficient and converts it. To get a correct result, when you define the formula, you must convert the coefficient itself, such as the coefficient of 10[^].

Formula Unit Conversion (continued)

For example, if you want to define the following formula:

$$\text{efg[g]} = 10^{(1.5662-0.0108*\{P1\}+0.0468*\{P2\}+0.171*\{D1\}+0.00034*\{P1\}*\{P1\}-0.003685*\{P2\}*\{D1\})}$$

D1[cm]: Distance

P1[cm]: Perimeter

P2[cm]: Perimeter

The system defines the standard value of each measurement as a meter [m]. If the unit of each measurement value of this formula is defined as centimeter [cm], you must define the formula as follows:

$$\text{efw[g]} = 10^{(1.5662-0.0108*\{P1\}*100 + 0.0468*\{P2\}*100 + 0.171*\{D1\}*100 + 0.00034*\{P1\}*\{P1\}*100*100 - 0.003685*\{P2\}*\{D1\}*100*100)}$$

(This converts each measurement value to a centimeter [cm], since the system standard unit is a meter [m].)

The output unit of this formula is a gram. Since the standard unit of the system is defined as a kilogram [kg], the system multiplies the output by 1,000.

Because the output of this formula is defined as a gram, it is necessary to define the formula as follows.

$$\text{efw[g]} = 10^{(1.5662-0.0108*\{P1\}*100 + 0.0468*\{P2\}*100 + 0.171*\{D1\}*100 + 0.00034*\{P1\}*\{P1\}*100*100 - 0.003685*\{P2\}*\{D1\}*100*100)/1,000}$$

As shown, you can obtain an exact calculation result.

Editing Calculations

To modify user-defined calculations:

1. Select Add Measurement from the Measurement menu. The system displays the Add Measurement window.
2. Select Blank and OK.
3. Type the appropriate name and select “Calculation” from the Tool pull-down menu.

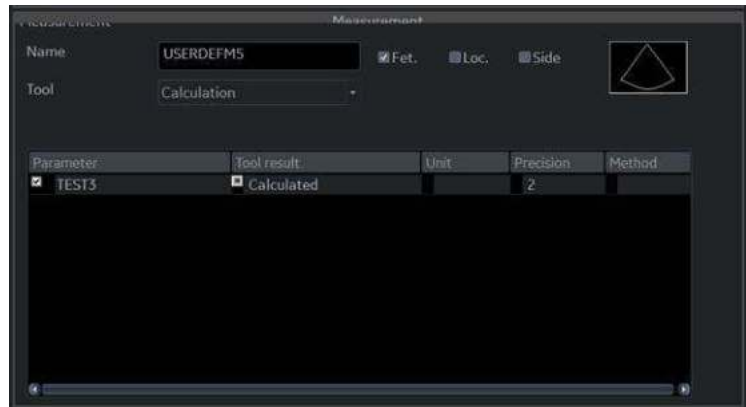


Figure 7-49. Measurement window

4. Type the parameter name.
5. Double click on the = Calculated symbol under Tool Result. The Edit Formula window displays.
6. Select OK.
7. In the Measurement menu section, select *Edit Calc.*



Figure 7-50. Edit Calc

The Modify User CALC window displays.

Editing Calculations (continued)

8. In the User Defined list, select the calculation that you want modified, then select OK.

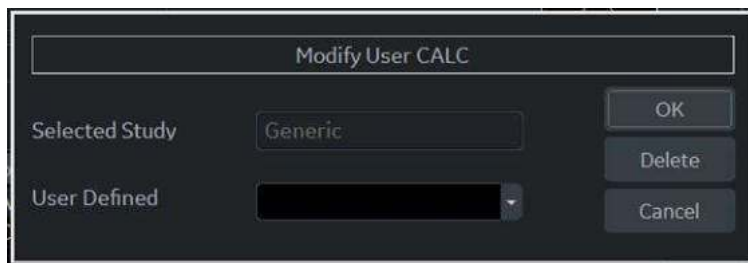


Figure 7-51. Modify User CALC window

9. The Measure tab for user-defined calculations displays. Double click on the equals sign symbol under Tool Result for the desired parameter.
10. 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 Trash icon next to Delete measure and study.

M & A Advanced Preset

The Advanced tab allows you to specify application-specific values for certain parameters.

1. On the monitor display, select the Advanced tab.

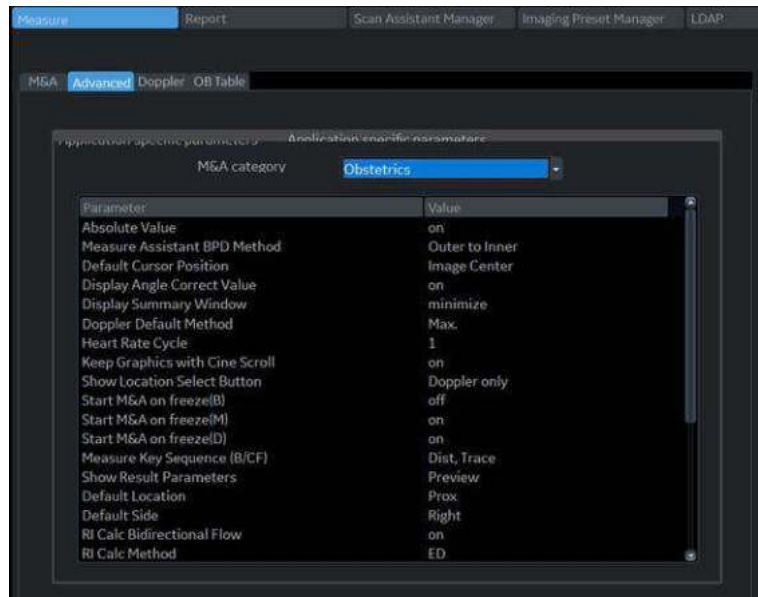


Figure 7-52. M&A Advanced Preset Menu

M&A Category: Display and select current exam category.

Parameter: Lists application specific parameters.

Value: Select the value for a parameter.

2. Select an exam category.
The Parameters list displays parameters for the selected category.
3. Select a value for a parameter.

NOTE: *The parameters that appear are category dependent.*

M & A Advanced Preset (continued)

Table 7-11: M&A Advanced

| Preset Parameter | Description |
|-----------------------------------|--|
| Absolute Value | Displays the absolute value of the Doppler Velocity measurement (On or Off) |
| Default Cursor Position | Image Center/Summary Window Select the display position of the cursor when the measurement key is pressed. |
| Display Angle Correct Value | On or Off |
| Display Sample Volume Depth (TCD) | 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 <i>NOTE: For Cardiac, you can select only "1".</i> |
| Keep Graphics with Cine Scroll | If you select "On", the measurement graphics remain while in CINE scroll. The measurement graphic redisplay on the frame where the measurement was taken in B-Mode. |
| Start M&A on a Freeze (B) | Off: Select measurement manually on Freeze |
| Start M&A on a Freeze (M) | On: Measurement menu appears automatically on Freeze. |
| Start M&A on a Freeze (D) | Caliper: Measurement menu and caliper appear automatically on Freeze. |
| 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 |
| PI Calc Method | MD or ED |
| RI Calc Bidirectional Flow | On or Off |
| RI Calc Method | MD or ED |
| Shear Measure Size | Sets the Default Diameter size of the shear wave measurement circle. |

Table 7-11: M&A Advanced (Continued)

| Preset Parameter | Description |
|----------------------------------|--|
| Shear Measure Fixed Size | On or Off |
| Shear Calculation Method | Specify Mean or Median <ul style="list-style-type: none"> • Mean averages all of the shear wave points within the measurement circle. • Median sorts, then selects the middle point of all points within the measurement circle. |
| Shear Units Determine Folder | If you have preset shear wave units via the Display Units on the Utility -> System -> System Imaging page, then when you specify On, the unit specified pre-selects the measurement folder. If m/s is specified as the unit, then the Velocity folder is used; if kPa is specified as the unit, then the Stiffness folder is used. |
| 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. |
| 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 |
| Length Unit | mm, cm, Default |
| Velocity Unit | mm/s, cm/s, m/s, Default |
| Acceleration Unit | mm/s ² , cm/s ² , m/s ² , Default |
| Area Unit | mm ² , cm ² , Default |
| Volume Unit | cm ³ , ml, l, Default |
| Volume Flow Unit | cm ³ , ml, l, Default |
| Time Unit | ms, s, Default |
| Show Area Value While Tracing | On or Off |
| 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) |

Table 7-11: M&A Advanced (Continued)

| Preset Parameter | Description |
|--|--|
| Primary Worksheet | For Abdominal and Small parts. Abdominal: Worksheet or Summary, Small parts: Worksheet or SWE summary |
| Doppler AutoCalc Velocity Unit | Velocity, Hz, Both or Auto |
| Default CCA location for ICA/CCA ratio | Prox/Mid/Dist/Off Select the default location of CCA which is used for the ICA/CCA ratio. |
| MCA/ICA Ratio | TAMAX or PS |
| Default ICA location for MCA/ICA ratio | Prox/Mid/Dist/Off Select the default location of CCA which is used for the MCA/ICA ratio. |
| 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 |
| Measure Assistant BPD Method | Outer to Inner, Outer to Outer |
| Restrict Breast Contour Caliper Edit | On or Off |
| AFI/AutoEF autoprocessing | Off, delay 1s, delay 2s, delay 3s or delay 4s |
| AFI/AutoEF ROI method | Auto ROI or 3 Points |
| AFI/AutoEF YOYO | Play or Stop |
| AFI Default Color Palette | Red-Blue, Green-Yellow-Red |
| AFI segment model | 17 segments, 18 segments |
| AFI PSS/PSI Mode | PSS only, PSS&PSI |
| Auto sequence - Trigger for next measurement | Measure or Freeze |
| Link contents | Select to link parameters by cardiac cycle. |
| Default value for RAP | Blank, 3, 5, 7, 8, 10,15 (system default is 3) |
| UGAP Print and Unfreeze | On or Off |
| Length unit | Default, mm or cm |
| Velocity unit | Default, mm/s cm/s, or m/s |
| Acceleration unit | Default, mm/s ² , cm/s ² , or m/s ² |

Table 7-11: M&A Advanced (Continued)

| Preset Parameter | Description |
|-------------------|--|
| Area unit | Default, mm ² , or cm ² |
| Volume unit | Default, cm ³ /s, ml/s, l/s, cm ³ /min, ml/min, or l/min |
| Volume Flow unit | Default, cm ³ /s, ml/s, l/s, cm ³ /min, ml/min, or l/min |
| Time unit | Default, ms, or s |
| Primary Worksheet | Worksheet or Summary |

Doppler tab - Modify Calculation

The Doppler tab allows you to preset the parameters for manual calculations.

1. On the monitor display, select the Doppler tab.
2. The following example describes how to configure the Carotid Doppler calculations.

Select Vascular next to M&A Categories. The Vascular measurement category is displayed.

3. Select Carotid. The available calculations are displayed in Modify Calcs.

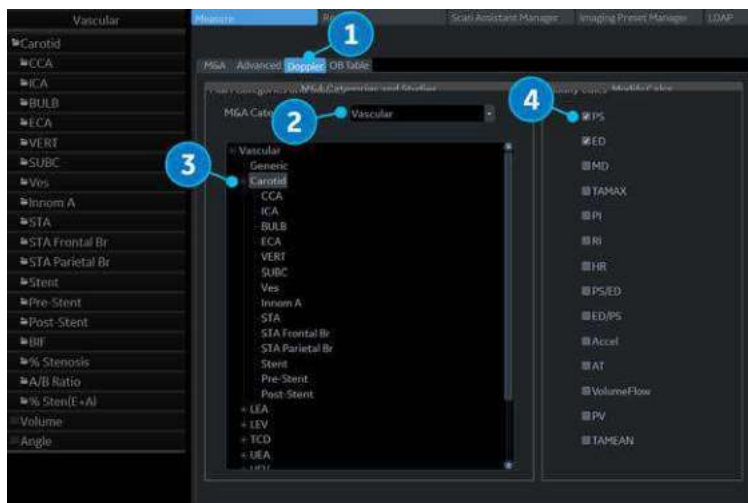


Figure 7-53. M&A Doppler Preset Menu

4. Check the desired calculations to be performed.

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.

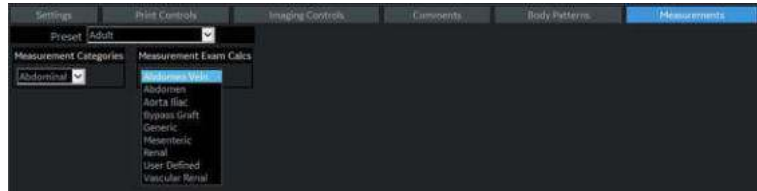


Figure 7-54. Application Measurements Menu

Chapter 8

Application M&A

Describes how to perform application specific measurements and calculations.

General Information

Overview

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 from the Touch Panel.

The system retains all measurements, but the worksheet retains only the last six measurements of each type.

Abdomen

Overview

Abdominal measurements offer a few different types of measurement studies. Select the desired study.

- Generic—Common to all applications. See ‘Generic Measurements’ on *page 7-18 for more information.*
- Abdomen
- Renal
- Bypass Graft
- Aorta Iliac
- Vascular Renal
- Mesenteric
- Abdomen Vein

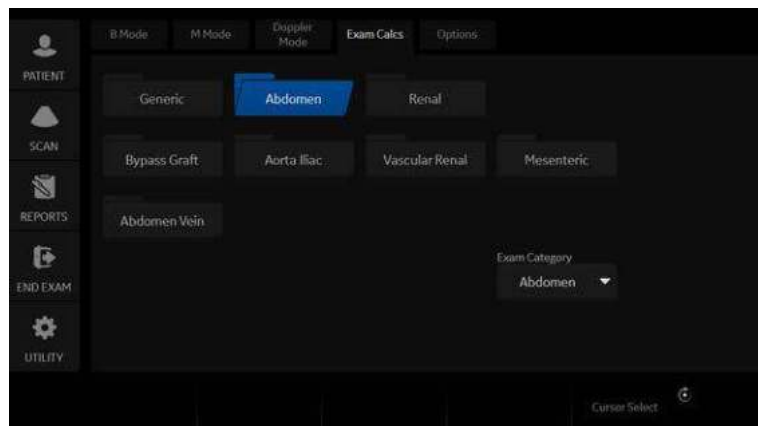


Figure 8-1. Abdomen Exam Category Touch Panel

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 7-18 for more information.*
- Small Parts, which includes the breast, thyroid and scrotal measurement packages.

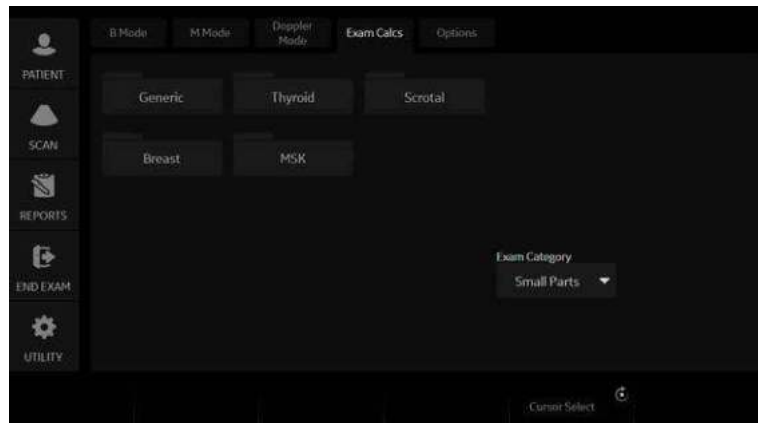


Figure 8-2. Small Parts Exam Category Touch Panel

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. On the **Exam Calcs**, select **Small Parts**.
2. Select **Thyroid**.
3. Select **Lt or Rt Thyroid**. Change the orientation (side), if necessary.
4. Select **Thyroid L**, **Thyroid W**, or **Thyroid H**.
An active caliper displays.
5. Perform a standard distance measurement.

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. On the **Exam Calcs**, select **Small Parts**.
2. Select **Scrotal**.
3. Select **Lt or Rt Testicle**. Change the orientation (side), if necessary.
4. Select **Testicle L**, **Testicle W**, or **Testicle H**.
An active caliper displays.
5. Perform a standard distance measurement.

Epididymis

To measure the epididymis structure, perform a distance measurement.

Introduction

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.

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).

OB Type change

The LOGIQ Fortis system includes measurements for the following studies: USA, Europe, Tokyo, Osaka and ASUM.

Select OB Type in Utility -> System -> System Measure.



Figure 8-3. OB Type selection

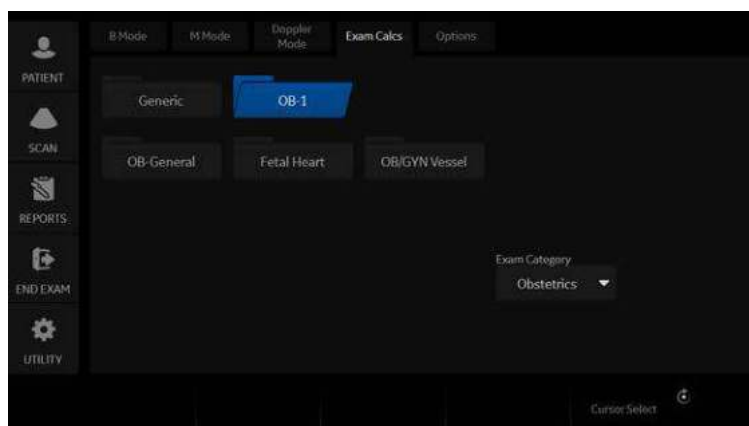


Figure 8-4. OB Type: Tokyo - example

NOTE: ASUM studies include the following measurements:

- ASUM: AC, BPD, and CRL
- ASUM 2001: AC, BPD, CRL, FL, HC, HL, and OFD

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. On the control panel, press **Patient**.
The Patient Data Entry screen is displayed.
2. On the Patient Data Entry screen, select New Patient.
3. 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.
4. 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 Patient Data Entry screen. For information about how to search for patient data, see 'Changing Patient Information or an Exam' on *page 4-24* 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 an Exam' on *page 4-2* for more information.*

To Start an Obstetrics Exam (continued)

Table 8-1: 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. |
| Accession # | Exam number used with hospital information system (DICOM). This is a tracking number from the worklist. |
| Exam Description | Describe the type of exam. |
| 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. |
| Operator | The person (not a physician) who performs the scan. Choose from the list. |

NOTE: To fill in the following information, move the **Trackball** to highlight the **Detail** button and press **Set**.

To Start an Obstetrics Exam (continued)

Table 8-2: Obstetric fields: Detail

| Field | Description |
|-------------|--|
| Indications | Why the patient needs the ultrasound exam. |
| Comments | Comments about the exam. |

After you complete the patient information, you can begin the scan.

- To change from the Patient Data Entry screen to the Scan screen, do one of the following:
 - On the keyboard, press **Esc**.
 - On the Touch Panel, select **Scan**.
 - On the Control Panel, select **Patient** or **Freeze**.
 - On the Control Panel, press the **B-Mode** key.

The system displays the Scan screen.

- To choose the appropriate probe, select the probe icon on the Touch Panel.
- On the Control Panel, press **Measure**.

The default Obstetrics study is displayed on the Touch Panel.

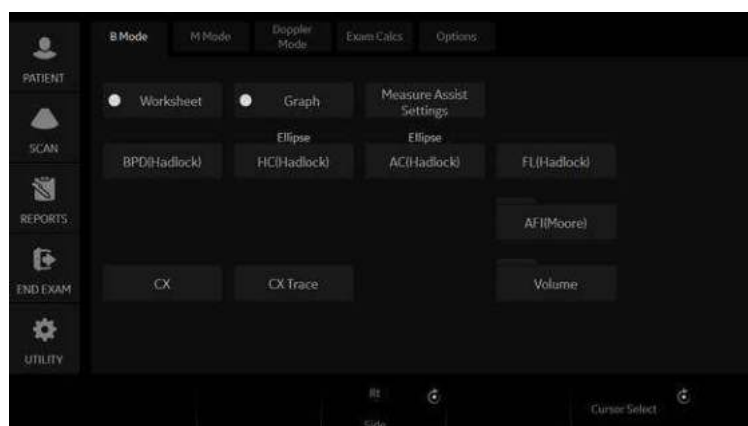


Figure 8-5. OB-General Study

To choose a study

1. To change the study on the exam category, select **Probe**. The Obstetrics exam category allows you to choose from the following studies:
 - Generic
 - OB-1
 - OB-2/3
 - OB-General
 - Fetal Heart
 - OB/GYN Vessel
2. To select a study, select the appropriate study on the Touch Panel.

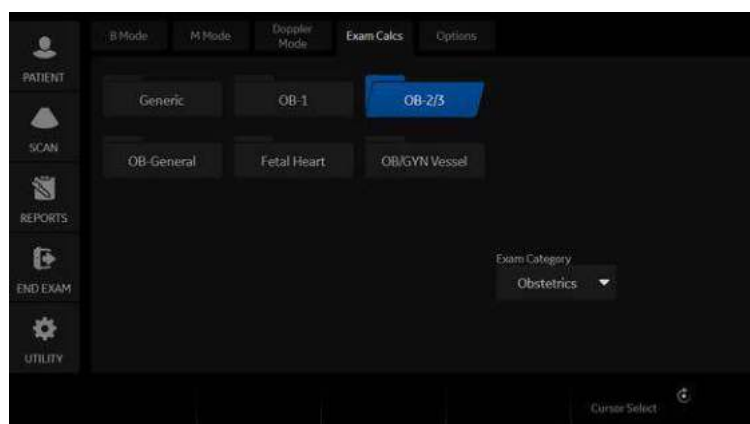


Figure 8-6. OB Study Touch Panel

NOTE: *The folders you see on the Touch Panel may be different if your system has been customized.*

OB Measurements Performed Over Multiple Planes

Gestational Sac

To calculate the gestational sac, you make three distance measurements in two scan planes. To display two scan planes, press the **L** or **R** 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.

To calculate the gestational sac by a 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.

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. Press the appropriate AFI quadrant Touch Panel key to toggle between caliper and 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 the top **Trackball** key.
 - Move the **Trackball** to highlight the unassigned distance measurement in the Results Window.
 - Select the AFI measurement on the Touch Panel.
- 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.

OB Calculation

SonoNT (Nuchal Translucency)

NOTE: *This measurement can be adjusted and customized in the system setup.*

To measure the contour detection of the NT border:

1. Select NT. The measurement cursor appears.
2. Select the fetal position ("Face Up" or "Face Down").
3. Position and fix the first point (P1) of the rectangular ROI.
4. Position and enter the second point (P2) of the rectangular ROI. The NT border detection is performed. If a valid result is found, the borders are shown in red and the NT distance is displayed with two crosses.
5. If the measurement is correct according to the guidelines, accept and confirm the result to store in the report. If the system cannot detect a result, a warning message appears.

NOTE: *To edit the measurement, move the trackball and/or press Change to readjust the start and end point before accepting the measurement.*

NOTE: *It is possible to select the calculation method by pressing Method: (i-i: inner-inner or i-m: inner-middle).*

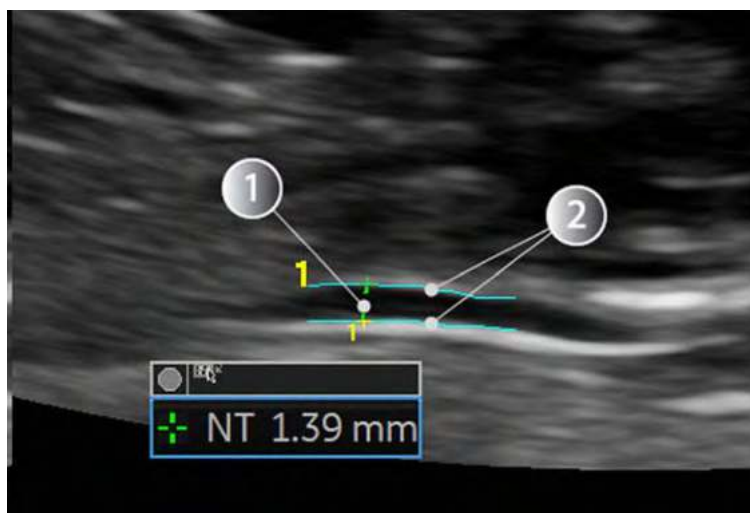


Figure 8-7. SonoNT

1. SonoNT Measurement

2. Detected NT Border

SonoNT (Nuchal Translucency) (continued)

SonoIT (Intracranial Translucency)

SonoIT (Sonography based Intracranial Translucency) is a system supported measurement for Intracranial Translucency. Starting from the routinely used midsagittal view of the fetal face, obtained for assessment of the Nuchal Translucency and nasal bone, the ultrasound system uses a semi-automated mode to measure the anterior-posterior diameter of the fourth ventricle recognizable as intracranial translucency.

The workflow is identical to SonoNT.

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 LOGIQ Fortis 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 **Measure**.
2. Select **Graph**.

The system displays the OB Graph keys.

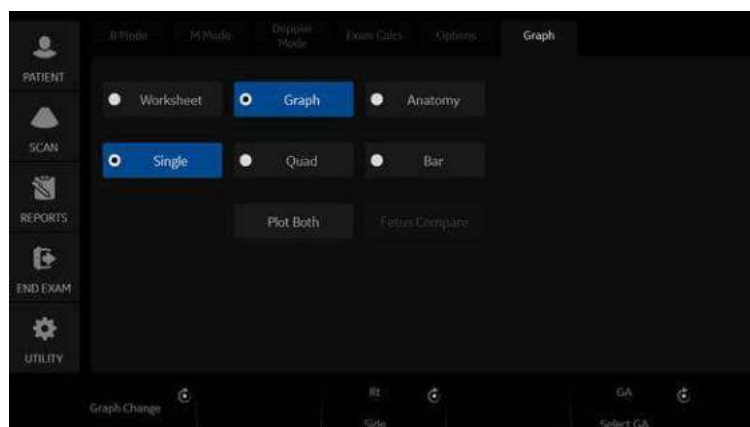


Figure 8-8. OB Graph keys on Touch Panel

Fetal Growth Curve Graph

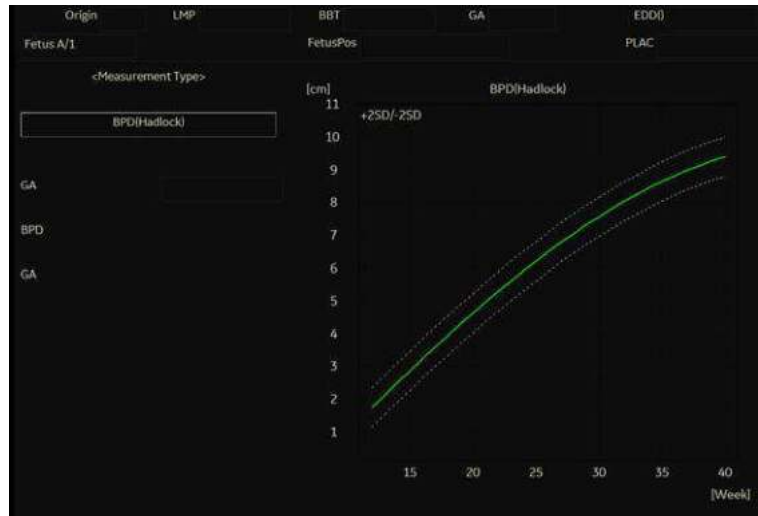


Figure 8-9. Fetal Growth Curve Graph (Single)

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

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

Fetal Growth Curve Graph (continued)

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 **Graph Change** control.

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** to view 4 graphs at once.

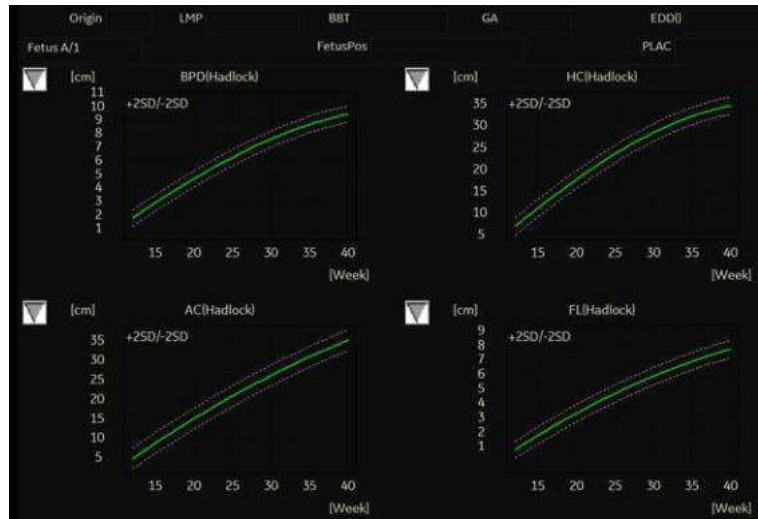


Figure 8-10. Fetal Growth Curve Graph: Quad View

The measurement values are displayed at the bottom of the graph.

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.

The order of a quad graph view can be saved by selecting **Save**.

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 Display** 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.

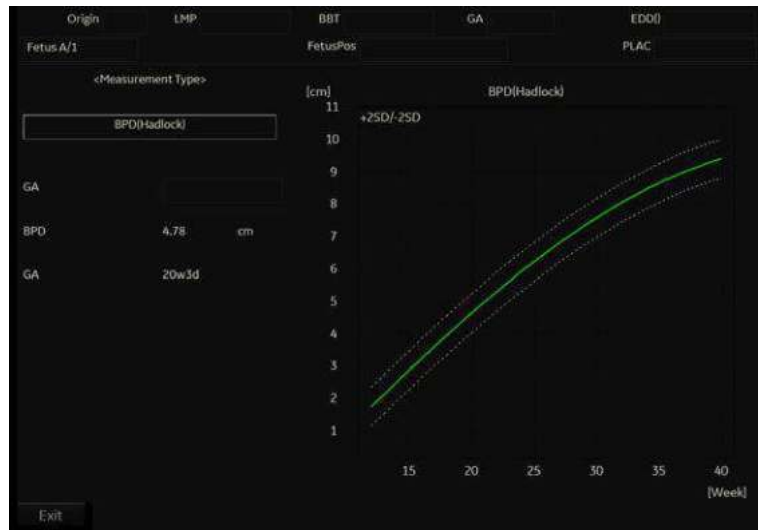


Figure 8-11. Fetal Trending on Fetal Growth Curve Graph

The legend at the bottom of the graph shows the symbols and colors that indicate Past and Present data.

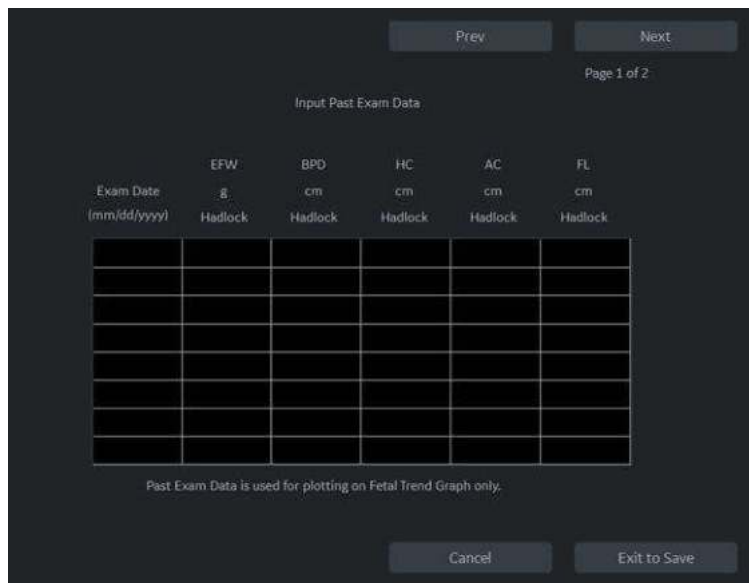
Fetal Trending (continued)

To manually enter past exam data

If you have data from a previous ultrasound exam that you want to use for fetal trending, but it is not in the system, you can manually enter the data.

1. After you have registered the patient for this exam, on the Patient Data Entry screen, in the Exam Information (Obstetrics) section, select Past Exam.
The system displays the Input Past Exam screen. See Figure 8-12.
2. Enter the data from previous exams.
3. To enter data on page 2, select Next.
4. After you enter the previous exam data, select Exit to Save.

The system saves the previous exam data. When you view the Fetal Growth Curve Graphs, select **Plot Both** to view fetal trending. The system automatically uses the data you entered.



Page 1 of 2

Input Past Exam Data

| Exam Date (mm/dd/yyyy) | EFW g Hadlock | BPD cm Hadlock | HC cm Hadlock | AC cm Hadlock | FL cm Hadlock |
|---------------------------|---------------------|----------------------|---------------------|---------------------|---------------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Past Exam Data is used for plotting on Fetal Trend Graph only.

Figure 8-12. Input Past Exam screen, page 1

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 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.
- On the Touch Panel, select **Graph**.

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 **Measure**.
2. Select **Graph**.
3. Select **Bar**.



Figure 8-13. 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

LOGIQ Fortis 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, enter the number of fetuses in the Patient Data Entry Menu.

The image shows a screenshot of the LOGIQ Fortis Patient Data Entry Menu. At the top, there are tabs for different exam types: ABD, OB, GYN, CARD, VAS, UR, SMP, and PED. The OB tab is selected. Below the tabs, there are several input fields and dropdown menus. On the left side, there are fields for LMP (Last Menstrual Period), EDD by LMP (Estimated Date of Delivery by LMP), and GA by LMP (Gestational Age by LMP). In the center, there are fields for Gravida, Para, AB (Amniotic Band), Ectopic, and Fetus #. The Fetus # field is a dropdown menu currently set to 2. On the right side, there are fields for Operator (ADM), Exam Description, Scan Assistant (Option not available), Accession #, Ref. Physician, and Ref. Physician. At the bottom, there are three buttons: Post Exam, Images, and Clear.

Figure 8-14. 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** twice.
The number is highlighted.
2. Type 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 worksheet 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/3 is fetus A from a total of 3.

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 worksheets and the graphs. You can type up to 23 characters in the FetusPos and PLAC fields.



Figure 8-15. Patient Data section of the OB Worksheet

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 the Summary Window and select the 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 Compare**.

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 worksheet.

Select **Worksheet**, then select **Fetus Compare**.

When you select **Fetus Compare**, the system lists the measurement results for each fetus on the Worksheet.

To Show Fetal Trending for Multiple Fetuses

When you have data for more than one exam, you can show fetal trending and compare fetuses on one graph.

To view fetal trending for multiple fetuses:

1. Select **Graph**.
2. Select **Fetus Compare**.
3. Select **Plot Both**.

NOTE: *You can only view fetal trending for multiple fetuses in single graph display.*

The symbol key for fetal trending and multiple fetuses is shown at the bottom of the graph.

OB Table Editor

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. On the Touch Panel, select **Utility**, then select **M&A**.
2. Check the Exam Category on the far left of the monitor screen. 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.

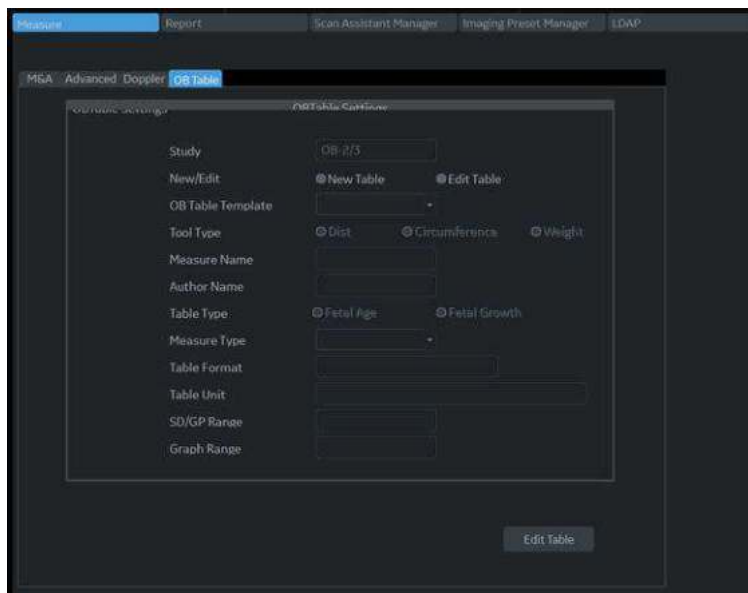


Figure 8-16. OB Table settings

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 Settings Menu (continued)

- **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 8-31 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 Touch Panel.
- **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 8-3: 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 8-4: 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 8-5: 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 8-6: 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 8-7: 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 | MAX |
| | Table Unit | WeekDay | mm | mm |
| | Table Range | 1SD | | |
| | Graph Range | 5%:95% | | |

Template 6

Table 8-8: Template 6 (based on several European tables)

| Template 6: 5%-95% 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 8-9: 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 | MAX |
| | 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:

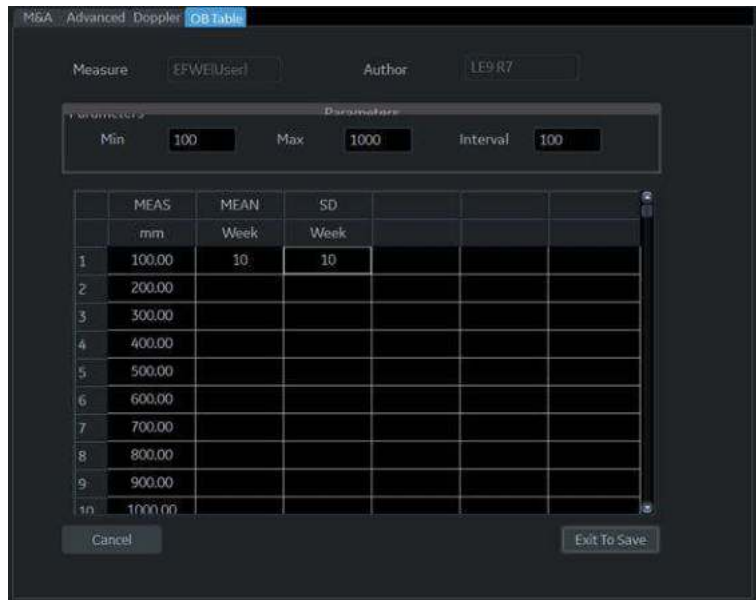


Figure 8-17. OB Table Edit Menu: Fetal Age Table

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 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:

M&A: Advanced Doppler **OB Table**

Measure: EFWEUser1 Author: LE9R7

Parameters: Min: 100 Max: 1000 Interval: 100

| | MEAS mm | MEAN Week | SD Week | | |
|----|------------|--------------|------------|--|--|
| 1 | 100.00 | 10 | 10 | | |
| 2 | 200.00 | | | | |
| 3 | 300.00 | | | | |
| 4 | 400.00 | | | | |
| 5 | 500.00 | | | | |
| 6 | 600.00 | | | | |
| 7 | 700.00 | | | | |
| 8 | 800.00 | | | | |
| 9 | 900.00 | | | | |
| 10 | 1000.00 | | | | |

Cancel Exit To Save

Figure 8-18. 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 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 Touch Panel. See 'Measurement and Calculation Setup' on page 7-74 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**.
 - New/Edit: Select “New Table”
 - OB Table Template: Select appropriate template.
 - Tool Type: Select “Weight”
 - Measure Name: Enter measurement name.
 - Author Name: Enter author’s name.
 - Table Type: Select “Fetal Age”

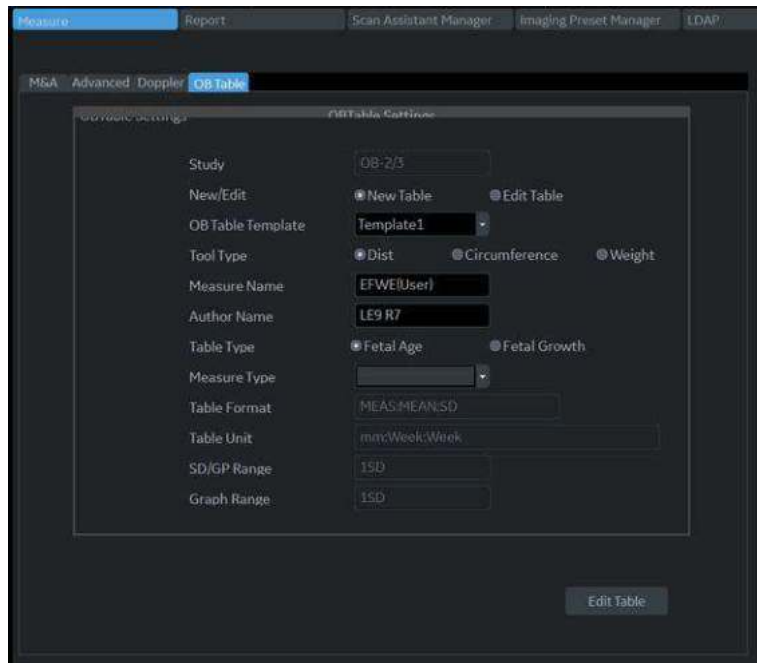


Figure 8-19. OB Table Tab Screen

EFW Table Editor (continued)

3. Edit the table data and press **Exit To Save**.

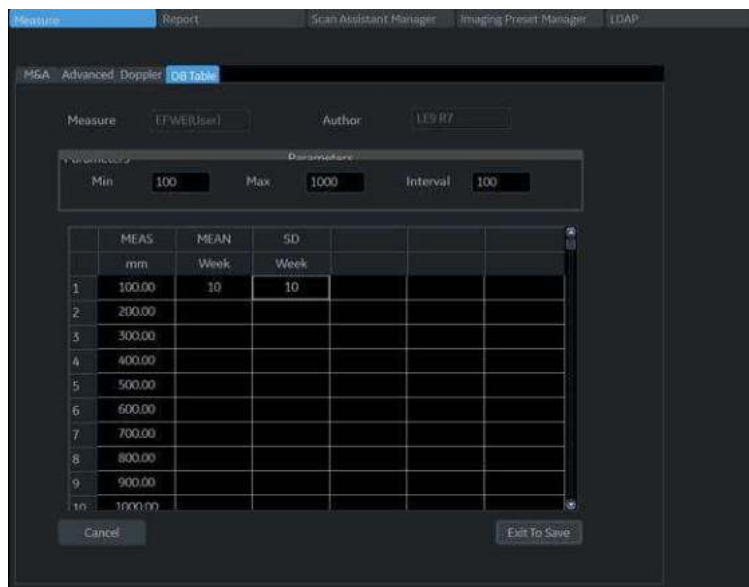


Figure 8-20. OB Table Editor Screen

EFW Formula Editor

1. 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**.
2. Select the “Calculated” button for the EFW parameter.
3. The EDIT FORMULA window displays. Edit the formula and select **OK**.

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,

$$10^{(1.56\{AC[\text{Hadlock}]\} * 100 + 0.08 * \{FL[\text{Hadlock}]\} * 100) / 1000}$$

Introduction

The Gynecology exam category includes the following three studies:

- Generic. This study is common to all exam categories. 'Generic Measurements' on *page 7-18*.
- 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.

B-Mode Measurements

In B-Mode, you make the measurements in the General Gynecology study. These measurements include:

- Ovarian follicle
- Endometrium thickness
- Ovarian length, width, and height
- Uterine length, width, and height
- Cervix
- Fibroid

Follicle measurements

You can make left and right ovary follicle measurements from one, two, or three distances.

To select the left or right, adjust the **Side** selection.

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.

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.

Cervix measurements

You can make cervix measurements from one distance or spline trace.

Cardiac

Overview

Cardiology measurements offer two different types of measurement studies, Generic and Cardiac.

- Generic—Common to all applications. See 'Generic Measurements' on *page 7-18 for more information..*
- Cardiac – This study includes all cardiac measurements.

Naming Format for Cardiac Measurements

When you make a measurement, on the Touch Panel you select the abbreviation for the measurement. Most abbreviations are made using acronyms. The following table lists acronyms used for naming cardiac measurements.

Table 8-10: 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 Regurgitation |
| 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 |

Table 8-10: Cardiology Abbreviations (Continued)

| Acronym | Name |
|---------|----------------------------------|
| 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 |
| 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 |

Table 8-10: Cardiology Abbreviations (Continued)

| Acronym | Name |
|---------|--|
| 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 Arteriosis |
| 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 |

Table 8-10: Cardiology Abbreviations (Continued)

| Acronym | Name |
|---------|---|
| 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 |
| 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*** on the Touch Panel.

Cardiac Doppler Measurements

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'.

The system calculates E/E' ratio automatically.

Introduction

Vascular measurements offer several different types of measurement studies:

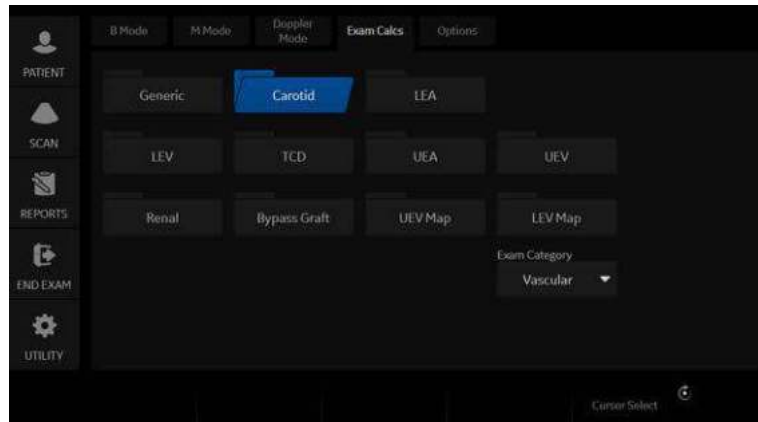


Figure 8-21. Vascular Exam Category Touch Panel

- Generic – Common to all applications. See ‘Generic Measurements’ on *page 7-18 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

Introduction (continued)

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 7-74 for more information..*

When you use Auto Vascular calculation, you use the vessel keys on the Touch Panel to post-assign vascular calculations. When you are not using Auto Vascular calculation, the vessel key is used for manual measurement.

Naming format for vessels

When you want to measure a vessel, on the Touch Panel 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 8-11: Vascular Vessel Abbreviations

| Acronym | Name |
|--------------|---|
| ACA | Anterior Cerebral Artery |
| Acc RA | Accessory Renal Artery |
| AComA | Anterior Communicating Artery |
| Anast | Anastomosis |
| ArcA | Arcuate Artery |
| ATA | Anterior Tibial Artery |
| ATV | Anterior Tibial Vein |
| AVF | Arteriovenous Fistula |
| Axill | Axillary Artery |
| Axill V | Axillary Vein |
| BA | Basilar Artery or Brachial Artery |
| Bas V | Basilic Vein |
| BasV Antecub | Basilic Vein Antecubital Fossa |
| BIF IMT F/N | Bifurcation Intima Media Thickness Far/Near |
| Brac V | Brachial Vein |
| CA | Celiac Artery |
| CCA | Common Carotid Artery |

Table 8-11: Vascular Vessel Abbreviations (Continued)

| Acronym | Name |
|----------------|--|
| Ceph V | Cephalic Vein |
| Ceph V Antecub | Cephalic Vein Antecubital |
| CFA | Common Femoral Artery |
| 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 | External Carotid Artery |
| EIA | External Iliac Artery |
| EIV | External Iliac Vein |
| Fr. Branch | Frontal Branch |
| FV | Femoral Vein |
| GBWall | Gall Bladder Wall |
| GDA | Gastroduodenal Artery |
| GR | Graft |
| GSV | Greater Saphenous Vein |
| HA | Hepatic Artery |
| Hilar A | Hilar Artery |
| HV | Hepatic Vein |
| IIA | Internal Iliac Artery |
| IIV | Internal Iliac Vein |
| ICA | Internal Carotid Artery (Transcranial Doppler) |
| ICA | Interior Carotid Artery (Carotid Artery) |
| IJV | Internal Jugular Vein |

Table 8-11: Vascular Vessel Abbreviations (Continued)

| Acronym | Name |
|----------------|--------------------------------|
| IMA | Inferior Mesenteric Artery |
| IMT | Intima Media Thickness |
| IMV | Inferior Mesenteric Vein |
| Inn | Innominate |
| Int. Lobular A | Interlobular Artery |
| IVC | Inferior Vena Cava |
| LSV | Lesser Saphenous Vein |
| MCA | Middle Cerebral Artery |
| Mcub V | Median Cubital Vein |
| Mid Hep V | Middle Hepatic Vein |
| MPV | Main Portal Vein |
| MRA | Main Renal Artery |
| Par. Branch | Parietal Branch |
| PCA | Posterior Cerebral Artery |
| PCoMA | Posterior Communicating Artery |
| Peron | Peroneal |
| POP | Popliteal |
| Pseudo | False Artery (aneurysm) |
| PTA | Posterior Tibial Artery |
| PTV | Posterior Tibial Vein |
| PV | Portal Vein |
| RA | Renal or Radial Artery |
| RV | Renal or Radial Vein |
| SA | Splenic Artery |
| Sap Fem Junc | Sapheno-Femoral Junction |
| Seg. A | Segmental Artery |
| SFA | Superficial-Femoral Artery |
| SFJV | Sapheno-Femoral Junction Vein |
| SMA | Superior Mesenteric Artery |
| SMV | Superior Mesenteric Vein |

Table 8-11: Vascular Vessel Abbreviations (Continued)

| Acronym | Name |
|----------------|--|
| SSV | Small Saphenous Vein |
| STA | Superficial Temporal Artery |
| SUBC | Subclavian Artery |
| SUBC V | Subclavian Vein |
| SV | Splenic Vein |
| SV Pop Junc | Small Saphenopopliteal Junction |
| TCD | Transcranial Doppler |
| TIPS | Transjugular Intrahepatic PortalSystemic Shunt |
| UA | Ulnar Artery |
| UV | Ulnar Vein |
| VERT | Vertebral Artery |
| VES | Vessel |

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 worksheet 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).

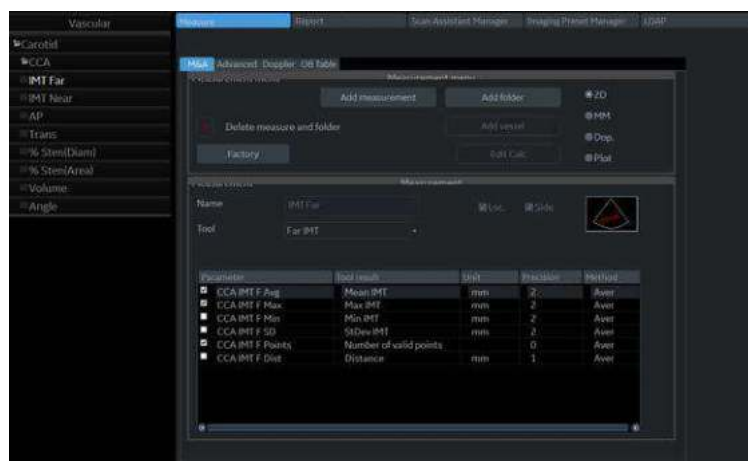


Figure 8-22. Configuring Auto IMT

IMT Measurement - Auto (continued)

In the Vascular Carotid application, the Auto IMT measurement is available.

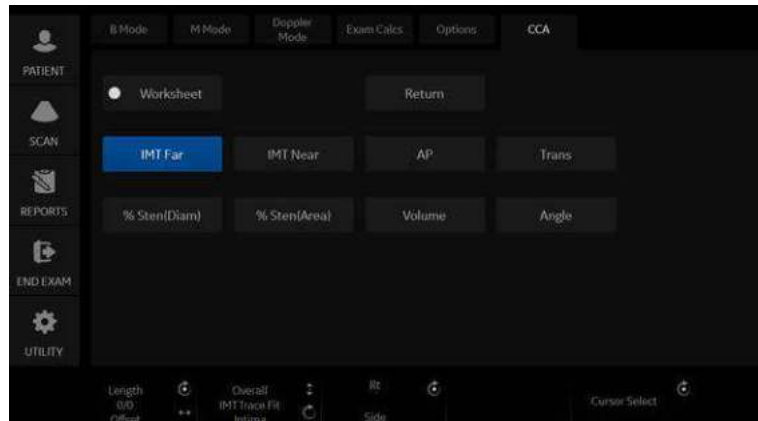


Figure 8-23. Auto IMT Touch Panel

The following controls are available.

Table 8-12: Auto IMT Touch Panel Description

| Parameter | Description |
|----------------------------------|--|
| Worksheet | Select to view the Worksheet |
| IMT Far | Select to begin the Far Field IMT measurement. |
| IMT Near | Select to begin the Near Field IMT measurement. |
| AP | Anterior Posterior |
| Trans | Transverse |
| 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 (remeasures) 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. Position the cursor, then select **IMT Far**.
3. Use the **Trackball** to set the length.

Or

Use the **Length / Offset** control on the Touch Panel 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 the Print key or press the Print key to store the image which also saves the measurement to the Worksheet.

To adjust the trace, use the **Overall IMT Trace Fit Intima** control on the Touch Panel. The Trace fit (up/down) adjusts the inter luminal line whereas the overall (rotate) adjusts both IMT lines.

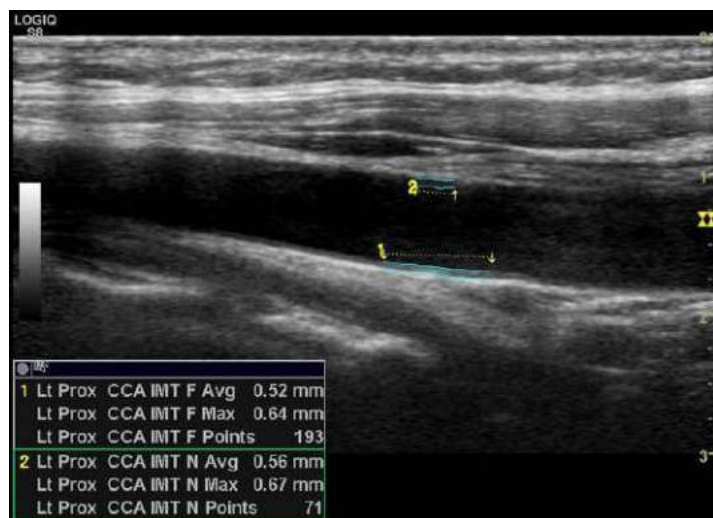


Figure 8-24. Example of Auto IMT Far Measurement

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 on the Touch Panel 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 pressing the **Print** key to store the image.

To adjust the trace prior to pressing the Print key, use the IMT Trace Fit control on the Touch Panel. The measurement is saved to the Worksheet.

NOTE: Since the IMT measurements are semi-automatic, the operator has to approve the detection by visual inspection before storing the results in the worksheet and report.

IMT Measurement - Manual

1. Before you measure the IMT, add the IMT measurement to the Carotid folder via the Measurement & Analysis screen (by selecting one of the three types of IMT measurements under Add Measurement in the M&A screen).
 - IMT: Three vertical lines are parallel. Place the start point on the line and place the end point anywhere.
 - IMT2: Each vertical line can be rotated with the **Ellipse** control. You must place the start and end points on the line.
 - 5mm Scale: The horizontal line can be rotated with the **Ellipse** control. A maximum of 20 distance values which produce one average value can be taken. The number of distance values is specified when adding the measurement in the M&A screen.
- IMT and IMT2 have three kinds of measurements:
- IMT --+/IMT2 --+: Measure from right to left.
 - IMT -+-/IMT2 -+ -: First measure at the center, then right and left are last.
 - IMT+--/IMT2 --+: Measure from left to right.
2. Acquire a longitudinal scan of the carotid artery and optimize the image. Then press **Freeze**.
 3. Scroll to an end-diastolic frame where the intima layer is clearly visible.

IMT Measurement - Manual (continued)

- Press **Measure**, then select **IMT1**, **IMT2** or **5mm scale**. An active caliper displays.

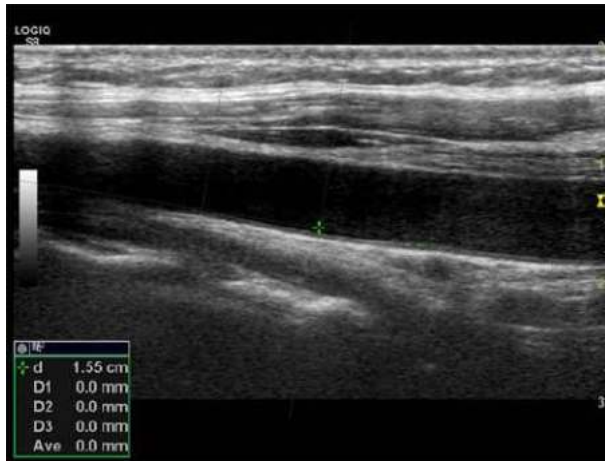


Figure 8-25. IMT caliper (Example)

- Use the **Trackball** to move the caliper and the **Ellipse** control to adjust the angle. Press **Set** to fix the caliper.

NOTE: *The interval of the vertical line for IMT1 and IMT2 is 1cm and for the 5mm scale is 5mm.*

- Measure the thickness of three points for IMT1 and IMT2.
OR

Measure the thickness of the specified number of points for the 5mm scale.

NOTE: *The caliper moves to the next point automatically.*

IMT Measurement - Manual (continued)

7. After you complete the measurement, the system calculates the average automatically.



Figure 8-26. IMT Measurement

IMT Measurement - Manual C(10)

1. Before you measure the IMT C10, create the IMT C10 measurement in the Carotid folder via the Measurement & Analysis screen.
 - IMT C10: Two vertical lines are parallel. One is the base line. Each vertical line can be rotated with the Ellipse control. Place the start point on the line and place the end point anywhere.
 - IMT2 C10: Two vertical lines are parallel. One is the base line. Each vertical line can be rotated with the Ellipse control. You must place the start and end points on the line.

IMT C10 and IMT2 C10 have two kinds of measurements:

- IMT C10 -+/IMT2 C10 -+: Base vertical line shows right side.
- IMT C10 +/-IMT2 C10 +/-: Base vertical line shows left side.

IMT Measurement - Manual C(10) (continued)

2. Acquire a longitudinal scan of the carotid artery and optimize the image. Then press **Freeze**.
3. Scroll to an end-diastolic frame where the intima layer is clearly visible.
4. Press **Measure**, then select **IMT C10**. An active caliper displays.

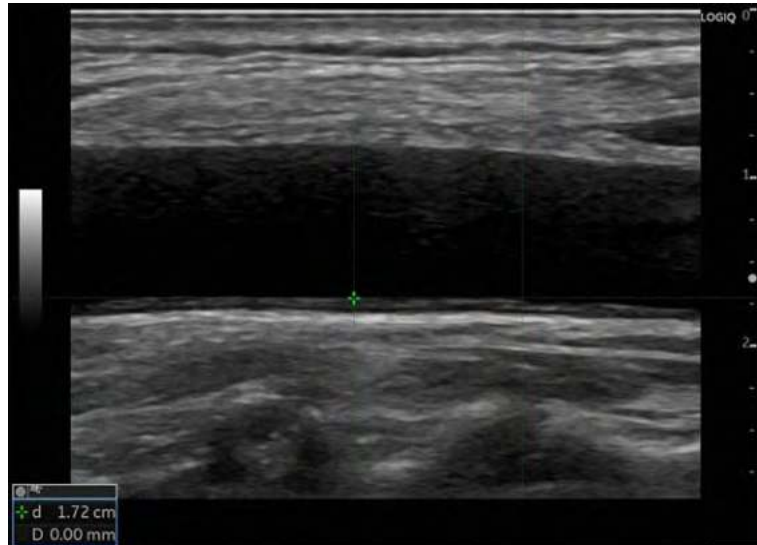


Figure 8-27. IMT C10 Active Caliper

5. Use the trackball to move the caliper and the Ellipse control to adjust the angle. Press **Set** to fix the caliper.

NOTE: *The interval of the vertical line for IMT1 and IMT2 is 1cm.*

6. Measure the thickness for IMT C10.

IMT Measurement - Manual C(10) (continued)

7. After you complete the measurement, the system shows base vertical line.

NOTE: The base vertical line length is 1cm.



Figure 8-28. Base Vertical Line

Plaque Score Tool

1. Before you measure, add Plaque Score to the Carotid folder at the Utility -> Measure -> Measurement & Analysis screen (by selecting 2D Plaque Score under Add Measurement in the M&A screen).

Label the parameters you want measured:

- Distance value (up to 20)
 - Sum (greater or equal to 1.1 mm)
 - Count (greater or equal to 1.1 mm)
 - Maximum value of each area
 - Average value
 - Average value of each area
2. Scan the carotid artery and press **Freeze**. Display dual images to measure across split screen images.
 3. Press **Measure** and select **Plaque Score Tool**. An active caliper, one horizontal line and five vertical lines display. The interval of the vertical lines are 1.5 cm.

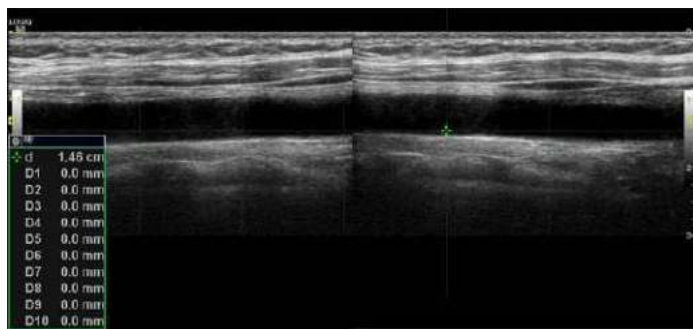


Figure 8-29. Plaque score example

4. Use the **Trackball** to move the caliper and the **Ellipse** control to adjust the angle. Press **Set** to fix the caliper.

Plaque Score Tool (continued)

5. Measure the thickness (up to twenty times) on any place as necessary.

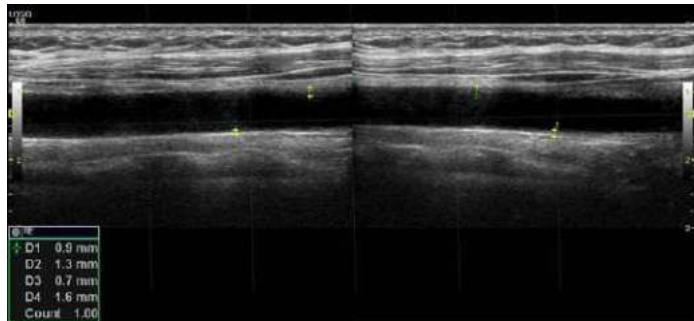


Figure 8-30. Plaque Score Example 2

6. The system displays the measurement result.

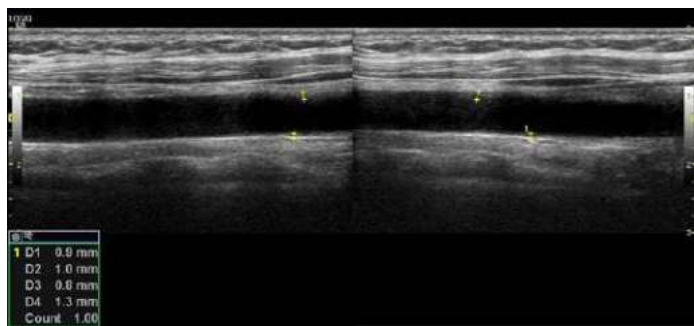


Figure 8-31. Plaque Score Example 3

NOTE: Only calculates the value larger than 1.1mm.

7. Double click the **Set** key to finish the measurement.

Auto Vascular Calculation

Auto Vascular Calculation enables the LOGIQ Fortis 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.

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.

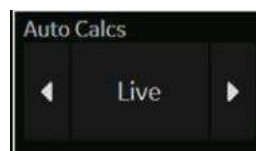


Figure 8-32. Auto Calculation Touch Panel key

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 using the **Trace Method** Touch Panel pull-down menu.

- **Selecting Trace Direction**

Trace Direction lets you use peak timeline data above, below, or composite (above and below) the baseline.

- Select Positive, Negative or Both to set the peak timeline data.

- **Modify Calculation**

- a. Select the **Modify Calcs** Touch Panel key.

The Modify Calculation menu is displayed.

- b. 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 Exam

1. Preset the system.
2. Perform the scan and press **Freeze**.
3. Activate Auto Vascular Calculation.

The system performs a calculation automatically.

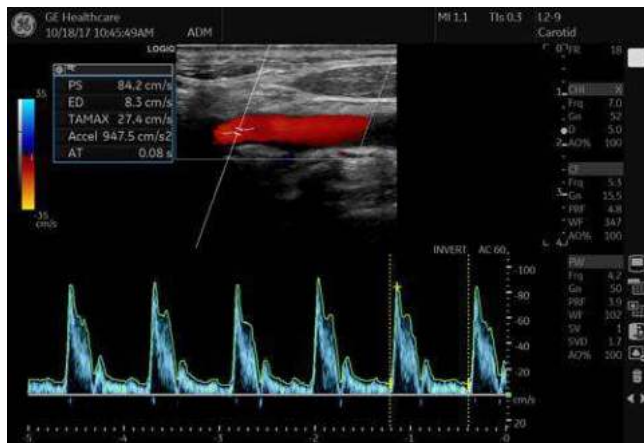


Figure 8-33. Auto Vascular Calculation

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 Touch Panel.

Selected vessel measurements are automatically assigned with the Auto Vascular calculation. The results are then displayed in the Results Window.

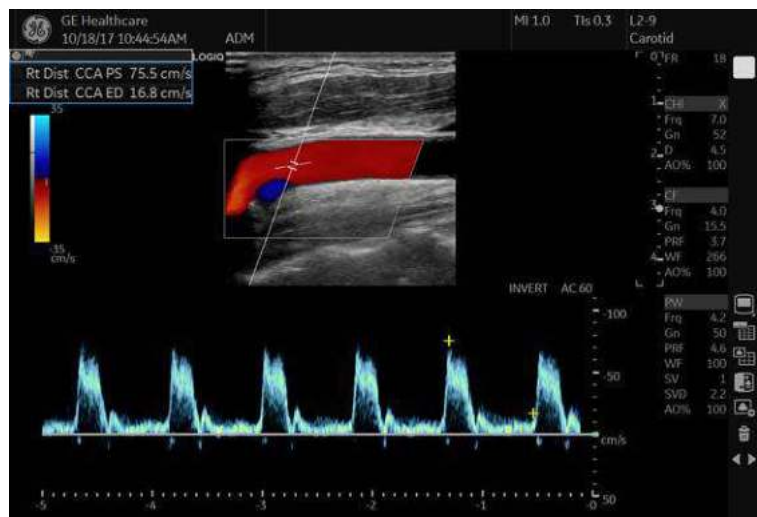


Figure 8-34. Assigned Vessel

NOTE: When you want to cancel the assignment, you can use the **Cancel Transfer** Touch Panel key. See 'Cancel Transfer' on page 7-32 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.
- 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.

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.

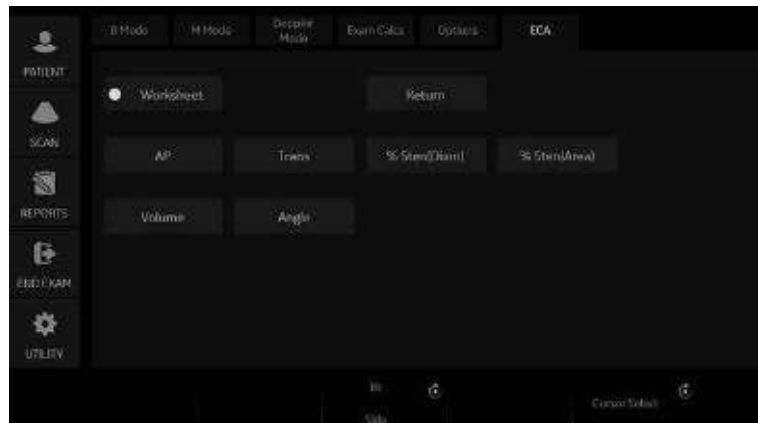


Figure 8-35. Measurement Menu Example

4. Make the required measurements according to the system, or select your preferred measurements.

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 for the vessel you want to measure.
2. Select **Show All**.
The system displays all possible vessel measurements.
3. Select the desired measurement.

NOTE: *The following instructions assume that you first scan the patient and then press **Freeze**.*

Intravessel ratio

On the Vessel Worksheet page, to calculate the Intravessel ratio, you need a measurement of assessing pressure and stenotic velocities.

1. Select **Intrav. Ratio** from the Touch Panel. The Intravessel Ratio pop-up window displays in the header section of the worksheet.

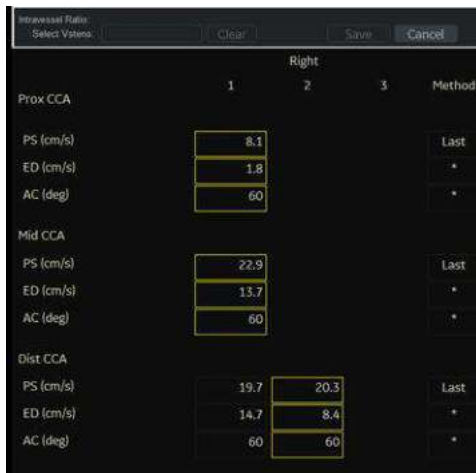


Figure 8-36. Intravessel Pop-up Window

2. Select the first velocity. The value displays in the window. The value is displayed in the window.

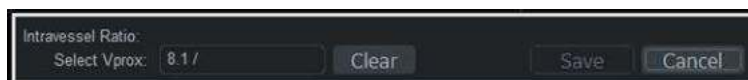


Figure 8-37. Intravessel ratio one

Intravessel ratio (continued)

3. Select the second velocity.

The second value and Result value display in the window.

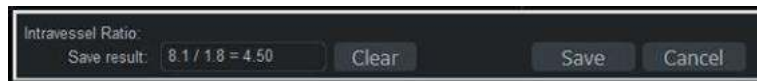


Figure 8-38. Intravessel ratio two

- 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.*

| | Right | | | Left | | |
|-------------|----------|----------|-------|----------|----------|-------|
| | PS | ED | AC | PS | ED | AC |
| Prox CCA | 8.1cm/s | 1.8cm/s | 60deg | 21.0cm/s | 10.0cm/s | 60deg |
| Mid CCA | 22.9cm/s | 13.7cm/s | 60deg | 22.2cm/s | 9.3cm/s | 60deg |
| Dist CCA | 29.3cm/s | 8.4cm/s | 60deg | 19.4cm/s | 11.5cm/s | 60deg |
| Intra-Ratio | 4.57 | | | | | |

Figure 8-39. Vessel Summary Example

Bypass Graft Anastomosis Graph

If there aren't any known Grafts associated with the current exam, you can create a Graft by describing its anastomosis locations and anastomosis modifiers.

NOTE: *You can always create another new Graft by selecting one from the "Choose to Add" table, and then modifying it into what you want.*

To graph Bypass Graft anastomosis,

1. Select Bypass Graft on the Touch Panel. The Add/Edit Grafts pop-up appears.

NOTE: *This pop-up appears if there are not any known Grafts.*

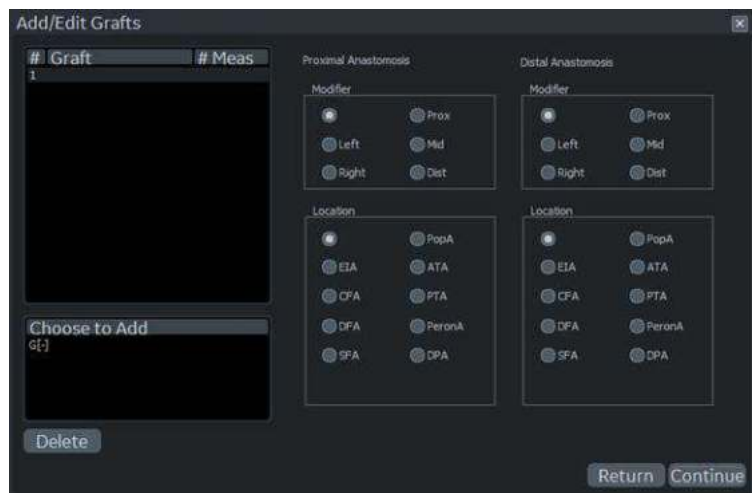


Figure 8-40. Add/Edit Graft

2. Use the Trackball to assign graft locations on the Add/Edit Grafts pop-up. Press Continue.

NOTE: *You can select a Graft by choosing it in the table of Grafts that exist in the current exam.*

NOTE: *You can always modify the selected Graft by choosing new anastomosis locations and anastomosis modifiers.*

NOTE: *The Stent pop-up is nearly identical to the Graft pop-up, except that you also have the ability to specify the Stent's laterality.*

Bypass Graft Anastomosis Graph (continued)

- Graft assignments now appear on the Touch Panel: This is saved on the system and can be edited. Specify the Topographic Modifier (location), Stenosis Modifier, and Anatomic Modifier for any measurement you would like to take.

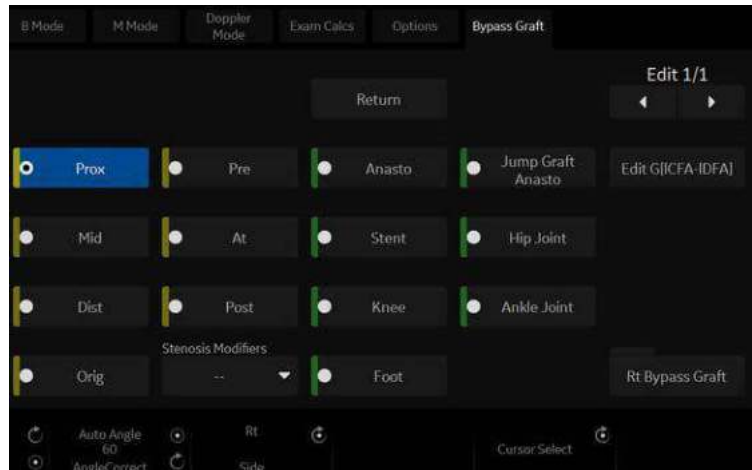


Figure 8-41. Graft table update

NOTE: For each measurement within a blood vessel, you can choose a Topographic Modifier (i.e., location) and a Stenosis Modifier. For Grafts and Stents, you can also choose an Anatomic Modifier (i.e., eye, ankle, or liver).

- To edit the Bypass Graft Anastomosis, select the “Edit 1/1” toggle on the Touch Panel to specify which of the Grafts you are measuring within.



HINTS

Very Important: When creating Grafts or Stents, it is always recommended to perform the accompanying measurements. The measurements folder can be found in the lower, right-hand portion of the Touch Panel.

Bypass Graft Anastomosis Graph (continued)

5. On the Doppler Mode M&A Touch Panel, you have the option to select the Stenosis Modifiers, Pre-Steno, At-Steno, or Post-Steno.

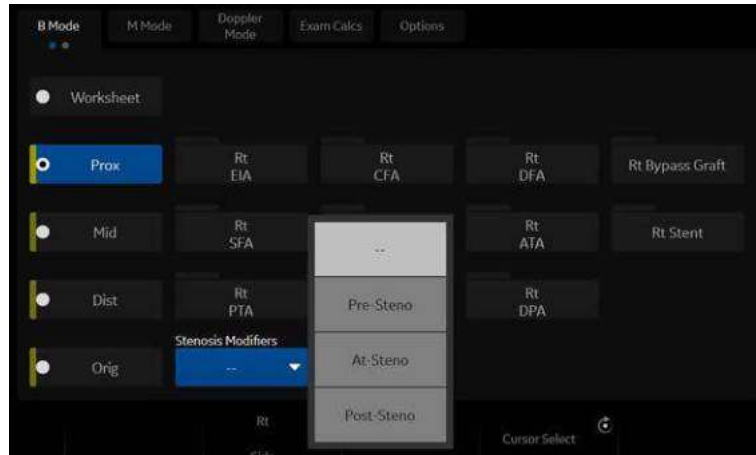


Figure 8-42. Select the Stenosis Modifier

Introduction

Urology measurements offer three different types of measurement studies:

- Generic—Common to all applications. See ‘Generic Measurements’ on page 7-18 for more information..
- Urology
- Pelvic Floor. See ‘Pelvic Floor Measurements’ on page 8-78 for more information.

NOTE: *Bladder(0.7) Vol, Bladder Vol, Post Void Vol, Prostate Vol, Renal Vol, Renal (0.8) Vol and Volume can be displayed on the Touch Panel 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.

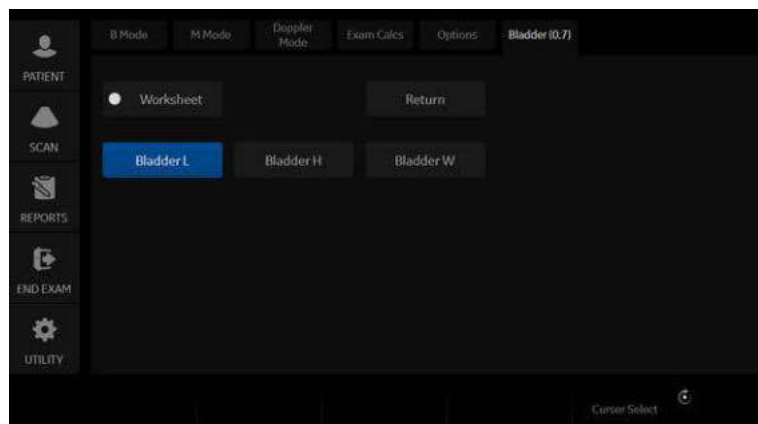


Figure 8-43. Bladder Volume Touch Panel

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.

To select the left or right, adjust the **Side** selection.

To measure Renal Volume:

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.

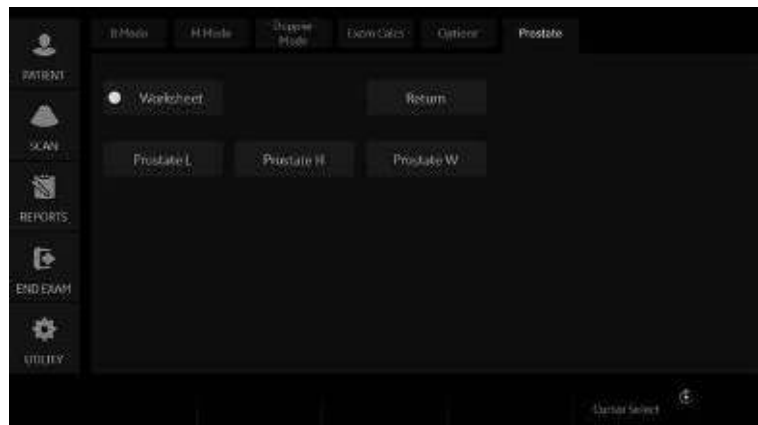


Figure 8-44. Prostate Volume Touch Panel

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 Worksheet and Report (if set appropriately on the Report Designer page).

| Field | Value | Unit |
|---------------------|-------|-------|
| PSA: | 1.000 | ng/ml |
| PPSA Coefficient 1: | 0.12 | |
| PPSA Coefficient 2: | 0.12 | |

Figure 8-45. Urology Patient Screen

| | |
|--------------|---------|
| 1 Prostate L | 2.88 cm |
| 2 Prostate H | 2.86 cm |
| 3 Prostate W | 2.15 cm |
| Prostate Vol | 9.29 ml |
| PSAD | 0.00 |
| PPSA(1) | 1.12 |
| PPSA(2) | 1.12 |

Figure 8-46. Measurement result window

PSAD: Prostatic Specific Antigen (PSA) Density – defined as:
 $PSAD = PSA/Volume$

PPSA: Predicted Prostate Specific Antigen – defined as: $PPSA = Volume \times PPSA \text{ Coefficient}$

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.

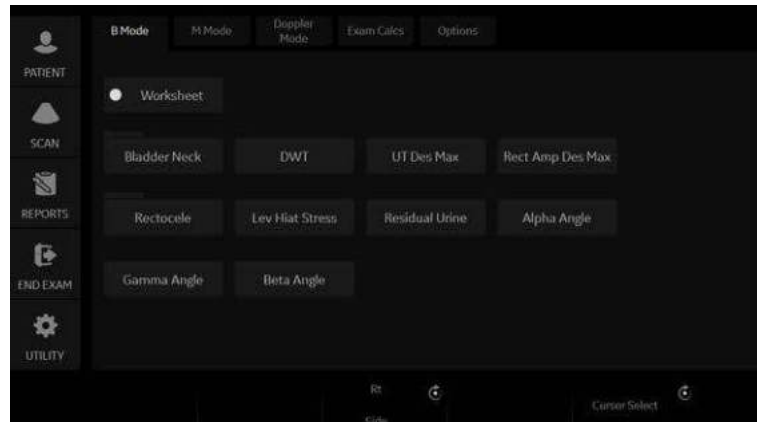


Figure 8-47. Pelvic Floor Study Touch Panel

BN (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.

BN (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.

Pelvic Floor Measurements (continued)

BN (Bladder Neck) Descent

The Bladder Neck Descent is a calculation that should be calculated after measuring the Bladder Neck Rest and Bladder Neck Stress.

$BND = \text{Bladder Neck Rest} - \text{Bladder Neck Stress}$

NOTE: If the Bladder Neck Stress is a negative number, it becomes positive and is added to the bladder neck rest measurement.

DWT (Detrusor Wall Thickening)

Three distance measurements of the bladder wall dome are calculated into a mean dimension and displayed in millimeters.

UT (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

Rect Amp Des Max (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 and Width)

Two 2-caliper diameter measurements to measure depth and width of the rectocele. Displayed in millimeters.

Pelvic Floor Measurements (continued)

Lev Hiatt Stress (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:

$(x) \times (y) \times 5.9 - 14.9$ equals Residual Volume displayed in ml.

Pediatrics

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 7-18 for more information..*
- Pediatric Hip (PedHip).

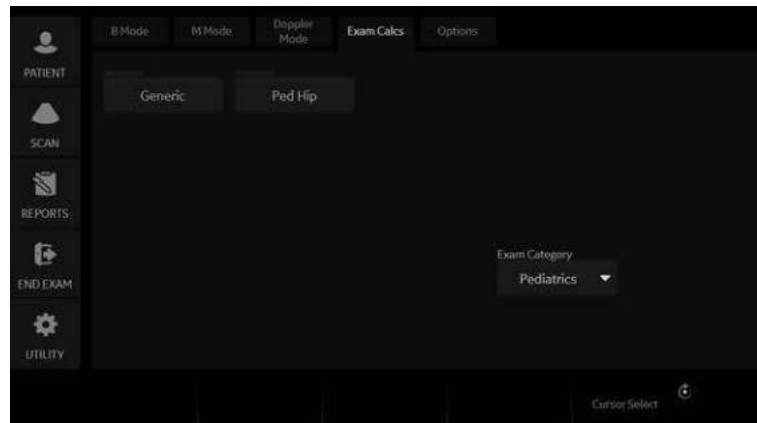


Figure 8-48. Touch Panel - Pediatrics Exam Calcs

Pediatrics Hip

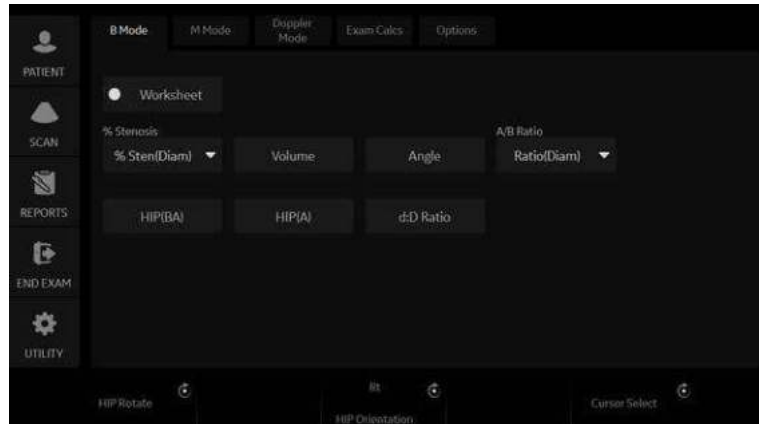


Figure 8-49. B-Mode Measurement Touch Panel – PedHip

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.

Hip Dysplasia Measurement (continued)

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.

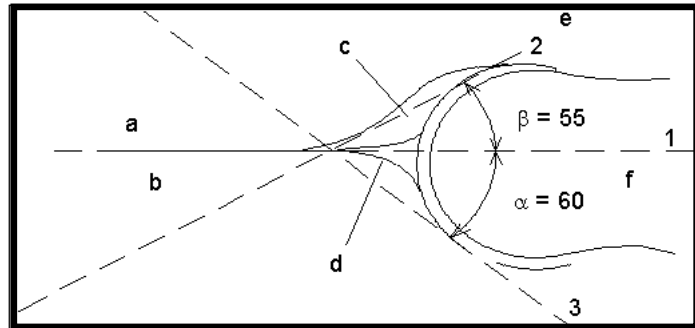


Figure 8-50. Hip Dysplasia

Anatomical Landmarks

| | |
|---------------|----------------------------------|
| a. Ilium | d. Bony Roof |
| b. Iliac Bone | e. Cartilaginous acetabular roof |
| c. Labrum | f. Femoral Head |

¹Source: R GRAF, Journal of Pediatric Orthopedics, 4: 735-740(1984)

To make a Hip Dysplasia measurement:

1. From the Touch Panel, select either the **right** or **left side** (orientation) and then select **Beta 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.

Hip Dysplasia Measurement (continued)

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. From the Touch Panel, 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. From the Touch Panel, 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 9

Recording images

Describes how to record images.

Getting Set Up to Record Images

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 **P1** key.
5. Store secondary capture for DICOM print via **P2** key.
6. Store images to the color printer or B/W printer via **P3** key.
7. Check the DICOM Job Spooler via **F4** to verify delivery.
8. End the exam.
9. Permanently store images via the Patient menu to permanent storage.

During an examination, the operator stores data, images and cineloops for immediate purposes. The LOGIQ Fortis includes an integrated patient archiving system for data and image storage.

The LOGIQ Fortis enables also storing of data and images to external databases (removable media).

Overview (continued)

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, WMV, and DICOM.

- You need to set up a process 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 the Customizing Your System chapter for instructions on setting up your system's connectivity.

Image Management Guide

Save As to View on any PC

Use this to save images in a computer-friendly format so you can view it on any PC.

EZBackup Images to Archive

Use this to take images off your Ultrasound system onto removable media for long-term archive. This is the way to free up hard disk space, rather than deleting images.

Export/Import Data/Images Between Systems

Use this to copy both patient data and images for specified patient(s) from one system to another.

Media Requirements

The system **ONLY** supports medical grade CD-R, DVD-R, USB Hard Disk Drive, and USB Flash Drive.

The system **DOES NOT** support CD-RW / DVD+R / DVD-RW / DVD+RW / or DVD-RAM.



CAUTION

DO NOT use or attempt to format CD-RW, DVD+R, DVD-RW, DVD+RW, or DVD-RAM media.

Media Handling Tips

Always finalize the media. This allows you to read them on any other PC.

DO NOT finalize the media if you want to add more images.

To eject the media, always press **F3**. **DO NOT** press the eject button on the drive:

1. Press **F3**. The Eject device menu is displayed.
2. 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 Drive or Hard Disk Drive media.*

Adding Devices

To add a destination device (printer, worklist server, etc.) to this system, see 'Device' on *page 10-66*.

To verify a DICOM device, see 'Device' on *page 10-66*.

Adding a Dataflow

To add a new dataflow to this system, see 'Dataflow' on *page 10-84*.

Adding Devices to a Print Button

To add devices/dataflows to a print button, see 'Button' on *page 10-85*.

Formatting Removable Media

To format removable media, see 'Formatting removable media' on *page 10-88*.

Storing Images and Cineloops

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 Dataflow in Connectivity for detailed settings related storing image/Cine.

Image archive is set by the dataflow selected (See Dataflow in Connectivity for more information.)

When you want to print/store an image, P1 is most commonly used for the primary destination and internal hard drive.

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 appropriate Print key.

The selected image is stored (per your preset instructions) and a thumbnail is displayed on the clipboard.

NOTE: *LOGIQ Fortis numbers the images which are saved in the Local Archive (Instance Number). But Instance Number may change or get duplicated when adding/deleting images to the exam. So for identification, the recommendation is to use Content Date/Content Time on the DICOM server instead of Instance Number.*

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.

The system can be configured to perform either

- Prospective clip: The system begins storing Cine from when you press the Print button, based on the Time Span setting.
- Retrospective clip: The system stores Cine predetermined time before you press the Print button, based on the Time Span setting.

Refer to 'Retrospective Cine/Prospective Cine' on *page 9-9* about the setting.

NOTE: *LOGIQ Fortis numbers the images which are saved in the Local Archive (Instance Number). But Instance Number may change or get duplicated when adding/deleting images to the exam. So for identification, the recommendation is to use Content Date/Content Time on the DICOM server instead of Instance Number.*

Previewing and Storing a CINE Loop

1. While scanning, press **Freeze**.
2. Move the Trackball to activate Cine.
3. Use the trackball or **Frame by Frame** to scroll through the acquisition and find the sequence of interest.
4. Press **Start Frame** or **End Frame** to set the corresponding cineloop boundary to the current frame as necessary.
Rotate **Start Frame** and **End Frame** to trim or expand the cineloop boundaries.
5. Press **Run/Stop** to run the cineloop and then press the print key to store the cineloop.
Cine loops stored on the clipboard are indicated with a movie strip icon.
6. Press **Run/Stop** again to stop the cine loop.
7. Press **Freeze** to return to live scanning.

Depending on whether the system has been configured to enable or disable "Preview Loop before store" (see 'Print Controls' on page 10-58), the following procedures enable the cine loop to be stored directly.

Storing a cine loop without Preview

If “Preview Loop before store” is disabled,

1. While scanning, press the appropriate print key.
2. The last valid cine loop is stored in the archive and a movie clip thumbnail is displayed on the clipboard.
3. Scanning resumes immediately.

Storing a cine loop with Preview

If “Preview Loop before store” is enabled,

1. While scanning, press the appropriate print key.
2. The last valid cine loop is previewed.
3. Adjust the cine loop, as necessary.
4. Press the appropriate print key.

The movie clip thumbnail is displayed on the clipboard.

Preview

Loop Preview can now be enabled independently for Time-Based Store, ECG-Based Store, and Mark CINE. This is useful for setting preview preferences based on the application.

NOTE: *The Contrast Time Span setting overrides the Time Span when in Contrast Mode.*

Retrospective Cine/Prospective Cine

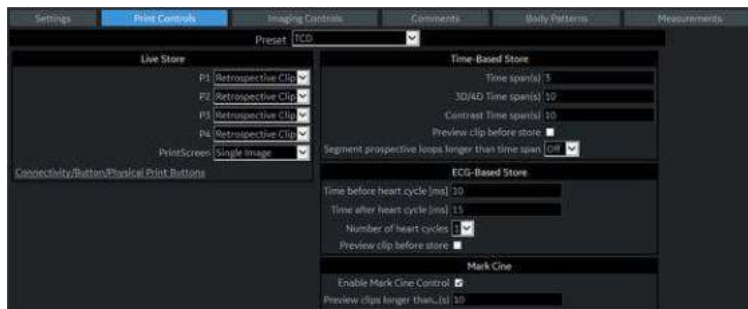


Figure 9-1. Print Control

Retrospective CINE

When you select to store a Cine loop retrospectively, the system stores cine for a specified time before you press the Print Button.

1. Set Live Store P1 - P4 to “Retrospective Clip” via Utility -> Application -> Print controls.
2. Specify the recording time in Time-Based Store or ECG-Based Store.
3. Press **Save**.

NOTE: *A Print button can be configured to store a Single Image during Retrospective Cine, without stopping the Cine loop.*

Prospective CINE

When you select to store a cine loop prospectively, the system begins storing cine from when you press the Print button.

1. Set Live Store P1 - P4 to “Prospective Clip”.
2. Specify the recording time in Time-Based Store or ECG-Based Store.
3. Press **Save**.

NOTE: *A Print button can be configured to store a Single Image during Prospective Cine, without stopping the Cine loop.*

NOTE: *The CINE gauge turns green when a Prospective CINE Clip is pending.*

NOTE: *You can cancel Prospective Store by pressing Freeze/Unfreeze or by changing Modes.*

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 or **Review**. 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 9-16 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 Patient screen.*

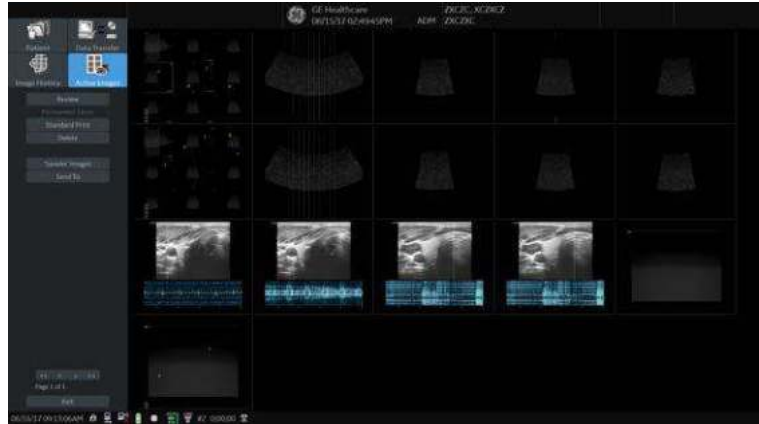


Figure 9-2. Active Images Screen

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.

NOTE: *If the size of an image is larger than 2GB, the image does not display on the Active Image screen. Take care when you scan a long CINE Loop, such as in Contrast.*

Active Images (continued)

Table 9-1: Active Images

| Parameters | Description |
|---|--|
| Delete Images Delete Selected Images/ Delete All Temp. Images | To delete selected images, select the image in the active screen, then select “Delete” on the monitor display or “Delete Selected Images” on the Touch Panel. To delete all images, select the image, then select “Delete All Temp. Images” on the Touch Panel. |
| 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 . |
| SaveAs Images | Refer to ‘SaveAs’ Images’ on <i>page 9-23</i> 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. |
| Select Images/Select All Unselect All | <ul style="list-style-type: none"> • To select one or multiple image, place the cursor on the image and press Set. • To select all images, press Select all on the Touch Panel. • To deselect images, press Deselect all on the Touch Panel. |
| Send To | See ‘Patient Menu DICOM Functionality’ on <i>page 13-478</i> for more information. Note: “Send To” button is not displayed in Active Images menu and the Touch Panel 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 **L/R**. Now both the archived and live images appear on the monitor display. Unfreeze the live image area.

Image Reorder

To reorder the sequence of the images displayed on the Active Images screen:

1. Select Image Reorder on the left side of the screen.
2. Select the image(s) you wish to move with the left and right trackball buttons.

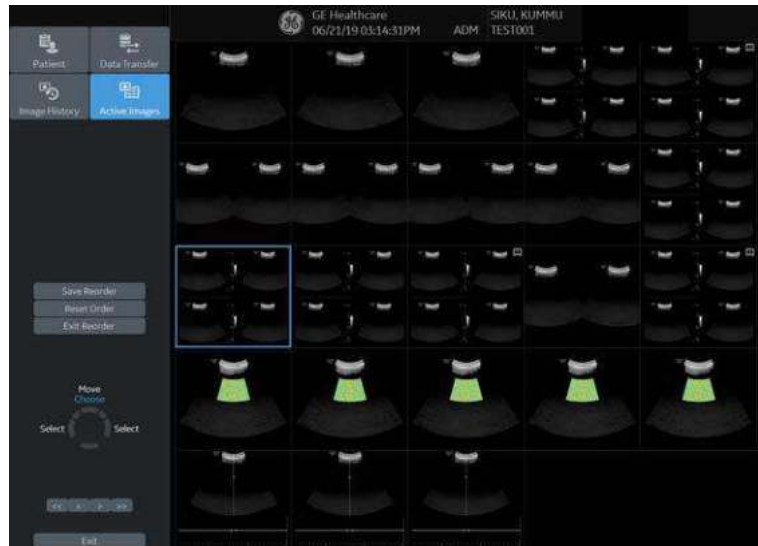


Figure 9-3. Select Image(s)

3. There are three ways you can freeze the selection and toggle from Choose to Move mode:
 - Press the top trackball button
 - Double-click the left or right trackball button
 - Drag and drop by holding the left or right trackball button

Image Reorder (continued)

4. Move the placement cursor with the trackball to the position you want to move the images to.



Figure 9-4. Move/Paste Image(s)

5. Press the top trackball button to paste the image(s) in the new location. After pasting, the system switches from Move mode to Choose mode.
6. Select Save Reorder to save the new image order, Reset Reorder to return to the original order, or Exit Reorder to return to the Active Images screen.

Image History

Image History displays the images of each exam in chronological order of the patient.

1. Select the patient.
2. Select **Image History**.
3. Select the appropriate button which shows the old exam by date and storage location. 'Active Exam' is displayed on the button.



Figure 9-5. Image History Screen

4. Move the cursor to the required image for review.
5. Select **Review**. The selected image (maximum of 4 images) is displayed.

If the image data is saved on a disk and you do not insert the disk when displaying the Image History page, a triangle icon displays instead of a thumbnail.

Place the cursor on the icon. The disk name displays under the preview window. Insert the appropriate disk.

- Name of the disk displayed under the preview window
- Raw data B-Mode image appears in gray.
- Raw data Color image appears in color
- Image which does not have raw data (screen capture image) appears with a question mark.

Viewing two different studies from the same patient

To view images side-by-side from two different studies on the same patient,

1. Select the patient.
2. Go to the Image History page.
3. Select the first image.
4. Select the next image from the other exam.
5. Press **Review**.

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.

NOTE: *If you have unsaved images in the clipboard and change the exam, the dialogue “You have unstored images. They will be saved to your current exam” displays. The unsaved images are saved to the current exam.*

All of the images can be viewed in the Active Images screen or in the Image History screen, available from the display or from the Patient menu.

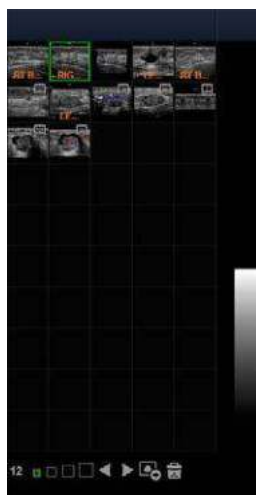


Figure 9-6. Clipboard example

Clipboard icon



Figure 9-7. Side clipboard icon

1. Number of Images in Exam
The number of images in an exam is tracked on the bottom of these Monitor Display Controls.
2. Thumbnail Size
Place the cursor on one of the Thumbnail size box icons and press Set.
3. Prev/Next Image
4. Save As
5. Delete recalled image / Delete last image

Saving the image /cine to the Clipboard

The active image/cine is stored and placed on the clipboard when you press the print key (this assumes that you have already set up a print key to do this). 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.

The clipboard fills from left to right, starting in the left-hand corner. Once the top row is full, the second row starts to fill. Once both rows are full, the next image stored starts to fill a 'third' row (the first row disappears from the clipboard display, with the second row now becoming the first row, and the third row now becoming the second row).

Previewing Clipboard Images

1. Select the **Pointer** 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 **Pointer** 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.
4. Press the left/right arrow of Menu icon to move to the previous/next image.

To delete an image from the clipboard

1. If in images live, press **Freeze**.
2. Select the **Pointer** key to obtain a cursor arrow.
3. Place the cursor on the clipboard image you want to delete, then press **Set** to select the image.
4. Place the cursor on the Delete icon and press **Set**.
A warning message is displayed asking the user to confirm the action to perform.
5. Select **Yes**.

Save As

Overview

Images and cineloops can be saved to a removable media storage to View on a **Windows PC** in the following standard formats:

- Still images: JPEG, DICOM and RawDICOM (Raw data + DICOM)
- Cineloops: WMV, DICOM and RawDICOM (Raw data + DICOM)

Images can also be stored as MPEG format as described on 'MPEGvue' on *page 9-37*.

SaveAs

To save images to the media:

1. Insert the media into the drive or connect the USB drive to the system.
2. On the scan screen, press the left **Set** 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.
4. Select **SaveAs** in the lower, right-hand corner of the screen. The Save As menu appears.

NOTE: If you have not formatted the media, the media will be formatted when you select Save As.

NOTE: If you save the image as an .WMV file, run the CINE Loop before you select SaveAs.

NOTE: You cannot save a 2D cineloop image as a .jpeg file.

SaveAs (continued)

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)
 - Max 32 characters

NOTE: You cannot edit the folder name when the folder is opened.

7. File Name: The name of the file is automatically filled in, but you can type a file name as well.
 - Max 64 characters

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

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
 - Lossless-Jpeg

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.

SaveAs (continued)

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.
 - WMV: Saves the CINE Loop in WMV(Windows Media Video) format.

NOTE: *Store "Image Only" is available if you select WMV for Type.*

NOTE: *WMV type is only available with CINE loop image.*

- JPEG: Saves the still image in jpeg format.
- JPEG2000: Saves the still image in jpeg2000 format.

NOTE: *The Save button is disabled when you select "AllFiles". Select each Save as type when you want to save data.*

If you want to see all data saved onto the local drive, select "AllFiles(*)". All the data names display in the window.

12. For images transferring to USB, press **Save**.

The images are saved directly to the USB drives storage whenever you press Save.

If saving to a CD/DVD, select "For Transfer to CD/DVD", the image is saved to the local drive buffer.

- If free space of the destination is not enough to save all selected images, then warning dialog appears.
- If the same file name exists in the destination, the warning dialog displays.

OK: Overwrite file and continue to save selected images.

Cancel: Cancel.



Buffer images for transfer to CD/DVD. Images are not cleared out of the image buffer after you start a new exam or new patient. It is the responsibility of the user to clear the image buffer before storing new patient data so that the CD/DVD does not contain images from multiple patients.

13. Repeat steps 4-12 for each additional image to be stored to the CD/DVD.

SaveAs (continued)

14. After you have added all of the images/loops you want to save and are ready to write to the media, 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, a warning dialog displays showing the total required file size and transferred file size. Press **OK**, insert a new CD/DVD, and press **Transfer to CD/DVD** again.

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. Select **Yes and Verify files** for CD/DVD. This compares the expected number of files with the actual number of files on the media. The files are also checked to ensure that they are readable.

NOTE: The Report Save As feature is somewhat different. As soon as you select to save a report, the report is saved.

NOTE: If you save 3D image as an WMV file, an annotation text “COMP” appears at the top of the saved image which represents the compressed image.

NOTE: Time line image can be saved as multi frames image with SaveAs.

Table 9-2: Save As Formats

| | .wmv format | MPEGvue in Data Transfer |
|-----------|--------------------|---------------------------------|
| B, B+CF | Multi frames | Multi frames |
| B+Doppler | Multi frames | Single frame |
| B+M | Multi frames | Single frame |
| 3D | 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 LOGIQ Fortis.

'SaveAs' Images

You can select multiple images to save at one time by selecting '**SaveAs**' in the Active Image screen.

Features are almost the same as the SaveAs feature. See 'Save As' on page 9-19 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 Images 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 or the Touch Panel. The SaveAs menu appears.
3. Ensure that Jpeg&WMV is selected, then press Save.

NOTE: *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 buffer, select '**SaveAs Images**' again and then **Transfer to CD/DVD**. See below.*

Notes on Transfer to CD/DVD

Transfer to CD/DVD transfers all saved files on the hard drive buffer to CD/DVD.

To Transfer saved files to CD/DVD,

1. 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.

2. If you do not want to save the image to CD/DVD, select “**Delete Files for Transfer**” All images are deleted.
3. Press **F3** to eject.

NOTE: Verify the saved image works correctly on the Windows PC. If the image/loop do not work, please repeat the Save operation again on the LOGIQ Fortis.

Storing Images with More Resolution

To store images with more resolution than is available with the JPEG selection, select Save As and select WMV as the Save As Type. You can save single images as .WMV files.

Table 9-3: 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. |

EZBackup

Overview

EZBackup allows you to manage hard disk space 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 drive to the removable media.



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.

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. 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.

When a backup is cancelled the system completes backing up the current media and then cancels the operation.

Only cancel the backup in case of an emergency. The system completes backing up the current media and then cancels the operation.

Overview (continued)



WARNING

The LOGIQ Fortis is not intended to be used as a storage device; backup of the Patient and Image Database is the responsibility of the end user. GE is NOT responsible for any lost patient information or for lost images. Loss of image data may require a rescan.



WARNING

The system crash can cause the SSD corruption. The SSD is not considered a permanent storage device. Backup data on a regular basis. Loss of image data may require a rescan.



WARNING

When EZBackup requires more space 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.” Failure to follow these instructions could result in loss of patient data.



WARNING

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 keeps turning.



WARNING

EZBackup does not back up the exams which were previously backed up once by EZBackup or Export. If you want to back up those exams by EZBackup again, select “Full Backup Option” on the EZBackup wizard. Failure to follow these instructions could result in loss of patient data.

Overview (continued)

**CAUTION**

NEVER restore the patient archive from media made previous to the last backup.

**CAUTION**

“Archived” information is saved to each exam during EZBackup. When you perform EZBackup, the system backs up the exams except for the archived exam.

Use a USB Hard Drive for EZBackup.

- NOTE:** *EZBackup saves 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 reports using EZBackup, use the USB HDD.*
- NOTE:** *EZBackup cannot span a single image across two (2) or more media. Therefore, if EZBackup encounters an image that is greater than the capacity of the media, it skips the oversized image.*
- NOTE:** *EZBackup 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 again. To avoid 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.*

Perform EZBackup

Basically, when you perform the EZBackup procedure, you connect the USB HDD, if applicable; the system backs up the images (or reports) and creates a reference between the patient database and the media's volume.

NOTE: EZBackup 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.

NOTE: BEFORE starting the EZBackup, select "Unlock All" in Utility --> Admin --> Logon.

2. Specify the EZBackup setup on the Utility --> System --> Backup/Restore page.
3. To start the EZBackup procedure, go to the Patient menu and select EZBackup. The EZBackup Wizard starts.

NOTE: If you use the USB HDD, some wizards and the pop-up messages DO NOT appear.

4. Verify the information on the first page of the EZBackup 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: If you update an exam which is already backed up, the exam is also backed up.

Perform EZBackup (continued)

5. Verify the information on the EZBackup 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*.

Free Space/Total Size: tells you the size of the data you have selected to store/and the total size of the USB Hard Drive storage media. If the storage capacity of the USB HD is insufficient, you will see the message, "Selected Location does not have enough free space."

NOTE: *This message appears if you press Next without inserting the backup media: "Please insert a blank media...". Insert the media and continue.*

6. A pop-up message appears that provides you with the media label. Label the media, then insert the media. Press *OK*.
 - 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 LOGIQ Fortis system where this backup procedure was done.
 - b. Update the EZBackup log with this information the volume information and the location of the media.
 - c. After the backup has been completed, file the media.

Table 9-4: Typical EZBackup Log

| Date | Scanner ID Name | Backup Images Y/N | Reminder Dialog Interval Days | Media Label (and Scanner ID) |
|------|-----------------|-------------------|-------------------------------|------------------------------|
| | | | | |

7. The status menu appears. When the backup has been completed, press *Next*.

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.*

Perform EZBackup (continued)

8. When the backup is complete, the completed wizard page appears. Press *Finish*.
9. Do a patient archive after each EZBackup.

We recommend attaching the patient list to the EZBackup media. Insert the media and select DICOM CD Read from the Patient Screen 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 EZBacked Up Images

You can review backed up media via the Patient Menu, Import, and the DICOM Read dataflow.

If you review an EZBacked Up image,

1. Select the patient on the Patient Menu (on the same system where the backup 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.*

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) See 'Query/Retrieve' on *page 13-268 for more information.*

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

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: *If you try exporting a previously backed-up exam, the message "Can't Find Source file" displays. The image data has already been removed from the hard disk drive with EZBackup.*

NOTE: *It is STRONGLY recommended 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 **Patient** 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.
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.

Exporting Data (continued)

8. Press **F3** to eject the media. Specify that you want to finalize the media.

After performing an Export, the system reflects that this operation was successfully completed; however, it is ALWAYS a good idea to verify that there was no corruption to the backup/export media during this process.

To verify that the data was successfully transferred to the media, Press **F3**, then select "Finalize" --> "Yes and Verify Files." If there was any 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: 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 **Patient** 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 images.

NOTE: You can retrieve from the media to the local drive, playback, or process exam information on the system as Raw Data.

DICOM Import

You can import the graphics which has DICOM DIR from CD/DVD/USB.



If the following message displays, there is a possibility that Import may not work properly (“Data detected is not LOGIQ Fortis. Measurements and RawData will not 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.

NOTE: You need to select the patient prior to sending images to a PACS.

1. Press **Patient** 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 Refresh 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.



WARNING

DO NOT transfer more than 50 patients at one time.



WARNING

DO NOT use lossy compression images, such as JPG or MPEG images, for diagnosis. Failure to follow these instructions could lead to repeated exam(s).



WARNING

MPEGvue function is NOT compatible with other LOGIQ series products. Do NOT share the same USB Drive for MPEGvue between LOGIQ Fortis and other LOGIQ series products. Failure to follow these instructions could lead to repeated exam(s).

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 or the USB drive.
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.*

MPEGvue (continued)

4. Select the media from the Transfer To pull-down menu.

NOTE: *Select Removable CD Archive if you use CD-R or DVD-R.*

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. The progress bar displays during the transfer.

Displays the check mark in the Copi... field of the completed patient.

When the message "Not enough free space" displays during MPEGvue,

- CD-R/DVD-R: Please insert new media.
- USB HDD/USB Flash Drive: Backup the current data in the USB device to the other media to make space on the USB device.

If the following dialogue and message displays ("Failed to complete MPEGVue") during MPEGvue, reduce the number of exams to gain space, and perform MPEGvue once again to new media (CD-R/DVD-R) or USB device.

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 LOGIQ Fortis.*

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)

If you save a Cine Loop by MPEGvue, there is a limitation for the length of time (or the number of frames) that can be saved as below.

- Standard B-Mode: About 30 seconds (up to 1000 frames).
- B + Color: About 20 seconds (up to 1000 frames).

Please check the number of seconds or frames on the Cine Gauge before MPEGvue.



1. Current displayed frame No.
2. Total number of frames
3. Current frame time (sec)
4. Total number of seconds

On your PC

An MPEG exam can be read from a PC. Do the following to install the MPEGVue Player Software App onto your PC.

1. Ensure that you are set up to be an Administrator on the PC.
2. Insert the Media, open up an Explorer window, and navigate to the MPEGVuePlayerAutorun application executable. Double click on it.
3. The MPEGVue Player 64-bit Setup wizard opens. Press Next.
4. Accept the suggested Destination Folder by pressing Next.
5. Press Install to start the installation.
6. Wait while MPEGVue is being installed.
7. After the MPEGVue installation has completed, press Finish.
8. From the Windows' main screen, select and double click on the MPEGVue application.
9. Double click on the patient's exam. Detailed instructions for using MPEGVue can be found in the Using MPEGVue section.

MPEGvue (continued)

You can see the exam data on the Windows PC by using MPEGvue.

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 CD 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 9-8. Patient list

- a. Open: Open anywhere on the PC.
 - b. View Exam: Open the selected exam (or double click on the patient name)
 - c. Open folder: Open a folder of the inserted media which contains images (e.g.:
G:\ESTORE\31_1_2013_20_2_22_917\Images)
2. Select the desired examination date to display the images. The MPEGVue screen is displayed.

MPEGvue (continued)

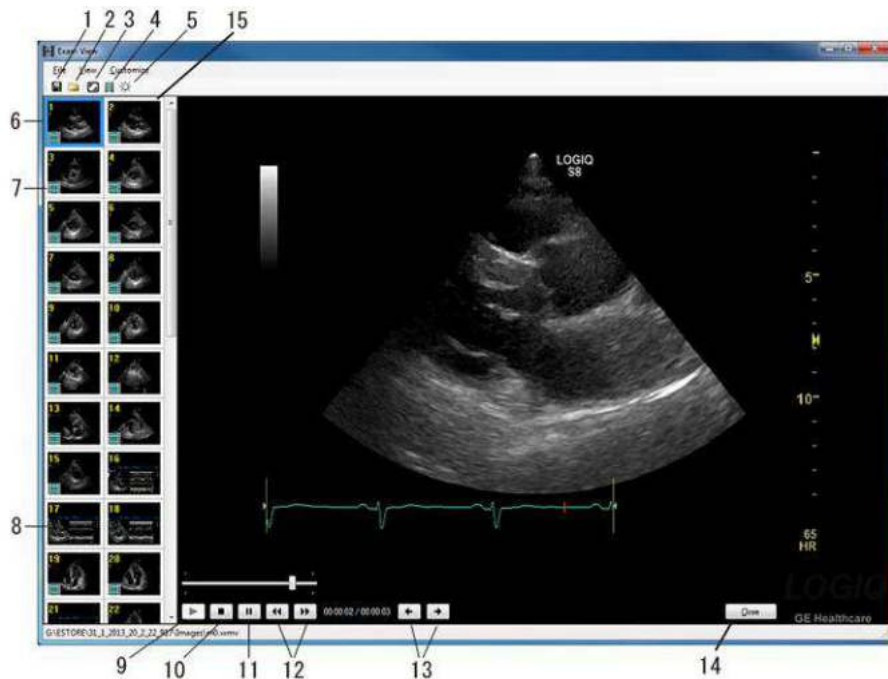


Figure 9-9. MPEGvue screen on the Windows PC

- | | |
|--|--|
| 1. Save image as .wmv, .bmp, jpeg, or .WMV | 9. Play |
| 2. Open folder | 10. Stop |
| 3. Display full screen | 11. Pause |
| 4. Slide Show | 12. Stop forward/backward |
| 5. Brightness/Contrast/Gain | 13. Display previous/next image |
| 6. Selected image | 14. Close |
| 7. Cineloop | 15. Clipboard: select the image to display |
| 8. Single frame image | |

MPEGvue (continued)

Slide show

You can change the time interval of Slide show in Customize -> Options.



Figure 9-10. Slide show setting

External drives

Intended Use

Removable media can be used for the following purposes:

- Backup of patient database and system configuration presets (see 'System Backup and Restore Preset Menu' on page 10-20)
- 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 9-37).
- Copy of system configuration presets between to units using the Backup/Restore feature (see 'Preset Synchronization Using Media' on page 10-155).
- SaveAs: Save images as JPEG, WMV, DICOM and RawDICOM for review on a standard Windows computer.
- Privacy and Security Encryption. See Chapter 12 for more information.

Supported removable media

The following removable media are supported:

- USB Flash Drive
- USB external hard disk drive
- CD-R / DVD

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

You can use these media 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)

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.

Inserting media

Insert the 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.

Ejecting media

1. To eject the 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



WARNING

Before removing the USB drive from the USB port, press Eject (F3) and select USB Drive from the pull-down menu. Disconnect the USB drive after the success dialogue is displayed. If the unsuccessful dialogue is displayed, retry after a while. Failure to follow these instructions could result in loss of patient data.



WARNING

If a problem occurs while exporting to the USB-HDD, such as a crash, the export may not have completed. Try again with a smaller number of patients.



WARNING

DO NOT use “Select All” when you export the patient data to the USB-HDD.

NOTE: Connect USB Flash Drives and Hard Disk Drives to the USB ports located on the Touch Panel (USB 3.0). Connect peripheral devices to the USB ports located at the rear of the system. (USB3.0).

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



CAUTION

Non-supported peripheral devices that use their own AC power source **CANNOT** be attached to the LOGIQ Fortis. **DO NOT** connect the peripheral device's power cord into the LOGIQ Fortis system. Only peripheral devices purchased from GE with the purpose of being used with the LOGIQ Fortis system should be used.

Use a USB printer cable that is less than 3 meters in length.

Failure to follow these instructions could lead to unexpected diagnostic performance.

System USB Ports

Side of Monitor

The two Monitor USB 2.0 Ports **SHOULD ONLY BE USED** for Bus-powered USB Hard Disk Drives and USB Flash Drives. The following configurations can be used:

- One or two USB Flash Drives
- One Flash Drive and One Bus-powered Hard Disk Drive
- One Bus-powered Hard Disk Drive



CAUTION

DO NOT plug in **TWO** Bus-powered Hard Disk Drives at the same time.

Operator Panel and Rear of System

The two USB 3.0 ports on the Touch Panel and at the back of the system SHOULD ONLY BE USED for the following devices:

- Color or Report Printer

NOTE: When connecting an external printer to the LOGIQ Fortis via the USB port on the back of the system, you MUST ensure that the power supplied to the printer is fed from the same power feed as the LOGIQ Fortis. This assures compliance to leakage currents.

- Footswitch
- PC Printer with isolation USB
- USB Storage (USB-HDD and USB Flash Device)

Ejecting a USB Flash Drive/USB HDD

1. To eject a removable media, always press **F3**.
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 USB port.
2. On the Patient 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. Failure to follow instructions could result in loss of patient data.

SaveAs

NOTE: See 'Save As' on page 9-19 for more information.

To save images to the USB Flash Drive or USB HDD,

1. Insert the USB Drive into the 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, 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)\xxxx(PatientID)”.

Direct SaveAs

You can save the image directly to the USB Drive just by pressing a **Print** key.

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 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 -> Backup/Restore -> EZBackup -> Media.
2. Follow instructions for EZBackup. See ‘EZBackup’ on page 9-25 for more information.
3. When EZBackup has completed, press **F3**.

USB Quick Save

USB Quick Save easily sends images to a USB flash drive storage.

The images are stored either in .jpg or .WMV format.

USB Quick Save Setup

In Utility -> Connectivity -> Service, select USB Quick Save.

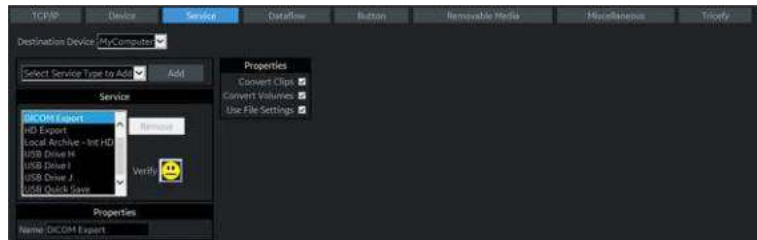


Figure 9-11. Service USB Quick Save

Assigning USB Quick Save to Print Keys

The USB Quick Save service can also be assigned to the Print keys via the Utility -> Connectivity -> Button preset menu. See 'Button' on page 10-85 for more information.

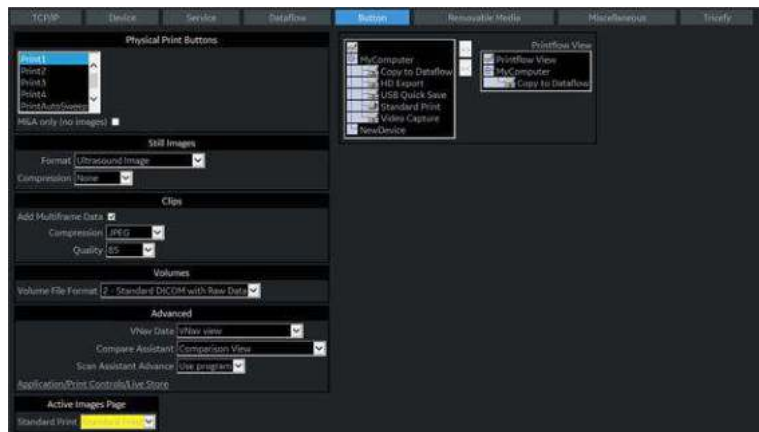


Figure 9-12. Assigning USB Quick Save to Print Keys

Printing Options

Setting up Digital Peripherals

Set up digital peripherals from the Utility --> System --> Peripherals menu.

The following printers can be connected to the power outlet supplied by the system.

- BW Printer: UP-D898DC

For the UP-DR80MD and UP-D25MD, insert the USB cable into the USB port of the rear panel and plug it into a wall socket.

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 (specific instructions are provided for each printer following this section).



- Before powering on the LOGIQ Fortis, connect the printer via the USB cable and turn the printer power on.
- DO NOT remove the cable while the LOGIQ Fortis is powered on.

Follow this procedure for each printer:

1. Select Utility--> Connectivity--> Service. Add the Standard Print service. Select the printer from the Printer pull-down Properties menu. For the UP-D898DC 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...) from the Physical Print Buttons section. Select the printer from the MyComputer column and press >> to move it to the Printflow View column. Press Save.

Sony UP-D25MD Instructions

Follow these steps to set up the paper size of Sony UP-D25MD printer.

1. Press Utility-->System-->Peripherals. Select the UP-D25MD from the pull-down menu under Standard Printer Properties. Click **Properties**.



Figure 9-13. Standard Printer Properties

2. Select Properties.

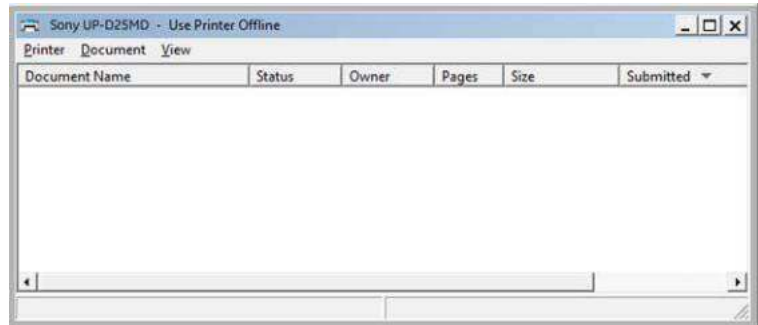


Figure 9-14. Properties

3. Select Printing Preferences. Select Paper Size. Press **Apply**. Press **OK**. Press **Save**, then **Exit**.



Figure 9-15. Printing Preferences

Notes for Sony UP-DR80MD



CAUTION

- Before powering on the LOGIQ Fortis, connect the UP-DR80MD and turn the printer power on.
There is no warning to let you know that the printer is not functioning. Check the printer.
- DO NOT remove the cable while the LOGIQ Fortis is powered on.
- DO NOT plug in a DR80MD while the LOGIQ Fortis is turned on.

UP-D898DC Printer Settings

Preferred printer settings for the UP-D898DC are shown below; and instructions follow.

Table 9-5: Recommended Settings

| Recommendations | Use These Settings |
|--------------------------|--|
| Recommended Setting | <ul style="list-style-type: none"> • Paper Size: 1920x1280 • Windows Orientation: Landscape • Utility--> Connectivity--> Service--> Standard Print--> Orientation: Landscape |
| Avoid using WIDE Setting | Utility--> System--> System Display--> Use the settings below: <ul style="list-style-type: none"> • Utility--> System--> System Display--> Image Display--> Image Display Area: Default or Large • Utility--> System--> System Display--> Use Wide Screen For... -- turn OFF all parameters |
| Use Large Print Setting | <ul style="list-style-type: none"> • Paper Size: 1920x1280 • Windows Orientation: Landscape • Utility--> Connectivity--> Service--> Standard Print--> Orientation: Portrait |

Setting up the UP-D898DC Printer Settings

1. Select Portrait for Orientation in Utility -> Connectivity -> Service--> Standard Print and press Save.
2. Select Utility ->System ->Peripherals.
3. Select the printer to adjust (UP-D898DC) from the pull-down menu under Standard Printer Properties. Click Properties.
4. Select Properties from the Printer pull-down menu.
5. Click Printing Preferences at the bottom of Properties Window.
6. Select the Layout tab and select:
 - Paper: 1920x1280
 - Orientation: Landscape
 - Interpolation Method: Bilinear
7. Select the Density Adjust tab and select:
 - Gamma: TONE2
 - Sharpness = 0; Dark = 0; Light = 0; Sharpness = 2
8. To save the adjusted printer settings, click Apply and then OK.
9. Close the 'Printers' window with the close button.
10. Exit System Setup with Save&Exit.
11. Assign the Printer to the remote keys.

Network Printer

A network printer can be added to the system.

NOTE: *It is solely the customer's responsibility to determine printer and network settings and configuration to enable and ensure the specific network printer usage and functionality.*

Add Network Printer

To add a network printer, the user must be logged on to the system as an administrator.

1. On the Utility ->System ->Peripherals page, Under "Network Printer," select **Add Network Printer**.

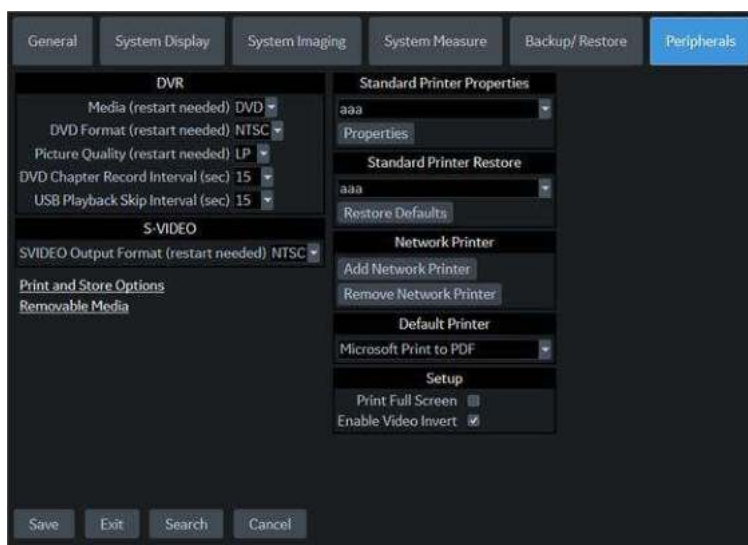


Figure 9-16. Network Printer

The "Add Printer" Dialog Box appears.

Add Network Printer (continued)

2. In the Add Printer dialog box, enter a Printer Name, the IP Address of the desired printer, and select the Printer Driver. Select “Add Printer.”

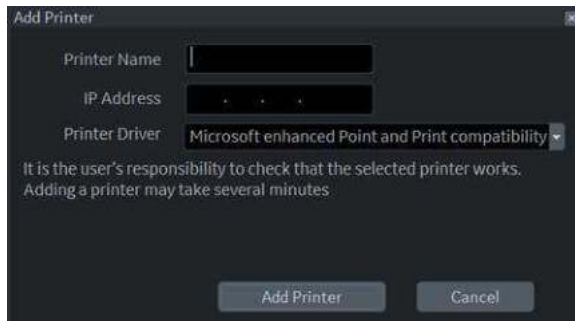


Figure 9-17. Add Printer

Adding a printer may take several minutes. A dialog box confirming installation displays when the printer has installed. Select “OK.”

NOTE:

Printer installation does not guarantee the printer will function correctly. The printer may install even if the IP address is incorrect or inaccessible.

3. After installing the printer, go to Utility -> Connectivity to add a Standard Print Service and a Print Button (see ‘Digital Printer Setup’ on page 9-54).

Print a test exam image or report and verify the full image or all information has printed. Verify the resolution, aspect ratio, clarity and color accuracy of the prints.

Remove Network Printer

To remove a network printer, the user must be logged on to the system as a Network Administrator.

1. On the Utility ->System ->Peripherals page, Under “Network Printer,” select **Remove Network Printer** (Figure 9-16 on page 9-58).
2. Select the printer to remove from the drop-down list and select “Remove Printer.”

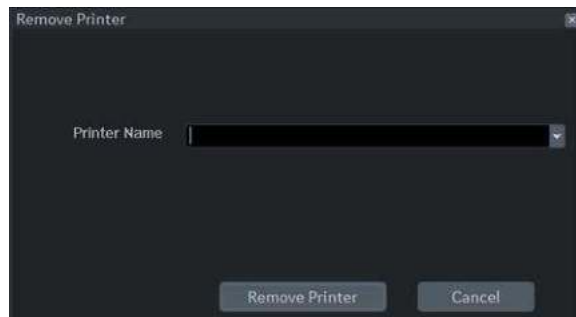


Figure 9-18. Remove Printer

A dialog box confirming printer removal displays when the printer has been uninstalled. Select “OK.”

External Paper Printer

You can connect an external paper printer via the USB connection.



ONLY plug in devices to the USB ports located at the rear of the system WHILE the LOGIQ Fortis is NOT powered up. If you plug in a device while the LOGIQ Fortis is powered on, your system may become unusable.



DO NOT place an external paper printer inside the patient environment. This assures compliance to leakage current.

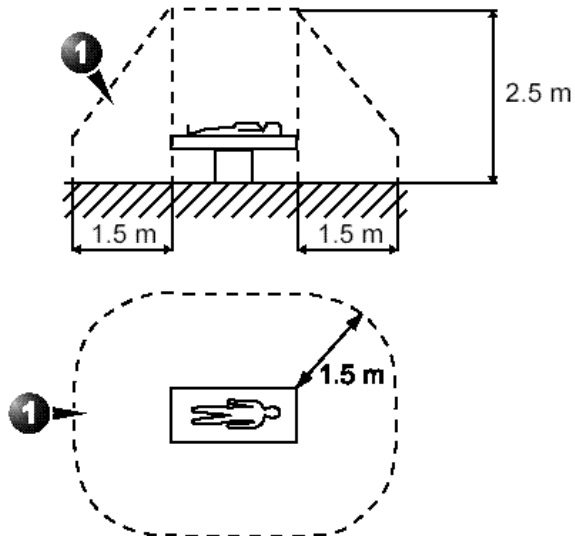


Figure 9-19. Patient Environment

External Paper Printer Setup

NOTE: The printer driver is customized for the LOGIQ Fortis 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 9-20. 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, Columns, Orientation, and Right Margin.
 - 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.

External Paper Printer Setup (continued)

6. Press Save, then select the Button tab.
7. Select the appropriate print key (Print1, Print2...) from the Physical Print Buttons section.
8. Select the printer from the MyComputer column and press ">>" to move it to the Printflow View column.

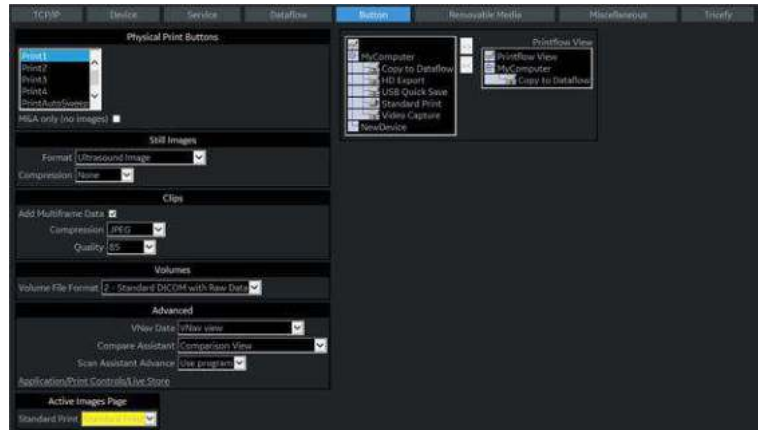


Figure 9-21. Connectivity -> Button Screen

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: *Adjust the rows, columns, and margins as necessary to obtain the image size and quality that you find acceptable.*

Setting up the Printer to Print Reports and Patient List Print

To set up the external printer to print reports and Patient List Print,

1. Press **Utility**--> **System**--> **Peripherals** and select **Printers** under Setup.
2. Select the printer from Default Printer pull-down menu.

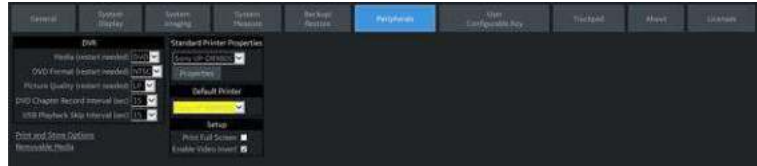


Figure 9-22. Report Printer Setup

3. Press **Save**.
4. Press Print on the Report screen to print the report.

Portable Exam

Perform a Portable Exam (Using the Worklist)

To perform a portable exam (using the worklist),

1. Go to the worklist and get the patient(s) you will need for this portable exam(s).
2. Ensure that images will be saved to the local hard drive.
3. Press the Power On/Off switch.
4. Proceed to perform the exam(s). Press Power On/Off. Select the patient, do the exam. Store images. Images are held in the spooler.
5. If there are additional patients to scan, repeat steps 4 and 5. After you have completed all portable exams, press Power On/Off.
6. When you have returned from performing the portable exam(s), reconnect to the network. Press Power On/Off.
7. Press F4. Send all of the images in the spooler to the printer/storage device.

Chapter 10

Customizing Your System

Describes how to create system, user, and exam presets.

Overview

Preset Menus provide the following functionality:

Utility, Page 1 Configuration Menus

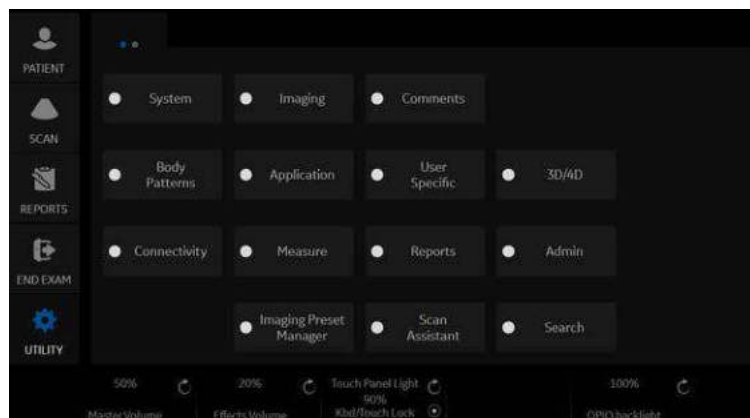


Figure 10-1. Utility Menu, Page 1

- **System presets.** View and update general system configuration settings, measurement and analysis settings, and video settings; backup and restore data and configuration files.
- **Imaging presets.** View and update exam and imaging parameters.
- **Comment library presets.** Set up comment libraries by application.
- **Body Pattern library presets.** Set up body pattern libraries by application.
- **Application and User Defined presets.** Configure application- and user-specific settings.

Overview (continued)

Utility, Page 1 Configuration Menus (continued)

- **User Specific.** Configure My Desktop.
- **3D/4D.** Real-time 4D and Static 3D scanning.
- **Connectivity Setup.** Define connection and communication setup, DICOM, Wireless Networking, Tricefy, and includes exam dataflow information.
- **Measurement and Analysis presets.** Customize exam studies, create measurements, set up manual sequencing, and create OB Tables. Refer to the “General Measurement and Calculations” chapter for more information.
- **Reports Presets.** Allows you to edit the report template, diagnosis codes, and report comments. Refer to the Advanced Features chapter for more information.
- **Administration presets.** Perform system administrator activities such as setting up user IDs and logon formats.
- **Image Preset Manager.** Activates the Image Preset Manager to create, edit, import, and export user imaging presets.
- **Scan Assistant.** Create, import/export, and manage Scan Assistant programs.
- **Search.** You can search for a parameter on the Utility pages (Measure, Reports, and Service pages cannot be searched.)

Overview (continued)

Utility, Page 2 Configuration Menus

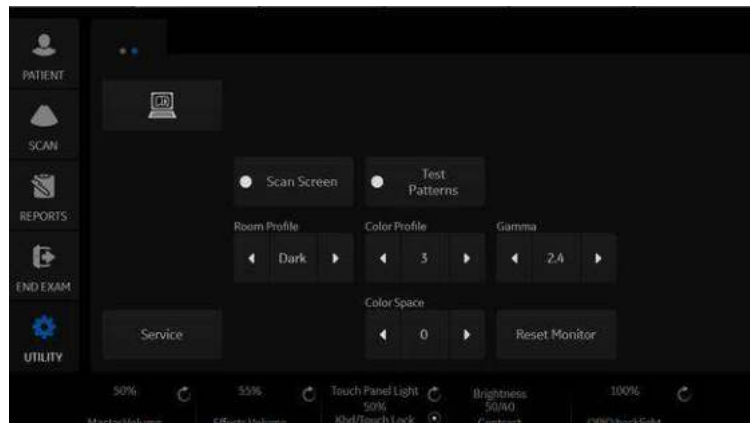


Figure 10-2. Utility Menu, Page 2

- **Electronic Instructions for Use (eIFU) Icon.** Activates the Online User Manual.
- **Scan Screen.** Activate the Scan Screen so that you can adjust the monitor's brightness/contrast via the **Room Profile** control and adjust the monitor's RGB level/color temperature/gamma via the **Color Profile** control.
 - **Room Profile.** Change Brightness and Contrast of main display when set to **User Defined**.
 - **Color Profile.** Control RGB level, color temperature, gamma, etc.
 - **Gamma.** Set the Gamma at 2.2 or 2.4.
 - **Color Space (OLED only).** Select ITU 709 Standard for High Definition TV, Native 1 for most vivid OLED colors, or Native 2 for a setting between ITU 709 and Native 1.
 - **Reset Monitor.** Resets the monitor to system default settings.
- **Test Patterns.** Test the Monitor screen's performance.
- **Service.** Activate the Service Browser.

To access these functions, select the **Utility** tab on the Touch Panel, then select the appropriate Touch Panel key.

Overview (continued)

In addition, you can adjust the following via the rotaries located beneath the Touch Panel.

- **Master Volume.** Select to adjust the system volume, e.g., Doppler volume.
- **Effects Volume.** Select to adjust the system notifications, e.g., Touch Panel pushes, Print sounds, etc.
- **Touch Panel Light.** Select to adjust the brightness of the Touch Panel.
- **Kbd/Touch Lock.** Select to lock the Keyboard and Touch Panel controls in order to clean the system.
- **Brightness/Contrast.** Select to adjust the monitor brightness/contrast.
 - User-adjustable when **Room Profile** is set to “**User Defined.**”
- **OPIO backlight.** Controls the level of brightness of the orange and green backlights on the hard keys.

System Presets

Overview

System presets allows you to view or change the following parameters

- **General** – Location, Date/Time, Patient Info, Key Usage, and Utility configuration
- **System Display** - Presets related to the monitor display format.
- **System Imaging** – CINE Loop Store, Cardiac, Biopsy Guides, and Image Control and Display configuration
- **System Measure** – Measurement, Cursor, and Results Window configuration
- **Backup/Restore** – Backup, Media, EZBackup, Detailed Restore of User Defined
- **Peripherals** – DVR, Print and Store Options, and Setup configuration
- **User Configurable Key** -- BT (Breakthrough) Key, Keyboard Key
- **About** – Release information and part numbers for: Application Software (including version), Online Help, Service Platform, Security Package, Base Image and Base Image Update.
- **Licenses** – Licenses for software used on the LOGIQ Fortis.

Changing system parameters

To change system parameters:

1. On the Touch Panel, select **Utility**.
2. On the Touch Panel, 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.

Table 10-1: Location

| Preset Parameter | Description |
|-----------------------------------|---|
| Hospital | Type the institution's name. |
| Department | Type the institution's department name. |
| Machine Description (1&2) | Type the machine name. |
| Preset Region (restart needed) | Select region (None, Americas, Asia, Europe or Japan). |
| Language (restart needed) | Select the appropriate language from the drop-down list. Note: If you select Japanese (JPN), only the warning and status messages are displayed in Japanese. You can not type in Japanese. |
| Online Help Language | Select the language you would prefer to use to read the online user manual. |
| Units | Select metric or US units of measurement. |
| Regional Options (restart needed) | Select to set up the keyboard. |

Table 10-2: Date/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 (restart needed) | 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 10-3: General User Interface

| Preset Parameter | Description |
|------------------------------|--|
| Color Level (restart needed) | Select the darkness of the utility pages and any message windows: Brightest, Bright, Standard (Dark Text), Standard (Light Text), Dark, Darkest. |

Table 10-4: Title Bar

| Preset Parameter | Description |
|----------------------------|---|
| Hide Patient Data | <ul style="list-style-type: none"> • <i>Always</i> - Patient information is removed from the scanning screen Title bar (and while storing images). • <i>On Store</i> - Patient information is removed only when storing the image. • <i>Never</i> - Patient information is always displayed. <p>NOTE: Upon recall of images with measurements, Dual image and/or V Nav, the DICOM image is recalled. In this case, there is no patient data burned into the DICOM image. If you want the data to appear on the image, set to Never.</p> |
| Hide DateTime | <ul style="list-style-type: none"> • <i>Always</i> - Date and time is removed from the scanning screen Title bar (and while storing images). • <i>On Store</i> - Date and time is removed only when storing the image. • <i>Never</i> - Date and time is always displayed. <p>NOTE: Upon recall of images with measurements, Dual image and/or V Nav, the DICOM image is recalled. In this case, the date and time are not burned into the DICOM image. If you want the date and time to appear on the image, set to <i>Never</i>.</p> |
| Font Size (restart needed) | Select to display patient information in the title bar using a small or large font size. You need to reboot the system for this change to take effect. |

Table 10-5: Worksheet

| Preset Parameter | Description |
|---|--|
| Use Bold Worksheet Fonts (Restart Needed) | Select to bold fonts in Worksheets. The setting will take effect when the system is restarted. |

Table 10-6: Trackball

| Preset Parameter | Description |
|------------------|--|
| Speed | Set how fast you want the Trackball to move while performing actions such as tracing the anatomy. Speed is used for Menu and Scan Mode. 0=Slow; 20=Very Fast |
| Acceleration | Set how fast you want to Trackball to move across the display. Acceleration is used for Menu and Scan Mode. 0, 1, and 2 with 0 being the slowest acceleration. |

Table 10-7: Key Usage

| Preset Parameter | Description |
|--------------------|---|
| Run Fast Key speed | Select the maximum value of the key interval when running Fast Key. |

Table 10-8: 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 10-8: Utility (Continued)

| Preset Parameter | Description |
|-------------------|--|
| Utility Font Size | Select the font size you want to use to view the Utility menus: Small, Medium, or Large. |

Table 10-9: Scan Assistant

| Preset Parameter | Description |
|---------------------------|--|
| Always Use Doppler Cursor | Use the Doppler Cursor when you activate Scan Assistant. |

Table 10-10: Start Assistant

| Preset Parameter | Description |
|---------------------|---|
| Use Start Assistant | <ul style="list-style-type: none"> • <i>On: Use Exam Description (default)</i> - Saves exam mapping automatically from worklist • <i>On: Use Scan Assistant only</i> - Exam description is ignored and selection of probe and preset is based on Scan Assistant protocol only. Exam Category and Scan Assistant program are not automatically selected. Start Assistant Editor does not show the Exam description column. Manual entry of an Exam Description for table entry is prevented. • <i>Off</i> |
| Create/Edit | Select to open Start Assistant Mapping Editor. |

Table 10-11: V Nav

| Preset Parameter | Description |
|---|---|
| Max.non US images per exam on Image History | Specify the number of non-Ultrasound images per exam to appear on the Image History page. |

Table 10-12: Touch TGC

| Preset Parameter | Description |
|---------------------------------------|--------------------------------|
| Delay Time for Auto Hide (sec) | Off, 3, 6, 8, 12, 16 |
| Custom Settings | Select Application or Category |
| Include TGC Curve when Saving Presets | Check to select. |

Table 10-13: Miscellaneous

| Preset Parameter | Description |
|-------------------------------|--|
| Reset Control Panel Park Lock | Press to reset operator panel park lock. |

Table 10-14: Touch Keyboard

| Preset Parameter | Description |
|---|---|
| Auto Popup Keyboard on Patient Screen | Display Touch Keyboard automatically when Patient screen is selected. |
| Auto Hide Delay Time for Touch Keyboard (sec) | Off, 6, 8, 12, 16, 20, 24, 30 |
| Display Keyboard with Comment Button | Display Touch Keyboard automatically when Comment mode is activated. |

System/System Display Preset Menu

The System/System Display screen allows you to specify parameters for the Monitor Display.

Table 10-15: Image Display

| Preset Parameter | Description |
|---------------------------------------|---|
| Image Display Area | Select Image Display Area Size: Default, Large, Extra Large |
| Image size (probe selection required) | Select Default or Large. |
| Magnification Zoom Available | Select to enable Magnification Zoom on images (enabled by default). |

Table 10-16: Side Panel Content

| Preset Parameter | Description |
|---------------------|-----------------|
| Side Clipboard | Display On/Off. |
| My Desktop | |
| Measurement Summary | |

Table 10-17: Clipboard

| Preset Parameter | Description |
|-------------------------------|--|
| Preview Image | Display On/Off |
| Show Zoom Reference Image | |
| Bottom Clipboard | Display On (Always display)/ Off (Never display)/ Auto (Display whenever there is no side clipboard) |
| Bottom Clipboard Auto Dimming | On/Off/Auto When the windows pointer is moved over the clipboard area, the pointer is undimmed. |
| Side Clipboard Auto Dimming | |

Table 10-18: Use Wide Screen for...

| 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. |
| LOGIQView | Automatically switch to Wide Screen when in LOGIQView. |

Table 10-18: Use Wide Screen for... (Continued)

| Preset Parameter | Description |
|------------------------------------|---|
| Volume Nav | Automatically switch to Wide Screen when in Volume Navigation. |
| QAnalysis | Automatically switch to Wide Screen when in QAnalysis. Side by Side Timeline automatically switches to wide screen when in Timeline mode. |
| Display Format Horizontal Timeline | Side by Side Timeline automatically switches to wide screen when in Timeline mode. |
| Single Image | On/Off/Auto Auto turns on wide screen if 2D image exceeds width of non wide screen image area. |

Table 10-19: 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 centimeters per second to meters per second. |
| Shear Elasto Display Units | Select m/s or kPa. |
| Shear Stiffness and Velocity Measurement | Specify whether to display Shear Wave Stiffness and Velocity measurements. |
| Shear Elasto Color Map | Select Red as Hard or Blue as Hard. |
| Strain Elasto Color Map | Select Red as Hard or Blue as Hard. |
| UGAP Display Units | Select dB/cm/Mhz or dB/m |
| Attenuation Coefficient and Rate Measurement | Select to display Attenuation Coefficient and Rate Measurement |
| Image Parameter Size (restart needed) | Choose Small, Medium, Large, or Extra Large. Must reboot the system. |
| Highlight Image Parameter Changes | Select if you want the display to indicate which controls you adjusted by highlighting the new value on the display. |
| Use Thicker V Nav Graphics | Select to display thicker V Nav graphics |
| Overlay Color (single visible dataset) | Select Red, Green, Blue or BW (Black/White). |
| PET Color in V Nav (if grayscale-only dataset) | Select Hot Body, Hot Metal, Warm Metal, BW (Black/White). |
| Hide Multiple Dataset Menu When Storing | Select to hide the Multiple Dataset Menu when storing. |
| Live/Freeze Indicator | Display On/Off. |

Table 10-19: Display (Continued)

| Preset Parameter | Description |
|--|---|
| Enable DICOM grayscale display mode (GSDF) | Enable On/Off. Adjust Gamma curve on DICOM GSDF. <i>Note: With GSDF disabled, the monitor still uses a gamma curve that may be selected on the Touch Panel (for backwards compatibility with sites that are happy with their PACS or may have a mix of older systems). With GSDF enabled, the gamma button on the touch panel affects the image, emulating the appearance of that gamma, but does not affect the monitor.</i> |
| Room Profile | Dark, Semi Dark, Light, User Defined, Last Used |

System/System Imaging Preset Menu

The System/System Imaging screen allows you to specify parameters for key usage and image control and display.

Table 10-20: 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. |
| Show Biopsy Mark on Dual View Mode | Displays the Biopsy Guideline on the image while in Dual View Mode. |
| Show Biopsy Circle | Specify whether to display the Biopsy Circle with the Biopsy guideline. |

Table 10-21: Compare Assistant

| Preset Parameter | Description |
|-----------------------|--|
| Comparison Image Side | Select Left or Right. |
| Comparison Image Date | Select All Dates, Different Date or None. |
| Copying Settings | Select Automatic: Imaging and Annotations, Automatic: Imaging Only, Automatic: Annotations Only, Manual: Imaging and Annotations, Manual: Imaging Only, Manual: Annotations Only or Off. |

For details on the Compare Assistant presets, see 'Setting Up Compare Assistant' on *page 13-382*.

Table 10-22: Image Label Layout

| Preset Parameter | Description |
|------------------|--|
| Clipboard | Select 1-Line Label, 2-Line Label or No Label. |
| Active Images | Select 1-Line Label, 2-Line Label or No Label. |
| Image History | Select 1-Line Label, 2-Line Label or No Label. |

Table 10-23: Image Label Color

| Preset Parameter | Description |
|------------------|--|
| Clipboard | Select the color of the Clipboard Image Label. |
| Active Images | Select the color of the Active Image Label. |
| Image History | Select the color of the Image History Image Label. |

Table 10-24: Controls

| Preset Parameter | Description |
|---|--|
| Auto Invert on Linear Steer | When selected, automatically inverts the color scale or spectral timeline when the Steer function is used. |
| 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. |
| Pushing Depth Rotary Performs Image Reverse | When selected, you can reverse the image when you push down on the Depth rotary. |
| Toggling Zoom Rotary Performs Depth | When selected, you can adjust the Depth by moving the toggle up and down. |
| Audio Volume | Adjusts the Doppler audio volume via a drop-down menu (for example, 0=softer; 20=louder). |
| Auto Freeze Time (probe selection required) | Automatically freezes the system after 10, 30 minutes, 1 hour of inactivity, or never. |
| Countdown Time For Contrast (sec) | Specify time for the Contrast Clock to countdown during a contrast study, 0 (off), 3, and 5 seconds. |
| Reverse Depth Control | Changes key direction for the Depth control. |
| Reverse Steer Controls | Changes key direction for the Steer controls. |
| Turn Off CrossXBeam for LOGIQView (non-linear probes) | Deactivates CrossXBeam when you activate LOGIQView. |
| 3D Postprocessing when reloading | When selected, the system re-processes the recalled 3D CINE Loop. |
| Tru 3D/Easy 3D Resolution | Set Easy 3D/Tru 3D Resolution: Default, High, or Very High. |
| Doppler Scroll Priority | Set to 2D, Doppler, or Last Live Mode. |
| Start Doppler in Update | Select to allow the B/CF image to continue live while the PW image is frozen in triplex. |
| Assign PW Sample Volume control to rotary | Select to assign PW Sample Volume control to rotary. |
| CF Knob Changes Shear Gain | Enables Shear Wave Elastography gain control via the CF knob on the console. Check box to enable Shear gain control with CF knob (Off by default). |
| Default Rotation when changing mode | Sets the default rotation when changing mode. |
| Default MyPreset | Check the box to start MyPreset. Uncheck the box to start ConventionalExam tab (Default). |

Table 10-25: V Nav 3D Marker

| Preset Parameter | Description |
|-------------------|---|
| Inner Alpha | 0-100 |
| Margin Alpha | 0-100 |
| Color | Yellow, Orange, Red, Blue, Purple, Pink, or White |
| Margin Color | Yellow, Orange, Red, Blue, Purple, Pink, or White |
| Diameter (mm) | 1-100 |
| Margin Dist. (mm) | 0-15 in 0.5 mm increments |
| Short Axis | 1-100 |
| Long Axis | 1-100 |
| Reposition | Check to reposition. |

Table 10-26: EZ Settings

| Preset Parameter | Description |
|---------------------|---|
| EZ Touch Panel Page | Check to enable EZ Touch Panel on first page of B and flow mode tabs. Uncheck disable EZ Touch Panel (default). |
| MyPreset Shortcuts | Select "By Probe (Default)" or "By Category". |
| B mode button | No function, Colorize, SRI HD, Reverse |
| Color mode button | No function, Map, Radiant Flow, Biopsy Guideline. |
| PDI mode button | No function, Map, Radiant Flow, Biopsy Guideline. |
| BFlow mode button | No function, Visualization, Background |
| MVI mode button | No function, Map, Radiant Flow, Biopsy Guideline. |
| PW mode button | No function, Simultaneous, Colorize, Wall Filter, Modify Auto Calcs, Trace Sensitivity, Quick Angle |
| CW mode button | No function, Simultaneous, Modify Auto Calcs, Trace Sensitivity, Trace Method, Map |

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.

Table 10-27: Measurement

| Preset Parameter | Description |
|-----------------------------------|---|
| Repeat Measurement | Select Repeat, No, DefaultMeasure Repeat = After you take a measurement, the system automatically starts the same measurement again. No = After you take a measurement, you have to touch a Touch Panel key or Trackball key to start another measurement. DefaultMeasure = After you take a measurement, the system automatically starts a default measurement based on the current scanning mode (B-Mode = basic length measurement, M-Mode = basic length measurement, Doppler Mode = velocity measurement except after a volume flow calculation). |
| 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): Hadlock, Williams, Brenner, Kramer (f), Kramer (m), WHO. |
| 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), Hadlock, Hansmann, Merz, Rich/Berk, Shep/Wars |
| EFW Formula (Tokyo) | Select the source used to calculate EFW (Tokyo) (Estimated Fetal Weight): Tokyo, Tokyo S-1, Tokyo S-2, Tokyo S-3. |
| 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. <i>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.</i> |
| 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". |

Table 10-27: Measurement (Continued)

| Preset Parameter | Description |
|--|--|
| Dual Caliper on V Nav and Simultaneous. | Select to enable Dual Caliper on Volume Navigation and Simultaneous. |
| Map Cycle Select to Trackball Key | Map "AutoCalc cycle select" to Left/Right Set key. |
| Use WeekDay format for OB GA in DICOM SR | Select to use WeekDay format. |

Table 10-28: Worksheet (USA/ASUM)

| Preset Parameter | Description |
|------------------------------------|--|
| Show Individual Growth Percentiles | Check to display individual growth percentiles on the Worksheet. |
| OB Range Type | Selections: Min-Max, Standard Deviation. |

Table 10-29: 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. |
| Cursor is Displayed when Trackball is moved | The active cursor does not display until you move the Trackball. This assumes the following presets are set: Repeat Measurement, Repeat, Default Measurement, and Cursor. |

Table 10-30: 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. |

Table 10-30: Results Window (Continued)

| Preset Parameter | Description |
|---------------------------------|--|
| 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: Left-Bottom, Left-Top, Right-Bottom, Right-Top, Extreme Right-Top, or Extreme Right-Bottom. |
| Result Window Location-TimeLine | Select the Result Window location: Left-Bottom, Left-Top, Right-Bottom, Right-Top, Extreme Right-Top, or Extreme Right-Bottom. |
| 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

Table 10-31: Backup

| Preset Parameter | Description |
|---|--|
| User Defined Configuration | Select to back up the user-defined configuration settings. |
| Service | Select to back up Service (InSite and Network) settings. |
| For Report templates, use Utility-> Report-> Export | |
| Backup | Select to begin the backup. |

Table 10-32: Backup To/Restore From

| Preset Parameter | Description |
|------------------|--|
| Location | Select media type to use for Backup, Restore and Detailed Restore. CD/DVD, USB Drive F, Local Backup or Cloud. |

Table 10-33: 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 procedure (only for moving images). |
| Enable Reminder Dialog | Select to activate the EZBackup reminder pop-up dialog. |
| Media | Select media type. |

Table 10-34: Restore

| Preset Parameter | Description |
|----------------------------|---|
| User Defined Configuration | Select to restore the user-defined configuration settings. |
| Service | Select to restore service InSite and Network settings. |
| Restore | Select to begin the restore process for the selected configuration files from media storage backup. |

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.

Table 10-35: Detailed Restore of User Defined

| 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 (Scan Assistant) templates. |
| Report Templates (Same Software Version Only) | Select to restore Report templates. |
| 3D/4D | Select to restore 3D/4D settings. |
| Fast Key | Select to restore Fast Key. |
| Utility-->Application Presets | Select to restore Utility--> Application presets. |
| Custom Scan Assistant Programs | Select to restore Scan 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. |
| Detailed Restore | Select to begin the restore process for the selected configuration files from media backup. |

Table 10-36: Local Backup or Local and Cloud Backup

| Preset Parameter | Description |
|----------------------|--|
| Backup Automatically | Select to automatically backup user-defined configuration settings to the system hard drive after a new setting or configuration is saved on the Utilities pages. |
| Upload for Fleet | Upload preset to Cloud for Fleet share. (Device Mgmt must be activated for Cloud Backup and Upload for Fleet button to appear. See 'Activate Device Mgmt' on page 10-94 for more information.) |

System/Peripherals Preset Menu

The System/Peripherals screen allows you to specify video and system setup parameters.

Table 10-37: DVR

| Preset Parameter | Description |
|------------------------------------|--|
| Media (restart needed) | Select recording media: DVD or USB storage. |
| DVD Format (restart needed) | Select the video format: NTSC or PAL. |
| Picture Quality (reboot required) | SP, HQ, EP, LP. Extended Play or Long Play. |
| DVD Chapter Record Interval (sec.) | Select the Interval of automatic chaptering for DVD recording from 15, 30, 60 and 120 seconds. |
| USB Playback Skip Interval (sec.) | Select the Interval of time skipping for USB playback from 15, 30, 60 and 120 seconds. |

Table 10-38: S-Video

| Preset Parameter | Description |
|---|---------------------|
| S-Video Output Format (restart needed): | Select NTSC or PAL. |

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 10-39: Standard Printer Properties

| Preset Parameter | Description |
|------------------|--|
| Properties | 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/DVD). Refer to the Basic Service Manual for more information. |

Table 10-40: Standard Printer Restore

| Preset Parameter | Description |
|------------------|---|
| Restore Defaults | Select to restore the selected printer to default settings. |

Table 10-41: Network Printer

| Preset Parameter | Description |
|-------------------------|-----------------------------------|
| Add Network Printer | Select to add network printer. |
| Remove Network Printer | Select to remove network printer. |

Table 10-42: Default Printer

| Preset Parameter | Description |
|-------------------------|-----------------------------------|
| Default Printer | Select to choose default printer. |

Table 10-43: Setup

| Preset Parameter | Description |
|-------------------------|---|
| 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. |

System/User Configurable Key

The User Configurable Key screen allows you to reconfigure the User Configurable Keys and configure Trackball Key functionality.



Figure 10-3. Programmable Operator Panel Controls

Table 10-44: User Configurable Keys

| Preset Parameter | Description |
|------------------------------------|--|
| 1 User Defined Key | Select desired function to each User Defined key. |
| 2 - User Defined Trackball Set Key | Specify which controls you want to be used on the Trackball: <ul style="list-style-type: none"> • B/B-Flow/Contrast: Auto or Frequency • Color Flow/TVI/PDI: Auto, Steer, or PRF • PW, CW, TVD: Auto, Baseline, or PRF • Use Set keys to change BSteer Angle (On or Off) |
| 3 - Replaceable Key caps | Replaceable key caps are provided should you choose to reconfigure the User Configurable Keys. |
| Keyboard Key 0 - 9 (Not pictured) | Check "Enable" in Keyboard key menu. Select desired function to each Keyboard key. |

System/User Configurable Key (continued)

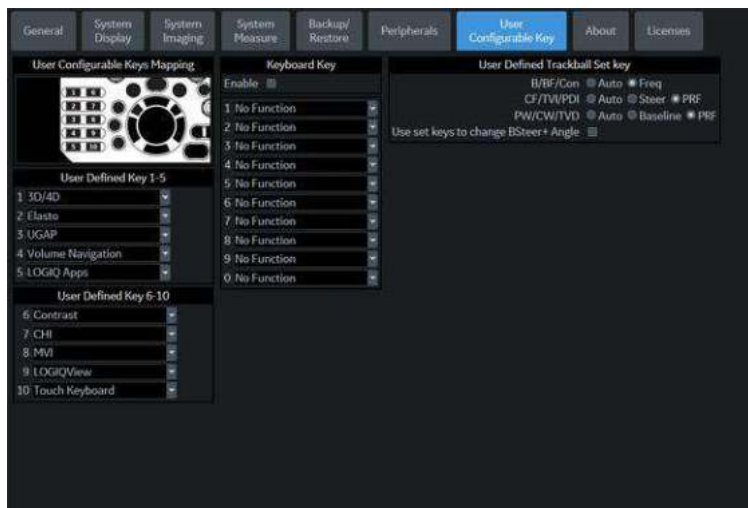


Figure 10-4. User Configurable Key Preset Menu

To reconfigure User Defined key (UD), numeric Keyboard Keys, or Trackball Keys,

1. Press Utility--> System--> User Configurable Key.
To configure the User Defined Keys, select the function for each key (refer to Figure 10-3). There are 10 User Defined Keys.
2. To configure the numeric Keyboard Keys, select the function for each Keyboard key (refer to the illustration above). There are ten (10) Keyboard keys that are configurable.
3. To configure the Trackball Keys, select the function for each user-defined Trackball Set Keys by mode.
4. Press Save.

Replace User Defined Key caps

To move and replace a User Dfined key cap,

1. Insert the flat blade of a screwdriver into the hole on the top side of the key cap and lift it up to remove it.



2. Repeat for each key, to match how you have configured the User Defined keys.
3. Replace the key caps by positioning it and pushing down on the key cap until it clicks into place.

System/About Preset Menu

The System/About screen lists information about the system software.

Table 10-45: Installed Software Packages

| Preset Parameter | Description |
|---------------------------|---|
| Application Software | The version, revision and part number of the current software on this system. |
| Online Help | The current version and part number of the Online Help on this system. |
| Application Service Patch | The current version and part number of the Service Platform on this system. |
| Security Package | The current version and part number of the Security Package on this system. |
| Base Image | The current version and part number of the Base Image on this system. |
| Base Image Update | The current version and part number of the Base Image Update on this system. |

Table 10-46: Copyright

| Preset Parameter | Description |
|------------------|-------------------------------------|
| Copyright | Lists the copyright for the system. |

Table 10-47: Patents

| Preset Parameter | Description |
|------------------|----------------------------------|
| Patents | Lists system patent information. |

Licenses

The Licenses screen lists information about the software licensed for use on the LOGIQ Fortis.

Table 10-48: Software

| Preset Parameter | Description |
|------------------|---|
| License Titles | Scroll to select the License; the license is displayed in the License window. |

Imaging Presets

Overview

Imaging screens allow you to specify parameters by Preset and Probe by Mode. For information about the specific parameters, refer to Chapter 5 Optimizing the Image.

- B-Mode (B)
- Color Flow Mode (CF)
- Power Doppler Imaging (PDI)
- Micro Vascular Imaging (MVI)
- Elastography (ELASTO)
- UGAP
- M-Mode (M)
- Anatomical M-Mode (AMM)
- Pulse Wave Mode (PW)
- Continuous Wave Mode (CW)
- Harmonics (HAR)
- B-Flow (BF)
- Contrast Reference (Ref)
- Contrast (CON)
- Tissue Velocity Imaging (TVI)
- Tissue Velocity Doppler (TVD)
- General



Figure 10-5. Imaging Preset Example

1. Preset/Application-dependent setup parameters.
2. Probe-dependent setup parameters.

Changing imaging presets

To change imaging presets:

1. On the Touch Panel, select **Utility**.
2. On the Touch Panel, select **Imaging**.
The system displays the Imaging screens.
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, Abdomen). The right column(s) list 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.*

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

You can specify a default probe per application and a default application per probe, EGC Display or Sync Mode.

Default probe per application

1. To specify a default probe per application, select Utility --> Imaging --> General.
2. Check the parameter if you want to start it automatically.
3. 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 mode and application from the pull-down menu.

Checkmark the following fields when you want the system to activate a certain display. Values vary by probe.

- Simultaneous
- Automatically Retain Field of View
If selected, the system automatically activates the Retain Field of View control when a field of view setting is changed. If not selected, you can activate the Retain Field of View manually from the Probe Touch Panel.
- Application Default Mode
 - B-Mode
 - Harmonic
 - Enable B Steer +
- Default PDI
 - PDI
 - MVI
- Default Elasto
 - Shear
 - Strain
- PDI/TVI button
 - PDI
 - TVI
- BF/CHI button
 - BF
 - CHI
- ECG
 - ECG Display
 - Sync Mode

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

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 Touch Panel. For each library, you can define two Touch Panel displays of comments (Page1 and Page2), with 30 comments on each Touch Panel. Home and Arrow controls can also be added to the Touch Panel displays.

You can configure these comment color groupings via Utility--> Comments--> Libraries (up to 5 groups).



Figure 10-6. Comment Libraries Preset Menu

Comments Libraries/Libraries Preset Menu (continued)

Table 10-49: Libraries

| Preset Parameter | Description |
|-------------------------|---|
| Library | The name of the comment library. |
| Reload Factory Defaults | Select to reload factory defaults. |
| Small List | Fields where you define a small list. |
| User Defined Library | The name of a new comment library that you want to create/delete. |
| Copy from Existing | You can add to or delete from the selection of comments. |

Defining Comments

- In the *Library* field, select the library you want.
The system displays all comments for the library. You can have two Touch Panel displays of comments for each library. The comments are listed in the order that they are shown on the Touch Panel when you use comments.
- To change or add an comment, select the comment or blank location and press **Set**, then do one of the following:
 - Type the comment.
 - Select the comment in the *Copy from Existing* list, and press **Set**.
- To save the changes, select the **Save** button.

Creating a new comments library

- In the *User Defined Library* field, type a name for the library, then select **Create**.
The system creates a new library.
- Enter comments as described in step 2 above.
- 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.

Creating a small list

A small list is a list of up to three comments attached to one comment location on the Touch Panel. You can use a small list to group similar comments, such as those indicating a probe location. For example, you can specify that a small list include the following comments: Long, Transverse, and Coronal. To make comments easier to use, you can define the small list in the same location in each comment library.

To define a small list:

1. Move the **Trackball** to the comment field on Page1 or Page2 where you want to create a small list, and press **Set**.
2. Move the **Trackball** to the first field in the *Small List* section, and press **Set**.
3. To enter comments in the fields in the Small List section, select the field and press **Set**, then do one of the following:
 - Type the comment
 - Select the comment in the Copy from Existing list, and press **Set** twice.

You can enter up to three comments. When you enter an comment in the first field of the Small List section, the selected comment field on Page1 or Page2 changes to SMALL LIST.

4. To save the changes, select the **Save** button.

NOTE: *The small list can be displayed as a pop-up window or as a toggle field. The Small List Operation field on the General tab allows you to specify how it is displayed.*

Comments Libraries/Comments Preset Menu

On the Comments tab you can specify text and pointer options.

Table 10-50: 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. |
| Arrow Color | Select the color for comment Arrow. |
| Text Boundary | Select Group Move or Word Wrapping. |
| Small List Operation | Select whether you want small list options to display in a Pop-up window, by a Toggle function, or in a Pop-up with replace. |
| Enable Type Over Mode | Select to type over existing comments. Position the cursor over the text to be changed, then start typing. |
| Reset Small List | Select to indicate that small lists should not be reset to the first item. |
| Automatically Set Text | Sets the comment as you are typing it. |
| Replace Mode | Select to replace comment. |

Table 10-51: 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 10-52: 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/Text2 states. |
| Erase when the probe or application is changed | Deletes annotations when you change the application or probe. |

Table 10-52: General (Continued)

| Preset Parameter | Description |
|---------------------------------|--|
| Clear Non Active Image Comments | Select if you want comments to be removed from the non-active multi image. |

After you change comment options, select **Save** to save the changes.

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.

The Applications/Comments screen can be accessed through either the Comments Libraries or Applications Touch Panel key.

Specifying which libraries belong to an application

1. On the Applications tab, in the Application field, select the application.
2. In the Library Group Tabs fields, select the libraries for this application. You can select up to six libraries.
3. In the Default Library Group field, select the default library you want the system to display when you use comments.

NOTE: *When you use comments, the default library is displayed. To use other libraries for the application, press the tab for the library.*

4. To save the changes, select the Save button.

Table 10-53: Applications

| Preset Parameter | Description |
|------------------|--|
| Preset | The name of the application preset. |
| Tabs | A list of libraries for the application. You can select up to six libraries. |
| Default Tab | The default library that the system displays when you use comments. |

Using comments from a library

To use comments, press the **Comment** key on the Control Panel. Comments are then displayed on the Touch Panel.

To select a comment library, press the appropriate tab (e.g. the tabs are OB23 and OB23_1).

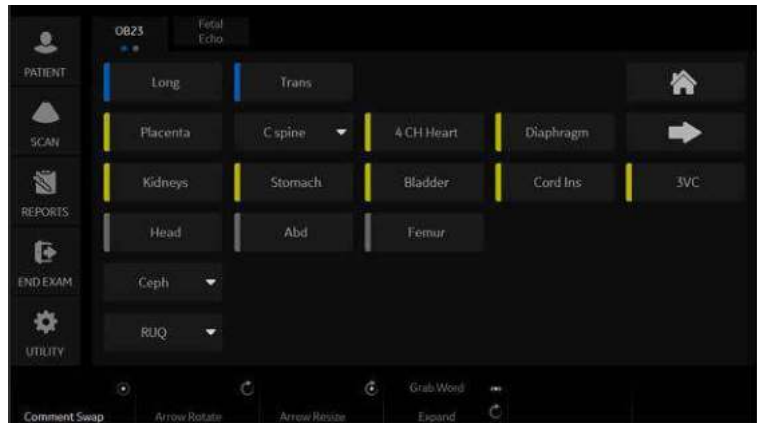


Figure 10-7. OB 2/3 Comments Touch Panel

Comments Libraries/Mapping Preset Menu

The system uses the annotation/body pattern information associated with the image to automatically assign the segment/position qualifier of the breast lesion.

On the Mapping tab, you add/delete/reset the user-defined mapping for the qualifier.

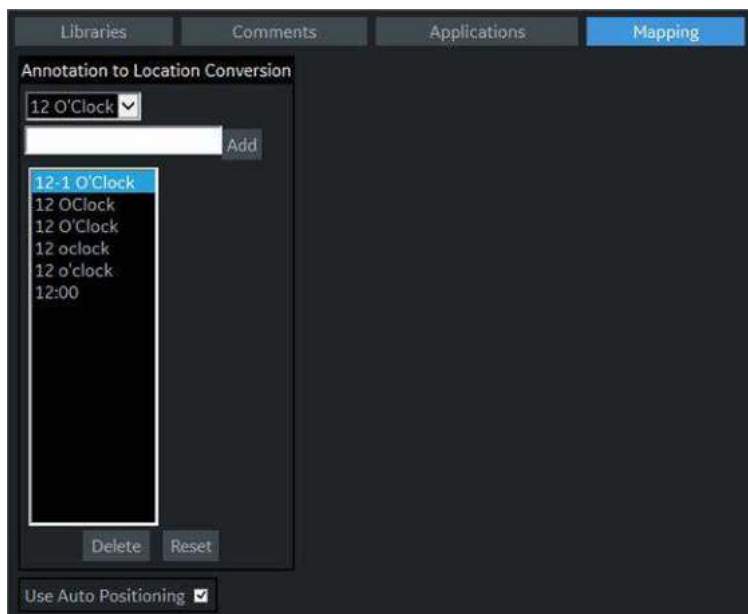


Figure 10-8. Comment Mapping

Table 10-54: Mapping preset

| Preset Parameter | Description |
|-----------------------------------|--|
| Annotation to Location Conversion | Add/Delete/Reset the use-defined mapping annotation for the qualifier for Breast. <ul style="list-style-type: none"> • Add: Add the use-defined mapping annotation • Delete: Delete selected user-defined mapping. • Reset: Reload factory default mappings to the selected qualifier. |
| Use Auto Positioning | Configure a mapping of annotation and body pattern to location (Position and Segment) mappings. Note: This is effective only against the following body pattern: Breast4 Lt/Rt, Breast5 Lt/Rt, Breast6 Lt/Rt, Breast7 Lt/Rt, Breast8 Lt/Rt |

After you change Mapping options, select Save to save the changes.

Comments Libraries/Mapping Preset Menu (continued)

For example,

1. Select Qualifier "12 O'Clock" from the pull-down menu.
2. Type the mapping annotation "12" and press Add.
3. Check "Use Auto Positioning".

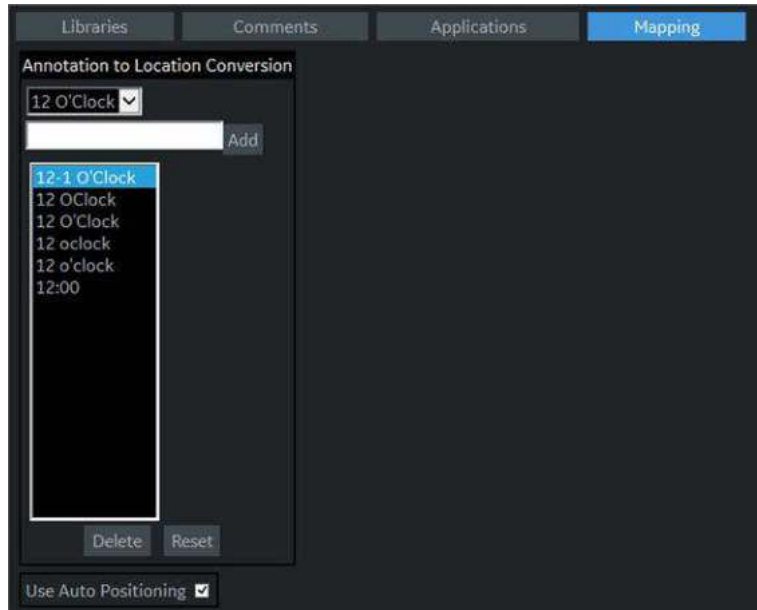


Figure 10-9. Comment Mapping

4. In Utility-> Body Pattern-> Libraries, select SMLP from pull-down menu.
5. Select an empty cell of the Library table.
6. Select Breast4_Rt in Copy from Existing to add.

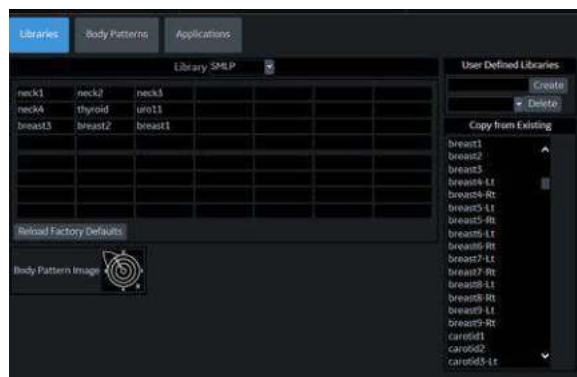


Figure 10-10. Comment Mapping - SMLP

Comments Libraries/Mapping Preset Menu (continued)

7. Press Save and Exit.
8. Scan the patient.
9. Type "Right Breast 12 Zone 1" as Comment on the image.
10. Activate Breast measurement and select Lesion folder from the Touch Panel for add Lesion1.

Position Rotary is set 12 O'Clock, Segment Rotary is set A, and "12 O'Clock A" displays as measurement name automatically.

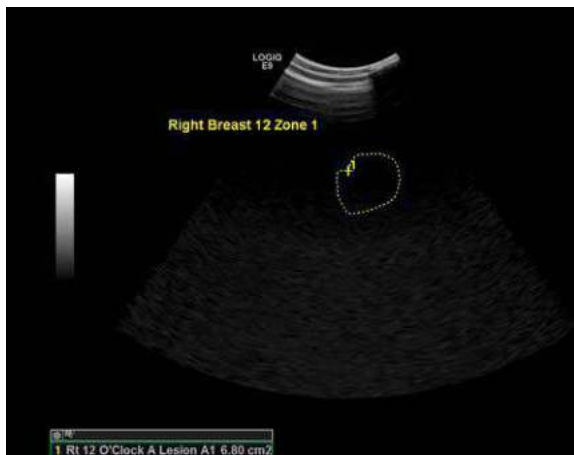


Figure 10-11. Comment Mapping - Measurement

NOTE: *The system assigns "-" to position qualifier if the value is not found in the annotation or body pattern information associated with the image.*

11. Select the frame for Lesion 2.
12. Select Breast4_Rt as Body pattern on the image and locate the probe mark in the appropriate position.
13. Activate Breast measurement and select Lesion folder from the Touch Panel.
14. Position Rotary and Segment Rotary is set automatically associated with the position and segment of the probe mark.

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 Touch Panel. For each library, you can define two Touch Panel displays of body patterns (Page1 and Page2), with 15 body patterns on each Touch Panel.

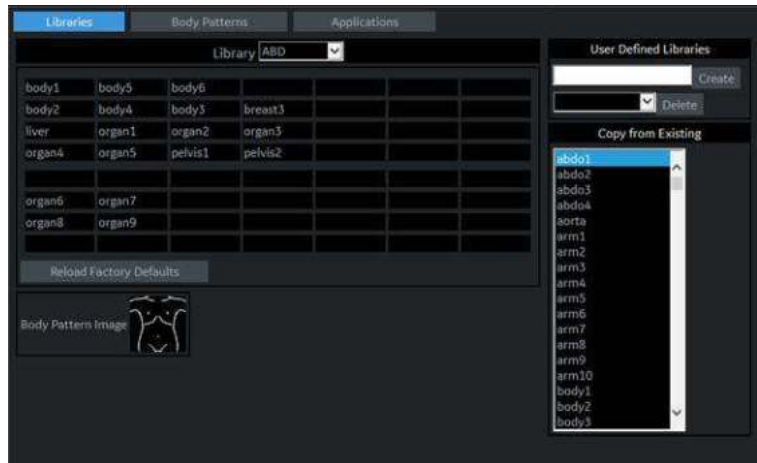


Figure 10-12. Body Patterns Libraries Preset Menu

Table 10-55: Body Patterns Libraries

| Preset Parameter | Description |
|-------------------------|---|
| Library | The name of the body pattern application library. |
| Reload Factory Defaults | Select to reload factory defaults. |

Table 10-55: Body Patterns Libraries (Continued)

| Preset Parameter | Description |
|-------------------------------|---|
| 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. |

Defining body patterns

1. In the *Library* field, select the application library you want. The system displays all body patterns for the library. You can have two Touch Panel displays of body patterns for each library. The body patterns are listed in the order that they are shown on the Touch Panel.
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 in a Touch Panel location 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

Table 10-56: 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 knob to select Body pattern | If selected, you can scroll through the body patterns with the Zoom control. |
| Body Pattern knob Recall On | <p>When the image is recalled, Body pattern knob works as below.</p> <p>Body Pattern on: Activate Body Pattern by press or move Up/Down/Left/Right the Body Pattern knob.</p> <p>U/D: Body Pattern On, L/R: Prev/Next image: Move Body Pattern knob Up and Down to Body Pattern On, Move left recalls previous image, move right recalls next image.</p> <p>Prev/Next image: Move up and left recall previous image, move down and right recall next image.</p> <p>None: Activate Body Pattern by press the Body Pattern knob.</p> |
| Body Pattern knob Recall Off | <p>When the image is not recalled, Body pattern knob works as below</p> <ul style="list-style-type: none"> • Body Pattern on: Activate Body Pattern by press or move Up/Down/Left/Right the Body Pattern knob. • U/D: Body Pattern On, L/R: Prev/Next image: Move Body Pattern knob Up and Down to Body Pattern On, Move left recalls previous image, move right recalls next image. • Prev/Next image: Move up and left recall previous image, move down and right recall next image. • None: Activate Body Pattern by press the Body Pattern knob. |
| Body Pattern knob: Scan Assistant On | <p>When Scan Assistant is activated,</p> <ul style="list-style-type: none"> • Scan Assistant Control: Navigate Scan Assistant protocol by move Up/Down the Body Pattern knob. Pause/Resume Scan Assistant by move Left/Right the Body Pattern Knob. • None: Activate Body Pattern by press the Body Pattern knob. |

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.

The Applications/Body Patterns screen can be accessed through either the Body Pattern Libraries or Applications Touch Panel keys.



Figure 10-13. Body Patterns Applications Preset Menu

Table 10-57: Applications

| Preset Parameter | Description |
|------------------|--|
| Preset | Defines the Body Pattern option. |
| Tabs | A list of body pattern applications. |
| Default Tab | The default library that the system displays when you use body patterns. |

Selecting body pattern application libraries

1. On the Applications tab, in the Application field, select the body pattern.
2. In the Library Group Tabs fields, select the application libraries for Body Patterns. You can select up to six libraries.
3. In the Default Library Group field, select the default application library you want the system to display when you use body patterns.

NOTE: *When you use body patterns, the default library is displayed. To use other application libraries, press the tab for the library.*

4. To save the changes, select the **Save** button.

Using body pattern application libraries

See the following Body Patterns Small Parts Touch Panel.

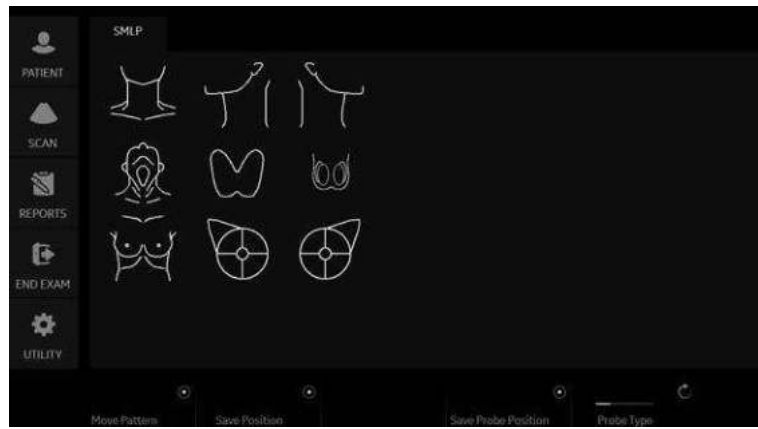


Figure 10-14. Body Patterns Small Parts Touch Panel

To select a body pattern library, select the tabs (for example, ABD or OB).

To select body patterns, use the **Ellipse/Body Pattern** control on the Control Panel.

Application Presets

Overview

Application Presets allow you to configure the application-specific settings (presets).

Settings

Table 10-58: Preset

| Preset Parameter | Description |
|------------------|--|
| Preset | Select the application that you want to specify the presets. Along with the various applications available on the system, there are four user-defined application presets that can be set. |

Table 10-59: Image Control and Display

| Preset Parameter | Description |
|--------------------------------|--|
| Show kHz scale | When selected, displays the kHz scale on the left side of the Doppler spectrum. |
| 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. |
| Hide Mode Cursor Key | Select to unmap (hide) the Mode Cursor key, which normally appears on the left Trackball key during live scanning in B-Mode or Color Flow Modes. |
| Horizontal Display for Biplane | Display of the two planes of the Biplane probe in a top and bottom layout. |

Table 10-60: Auto Zoom Linear Probe Images at Shallow Depth...

| Preset Parameter | Description |
|-----------------------|---|
| Check Desired Setting | <ul style="list-style-type: none"> • Single Screen • Dual Screen and DualView • Virtual Convex |

Table 10-61: 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 10-62: 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 10-63: 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. |
| Erase when the image is unfrozen | Select to erase image when system Freeze is deactivated. |

Table 10-64: Footswitch

| Preset Parameter | Description |
|---------------------|---|
| Left, Middle, Right | Specify from the following for each footswitch pedal: No Function, Record/ Pause, Freeze, Next Heartcycle, Previous Heartcycle, Print 1,2,3,4, Update, Next Step (Scan Assistant), Previous Step (Scan Assistant), Scan Assistant Pause/Resume, or Mark Cine. |

Table 10-65: Protocol

| Preset Parameter | Description |
|-------------------|---|
| Show Protocol Tab | Check to display the Protocol Tab on the Touch Panel. |
| Template | Select the default stress echo template: Bicycle Normal, Bicycle Sporty, Contrast Pharmacological, Pharmacological 4x4, Pharmacological 8x5, Exercise 2x4, Exercise 2x4 B, Pharmacological US 4x4 |

Table 10-66: ECG

| Preset Parameter | Description |
|------------------|--|
| Show ECG Tab | Check to display the ECG Tab on the Touch Panel. |

Table 10-66: ECG (Continued)

| Preset Parameter | Description |
|------------------|---|
| ECG Lead | Specify the number of ECG Leads (1, 2, or 3). |
| Resp Lead | Specify the number of Respiration Leads (1 or 2). |

Table 10-67: ELASTO

| Preset Parameter | Description |
|--|--|
| Show Quality Bar | Check to display a Quality Bar for Elastography. The more bars, the better the quality. As the quality increases, the bars go from red, to yellow, to green. |
| Show Quality Graph (restart needed) | Check to display a Quality Graph for Elastography. The higher the level, the higher the data quality for the frames. This appears when you checkmark Utility--> Imaging--> General--> Elasto--> Quality Display. |

Table 10-68: SHEAR

| Preset Parameter | Description |
|------------------|---|
| Show Quality Bar | Check to display a Quality Bar for Shear. The more bars, the better the quality. As the quality increases, the bars go from red, to yellow, to green. |

Table 10-69: User Label

| Preset Parameter | Description |
|------------------|--|
| Show Label | If selected, the system displays the User label in the Preview Window at the bottom left portion of the monitor. |
| Label 1-8 | User Labels have eight (8) text lines. Each User Label is limited to 50 characters. |

Print Controls

Table 10-70: Live Store

| Preset Parameter | Description |
|--------------------------------|--|
| P1, P2, P3, P4, PrintScreen | Select Retrospective Clip (CINE prior to pressing Print), Prospective Clip (CINE after pressing Print), Single Image or None to store from a live image. |

Press the “Connectivity/Button/Physical Print Buttons” hyperlink to go directly to the Connectivity Print Button Setup page.

Table 10-71: Time-Base Store

| Preset Parameter | Description |
|------------------|--|
| Time span (s) | Select the number of seconds of CINE Loop storage. The default is 3 seconds. |

Table 10-71: Time-Base Store (Continued)

| Preset Parameter | Description |
|---|--|
| 3D/4D Time span (s) | Select the number of seconds of CINE Loop storage while in 3D/4D. |
| Contrast Time span (s) | Select the number of seconds of CINE Loop storage while in Contrast. |
| Preview clip before store | When selected, allows you to review cine loops before storage. |
| Segment prospective loops longer than time span | Specify length of Clip (15, 30, or 45 seconds, Off, or Max). |

Table 10-72: 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 cine clip before store | When selected, allows you to review Cine loops before storage. |

Table 10-73: Mark Cine

| Preset Parameter | Description |
|---------------------------------|--|
| Enable Mark Cine Control | Lets you mark where you want the Cine Loop to start (prospective CINE). |
| Preview Loop Longer than... (s) | When selected, allows you to review Cine loops before storage for loops longer than selected timeframe (in seconds). |

Imaging Controls

You can select which controls you want to be available via the Touch Panel during a clinical scan. When you select Preset--> Application and Control Mode--> Clinical, deselect the controls you **DO NOT** want to appear while scanning in this clinical application.

NOTE: If you select Research, all controls appear.



Figure 10-15. Imaging Controls, Research

Clinical vs Research Touch Panel Example. To view all controls press the View All/View Less control (circled).

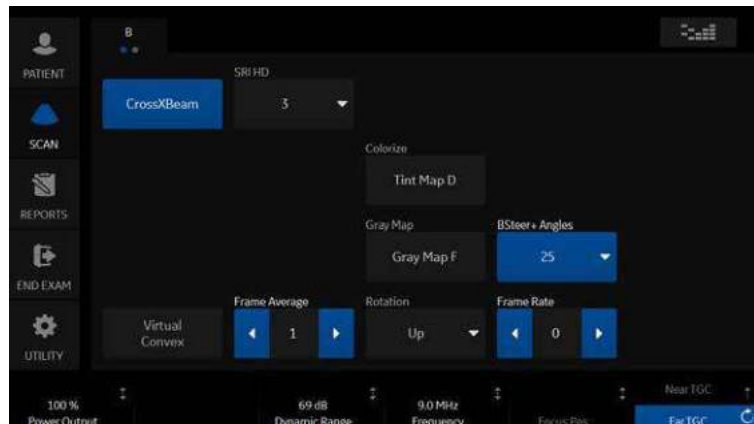


Figure 10-16. Clinical Control Mode

Imaging Controls (continued)

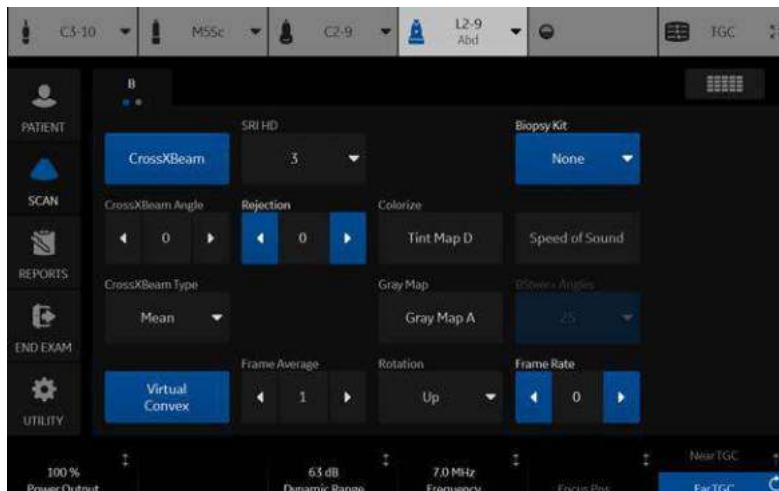


Figure 10-17. Research Control Mode

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.

User Specific

Refer to “Monitor Display” in Chapter 3 for more information.

Test Patterns

For more information, see **Test Patterns** in the Wide Monitor section of Chapter 3.

Overview

3D/4D presets allow you to set up application-specific settings (presets) for each 4D image acquisition type. You can define different application-specific settings for each probe. Refer to Chapter 5 for more information.

4D Presets

To set up 4D presets:

1. On the Touch Panel, select **Utility**.
2. On the Touch Panel, select **3D/4D**.
The system displays the 4D Presets screen.
3. To select a probe, click on the plus sign (+) that appears next to the desired probe.
4. To select the application, click on the plus sign (+) that appears next to the desired application.
5. To select the acquisition type, click on the plus sign (+) that appears next to the desired application.
6. Double-click the desired application under the acquisition type. The Display tab is selected.

Display Presets Tab

Table 10-74: Image Display

| Preset Parameter | Description |
|--------------------------|---|
| Tile | Determines the number of display windows. Values include: 1 (Single), 2 (Dual), and 4 (Quad). |
| Visualization | Determines the method of display for working with images. Selections available: Sectional, Render, VOCAL, VCI static and TUI. |
| 3D Orientation (degrees) | Determines the orientation of the ROI on the monitor display. Values include: 0, 90, 180, 270. |
| Zoom Factor | Determines the magnification factor of the zoom. Values include: 0.3 through 4.0, in .01 increments. |
| Orientation Help | Activate Orientation Help. |
| Gain | Set the desired Gain. |

Table 10-75: Pre-mode ROI

| Preset Parameter | Description |
|------------------|---|
| ROI Center (cm) | Determines the vertical center of the region of interest. Values vary by probe. |
| ROI Span (cm) | Determines the height of the region of interest. Values vary by probe. |
| Tilt (degrees) | Determines the degree of tilt from the vertical center location of the ROI. Values vary by probe. |
| Width (degrees) | Determines the width of the ROI. Values vary by probe. |
| Volume Angle | Set the range of the volume sweep. Values vary by probe. Listed in degrees for curved probes, cm for linear probes. |

Table 10-76: Quality Setting

| Preset Parameter | Description |
|------------------|---|
| Setting | Set quality setting -- balances speed with line density. Selections are Low, Mid1, Mid2, Hi1, Hi2, Max. High combines the highest density with the slowest speed. Low combines the lowest density with the highest speed. |
| CF Setting | Set quality setting -- balances speed with line density. Selections are Low, Mid1, Mid2, Hi1, Hi2. High combines the highest density with the slowest speed. Low combines the lowest density with the highest speed. |

Render Tab

Table 10-77: Render and Render for VCI Static

| Preset Parameter | Description |
|--|---|
| Render Mode 1:Mode2 (Gray Inversion, and VCI Static) | Set render mode values. Surface Smooth, Surface Texture, Transp Max, Transp X-Ray, TransMin (Render 1), or HDlive Texture Surface Smooth, Light, Gradient Light, Transp Max, Transp X-Ray, Transp Min (Render 2), or HDlive Smooth. |
| Mix/Mix Inversion/eMixVCI Static (% Render Mode 2) | Set mix of Render 1 / Render 2 Mode, 0-100. |
| Lower Threshold | Set a lower threshold below which weaker echoes are removed, 0-255. |
| Transparency/ Transparency (Inversion) | Set the transparency of the image, 10/20-250. The higher the number, the more transparent the gray scale information. |
| Render Direction | Set the direction in which the ROI is viewed. |
| SonoRenderLive | Check to use SonoRenderLive. |
| SonoRenderLive Sensitivity | Set the SonoRenderLive sensitivity from 1-100. |
| [VCI Static] Slice Thickness | Set slice thickness, 2-20. |

Color / PDI Render tab

Table 10-78: Color / PDI Render

| Preset Parameter | Description |
|---|---|
| Render Mode 1 (Color) / Render Mode 2 (Color) | Determine the render mode, selected from Render Mode 1 and Render Mode 2. |
| Mix (Color) | Set the percentage of Render Mode 1 to be mixed with Render Mode 2. |
| Lower Threshold (Color) | Set the lower threshold below which weaker echoes are removed. |
| Transparency (Color) | Determine the transparency of the image. The higher the number, the more transparent the gray scale information. Values: 20 to 255. |
| Render Gray : Color) | Determine the render mode, selected from Render Mode 1 and Render Mode 2. |
| Mix (Gray Color) | Set the percentage of Render Mode 1 to be mixed with Render Mode 2. |

VOCAL tab

Table 10-79: VOCAL

| Preset Parameter | Description |
|-----------------------------|--|
| Vocal Method | Set Sphere, Manual, Contour Detect, or Semi-Auto Contour Detect. |
| Vocal Semi-Auto-Detect type | Set Hypo, Cystic, or Hyper/Iso. |
| Vocal Rotation step | Set 6, 9, 15, or 30. |

TUI tab

Table 10-80: TUI

| Preset Parameter | Description |
|-------------------------|--|
| Display Format | Set 1x1, 1x2, 2x2, or 3x3. |
| Total Slices | Set 3, 5, 7, 9, 11, 13, 15, 17, or 19. |
| Slice Distance (mm) | Set 0.5-40 (0.1 step increments). |

OmniView tab

Table 10-81: OmniView

| Preset Parameter | Description |
|-------------------------------------|--|
| Show OmniView View Direction Marker | Select to view the direction marker in OmniView. |

Advanced tab

Table 10-82: Advanced

| Preset Parameter | Description |
|--------------------------|--|
| Upper Threshold | Sets the higher threshold above which weaker echoes are removed. |
| Volume Calibration Shift | See a Field Service Engineer for information on this parameter. |

Configuring Connectivity

Overview

You use Connectivity functionality to set up the connection and communication protocols for the ultrasound system. The following page gives an overview of each of the Connectivity functions. Each function is described in detail in the following pages.

Connectivity Functions

To set up your institution's connectivity, you must login with administrator privileges.

1. **TCP/IP:** 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 video print and 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.

Connectivity Functions (continued)

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. **Tricefy:** allows you to archive, collaborate, and share patient images via a cloud-based image viewer.
9. **Koios DS.** Koios DS is a Breast and Thyroid Lesion Analysis Option. Koios DS is integrated with the LOGIQ Fortis via DICOM. Koios DS is configured similar to a DICOM Service. The user can accept/dismiss analysis results. If accepted, these results are included in the DICOM Structured Report. (Not available in all countries.)

Configure these screens from left to right, starting with the TCP/IP 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.

TCP/IP

The left side of the TCP/IP screen displays the Wired Network Configuration; the right side of the screen displays the Wireless Network Configuration.

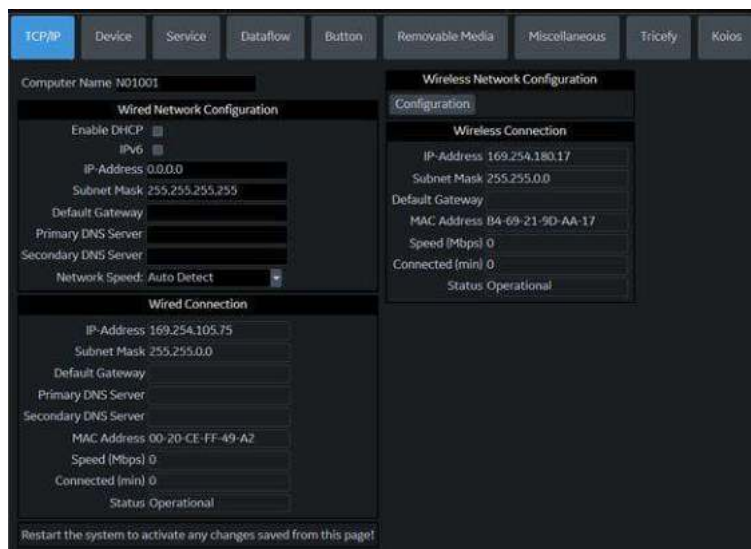


Figure 10-18. TCP/IP Screen

The **Wired Network Configuration** shows what the LOGIQ Fortis local area network settings are configured to, while the **Wired Connection** section shows the actual network configuration the system is currently using and has recognized. If these two sections do not match, reboot the system and recheck the network settings.

Determine Your Network Settings

Determine the type of network settings you will use and configure:

- **IPv4 or IPv6:** IPv4 is a 32-bit address, IPv6 is a 128-bit address.
- **DHCP (Dynamic Host Configuration Protocol):** Enables a server to automatically configure the network settings.
- **Static IP:** Manually configured network settings.

DHCP

To configure DHCP network connectivity:

1. Select the DHCP check box to enable automatic configuration of your network settings.

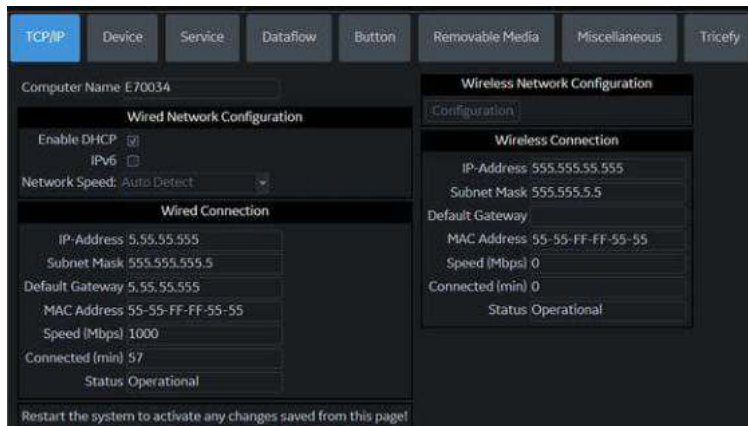


Figure 10-19. DHCP Network Connectivity Menu

2. To use IPv6, check the IPv6 box. If unchecked, the system will use the default IPv4 settings.
3. Press Save at the bottom of the screen to save the automated configuration.
4. Restart the system to activate any saved changes.

Static IP

To configure Static IP network connectivity:

1. Uncheck the Enable DHCP box.
2. To use IPv4, leave the IPv6 box unchecked (IPv4 is the default Static IP configuration).
To use IPV6, check the IPv6 box.

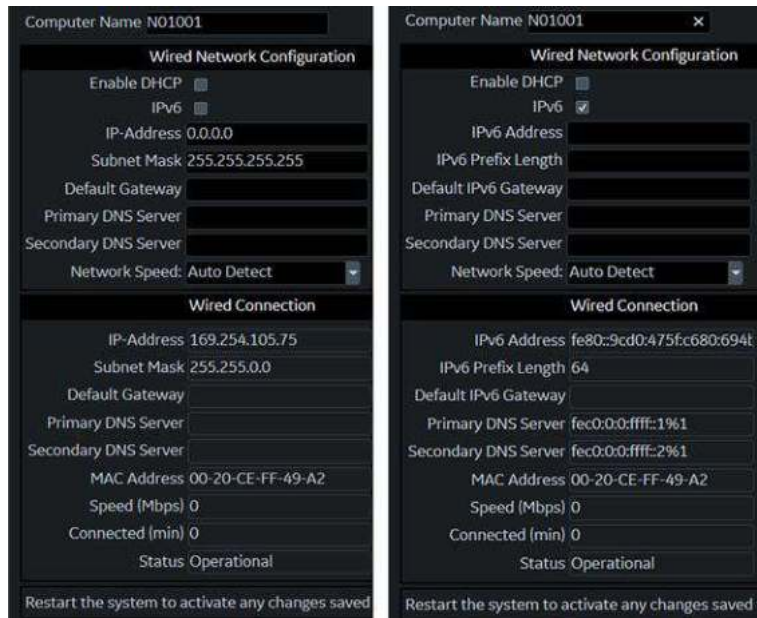


Figure 10-20. IPv4 and IPv6 Static IP Connectivity Menu

3. Type the name of the Ultrasound system in the Computer Name field.
4. Enter the following information in the designated fields:
 - IP-Address (acquire a unique static IP address from the network administrator)
 - Subnet Mask
 - Default Gateway (if applicable)
 - Primary and Secondary DNS addresses (optional)

NOTE: *At least one valid DNS address is needed for Insite remote service connectivity.*

5. Press Save at the bottom of the screen.

Static IP (continued)

6. Restart the system to activate any saved changes.

NOTE: *Per system design, TCP/IP settings do not get restored when restoring backups. The LOGIQ Fortis IP address MUST BE unique.*

TCP/IP Preset Menus

Table 10-83: Computer Name

| Preset Parameter | Description |
|------------------|---|
| Computer Name | Type the unique name for the Ultrasound system (no spaces in name). |

Table 10-84: Wired Network Configuration

| Preset Parameter | Description |
|------------------|---|
| Enable DHCP | Select this box to enable dynamic IP Address selection (unless you use DICOM). When DHCP is enabled, the IP Address, Subnet Mask, Default Gateway, Primary DNS Server and Secondary DNS Server fields are disabled. |
| IPv6 | Select this box to enter IPV6 Static IP settings. |
| Network Speed | Select the network speed (Auto Detect, 10Mbps/Half/Full Duplex, or 100 Mbps/Half/Full Duplex, and 1000Mbps/Auto-negotiate). |

Table 10-85: Wired Connection

| Preset Parameter | Description |
|----------------------|---|
| IP-Address | 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 | The Subnet Mask is an IP address filter that eliminates communication/ messages from network devices of no interest to your system. |
| Default Gateway | The default gateway address (optional). |
| Primary DNS Server | Enter the IP address for the Primary DNS server (optional - - at least one valid DNS address is needed for Insite remote service connectivity). |
| Secondary DNS Server | Enter the IP address for the Secondary DNS server (optional). (Do not configure Secondary DNS server only; if only one DNS IP address is being used, enter it in the Primary DNS Server field.) |
| MAC Address | Unique network card address. |
| Speed (Mbps) | Actual network speed in Megabits per second. |
| Connected (min) | The number of minutes the system has been connected to the network. |

Table 10-85: Wired Connection (Continued)

| Preset Parameter | Description |
|------------------|--|
| Status | Current network status. <ul style="list-style-type: none"> • Operational: Network adapter has been disabled, for example because of an address conflict. • Unreachable: Network adapter that is not connected. • Disconnected: For LAN adapters: network cable disconnected. For WLAN adapters: no carrier. • Connecting: Network adapter that is in the process of connecting. • Connected: Network adapter that is connected to a remote peer. |

Table 10-86: Wireless Network

| Preset Parameter | Description |
|----------------------|--|
| Configuration | Press to view or change the Wireless Networking settings. <i>See Chapter 13 for more information.</i> |
| IP-Address | The current IP address assigned to the wireless network adapter. |
| Subnet Mask | The current network mask assigned to the wireless network adapter. |
| Default Gateway | IP address of the local subnet gateway host. |
| Primary DNS Server | Enter the IP address for the Primary DNS server (optional - - at least one valid DNS address is needed for Insite remote service connectivity). |
| Secondary DNS Server | Enter the IP address for the Secondary DNS server (optional). (Do not configure Secondary DNS server only; if only one DNS IP address is being used, enter it in the Primary DNS Server field.) |
| MAC Address | The Ethernet address assigned to the installed wireless adapter hardware. |
| Speed (Mbps) | Actual network speed in Megabits per second. |
| Connected (min) | The number of minutes the system has been connected to the network. |
| Status | Current network status. <ul style="list-style-type: none"> • Operational: Network adapter has been disabled, for example because of an address conflict. • Unreachable: Network adapter that is not connected. • Disconnected: For LAN adapters: network cable disconnected. For WLAN adapters: no carrier. • Connecting: Network adapter that is in the process of connecting. • Connected: Network adapter that is connected to a remote peer. |

Device

The LOGIQ Fortis 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 one 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.

Allow Trusted Devices Only

The LOGIQ Fortis is set by default to only connect to trusted devices via Utility-> Connectivity-> Device-> Allow Trusted (Configured) Devices Only.

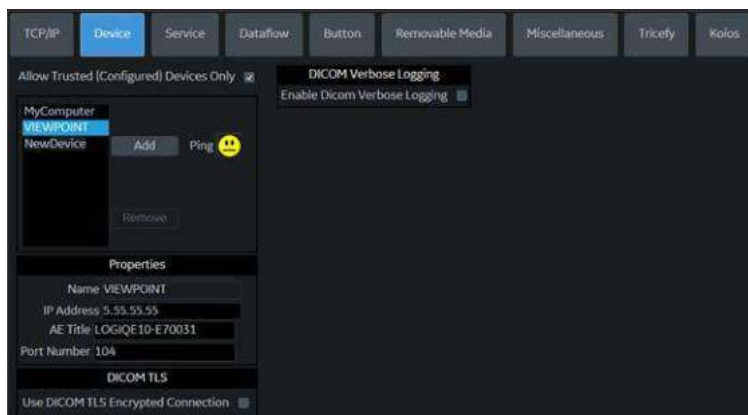


Figure 10-21. Connect LOGIQ Fortis to Trusted Devices Only

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.

DICOM Verbose Logging

You can set the LOGIQ Fortis to enable logging of DICOM traffic messages to protected logs by enabling DICOM Verbose Logging. The default time limit is set for 5 minutes. DICOM protected logs are collected via [Alt+D]. After the configured time, DICOM Verbose Logging is automatically disabled.

Device (continued)

DICOM TLS

If you select DICOM TLS, the LOGIQ Fortis communicates securely with all the configured services for that device with secure communication by encrypting the DICOM objects during transfer, via TLS1.2 protocol. You can import/delete certificates, use the selected certificate, and verify the certificate during association negotiation.

Click on “Certificate” to view, import, verify, or delete certificates.

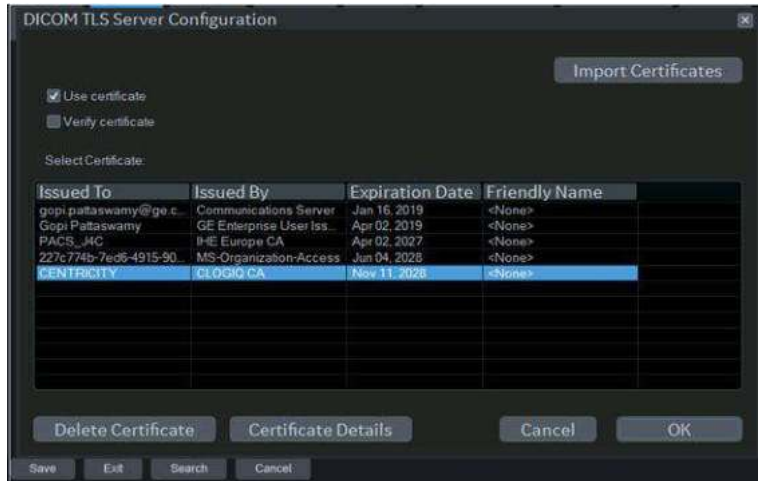


Figure 10-22. Certificate Manager

To import a Certificate, press “Import Certificates”:

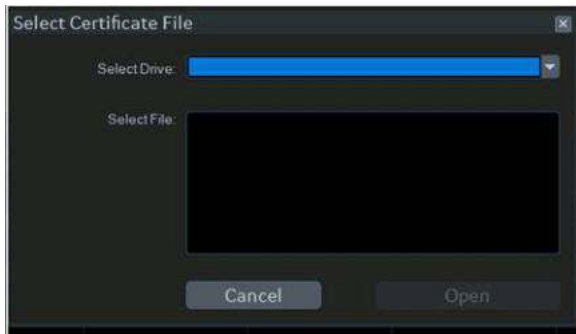


Figure 10-23. Import Certificate Pop-up

Device (continued)

Table 10-87: Device

| Preset Parameter | Description |
|---|--|
| Allow Trusted (Configured) Devices Only | Checked by default. Uncheck to allow non-trusted or unconfigured devices. |
| Ping | Press Ping to confirm that a device is connected. |
| Add/Remove | Press Add to add a new device; press Remove to delete a device. |
| Properties: Name | Type the name of the device. |
| Properties: IP Address | Type the device's IP address. |
| Properties: AE Title | AE Title of the LOGIQ Fortis. 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.

Table 10-88: DICOM TLS

| Preset Parameter | Description |
|------------------------------------|--|
| Use DICOM TLS Encrypted Connection | Check box to use a DICOM TLS encrypted connection. |

Table 10-89: DICOM Verbose Logging

| Preset Parameter | Description |
|------------------------------|--|
| Enable DICOM Verbose Logging | Check to enable DICOM verbose logging. Select number of minutes from dropdown menu: 5, 10, 15 or 30 minutes. |

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).

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 properties for the service currently selected in the Services section. The name and properties 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 by selecting the *Verify* button (“Smiley Face”). The *Verify* button checks the connection status with the server and the compatibility with the PACS device.

If the connection status and compatibility with the PACS device are successful, the *Verify* button exhibits a smile and the Test Results area displays the compatible settings, along with Print button details (if Use Button Settings is enabled). (See Figure 10-24.)

If the connection status and compatibility results are unsuccessful, the *Verify* button exhibits a frown and the Test Results area displays the error with recommended actions. Examples of unsuccessful verify results are:

- Connection to the server not established
- PACS device refuses service
- DICOM objects are not supported
- Configured compression is not supported

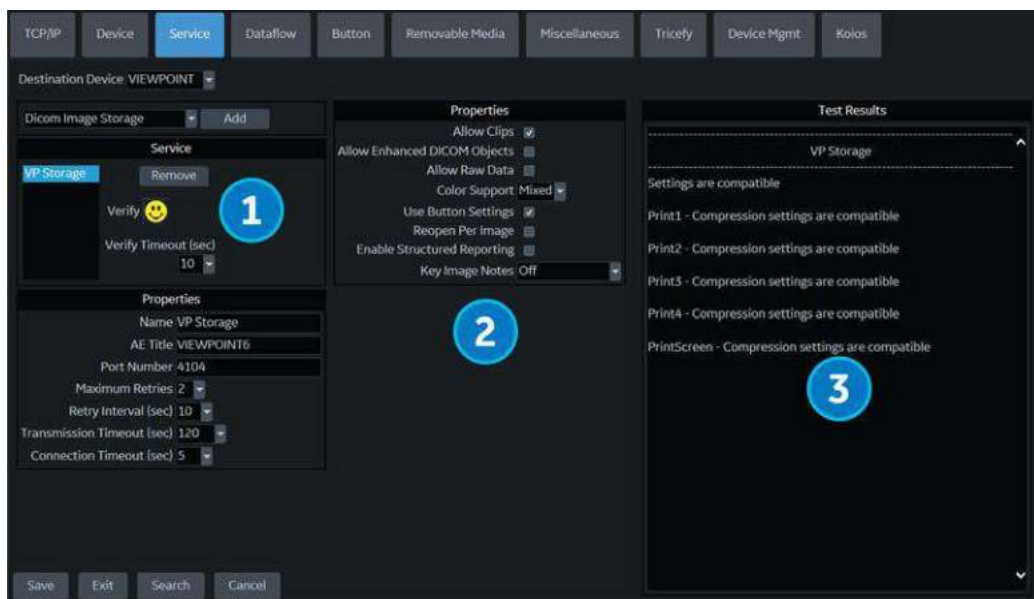


Figure 10-24. Service Verify Button (1), Properties (2) and Test Results (3)

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 (see Figure 10-24 on page 10-70):

Table 10-90: Service Properties: 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. |
| Enable Encryption | Select to enable Patient Data Encryption. |



CAUTION

DO NOT use the following Ports:

- Port 22 (SSH, SFTP)
- Port 53 (DNS-Domain Name Service)
- Ports 67, 68 (DHCP-Dynamic Host Configuration Protocol)
- Port 80, 443 (Web Traffic)
- Port 123 (NTP-Network Time Protocol)
- Port 445 (Microsoft File Sharing)
- Port 546, 547 (DHCPv6)
- Port 5900 (Tight VNC Server)
- Port 8100 (Node-HTTP)

Changing parameters for a service (continued)

Many service parameters are specific to each type of service. The parameters are described on the following pages:

- Standard Print
- Video Capture
- Save As
- USB Quick Save

Standard Print

Table 10-91: 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) |

Video Capture

Table 10-92: Video Capture

| Preset Parameter | Description |
|------------------|---|
| Type | Specify Color, BW, or DVR Record/Pause. |

Save As

Table 10-93: Save As

| Preset Parameter | Description |
|------------------|--|
| Destination | Specify destination device, Hard Drive, USB Flash Drive. |

Setting up a Printer

There are two service types that pertain to printers: Standard Print and Video Capture Device.

Standard Print. Use Standard Print for digital peripherals. These are printers with either a USB interface or Ethernet interface (Sony UP-D898DC, for example).

Video Capture Device. Use Video Capture Device for devices that are triggered by a contact closure, typically analog devices (color printer, black/white printer and DVR Record/Pause, 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 New Patient Active Images screen.

Example: For instance a video capture device, 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.

USB Quick Save

See 'USB Quick Save' on page 9-52 for more information.

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.

DICOM Structured Reporting is a standardized format for medical results. LOGIQ Fortis supports the following templates:

- OB-GYN Report Templates
- Vascular Ultrasound Report Templates
- Cardiac Report Templates
- Abdomen Report Templates
- Breast Report Templates
- Thyroid Report Templates

These templates do not support all M&A results for the LOGIQ Fortis.

Supported Parameters

The DICOM supported parameters are listed in the DICOM Conformance Statement at the following website under DICOM - Ultrasound:

<https://www.gehealthcare.com/products/interoperability/dicom/ultrasound-dicom-conformance-statements>

DICOM SR Storage

DICOM SR Storage enables the system to send or receive ultrasound structured reports in a format that can be interpreted by PACS.

To configure this service, navigate to Utility -> Connectivity -> Service and select DICOM SR Storage from the Destination Device drop-down menu.

DICOM Image Storage

DICOM Image Storage enables the system to send or receive ultrasound images in a format that can be interpreted by PACS.



Figure 10-25. DICOM Image Storage

Table 10-94: DICOM Image Storage

| Preset Parameter | Description |
|------------------------------|--|
| Allow Clips | Select to allow cine loop storage. Deselect to send only Stills to PACS. |
| Allow Enhanced DICOM Objects | Select to allow enhanced DICOM objects. |
| Allow Raw Data | Select to save data in both TruAccess (raw data) and DICOM format. Clear to save in DICOM format only. |
| Color Support | Select: Mixed or Color. Best performance when set to Color. |
| Use Button Settings | If “Use Button Settings” is checked, the system will use the default system image storage and compression presets. If “Use Button Settings” is unchecked, the Properties menu expands and the user can define the image storage and compression presets as desired. |
| Still Image Compression | Select the compression type: None, Rle, Jpeg, or Jpeg2000. Copy the compression settings from the local file for best performance. |

Table 10-94: DICOM Image Storage (Continued)

| Preset Parameter | Description |
|---|---|
| Clip Compression | None, RLE, JPEG, JPEG2000 |
| Clip Quality | Lossless, 50-95. 85 is the recommended quality setting. |
| Use RGB color format for JPEG2000 | Select to use RGB color format for JPEG2000 compressed images. (This option is visible only if Still, Clip or Volume compression is set to JPEG2000.) |
| Max Framerate | Select the maximum frame rate: Full, 25, 30, 60 or 80. |
| Reopen per image | When selected, the storage protocol uses a new association for each image sent. |
| Enable Structured Reporting | Select for Structured Reporting. |
| Apply Display Precision to Measurements | When Enable Structured Reporting is selected, Apply Display Precision to Measurements is available; select to apply the same precision for a Structured Report that is used on the scanner display. (Apply Display Precision to Measurements is always available for a DICOM SR Storage service.) |
| 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.

DICOM Print

DICOM Print provides the ability to send or receive ultrasound image data to DICOM printers.

Table 10-95: Properties

| Preset Parameter | Description |
|------------------|--|
| Vendor | Specify PACS Vendor. This enables annotation on patient information since by definition patient information is missing on the title bar. |
| 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. |

Table 10-95: Properties (Continued)

| Preset Parameter | Description |
|---------------------------|--|
| 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 film <ul style="list-style-type: none"> • Magazine – Store in a film magazine • Processor – Develop in a film processor |
| Magnification | Specify how the printer magnifies the image to fit it onto the film. <ul style="list-style-type: none"> • Replicate – Interpolated pixel are copies of the adjacent pixels • Bilinear – Interpolated pixels are created by bilinear interpolations between the adjacent pixels • Cubic – Interpolated pixels are created by cubic interpolations between the adjacent pixels • None – 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. |
| 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 10-96: 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.

Verify Before Query

Box Checked. The system DOES CHECK the DICOM connection status PRIOR to issuing the Query/Retrieve request. This way, the system ensures that the PACS server is 'alive' before performing the actual query. If the server is down, the scanner will not issue the query request and the system is accessible to the user within the configured "Verify Timeout (sec)" preset value which is ~10 seconds by default.

Box unchecked. The system DOES NOT CHECK the DICOM connection status PRIOR to issuing the Query/Retrieve request to the PACS server. If the server is down, the scanner is accessible only AFTER configured "Connection Timeout(sec)" value which is ~20 seconds by default.

Table 10-97: DICOM Query/Retrieve

| Preset Parameter | Description |
|------------------|--|
| Maximum Results | Specify the maximum number of patient records you want the system to retrieve when searching the patient database, up to 300, with the default set at 100. |
| Search Criteria | Displays the Search Criteria window, where you can enter search parameters for the system to use when searching the patient database. |

DICOM Query/Retrieve (continued)

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.*

Table 10-98: 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. |
| 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. |
| 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 also display/retrieve multiple series by patient on the Patient--> Data Transfer--> Q/R page.

DICOM Storage Commitment

DICOM Storage Commitment provides acknowledgement from PACS that the study has been accepted into archive.

Table 10-99: 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.

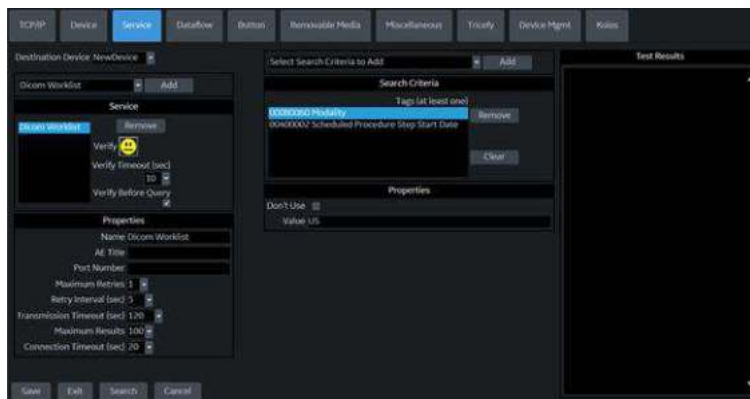


Figure 10-26. DICOM Worklist Service

Verify Before Query

Box Checked. The system DOES CHECK the DICOM connection status PRIOR to issuing the Worklist Query request. This way, the system ensures that the HIS/RIS server is 'alive' before performing the actual query. If the server is down, the scanner will not issue the query request and the system is accessible to the user within the configured "Verify Timeout (sec)" preset value which is ~10 seconds by default.

Box unchecked. The system DOES NOT CHECK the DICOM connection status PRIOR to issuing the Worklist Query request to the HIS/RIS server. If the server is down, the scanner is accessible only AFTER configured connection timeout value with configured number of retries, which is ~45 seconds.

DICOM Worklist (continued)

Table 10-100: DICOM Worklist

| Preset Parameter | Description |
|------------------|---|
| Max. 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. |

Table 10-101: 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. |
| 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. |
| 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. |

DICOM Export

DICOM Export allows you to export DICOM content.

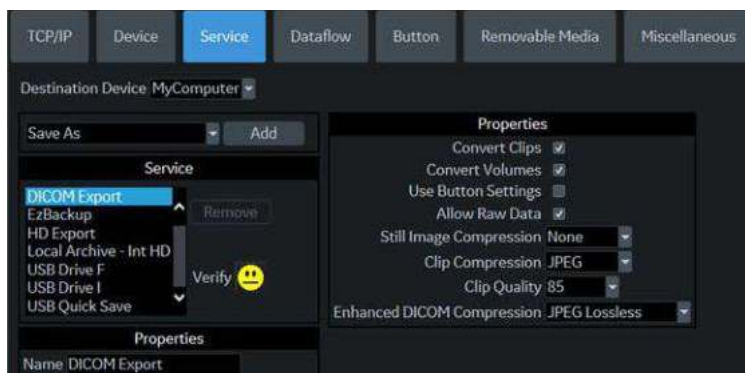


Figure 10-27. DICOM Export Service

Table 10-102: DICOM Export

| Preset Parameter | Description |
|----------------------------|--|
| Convert Clips | Select to convert raw clips to DICOM multi-frame clips. |
| Convert Volumes | Select to convert raw volume files to Enhanced DICOM format (DICOM 3D files). |
| Use Button Settings | If “Use Button Settings” is checked, the system will use the default system image storage and compression presets. If “Use Button Settings” is unchecked, the Properties menu expands and the user can define the image storage and compression presets as desired. |
| Allow Raw Data | Select to save data in both TruAccess (raw data) and DICOM format. Clear to save in DICOM format only. |
| Still Image Compression | Select the compression type: None, Rle, Jpeg, or Jpeg2000. Copy the compression settings from the local file for best performance. |
| Clip Compression | None, RLE, JPEG, JPEG2000 |
| Clip Quality | Lossless, 50-95. 85 is the recommended quality setting. |
| Enhanced DICOM Compression | None, RLE, JPEG Lossless, JPEG2000 Lossless |

EZBackup

EZBackup allows you to manage hard disk space while maintaining the patient database on the scanner, as well as to back up the patient database and images, by copying the data from the local drive to removable media.

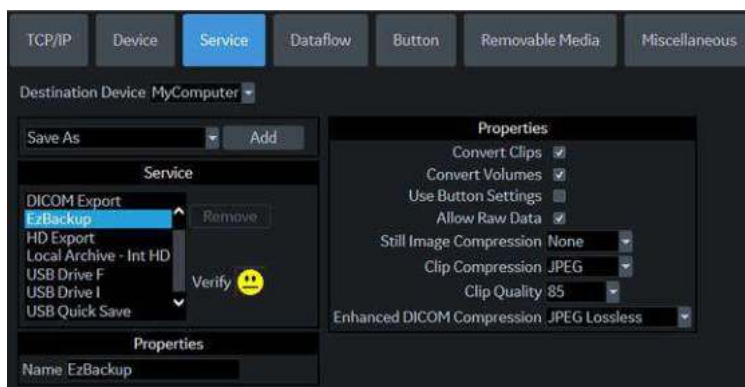


Figure 10-28. EZ Backup Service

Table 10-103: EZBackup

| Preset Parameter | Description |
|----------------------------|--|
| Convert Clips | Select to convert clips for EZBackup. |
| Convert Volumes | Select to convert volumes for EZBackup. |
| Use Button Settings | If “Use Button Settings” is checked, the system will use the default system image storage and compression presets. If “Use Button Settings” is unchecked, the Properties menu expands and the user can define the image storage and compression presets as desired. |
| Allow Raw Data | Select to save data in both TruAccess (raw data) and DICOM format. Clear to save in DICOM format only. |
| Still Image Compression | Select the compression type: None, Rle, Jpeg, or Jpeg2000. Copy the compression settings from the local file for best performance. |
| Clip Compression | None, RLE, JPEG, JPEG2000 |
| Clip Quality | Lossless, 50-95. 85 is the recommended quality setting. |
| Enhanced DICOM Compression | None, RLE, JPEG Lossless, JPEG2000 Lossless |

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 10-29. Dataflow Preset Menu

Table 10-104: Dataflow Properties

| 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. |

Key Object Selection: Image Deletion Notification

Image Deletion Notification is available ONLY for the Direct Store Workflow and only generated when there are images deleted during the exam. 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.

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.

Table 10-105: Print Button

| Parameter | Description |
|--|---|
| Physical Print Buttons • Print 1-4 • PrintAutoSweep | |
| M&A only (no images) | Configures the system to send a DICOM structured report only; no image is generated or sent. |
| Still Images | <ul style="list-style-type: none"> • Format: Ultrasound Image, Secondary Capture (Image, Video, Screen) • Compression: None, Rle, Jpeg, Jpeg2000 |
| Clips | <ul style="list-style-type: none"> • Clips: Add Multiframe Data: Checkbox • Compression: None, Rle, Jpeg, Jpeg2000 • Quality: Lossless, 99, 98, 97, ... 50 |
| Volume | Volume File Format*: 1-Standard DICOM (Default), 2-Standard DICOM with Raw Data; 3-Enhanced DICOM, 2&3 (2 files) |
| Note: The default Compression for Clips/Volumes is JPEG85. It is strongly recommended to keep the Compression set to JPEG85. | |

Table 10-105: Print Button (Continued)

| Parameter | Description |
|------------------------------------|--|
| Advanced | <ul style="list-style-type: none"> • VNav Data: V Nav View (Default), Ultrasound Only, or VNav & Ultrasound (2 files) • Compare Assistant: Comparison view (Default), New image, Both Comparison & New (2 files) • Scan Assistant Advance: On, Off, Use program (system uses setting from the Scan Assistant program which allows a user to configure two print keys identically except that one advances Scan Assistant and the other does not.) On =advances to the next step when that print key is pressed independently of the program setting. Off = does not advance to the next step when the print key is pressed independently of the program setting. Press "Application/Print Controls/Live Store" to hyperlink to the Application Print Controls utility page. |
| Active Images Page: Standard Print | |

Removable Media

The Removable Media tab allows you to:

- Verify the DICOM directory on removable media.
- Verify the free space of the media.

NOTE: *Currently, the DVD-R Capacity displays the wrong value of 650 MB.*

- 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).

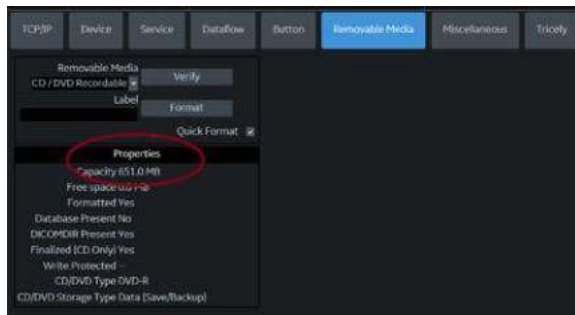


Figure 10-30. Removable Media Preset Menu

Table 10-106: 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 | <ul style="list-style-type: none"> • 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.

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.

NOTE: Select Full Format (do not check Quick Format box) when formatting a new MOD for the first time.

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.

Table 10-107: Patient/Exam Menu Options

| Preset Parameter | Description |
|---|--|
| Use birthdate | In the Patient information window, enter either the patient age or the birth date:When selected, enter birth date, then the age is calculated.When cleared, 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 of patient ID | In the Search/Create Patient window:When selected, the Patient ID is not required when entering a new patient in the archive. The system automatically generates an ID number.When cleared, the Patient ID is required when entering a new patient in the archive. |
| Auto Archiving patient data | Archives patient data automatically. |
| After [End Current Patient], go to: | Select Worklist screen or Patient screen. |
| Keep Search String | Search string is kept rather than cleared. |
| Worklist Auto Query | Automatically queries the worklist server. |
| Validate Incoming Worklists | Confirm incoming Worklists are valid. |
| Link Measurements to Images | Check to link measurements to images when sent to PACS. |
| Verify all Measurements have Image References | Check to verify that all measurements have image references when sent to PACS. |
| 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. |

Table 10-107: Patient/Exam Menu Options (Continued)

| Preset Parameter | Description |
|---|--|
| 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: <ol style="list-style-type: none"> 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 10-108: Patient/Exam Message Options

| Preset Parameter | Description |
|---|--|
| 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. |
| 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 10-109: Columns in examination listing

| Preset Parameter | Description |
|--------------------------------|--|
| Columns in examination listing | Create new columns, remove columns, and select the information to display in a column. <ol style="list-style-type: none"> 1. Move the Trackball to highlight a column. 2. Press Set. 3. Use the arrows (<< or >>) to reposition column headings. |

Table 10-110: Print and Store Options

| Preset Parameter | Description |
|----------------------------------|---|
| P[1-4] Key Sound | Select None, Click, Chimes, Ding, Ding-Dong, or Whoosh. |
| Enable Smart Capture Area | Check box to select. |
| Store 2D Loop with Timeline Data | Check box to select. |

Table 10-110: Print and Store Options (Continued)

| Preset Parameter | Description |
|--|--|
| Patient List Print-Font Size | Select font size. |
| Add Titlebar Information to Multiframe Loops | Adds a title bar to the DICOM image. |
| Add Scan Parameter Information to Multiframe Loops | Adds scan parameter(s) to the DICOM image. |
| Send Images via Wireless | When connected to the network via Wireless LAN and this box is checked, images will be sent to the DICOM device over the Wireless LAN. If not checked, images spooled in the Spooler will be sent when the system is connected to the wired network. |
| Receive Images via Wireless | When connected to the network via Wireless LAN and this box is checked, images will be received from the DICOM device over the Wireless LAN. If not checked, images will be received when the system is connected to the wired network. |
| Store DICOM MultiFrame When Collecting RF Data | Select to store DICOM MultiFrame images when collecting RF Data |
| Store DICOM MultiFrame in QAnalysis packages | Select to store DICOM MultiFrame images in Quantitative Analysis mode. (Selected by default.) |
| Allow press and hold print key to replace an image | Select to enable pressing and holding print key to replace an image. |
| Send To: Default Service | Select default Send To service from dropdown list. |

Table 10-111: 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. |
| 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) |

Table 10-112: Image Numbering

| Preset Parameter | Description |
|---|--|
| Use Scan Assistant image reordering/numbering | Select to use Scan Assistant image reordering/renumbering. |
| Show image number on Active Images screen | Select to show image number on Active Images screen. |

Table 10-113: LOGIQ Apps

| Preset Parameter | Description |
|--------------------------|---|
| Unpair Bluetooth Devices | Select to unpair the LOGIQ Apps device. |

Table 10-114: Imaging Insights

| Preset Parameter | Description |
|---|--|
| Store incremental analytic data in each image | Select to store incremental data in each image. |
| Send consolidated analytic data to server | Select to send consolidated analytic data to server. |
| Trigger interval outside an exam (hours) | Off, 1, 2, 3, 5 |
| Server | Select server from dropdown list. |

Tricefy Activation

Tricefy is a cloud-based image viewer and a platform to archive, collaborate, and share. The corresponding DICOM destinations can be used via the Print keys. An internet connection is necessary for uploading data to Tricefy.

As soon as the Tricefy option is enabled, relevant Tricefy items are displayed.

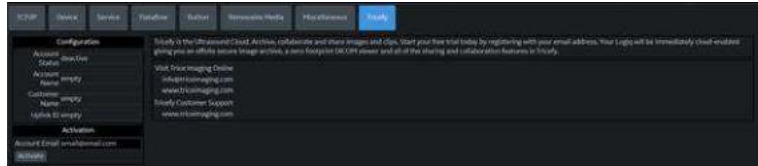


Figure 10-31. Tricefy Preset Menu

Table 10-115: Configuration

| Preset Parameter | Description |
|------------------|-----------------------|
| Account Status | Active/Inactive |
| Account Name | Name for the account. |
| Customer Name | Customer's name. |
| Uplink ID | Uplink ID. |

Table 10-116: Activation

| Preset Parameter | Description |
|------------------|---------------------------------------|
| Account E-mail | Account mail |
| Activate | Press to activate the Tricefy option. |

Device Mgmt Configuration

Device Mgmt is a remote device management tool that enables bi-directional management capabilities on the device. See 'Device Mgmt' on *page 13-498 for more information.*

Cloud Sign-Up

Before Device Mgmt can be activated, the Device Owner must register a valid e-mail address on the Cloud at:

<http://AVURI.gehealthcare.com/signup>

Activate Device Mgmt



Figure 10-32. Device Mgmt Connectivity Page

To activate Device Mgmt:

1. Go to Utility > Connectivity > Device Mgmt.
2. Under Configuration, set the configuration parameters (see Table 10-117 on *page 10-95*).
3. Select **Save** at the bottom of the screen to save configuration parameter changes.
4. Select **Activate**.

The activation result is displayed.

NOTE: For more information on configuring Device Mgmt for activation, refer to the *LOGIQ Fortis Basic Service Manual*.

Activate Device Mgmt (continued)

Table 10-117: Configuration Parameters

| Parameter | Description |
|------------------------------|--|
| Account E-mail | E-mail address of the Device Owner used for registration on Cloud. The email address MUST be the same, valid email address registered during Cloud Sign-up. |
| Registration Key | Product specific key strings, pre-populated by the device (can be overwritten if necessary). |
| Server URL | URL of registration server strings, pre-populated by the device (can be overwritten if necessary). |
| Proxy Server (Optional) | Proxy server address of the facility. |
| Proxy Port (Optional) | Port number of the Proxy server. |
| Proxy User Name (Optional) | Account user name of the Proxy server. |
| Proxy Password (Optional) | Account password of the Proxy server. |
| Upload/Download Timeout(sec) | Upload is used during Auto Backup, Manual Backup and Upload for Fleet. Download is used during install. The timeout pulldown is displayed only when Device Mgmt is Active. |
| Query Timeout(sec) | Query runs when user starts New Patient, End Current Patient, Log off, Log on, or Unlock lock screen. The timeout pulldown is displayed only when Device Mgmt is Active. |

Device Mgmt Group Rights

Device Mgmt activation requires the following Device Mgmt Group Rights.

Device Mgmt Administration Group Rights

- Activate
- Upload for Fleet

Advanced Configuration Group Rights

- Manual Backup/Backup Automatically
- Receive Installation Notification
- Install from Cloud

NOTE: For more information on configuring Device Mgmt for activation, refer to the LOGIQ Fortis Basic Service Manual.

Update Connection Configuration

Proxy information and the Registration Key can be updated after Activation.

1. Go to Utility > Connectivity > Device Mgmt.
2. Edit the Server URL, Proxy Server, Port, User Name, Password, Upload/Download Timeout and Query Timeout fields, as needed.

NOTE: *Account Email may not be modified.*

3. Select **Save** at the bottom of the screen to save configuration parameter changes.
4. Select **Update Connection Configuration**.

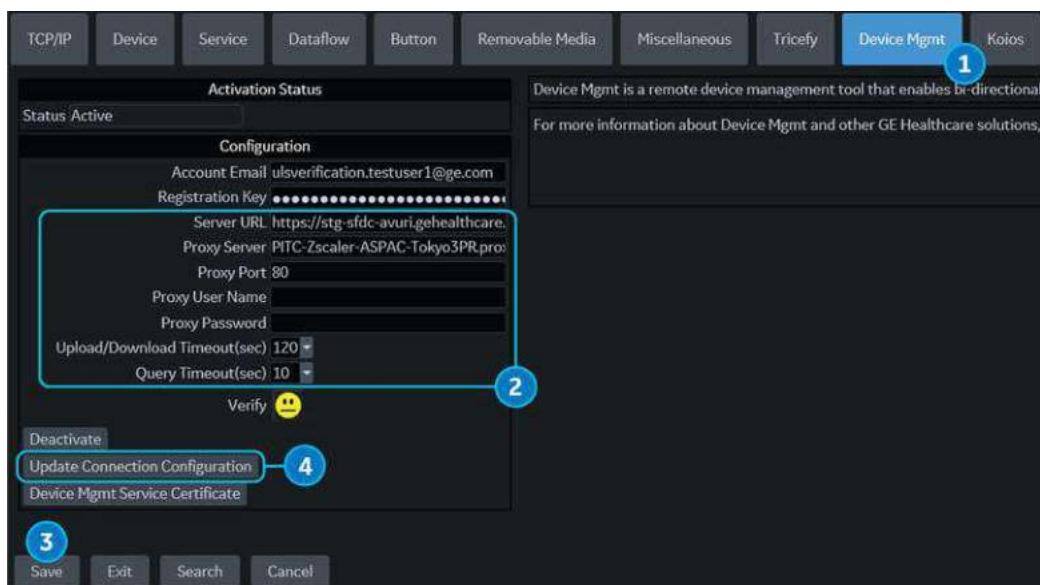


Figure 10-33. Update Connection Configuration

Update Account Email

To update the account email from the system:

1. Go to Utility > Connectivity > Device Mgmt.
2. Select **Deactivate** to deactivate the configuration.
3. Under Configuration, set the configuration parameters (see Table 10-117 on page 10-95).
4. Select **Save** at the bottom of the screen to save configuration parameter changes.
5. Select **Activate**.

The activation result is displayed.

Koios DS Configuration (not available in all countries)

Koios DS is a Breast and Thyroid Analysis Option. Koios DS is integrated with the LOGIQ Fortis via DICOM and is configured similar to a DICOM Service. The user can accept/dismiss analysis results. If accepted, these results are included in the DICOM Structured Report.

Activate Koios DS

1. Access the Utility--> Connectivity--> Koios Configuration page.
- NOTE: The Koios DS Configuration page will only appear if the option activation code is present. If there is no option activation code, the Koios tab will not display.*
2. Type in the IP address of the Koios DS Server.
 3. Select **Activate**

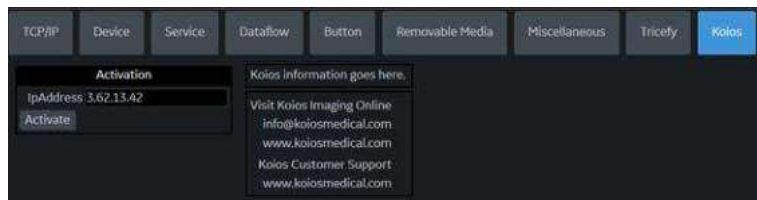


Figure 10-34. Activate Koios DS

4. You will receive notification upon successfully connecting to the Koios DS Server (The activation was successful. Your system is connected to Koios DS). Confirm (Save Changes? --> Ok) that you want to save the changes on this Configuration page.
5. Confirm that the connection was successful by pinging the Koios DS Server via the Utility--> Connectivity--> Device page.

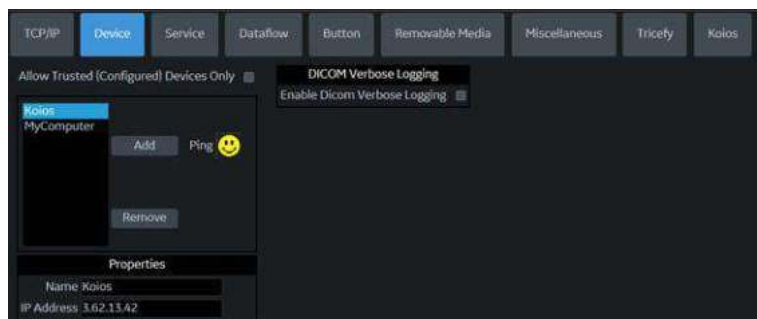


Figure 10-35. Ping the Koios DS Server

Activate Koios DS (continued)

6. Confirm that the Koios DS Assessment service is running by pinging the “Koios Assessment” service via the Utility--> Connectivity--> Service page.



Figure 10-36. Ping the Koios DS Assessment Service

Deactivate Koios DS

1. Access the Utility--> Connectivity--> Koios Configuration page.
2. Select **Deactivate**.

Configuration

Table 10-118: Koios DS Breast

| Parameter | Description |
|------------------------------|--|
| Lesion Classification System | Select BI-RADS or U1-U5. |
| Include Result in DICOM SR | Select to save Koios Breast results to Structured Reporting. |

Table 10-119: Koios DS Breast - Results Dialog

| Parameter | Description |
|--------------------------|-------------------------------------|
| Show Classification Name | Select to show classification name. |
| Show Banner in Color | Select to show banner in color. |

Table 10-120: Koios DS Breast - Assessment Menu

| Parameter | Description |
|--------------------------|-------------------------------------|
| Show Classification Name | Select to show classification name. |
| Show Banner in Color | Select to show banner in color. |

Table 10-121: Koios DS Breast - Summary

| Parameter | Description |
|--------------------------|-------------------------------------|
| Show Classification Name | Select to show classification name. |
| Show Banner in Color | Select to show banner in color. |

Table 10-122: Koios DS Thyroid - Results Dialog

| Parameter | Description |
|--------------------------|-------------------------------------|
| Show Classification Name | Select to show classification name. |
| Show Banner in Color | Select to show banner in color. |
| Show Recommendation | Select to show recommendation. |

Table 10-123: Accept Key

| Parameter | Description |
|---|--|
| Display Key | Select to display this key in the Results dialog. |
| Save Image for Off Scanner Koios Analysis | Select to save the image sent to Koios in the exam for off scanner analysis. |
| Save Descriptors to Exam | Select to save Descriptors from Koios Analysis to the exam. |
| Save Koios Analysis to Exam | Select to save Koios Analysis result to the exam. |

Table 10-124: Review Key

| Parameter | Description |
|---|--|
| Display Key | Select to display this key in the Results dialog. |
| Save Image for Off Scanner Koios Analysis | Select to save the image sent to Koios in the exam for off scanner analysis. |
| Save Descriptors to Exam | Select to save Descriptors from Koios Analysis to the exam. |
| Save Koios Analysis to Exam | Select to save Koios Analysis result to the exam. |

Measure

Please refer to Chapter 7, General Measurements and Calculations for more information on setting up Measurement and Analysis Presets.

Reports

Refer to Chapter 13 for more information.

System Administration

Overview

The Admin screen has the following 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, registration of staff related to an examination (for example, referral doctors and sonographers) and password update requirements.
- **Logon** – defines logon procedures, allows the System Administrator to set password policies, and LDAP Configuration.
- **Groups** – The System Administrator can set up user groups on this page.
- **System Password** – Password for the Application Windows Logon Account.
- **Disk Encryption** – The System Administrator can encrypt the disk for highest system security, if required.
- **Audit Report** – Generates an audit report.
- **Vulnerability Scan Mode** – Part of the Advanced Security Option. Vulnerability Scan Mode configures the system so that an external scanner can analyze the LOGIQ Fortis.

NOTE: Only the System Administrator can access the pages.

Administrator Tasks

Here are the tasks typically performed by the LOGIQ Fortis System Administrator. Instructions for each of these tasks can be found in this chapter.

- Privacy and Security Configuration options
- Define connection options for LDAP Directory Server
- Control encryption of the Patient Data drive
- Create Users/Groups
- Change rights for Users/Groups
- Change Encryption status for the system
- Change/Add Encryption Passwords
- Save/Print Recovery keys for encrypted drives
- Configure Password Policies
- Configure Session Policies
- Vulnerability Scan Mode
- Generate Audit Reports
- Configure Remote Logging Servers

Privacy and Security

Privacy protects both personal and private interests and information of persons. Security protects both system and information from risks to confidentiality, integrity, and availability. The LOGIQ Fortis Privacy and Security capabilities are discussed in Chapter 12; Privacy and Security configuration is discussed below, followed by a description of each system administrative page.

Creating Password Policies and User Groups

The foundation of setting up effective privacy and security is controlling user groups, users, and their system permissions.

Enabling Password Policies

Check the “Enable Password Policies” box on the Utility-> Admin-> LOGON page.

In addition, set the password policy for each selection. These policies should be set **BEFORE** creating new users. Save the changes and reboot the system. This applies rules for the passwords.



Ensure the ADM password is known **BEFORE** rebooting the system.



Figure 10-37. Enable Password Policies

Groups

You define Group access rights via the Utility-> Admin-> Groups page. When each user logs in, they will have access to the system according to the rights assigned to their group(s). Default system groups are preset with pre-determined access rights. To view these access rights, highlight a group name in the Group List column on the left, then look in the Groups Rights column to see the permissions by group.



Admin has full access rights.

| Group List | | Name and Description | Factory Defaults | | | | | |
|---|-------------------------------------|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------|----------------|
| <ul style="list-style-type: none"> BioMed DiagPhys EmergencyUser LeadSonographer Operator Physician RefDoc Sonographer SysAdmin | | Id BioMed Description Facility BioMed Group Rights Login <input checked="" type="checkbox"/> Admin <input checked="" type="checkbox"/> Create Patient Data <input checked="" type="checkbox"/> Update Patient Data <input checked="" type="checkbox"/> Delete Patient Data <input checked="" type="checkbox"/> Transfer Patient Data <input checked="" type="checkbox"/> Export Patient Data <input checked="" type="checkbox"/> Import Patient Data <input checked="" type="checkbox"/> Basic Configuration <input checked="" type="checkbox"/> Imaging Configuration <input checked="" type="checkbox"/> Advanced Configuration <input checked="" type="checkbox"/> Authorize Remote Service Access <input checked="" type="checkbox"/> Capture Logs <input checked="" type="checkbox"/> Capture Logs with PHI <input checked="" type="checkbox"/> Access Service Desktop <input checked="" type="checkbox"/> | SysAdmin | BioMed | Lead Sonographer | Sonographer | Physician | Emergency User |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
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| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |

Figure 10-38. Groups Page

Adding users

You define Group access rights via the Utility-> Admin-> Users page.



Figure 10-39. Page to Add Users

Creating a user

1. Press **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 (_), ampersand (&), or blank spaces.

NOTE:

3. Type the user's information in the Identity section, ensuring that you are using the defined policies. User IDs are enforced as all uppercase letters for local users.

If a password is created, the user will be required to enter the password when logging on, even if Password Policies is not enabled. Remember, passwords are case-sensitive.
4. Select the user's group(s). Multiple groups can be selected, if needed.

Creating a user (continued)

5. If the user needs full configuration and advanced operations access, select **Admin**.
6. Press **Save**.

NOTE: DO NOT add users with the same User ID. The system allows you to do this; however, the first user is erased and only the second user 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.*

User Login

After the system administrator adds a new user, the new user should login with their new user name and password. If designated by the system administrator, they may be required to change their password.

The user will be prompted for their password when logging into the system or when selecting their user name from the Patient menu as well.

After logging in, the user will have access according to the rights available to them within their assigned group(s).

Changing a user configuration

The system administrator can update a user. The system administrator can also specify whether the user's account is "Active," "Blocked," or requires a password change. If needed, select the check box, "User must change password." Then the user will be prompted to change their password the next time they log into the LOGIQ Fortis.

1. Move the **Trackball** to a user ID in the User List.
2. Make the desired changes.

Deleting a user

The system administrator can delete a user.

1. Move the **Trackball** to a user ID in the User List.
2. Select **Remove**. This marks the account as inactive.
The user is removed from the User List.
3. Select Remove again.

NOTE: *Accounts are not removed immediately because User data is retained for auditing purposes. This can be useful because their name will still appear in audit reports. Also, they can be reactivated.*

If you permanently remove the user, by selecting "Remove" on an inactive user, this traceability will be lost.

User Accounts and Password Policies Frequently Asked Questions

Here are answers to some frequently-asked questions:

Q I lost or forgot my password.

A System Admin can change your password.

Q I entered the wrong password multiple times and now the system says I am locked out.

A Wait until you are unlocked, enter the correct password. If you have forgotten your password, the System Admin can access the system and user details. Utility>Admin>Users

Q I am locked out after multiple attempts to remember my password, does the System Admin have to wait until my account is unlocked before accessing the system?

A The System Admin can logon with their own logon information before the users blocked time is over. The box "Block user account" Utility>Admin>User, should be unchecked to allow the user to logon.

Q I have created a list of users on one u/s system, I have three more in the department, can I do a backup to disk and restore the user list onto the other systems?

A Yes, you can copy both User and Password.

User Accounts and Password Policies Frequently Asked Questions

(continued)

Q I have a sonographer who left the facility, how do I delete this user?

A The System Admin can deactivate or delete a user. Utility>Admin>Logon. Select the user and press "remove"

Q I have a sonographer who is on medical leave for a few weeks. I do not want to remove their user logon but I want to make sure they cannot access the system while not working.

A The System Admin can block a user account. Utility>Admin>Logon, select the user and check "Block user account," or deselect "active user account."

Q We have information that a weekend users password may have been compromised, I need to ask the user to change their password the next time they logon.

A The System Admin can require the user to change their password. Utility>Admin>Logon, select the user and check "Require password change"

Q I have created a new user for a new sonographer, how do I assign the correct group?

A When a new user is added to the list, the groups list is located on the right column of the screen. Assign the user to a group or multiple groups with the appropriate access rights.

Q Can I change the access rights for a pre-defined group?

A Currently this is not supported. You can select multiple groups from the factory default list for any user that needs additional access but not full admin rights; or create your own groups with desired rights.

Q The default "ADM" user account does not have a password, can I create a password for this account?

A Yes, you can create a password for the default ADM. Be sure to write this down for anyone who will need access to the system, such as GE Service.

User Accounts and Password Policies Frequently Asked Questions

(continued)

Q I was the last user on the system, the screen has gone black, do I need to logon again?

A Yes, once the Screen Lock time has been reached touch any button or the trackball on the operator panel to display the logon screen. Logon with your current credentials.

Q Can I use the Auto Logon feature?

A Yes, the Auto logon if checked will logon with the last user if the “Use password policies” is unchecked and the user has blank password. If the user is not assigned a password they will be logged on with no other entry required. If the user is assigned a password the logon window will pop-up requiring the password to be entered.

Locking the Screen and Logon

You define Automatically Lock Screen via the Utility-> Admin-> Logon page by checking the Enable Session Timeout (Lock Screen) box. Then go to the bottom of the column to designate after how many minutes the screen should be locked (Session Lock Screen Timeout (min)).

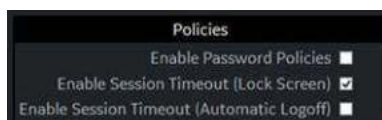


Figure 10-40. Enable Lock Screen

The screen will lock after the designated time. During this time, the system will be completely black. To reactivate the system, the user will need to logon again.

NOTE: *If “use password policies” is unchecked and no password is set to the user, and when Auto Logon is checked, the system will start by using the ID of the last operator. If Admin is used as the operator, assure that all characters are removed from the password field.*

To lock the screen,

- Type [Alt+L].

System Admin

The System Admin screen has information about any options implemented for the system.

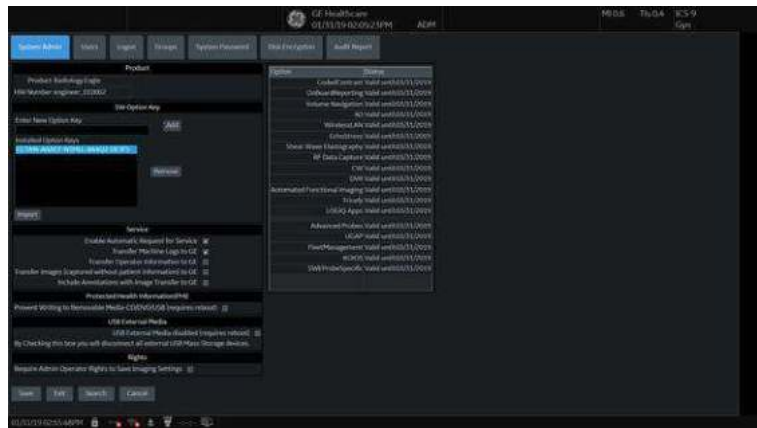


Figure 10-41. Administrative System Admin Preset Menu

Table 10-125: Product

| Preset Parameter | Description |
|------------------|-------------------------------------|
| Product | The name of the product. |
| HW Number | The hardware number of the product. |

Table 10-126: Software Option Key

| Preset Parameter | Description |
|-----------------------|--|
| Enter New Option Key | Type the key for the option you wish to add and press Add. <i>Note: The Option Key may contain alphanumeric characters (2-9, A-H, J-N, P-Z) and special characters ("?", "%", and "&").</i> |
| Installed Option Keys | Lists the key for the installed options. |
| Add | Press to add a software option key. |
| Remove | To remove a software option key, select the key in the SW Option Key list, and then select Remove. |
| Import | Used to import option strings stored on media (USB or DVD) or in the system (OptionKeys.txt may be stored at d:\service). When you press Import, a dialog box comes up that allows you to select from the following locations: USB drive, DVD drive, and d:\service. |

Table 10-127: Service

| Presets Parameter | Description |
|--|---|
| Enable Automatic Request for Service | Check this box to enable the system to send system-generated requests for service, without your intervention. |
| Transfer Machine Logs to GE | Allows transfer of monitoring errors and status logs to GE back office for data analytics. |
| Transfer Operator Information to GE | Allows transfer of operator information to GE back office for usage analytics. |
| Enable Automatic Probe Diagnostics | Enable Automatic Probe Diagnostics to run and save data to log file for transfer to GE backoffice for analysis. |
| Transfer Images (captured without patient information) to GE | Allows transfer of images for analysis. |
| Include Annotation with Image transfer to GE | Usage Analysis: Allows transfer of operator information to GE back office for usage analytics. |

If your site decides to deactivate the InSite ExC Agent, then Remote Connectivity is no longer available on the LOGIQ Fortis. This also means that Remote Service can no longer connect to the LOGIQ Fortis via Disruptive Mode to diagnose system issues. and the “Service” section will be removed from this Utility page. In addition, you will not be able to initiate a Request for Service or Clinical Support Request via the “GE InSite ExC” icon control located at the bottom of the Monitor Display.

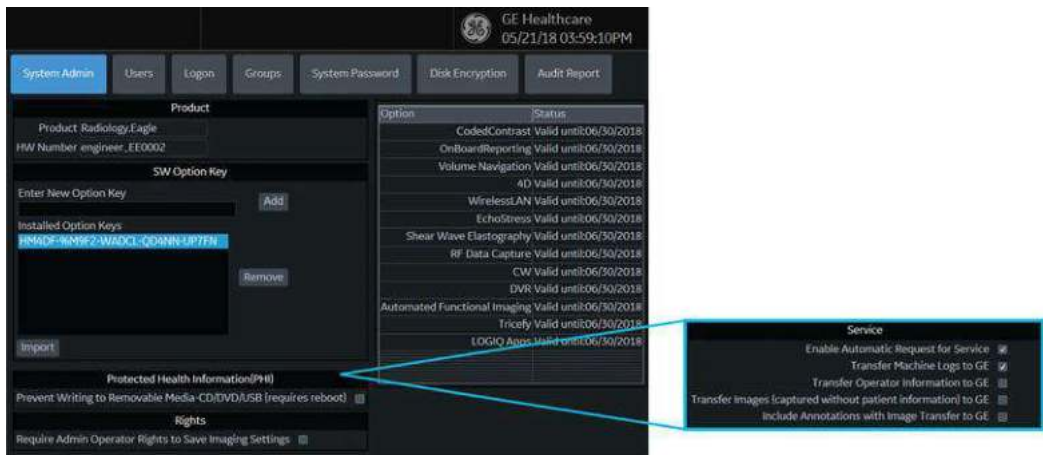


Figure 10-42. Remote Connectivity Deactivated; Service Fields Removed

Table 10-128: Protecting Health Information (PHI)

| Preset Parameter | Description |
|---|---|
| Prevent Writing to Removable Media CD/DVD/USB (requires reboot) | Check this box to prevent users from copying/saving information to removable media. |

Table 10-129: USB External Media

| Preset Parameter | Description |
|---|---|
| USB External Media disabled (requires reboot) By Checking this box you will disconnect all external USB Mass Storage devices | Select to disable any USB media from connecting to the LOGIQ Fortis. Please remember to enable this feature to reload software or to install the eIFU USB Media. |

Table 10-130: Rights

| Preset Parameter | Description |
|--|---|
| Require Admin Operator Rights to Save Imaging Settings | Check this box to require the User to have Administrative rights in order to save image settings. |

Table 10-131: Option Status

| Preset Parameter | Description |
|------------------|---------------------------------------|
| Options | A list of the option name and status. |
| Status | Lists each option's effectivity. |

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 10-43. Users Preset Menu

Table 10-132: 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. |
| User Controls | The System Administrator can specify whether a user’s account is active, blocked, or requires a password update. |
| 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. Note, other groups may exist as set up by the System Administrator. |

Logon

The Logon section defines log on procedures.

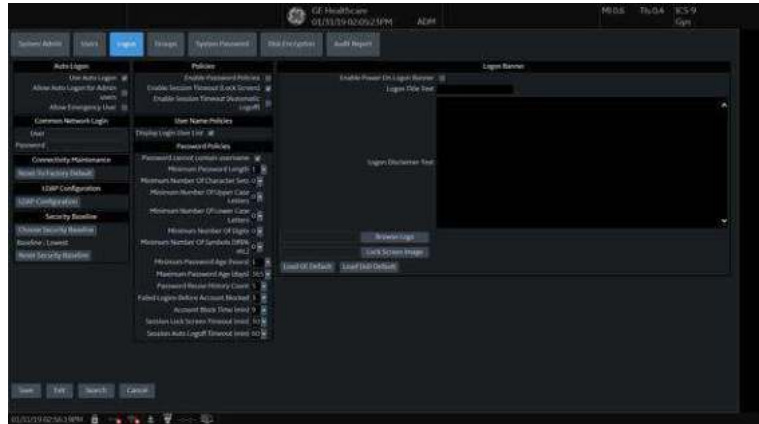


Figure 10-44. Administrative Logon Preset Menu

Table 10-133: Logon

| Preset Parameter | Description |
|--------------------------|--|
| Auto Logon | <p>Specifies logon procedures:</p> <ul style="list-style-type: none"> • Use Auto Logon <ul style="list-style-type: none"> • When selected, the system is started automatically, using the last user logon. • When blank, the user must select a user ID and enter a password when logging on. <p>Note: Auto LOGON only works when password policies are disabled and if there is no password assigned to the user.</p> <ul style="list-style-type: none"> • Allow Auto Logon for Admin users: The system is started automatically when logging in as an ADM user. • Allow Emergency User: The system will allow the EUSR user for emergency use. |
| Common Network Login | <p>Specifies the user ID and password used to access the network.</p> <ul style="list-style-type: none"> • User – User ID for network access • Password – Password for network access |
| Connectivity Maintenance | Reset to factory default. |
| LDAP Configuration | Refer to the next section for LDAP instructions. |

Table 10-133: Logon (Continued)

| Preset Parameter | Description |
|-------------------|--|
| Security Baseline | <p>Choose Security Baseline. Select a baseline set of security policies for password and session management. For example:</p> <p>Lowest (default): Autologon available. No password complexity rules.</p> <p>Medium: Autologon unavailable. Passwords must meet the following criteria:</p> <ul style="list-style-type: none"> • Minimum password length of 8. • Minimum of 2 character sets. • Password should not contain username. • Password should not be any of the last 10 passwords. <p>High: Autologon unavailable. Passwords must meet the following criteria:</p> <ul style="list-style-type: none"> • Minimum password length of 10. • Minimum of 4 character sets. • Minimum of 1 lower case characters. • Minimum of 1 upper case characters. • Minimum of 1 special characters. • Minimum of 1 digits. • Password should not contain username. • Password should not be any of the last 15 passwords. <p>Highest: Autologon unavailable. Passwords must meet the following criteria:</p> <ul style="list-style-type: none"> • Minimum password length of 14. • Minimum of 4 character sets. • Minimum of 1 lower case characters. • Minimum of 1 upper case characters. • Minimum of 1 special characters. • Minimum of 1 digits. • Password should not contain username. • Password should not be any of the last 25 passwords. <p>Reset Security Baseline: Clears the stored value for customer-selected security baseline. This forces the dialog which allows you to choose a baseline to be presented at the next Admin logon.</p> |

Table 10-134: Policies

| Preset Parameter | Description |
|---|--|
| Enable Password Policies | Specify whether to enable establishing policies for acceptable passwords, This specifies Password requirements such as # of letters, numbers, symbols, etc. |
| Enable Session Timeout (Lock Screen) | <p>2-step logout:</p> <ol style="list-style-type: none"> 1. System will display a lock screen after a set amount of time (configurable below under "session Lock Screen Timeout"). 2. System attempts to logout the user if "Automatic Logoff" is enabled and the timeout for it is reached or another user logs in instead. |
| Enable Session Timeout (Automatic Logoff) | This logs out a user automatically after a set amount of time. |
| Require Logon At Startup | Select to require logon with password at startup. |

Table 10-135: User Name Policies

| Preset Parameter | Description |
|-------------------------|--|
| Display Login User List | Check this box to display a list of Users. |

Table 10-136: Password Policies

| Preset Parameter | Description |
|---|--|
| Password cannot contain username | Password policy stating that the password cannot contain the user's name. |
| Minimum Password Length | Password policy for password minimum length. |
| Minimum Number of Character Sets | Password policy for minimum number of characters types (Upper-Case, Lower-Case, Digits, Symbols). |
| Minimum Number of Upper Case Letters | Password policy for minimum number of upper-case letters allowed (A, B, C, etc.) |
| Minimum Number of Lower Case Letters | Password policy for minimum allowed for number of lower-case letters (a, b, c, etc.) |
| Minimum Number of Digits | Password policy for minimum number of numbers (1, 2, 3, etc.) |
| Minimum Number of Symbols (~#\$% etc.) | Password policy for minimum number of symbols allowed (#, @, etc.). |
| Minimum Password Age (hours) | Password policy for the minimum age for a password, in hours. |
| Maximum Password Age (days) | Password policy for the maximum age for a password, in days. |
| Minimum Changes Between Passwords | Password policy for the minimum number of changes between passwords. |
| Maximum Number Of Repeated Characters | Password policy for the maximum number of repeated password characters. |
| Maximum Number Of Sequential Characters | Password policy for the maximum number of sequential password characters. |
| Password Reuse History Count | Password policy -- users can't reuse old password -- # of old passwords it stores so you can't reuse it |
| Failed Logins Before Account Blocked | Password policy for the number of failed attempts to login that are allowed. |
| Do Not Allow Common Passwords | Select to disallow commonly used passwords. |
| Account Block Time (min) | There's a policy which will block an account for a certain amount of time after a certain number of failed logins -- you can set how long that time is |
| Session Lock Screen Timeout (min) | Password policy for the time, in minutes, before the system will lock the screen. |

Table 10-136: Password Policies

| Preset Parameter | Description |
|-----------------------------------|---|
| Session Auto Logoff Timeout (min) | Password policy for the time, in minutes, before the system will automatically log a user off the system. |

Logon Banner

The Power On Logon Banner displays the text at power-on and requires user confirmation to complete booting the system. This is user-configurable.

Updating the Logon Banner Page

You can change the text that displays when the user logs onto the LOGIQ Fortis via the Utility-> Admin-> Login screen.

There are three login screens that can be used:

- GE Default Login Screen
- Department of Defense (DoD) Default Login Screen
- User-customized Login Screen

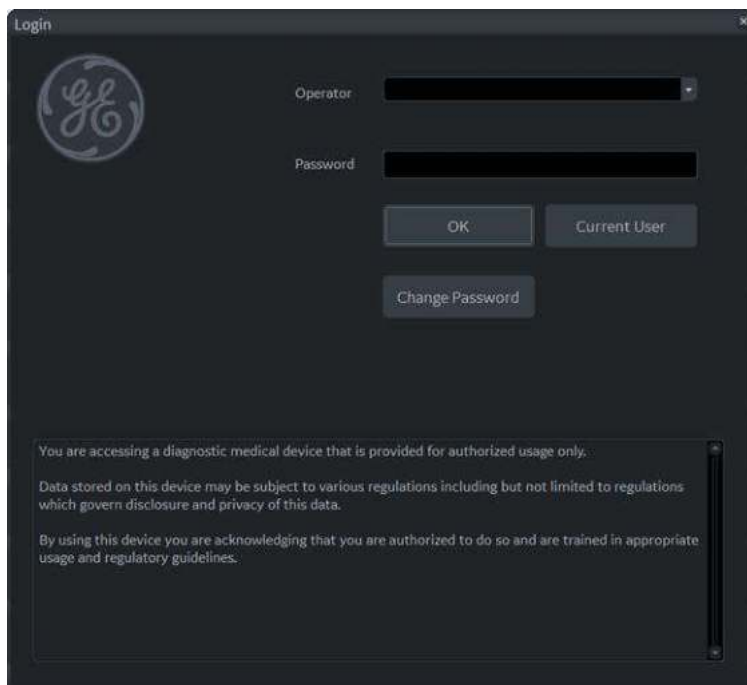
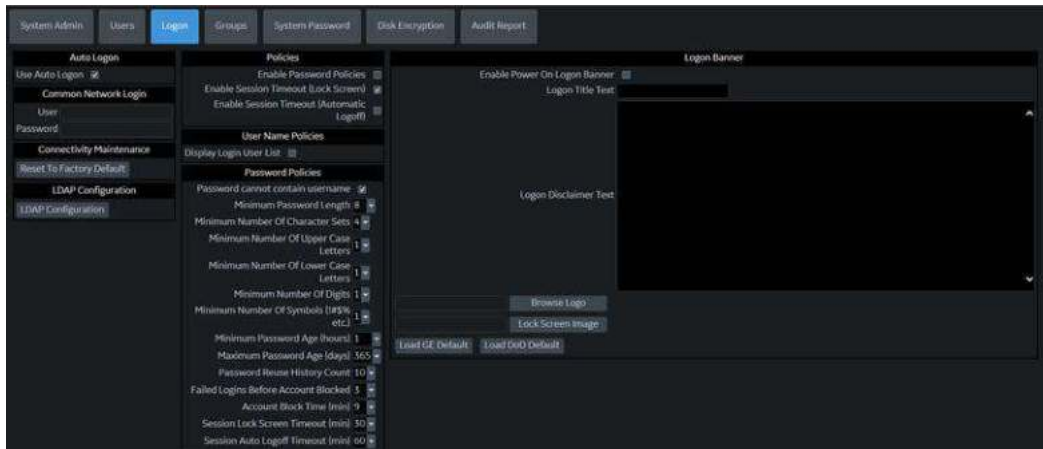


Figure 10-45. GE Default Login Window

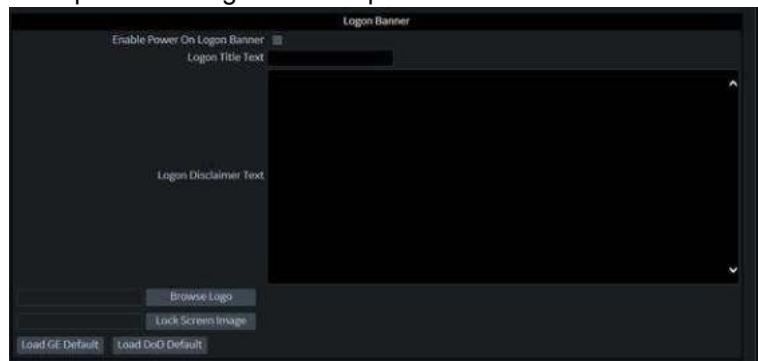
Updating the Logon Banner Page (continued)

To configure a customer-specific Login Banner page,

1. Access the Utility-> Admin-> Login screen.



Update the Logon Banner portion of this screen:



2. Type the Title into Logon Title Text.
3. Type the text into Logon Disclaimer Text.
4. Press Save.

Updating the Logon Banner Page (continued)

To set the GE Default as the Login window, press Load GE Default. Then press OK-> Save.

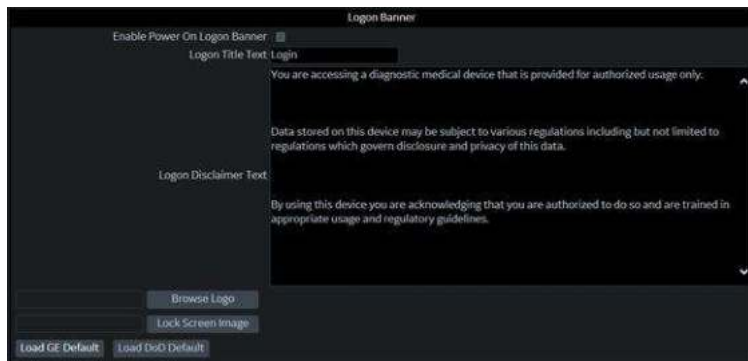


Figure 10-46. Default GE Logon Banner

To set the DoD Default as the Login window, press Load DoD Default. Then press OK-> Save.

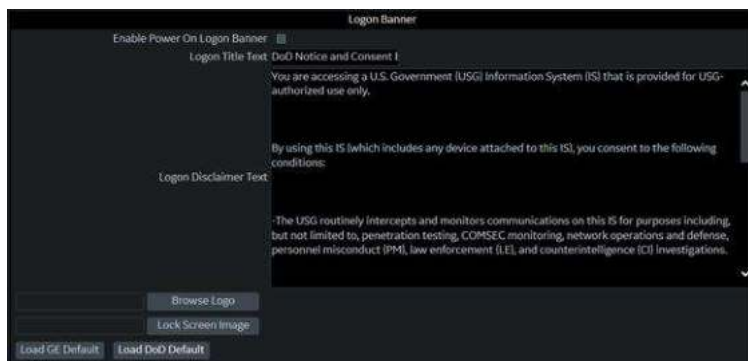


Figure 10-47. Department of Defense Logon Banner

Enabling the Power On Logon Banner

To ensure the Power On Logon Banner displays and requires user confirmation to complete booting the system,



Figure 10-48. Power On Logon Banner

1. Access the Utility-> Admin-> Login screen.
2. Checkmark **Enable Power On Logon Banner**.
3. Press Save and Exit.

Adding a Logon Logo

The system default logo on the LOGIQ Fortis is the GE Logo. To add your own Logo,

1. Insert the USB Flash Drive with the Logo into a USB port on the LOGIQ Fortis.

Specifications: The 'Logo' image should be a bitmap image (.BMP) format ONLY, with a size of 128x128.

2. Navigate to the Utility-> Admin-> Login screen.
3. Select Browse Logo. A pop-up window appears for you to navigate to the USB Flash Drive and Logo you want to add.
4. Select the Logo. Select OK. Then Save.

Adding a "Lock Screen" Image

You can add a custom lock-screen image.

Specifications: The 'Lock Screen' image should be a bitmap image (.BMP) format ONLY, with a size of 1920x1080.

NOTE: Please select a screen that does not have high contrast or bright colors.

To add a 'Lock Screen' image,

1. Insert the USB Flash Drive with the image into a USB port on the LOGIQ Fortis.
2. Navigate to the Utility-> Admin-> Login screen.
3. Select Lock Screen Image. A pop-up window appears for you to navigate to the USB Flash Drive and image you want to add.
4. Select the image. Select OK. Then Save.

LDAP Configuration

To enable LDAP authentication, check the “Enable LDAP authentication” box at the top of the LDAP Configuration page.

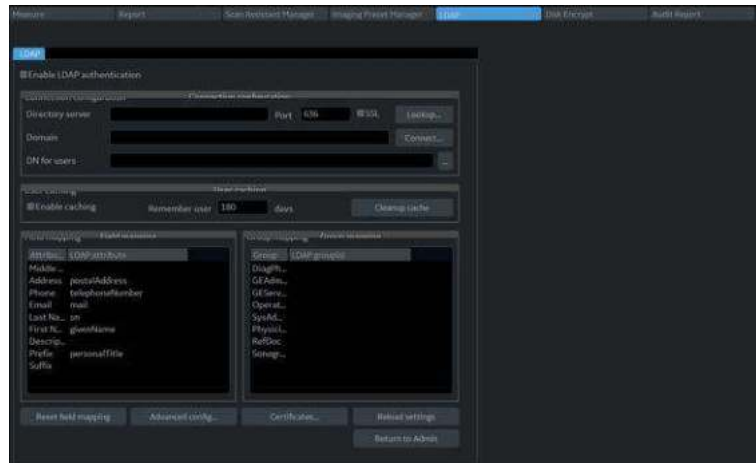


Figure 10-49. LDAP Configuration

Table 10-137: Connection Configuration

| Preset Parameter | Description |
|----------------------------|---|
| Enable LDAP authentication | The administrator can select to enable system credentials using LDAP |
| Connection Configuration: | |
| Directory Server | URL for the Directory Server |
| Port | Port for the Directory Server |
| SSL | SSL (Secure Sockets Layer) -- Select to enable LDAPs (LDAP over SSL). |
| Lookup... | Button that opens up a Query pop-up for groups, domain, LDAP server, etc. |
| Domain | Domain name for LDAP server (if needed). |
| Connect... | Select to connect to server as... |
| DN for users | Distinguished Name for users. The LDAP API references an LDAP object by its distinguished name (DN). A DN is a sequence of relative distinguished names (RDN) connected by commas. |
| ... | Select to open a list of DNs supported by the server. |
| User caching: | |
| Enable caching | The administrator can select to allow the user to cache their password credentials. |

Table 10-137: Connection Configuration (Continued)

| Preset Parameter | Description |
|--|---|
| Remember user ____ days | This field specifies the number of days to remember the user for caching purposes. |
| Cleanup cache | The user can cache credentials. When they select this, it clears out the cache of credentials. |
| Field mapping: | |
| Field mapping | The mapping between attributes on the Ultrasound system and LDAP attributes. This allows you (for instance) to select which of several phone numbers that may be stored in your AD server are mapped to the Phone Number field of a user on the system or to refrain from mapping any AD element to that field. |
| Group mapping: | |
| Group mapping | Maps an LDAP group to a local group on the machine. |
| Selection buttons on bottom of screen: | |
| Reset field mapping | Resets field mapping to the factory defaults |
| Advanced config... | Entries in this menu should only be changed by experienced network administrators. |
| Certificates... | Server Certificate |
| Reload settings | Reloads LDAP settings. |
| Return to Admin | Press to go back to the Utility--> Admin configuration screens. |

Lookup LDAP Servers

To look up LDAP Servers, select “Lookup” from the LDAP Configuration menu. Select the Domain from the pull-down menu, then select the LDAP Server from the list and press OK.

Logging on to the LDAP Server

To logon to the LDAP server, type your User Name and Password, then press OK.

Cleaning Up the Cache of Credentials

To clean up (empty) the cache of credentials, type your User Name and Password, then press OK.

Certificate Management

The Certificate Manager displays the system's Intermediate and Trusted Root Certification Authorities, as noted on the Certificate Manager's Tabs (Intermediate Certification Authorities and Trusted Root Certification Authorities). You can import or remove certificates.

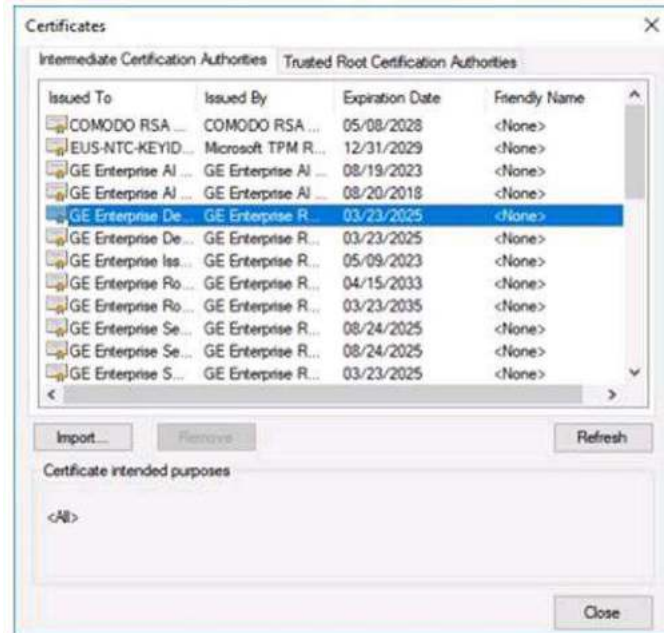


Figure 10-50. Certificate manager

Select the appropriate Certification Authority, then press “Import” to import Certificates or press “Remove” to remove Certificates.



Figure 10-51. Certificate Import Dialog

Advanced LDAP Configuration

Advanced LDAP Configuration Settings can be set on the Advanced LDAP Configuration menu.

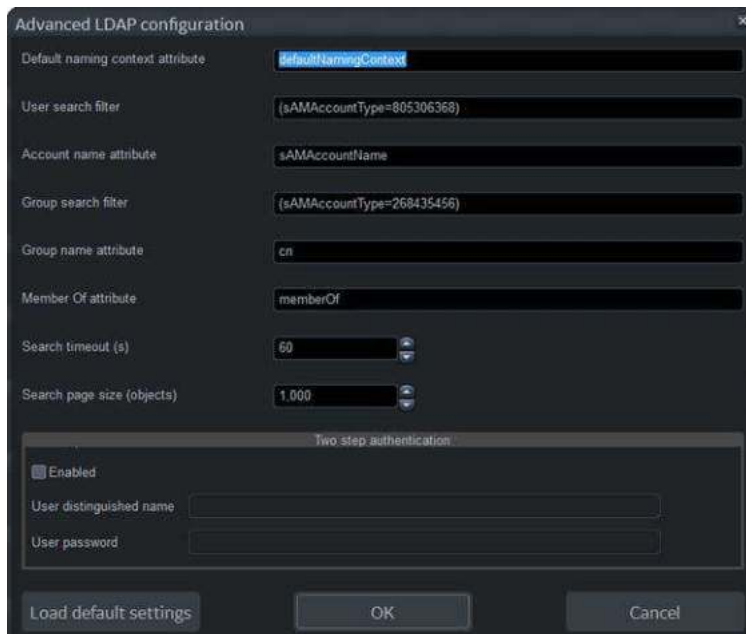


Figure 10-52. Advanced LDAP Configuration

Table 10-138: Advanced LDAP Configuration

| Preset Parameter | Description |
|----------------------------------|--|
| Default naming context attribute | Attribute name for the naming context. |
| User search filter | Search for the user using a keyword |
| Account name attribute | Attribute name for LDAP Attribute to be used as Account/User Name |
| Group search filter | Search for the group using a keyword |
| Group name attribute | Attribute name for the LDAP group. |
| Member Of attribute | Attribute name for the "Member Of". |
| Search timeout(s) | Limits the time to perform a search |
| Search page size (objects) | Limits the number of search results |
| Two step authentication | Under LDAP there's a option for a secondary authentication so you give it a user name and password to login to the LDAP server. (Advanced Configuration) |
| Enabled | Check this box to enable two-step authentication. |
| User distinguished name | The user's distinguished name. |

Table 10-138: Advanced LDAP Configuration (Continued)

| Preset Parameter | Description |
|-------------------------|--|
| User password | The user's password. |
| Load default settings | The user can select to load system default settings. |

Groups

System rights are set by the Administrator. If you do not have rights to a feature/function, please contact the Administrator. If access is denied, a message in red will appear in the status line (such as “You do not have the required permission to perform...” or a dialog will be displayed with more information. In some cases, buttons or sections of the screen may simply be disabled if you do not have appropriate rights.

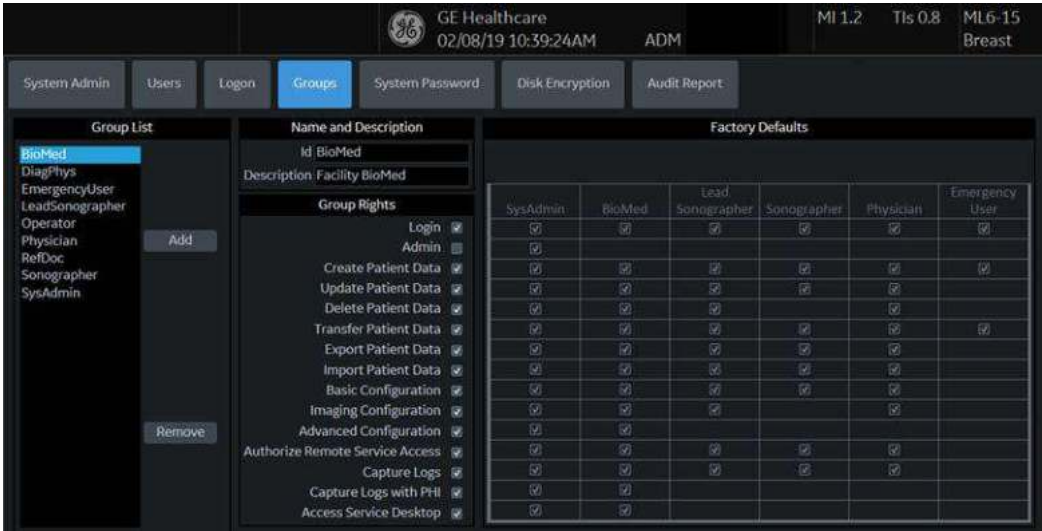


Figure 10-53. Groups Configuration

Table 10-139: Group List

| Preset Parameter | Description |
|------------------|---|
| Add | This creates a new group. |
| Default Groups | BioMed, DiagPhys, Emergency User, Lead Sonographer, Operator, Physician, RefDoc, Sonographer, and SysAdmin. |
| SysAdmin | All Group Rights |
| BioMed | All Group Rights, except Admin. Can edit Imaging/Connectivity Utility pages. Can change the system time and date. Can access the Service Desktop. Cannot edit Admin Utility pages. |
| Lead Sonographer | Login, Create/Update/Delete/Transfer/Export Patient Data, Basic/Imaging Configuration, Authorize Remote Service Access, and Capture Logs. Can edit Imaging Utility pages. Cannot edit Connectivity or Admin Utility pages and cannot change the system time and date. |
| Sonographer | Login, Create/Update/Transfer/Export Patient Data, Basic Configuration, Authorize Remote Service Access, and Capture Logs |

Table 10-139: Group List (Continued)

| Preset Parameter | Description |
|------------------|--|
| Physician | Login, Create/Update/Delete/Transfer/Export Patient Data, Basic/Imaging Configuration, Authorize Remote Service Access, and Capture Logs |
| Emergency User | Login, Create/Transfer Patient Data. Only access to the Utility System and Search Tabs. |

Table 10-140: Name and Description

| Preset Parameter | Description |
|------------------|-------------------------------------|
| Id | The Id, from the Group List. |
| Description | A description of the Group List Id. |

Table 10-141: Group Rights

| Preset Parameter | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Rights assigned to each Group, by default | <table border="1"> <thead> <tr> <th>SysAdmin</th> <th>BioMed</th> <th>Lead Sonographer</th> <th>Sonographer</th> <th>Physician</th> <th>Emergency User</th> </tr> </thead> <tbody> <tr><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" 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| Login | Allows users in this group to logon to the system. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Admin | Allows users in this group to have system administrator's rights. Can add/remove users and enable/disable encryption, etc. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Create Patient Data | Allows users in this group to create patient and exam data. This right is needed to register a patient and start an exam. Access to the following controls is prohibited without this right: New Patient, Register, and Save and Exit. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Update Patient Data | Allows users in this group to change patient and exam data. This right is needed to view patient and exam information stored in the patient database. Access to the following is prohibited without this right: Patient List, Exam List, Data Transfer screen, ability to delete images from the clipboard or active images screen, ability to delete reports from the Reports screen, ability to change to the USB/CD Read Only workflow, ability to see all the jobs (except one's own) in the Spooler. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table 10-141: Group Rights (Continued)

| Preset Parameter | Description |
|---------------------------------|---|
| Delete Patient Data | Allows users in this group to delete patient and exam data. This right is needed to use the Delete button on the Patient List and Exam List. Access to the following is prohibited without this right: Patient delete via Patient Registration and Patient List. |
| Transfer Patient Data | Allows users to transfer patient and exam data over DICOM. This right is needed for DICOM transfers over the network configured for Print keys and with Workflows. Access to the following is prohibited without this right: DICOM Image Storage, DICOM SR Storage, DICOM MPPS, DICOM Storage Commitment, and DICOM Print; Print button and Workflow; Koios DS in TCS; and Sent To from Patient Registration and Active Image Patient screens. |
| Export Patient Data | Allows users to export patient and exam data to media. This right is needed to Export, Save As, USB quick Save to media and for print functionalities. Access to the following is prohibited without this right: Executing a Save As, USB Quick Store, or Video Capture via a configured Print key, EZBackup, Printing or Saving a Report As, Print the Patient List; in TCS Standard Print Button, and Save As Images controls, Data Transfer screen functionality to perform an Export or MPEGvue export. |
| Import Patient Data | Allows users to import patient and exam data from media. This right is needed to import from media, Worklist download, or to use the Query/Retrieve feature. |
| Basic Configuration | Allows access to and modification of basic Utility pages, which everyone has access to, except members of the Emergency User's Group. |
| Imaging Configuration | Allows modification of imaging preset Utility pages. Note, If the "Require Admin Operator Rights to Save Imaging Settings" is checked on the Utility page, then the "Imaging Configuration" right can only be used by a SysAdmin. |
| Advanced Configuration | Allows access to and modification of advanced configuration pages. |
| Device Mgmt Configuration | Allows users in this group to activate and configure Device Mgmt Cloud configuration management tool. |
| Authorize Remote Service Access | Allows users to authorize service engineers to connect to the system remotely and perform service tasks. |
| Capture Logs | Allows users in this group to capture and export a system log to monitor system performance. |
| Capture Logs with PHI | Allows users in this group to export log files with PHI included. |
| Access Service Desktop | Allows users in this group to access the Service Desktop. |
| Software Management | Allows users in this group to access Software Download. |

To set up a new group,

1. Select the Group.
2. Assign the Rights you wish this Group to have.

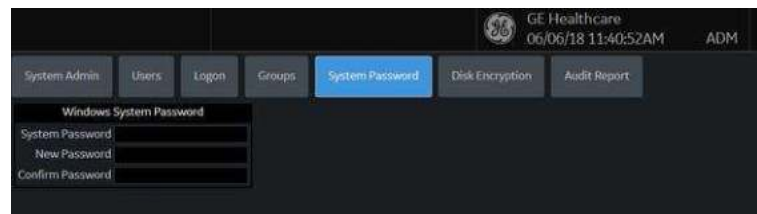
System Password

The System Password is the Windows Password used by the LOGIQ Fortis to automatically log into Windows. 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, prefers to define their own password instead of using the factory-created default password. As with all passwords, this should be treated with care and archived appropriately so that it can be provided to service personnel if necessary.

If you have changed the System Password, you must have the Current Password to change it.

To change the System Password,

1. Type your current password in the System Password field



NOTE: *There is no need to enter the “current password” to change the System Password if the System Password has not been previously changed from the factory default. The same is true for the Database Password.*

2. Type the new password in the New Password field.
3. Type the new password again in the Confirm Password field.
4. Press Save to save the new Password; then press Exit.

NOTE: *‘Windows System password’ is the password for the underlying Windows OS user running this application. Do not change this password unless you are the system administrator of the device. This password is not needed for users of the system. It will only be needed by GEHC service in special situations. If you change the password, be sure to keep the new password secured and available if needed by GEHC service.*

Disk Encryption

Disk Encryption is designed to protect data privacy and assist your organization with HIPAA/HITECH compliance. Safeguards include:

- All patient data on the system's patient archive drive can be encrypted to provide protection in the event of a stolen device or hard drive.



If you've selected "Encryption ON. Key is stored on USB / password is entered manually" encryption and both password and recovery key are lost, you will not be able to access archived patient data (images and measurements included) nor store new patient data on this system.

The only way to recover the system to allow storing patient data is to reset the entire disk, which deletes all the archived patient data on the disk.

It is strongly recommended that all the patient data be stored in PACS or backed up to media prior to encrypting the disk.

In addition, it is recommended that the recovery key be stored on a USB storage device, printed, and kept in a secure location, ensuring that it will not be lost.



Make sure the system power cable is plugged into external power. **DO NOT** attempt to perform the initial encryption function on battery power.

Disk Encryption (continued)

The system encrypts patient data by default (Encryption On. Disks are unlocked automatically).

1. If you wish to change the default encryption setting, select the desired Encryption Policy, then press Accept.

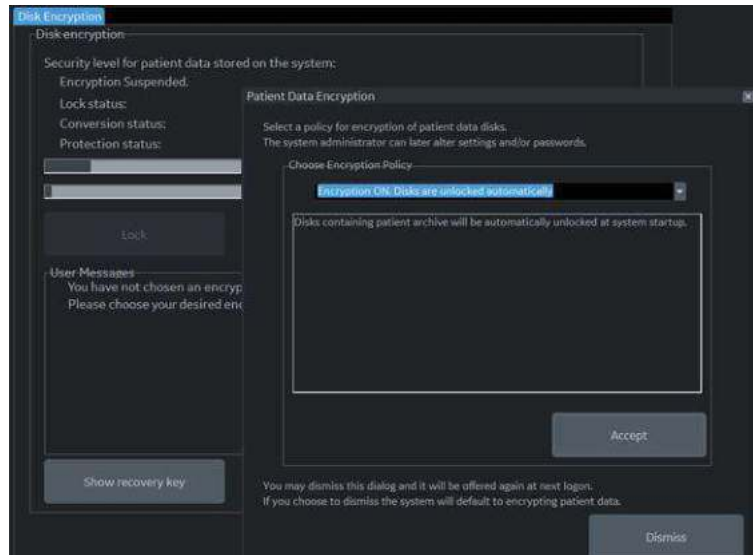


Figure 10-54. Initialize System Encryption

NOTE: *If you (or the Field Service Engineer) reloads system software, you will need to press “Initialize System Encryption” to encrypt the system and reset System Encryption password and preferences.*

Disk Encryption (continued)

Table 10-142: Encryption Policy Selections

| Encryption Policy | Description |
|---|--|
| Encryption OFF | Patient Data will not be encrypted. Selecting "OFF" will unencrypt the drive. System drive and recovery partition will remain encrypted. |
| Encryption ON. Disks are unlocked automatically | System Default. Patient data is encrypted and unlocked at system boot-up. Recovery Key and Password tied to the hard drive. |
| Encryption On. Require Pre-Boot PIN/Password before unlocking system drives | The system will not boot until the Pre-Boot PIN or Password has been entered. Unlike other manual key entry configurations, no system functionality is available without the PIN/Password. This encryption policy is intended for high security environments or customers with specific needs. |
| Encryption ON. Key is stored on USB / password is entered manually | The system will request the encryption password or recovery key at system startup. The system is not accessible until this password or a disk recovery key is provided. Requiring a password to access the patient archive may prevent emergency usage of the system. |

NOTE: *If you choose to dismiss this dialog, you will be reminded to continue configuring encryption at each logon.*

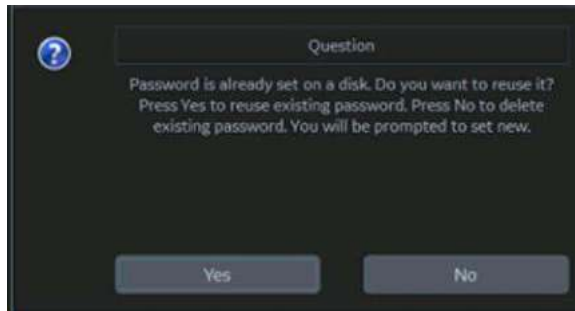
Disk Encryption (continued)

2. You must set the Encryption Password and record the Recovery Key in order to ensure access to your institution's patient data (required if replacing the system drive, ECB Board, or reformatting the C:\ Drive).

- a. To reset the Encryption Password, "Change password."

NOTE:

*Press **NO** if this question pop-up appears: "Password is already set on a disk. Do you want to reuse it? Press Yes to reuse existing password. Press No to delete existing password. You will be prompted to set new."*



You can now update the encryption password, then press OK.



Disk Encryption (continued)

- Recovery Keys are not backed up by the system; you must record / archive the Recovery Key in order to retrieve patient data.



Make sure to keep the password, recovery key, and any backup of these in a secure place, not accessible for any unintended audience.

```
Recovery Keys:
HW Number: engineer_500469057
Drive Letter: D:
Full recovery key identification: B1026E13-1830-4AFA-8262-23CD803C5825
BitLocker Recovery Key: 211178-413270-085998-416427-664752-148687-189992-430155
Drive Letter: E:
Full recovery key identification: 64C8FF7D-D54F-49AC-87D1-EEEA25D0FCA4
BitLocker Recovery Key: 211178-413270-085998-416427-664752-148687-189992-430155
Drive Letter: F:
Full recovery key identification: 0F6165AC-A86C-47BC-9AAA-467D98628C67
BitLocker Recovery Key: 211178-413270-085998-416427-664752-148687-189992-430155
```

You can Show or Hide the Encryption key. Store the Recovery Key in a secure location, accessible to the ADM user as necessary.

- Insert the USB flash drive into a USB port to save the recovery key.

NOTE:

Use the USB flash drive as the repository only for the recovery key. DO NOT use it for data archiving or DVR recording.

Save recovery key to a USB Flash Drive by pressing **Save recovery keys**.

- View the Recovery Key by pressing **Show recovery key**, then print it to a local printer or PACS.

Press the **Print key** to print the recovery key on the local printer.

- Press **Show recovery key** to display the recovery key on the screen.

Press **Hide recovery key** to hide the recovery key.

Change password

Press **Change Password** to change the password as necessary.

Change the recovery key

If you want to change the recovery key, select **Change recovery key** to generate a new key.

NOTE: Generating a new key causes the previous key to expire.

Disk Encryption Frequently Asked Questions

Here are answers to some frequently-asked questions:

Q What type of encryption technology is used on my ultrasound system?

A The system uses Microsoft Bitlocker FDE configured to use FIPS-Compliant encryption protocols.

Q The system was accidentally turned off or lost power during the disk encryption process.

A Restart the system, and then go to Utility>Admin>Disk Encryption, select "On", ...resume, the disk encryption will continue

Q The USB recovery key was accidentally formatted. How do I access the system?

A If a password was created or the recovery key was written down, enter the information in the pop up window. Then go to Utility>Admin>Disc Encryption and Select **Change recovery key**. Be sure to print and save the new recovery key and store the USB in a secure location.

Disk Encryption Frequently Asked Questions (continued)

Q Is it possible to stop encrypting the data?

A Utility>Admin>Disk encryption, select the “Off” radio button.
The process to unencrypt may take up to 15 minutes.

Q Is there a step I need to take every day to encrypt new data?

A No, the encryption will happen in the background without the need for any additional manual steps.

Q The encryption was done it took nearly 90 minutes, is this going to happen every time the data is encrypted?

A No, after the initial encryption process is completed, new data will be encrypted automatically.

Q How does this protect the patient data?

A The data is unreadable by anyone who attempts to use the system without entering the password or recovery key.

Q I am using the system portable with Power Assistant, do I have to enter the password or recovery key after each exam?

A No, the password or recovery key will only need to be entered at each full boot up.

Q I do not have Power Assistant but I take the system portable occasionally do I need to enter the recovery key or password each time?

A Yes, the recovery key or password must be entered each time the system is turned on. If the USB with Recovery key is connected with each start up you will not need to manually enter the password or recovery key.

Disk Encryption Frequently Asked Questions (continued)

Q The USB recovery key has been lost, how do I unlock the system?

A Manually enter the password or recovery key, then create a new USB key from the Disk Encryption page.

Q The USB recovery key and the password has been lost how do I unlock the disk?

A Contact your service, the system will need a base image and application reload. Create a new encryption key. *Note the patient data on the system is not recoverable from this scenario. Always store patient data to a PACS or backup to external media.

Q If it is not possible to unlock the data can I still scan and what cannot be used?

A Yes: Unless the "Require Pre-Boot PIN/Password" Encryption policy option is selected, Live scan, measurement, "Save As" can be used to store on other media (USB, printer, etc). You can not access patient information, cannot access system Archive, cannot create an exam, cannot store to the hard drive, and DICOM Transfer is not possible.

Audit Report and System Log Server Configuration

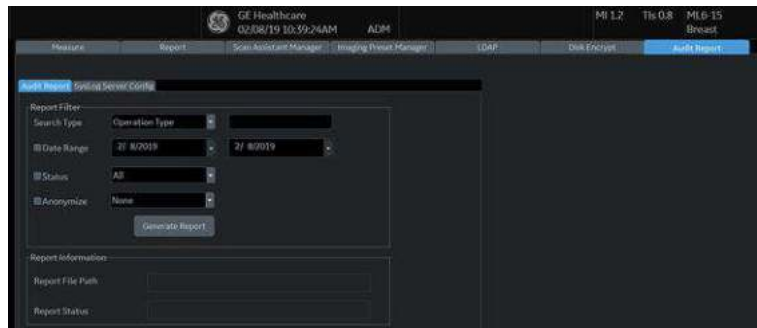


Figure 10-55. Audit Report

Table 10-143: Audit Report

| Preset Parameter | Description |
|---|---|
| Report Filter: Specify the following criteria. | |
| Search Type | Select the type of search. |
| Date Range | Specify the “From” and “To” date range. |
| Status | Specify the status. |
| Anonymize | Indicate whether to anonymize the report (remote patient data). |
| Generate Report | Press to generate the report. |
| Report Information: Generated report information. | |
| Report File Path | The location where to place the generated report. |
| Report Status | Report status. |

Audit Report and System Log Server Configuration (continued)

The Audit Report System Log Server Configuration page allows you to customize where to draw information from for the Audit Report.

You are also able to connect the LOGIQ Fortis to a centralized logging database at your institution to monitor for pattern analysis. This way, if your system is compromised, the data can be analyzed for incident response.

This centralizes all the system's data in the customer's data center -- It's like a DICOM connection page, but connects logs to a central location.

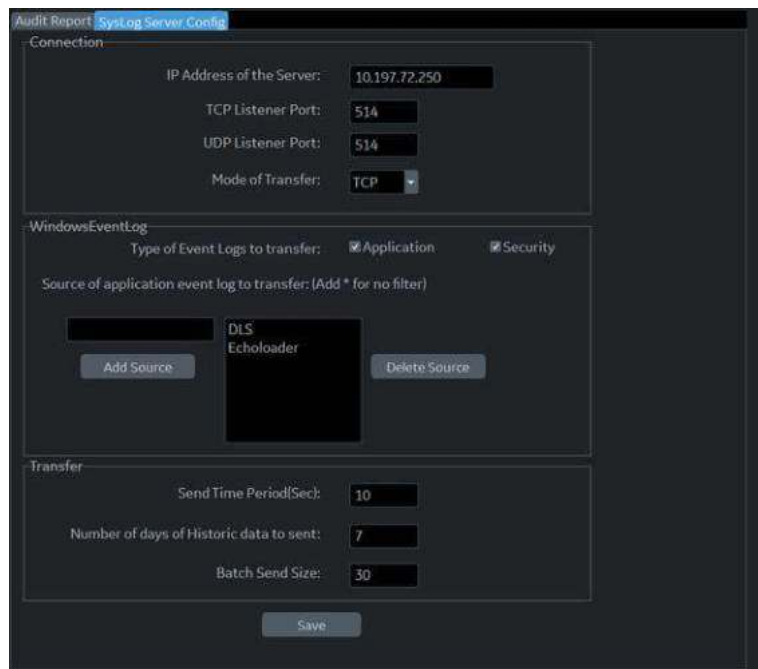


Figure 10-56. System Log Server Configuration

Table 10-144: System Log Server Configuration

| Preset Parameter | Description |
|--------------------------|--|
| Connection. | |
| IP Address of the Server | The Server's IP address |
| TCP Listener Port | Transfer Control Protocol Listener Port. This is the port which we transfer logging data to use the syslog data protocol. It can be done by UDP or TCP, depending on the configuration of the customer logging server. |

Table 10-144: System Log Server Configuration

| Preset Parameter | Description |
|--|---|
| UDP Listener Port | User Datagram Protocol Listener Port. This is the port which we transfer logging data to use the syslog data protocol. It can be done by UDP or TCP, depending on the configuration of the customer logging server. |
| Mode of Transfer | Mode of transferring the data to the server (UDP, TCP, or TLS). |
| Windows Event Log | |
| Type of Logs to transfer | <ul style="list-style-type: none"> • Application Logs • Security Logs |
| Source of application event log to transfer: (Add * for no filter) | <ul style="list-style-type: none"> • Add Source: The user needs to specify where to draw data from for the audit report. • Delete Source: Delete the event log source from the application. |
| Transfer | |
| Send Time Period (Sec): | How often the system will attempt to contact the logging server to send logs. |
| Number of days of Historic data to send: | If logging server connectivity has not been available, how many days of history should be sent when it is restored? |
| EventLog Batch Send Size | When sending historic data, how much to send in each transaction – this can help manage network traffic and server load, not typically necessary to change this. |

Imaging Preset Manager

Overview

The Imaging Preset Manager allows you to:

- Create and Edit User Presets
 - Update User Presets
 - Rename User Presets
 - Delete User Presets
- Arrange presets on the Touch Panel
- Share User Presets across LOGIQ Fortis systems
 - Export User Presets
 - Import User Presets
- Configure MyPreset for probe
 - Update MyPreset Config for each probe if desired. Need for each probe separately. See 'Arranging MyPreset Tab' on *page 4-29 for more information.*

Creating a User-Defined Application Preset

To create a User-Defined Application Preset,

1. From the Touch Panel, select the **Probe** icon at the top of the Touch Panel.
2. Select the **Application** you want to use as a basis for the new Application Preset.

You are now ready to create your own user preset.

Creating a User-Defined Application Preset (continued)

3. Press **Save**. A pop-up menu appears: The Create New Application menu appears.

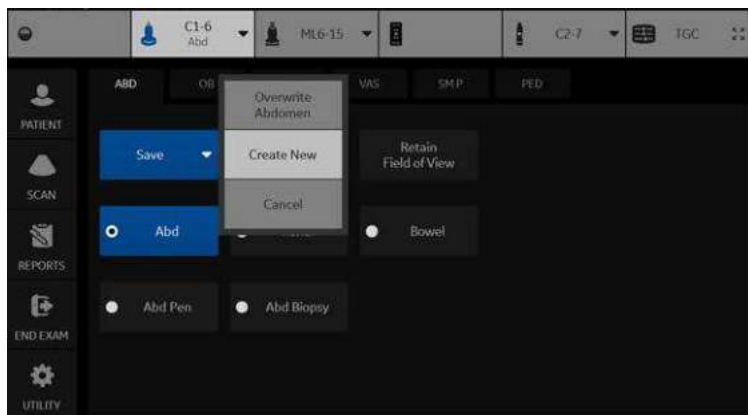


Figure 10-57. Create New User Pop-up Menu

4. Select **Create New**. The Create New Application menu appears.

NOTE: *The new user application is based upon the current exam 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.*

NOTE: *There is no limit to the number of user-defined application presets you can create for each exam category; you do not need to map all created presets to the Touch Panel.*

After you select to create the new preset, the Imaging Preset Manager screen appears. The preset you just created now appears in the Available Imaging Presets column. You'll notice that it has the name you assigned it ("GE").

Arranging Presets on the Touch Panel

On this screen, you specify where you want the new user (and existing) presets to appear on the exam's Touch Panel screen.

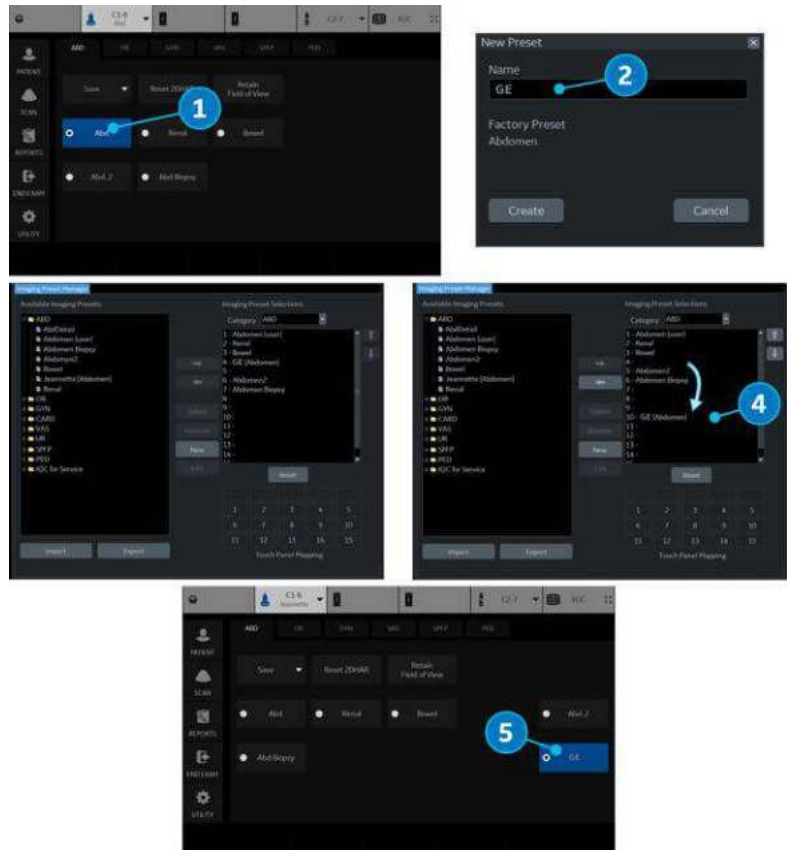


Figure 10-58. Steps to Add a User Preset

You can move the location of where the application appears on the Touch Panel via the Imaging Preset Manager (accessed from the Utility Touch Panel).

To reposition an application on the Touch Panel grid,

1. Select the Application to copy. Right click and select Create New.
2. Provide the new name.
3. The Imaging Preset Manager page appears (number not shown above).
4. Position the new application to appear at the desired Touch Panel location.
5. The new application appears on the Touch Panel.

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 the **probe** at the top of the Touch Panel screen.
3. Press **Save-->Overwrite** [Preset Name].
4. From the Utility--> Imaging menus.

To view/edit the parameters for the user defined preset

1. Press Utility--> Imaging 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 the **probe**.
3. Press **Save-->Overwrite** [**Preset Name**].

Renaming a User Preset

To rename a user preset,

1. Press Utility--> Imaging 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 press Rename.

Deleting a User Preset

To delete a user preset,

1. Press Utility--> Imaging 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 press OK.

Sharing User Presets between LOGIQ Fortis Systems

You can share the user presets you have created between LOGIQ Fortis systems by exporting/importing the preset(s) you want to share.

To move a user preset from one LOGIQ Fortis to another LOGIQ Fortis 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. Activate the **Imaging Preset Manager** from the Utility Touch Panel.
2. Insert the media.
3. Press **Export** (on the bottom).
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.

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 LOGIQ Fortis and follow the Importing User Presets instructions below.

Importing User Presets

To import a User Preset,

1. Activate the **Imaging Preset Manager** from the Utility Touch Panel.
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 LOGIQ Fortis, 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.

Retain Field of View

Selecting Retain Field of View ensures that the Imaging Parameters shown in the table below stay constant over Probe and Preset changes.

Table 10-145: Retain Field of View

| Mode | Probe | Retain Field of View Imaging Parameters |
|--|-------------------|--|
| B-Mode, Harmonics, Contrast and B-Flow | Convex and Sector | Depth, Tilt, Zoom, Width |
| | Linear | Virtual Convex, Zoom, Depth, Steer |
| Color Flow Mode | Convex and Sector | ROI Size/Position |
| | Linear | ROI Size/Position, CF Virtual Convex, CF Steer |
| Doppler Mode | | Doppler Cursor Position |

Backup and Restore

Overview

The Backup/Restore function enables the user to copy and restore system presets, settings and service configurations, and enables the user to configure several units with identical configurations (providing 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.

To minimize accidental loss of data, backup system presets, settings and service configurations, **DAILY** to formatted media and/or to the local hard drive (manually or automatically). Presets and service configurations can 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

Media Backup

1. Insert media into the drive or USB device into a USB port.
2. On the Touch Panel, press **Utility**.
3. On the Utility Touch Panel, press **System**.
4. On the monitor display, select **Backup/Restore**.
The Backup/Restore screen is displayed.

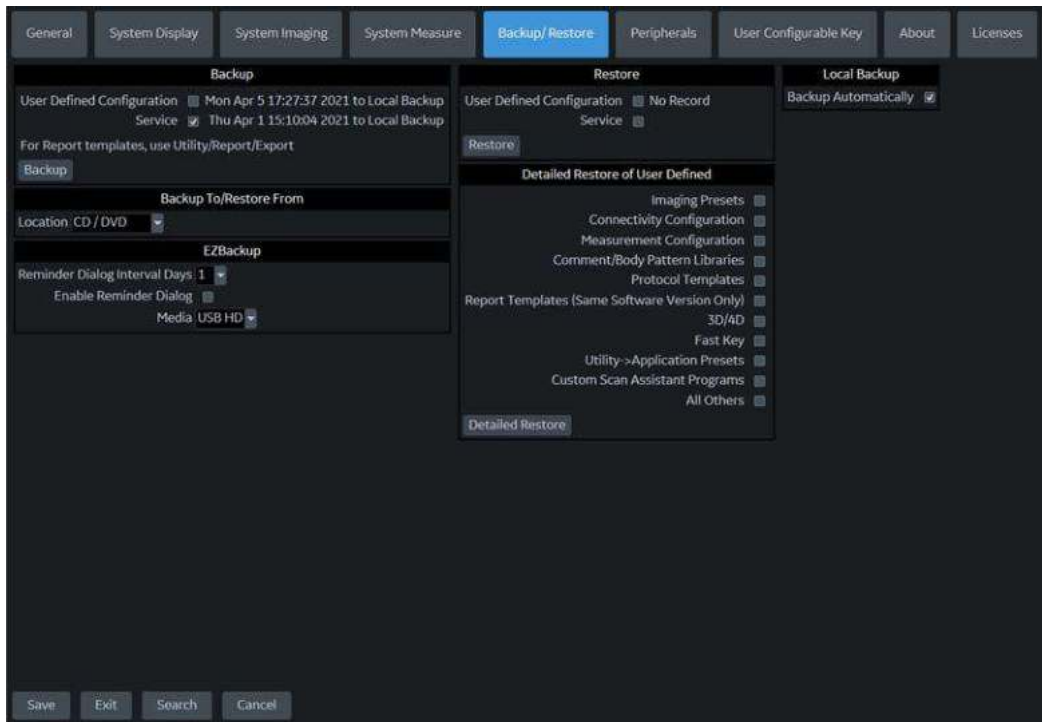


Figure 10-59. System/Backup/Restore Preset Menu

5. In the *Backup* field, select *User Defined Configuration* and/or *Service* to copy system presets, settings and service configurations.
6. Select CD/DVD or USB Drive F to save data in the Backup To/Restore From field.

Media Backup (continued)

7. Select **Backup**.
The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.
8. At the end of the process, the Backup completed message is displayed on the monitor.
Press **Eject** (F3) to eject media/disconnect USB device.
9. 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.
Store the media in a safe place.

Local Backup

Select *Backup Automatically* under *Local Backup* to automatically backup User Defined configurations to the system hard drive when the configuration is changed and saved.

Select Manual Backup to manually backup User Defined configurations to the system hard drive.

Backup Automatically

1. Check **Backup Automatically** under Local and Cloud Backup.
2. Select **Local Backup** under Backup To/Restore From.
3. Press **Save**.
User Defined Configuration files are automatically backed up to Local Backup, when configuration is changed and then saved.

Manual Backup

1. Select **Local Backup** under Backup To/Restore From.
2. Press **Backup** under Backup.

Restore from Media or Local Backup



The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct media. You cannot restore system presets, settings and service configurations between systems with different software versions. To minimize accidental loss of data, perform backup of the patient archives stored on the local hard drive periodically.

1. On the Touch Panel, press **Utility**.
2. On the Utility Touch Panel, press **System**.
3. On the monitor display, select **Backup/Restore**.
The Backup/Restore screen displays. (See Figure 10-59 on page 10-153.)
4. In the *Restore* list, select *User Defined Configuration* and/or *Service* to restore system presets, settings and/or service configurations.
5. **If restoring from Media:** Ensure the appropriate source device is selected in the *Media* field and select **Restore from Media**.
If restoring from Local Backup: Select **Restore from Local Backup**.
The system performs the restore. As it proceeds, status information displays on the Backup/Restore screen.
6. The LOGIQ Fortis restarts automatically when Restore is done.

Preset Synchronization Using Media

The procedure for preset synchronization of several scanners using media is as follows:

1. Make a backup of the user-defined configurations on a removable media from a fully configured LOGIQ Fortis system.
2. Restore user-defined configurations from the removable media to another LOGIQ Fortis system (you can restore all the user-defined presets or select specific presets to restore via Detailed Restore).

NOTE: For information on Device Mgmt cloud-based system preset configuration management see 'Device Mgmt' on page 13-498.

Utility Parameter Search

Opens up a search window to find a parameter on the utility pages.

To search for a utility parameter,

1. Press **Search** from the Utility Touch Panel or from another Utility page.
2. Type in the search string. For instance, if you're searching for Zoom you would just type 'zoom'.
3. A list of possible matches appears to the right. Select the correct match.

NOTE: You cannot perform a search on the Measure, Reports, Imaging Preset Manager, Scan Assistant, or Service Utility pages.

Chapter 11

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

Supported Probes

Introduction

The LOGIQ Fortis supports the following types of probes:

- Matrix Array probes
- Convex Array probes
- Linear Array probes
- Micro Convex Array probes
- Sector Phased Array probes
- Split Crystal
- Volume Probes (4D)



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.

Probe Description

Table 11-1: Probe Applications and Features



| Probe | Clinical Applications | Capabilities and Features | Illustration |
|----------|--|---|---|
| BE9CS-D | <ul style="list-style-type: none"> • Urology | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • LOGIQView • Contrast • CrossXBeam • Strain Elastography • Biopsy |  |
| C1-6-D | <ul style="list-style-type: none"> • Abdomen (incl. Pleural) • OB/GYN • Pediatric • Peripheral Vascular • General musculoskeletal | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • Anatomical M-Mode • LOGIQView • Contrast • B-Flow/Hybrid B-Flow • CrossXBeam • Shear Wave and Strain Elastography • UGAP • MVI/Contrast MVI • Biopsy |  |
| C1-6VN-D | | <ul style="list-style-type: none"> • Easy3D/Avanced3D • Tru3D • Volume Navigation • PDI • M-Mode • Anatomical M-Mode • LOGIQView • Contrast • B-Flow/Hybrid B-Flow • CrossXBeam • Shear Wave and Strain Elastography • UGAP • MVI/Contrast MVI • Biopsy | |

Table 11-1: Probe Applications and Features (Continued)



| Probe | Clinical Applications | Capabilities and Features | Illustration |
|----------|---|--|--|
| C2-7-D | <ul style="list-style-type: none"> • Abdomen • Pediatric | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • Anatomical M-Mode • LOGIQView • CrossXBeam • Contrast • B-Flow • Biopsy |  |
| C2-7VN-D | | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • Anatomical M-Mode • LOGIQView • CrossXBeam • Contrast • V-Nav • Tru3D • B-Flow • Biopsy | |
| C2-9-D | <ul style="list-style-type: none"> • Abdomen • OB/GYN • Pediatric • Peripheral Vascular • Neonatal • Neonatal transcranial • General musculoskeletal | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • Anatomical M-Mode • LOGIQView • CrossXBeam • Contrast • B-Flow/Hybrid B-Flow • Strain Elastography • UGAP • Biopsy |  |
| C2-9VN-D | | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • Anatomical M-Mode • LOGIQView • CrossXBeam • Contrast • B-Flow/Hybrid B-Flow • V-Nav • Tru3D • Strain Elastography • UGAP • Biopsy | |

Table 11-1: Probe Applications and Features (Continued)




| Probe | Clinical Applications | Capabilities and Features | Illustration |
|----------|--|--|---|
| C3-10-D | <ul style="list-style-type: none"> • Neonatal • Pediatric • Neonatal transcranial • Peripheral Vascular • Small Parts • Abdomen | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • Anatomical M-Mode • LOGIQView • CrossXBeam • Contrast • B-Flow • V-Nav • Tru3D • Volume Navigation |  |
| IC5-9-D | <ul style="list-style-type: none"> • OB/GYN • Urology | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • Anatomical M-Mode • LOGIQView • Contrast • Shear Wave and Strain Elastography (GYN and Urology only) • V-Nav • Tru3D • Biopsy • Volume Navigation |  |
| L2-9-D | <ul style="list-style-type: none"> • Peripheral Vascular • Abdomen (incl. Pleural) • OB/GYN • Small Parts • Pediatrics • Neonatal • Neonatal transcranial • General musculoskeletal • Superficial musculoskeletal | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • LOGIQView • Virtual Convex • Contrast • CrossXBeam • B-Flow/Hybrid B-Flow • MVI/Contrast MVI • Shear Wave and Strain Elastography • Biopsy |  |
| L2-9VN-D | | <ul style="list-style-type: none"> • Easy3D/Avanced3D • PDI • M-Mode • LOGIQView • Virtual Convex • Contrast • CrossXBeam • B-Flow/Hybrid B-Flow • MVI/Contrast MVI • Shear Wave and Strain Elastography • V-Nav • Tru3D • Biopsy | |

Table 11-1: Probe Applications and Features (Continued)




| Probe | Clinical Applications | Capabilities and Features | Illustration |
|---|---|---|--|
| L8-18i-D | <ul style="list-style-type: none"> • Small Parts • Peripheral vascular • Neonatal Abdomen • Neonatal transcranial • Musculoskeletal • Intraoperative (Peripheral Vascular) | <ul style="list-style-type: none"> • Easy3D/Advanced3D • PDI • M-Mode • LOGIQView • Virtual Convex • Contrast • CrossXBeam • B-Flow/Hybrid B-Flow • MVI • Shear Wave and Strain Elastography • V-Nav • Tru3D • Volume Navigation |  |
| L6-24-D (May not be available in all countries.) | <ul style="list-style-type: none"> • Musculoskeletal • Small Parts • Neonatal Abdomen • Neonatal Transcranial | <ul style="list-style-type: none"> • LOGIQView • Virtual Convex • CrossXBeam • B-Flow/Hybrid B-Flow • MVI • PDI |  |
| L3-12-D | <ul style="list-style-type: none"> • Vascular • Abdomen (incl. Pleural) • OB • Small Parts • General musculoskeletal • Superficial musculoskeletal • Neonatal • Neonatal transcranial • Pediatrics | <ul style="list-style-type: none"> • Easy3D/Advanced3D • PDI • M-Mode • Anatomical M-Mode • LOGIQView • Virtual Convex • Contrast • CrossXBeam • B-Flow/Hybrid B-Flow • MVI/Contrast MVI • Strain and Shear Wave Elastography • Biopsy |  |

Table 11-1: Probe Applications and Features (Continued)










| Probe | Clinical Applications | Capabilities and Features | Illustration |
|----------|--|---|--|
| ML6-15-D | <ul style="list-style-type: none"> • Abdomen • Small Parts • Peripheral Vascular • Pediatrics • Neonatal • Neonatal transcranial • General musculoskeletal • Superficial musculoskeletal | <ul style="list-style-type: none"> • Easy3D/Advanced3D • PDI • M-Mode • LOGIQView • Virtual Convex • Contrast • CrossXBeam • B-Flow/Hybrid B-Flow • MVI/Contrast MVI • Shear Wave and Strain Elastography • V-Nav • Tru3D • Biopsy • Volume Navigation |  |
| M5Sc-D | <ul style="list-style-type: none"> • Adult cardiac • Pediatric cardiac • Adult cephalic • Abdomen (incl. Pleural) | <ul style="list-style-type: none"> • Easy3D/Advanced3D • PDI • M-Mode • Anatomical M-Mode • Curved Anatomical M-Mode • Color M • LOGIQView • Virtual Convex • Contrast • Anatomical M-Mode • B-Flow • CW • TVI/TVD • Volume Navigation • Tru3D • Biopsy |  |
| 6S-D | <ul style="list-style-type: none"> • Pediatric cardiac • Pediatric abdomen (incl. Pleural) | <ul style="list-style-type: none"> • Easy3D/Advanced3D • PDI • M-Mode • Anatomical M-Mode • Curved Anatomical M-Mode • Color M • PDI • LOGIQView • Virtual Convex • Anatomical M-Mode • CW • TVI/TVD |  |

Table 11-1: Probe Applications and Features (Continued)

| Probe | Clinical Applications | Capabilities and Features | Illustration |
|----------------|---|--|--|
| RAB6-D | <ul style="list-style-type: none"> • OB/GYN • Abdomen • Pediatric • Neonatal | <ul style="list-style-type: none"> • PDI • M-Mode • Anatomical M-Mode • LOGIQView • Contrast • CrossXBeam • Realtime 4D • Static3D • Biopsy |  |
| RIC5-9-D | <ul style="list-style-type: none"> • OB/GYN • Urology | <ul style="list-style-type: none"> • PDI • M-Mode • Anatomical M-Mode • LOGIQView • Contrast • CrossXBeam • Realtime 4D • Static3D • BetaView • Biopsy |  |
| 6Tc-RS | <ul style="list-style-type: none"> • Adult cardiac | <ul style="list-style-type: none"> • CW • Virtual Convex • PDI • M-Mode • Anatomical M-Mode • Curved Anatomical M-Mode • Color M • TVI/TVD |  |
| 6TC-RS Adapter |  | | |
| P2D | <ul style="list-style-type: none"> • Adult cardiac • Pediatric cardiac • Peripheral vascular • Adult cephalic | <ul style="list-style-type: none"> • CW |  |
| P6D | <ul style="list-style-type: none"> • Adult cardiac • Pediatric cardiac • Peripheral vascular • Adult cephalic | <ul style="list-style-type: none"> • CW |  |

Beta View

Beta View enables you to steer the probe head in elevation direction without moving the probe. This feature is available on the 4D RIC5-9-D probe during live scanning and is especially useful during an endovaginal or neonatal head exams.

The Beta View Touch Panel control appears on the B-Mode Touch Panel when you select either of these two probes. You can adjust the Beta View control Right/Left or Up/Down. When you press down on the Beta View control, the probe head re-centers itself.

Beta View is not available while the image is Frozen, during an image Recall, during a Biopsy procedure, or during Volume Navigation. When these controls are selected, the Beta View Touch Panel control is hidden and unavailable.

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.

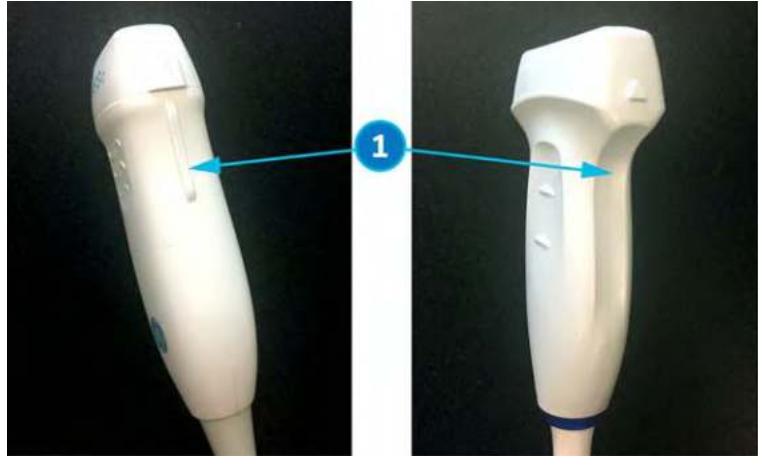


Figure 11-1. Orientation Marking on Probe (Example)



Figure 11-2. Probe orientation marker on the display

1. Orientation Mark

Probe Naming Conventions

Table 11-2: Probe Naming Convention

| Real Time 4D | Type | Application | Frequency | Connector Type |
|--------------|--|----------------------------------|-----------|--|
| "R" | C=Convex L=Linear M=Matrix S=Sector | AB=Abdominal IC=Intracavitary | "1-5" | D=DLP RS= RS Connector with RS-DLP Adapter LC=Long Cord |

Probe Safety

Care and Handling

The following recommendations help to reduce preventable probe damage.



Failure to follow the precautions listed in the Probe Care Recommendations table can result in serious injury and/or equipment damage.

Table 11-3: Probe Care Recommendations

| Do: | Don't Do: |
|---|---|
| Handle all probes with extreme care. | DO NOT drop or knock the probe or probe lens. Impacting the probe lens face can cause fractures of the crystal elements leading to failure. |
| Ensure that connected probes are placed in the probe holder yoke when not in use. Be sure to utilize the endocavitary probe holder and the probe inserts for the 3D and small aperture probes that were provided at delivery. | DO NOT leave probes in places where they may be knocked over or dropped. |
| Use wall-mounted probe holders with lens facing upward. | Ultrasonic cleaning IS NOT approved for GE probes. |
| Visually inspect probes and cables for damage prior to connecting them to the LOGIQ Fortis. If a probe appears to be damaged, discontinue use and notify your GE Customer Service Representative. Possible damage may include, but is not limited to: <ul style="list-style-type: none"> • Bent or broken probe pins • Cable cuts or splitting • Surface cracks • Exposed wires or shielding • Fluid leaks | DO NOT drop probes into holders or into disinfectant containers with the probe's lens face down. Even a short drop can damage a probe. |
| Disconnect probes from the system prior to cleaning or disinfecting the probe. | DO NOT let probe cables dangle loosely from the LOGIQ Fortis where they might be caught in the wheels/casters while moving. |
| Ensure you follow the chemical manufacturer recommendations regarding the use and handling of the chemical. | DO NOT immerse probes deeper than permissible levels. NEVER immerse the connector or adapter into any liquid. |

Table 11-3: Probe Care Recommendations (Continued)

| Do: | Don't Do: |
|---|---|
| Always use bite guards with Transesophageal (TEE) probes. | DO NOT apply excessive bending or pulling force to the probe cable. |
| Clean and disinfect all probes following the procedures contained in this manual. | DO NOT kink, tightly coil, or apply excessive force on the probe cable or TEE shaft. Insulation failure may result. |

Handling precautions



DANGER

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 an increase probability of disease progression, injury and equipment damage.



CAUTION

Transesophageal, endocavity and intraoperative probes require a special handling. Refer to the user documentation enclosed with these probes.

Transesophageal probe safety



WARNING

Never use excessive force when manipulating the transesophageal probe. The detailed operator manual enclosed with the transesophageal probe must be read carefully. Failure to follow these instructions could lead to patient injury and/or equipment damage.



CAUTION

TEE probes should always be used with an appropriate Bite Guard in place.

Electrical shock hazard



Electrical 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 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.

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. Failure to follow these instructions could lead to exposure to infectious agents.



Devices containing latex may cause severe allergic reactions in latex sensitive individuals. Refer to FDA's March 29, 1991 Medical Alert on latex products.



DO NOT use an expired probe sheath. Before using probe sheaths, verify whether the term of validity has expired. Failure to follow these instructions could lead to exposure to infectious agents.



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.

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.

Endocavitary Probe Handling Precautions

If the disinfectant solution comes out of the endocavitary probe, please follow the cautions below.



Sterile/sanitary sheaths are to be used on the probe during its actual use with patients. Wearing gloves protects the patient and operator. Failure to follow these instructions could lead to exposure to infectious agents.



Disinfectant Exposure to Patient (e.g., Cidex)—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 (e.g., Cidex)—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 (e.g., Cidex)—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.

Endocavitary Probe Point of Contact—Refer to the disinfectant’s instruction manual.

Failure to follow these instructions could lead to inflammation of skin or mucous membrane.

NOTE: *Sporadically, silicone grease can leak in small amounts from the probes’ cable bushing. This leakage is not a failure and is not harmful to the human body. Silicone grease does not contain any hazardous substances and is only use to seal the cable bushing. In the case of a leakage, wipe the grease with a cloth.*

Probe handling and infection control



WARNING

ALWAYS clean and disinfect the probe according to the probe specific instructions, including probe compatible chemicals between patients to the level appropriate for the type of examination and use FDA-cleared probe sheaths where appropriate. Failure to follow these instructions could lead to exposure to infectious agents.



WARNING

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.



WARNING

To minimize the risk of infection from blood-borne pathogens, you must handle the probe and all disposables which have contacted blood, other potentially infectious materials, mucous membranes, and non-intact skin in accordance with infection control procedures. You must wear protective gloves when handling potentially infectious material. Use a face shield and gown if there is a risk of splashing or splatter.

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.

Care and Maintenance

Inspecting probes



WARNING

If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative. Failure to follow these precautions can result in injury and equipment damage.

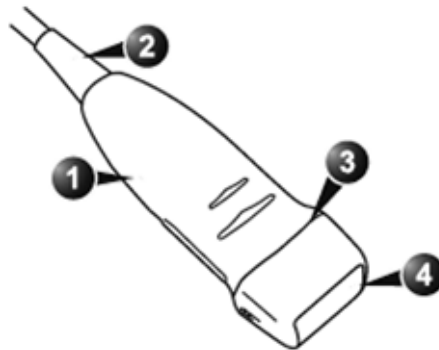


Figure 11-3. Probe parts

- | | |
|------------------|---------|
| 1. Casing | 3. Seal |
| 2. Strain relief | 4. Lens |

Perform After Each Use

Inspect the probe's lens, cable, casing, and connector. Look for any damage that would allow liquid to enter the probe.

NOTE: *Keep a log of all probe maintenance, along with a picture of any probe malfunction.*

Probe Reprocessing

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 11-6 on page 11-35.

The Probe Care Card is supplied with every probe and may also be downloaded from:

Table 11-4: Documentation Web Site

| Support Documentation Web Site |
|---|
| https://www.gehealthcare.com/support/documentation |

Adequate cleaning and disinfection between patient cases are necessary to prevent transmission of disease. All probes must be thoroughly cleaned prior to disinfection. The level of disinfection required is based on patient contact.

- To verify probe chemical compatibility, a full list of chemicals tested is available at the GE Probe website Table 11-5 on page 11-18.
- Probes that contact mucosal or non-intact skin require cleaning followed by High-Level Disinfection either soaking or use of a trophon® EPR or trophon2.
- Probes that contact intact skin require cleaning followed by Intermediate-Level Disinfection (wipe or spray).

Table 11-5: Probe Web Site

| Ultrasound Probe Web Site |
|---|
| https://www.gehealthcare.com/products/ultrasound/ultrasound-transducers |

Probe Pre-Treatment at the Point of Use (Required 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 remove the coupling gel by wiping from the strain relief to the lens with a soft, low-lint cloth.



DO NOT use abrasive products or brushes when cleaning or wiping a GE Ultrasound probe. The use of abrasive wipes can damage the soft lens (acoustic window). To extend the life of the probe lens, pat dry only.

2. Wipe the cable with one of the wipes listed in probe compatibility website from the strain relief to the connector. Wipe the cable with a low-lint cloth dampened with potable water to remove chemical residue. Dispose of the cloth, wipe and gloves in the clinical trash.

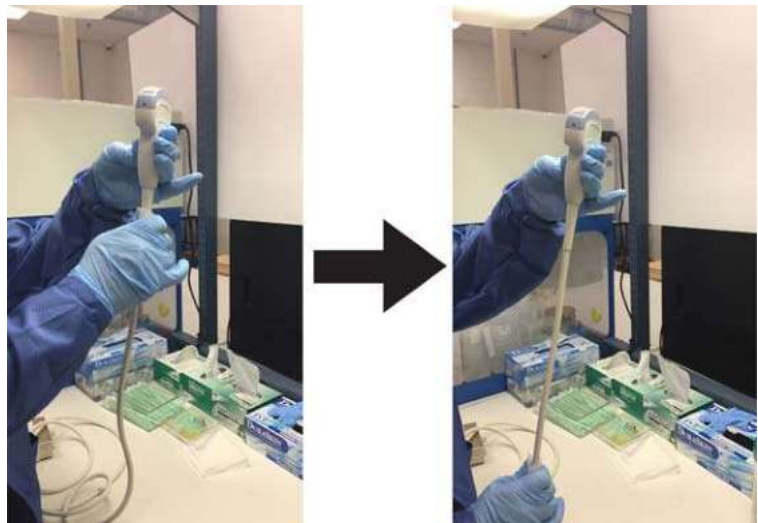


Figure 11-4. Cleaning the Probe Cable

NOTE: *Use of wipes listed in the Ultrasound Probe website may result in discoloration of the cable.*

Probe Pre-Treatment at the Point of Use (Required for All Probes)

(continued)



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.

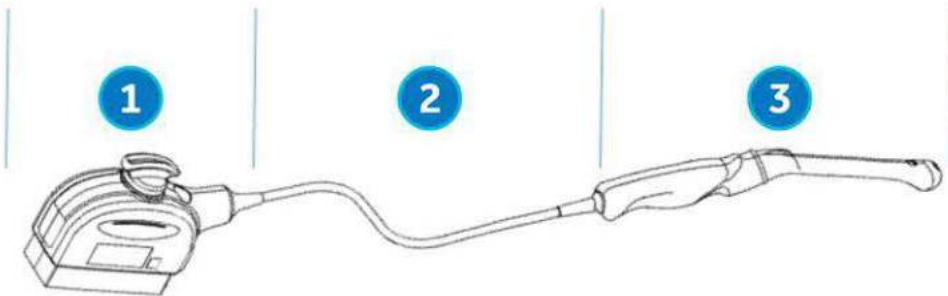


Figure 11-5. Inspect the Lens, Cable, and Probe House After Each Use

1. Cleaning only portion
2. Cleaning only or cleaning and disinfection portion
3. Cleaning followed by appropriate level of disinfection

Probe Manual Cleaning Instructions

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.

Cleaning with Wipes

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.

Cleaning with Enzymatic Detergent

1. Ensure the probe has been disconnected from the console. Replace 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 Figure 11-12 on page 11-30.
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.

NOTE: For IC5-9-D, see Figure 11-13 on page 11-31 for special immersion instructions.



CAUTION

Do not submerge probe beyond the immersion line shown in Figure 11-12 on page 11-30.

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 11-6. Cleaning the probe using a brush



CAUTION

DO NOT use the brush on the probe lens.

Cleaning with Enzymatic Detergent (continued)

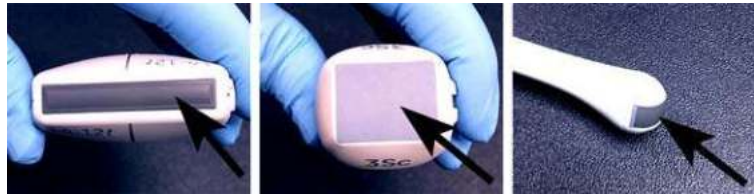


Figure 11-7. Probe Lens Examples

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.



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, low-lint, soft cloth or wipe. Pat dry lens.



DO NOT use a twisting motion or abrasive paper products when wiping the probe as this may damage the soft lens. To extend the life of the probe lens, pat dry only.

Cable and Connector Manual Cleaning



CAUTION

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 Ultrasound Probe website may result in discoloration of the cable.

2. Wipe the cable with a low-lint cloth dampened with potable water to remove chemical residue.

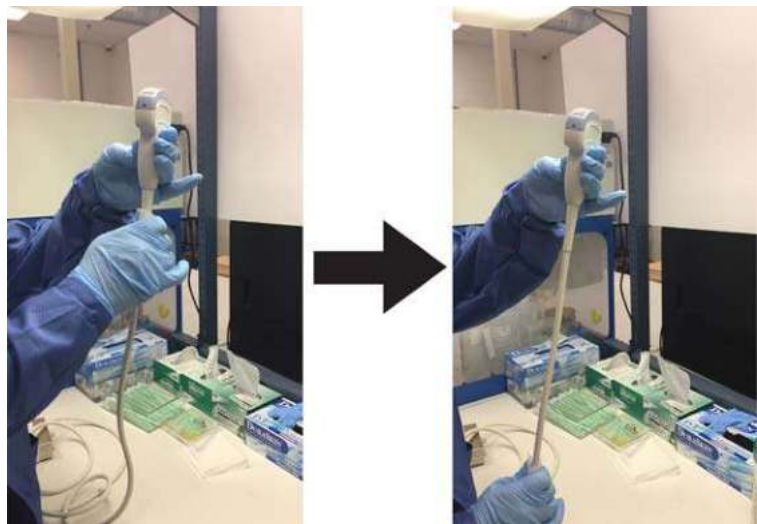


Figure 11-8. Cleaning the Probe Cable

Probe Intermediate-Level Disinfection (ILD)

For Intermediate-Level Disinfection of intact skin contacting probes, choose either the spray or wipe method.



If the probe is damaged, DO NOT place it into any liquid (e.g. for disinfection) and DO NOT USE until the probe has been inspected and repaired/replaced by a GE Service Representative.



After each use, inspect the lens, cable, and housing of the probe. Look for any damage that would allow liquid to enter the probe.

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.*

Probe ILD - Disinfectant Spray

1. Put on a new pair of gloves and spray enough disinfectant solution to saturate a new disposable low-lint 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.

Probe ILD - Disinfectant Spray (continued)

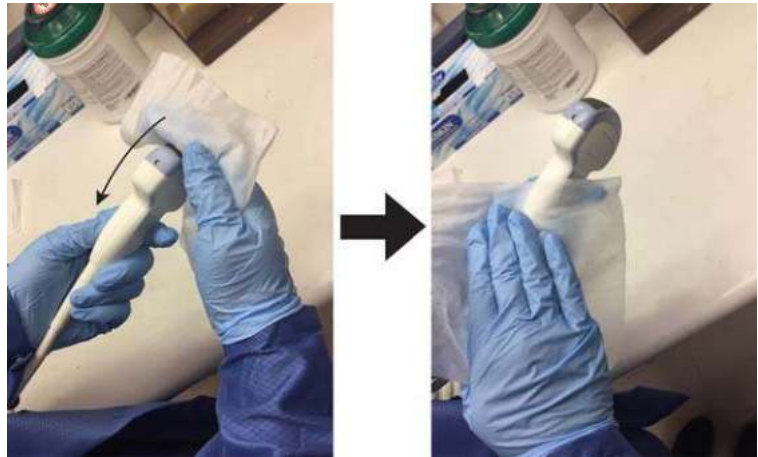


Figure 11-9. Disinfecting the Probe Moving from Lens to Strain Relief

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. Thoroughly dry all surfaces of the probe using a soft, low-lint wipe or cloth, changing wipes/cloths when necessary to ensure the probe is completely dry. Pat dry lens. Visually inspect the probe to ensure all surfaces are dry. Repeat drying steps if any moisture is visible.
6. 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 ILD - Disinfectant Wipe

1. Replace 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.

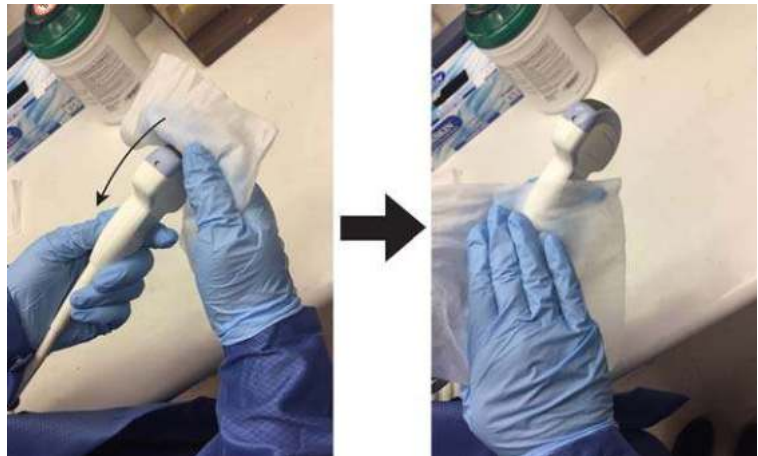


Figure 11-10. Disinfecting the Probe Moving from Lens to Strain Relief

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 ILD - 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.

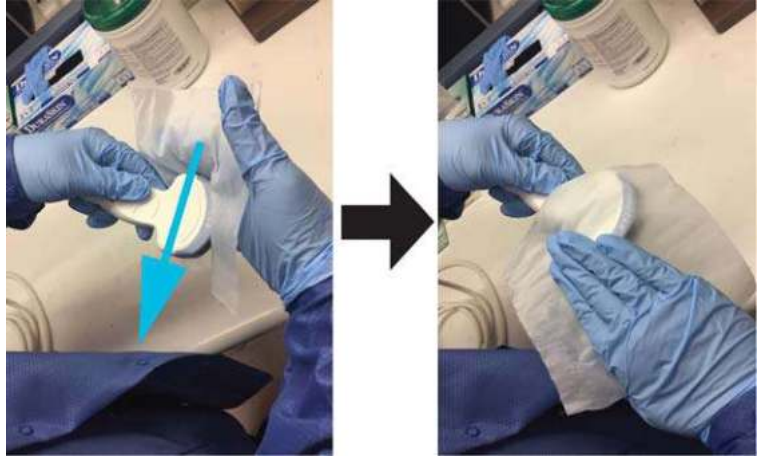


Figure 11-11. Disinfecting the Probe

4. Thoroughly dry all surfaces of the probe using a soft, low-lint wipe or cloth, changing wipes/cloths when necessary to ensure the probe is completely dry. Pat dry lens. Visually inspect the probe to ensure all surfaces are 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.

Probe High-Level Disinfection (HLD)

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 or trophon2.



If the probe is damaged, **DO NOT** place it into any liquid (e.g. for disinfection) and **DO NOT USE** until the probe has been inspected and repaired/replaced by a GE Service Representative.



After each use, inspect the lens, cable, and housing of the probe. Look for any damage that would allow liquid to enter the probe.

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 HLD - Soak

1. Ensure the probe has been disconnected from the console. Replace 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 Figure 11-12 on page 11-30.



Ensure no liquid comes into contact with the probe connector pins or labels.

Probe HLD - 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.

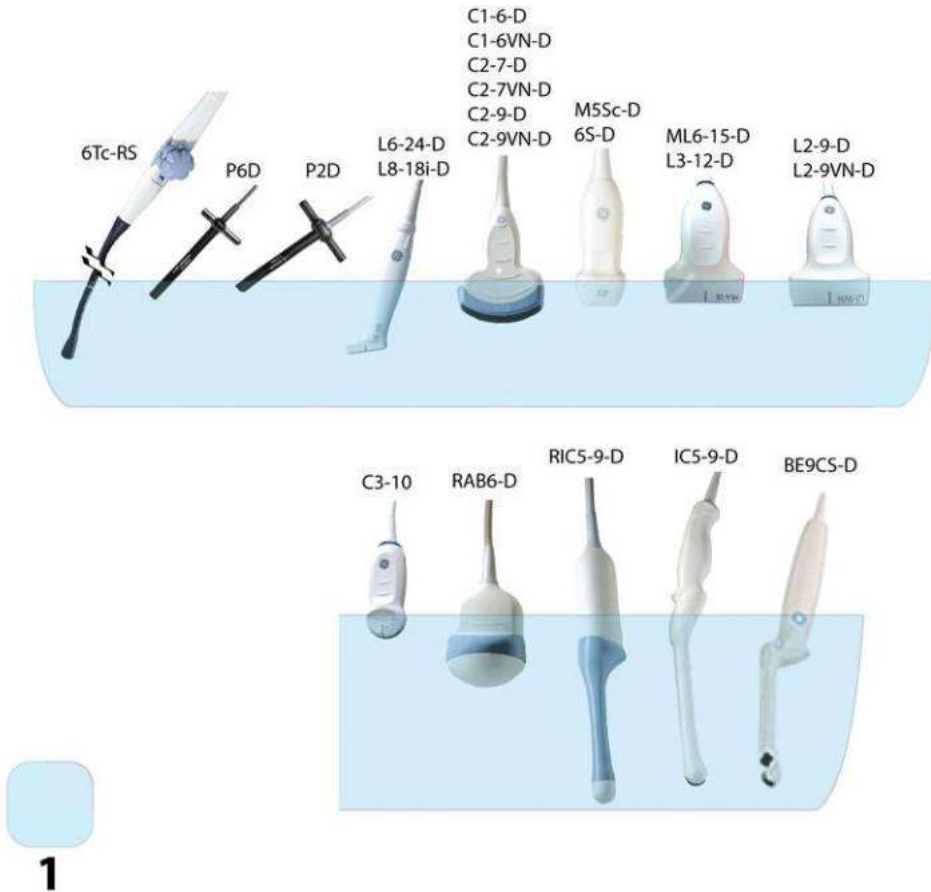


Figure 11-12. Probe Immersion Levels, 1 = Fluid Level

For IC5-9-D probe with serial numbers listed below or greater, refer to Figure 11-13 on page 11-31 for the soaking level:

- IC5-9-D: 780333WX1 or greater (example 780334WX1, 780335WX1)

The prefix number, i.e. 780333 for 780333WX1, indicates serial number sequence.

Probe HLD - Soak (continued)

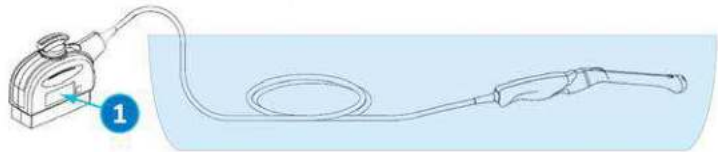


Figure 11-13. Probe Immersion Level for IC5-9-D

1. Serial number location

NOTE: *Over-exposing ultrasound probes to high-level disinfectants may damage the ultrasound probe. NEVER exceed the disinfectant manufacturer's maximum exposure time.*



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 11-14. 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.



Failure to properly rinse probes with water following disinfection may cause skin irritation. Failure to follow these instructions could lead to inflammation to skin or mucosal membrane.

Probe HLD - Soak (continued)

4. Thoroughly dry all surfaces of the probe using a soft, low-lint wipe or cloth, changing wipes' cloths when necessary to ensure the probe is completely dry. Pat dry lens. 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 HLD - trophon® EPR or trophon2

When performing High-Level Disinfection of GE ultrasound probes with the trophon® EPR or trophon2, 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, low-lint soft cloth or wipe. Carefully dry the probe by wiping from the distal tip to the strain relief.



DO NOT use abrasive products or brushes when cleaning or wiping a GE Ultrasound probe. The use of abrasive wipes can damage the soft lens (acoustic window). To extend the life of the probe lens, pat dry only.

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 HLD - trophon® EPR or trophon2 (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, low-lint soft cloth or wipe to remove any residual hydrogen peroxide from the probe surface.



CAUTION

DO NOT use a twisting motion or abrasive paper products when wiping the probe. To extend the life of the probe lens, pat dry only.

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 11-6: 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 |
| | McKesson OPA/28 | McKesson | | |

A full list of chemicals tested for compatibility is available at the GE Probe Web Site:

Table 11-7: Probe Web Site

| Ultrasound Probe Web Site |
|---|
| http://www.gehealthcare.com/transducers |

NOTE: *The tables in this manual indicate the status when this manual was published. Please visit the website for the latest information.*

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.

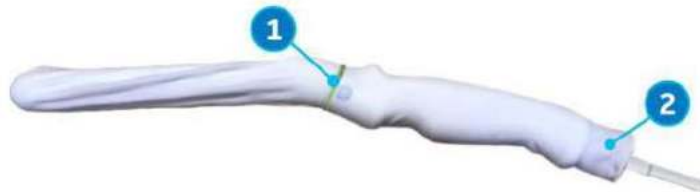


Figure 11-15. Applying the Sheath

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 Cleaning and Disinfecting Notes



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 (except in the case of using trophon's hydrogen peroxide).
 - Avoid contact with solutions or coupling gels containing mineral oil or lanolin
 - Avoid temperatures above 60°C (except with trophon for approved probes).
- Inspect the probe prior to use for damage or degeneration to the housing, strain relief, lens and seal. Do not use a damaged or defective probe.
- Use only the products that are listed on the Transducer website or on the Probe Care Card enclosed with the probe. In addition, refer to the local/national regulations.



Do not steam, heat autoclave on general surface probes.

Probe Cleaning and Disinfecting Notes (continued)



CAUTION

CREUTZFELDT-JAKOB DISEASE

Neurological use on patients with this disease must be avoided. If a probe becomes contaminated, there is no adequate disinfecting means.



Biological
Hazard



CAUTION

DO NOT expose the system/probe connector to any moisture or liquids.



CAUTION

Take extra care when handling the lens face of the Ultrasound transducer. The lens face is especially sensitive and can easily be damaged by rough handling. NEVER use excessive force when cleaning the lens face.



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 LOGIQ Fortis 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.

Probe Cleaning and Disinfecting Notes (continued)



Avoid cross-contamination, follow all infection control policies established by your office, department or hospital as they apply to personnel and equipment.



- Do not use paper products or products that are abrasive when cleaning the probe. They damage the soft lens of the probe.
- Before storing the probes, ensure that they are thoroughly dry. If it is necessary to dry the probe after cleaning, blot the probe with a soft cloth.



Probes must be cleaned and disinfected before they are replaced or disposed of.

NOTE: Cleaning products should be as close to neutral PH as possible. Any gel, cleaning, or disinfectant products containing concentrations, surfactants, methanol, ethanol, benzyl or methyl alcohol, mineral oil, lubricant oil, oil-based lotions, acetone, ammonia, anhydrous ammonia, iodine, iodine compounds, acids with 5PH or greater may damage or discolor your probe. Ultrasonic cleaning is not approved for GE probes.

NOTE: DO NOT re-use cloths or wipes. Soap, detergents, or enzymatic cleaners should be used in accordance with the manufacturer's instructions. GE is not responsible for damage incurred during the cleaning process for products which no material compatibility evaluation has been conducted.

Probe Disinfectants

Choosing a Disinfectant

NOTE: For latest chemicals tested for compatibility, check the GE Probe Website at the link listed in Table 11-8.

Table 11-8: Probe Web Link

| Ultrasound Probe Web Site |
|---|
| http://www.gehealthcare.com/transducers |

When choosing a disinfectant, determine the required level of disinfection. If the possibility of cross-contamination or exposure to unhealthy or non-intact skin exists, then high level disinfection should be performed. Good hand hygiene practice is highly recommended to help further reduce the risk of cross-contamination.



Disinfectant wipes and topical spray products are not FDA cleared high level disinfectants and do not provide adequate protection should the probe become cross contaminated or in contact with unhealthy or non-intact skin. Failure to appropriately disinfectant could lead to exposure to infectious agent(s).



Review the probe care card that is packed with each probe.

NOTE: For additional information about cleaning and disinfection, refer to the recommendations of the Association for Professionals in Infection Control (APIC), the U.S. Food and Drug Administration (FDA), and the U.S. Centers for Disease Control (CDC). For country-specific disinfection regulations, check with your local regulatory infection control authorities.

NOTE: GE publishes a list of material-compatible disinfectants (see below and also refer to the GE website at http://www3.gehealthcare.com/en/Products/Categories/Ultrasound/Ultrasound_Probes). DO NOT use non-GE-approved disinfectants or products that have not been evaluated by GE for material compatibility. Damages linked to the use of disapproved chemicals are not covered under product warranty or service contract.

trophon EPR Probe High-Level Disinfection

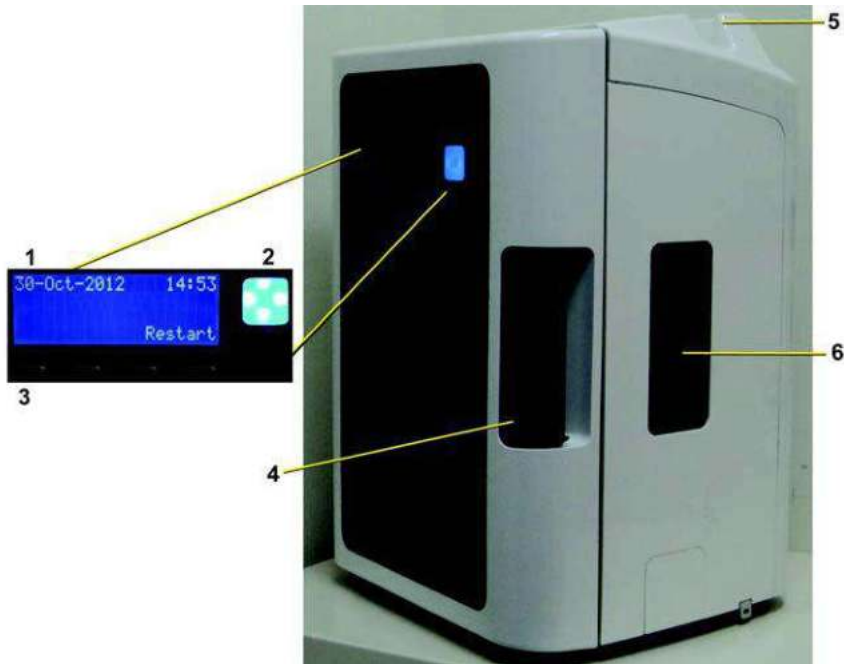


Figure 11-16. trophon EPR

1. Screen Display
2. Start Button
3. Soft key buttons

4. Chamber door handle
5. Probe cable clamp
6. Cartridge door



Only those individuals previously trained on the trophon EPR or trophon2 unit may use the device. Refer to the trophon EPR or trophon2 user documentation for more information on disinfecting approved probes.

trophon EPR Instructions for Use

Installing the disinfectant cartridge

1. The cartridge door automatically opens when a cartridge needs replacing.
2. Screen message: “Load Cartridge” or “Cartridge Empty, Replace Cartridge Now” displays.
3. Wear disposable gloves and chemical resistant goggles. These should be worn at all times while using the trophon EPR.
4. Press the soft key button under “Yes” to open the cartridge replacement door.
5. Remove the cartridge lid and insert the bottle on the side of the unit.
6. Rotate the cartridge until it drops into place and cannot rotate any further.
7. Close the cartridge door. Do not use excessive force to accomplish this. The door clicks into place and locks.

Disinfecting probe in trophon EPR

8. When the screen message reads “Load Probe”, open the chamber door.
9. Clean and rinse the probe. Dry the probe.
10. Place Chemical Indicator on the bottom of the device chamber.
11. While holding the probe handle, press the top of the probe into the chamber’s seal. Ensure the probe is straight and not touching either the walls or bottom of the chamber. Strain relief (interface between cable and probe body) must be positioned at the top of the chamber. The tip of the probe must be above the horizontal line marked in the chamber.

NOTE:

The probe must be cleaned, per the manufacturer’s guidelines, and dried before disinfection.



Do NOT allow the probe surface or lens to touch the chamber’s wall during the disinfection process. This could cause permanent damage to the probe.

trophon EPR Instructions for Use (continued)

12. Press the probe's electrical cable into the cable clamp, found at the top of the chamber.
13. Close the chamber door. It will automatically lock.
14. The screen message "Is the probe clean and dry?" appears, select Yes.
15. Press "Start" to begin the disinfecting process.
16. Discard disposable gloves.

Removing the Probe after 7-minute cycle time

1. Wear a new pair of disposable gloves.
2. When "Cycle complete" displays on the screen, open the chamber door.
3. Check the Chemical Indicator color change and refer to the Chemical Indicator on the box.
4. Remove the Chemical Indicator from device and discard.
5. Remove the probe from the trophon EPR.
6. Wipe the probe prior to use with an absorbent, single-use, dry, low-lint cloth.
7. Remove and discard the disposable gloves.

Coupling Gels



CAUTION

Do not use unrecommended gels (lubricants). They may damage the probe and void the warranty.

Table 11-9: Probe Gels

| Gel | L2-9-D/L2-9VN-D | L3-12-D | L6-24-D | ML6-15-D | M5Sc-D | 6S-D | L8-18i-D | BE9CS-D | C1-6-D/C1-6VN-D | C2-7-D/C2-7VN-D | C2-9-D/C2-9VN-D | C3-10-D | IC5-9-D | RAB6-D | RIC5-9-D | P2D | P6D |
|--|-----------------|---------|---------|----------|--------|------|----------|---------|-----------------|-----------------|-----------------|---------|---------|--------|----------|-----|-----|
| Aquasonic 100 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Clear Image | X | X | | X | X | X | X | X | X | | X | X | X | | | | |
| EcoGel 200 Ultrasound Gel | X | X | | X | X | X | X | X | X | | X | X | X | X | X | | |
| EcoVue Ultrasound Gel | X | X | | X | X | | X | X | X | | X | X | X | X | X | | |
| Haiyin | X | X | | X | | X | X | X | X | | X | | X | | | | |
| Kendall Life Trace Ultrasound Gel | X | X | | X | X | X | X | X | X | | X | X | X | X | X | | |
| Konix Ultrasound Gel | X | X | | X | X | X | X | X | X | | X | X | X | X | X | | |
| MediChoice Standard Ultrasound Gel | X | X | | X | X | X | X | X | X | | X | X | X | X | X | | |
| Medline Ultrasound Gel/ Ultrasound Transmission Gel | X | X | | X | X | X | X | X | X | | X | X | X | X | X | | |
| Natural Image | | | X | | | | | | | X | | | | | | | |
| Scan | X | X | | X | X | X | X | X | X | | X | X | X | X | X | | |
| Sonogel | X | X | | X | X | X | X | X | X | | X | X | X | X | X | | |
| Wavelength Multi-Purpose Ultrasound Gel | X | X | | X | X | X | X | X | X | | X | X | X | X | X | | |

Coupling Gels (continued)

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.



CAUTION

Do not allow gel contact with eyes. If there is gel contact with the eye, flush eye thoroughly with water.

NOTE: *Gel is not applied to the 6Tc-RS Transesophageal probe prior to use.*

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

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.

V Nav Cleaning Requirements

Cleaning and Disinfecting V Nav Probe Brackets

The probe bracket **SHOULD NOT** be autoclaved or gas sterilized. The bracket can be sterilized with Cidex. Details are in the CIVCO reference guide that is included with the bracket kit.

Cleaning and Disinfecting Cables, and Transmitter

Periodically clean the equipment (transmitter, sensor, and cables) by wiping them down with a cloth dampened in a cleaning solution such as mild soap and water, isopropyl alcohol, or a similar acceptable cleaning solution. If the tracker's components come in contact with biological fluid or tissue, be sure to follow your organization's procedures for proper cleaning and disinfection. The transmitters and sensors are not designed to withstand autoclaving or gamma radiation. Sensors are ETO-compatible. **DO NOT** immerse the transmitter, sensor, or cables in liquids. Components are not waterproof.

Disinfecting and Sterilizing General Purpose Sensor

High-level disinfect general purpose sensor using CIDEX OPA® ortho-Phthalaldehyde Solution (Johnson & Johnson) or equivalent .55% ortho-phthalaldehyde-based solution. Follow manufacturer's instructions and recommendations for concentration, time of contact and postprocess procedure.

High-level disinfect or sterilize general purpose sensor using CIDEX® Activated Dialdehyde Solution (Johnson & Johnson) or equivalent 2% glutaraldehyde-based solution, CIDEX Plus® (Johnson & Johnson) or equivalent 3.4% glutaraldehyde-based solution, or a hydrogen peroxide-based solution. Follow manufacturer's instructions and recommendations for concentration, time of contact and post-process procedure.

DO NOT gas sterilize or autoclave general purpose sensor.

Covers

Covers can be used to go over the probe, bracket, sensors, and transmitter.

Planned Maintenance

The following maintenance schedule is suggested for the system and probes to ensure optimum operation and safety.



Improper handling can lead to early probe failure and electric shock hazards.

Failure to do so will void probe warranty.

DO follow the specific cleaning and disinfection procedures provided in this chapter and the disinfectant manufacturer's instructions.

Table 11-10: 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 |

Automatic Probe Diagnostics

Automatic Probe Diagnostics uses automated lens echo acquisition and advanced processing to provide real-time probe health information.

Enable Automatic Probe Diagnostics by selecting "Enable Automatic Probe Diagnostics" on the Utility>Admin page.

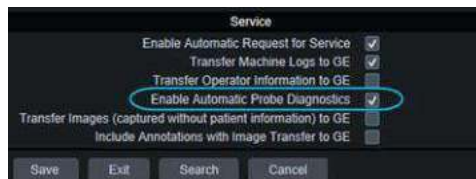


Figure 11-17. Enable Automatic Probe Diagnostics

Automatic Probe Diagnostics will execute once at each system startup (on only the first supported probe connected from the left to right) and generate a dump file in the "D:\log\diags\VITA" directory. The dump file will be transferred to the Back Office together with other files under D:\log directory every day.








Automatic Probe Diagnostics supports the following probes at this time: C1-6, IC5-9-D, M5sc-D, ML6-15 and RiC5-9-D.

Probe Care Cards

Perform After Each Use

Ultrasound probes can be disinfected using liquid chemical disinfectants. The level of disinfection is directly related to the duration of contact with the disinfectant. Increased contact time produces a higher level of disinfection. Refer to the Probe Care Card that was shipped with each LOGIQ Fortis probe.

Table 11-11: Description of Pictogram on Probe Care Cards

| Pictogram | Description |
|---|--|
|  | <p>“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.</p> |
|  | <p>“CAUTION” - Dangerous voltage (the lightning flash with arrowhead) is used to indicate electric shock hazards.</p> |
|  | <p>Biohazard - Patient/user infection due to contaminated equipment. Usage</p> <ul style="list-style-type: none"> • Cleaning and care instructions • Sheath and glove guidelines |
|  | <p>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.</p> |
|  | <p>Do not immerse the probe into any liquid beyond the level specified for that probe. Refer to the user manual of the ultrasound system.</p> |
|  | <p>Since there is a possibility of having negative effects on the probe, observe the specified immersing time by the disinfectant manufacturer strictly. Do not immerse the probe in liquid chemical disinfectants more than the time prescribed in the care card.</p> |
|  | <p>“Consult accompany document” - Refer to the ultrasound system user manual for important probe care and cleaning instruction.</p> |

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.

This ensures that employees in the transportation industry as well as the people who receive the package are protected from any risk.

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 guide zones 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 target mass during the procedure, otherwise it could result in repeated biopsies or patient injury.



WARNING

NEVER reuse the TR5° disposable biopsy guide attachment, disposable sterile Ultra-Pro II needle guide kits or Verza Needle guide kits. Failure to follow the manufacturer's instructions could lead to potential exposure to infectious disease.



WARNING

The use of biopsy devices with accessories that have not been evaluated for use with this equipment may not be compatible and could result in injury. Failure to follow these instruction could result in repeated biopsies or patient injury.

Precautions Concerning the Use of Biopsy Procedures (continued)



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 cleaning 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.

Failure to follow these instructions could lead to exposure to infectious agents.



Improper cleaning 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 11-11 for more information.*



Consult the biopsy needle manufacturer's instructions for acceptable reprocessing of biopsy needles. Failure to follow the manufacturer's instructions could lead to exposure to infectious agents.

Biopsy Guide Sterilization

Sterilization with autoclave is possible for the reusable stainless steel Biopsy Guides for the following probes:

- IC5-9-D
- RIC5-9-D
- RAB6-D

See 'Probe Biopsy Reprocessing' on *page 11-81 for more information.*

Performing a Biopsy

Displaying the Guidezone

Activate the Biopsy Kit by selecting it from the B-Mode Touch Panel.

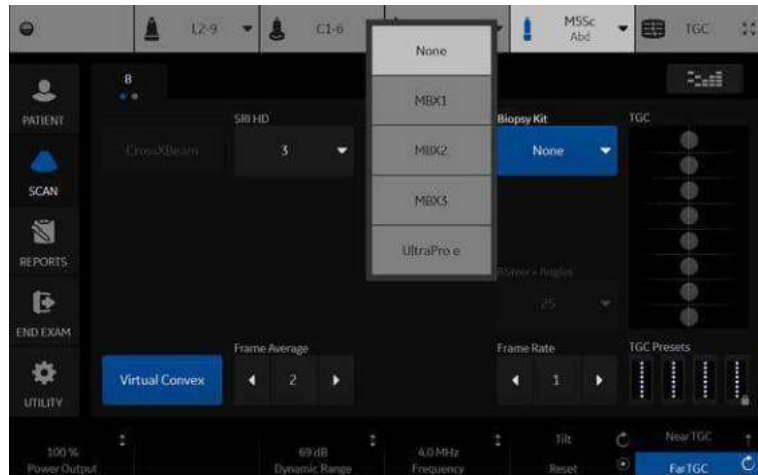


Figure 11-18. B-Mode Touch Panel Menu

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 LOGIQ Fortis depending on the probe. Select the desired biopsy kit.



Some angles (for example, if outside of the Field of View) may not be supported on all probes.

NOTE: *You can display the biopsy guideline on the CFM image in simultaneous mode. Enabling Color Flow allows for visualization of the vascular structure around the area to be biopsied. Select the Show Biopsy Mark on CFM simultaneous Mode preset in the Utility -> System -> System Image -> Biopsy Guide screen.*

Displaying the Guidezone (continued)

NOTE: Be sure to match the angle setting on the bracket to the Biopsy Kit setting on the system.

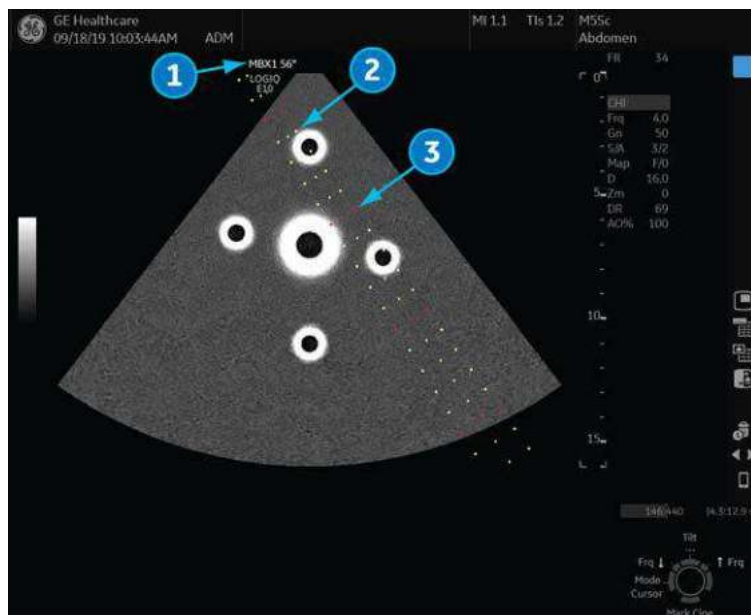


Figure 11-19. Biopsy Guidezones for the M5Sc Probe

1. Biopsy Kit Name and Biopsy Needle Angle
2. 1 cm increments
3. 5 cm increments

The biopsy guidezone represents the path of the needle. The dots which make up the guidezone represent the depth readout, where:

- Yellow represents 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. Use appropriate needle length to reach target area. Adjust the guide settings on the system and confirm they pass through the target, then match the setting on the system to the pin settings on the guide.

Displaying the Guidezone (continued)

NOTE: *Biopsy Needle Angle is defined with respect to the horizontal axis. This is equivalent to (90 deg) – (angle specified by CIVCO). Displayed angle may be slightly different from CIVCO's specifications due to part variability.*

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.



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.

Guide circle on the biopsy line

You can use a guide circle on the biopsy line.

Mode: B/CF/PDI/Elastography/Contrast/Volume Navigation

Display format: Single/Dual



Figure 11-20. Guide circle

- Guide circle
- Biopsy line
- The system displays current size of Target diameter (inside circle) and margin distance in the status area.

Preset for guide circle

Check “Show Biopsy Circle” in Utility -> System -> System Imaging to display a guide circle control on the monitor display and the trackball key.

Biopsy circle control



Figure 11-21. Biopsy circle control

1. Target diameter
2. Margin distance
3. Guide circle display On/Off
4. Circle position (move Trackball Up/Down)

Preparing the Biopsy Guide Attachment

Convex, Sector and Linear probes have optional biopsy guide attachments for each probe. The guide consists of a non-disposable 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.



CAUTION

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. Failure to follow these instructions could result in repeated biopsies or patient injury.

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



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. Failure to follow these instructions could result in repeated biopsies or patient injury.

1. Identify the appropriate biopsy guide bracket by matching the label on the bracket with the probe to be used.
2. Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

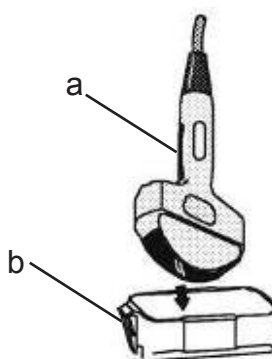


Figure 11-22. Probe/Bracket Alignment

- a. Probe Orientation Mark
 - b. Bracket
3. Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.
 4. Place an adequate amount of coupling gel on the face of the probe.

Fixed Needle Biopsy Guide Assembly (continued)

5. Using a sterile technique, place the proper sanitary sheath over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

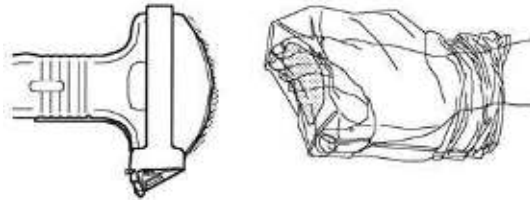


Figure 11-23. Applying Sanitary Sheath

6. Snap the fixed or adjustable needle clip onto the biopsy guide bracket.

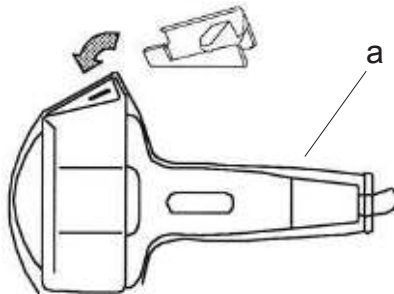


Figure 11-24. Fixed Needle Clip Attachment

- a. Sheath

Fixed Needle Biopsy Guide Assembly (continued)

7. Push the locking mechanism towards the bracket to secure the lock. Make sure the needle guide is firmly attached to the bracket.

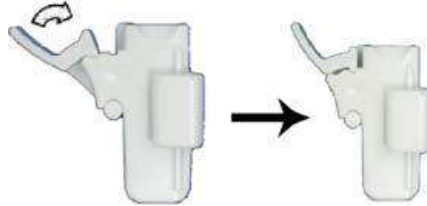


Figure 11-25. Locking the Needle Clip

NOTE:

If using an in-plane needle guide, the needle clip appears as shown here. Be sure to choose an in-plane guide that matches the gauge of the needle being used. The in-plane guide does not support any on-screen graphics. This is because the guide allows variable angles. For in-plane needle guides, steps 8 and 9 are not applicable.



Figure 11-26. Example of In-Plane Needle Guide

Fixed Needle Biopsy Guide Assembly (continued)

8. Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.



Figure 11-27. Needle Barrel Selection

9. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

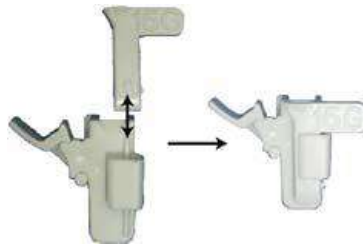


Figure 11-28. Needle Barrel Installation



Ensure that all guide parts are seated properly prior to performing a biopsy. Failure to follow these instructions could result in repeated biopsies or patient injury.

Multi Angle Biopsy Guide Assembly



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. Failure to follow these instructions could result in repeated biopsies or patient injury.

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.

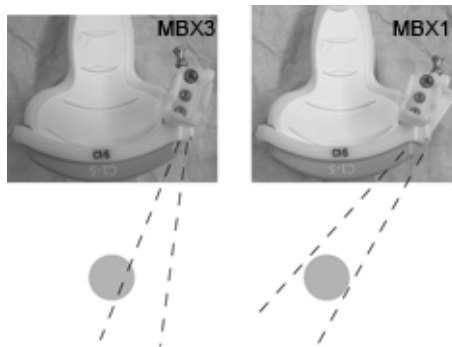


Figure 11-29. Example

2. Pull up on the pin (Figure 11-30 a) to freely move the needle guide attachment. Align the pin with the selected position of the needle guide attachment.
Push the pin down (Figure 11-30 b) into the desired slot to secure the angle position of the needle guide attachment.



Figure 11-30. Pull up and push down the pin

Multi Angle Biopsy Guide Assembly (continued)

3. Fit a convex piece of the biopsy bracket (a) into the concave position of the probe (b).

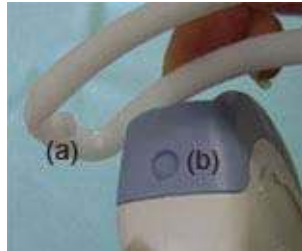


Figure 11-31. Probe/Bracket Alignment

Hold the side (a) and tuck down the needle guide side (b) until it clicks or locks in place.



Figure 11-32. 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.

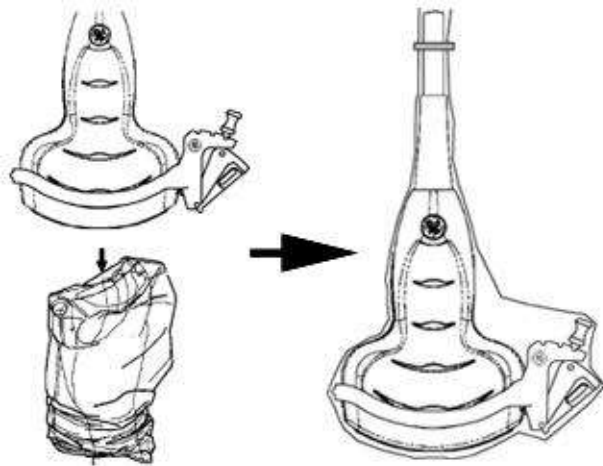


Figure 11-33. Applying Sanitary Sheath

6. Snap the needle guide onto the biopsy guide bracket.

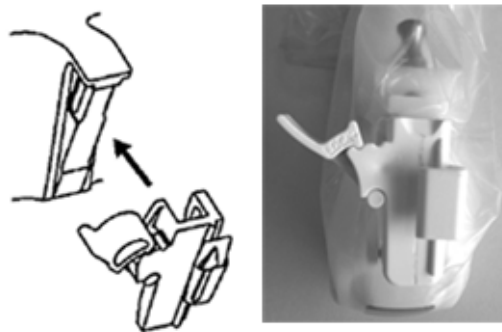


Figure 11-34. Snap the needle guide

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 11-35. 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 11-36. Needle Barrel

9. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.



Figure 11-37. 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 11-38.



Figure 11-38. 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.

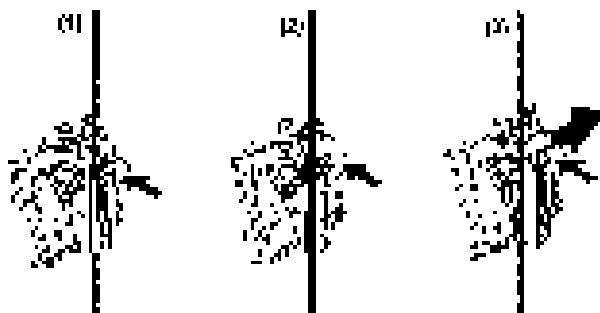


Figure 11-39. Release the needle from assembly

- 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.

Endocavitary Probe Biopsy Guide Assembly - Representative Example



DO NOT use the needle with the catheter (soft tube). There is a possibility of breaking the catheter in the body.



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. Failure to follow these instructions could result in repeated biopsies or patient injury.

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.

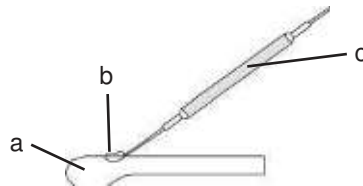


Figure 11-40. Attachment Filling Removal

- 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.

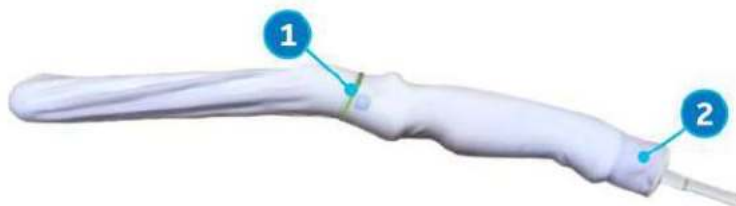


Figure 11-41. Endocavitary Probe with Sheath

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.
5. Rub a finger over the tip of the probe to ensure all air bubbles have been removed.

Endocavitary Probe 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.



WARNING

Ensure that all guide parts are seated properly prior to performing a biopsy. Failure to follow these instructions could result in repeated biopsies or patient injury.

2. Fix with a screw
NOTE: For the RIC5-9-D and IC5-9-D probes, use the TR5 guidelines for the plastic (disposable-only) biopsy guides; use the RU guidelines with the stainless steel reusable biopsy guides.
3. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.
4. 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.

4D Biopsy Guide Assembly - Representative Example

4D Probe

1. Place the needle guide onto the probe.
2. Push the needle forward until the bracket catches in the support on the housing of the probe (a).



Figure 11-42. Support on the housing

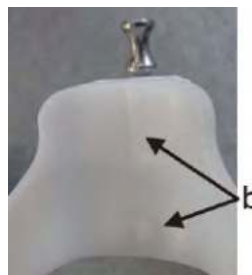


Figure 11-43. Biopsy Needle Guide

3. Fix the biopsy guide by locking the frame on the opposite side (b).



Figure 11-44. Mounting the Biopsy Needle Guide to the 4D Probe

NOTE: Needle guide sterilization with autoclave possible.

4D Endocavitary Probe

1. 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.

2. Place the sheath tip over the probe aperture and then pull the sheath end toward the probe handle.
3. Inspect the sheath for nicks, cuts or tears.
4. Rub a finger over the tip of the probe to ensure all air bubbles have been removed.
5. Position the small swelling of the needle guide on the notch at the probe tip. Snap the needle guide.

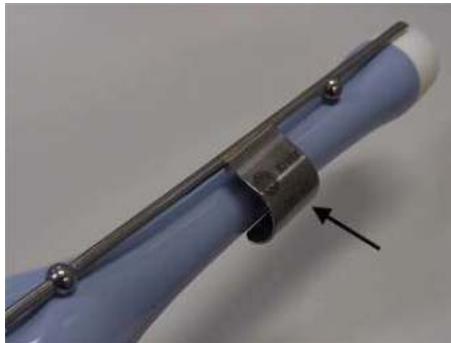


Figure 11-45. Installation (without probe sheath)

NOTE: Material: Stainless Steel

NOTE: Needle guide sterilization with autoclave possible.

Verza Biopsy Needle Guide

The Versa Biopsy Needle Guide is available for the C1-6-D, C1-6VN-D, L2-9-D, L2-9VN-D probes.

Activate the Biopsy Kit by selecting it from the B-Mode Touch Panel.

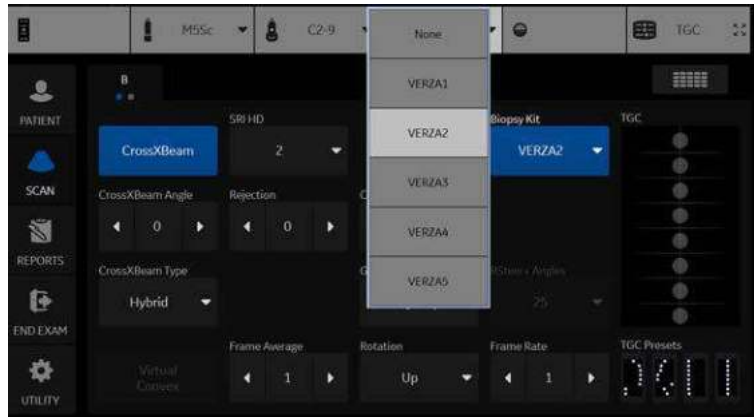


Figure 11-46. B-Mode Touch Panel Menu

The available biopsy options appear when Biopsy Kit is selected. Select the desired biopsy kit.



CAUTION

Be sure to match the 'pin' setting on the bracket to the pin setting on the system.

Verza Needle Guide Attachment Procedure

NOTE: The following procedure is shown with a C1-6-D probe.

Table 11-12: Verza Biopsy Guide Attachment Procedure

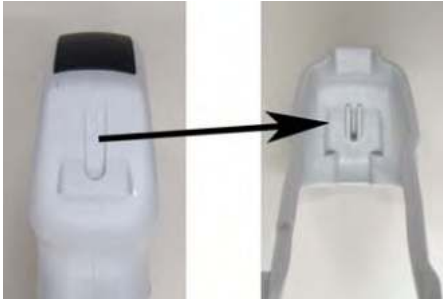


| Step | Instructions | Illustration |
|------|---|---|
| 1. | Attach the Biopsy Guide Bracket to the probe. a. Match the indentations on the Biopsy Guide Bracket and the probe. |  |
| 2. | Tightly secure the Biopsy Guide Bracket to the probe. NOTE: Be sure you are using the correct bracket for the probe. The bracket and probe are clearly marked. |  |
| 3. | Attach the probe sheath. a. Apply gel. b. Cover the probe. c. Attach the rubber band. |  |

Table 11-12: Verza Biopsy Guide Attachment Procedure (Continued)






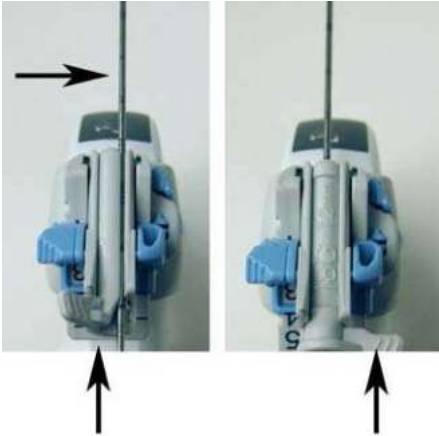
| Step | Instructions | Illustration |
|------|---|---|
| 4. | Tightly secure the Needle Guide to the Biopsy Guide Bracket through the sheath. |  |
| 5. | Unlock angle lock to adjust the needle guide angle; then re-lock. | <p data-bbox="727 997 801 1020">Locked</p> <p data-bbox="973 997 1063 1020">Unlocked</p>  |
| | Adjust Needle Guide Angle | <p data-bbox="727 1256 801 1279">Re-lock</p>  |

Table 11-12: Verza Biopsy Guide Attachment Procedure (Continued)

| Step | Instructions | Illustration |
|------|--|---|
| 6. | Insert correct Needle Gauge Holder.  |  |
| 7. | Push the Quick Tab Release, insert the biopsy needle into the needle guide. Close the Quick Tab Release. |  |

4D Probe Biopsy Needle Path Selection

To select the needle path and verify that the path of the needle is accurately indicated within the guidezone on the system monitor, perform the following before use:

1. Properly install the bracket and biopsy guide.
2. Scan in a container filler with water (47° C).
3. Select **Biopsy kit**. The available biopsy options from the Touch Panel.

Select the biopsy guidezone where the needle echo passes through the center of the guidezone. Use the selected biopsy guidezone when performing the biopsy.

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. Failure to follow these instructions could result in repeated biopsies or patient injury.



WARNING

Ensure that all guide parts are seated properly prior to performing a biopsy. Failure to follow these instructions could result in repeated biopsies or patient injury.

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 Touch Panel. 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.

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 'Probe Reprocessing' on *page 11-18 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. Failure to follow these instructions could result in repeated biopsies or patient injury.

Probe Biopsy Reprocessing

Manual Cleaning

NOTE: *Efficacy of this manual cleaning process has been shown using ENZOL Enzymatic Detergent.*

1. Remove the biopsy guide and protective sheath(s) from the probe.
2. Whenever possible the biopsy guide should be rinsed immediately after use. If the biopsy guide cannot be cleaned immediately after use, maintain moisture by placing them in a clean container. Cover the container with a towel dampened with purified water. Devices may remain in this condition for a maximum of 4 hours.
3. Remove all visible soil. Flush the biopsy guide using potable water (30 - 40°C) for not less than 2 minutes.
4. Prepare an enzymatic detergent safe for use with metal instruments according to the manufacturer's recommendations, using potable water.
5. Submerge the biopsy guide in the prepared solution and soak for no less than 2 minutes.
6. After the 2-minute soak, while the biopsy guide is submerged in the detergent water, vigorously scrub the device with a soft nylon bristle brush.
7. Use a round nylon cleaning brush to clean the biopsy lumen. Use a syringe to flush detergent water through the lumen. Scrub the device for a minimum of 2 minutes.
8. Remove the device from the detergent water and rinse thoroughly in running potable water (30 - 40°C) taking care to remove any visible detergent. Rinse the device for a minimum of 1 minute.
9. Visually inspect the device for any residual soil or detergent. Repeat steps 6 through 8 until the device is visibly clean.

High-Level Disinfection

NOTE: *High-Level disinfection efficacy of this manual process has been shown using Cidex OPA.*

1. Fill a sink or basin with high-level disinfectant prepared in accordance with the disinfectant manufacturer's instructions to a level allowing immersion of the biopsy guide.
2. Immerse the devices in the disinfectant solution and agitate to ensure all air bubbles are removed from the surface of the device.
3. Allow the devices to soak in the disinfectant solutions for least the minimum contact time listed in the disinfectant manufacturer's instructions for use.
4. Thoroughly rinse the device by immersing in a large volume of critical (purified) water for a minimum of 1 minute.
5. Repeat Step 4 two additional times, for a total of 3 (three) rinses using fresh volumes of water for each rinse.
6. Thoroughly dry the biopsy guide using a sterile, lint-free wipe. Visually inspect the biopsy guide to ensure all surfaces are clean and dry.

Autoclave Sterilization

NOTE: *Sterilization efficacy testing was performed using worst-case parameters for time, temperature and load density. Parameters listed in the tables are the minimum required to ensure a Sterility Assurance Level (SAL) of 10^{-6} or better.*

1. Place the cleaned and disinfected biopsy guide in an approved autoclave pouch.
2. Autoclave using the following parameters:

Table 11-13: Autoclave parameters

| Parameter | Cycle Type 1 | Cycle Type 2 |
|-------------------------|--------------------------|--------------------------|
| Sterilizer | Pre-vacuum | Pre-vacuum |
| Preconditioning Pulses | 3 | 3 |
| Temperature (Minimum) | 132 degrees C | 121 degrees C |
| Exposure Time (Minimum) | 3 Minutes | 20 Minutes |
| Drying Time (Minimum) | 15 Minutes | 15 Minutes |
| Package Configuration | Tyvek Pouch (14 x 25 cm) | Tyvek Pouch (14 x 25 cm) |

Surgery/Intra-operative Use

Preparing for Surgery/Intra-operative Procedures

Preparing the transducer for intra-operative use follows the same sterile procedure as for biopsy use except that no biopsy attachments are used. See 'Preparing the Biopsy Guide Attachment' on *page 11-58 for more information*. Sterile gel is applied to the transducer face and a sterile sheath completely covers the transducer and cable which has first undergone a thorough cleaning and high-level disinfection.

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.



For surgery/intra-operative procedures, a sterile environment is required. Therefore, both the operator and probe sheath needs to be sterile.

Preparing for Surgery/Intra-operative Procedures (continued)

To ensure a sterile environment during the procedure, it is recommended that this be a two-person job.

1. Perform a high level disinfection of the probe.
2. The scanner (surgeon, sonographer, etc.) should be sterile and gloved.
3. Place an adequate amount of sterile coupling gel on the face of the probe.
4. Place the proper sterile sheath over the probe and cord.

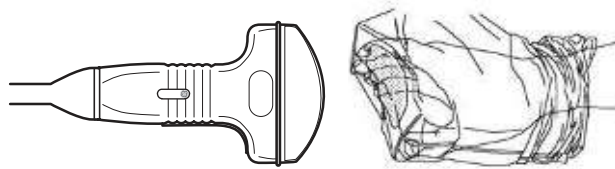


Figure 11-47. Applying Sterile Sheath

5. Depending on the type of procedure, use either sterile water or sterile gel on the sheath cover.

NOTE: *Follow your institutions guidelines on post surgery/ intra-operative procedures for probe cleaning and disinfection.*

Chapter 12

User Maintenance

This chapter supplies system data, assistance information, and system care and maintenance instructions.

System Data

Features/Specifications

Table 12-1: Physical Attributes

| | |
|---|--|
| <p><u>Dimensions and Weight (for Transport)</u></p> <ul style="list-style-type: none"> • Height: 1250 - 1800 mm, 49 - 71 in (HDU display), 1210 - 1760 mm, 48 - 69 in (LCD display) • Width: 530mm, 20.9 inch (Caster), 545mm, 21.5 inch (LCD display), 565mm, 22.2 inch (HDU display) • Depth: 885mm, 34.8 inch • Weight: 85 kg (187.4 lb.) <p><u>User interface</u></p> <ul style="list-style-type: none"> • Operating keyboard adjustable in height and rotation • Ergonomic hard key layout • Interactive Back-Lighting • Integrated recording keys for remote control of up to 4 peripheral or DICOM devices • Integrated Gel Warmer (Option) <p><u>Electrical Power</u></p> <ul style="list-style-type: none"> • Voltage:100 - 240 Vac • Frequency: 50/60 Hz • Power consumption maximum of 0.9 KVA with peripherals. <p><u>Touch Screen</u></p> <ul style="list-style-type: none"> • 12.1 in High Resolution, Color, Touch, Display screen • Interactive, dynamic software menu • Brightness adjustment • User-configurable layout | <p><u>Console Design</u></p> <ul style="list-style-type: none"> • 4 Active Probe Ports, 1 Inactive Probe Storage Port • Integrated SSD (1TB) • Integrated DVD-R Multi Drive • On-board storage for peripherals: Thermal printer. • Integrated speakers • Integrated locking mechanism that provides rolling lock and caster swivel lock • Integrated cable management • Front and Rear handles • Easily-removable air filters <p><u>HDU Display</u></p> <ul style="list-style-type: none"> • 23.8" Wide screen High-Resolution HDU Display • Monitor translation: 350mm, 13.7 in. horizontal; 120mm, 4.7 in. vertical; 90 degree swivel • Fold-down and Lock Mechanism for transport • Brightness & contrast adjustment • Resolution 1920 x 1080 • Anti Glare • Viewing Angle 89/89/89/89 degrees <p><u>LCD Display</u></p> <ul style="list-style-type: none"> • 23.8" Wide screen High-Resolution LCD Display • Monitor translation: 350mm, 13.7 in. horizontal; 120mm, 4.7 in. vertical; 90 degree swivel • Fold-down and Lock Mechanism for transport • Brightness & contrast adjustment • Resolution 1920 x 1080 • Anti Glare • Viewing Angle 89/89/89/89 degrees |
|---|--|

Table 12-2: System Overview

| | |
|--|--|
| <p><u>Applications</u></p> <ul style="list-style-type: none"> • Abdominal • Obstetrical • Gynecological • Breast • Small parts • Peripheral Vascular • Transcranial (Adult and neonatal) • Pediatric and neonatal • Musculoskeletal (general and superficial) • Urological • Cardiac (adult and pediatric) <p><u>Operating modes</u></p> <ul style="list-style-type: none"> • B-Mode • M-Mode • Color Flow Mode (CFM) • B-Flow (Option) • Extended field of view (LOGIQView) • Power Doppler Imaging (PDI) • PW Doppler • CW Doppler (Option) • Volume Mode (3D/4D) (Option) <ul style="list-style-type: none"> • 3D Static • 4D Real Time • Anatomical M-Mode • Coded Contrast Imaging (Option) • Strain Elastography • Shear Wave Elastography (Option) • UGAP (Option) <p><u>Scanning methods</u></p> <ul style="list-style-type: none"> • Electric sector • Electric convex • Electric linear • mechanical volume sweep <p><u>Transducer Types</u></p> <ul style="list-style-type: none"> • Sector Phased Array • Convex Array • Micro convex Array • Linear Array • Matrix Array • Volume probe (4D) • Split Crystal | <p><u>Standard Features</u></p> <ul style="list-style-type: none"> • Advanced user interface with high resolution 12.1 inch touch screen • Automatic Optimization • CrossXBeam • Advanced Speckle Reduction Imaging • Fine Angle Steer • Coded Harmonic Imaging • Virtual Convex • Patient information database • Image Archive on integrated CD/DVD and Hard Drive • Advanced 3D • Raw Data Analysis • Real-time Automatic Doppler Calculations • OB Measurements/Calculations • Fetal Trending • Multigestational Calculations • Hip Dysplasia Calculations • Gynecological Calculations • Vascular Calculations • Urological Calculations • Renal Calculations • Cardiac Calculations • InSite Capability • On-board electronic documentation • Auto Doppler Assist • Privacy and Security, including user and rights management • LOGIQView • Breast Productivity Package • Thyroid Productivity Package • External USB Printer connection • Network Printer Support • HDMI output available for compatible devices |
|--|--|

Table 12-2: System Overview (Continued)

| | |
|--|--|
| <p><u>Options</u></p> <ul style="list-style-type: none"> • Tricify • DICOM • B-Flow • Auto IMT • Compare Assistant • Scan Assistant • OB Measure Assistant • Color Quantification • Strain Elastography • Advanced Privacy & Security (Vulnerability Scan) • Power Assistant and Scan on Battery • Storage Bins • SonoNT/SonoIT • Advanced SRI-HD Type 2 <p><u>Peripheral Options</u></p> <ul style="list-style-type: none"> • Integrated Options <ul style="list-style-type: none"> • Digital B&W thermal printer • DVD vide recorder • Digital color thermal printer • Digital A6 color thermal printer • Foot switch, with programmable functionality • Console protective cover • LOGIQ smart device apps <ul style="list-style-type: none"> • Photo Assistant • Remote Control • Card Reader (Japan only): Magstripe Card Reader for Patient Screen, Worklist and Image Display. | <p><u>Display Modes</u></p> <ul style="list-style-type: none"> • Live and Stored Display Format: Full and Split Screen -- both with thumbnails for Still and CINE • Review Image Format: 4x4 and Thumbnails for Still and CINE • Time line Display [Independent Dual B or CrossXBeam/PW Display; CW; Display Formats; Top/Bottom or Side/Side selectable Format; 2 Timeline Methods: Scrolling or Moving Bar • Virtual Convex • Simultaneous Capability [B or CrossXBeam/PW, B or CrossXBeam/CW (Option), B or CrossXBeam/CFM or PDI, B/M, B/CrossXBeam, Realtime Triplex Mode [B/CrossXBeam + CFM/PDI + PW] • Selectable alternating Modes [B or CrossXBeam/PW; B or CrossXBeam + CFM (PDI)/PW; B/CW (option)] • Multi Image Split/Quad Screen [Live and/or Frozen, B or CrossXBeam+B or CrossXBeam/CFM or PDI, PW/M, Independent Cine playback] |
|--|--|

Table 12-3: System Parameters

| | |
|--|---|
| <p><u>Controls Available on Freeze or Recall</u></p> <ul style="list-style-type: none"> • Automatic Optimization • SRI-HD • CrossXBeam (display non-compounded and compounded image simultaneously in split screen) • 3D Reconstruction from a stored CINE loop • B/M/CrossXBeam Mode (Gray Map Optimization; TGC, Colorized B and M; Frame Average [Loops only]; Dynamic Range) • Anatomical M-Mode • Magnification Zoom • Pan Zoom • Baseline Shift • Sweep speed • PW-Mode (Gray Map; Post Gain; Baseline Shift; Sweep Speed; Invert Spectral Waveform; Compression; Rejection, Colorized Spectrum; Display Format; Angle Correct; Quick Angle Correct, Auto Angle Correct, Doppler Audio) • Color Flow (Overall Gain [Loops and Stills]; Color Map; Transparency Map; Frame Averaging [Loops only]; Flash Suppression, CFM Display Threshold; Spectral Invert for Color/Doppler) • Anatomical M-Mode on CINE Loop • 4D (Gray Map, Colorize; Post Gain; Change display between single or rendered) <p><u>Controls Available While “Live”</u></p> <ul style="list-style-type: none"> • Magnification Zoom: Magnifies the entire image on the screen without zoom ROI • Pan Zoom: Magnifies the display of the data within the ROI • HD Zoom: Magnifies the image within the zoom ROI, with higher spatial resolution than original images • B/M/CrossXBeam-Mode (Gain; TGC; Dynamic Range; Acoustic Output; Frame Rate Control, Sweep Speed for M-Mode; # of Angles for CrossXBeam) • PW-Mode (Gain; Dynamic Range; Acoustic Output; Transmission Frequency; PRF; Wall Filter; Spectral Averaging; Sample Volume Gate for PW-Mode Length and Depth; Velocity Scale) • Color Flow (CFM Gain; CFM Velocity Range; Acoustic Output; Wall Echo Filter; Frame Rate Control; CFM Spatial Filter; CFM Frame Averaging; CFM Line Resolution; Frequency/ Velocity Baseline Shift) | <p><u>Connectivity</u></p> <ul style="list-style-type: none"> • Ethernet network connection • Wireless LAN 802.11ac/a/b/g/n (option) • DICOM 3.0 (option) with Verify, Print, Store, Modality Worklist, Storage Commitment, Modality Performed Procedure Step [MPPS], Media Exchange, Off network/mobile storage queue, Query/Retrieve) • Public SR Template • Structured Reporting - compatible with Vascular, OB, Cardiac, and Breast standard • InSite capability • Advanced privacy and security (Option) <p><u>Scanning Parameters</u></p> <ul style="list-style-type: none"> • Displayed Imaging Depth: 0-50cm [Minimum: 0-2 cm (Zoom); Maximum: 0-50 cm] (Probe dependent) • Continuous Dynamic Receive Focus/Continuous Dynamic Receive Aperture • Adjustable Dynamic Range • Adjustable Field of View (FOV) • Image Reverse: Right/ Left • Image Rotation: 0, 90, 180, 270 degrees <p><u>Image Storage</u></p> <ul style="list-style-type: none"> • On-board database of patient information from past exams • Storage Format: DICOM (compressed/ uncompressed, single/multiframe, enhanced [3D/ 4D], with/without Raw Data), Export JPEG, and WMV (MPEG4) • Storage Devices: USB Memory Stick (64MB to 64GB, for exporting individual images/clips); CD-R Storage (700MB); DVD-R Storage (4.7GB); Hard Drive Image Storage (~730GB) • Compare previous exam images with current exam • Reload of archived data sets <p><u>CINE Memory/Image Memory</u></p> <ul style="list-style-type: none"> • 1 GB of CINE Memory • Selectable CINE Sequence for CINE Review • Prospective CINE Mark • Measurements/Calculations & Annotations on CINE Playback • Scrolling timeline memory • Dual Image CINE Display • Quad Image CINE Display • CINE Gauge and CINE Image Number Display • CINE Review Loop • CINE Review Speed |
|--|---|

Table 12-4: Measurements and Calculations

| | |
|---|---|
| <p><u>B-Mode</u></p> <ul style="list-style-type: none"> • Depth and Distance • Circumference and Area (Ellipse/Trace) • Volume (Ellipsoid) • Angle between 2 Lines • % Stenosis (Area or Diameter) • Dual B-Mode capability <p><u>M-Mode</u></p> <ul style="list-style-type: none"> • M Depth and Distance • Time • Slope • Heart Rate <p><u>Doppler Measurements/Calculations</u></p> <ul style="list-style-type: none"> • Velocity • Time • Peak Systole • End Diastole • Acceleration • Acceleration Time • Ratios <ul style="list-style-type: none"> • A/B Ratio (Velocities/Frequency Ratio) • Peak Systole/End Diastole (PS/ED Ratio) • End Diastole/Peak Systole (ED/PS Ratio) • Heart Rate • TAMAX (Time Averaged Maximum Velocity) • Volume Flow [TAMEAN and Vessel Area] • PI (Pulsatility Index) • RI (Resistivity Index) <p><u>Shear Wave Measurements/Calculations</u></p> <ul style="list-style-type: none"> • Stiffness • Velocity <p><u>Vascular Measurements/Calculations</u></p> <ul style="list-style-type: none"> • Carotid, Vertebral, Subclavian Measurements, Auto IMT • Summary Worksheet • Summary Report <p><u>Small Part Measurement Analysis</u></p> <ul style="list-style-type: none"> • Koios DS Breast Lesion Decision Support • Koios DS Thyroid Lesion Decision Support | <p><u>Obstetrics Measurements/Calculations</u></p> <ul style="list-style-type: none"> • Gestational Age Calculation • Calculations and Ratios • EFW Calculation • Growth Percentiles • Multi-Gestational Calculation • Fetal Qualitative Description (Anatomical Survey) • Fetal Environmental Description (Biophysical profile) • Programmable OB Tables • Fetal Graphical Trending • Measurements / Calculations by: ASUM, ASUM 2001, Alexander, Bahlmann, Baschat, Berkowitz, Bertagnoli, Brenner, Campbell, CFEF, Chervenak, Chitty, Doubilet, Ebbing, Eik-Nes, Ericksen, Goldstein, Hadlock, Hansmann, Hellman, Hill, Hohler, Jeanty, JSUM, Kurmanavicius, Kurtz, Mari, Mayden, Mercer, Merz, Moore, Nelson, Osaka University, Paris, Pexsters, Rempen, Robinson, Shepard, Shepard/Warsoff, Sonek, Tokyo University, Tokyo/Shinozuka, WHO, Yarkoni • Over 20 selectable OB Calcs • Summary Worksheet • Summary Report <p><u>Gynecology Measurements/Calculations</u></p> <ul style="list-style-type: none"> • Ovarian, Uterine, Pelvic Floor, Endometrium, Follicular Measurements, Cervix • Summary Worksheet • Summary Report • Qualitative Description (Anatomical Survey) <p><u>Urology Measurements/Calculation</u></p> <ul style="list-style-type: none"> • Bladder, Prostate, Renal, Generic, Post-Void Bladder Volume Measurements • Summary Worksheet • Summary Report <p><u>Cardiology Measurements/Calculations</u></p> <ul style="list-style-type: none"> • Cardiology Measurements and Calculations • Summary Worksheet • Summary Report |
|---|---|

Table 12-5: Biopsy Guides

| | |
|---|--|
| <ul style="list-style-type: none"> • Single-Angle, disposable with a reusable bracket • Multi-Angle, disposable with a reusable bracket | <ul style="list-style-type: none"> • Single-Angle, disposable with a disposable bracket |
|---|--|

Table 12-6: Inputs and Outputs Signal

| | |
|---|--|
| <ul style="list-style-type: none"> • HDMI (with stereo audio) • S-Video | <ul style="list-style-type: none"> • Ethernet • Multiple USB 3.0 ports |
|---|--|

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 12-7: System Measurements and Accuracies

| Measurement | Units | Useful Range | Accuracy | Limitations or Conditions |
|--------------------------------------|-----------------|------------------|---|---------------------------------|
| Depth | mm | Full Screen | ±20% | |
| Distance: | | | | |
| Axial (Equal to 1540m/s) | mm | Full Screen | ±3% or ±1mm, whichever is greater | |
| Lateral (Equal to 1540m/s) | mm | Full Screen | ±5% or ±1mm, whichever is greater | Linear Probes |
| Lateral (Equal to 1540m/s) | mm | Full Screen | ±6.5% or ±3.5mm, whichever is greater | Convex Probes |
| Lateral (Equal to 1540m/s) | mm | Full Screen | ±5% or ±1mm, whichever is greater | Sector Probes |
| Axial/Lateral (Not Equal to 1540m/s) | mm | Full Screen | ±7.5% or ±5.0mm, whichever is greater | All probes Not Equal To 1540m/s |
| Circumference: | | | | |
| Trace (Equal to 1540m/s) | mm | Full Screen | ±5% or ±1mm, whichever is greater | |
| Ellipse (Equal to 1540m/s) | mm | Full Screen | ±5% or ±1mm, whichever is greater | |
| Trace (Not Equal to 1540m/s) | mm | Full Screen | ±7.5% or ±5mm, whichever is greater | All probes Not Equal To 1540m/s |
| Ellipse (Not Equal to 1540m/s) | mm | Full Screen | ±7.5% or ±5mm, whichever is greater | All probes Not Equal To 1540m/s |
| Area: | | | | |
| Trace (Equal to 1540m/s) | mm ² | Full Screen | ±10% or ±5mm ² , whichever is greater | |
| Ellipse (Equal to 1540m/s) | mm ² | Full Screen | ±10%, or ±5mm ² , whichever is greater | |
| Trace (Not Equal to 1540m/s) | mm ² | Full Screen | ±20% or ±20mm ² , whichever is greater | All probes Not Equal To 1540m/s |
| Ellipse (Not Equal to 1540m/s) | mm ² | Full Screen | ±20% or ±20mm ² , whichever is greater | All probes Not Equal To 1540m/s |
| Time | s | Timeline Display | ±5%, not to exceed 10ms | M or Doppler Mode |
| Slope | mm/s | Timeline Display | ±5%, not to exceed 1mm/s | M-Mode Only |

Table 12-7: System Measurements and Accuracies (Continued)

| Measurement | Units | Useful Range | Accuracy | Limitations or Conditions |
|--|---------|---------------------------|---|---|
| Doppler Sample Volume Depth (SVD) | mm | Full Screen | 2mm (0.2cm) in any direction | When SVD is at least half the depth of the image |
| Velocity | cm/s | Full Range | 10% | PW and CW Doppler Mode |
| Doppler Angle Correction | degrees | From 0-59° From 60-90° | ±1% ±2% | |
| Shear Wave Elastography Velocity/Stiffness Measurements | | | | |
| Velocity | m/s | Shear wave ROI | ±10%, or 0.5 m/s, for the 9L-D and ±15%, or 0.5 m/s, for the C1-6-D, C1-6VN-D, L2-9-D and L2-9VN-D, whichever is greater over the range of depths for which measurements can be made, limited by shear wave penetration. | SD less than or equal to 5% for multiple repeated measurements over the range of depths for which measurements can be made, limited by shear wave penetration. |
| Stiffness | kPa | Shear wave ROI | ±20%, or 0.75 kPa, for the 9L-D and 30%, or 0.75 kPa, for the C1-6-D, C1-6VN-D, L2-9-D and L2-9VN-D, whichever is greater over the range of depths for which measurements can be made, limited by shear wave penetration. | SD less than or equal to 10% for multiple repeated measurements over the range of depths for which measurements can be made, limited by shear wave penetration. |
| <p>The formula for Stiffness: $E = 3 * \rho * c^2$ Where E = Young's modulus of tissue rho = density of tissue (assumed to be 1 g/cc) c = shear wave speed in m/s <i>Note: The conversion from shear wave speed (m/s) to Young's modulus is done under the assumption that the underlying material in which the shear wave propagates is linear, isotropic, incompressible, and homogenous.</i></p> | | | | |

Clinical Calculation Accuracy

Estimate the overall inaccuracy of a combined measurement and calculation by including the stated inaccuracy from the basic measurement accuracy statements.

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.

V Nav Magnetic Field Data

For the Patient



DO NOT use the Volume Navigation feature on any patient relying on life-sustaining electronic equipment, such as a pacemaker or defibrillator. Failure to follow this instruction could lead to interference with patient electronic device(s).



The Tracker's magnetic fields may possibly interfere with nearby electrical systems, e.g., an EKG. It is the users's responsibility to identify nearby devices to ensure their performance is not degraded when you are simultaneously using Volume Navigation.

Electromagnetic Field Strength is measured in units called Tesla, or for smaller fields, milliTesla (mT). According to this article from the World Health Organization (WHO), <https://www.who.int/peh-emf/publications/facts/fs299/en/>, people with pacemakers should avoid fields that exceed 0.5 mT.

The electromagnetic field created by the transmitter in our Volume Navigation offering is 0.5 mT once you are 7.5cm away from the transmitter face and goes down quickly after that (0.1 mT at 18cm away, e.g.). Nevertheless, we recommend not using V Nav on patients relying on a pacemaker or defibrillator.

V Nav Magnetic Field Data (continued)

For the Operator

The World Health Organization website addresses many items regarding exposure to electro-magnetic (EM) fields at <http://www.who.int/peh-emf/about/WhatisEMF/en/index.html> (see extract below).

Extracted from World Health Organization:

“Many people are surprised when they become aware of the variety of magnetic field levels found near various appliances. The field strength does not depend on how large, complex, powerful or noisy the device is. Furthermore, even between apparently similar devices, the strength of the magnetic field may vary a lot. For example, while some hair dryers are surrounded by a very strong field, others hardly produce any magnetic field at all. These differences in magnetic field strength are related to product design. The following table shows typical values for a number of electrical devices commonly found in homes and workplaces. The measurements were taken in Germany and all of the appliances operate on electricity at a frequency of 50 Hz. It should be noted that the actual exposure levels vary considerably depending on the model of appliance and distance from it.”

In the context of this, the VNav transmitter has the following EM field strengths at various distances from the transmitter face:

- 928 μ T at 5.1cm (2 inches) distance
- 287 μ T at 10.2cm (4 inches) distance
- 64 μ T at 20.3cm (8 inches) distance
- 11 μ T at 40.6cm (16 inches) distance
- 2.4 μ T at 71cm (28 inches) distance

NOTE: *Note that the field is only active when the green light on the position sensing electronics unit is on. This is the same unit that the transmitter plugs into.*

V Nav Magnetic Field Data (continued)**Typical Magnetic Field Strength Data**

Typical magnetic field strength commonly found in your home are shown below:

Table 12-8: Typical magnetic field strength of household appliances at various distances

| Electric Appliance | 3 cm Distance (μT) | 30 cm Distance (μT) | 1 m Distance (μT) |
|---------------------------|---|--|--|
| Hair Dryer | 6 – 2000 | 0.01 – 7 | 0.01 – 0.03 |
| Vacuum Cleaner | 200 – 800 | 2 – 20 | 0.13 – 2 |
| Portable Radio | 16 - 56 | 1 | < 0.01 |
| Microwave Oven | 73 - 200 | 4 - 8 | 0.25 - 0.6 |
| Fluorescent Light | 40 – 400 | 0.5 - 2 | 0.02 - 0.25 |
| Electric Oven | 1 - 50 | 0.15 - 0.5 | 0.01 - 0.04 |

Privacy and Security

Introduction

Privacy & Security considerations, capabilities and configuration of the LOGIQ Fortis Ultrasound System are described in the LOGIQ Fortis Privacy and Security Manual, available in the GE Healthcare Product Security Portal at the GE Documentation Library website at:

<https://www.gehealthcare.com/support/documentation>

Privacy & Security Environment

The GE Healthcare LOGIQ Fortis Ultrasound System 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 LAN or VLAN, configured and segmented according to appropriate networking best practices, not open to unintended users or generally connected to a WAN.
- The LOGIQ Fortis Ultrasound System should be physically secured in such a way that it is not accessible to unintended users.
- Default application users and passwords should be replaced with customized users and passwords.
- External media containing images, patient data, reports and logs should be secured. When no longer used, the data should be securely erased and/or the media should be securely deleted.
- The monitors of the LOGIQ Fortis Ultrasound System should be placed in a way limiting the visibility of the screen content to the user only.

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.

Management of user accounts

User accounts are created, maintained and suspended by users with administrator privileges. When received from factory the system has three predefined user accounts:

- “ADM”: an administrative user account
- “USR”: a normal user account template without administrative privileges
- “EUSR” : an emergency user account template with limited privileges

When receiving the LOGIQ Fortis Ultrasound System, it is recommended to do the following steps to ensure control of the user accounts on the system:

- Change the password of the “ADM” account.
- Change the password of the “USR” user account.
- Create groups for local or LDAP users and set their rights/ privileges appropriately for your workflows and operating environment.
- Create user accounts for each individual user of the system:
 - Give each user the needed group memberships / privileges.
 - Make sure to give administrative privileges only to users intended to perform administrative tasks on the system, like configuring dataflows, managing users on the system, inspecting audit logs etc. As administrative privileges may 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 user of the system. This is particularly relevant for the audit logging, to associate actions performed on the system with individual persons.

Identity Provisioning (continued)

Maintenance of user accounts

It is recommended to establish administrative routines for removing user accounts no longer being used.

User information stored on the system

The following information can be entered for a user defined on the system:

- User ID / User name (Required)
- Display ID (Optional)
- Last name (Required)
- First name (Optional)
- Title (Optional)
- Phone number (Optional)
- E-mail address (Optional)
- Address (Optional)

The user password is encrypted and not accessible in the system.

User name and password restrictions

The restrictions for usernames and passwords are:

- User names can be 1 - 32 characters long.
- Password can be 0 - 256 characters long.

It is recommended to enable and configure username and password policies as described below.

Identity provisioning by use of Backup/Restore

Users defined on a system can be copied from one system to another by use of the system's built-in Backup/Restore functionality.

Network Infrastructure

The infrastructure of the network where the LOGIQ Fortis Ultrasound System is connected must be configured to allow traffic. For information on inbound and outbound firewall configuration, refer to the LOGIQ Privacy and Security Manual, available in the GE Healthcare Product Security Portal at:

<https://www.gehealthcare.com/en-US/security>

Anti-Virus Software Note

LOGIQ Fortis Security

Since the LOGIQ systems are integrated into your IT-network, GE wants to make sure that you are aware of the proactive measures we are taking to secure the system. Below are measures we have implemented to secure the LOGIQ systems.

- Use of Windows* Embedded Standard 10, a componentized version of Windows 10 specifically made for embedded systems. Only the components required are used for the LOGIQ scanners, thereby reducing the OS attack surface. Please note that Windows 10 IoT Enterprise is NOT the same operating system as Windows 10.
- Disabled the user's ability to access the internet and Windows desktop.
- Disabled, or made inaccessible, functionality that is typically used as malware vectors for spreading viruses (e.g. email services, web browsers).
- Disabled AutoRun functionality on removable media.
- Closed network entry points that are not in use by the LOGIQ scanner software by strict firewall configuration and by disabling Services. The only Internet connection needed is on outbound port to GE's remote service platform (Insite™ ExC), which is only opened on request by the user and through a secure HTTPS connection (port 443), and inbound and outbound connections through port 104 for DICOM connectivity.

LOGIQ Fortis Security (continued)

- System provides user access controls under customer management to control scanner access.
- Uses secure integration and communication between systems (Scanners, Workstations and Servers).
- Monitor public security bulletins from software vendors and news services, analyze for applicability to the LOGIQ scanner, and include third party software security patches as necessary within GE software.
- Release GEHC Ultrasound validated software or use other measures as necessary to resolve or mitigate product vulnerabilities.
- Assess potential vulnerabilities of our systems using up-to-date commercially available vulnerability scanning tools. Identified vulnerabilities are mitigated as appropriate based on risk assessment of the product.

GE believes that this Defense in Depth strategy using the combination of the security measures above and the security standards of Microsoft Windows 10 IoT Enterprise will provide security against malware, especially for a system used in a professional hospital grade networking environment that itself should provide a high level of security measures.

Finally, a few points as to why GE (as well as all other manufacturers of PC-based medical Ultrasound devices) do not use Anti-Virus software: Commercial Anti-Virus software is commonly used on general-purpose computers to detect the presence of malicious software (e.g. virus, Trojan horse, worm). Anti-Virus software is useful on general-purpose computers as they typically cannot be sufficiently hardened against the attack vectors used by malicious software.

LOGIQ Fortis Security (continued)

The LOGIQ ultrasound systems however are single purpose (dedicated) devices that have controlled intended use, and thus are well hardened. For the LOGIQ ultrasound systems, the potential patient safety and security risks introduced by using commercial Anti-virus software would outweigh the security benefits. Such risks include:

- Real-time anti-virus scanning can affect ultrasound system performance.
- The effectiveness of Anti-Virus software depends on regular updates of the virus definitions files. This would typically require internet connectivity for the ultrasound system.
- The Anti-Virus software itself is a popular attack vector.
- Disruptive nature of the support of the Anti-Virus software throughout the life cycle of the medical device. The operating system of a medical ultrasound system is part of a medical device that requires a special and controlled release process. Any update of the Anti-Virus software would require a change of the system software.

Due to the cited risks, the use of commercial anti-virus software is not part of the LOGIQ systems product security strategy.

*Microsoft and Windows are trademarks of Microsoft Corporation.

Loading Windows Patches

Loading a Windows Patch

As part of the product lifecycle management, GE regularly analyzes and integrates software updates from our third party vendors into our products. These are typically released as part of regular updates or software releases.

To load a Windows patch onto the LOGIQ Fortis:

1. Power down the LOGIQ Fortis and insert the Windows Patch USB Flash Drive into a rear USB port.

NOTE: Ensure that the system is USB Device Enabled (check setting on System Admin Utility page).

2. Power on the LOGIQ Fortis. Windows Patch files will be loaded onto the LOGIQ Fortis automatically, following several screen prompts:
 - a. Select **Install SW...** on the Start Application screen.
 - b. Select OK on the first StartLoader screen.
 - c. Select the package and then select Install on the second StartLoader screen; software patch installation will begin.

NOTE: The Patch package is installed at the root folder or under the SWLoad directory in the root folder of the USB.

Multiple screens appear during the software re-imaging installation process. **DO NOT** interrupt this process **AND** follow instructions as they appear on the display.

- d. Once the installation is complete, a message displays saying that the “Software Installation completed successfully. System will reboot soon.” The LOGIQ Fortis restarts.
3. When the system starts up after the software installation has finished, the following dialog displays: the “New Software Verification” Checklist.

Performing Software Patch Verification

The Software Patch Verification dialog is **critical**. You **MUST** perform software verification after downloading and installing a software update.

- a. If you are able to successfully perform each function, then Pass all of the items and type your name into the Signature box and press OK. Press the Question Mark if you have questions about how to perform this task.

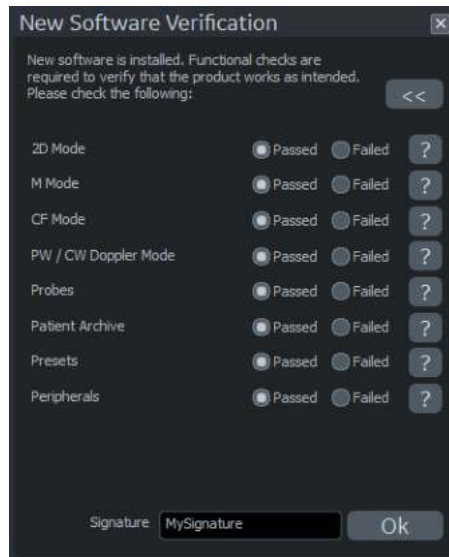


Perform a check for all the features listed. You **MUST** ensure that the entire system functions normally, as expected, in each of the categories listed on the New Software Verification checklist.

These verification results are tracked for regulatory purposes, sent back to GE for tracking, and approved with your signature.

- b. As you verify that each feature works correctly, select “Passed.” If all features work correctly and “Passed” is filled in for all features, then the signature field is enabled at the bottom of the New Software Verification Checklist.

Type your signature (minimum of three characters) and press **OK**. The system is now ready for use.

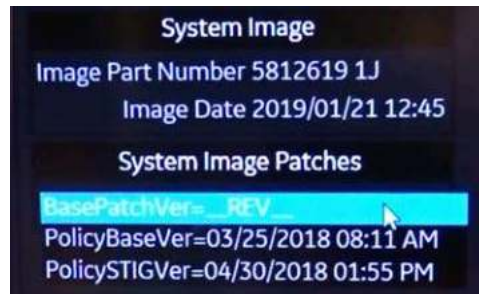


Performing Software Patch Verification (continued)

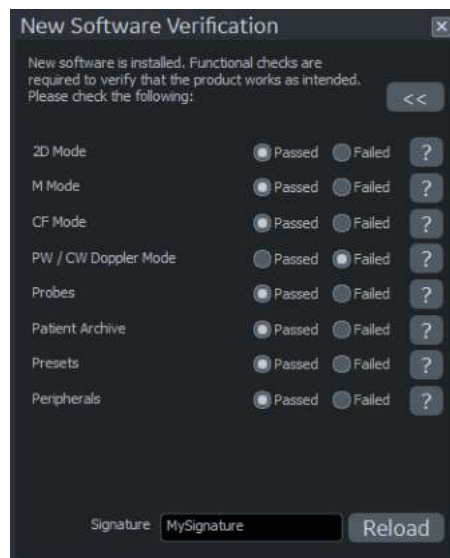


If any of the features **DID NOT** function as expected, you need to select “Failed” next to the feature that failed. Type your signature (minimum of three characters) and press **Reload**.

The version of the installed Patch appears on the Utility--> System--> About page.



- c. If one of the steps fails, then Fail the item(s).



- d. Type your **Signature**, then press **Reload**. The previous version of software will be reloaded onto the system automatically.

- e. Load the latest system patch which should be stored with the software located under the LOGIQ Fortis covers.

Patch Installation Notes

If by accident you try to load a patch that is not compatible with the software on the LOGIQ Fortis, an error message will notify you of this incompatibility.

If there is any issue with the media, an error message will indicate “The package cannot be installed. The package is not compatible or has been tampered. Please contact GE Service.”

The system may reboot multiple times during patch/software update.

If the software reload fails, an error message will indicate “Software Reload operation failed. Please contact GE Service.”

Reloading Software

When reloading software, you will need to reload the latest system patches which should be stored with the software located under the LOGIQ Fortis covers.






Software Download

Overview

The LOGIQ Fortis is designed to download software updates when they are available. Software Download monitors, notifies, delivers and installs available system software updates. This feature requires active InSite ExC connectivity.

When system software is available for download, a Software Download icon appears in the system status bar at the bottom of the monitor screen.

Table 12-9: Software Download Icons

| | |
|---|--|
|  | Software Download Available Icon |
|  | Software Download In Progress Icon |
|  | Software Download Paused Icon |
|  | Software Download Complete/Ready to Install Icon |
|  | Software Download Information Icon |

Software Download Available

When the “Software Download Available” icon appears in the status bar, select the icon to bring up the following Software Download and Install menu. Choose the desired option.

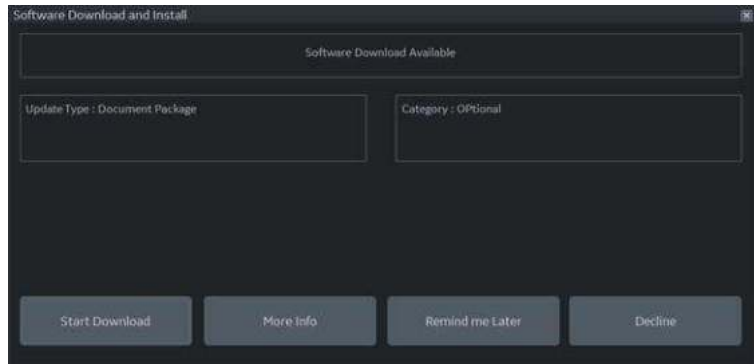


Figure 12-1. Software Download and Install Menu

Start Software Download and Install

1. Select **Start** to begin the software download. The software download status displays in the menu and the Software Download in Progress icon appears in the system status bar at the bottom of the monitor.

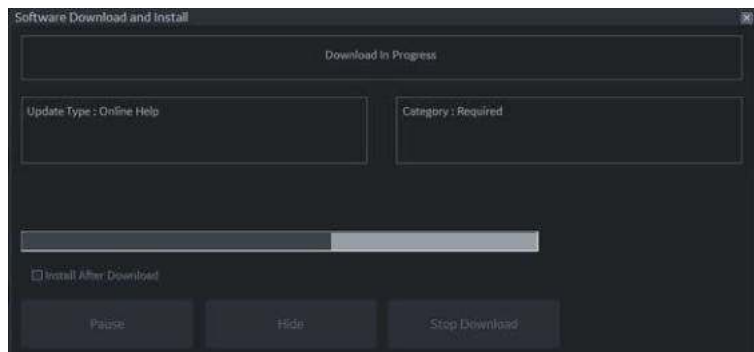


Figure 12-2. Software Download in Progress

While the software is downloading, you can choose to pause the download, hide the Software Download and Install menu or stop the download.

- Select **Pause** to temporarily pause the download. The Software Download Paused icon appears in the system status bar. Select the icon again to bring up the Software Download menu and press **Resume** to resume the download from the previous download point.

Start Software Download and Install (continued)

- Select **Hide** to hide the Software Download menu (the download continues in the background). The Software Download in Progress icon appears in the system status bar. Select the icon again to bring up the Software Download menu.
 - Select **Stop Download** to discontinue the download process. The download progress is not saved, and the Software Download Available icon must be selected again to bring up the Software Download menu to restart the software download process.
2. When the download is complete the Software Download and Install menu informs you the software is ready to install.

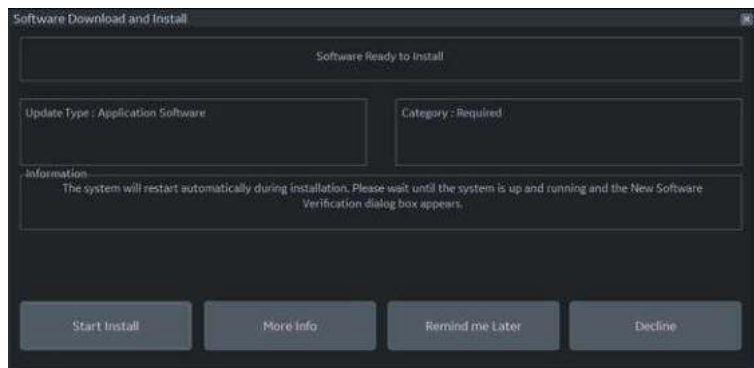


Figure 12-3. Software Ready to Install Menu

Select **Start** to begin the installation. The installation begins and the software Installation in Progress status is displayed.

Start Software Download and Install (continued)

3. **New Software Verification** - When the software package installation is complete, the system shuts down and restarts. When the system restarts, the New Software Verification checklist dialog displays. You **MUST** perform the new software verification.

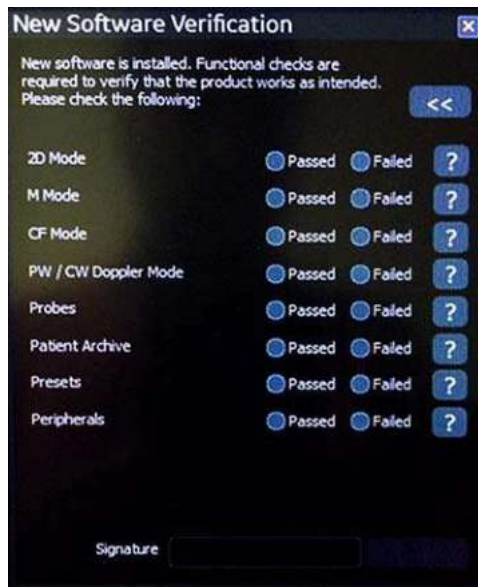


Figure 12-4. New Software Verification Dialog



CAUTION

Perform a check for all the features listed. You **MUST** ensure that the entire system functions normally, as expected, in each of the categories listed on the New Software Verification checklist.

As you verify that each feature works correctly, select “Passed.” If all features work correctly and “Passed” is filled in for all features, then the signature field is enabled at the bottom of the New Software Verification Checklist. Type your signature (minimum of three characters) and press OK. The system is now ready for use.

If any of the features **DID NOT** function as expected, you need to select “Failed” next to the feature that failed. Type your signature (minimum of three characters) and press Reload.

Contact your GE Service Representative for assistance.

More Info

Select **More Info** from the Software Download and Install menu to see details about the available software download.

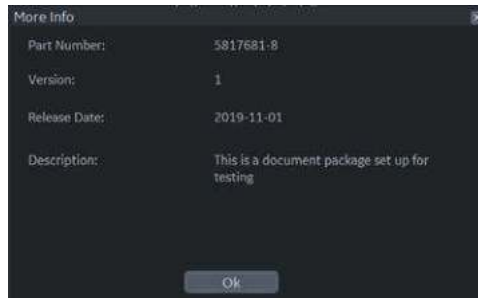


Figure 12-5. More Info

Remind Me Later

Select **Remind Me Later** to close the Software Download and Install Menu and download the software at a later time. The Software Download Available icon remains in the system status bar at the bottom of the monitor screen.

Decline

Select **Decline** to decline the software download package. A popup displays.

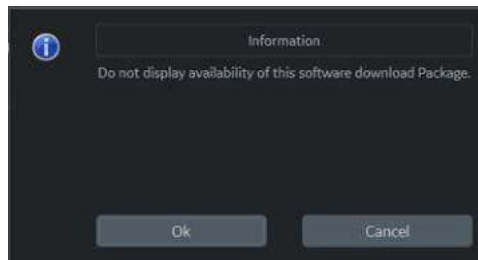


Figure 12-6. Decline Software Download Package Popup

You can then select **OK** or **Cancel**.

- Select **OK** to decline the package. You must then enter a signature consisting of three or more characters.
OR
- Select **Cancel** to go back to the Software Download and Install menu.

Base Image and Software Load

Base Image and Software Load Procedure

For the Base Image and Software Load procedure, refer to the LOGIQ Fortis Basic Service Manual.

Copyrighted Material

Viewing Copyrighted Third Party Software License Information

The LOGIQ Fortis contains copyrighted material. For more information, you can view Copyrighted Third Party Open Source Software Licenses via the Utility-> System-> Licenses page.

- Select Utility-> System-> Licenses
- Scroll to select the license you wish to view in the License Title section. Press Set.

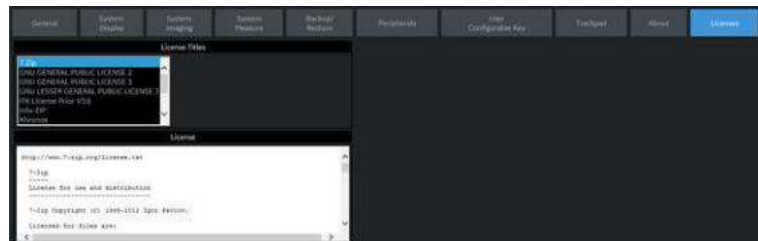


Figure 12-7. Third Party Software License Information

- The selected software license appears in the License window. Use the Set+Trackball to scroll through the license.

System Care and Maintenance

Overview

Refer to Section 10 of the LOGIQ Fortis Service Manual for any additional maintenance guidance.

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. 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.

Expected Service Life Description

The expected service life for the LOGIQ Fortis system and probes is identified in this table:

Table 12-10: Expected Service Life

| Equipment / Accessory | Expected Service Life |
|-----------------------|---|
| LOGIQ Fortis system | The expected service life for the LOGIQ Fortis is at least seven (7) years from the manufacturing date under the provision of regular maintenance by authorized service personnel. |
| LOGIQ Fortis Probes | The expected service life for the LOGIQ Fortis 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 / Accompanying LOGIQ Fortis Instructions for Use. |

Maintenance Schedule

Follow this Maintenance Schedule to maintain optimum system function and patient care:

Table 12-11: LOGIQ Fortis Maintenance Schedule

| Monthly | Weekly | Daily | After Each Patient |
|--|--|--|--|
| Inspect the following on a monthly basis: <ul style="list-style-type: none"> • 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. • Casters for proper movement and locking operation. | Clean the following on a weekly basis: <ul style="list-style-type: none"> • Console <ul style="list-style-type: none"> • System Cabinet • Removable Trackball/Trackball • Air Filters (weekly, or as needed) • Footswitch • B/W Printer • CD/DVD-R Multi Drive • Monitor and Monitor Frame • Operator Controls and Touch Panel | Clean and Disinfect the following areas where Cross Contamination can occur: <ul style="list-style-type: none"> • Operator Panel and Touch Panel • Monitor Frame • Front and Rear Handles | Clean and Disinfect the following after each patient: <ul style="list-style-type: none"> • Probe • Biopsy Bracket, as applicable Additionally, Clean and Disinfect any area on the system that has visible contamination from the previous exam. Note: Biopsy Accessories must be cleaned and disinfected or disposed of after each patient. Refer to the Probes Chapter, for probe cleaning and disinfecting instructions. |



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.

If any defects are observed or malfunctions occur, do not operate the equipment but inform a qualified service person. Contact a Service Representative for information.

Cleaning and Disinfecting the System



WARNING

All cleaners and disinfectants **NOT** on this list are **unapproved** by GE. Failure to follow guidelines could result in damage to the device.



CAUTION

When reprocessing 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.



CAUTION

To avoid liquids entering the product, **DO NOT** spray any liquid directly onto the surfaces. **ALWAYS** use a cloth or wipe.



CAUTION

Avoid using ALCOHOL (ISOPROPANOL) 70% inside the trackball. ALCOHOL (ISOPROPANOL) 70% may also compromise the durability of the paint used on the console controls.



CAUTION

Oxivir TB Wipes may compromise the durability of the paint used on the console handles and controls. Avoid the use of any Hydrogen Peroxide (H₂O₂) based disinfectants on the HDU monitor, as it may result in damage to screen.

These cleaners/disinfectants can be used anywhere on the console (Operator Panel, Monitor, Probe Holders, etc.), except for the probes. Refer to 'Probe Disinfectants' on *page 11-40* for probe disinfectant information and web links.

Always consult the cleaner or disinfectant manufacturer's instructions for proper use of their product. Wear appropriate PPE as indicated by the manufacturer.

Cleaning and Disinfecting the System (continued)

Appropriate cleaners/disinfectants for the console that have been validated for compatibility are shown below:

Table 12-12: Appropriate Cleaners/Disinfectants

| Product | Manufacturer | Notes | Chemistry | Locale | Cleaner/Disinfectant |
|---|-------------------------------------|--|---------------------------|------------------------|----------------------|
| Mild Soap | | | | | Cleaner |
| Acryl-Des Wipes | Schülke & Mayr GmbH | Same as Mikrozyd Sensitive Wipes also by Schulke | Quat | Europe | Cleaner/Disinfectant |
| Alcohol (Isopropanol) 70% | Generic | | Alcohol | Global | Disinfectant |
| Cleanisept Wipes | Dr. Schumacher GMBH | Same as GE branded Septiwipe | Quat | Europe | Cleaner/Disinfectant |
| Clinell Clorox Wipes | GAMA Healthcare | Same as Clorox Wipes sold in USA | Bleach | Europe | Cleaner/Disinfectant |
| Clinell Universal Sanitizing Wipes | GAMA Healthcare | | Quat+ Polyhexanide (PHMB) | Europe | Cleaner/Disinfectant |
| Clorox Healthcare Bleach Germicidal Wipes | Clorox Professional | Same formula as Clinell Clorox Wipes | Bleach | US Canada Europe | Cleaner/Disinfectant |
| Easy Screen Cleaning Wipes | Professional Disposables Inc. (PDI) | This product is 70% IPA | Alcohol | US | Cleaner |
| Mikrobac Tissues | BODE Chemie GmbH | | Quat | Europe | Cleaner/Disinfectant |
| Mikrozyd Sensitive Wipes | Schülke & Mayr GmbH | Same formula as Acryl-Des wipes | Quat | Europe | Cleaner/Disinfectant |
| Oxivir TB Wipes | Sealed Air | | H2O2 | US Canada | Cleaner/Disinfectant |
| Protex Ultra Wipes | Parker Laboratories | Same formula as SONO Wipes | Quat | US | Cleaner/Disinfectant |

Table 12-12: Appropriate Cleaners/Disinfectants (Continued)

| Product | Manufacturer | Notes | Chemistry | Locale | Cleaner/Disinfectant |
|---|---|---|----------------|-----------|----------------------|
| Sani-Cloth HB Germicidal Disposable Wipe | Professional Disposables Inc. (PDI) | | Quat | US | Cleaner/Disinfectant |
| Sani-Cloth Plus Germicidal Disposable Cloth | Professional Disposables Inc. (PDI) | Same Formula as Asepti Wipes II | Quat + Alcohol | US | Cleaner/Disinfectant |
| Sani-Cloth Prime Germicidal Disposable Cloth | Professional Disposables Inc. (PDI) | | Quat + Alcohol | US | Cleaner/Disinfectant |
| Septiwipes | EDM Medical Imaging | Same formula as Cleanisept Wipes | Quat | Europe | Cleaner/Disinfectant |
| Sodium Hypochlorite 5.25% (Bleach) diluted 10:1 | Generic | Clorox Healthcare Bleach Germicidal Wipes | Bleach | Worldwide | Cleaner/Disinfectant |
| SONO ULTRASOUND WIPES | Advanced Ultrasound Solutions, Inc. | | Quat | US | Cleaner/Disinfectant |
| Super Sani-Cloth Germicidal Disposable Wipes | Professional Disposables Inc. (PDI) | | Quat + Alcohol | US | Cleaner/Disinfectant |
| Tristel Distel | Tristel | | Quat+PHMB | Europe | Cleaner/Disinfectant |
| Trophon Companion Cleaning Wipes | Nanosonics | Same formula as SONO Wipes | Quat | US | Cleaner/Disinfectant |
| Virox Accel TB wipes | Virox Technologies Inc. (owned by Sealed Air) | Same formula as Oxivir TB | H2O2 | CAN | Cleaner/Disinfectant |

Console

Cleaning the LOGIQ Fortis Console

The LOGIQ Fortis Console includes the System enclosure, Monitor, Monitor Frame, Operator Panel, Touch Panel, and Probe Holders. For Probes Reprocessing, see 'Probe Reprocessing' on page 11-18.

Always clean visible soil from surfaces first before disinfecting the Console.

Follow the cleaning/disinfecting frequency suggested in 'Maintenance Schedule' on page 12-33.

To clean the system,

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution or approved cleaning/disinfecting agent.

NOTE: *The cloth/wipe should be damp, not dripping wet and running. Moisture should not drip into the crevices anywhere on the console.*

NOTE: *Refer to Table 12-12 on page 12-35 for a list of acceptable solutions to be used on the Console.*

2. Use a gentle wiping action to clean any surface on the console.



HINTS

A scrubbing action with the wipe may be necessary to help remove stubborn soil from the surfaces. However be careful with this action over crevices and gaps in the surface to prevent liquid from being scraped off the wipe and entering the product.

3. Wipe off excess cleaning agents.

NOTE: *Do not spray any liquid directly into the unit.*

NOTE: *DO NOT scratch or press on the panel with any sharp objects, such as pencils or pens, as this may result in damage to the panel.*

Disinfecting the LOGIQ Fortis Console

For disinfectants to be effective, the surface must first be clean. Refer to 'Cleaning the LOGIQ Fortis Console' on *page 12-37*.

ALWAYS follow the manufacturer's instructions concerning the use of the disinfectant and follow the contact time to be sure the disinfectant's kill claims are accomplished.

Follow the cleaning/disinfecting frequency suggested in 'Maintenance Schedule' on *page 12-33*.

Disinfect the desired surfaces of the console. To prevent cross contamination, surfaces that are often touched during exams should be disinfected after every patient. To disinfect the system,

1. Moisten a sterile cloth with a liquid disinfectant or remove pre-moistened disinfectant wipe from the container.



If a cleaner/disinfectant wipe was used to clean off visible soil per the above section, a second, fresh cleaner/disinfectant product should be used for the disinfectant step.

2. Wet the surfaces by gently applying the cloth or wipe. Avoid high pressure or squeezing the wipe to avoid having the liquid enter the gaps and services of the Console. Scrubbing is not necessary in the disinfecting step; evenly applying the liquid is the goal.
3. Let the surface remain wet for the appropriate contact time.
4. If the surface does not remain wet for the full contact time, apply an additional application of the disinfectant, as necessary, to extend the time.
5. After the contact time has expired, remove excess liquid with a dry sterile cloth.
6. To avoid disinfectant buildup, or to remove disinfectant residue which may cause skin irritation, perform a rinse step with a sterile damp cloth.

Probe Cleaning Notes

When cleaning/disinfecting probes, take care **NOT** to damage the Console with a solution that is approved for the probe but that **IS NOT APPROVED** for the Console. Refer to 'Probe Disinfectants' on *page 11-40* for a list of acceptable solutions to be used on the Console. Refer to the Probes Chapter, for probe cleaning and disinfecting instructions.



NEVER use any cleaner or disinfectant containing alcohol.

When cleaning/disinfecting probes using a spray cleaner/disinfectant, **DO NOT** spray the probe while the probe is set in its probe holder on the Ultrasound system (1). Overspray can damage the TGC controls.



Figure 12-8. DO NOT Spray a Probe While in its Holder

If you use a spray cleaner, spray **AWAY** from the Ultrasound system (2).

If you are cleaning/disinfecting probes while they are on the Ultrasound system, use a wipe cleaner/disinfectant instead (3).

Monitor and Monitor Frame

Monitor

To clean the Monitor:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.

NOTE: The cloth should be damp, not dripping wet.

2. Wipe down the top, front, back, and both sides of the monitor.
3. Wipe off excess cleaning agents.

NOTE: Never use thinner, benzene, alcohol (ethanol, methanol, or isopropyl alcohol), abrasive cleaners, or other strong solvents, as these may cause damage to the monitor.

Monitor Frame

To clean the monitor frame:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.

NOTE: The cloth should be damp, not dripping wet.

2. Wipe down the top, front, back, and both sides of the monitor frame.
3. Wipe off excess cleaning agents.

Other acceptable cleaning agents are:

- Ammonia
- Bleach (10 to 1 ratio of water to 5% home bleach)
- Hydrogen Peroxide / Hydrogen Peroxide Wipes

NOTE: DO NOT scratch or press on the panel with any sharp objects, such as pencils or pens, as this may result in damage to the panel.

Operator Controls and Touch Panel

ONLY USE the following cleaners on the LOGIQ Fortis Operator Panel:

- Palmolive Dishwashing Liquid (manufactured by Colgate-Palmolive, www.colgatepalmolive.com)
- Sani-Cloth® HB, green cap (manufactured by Professional Disposables International, www.wearepdi.com). *NOTE: May cause yellowing to the operator panel and probe cabling.*
- Super Sani-Cloth®, purple cap (manufactured by Professional Disposables International, www.wearepdi.com)
- Sani-Cloth® Prime, plum cap (manufactured by Professional Disposables International, www.wearepdi.com)
- Sono® Ultrasound Wipes (manufactured by Advanced Ultrasound Solutions, Inc, www.UltrasoundWipes.com)
- Bleach (10 to 1 ratio of water to 5% home bleach)
- Hydrogen Peroxide / Hydrogen Peroxide Wipes

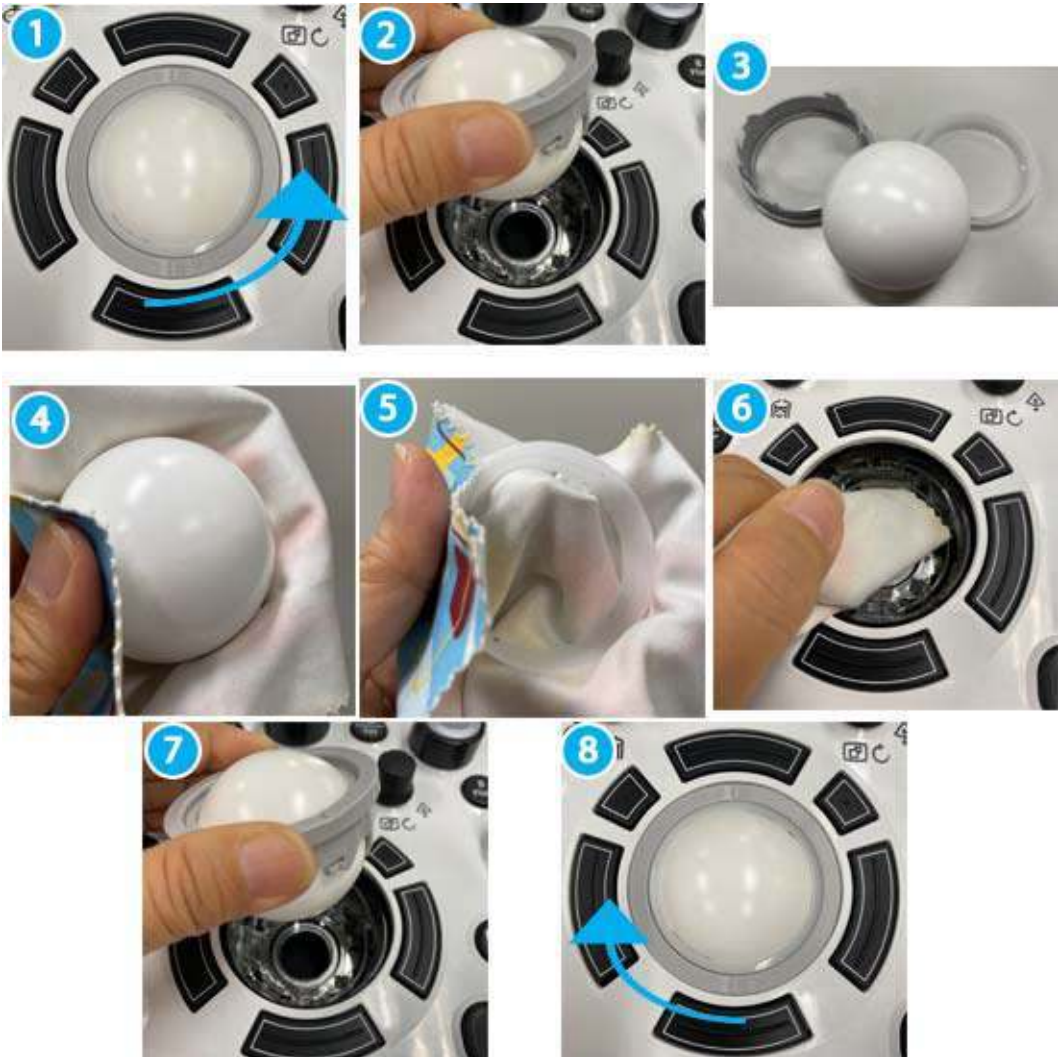
DO NOT USE:

- Cleaners or Disinfectants **NOT** listed above

Cleaning the Trackball

To clean the Trackball,

1. Twist and remove the Trackball prior to cleaning both the Trackball and Trackball housing (1 - 3).



2. Clean the Trackball and Trackball Housing with dry, soft cloth (4 - 6).
3. After cleaning the Trackball, replace and twist the Trackball into the Trackball housing (7-8).

Other Maintenance

Cleaning the air filter

Clean the system's air filters to ensure that a clogged filter does not cause the system to overheat and reduce system performance and reliability. It is recommended the filters be cleaned every two weeks, but the requirements will vary due to your system use.



Be sure to lock the wheels before cleaning the air filters to avoid injury by any unexpected movement of the system.

DO NOT operate the unit without the air filters in place.

Allow the air filters to dry thoroughly before re-installing them on the unit.

Cleaning

1. Pull the front cover of cabinet.



Figure 12-9. Remove the front cover

Cleaning (continued)

2. Pull out the air filter with the frame.

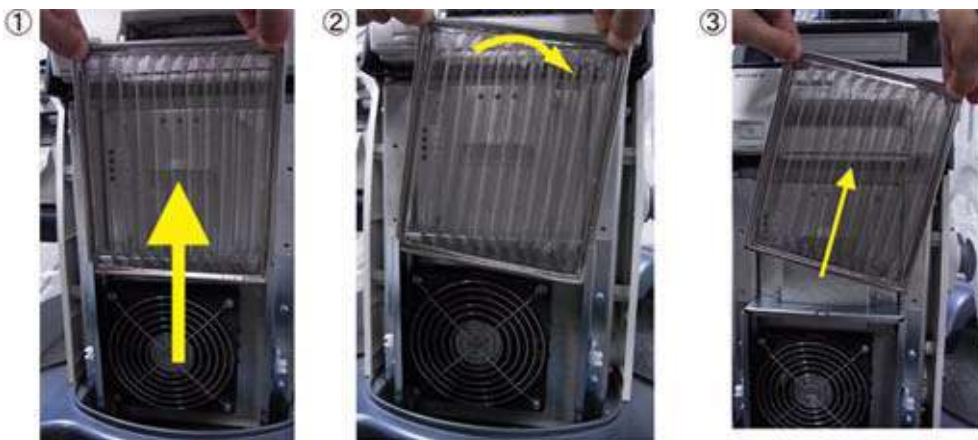


Figure 12-10. Remove the air filter

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 with both hands and the front cover.

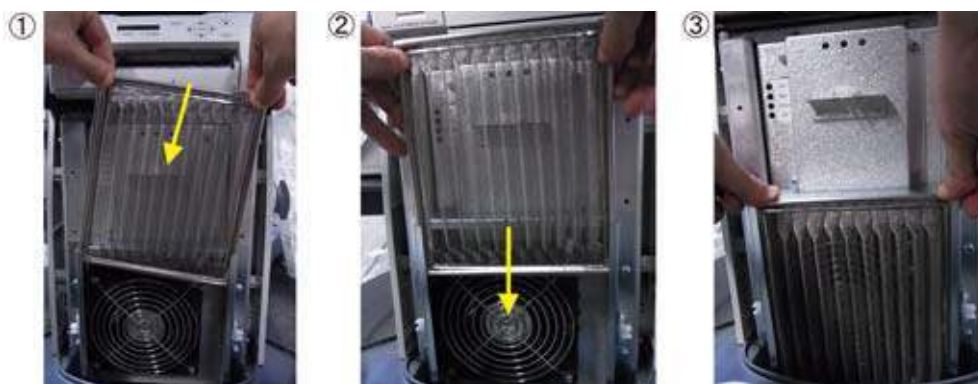


Figure 12-11. Put back the air filter

Cleaning Storage Tray and TVTR holder

Storage Tray

1. Loosen a screw ((1) in Figure 12-12) to remove the tray from the console.
2. Wash the tray with mild detergent.
3. Thoroughly dry the tray using a clean, low-lint, soft cloth or wipe.
4. Attach the tray to the system. Screw tightly.



Figure 12-12. Screw of the storage tray

Cleaning Storage Tray and TVTR holder (continued)

TVTR Probe Holder

1. Pull the claw (Refer to Figure 3-5) to remove the probe holder from the console.



Figure 12-13. Pull the claw to remove

2. Wash the probe holder with mild detergent.
3. Thoroughly dry the probe holder using a clean, low-lint, soft cloth or wipe.
4. Put the probe holder to the original position.

Replacing key caps

Contact a local Service Representative when a key cap needs to be replaced.

For Feature Keys, the user can rearrange these keys if desired. Please see 'System/User Configurable Key' on *page 10-25* for more information on how to remove and replace these Feature keycaps.

Footswitch

To clean the footswitch:

1. Disconnect the footswitch from the LOGIQ Fortis.
2. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.

NOTE: The cloth should be damp, not dripping wet.

3. Wipe the external surfaces of the unit then dry with a soft, clean, cloth.

CD/DVD Discs

To clean medical grade CD/DVD discs:

- If the disc is dirty, you can clean it with a commercially available dust removal spray. Be careful not to scratch the disc when wiping it off.

NOTE: *CD type cleaner cannot be used.*



HINTS

Keeping your media disc in an original media case or caddy all the time will prevent it from becoming dirty or damaged.

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.

NOTE: For information on setting up the Image Quality Check, refer to Image Quality Check .

For details on system and peripheral routine preventive maintenance instructions, See 'System Care and Maintenance' on page 12-32 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.

The phantom shown is shown as a representative example of a phantom. You can select from any number of phantoms available on the market.

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 may 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.

The RMI 403GS phantom is shown in the illustration below as a representative example of a phantom.

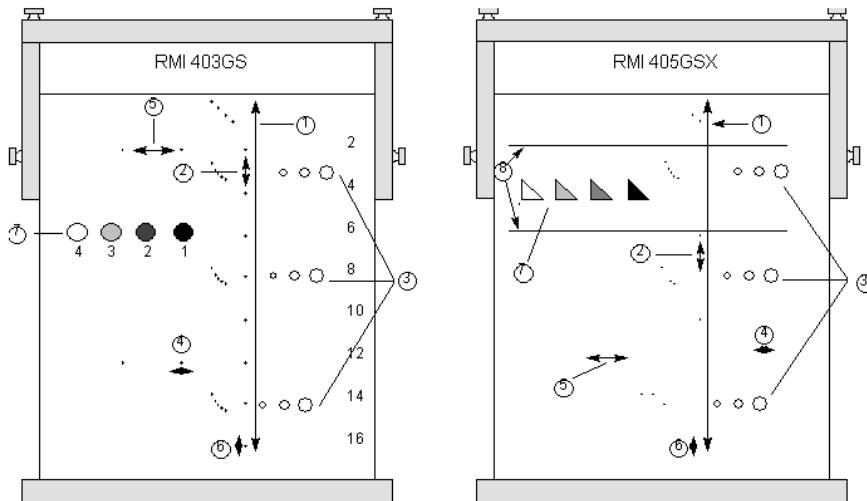


Figure 12-14. Representative Phantom Example

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 12-14 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 12-14 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 distance, 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 12-14 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 12-14 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 beamforming 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 12-14 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 12-14 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 12-14 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 12-14 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 its 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 12-13: 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 12-14: (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 | | | | | | |

Image Quality Check

Image Quality Check (IQC)

Image Quality Check is intended to facilitate Image Quality checks during Quality Assurance Evaluations. Quality Assurance tests are used to determine whether a scanner is providing the same level of performance year after year.

By using the same settings year after year, this ensures that the data collection is consistent, independently of who performs the test.

This preset only includes fundamental settings for B-Mode. Processing modes like SRI, Harmonics, etc., are turned off.

To do an Image Quality Check (IQC),

1. Activate IQC via Utility--> Imaging Preset Manager--> Category (select the Category first).
2. Click on the plus sign in front of IQC for Service and select IQC.
3. Assign IQC to a Touch Panel key by using the right arrow key.
4. Map the IQC to the location you want it to appear on the Touch Panel.
5. Select Probe. Then select IQC.

Supplies/Accessories






Not all features or products described in this document may be available or cleared for sale in all markets.

Contact the distributor, GE affiliate or sales representative for approved peripherals. For HCATs, contact your sales person. For field service replacement part numbers (FRUs), these are service replacement part numbers that may be either new or refurbished, please consult the Basic Service Manual. To order these, contact CARES in the US, or call service in Europe and Asia.

The following supplies/accessories have been verified to be compatible with the system:

Peripherals

Table 12-15: Peripherals and Accessories

| Accessory | Illustration/Photo | Part Number / HCAT |
|--|---|------------------------|
| Onboard Printer installation kit (UP-D898DC) |  | H46612LF |
| Sony UP-D25M Color Printer |  | H4911JT |
| HP 8210 Printer |  | H4918RP |
| Footswitch, USB |  | H46732LF |
| Powervar144k120v MG UPS UPS | N/A | H4913UP |
| Barcode Reader USBee1000A | N/A | Z72692FB (Japan only) |
| Magstripe Card Reader |  | Z72212FB3 (Japan only) |

Console

Table 12-16: Console Accessories


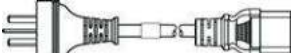



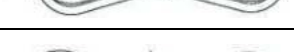




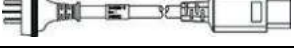



| Accessory | Illustration/Photo | Part Number / HCAT |
|------------------------------------|---|--------------------|
| English Keyboard Assembly | | H43342LR |
| Protective Cover | | H4918DC |
| Swedish Keyboard Assembly | | H43342LA |
| Norwegian Keyboard Assembly | | H43342LY |
| Greek Keyboard Assembly | | H43342LW |
| Russian Keyboard Assembly | | H43342LZ |
| German Keyboard Assembly | | H43342LS |
| French Keyboard Assembly | | H43342LT |
| Power Cord - North American |  | H46712LW |
| Power Cord - Argentina |  | H46712LP |
| Power Cord - Europe |  | H46342LZ |
| Power Cord - UK-Ireland |  | H46712LM |
| Power Cord - Switzerland |  | H46712LS |
| Power Cord - Denmark |  | H46712LT |
| Power Cord - Italy |  | H46722LD |
| Power Cord - Israel |  | H46712LR |
| Power Cord - Japan |  | H46712LY |
| Power Cord - China |  | H46722LA |
| Power Cord - Australia/New Zealand |  | H46712LZ |

Table 12-16: Console Accessories (Continued)

| Accessory | Illustration/Photo | Part Number / HCAT |
|-----------------------------------|---|--------------------|
| Power Cord - India |  | H46722LB |
| Power Cord - South Africa |  | H46712LN |
| Power Cord - Brazil |  | H46752LW |
| Power Cord - Taiwan | | H44512LY |
| High Cabinet installation kit | | H43342LL |
| Low Cabinet installation kit | | H43342LM |
| Side Cabinet Installation kit | | H43342LN |
| Option 5inch bay installation kit | | H43342LP |
| Small Probe Holder | | H43352LC |
| VERTICAL TV PROBE HOLDER | | H43352LD |
| TVTR Probe Holder Assembly | | H43352LE |
| Probe Cable Hanger | | H44412LA |
| Ethernet Protection cable | | H43272LJ |
| Option Tray | | H43352LF |

Volume Navigation

Table 12-17: Volume Navigation

| Accessory | Part Number / HCAT |
|---|---|
| V Nav Active Tracker (Omni TRAX) Starter Kit | H4913AT |
| V Nav Needle Tracking Storage Insert | H4913NS |
| V Nav eTRAX <ul style="list-style-type: none"> • 18/20g Starter Kit • 14g Starter Kit • 12g Starter Kit | <ul style="list-style-type: none"> • H4913NT • H4913NV • H4913NU |
| V Nav Probe Sensor | H4913PS |
| V Nav MR Active Tracker (Omni TRAX) | H4915MT |
| Probe Holder Insert | H4915P |
| Volume Navigation Stand | H4908NS |
| V Nav Needle Tracker Starter Kit | H4910NT |
| V Nav Needle Virtual Tracker Starter Kit (VirtuTRAX) | H4910NY |
| Virtual Tracker Sensor | H4911NG |
| Volume Navigation Bracket Starter Kit | H4908NK |
| V Nav Upgrade to Needle Tracking Kit | H4910NS |

V Nav Shelf Load Description

Shelf load for the V Nav wire shelf on the V Nav Stand is 10 lbs.

Hardware options

Table 12-18: Hardware options

| Accessory | Part Number / HCAT |
|-------------------------------------|--------------------|
| CW Doppler Option Collector Swallow | H43342LA |
| Realtime 4D | H43342LB |
| ECG | H43342LC |
| Scan on battery Option kit | H43342LD |
| Power Assistant Option kit | H43342LE |
| Volume Navigation | H43342LF |
| Wireless | H43342LG |
| S-Video | H43342LH |
| Pencil CW Hardware Kit | H43342LJ |

ECG Accessories

Table 12-19: ECG Accessories

| Accessory | Part Number / HCAT |
|---|--------------------|
| ECG Cables, IEC, AHA Style for Americas | H4910EC |
| ECG Cables, IEC Style | H4911JC |
| ECG Cable Kit | H45521AL |

Probes

Table 12-20: Probes and Accessories

| Probe | HCAT Global P/N Japan P/N | Biopsy Guide | Biopsy Guide HCAT | V Nav Capable | V Nav Bracket HCAT |
|--|---------------------------------|---|--|------------------|--------------------------|
| BE9CS-D | H40482LE | Multi-angle disposable with a reusable bracket Multi-Angle Reusable Stainless Bracket | E8387M E8387MA | No | N/A |
| C1-6-D Convex | H40472LT | Verza starter Kit Note: ONLY support Verza Starter Kit. | H4917VB | No | N/A |
| C1-6VN-D Convex | H40472LW | Verza starter Kit Note: ONLY support Verza Starter Kit. | H4917VB | Yes | N/A (V Nav Inside) |
| C2-7-D Convex | H46422LM | Multi-angle disposable with a reusable bracket Multi-Angle Reusable Stainless Bracket | H40482LK H40482LL | No | N/A |
| C2-7VN-D Convex | H46422LN | Multi-angle disposable with a reusable bracket Multi-Angle Reusable Stainless Bracket | H40482LK H40482LL | Yes | N/A (V Nav Inside) |
| C2-9-D Convex | H40462LN | Starter Kit | H4913BA | No | N/A |
| C2-9VN-D Convex | H40472LY | Starter Kit | H4913BA | Yes | N/A (V Nav Inside) |
| C3-10-D Convex | H40482LB | N/A | N/A | Yes | H40482LF |
| IC5-9-D Micro Convex Intracavitary | H40442LK | Single Angle Disposable with a Plastic Bracket or Reusable with a Stainless Steel Bracket | H40412LN IC59_TR5 (E8387M) IC59_RU (E8387MB) | Yes | H4908NF |
| L2-9-D Linear | H44901AI | Verza starter Kit Note: ONLY support Verza Starter Kit. | H44901AM | No | N/A |
| L2-9VN-D Linear | H44901AJ | Verza starter Kit Note: ONLY support Verza Starter Kit. | H44901AM | Yes | N/A (V Nav Inside) |

Table 12-20: Probes and Accessories (Continued)

| Probe | HCAT Global P/N Japan P/N | Biopsy Guide | Biopsy Guide HCAT | V Nav Capable | V Nav Bracket HCAT |
|--|---|---|---|------------------|-----------------------------------|
| L3-12-D | H48062AA | Multi-angle | H48302AA [Kit] OR H78652PA [Set] | No | N/A |
| L8-18i-D Linear | H40452LL | N/A | N/A | Yes | H4908NH |
| L6-24-D Linear Array | H4920HF (May not be available in all countries.) | N/A | N/A | No | N/A |
| M5Sc-D XDclear Active Matrix Single Crystal Phased Array Transducer | H44901AE | Multi-angle disposable with a reusable bracket | H45561FC5 | Yes | H4908NM |
| ML6-15-D Matrix Array Linear | H40452LG | N/A | H40432LI | Yes | H40432LK (Tru3D Biopsy Kit) |
| RIC5-9-D 4D Convex Volume Intracavitary | H48651MS | Single Angle, Reusable Biopsy Kit for RAB Light | H46721R H48621Y | N/A | N/A |
| RAB6-D 4D Volume | H48681MG | Starter Kit | H46701ML | N/A | N/A |
| 6S-D | H45021RR | N/A | N/A | No | N/A |
| 6Tc-RS + RS-DLP Trans- esophageal | H46402LW | N/A | N/A | N/A | N/A |
| P2D Pencil Probe | H4830JE | N/A | N/A | N/A | N/A |
| P6D Pencil Probe | H4830JG | N/A | N/A | N/A | N/A |

Transesophageal Probe Options

- Bite Guard (KZ200687 - H45511EE)
- Bite Guard Opr. Clip On (KZ693 - H45521CB)
- TEE Scanhead. Protective Cover (KZ808 - H45521CK)
- Bite Guard AD.16”27MM (086A0016 - H45521JH)
- Bite Hole Inducator (KZ800 - H45531HS)
- Storage Rack (H4551NM)

Options

NOTE: Not all options are available in all countries.

Table 12-21: Options

| Option | Part Number / HCAT |
|--|--------------------|
| Advanced Security | H46622LL |
| *Coded Contrast - AM | H43332LA |
| *Parametric Imaging | H43332LB |
| Cardiac Automated Functional Imaging (AFI) | H46622LN |
| Report Writer | H46622LR |
| Stress Echo | H46622LS |
| Tricefy | H46622LT |
| LOGIQ Apps | H46622LW |
| KOIOS SW | H46622LY |
| Thyroid Assistant, Powered by Koios DS | H4920KT |
| Scan Assistant | H46622LZ |
| Advanced Probes | H46612LS |
| Auto IMT | H46612LT |
| B-Steer+ | H46612LW |
| B-Flow | H46612LY |
| Compare Assistant | H46612LZ |
| DICOM | H46622LA |
| Flow Quantification (Q-Analysis) | H46622LB |
| Breast Measure Assist | H46622LC |
| OB Measure Assistant | H46622LD |
| Elastography | H43332LC |
| Elastography QA | H43332LD |
| Shear Wave Elastography | H46622LE |
| Ultrasound Guided Attenuation Parametre (UGAP) | H46622LH |
| Hepatic Assistant | H46622LE |
| SonoNT/SonoIT | H46622LJ |
| DVR | H4918DR |

Table 12-21: Options (Continued)

| Option | Part Number / HCAT |
|---|--------------------|
| SRI HD Type2 | H4920SR |
| V-Nav Image-Based Registration | H4920VR |
| OmniView | H43332LF |
| STIC | H43332LG |
| TUI | H43332LH |
| VCI Static | H43332LJ |
| VOCAL II | H43332LK |
| Thyroid Productivity | H43332LL |
| Breast Productivity | H43332LM |
| VITA on Demand | H43332LN |
| <p>*The LOGIQ Fortis 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.</p> | |

Gel

Table 12-22: Gel — Refer to Accessories Catalog

| Accessory | Units |
|------------------------|---|
| Thermasonic Gel Warmer | Holds three plastic bottles (250ml or 8 oz) |
| Aquasonic 100 Scan Gel | 5 liter jug |
| | 250 ml plastic bottles (12/case) |
| Scan Ultrasound Gel | 8 oz plastic bottles (12/case) |
| | 1 gallon plastic jug |
| | Four 1-gallon plastic jugs |

Disinfectant

Table 12-23: Disinfectant — Refer to Accessories Catalog

| Accessory | Units |
|----------------------------|----------------------|
| Cidex Activated Dialdehyde | 16/1 quart bottles |
| | 4/1 gallon bottles |
| | 2/2.5 gallon bottles |

Ultrasound Probe and Cord Sheath Sets

Table 12-24: Probe and Cord Sheath Sets — Refer to Accessories Catalog

| Accessory | Units |
|---|------------|
| Sterile Ultrasound Probe Sheath Set | 20 Per Set |
| Sterile Ultrasound Cord Sheath Set | 20 Per Set |
| Sanitary Rectal/Vaginal Probe Cover | 20 Per Set |
| Sterile Combination Probe and Cord Cover Set | 12 Per Set |
| Sterile Ultrasound Probe Sheath Set for Wide (2.5 and 3.5) Aperture Sector Probes | 20 Per Set |

Chapter 13

Advanced Features

Describes Advanced system features and options.

List of Advanced Features

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4D Introduction

4D provides continuous, high volume acquisition of 3D images. 4D adds the dimension of “movement” to a 3D image by providing continuous, real-time displays. With 4D, you can apply rendering techniques to smooth out the appearance of an anatomical structure, for example, a baby’s spine.

You can perform the following types of volume acquisitions within the 4D feature:

Table 13-1: 4D Package Options

| 4D Type | Description | Acquisition Mode |
|-----------|---|------------------|
| 4D | Designed for continuous volume acquisition of a 3D image. | B, 4D |
| Static 3D | Designed for single volume acquisition of a 3D image. | B, 3D |

Features supported with 4D

The following features are supported with 4D:

- Most B-Mode controls
- Annotations
- Measurements and Calculations

The following post-processing controls are available with 4D:

- CINE
- Zoom

4D Principles of Operation

The acquisition of volume starts with a 2D image using special probes designed for performing 3D sweeps and 4D scans. The volume box defines the region of interest to be used for the volume sweep.

Volume sweep refers to the range of the sweep of the 2D image to be transformed into a rendered, 3D or 4D image. Static 3D acquisition involves a single volume sweep. 4D involves multiple, continuous volume sweeps.

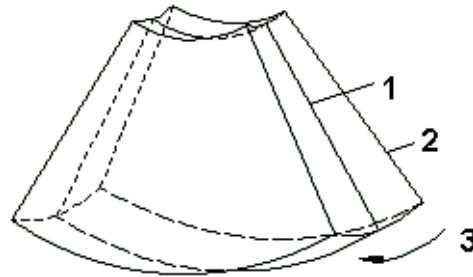


Figure 13-1. Volume Sweep

1. Central 2D scan
2. Start 2D scan
3. Range of VOI sweep

When you initiate a volume sweep, you can adjust the angle of the volume.

What is Interactive 3D Rendering?

Interactive 3D rendering allows you to visualize certain structures and to view and analyze different sections of the volume.

Region of Interest (ROI) / Render Box

The Region of Interest (ROI) - also referred to as the Render Box in rendering - contains the section of the volume you want to render. Therefore, objects that are not inside of the box are not included in the render process and are cut out (this is important in surface mode to allow a free line of sight). This may or might not be the entire Volume of Interest (VOI).

You can adjust the view direction of the ROI.

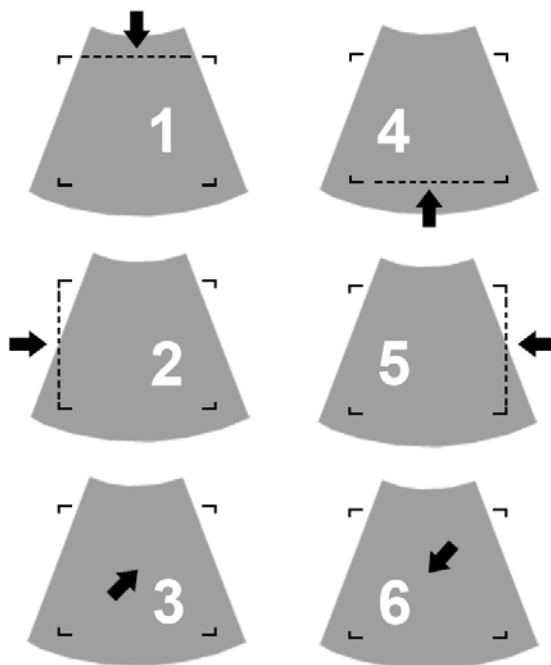


Figure 13-2. Render View Directions

- | | |
|---------------|---------------|
| 1. Up/Down | 4. Down/Up |
| 2. Left/Right | 5. Right/Left |
| 3. Front/Back | 6. Back/Front |

Render View

In Render view, only the rendered image displays - no reference images.

Image Orientation

Orientation of Image in Sectional view

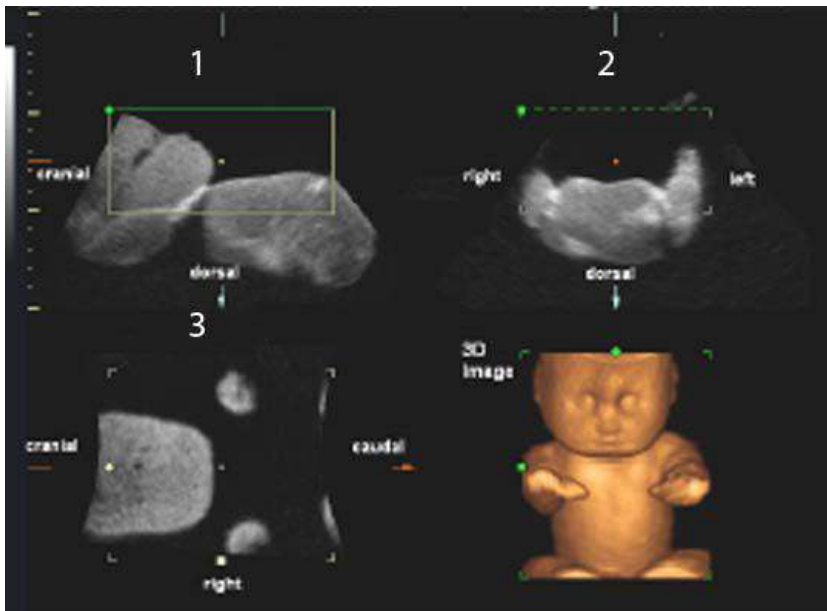


Figure 13-3. Quad Render Visualization Mode

1. Longitudinal
2. Transverse
3. Coronal

Principle of Sectional Planes

Sectional planes represent three different planes of the same 3D volume. There are three separate planes, A (Longitudinal), B, (Transverse) and C (Coronal).

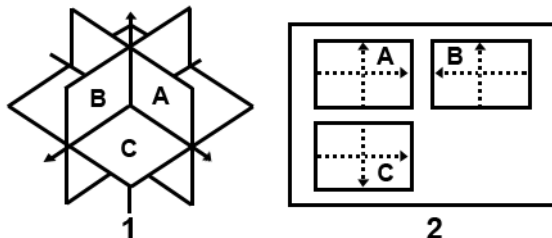


Figure 13-4. Illustration of Sectional Planes

The presentation of three orthogonal sectional planes is different from the conventional patient orientation in 2D sonography.

NOTE: *Whenever you select the usual, longitudinal section of the patient to display in field A, the conventional orientation for longitudinal and transverse sections is valid.*

Reference Images

Reference images are the individual image displays within the corresponding sectional plane. Reference image A represents the longitudinal view; reference image B the transverse view, and reference image C represents the coronal view.

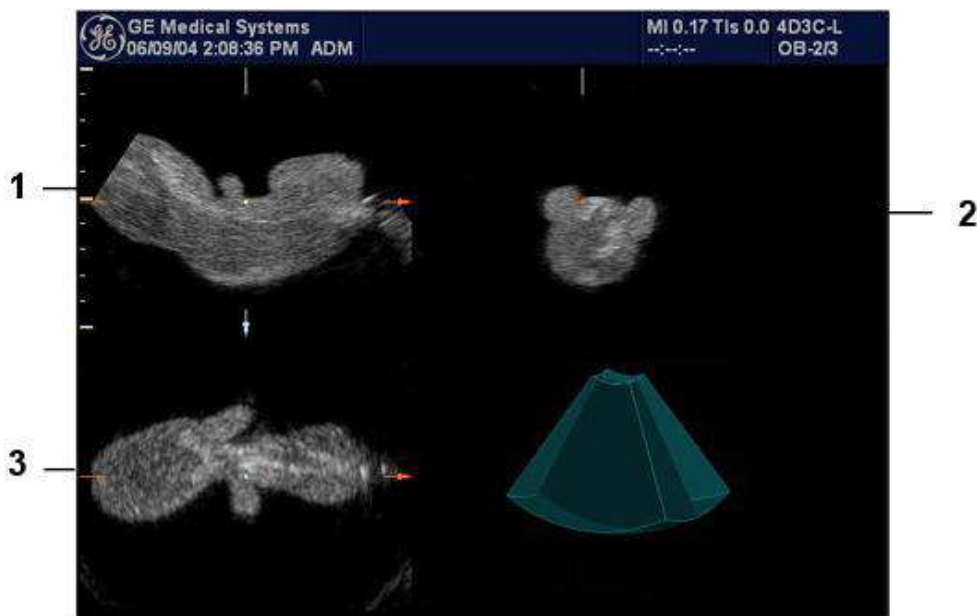


Figure 13-5. Monitor Display of Reference Images in Sectional View

1. Reference Image A (Longitudinal)
2. Reference Image B (Transverse)
3. Reference Image C (Coronal)

Orientation Help. When you view a 4D image on the display, it's sometimes difficult to recognize the orientation. To help, the system displays a three-dimensional drawing to illustrate the orientation. This drawing displays **ONLY** in sectional view.

Reference Images (continued)

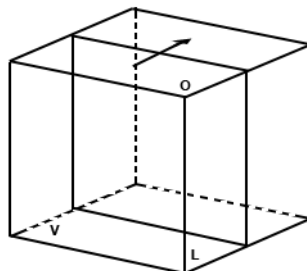


Figure 13-6. Reference Image A

For Reference image A, the transducer plane migrates from the FRONT to the REAR through the volume body.

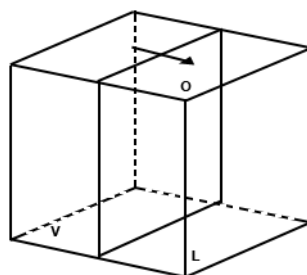


Figure 13-7. Reference Image B

For Reference image B, the transducer plane migrates from the LEFT to the RIGHT through the volume body.

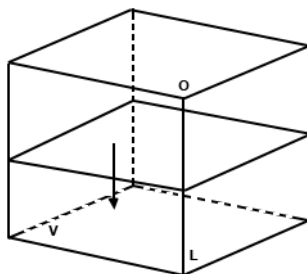


Figure 13-8. Reference Image C

For Reference image C, the transducer plane migrates from the TOP to the BOTTOM through the volume body.

Reference Images (continued)

Examples of Probe Orientation with Reference Planes

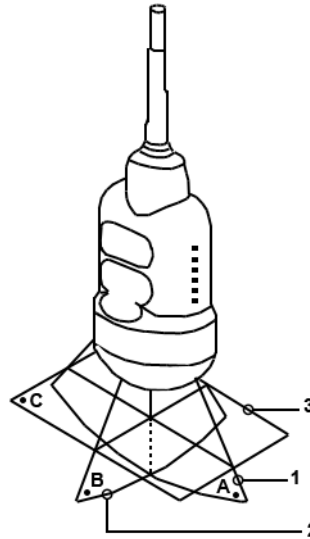


Figure 13-9. Abdominal Probe Orientation

1. Image Plane A
2. image Plane B
3. Image Plane C

Reference Images (continued)

Examples of Probe Orientation with Reference Planes

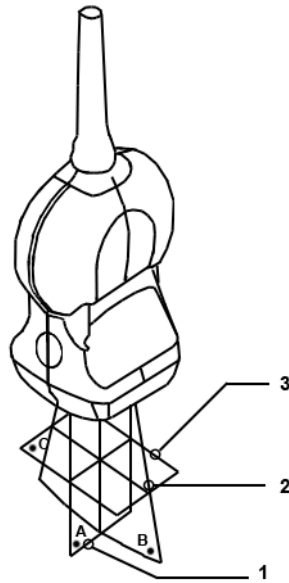


Figure 13-10. Small Part Probe Orientation

1. Image Plane A
2. Image Plane B
3. Image Plane C

Reference Images (continued)

Examples of Probe Orientation with Reference Planes

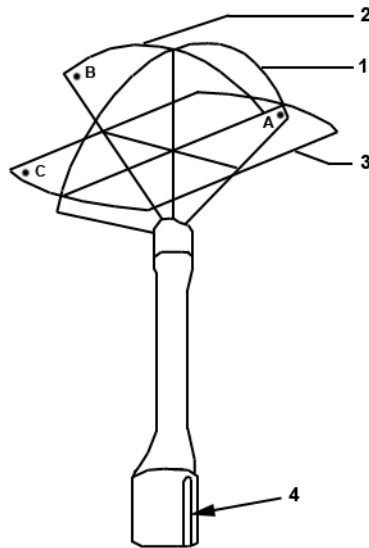


Figure 13-11. Endocavity Probe Orientation

1. Image Plane A
2. Image Plane B
3. Image Plane C
4. Groove

4D Operational Controls

Control Panel Overview

When you enter 3D/4D mode, the behavior of some of the Control Panel buttons changes. For example, in 3D/4D mode, you use the PW-Mode, CF-Mode, M-Mode buttons (along with Depth) to manipulate the Volume of Interest (VOI).



Figure 13-12. Control Panel Buttons

1. User-configurable controls.
2. M key, M-Mode key used to rotate about the X axis.
3. PW key, PW-Mode key used to rotate about the Y axis.
4. CF Key, CF-Mode key used to rotate about the Z axis.
5. Depth key, used as a transverse translation through the image.
6. Width key, used to adjust the size and position of the VOI.
7. Trackball, used to move the VOI. Also, the 4 keys surrounding the Trackball map to additional functionality, as shown on the monitor display.
8. L (left) key, used to begin a 4D acquisition.
9. Freeze or R (right) key, used to freeze a 4D image.

4D Monitor Display

Imaging parameters are displayed in the upper right-hand portion of the display. The 4D specific parameters are Quality (Q), Volume Angle (A) and Volume Rate (VR). The Status Bar contains instructions on the tasks you can perform at each stage of the 4D imaging process. Remember to take a look at the Status Bar as needed.

4D Touch Panel Overview

The following is the first Touch Panel that appears when you press **3D/4D**.

Common 4D Touch Panel Controls

Most 4D Touch Panel screens contain some similar controls. Refer to the table below for descriptions of these controls. Controls that are unique to or that contain slightly different functionality are described in their respective sections.

Table 13-2: Common 4D Touch Panel Controls

| Preset Parameter | Description |
|------------------|---|
| Tile | You can divide the display into 1, 2, or 4 windows for Render view (Render = On) and 1 or 4 windows for Sectional view (Render = Off). |
| Reset Curve | Resets the three-point curve to a straight line. |
| Direction | Adjusts the view direction of the ROI. |
| Visualization | Sectional, Render, VCI, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image. |
| Focus Position | Adjusts the focal position. |
| Volume Angle | Sets the range of the volume sweep. |
| Quality | Balances speed with line density. Max combines the highest density with the slowest speed; Low combines the lowest density with the highest speed. |

4D Presets

Real-Time 4D/Static 3D Presets

1. When you enter 3D/4D mode, press the **Preset** tab.
2. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

Table 13-3: Common 4D Touch Panel Controls

| Preset Parameter | Description |
|----------------------------|--|
| Save | Selections: Overwrite, Create New, Cancel. Overwrite . Overwrite the application preset file with the changes you just made. Create New . Create a new user application preset file based upon the current exam category and application. Cancel . Cancel without saving preset parameters. |
| Pre-defined Preset | Reloads the presets for the selected application. |
| User1, User2, User3, User4 | Used to define new user presets for a given application. |

Static 3D Presets

1. When you enter 3D/4D mode, press **Static 3D**, then the **Preset** tab.
2. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

Performing a 4D Scan

Visualizations

4D provides two types of views for displaying and working with images: Sectional, Render, and Tomographic Ultrasound Imaging (TUI).

Sectional View

Sectional view contains one display for each sectional plane.

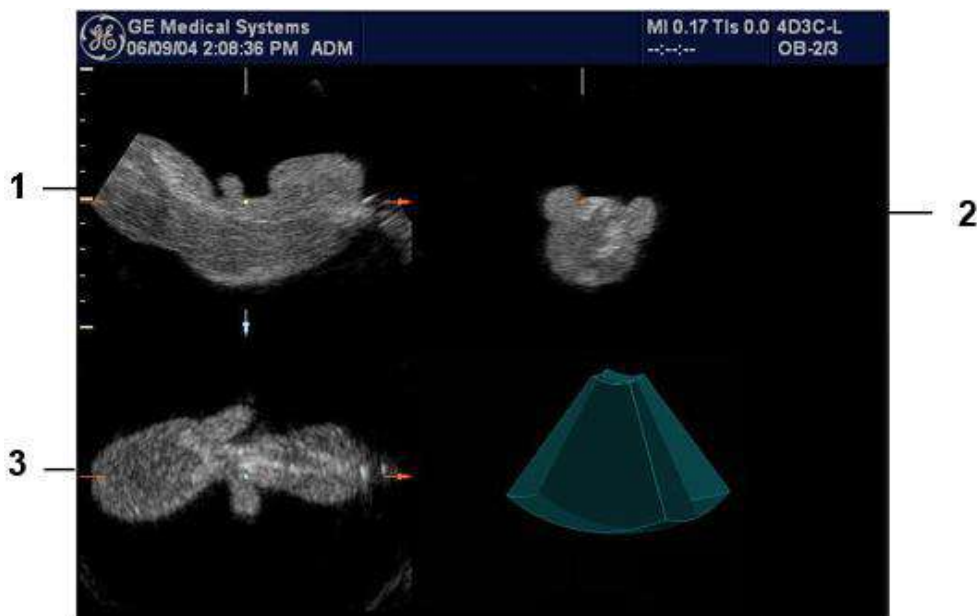


Figure 13-13. Monitor Display in Sectional View

1. Sectional Image A
2. Sectional Image B
3. Sectional Image C

Visualizations (continued)

Render View

The LOGIQ Fortis continuously displays the 4D rendered image.

NOTE: *When the tile selection is single, only the rendered 4D image appears. When the tile selection is quad, the sectional images are located in 3 quadrants with the rendered 4D image in the fourth.*



Figure 13-14. Quad Tile Render View

Visualizations (continued)

Orientation Help

When you view a 4D image on the display monitor, it's sometimes difficult to recognize the orientation. To help, the system displays a three-dimensional drawing to illustrate the orientation. This drawing displays **ONLY** in sectional view.

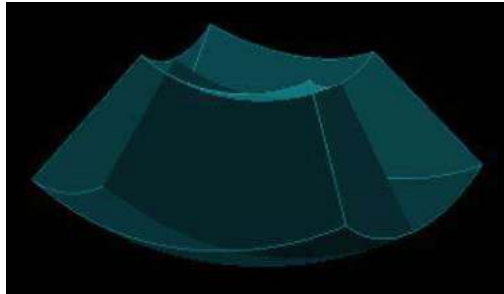


Figure 13-15. Orientation Help Graphic

Acquiring and Rendering a 4D VOI

Starting with a 2D Image

To create a 4D image, you start with an optimized 2D image. The 2D image serves as the mid-line for the resulting 4D image.

1. Connect the appropriate 4D-compatible probe, leaving the probes in their respective holders. Follow the guidelines in Chapter 3 for connecting probes.

NOTE: *If the appropriate 4D probe is not connected, the original 3D Touch Panel appears.*

2. Obtain a 2D image. Optimize the image as usual.

Entering 3D/4D Mode

In 3D/4D mode, you choose the type of scan you want to perform: 4D or Static 3D.

1. Press **3D/4D** to enter 3D/4D mode. The first time you press 3D/4D, the system is in B Pre mode.

NOTE: *The location of the number of focal zones might change when you enter 3D/4D mode, since the number of zones is pre-determined by the default ROI.*

The default acquisition mode varies by application. If you are in OB, the default acquisition mode is Real-Time 4D; for all other applications, Static 3D is the default acquisition mode. When you enter pre-mode, an ROI graphic may appear on the monitor display that defines the initial ROI (Region of Interest) of the volume.

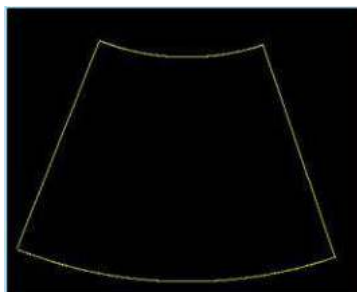


Figure 13-16. ROI Graphic

2. Press the **Preset** tab. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

Quick Acquisition Steps

1. Connect the appropriate 4D-compatible probe, leaving the probes in their respective holders. Follow the guidelines in Chapter 3 for connecting probes.
2. Select a 4D probe from the probe indicator.
3. Obtain a 2D image. Optimize the image as usual.
4. Press **3D/4D**. An ROI graphic appears. 4D is selected.
5. Define the Volume of Interest (VOI) to be scanned. Use the **Trackball** to move the VOI and the **Width** button to re-size and re-position the VOI. Only the area defined within the VOI is rendered.
6. Adjust the volume angle and quality. This defines the range of the volume sweep. A small sweep angle results in a lower number of slices with a high volume rate.
7. To begin 4D acquisition, press the **L** key.

You DO NOT have to hold the probe steady during data acquisition.

During data acquisition, you can manipulate the VOI to see different views of the image. To rotate the VOI left or right, use the **PW** control. To rotate the VOI forward or backward, use the **CF** control. To rotate the VOI in a circular motion, use the **M** control.

To return to 3D/4D pre-mode, press **L**.

NOTE: *If the volume size is too large, the message "Volume Size Too Big - Quality Degraded" displays in the status bar. The system changes the quality automatically to below the upper limit and displays the proper Quality value in the information window.*

8. Set Render to On.
9. To complete the acquisition, press **Freeze** or **R**.
10. Store the image.

4D

4D provides continuous, high volume acquisition of 3D images. You can apply rendering techniques to smooth out the appearance of an anatomical structure, for example, a baby face.

4D imaging contains two main viewing modes: Sectional, Render, and Tomographic Ultrasound Imaging (TUI). Sectional mode displays three separate representations of the image: Longitudinal (original 2D image), Transverse (elevational), and Coronal (horizontal). Render mode displays one rendered 4D image.

Acquiring a 4D Volume of Interest (VOI)

Once you have acquired an optimized 2D image, you can perform a 4D scan to acquire the 4D image.

During 4D image acquisition:

- Frame Averaging is disabled.
- You cannot change the transmit frequency.

To acquire a 4D VOI:

1. Press **4D**.
2. Make sure the VOI is defined appropriately. If necessary, adjust the volume angle. This defines the range of the volume sweep. A small sweep angle results in a lower number of slices with a higher volume rate.
See *Manipulating the Volume of Interest (VOI)* for more information.
3. To begin 4D acquisition, press the **L** key. The system will perform continuous sweeps across the VOI. You do not have to hold the probe steady during a 4D scan.
To return to 4D pre-mode, press **L**.
4. Set the Render to On.

Sectional VOI Acquisition

Sectional view provides three separate views of the same image: Longitudinal (original image), Transverse (elevational), and Coronal (horizontal).

1. In the 4D tab, Render defaults to On (Render mode). Change Render to Off for Sectional view.
2. To select a reference image, use the Ref Image control on the Touch Panel. The reference image selected contains the focus for control panel keys, allowing you to manipulate or optimize that image.

Table 13-4: 4D Data Acquisition Parameters

| 4D Parameter | Description |
|------------------|---|
| Restore View | Resets all parameters back to the original values or chosen presets. |
| Tile | Selections: Single, Quad. You can divide the display into 1 or 4 windows. |
| Visualization | Sectional, Render, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image. |
| Ref Image | Use to select the reference image that has focus for use with the control panel keys and Trackball . |
| Orientation Help | Displays a three-dimensional drawing to illustrate the orientation. Only displays in sectional view. |
| Volume Angle | Sets the range of the volume sweep. |
| B Quality | Selections: Max, Hi2, Hi1, Mid2, Mid1, Low. Used to balance speed with line density. Max combines the highest density with the slowest speed. Low combines the lowest density with the highest speed. BQ displays on the display. |

Render VOI Acquisition

Rendering allows you to distinguish subtle anatomical detail. You can render all areas of an VOI, or just certain regions of the VOI. The region you define for rendering is referred to as the Render Box.

1. Define the area you want to render. For example, if you have an image of an entire fetus, you might only want the fetal face to be rendered. Therefore, you would define the fetal face as the VOI.
2. Set Render to On.

Table 13-5: 4D Data Acquisition Parameters - Render Mode

| 4D Parameter | Description |
|-----------------|---|
| Restore View | Select to reset all parameters back to the original values or chosen presets. |
| Tile | Selections: Single, Dual, Quad. You can divide the display into 1, 2, or 4 windows. |
| Visualization | Sectional, Render, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image. |
| 3D Orient | When selected, changes the orientation of the image on the monitor display. Selections include: 0 degrees, 90 degrees, 180 degrees, and 270 degrees. |
| Ref Image | Use to select the reference image that has focus for use with the control panel keys and Trackball . This control is enabled only if Tile is set to Quad. |
| Volume Angle | Sets the range of the volume sweep. |
| Quality | Selections: Max, Hi2, Hi1, Mid2, Mid1, Low. Used to balance speed with line density. Max combines the highest density with the slowest speed. Low combines the lowest density with the highest speed. |
| Activate Curve | Define a three-point curved surface for the render window using the Trackball. |
| Reset Curve | Reset the three-point curve to a straight line. |
| Mix | Selections: 0-100% in increments of 2. Allows you to mix a Rend Mode 1 mode with a Rend Mode 2 mode. Always select two modes. |
| Lower Threshold | Selections: 0-255. Sets a lower threshold below which weaker echoes are removed. |

Render VOI Acquisition (continued)

1. Select the **Render Setting** tab.

The Render Setting tab allows you select and combine gray-scale and color rendering modes.



HINTS

If you are using Surface modes, we recommend that you adjust the Lower Threshold to recognize border structures more clearly.

Table 13-6: 4D (Data Acquisition) Render Parameters

| 4D Parameter | Description |
|--------------|---|
| Direction | The ROI determines the region that is rendered during 4D acquisition. You can change the direction in which this ROI is viewed. Selections: Up/Down, Down Up, Left/Right, Right/Left, Front/Back, Back/Front. |
| Gray Map | Displays the gray map selections on the display monitor. Select maps using the Trackball. |
| Colorize | Displays the tint map selections on the display monitor. Select maps using the Trackball. |
| Render Mode | Select Gray or Inversion. If you select Inversion, inverts the gray values of the rendered image (e.g., image information that was black becomes white and vice versa). |
| Render 1 | Allows you to combine render mode values from render mode 1. Select the render map combination from the upper-left portion of the monitor display. Select map combinations using the Trackball. Render Mode 1 Selections: Surface Smooth, Surface Texture, Transp Max, Transp X-ray, Transp Min, HDlive Texture. Surface Smooth - Surface displays in a smoothed texture mode, which means that the gray values of the surface are identical with the gray values of the original 2D scan. Surface Texture - Surface displays in texture mode, which means that the gray values of the surface are identical with the gray values of the original 2D scan. Transp Max. - Displays the maximum intensity of gray values in the ROI. This is helpful for viewing bony structures. Transp X-Ray - Displays the mean value of all gray values in the ROI. Trans Min. - Displays the minimum number of gray values in the ROI. This is helpful for viewing vessels and hollow structures. HDlive Texture - Uses an illumination source that can be positioned by the user around the rendered 3D object on a spherical coordinate. By highlighting structures from the side, the three-dimensional impression can be improved considerably. |

Table 13-6: 4D (Data Acquisition) Render Parameters (Continued)

| 4D Parameter | Description |
|--------------|---|
| Render 2 | <p>Allows you to combine render mode values from render mode 2. Render Mode 2 Selections: Surface Smooth, Light, Gradient Light, Transp Max, Transp X-ray, Transp. Min., HDlive Smooth.</p> <p>Surface Smooth - Surface displays in a smoothed texture mode, which means that the gray values of the surface are identical with the gray values of the original 2D scan. Light - Surface displays in light mode. Structures in the near field are brighter; structures in the far field are darker. Gradient Light - Surface displays as if it is illuminated from a spot light source. This is helpful if the displayed surface is surrounded by hypoechoic structures (for example, liquids). Transp Max. - Displays the maximum intensity of gray values in the ROI. This is helpful for viewing bony structures. Transp X-ray - Displays the mean value of all gray values in the ROI. Transp Min. - Displays the minimum number of gray values in the ROI. This is helpful for viewing vessels and hollow structures. HDlive Smooth - Smoothed HDlive texture mode. When Render 1 value is set to HDlive Texture, the only available mode for Render 2 is HDlive Smooth. Note: HDlive rendering is not available if VCI is active.</p> |
| Edit Light | <p>Activates the light editor for the virtual light source in HDlive render mode. User can position the light source by moving the Trackball, A light icon on the main display indicates the direction of the light. Note: The Edit Light parameter is only available for the HDlive rendering modes.</p> |
| Transparency | <p>Selections: 20 to 250. Sets the transparency of the image. The higher the number, the more transparent the gray scale information.</p> |

Manipulating the Volume of Interest (VOI)

Imagine you are able to manipulate the 4D volume of interest (VOI) in your hand. The 3D/4D ROI is a tangible anatomical object that you can see and manipulate easily using the **Trackball** and other control panel keys.

If the monitor display is in Sectional view, select the desired reference image before you manipulate the image.

NOTE: The manipulation examples are with A set as the reference image.

Rotating the 4D VOI Left/Right or Forward/Backward

You can rotate the VOI around the X, Y, and Z axes. To rotate the VOI around the Z axis, turn the **CF** control left/right.

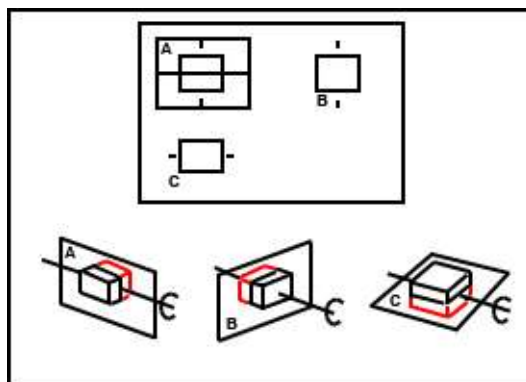


Figure 13-17. Rotate about Z Axis with CF Control

Manipulating the Volume of Interest (VOI) (continued)

To rotate the VOI around the Y axis, turn the **PW** left/right.

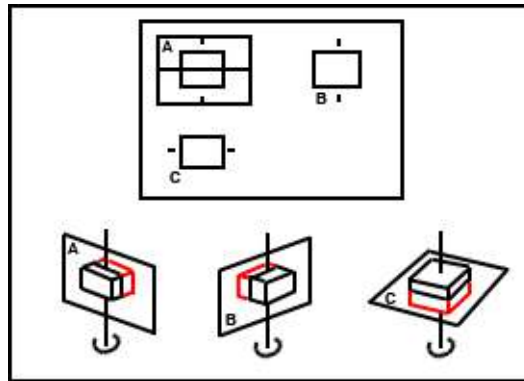


Figure 13-18. Rotate about Y Axis with PW Control

Rotating the 4D Image in a Circular Motion

To rotate the VOI around the X axis, turn the **M** control left/right.

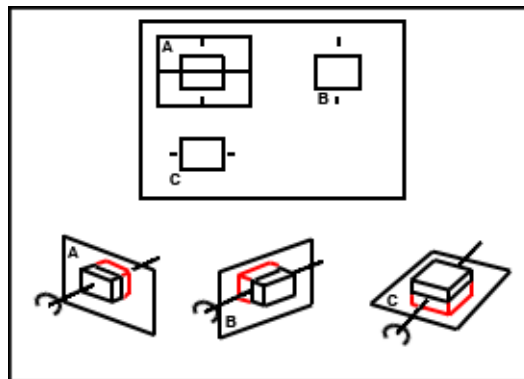


Figure 13-19. Rotate about X Axis with M Control

NOTE: To speed up the rotation, press the **PW**, **CF**, or **M** controls before you turn them. To slow down the rotation, press **PW** or **CF** again.

Manipulating the Volume of Interest (VOI) (continued)

Moving through the VOI

To move through the image to view a particular slice, press **Depth**.

This allows a displacement of the center of rotation along the intersection lines of the sectional planes A, B, and C. The displacement of the center of rotation leads to the display of parallel sectional images. See 'Reference Images' on *page 13-9 for more information*.

Zooming the Image

Rotate **Zoom** to zoom on the image.

Moving the VOI Position

To move the position of the VOI, move the **Trackball** left, right, up and down, as needed.

Resizing the VOI

To re-size the VOI, use the **Width** control panel button. See the Width section in this chapter.

Stopping 4D Image Acquisition

To stop acquiring a 4D image, press **Freeze** or R if you are in Render view or just **Freeze** if you are in Sectional view.

4D VOI Post-Processing

When you press **Freeze** or **R**, one of the following Touch Panel displays, depending on whether you are in Render view or Sectional view.

Volume CINE

The system constantly stores CINE images so you can play back and review those images. CINE is useful for focusing on images during the specific part of the heart cycle or to view short segments of a scan session.

To activate CINE in 4D:

1. Press **Freeze**.
2. Select the **VolCine** tab.

Table 13-7: 4D Cine Parameters

| Preset Parameter | Description |
|------------------|---|
| Loop Mode | Selections include: One Way, BiDirectional (two-way). One Way - plays one loop sequence forward. BiDirectional - plays the sequence forward and backward. |
| First | Displays the first volume in the CINE loop. |
| Last | Displays the last volume in the CINE loop. |
| Run/Stop | Starts and stops the CINE loop. |
| Loop Speed | Adjusts the CINE loop speed. |
| Volume by Volume | Used to select an individual volume in the CINE loop. |

3. If you were in Render visualization mode when you entered 4D CINE mode; press **L** to return to Pre-Mode.
If you were in Sectional visualization mode when you entered 4D CINE mode; press **L** to return to Pre-Mode.
4. To re-start real-time 4D acquisition, press **Freeze**.

Static 3D

You can create a single sweep, single volume static 3D image.

Performing a Static 3D Scan

1. Connect the appropriate 4D-compatible probe, leaving the probes in their respective holders. Follow the guidelines in Chapter 3 for connecting probes.
2. Select a 4D probe from the probe indicator.
3. Obtain a 2D image. Optimize the image as usual.
4. Press **3D/4D**.
5. Press **Static 3D**. Set Visualization to Render.
6. Set the Volume of Interest (VOI) to be rendered. Use the **Trackball** to move the VOI and **Width** to re-size the ROI.
7. Adjust the volume angle. This defines the range of the volume sweep. A small sweep angle results in a lower number of slices with a high volume rate.
8. Set the probe down on the patient, making sure the probe is held steady. Press the **L** key to start acquisition.

NOTE: *During 3D acquisition, no control panel keys are not available, except for 'R.'*

NOTE: *When the 3D acquisition begins, the Touch Panel appears blank for a brief moment.*

9. Hold the probe steady until the system stops automatically. You will know the acquisition has stopped when the **Touch Panel** changes to display the Render Setting, 3D Rotational Cine, and Scalpel tabs.
To stop the acquisition manually, press the **R** key.
10. Save the image.
11. To further manipulate the 3D image, press **Static 3D**.

The Touch Panel that displays depends on the visualization mode selected prior to freeze, Sectional, Render, TUI or VCI.

Static 3D Sectional View

Table 13-8: 3D After Acquisition Parameters - Sectional View

| Preset Parameter | Description |
|------------------|--|
| Orientation Help | Displays a 3-dimensional drawing to illustrate the orientation. Only displays in sectional view. |

Static 3D Render View

Table 13-9: 3D After Acquisition Parameters - Render View - Page 1

| Preset Parameter | Description |
|------------------|--|
| Edit/Accept ROI | Selections include Edit, Accept. Edit - Select to adjust the size of the Region of Interest (ROI). Accept - accepts the active 3D image. |
| 3D Orient | When selected, changes the orientation of the image on the monitor display. Selections include: 0 degrees, 90 degrees, 180 degrees, and 270 degrees. |

VCI

Introduction

VCI (Volume Contrast Imaging) allows you to sweep smaller slices of data with a higher volume rate. The resulting image shows an average, integrated gray value of the tissue contained within the ROI. VCI improves the contrast resolution and signal/noise ratio. It also reduces image speckle. This may facilitate finding diffuse lesions in organs.

Touch Panel

The data is represented as in Static 3D - Sectional Planes. However, the three planes are VCI renderings (tissue information of a thick slice) computed from the 3D dataset.

Table 13-10: VCI View

| Preset Parameter | Description |
|------------------|----------------------------|
| Slice Thickness | Select the slice thickness |

Static 3D Color

To view Static 3D Color,

1. Acquire the anatomy you want to view in B-Mode.
2. Activate Color Flow or PDI.
3. Activate 3D/4D. The Pre-3D displays. Select the desired Visualization.

NOTE: 4D cannot be selected from Pre-Mode with Color active.

4. Press 'L' to render the image.

The color is rendered. You can adjust the Render Mode (default is Glass Body):

- **Gray.** Gray, no color.

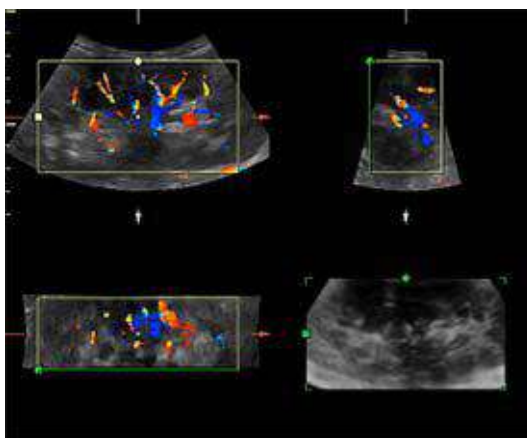


Figure 13-20. 3D Color - Gray

- **Inversion.** Inverts the grayscale.

Static 3D Color (continued)

- **Color.** Displays Color-Flow.
Select the rendering method ([Rend Color1] (Surface only) or [Rend Color2]) and the mixing ratio.

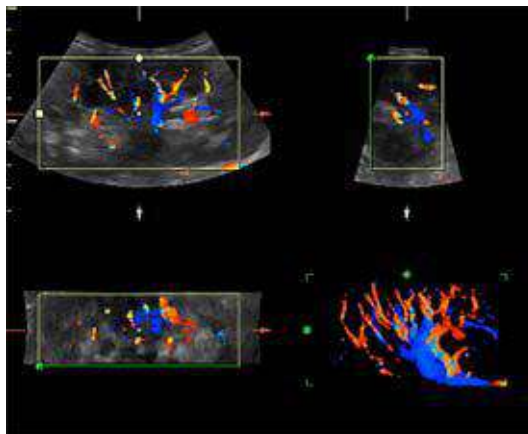


Figure 13-21. 3D Color - Color

- **Glass Body.** Displays both Color-Flow and B-Mode.
Select the rendering method ([Rend Gray] or [Rend Color]) and the mixing ratio.

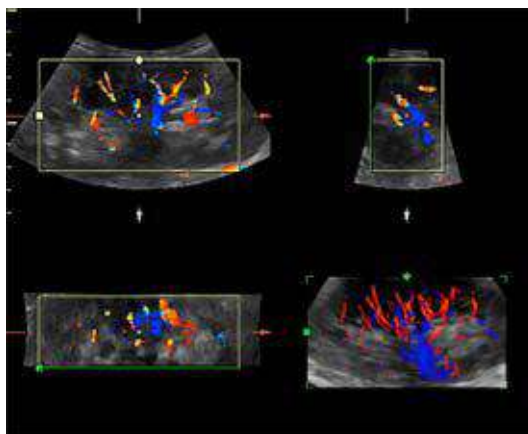


Figure 13-22. 3D Color - Glass Body

To hide the color on the sectional planes, select **Color Off** from the Touch Panel.

NOTE: *If you scan in Render mode and select Tile as Quad, you can hide the color with the Color Off Touch Panel key.*

Volume Review

You can post process VOI (the entire volume of interest) and scroll through acquisition planes via Volume Review. This allows you to review all of the frames within this volume set.

In Volume Review, start in Run/Stop so that every frame in the volume is displayed.

NOTE: *If you adjust the screen while in Volume Review, these changes ARE NOT reflected on the Static 3D volume.*

Scalpel

Scalpel allows you to edit/cut sections of a 3D image. Scalpel is available only on a rendered image.

1. Press **Scalpel**.

Table 13-11: Scalpel Parameters

| Preset Parameter | Description |
|------------------|---|
| Cut Mode | Selections: Inside Contour, Outside Contour, Inside Box, Outside Box, Eraser Big, Eraser Small. Inside Contour, Outside Contour - Allows you to trace the portion of the image you want to cut. Trace Outside removes all portions of the image that fall outside your traced region. Trace Inside removes all portions of the image that fall inside your traced region. Inside Box, Outside Box - Displays a box you can use to define the portion of the image you want to cut. Outside Box removes all portions of the image that fall outside the box. Inside Box removes all portions of the image that fall inside the box. Eraser Big, Eraser Small - Provides a big and small eraser tool you can use to define the portion of the image to cut by hand. Available only if Depth is Full. |
| Cut Depth | Selections: Full, Define. Full -The entire depth of the selected region will be cut. Define - Allows you to define the depth to cut using the Depth control panel knob. |
| Undo Last | Undoes the last cut only. |
| Redo | Select to redo scalpel. |
| Undo All | Undoes all cuts since you entered Scalpel mode. |
| Done | Applies to User Defined Cut Depth when complete. |

Scalpel (continued)

2. Select the cut mode.
3. Use the **Trackball** and **Set** key to define the portion of the image to cut. Press **Set** to start, move the **Trackball** to define the region, then press **Set** again to cut the image. The portion is removed.

To undo the last cut, select **Undo Last**.

To undo all cuts in the current session, select **Undo All**.

NOTE: *With the cut image displayed, if you attempt to switch to the Static 3D tab to edit the ROI, the following warning message appears: Scalpel changes will be lost. Do you want to continue? [Yes/No].*

3D Rotation CINE

3D Rotation CINE allows you to view the 3D image from various angles.

To activate rotation CINE in 3D:

1. Press **Freeze**.
2. Select the 3DRot Cine tab.

Table 13-12: 3D Rotation Cine Parameters

| Preset Parameter | Description |
|------------------|--|
| Rotational Angle | Sets the rotational angle of the 3D image over which the CINE loop is played. Typical values are 30, 45, 60, 90, 180 and 360 degrees. |
| Step Angle | Sets the step angle between individual frames in the CINE loop. |
| Rotation Axis | Sets the axis about which the CINE loop is calculated. Selections X and Y. |
| Loop Mode | Selections include: One Way, BiDirectional (two-way). One Way - plays one loop sequence forward. BiDirectional - plays the sequence forward and backward. |
| First | Displays the first volume in the CINE. |
| Last | Displays the last volume in the CINE. |
| Run/Stop | Starts and stops the CINE sequence. |
| Start Angle | Used to select the starting angle in the CINE loop range. The default Start Image is calculated from the rotational angle as: $-1 \times \text{Rotational angle} / 2$. If you adjust the Start Image, the Rotational Angle is re-set to be the value of the adjusted Start Image. |
| End Angle | Used to select the ending angle in the CINE loop range. The default End Image is calculated from the rotational angle as: $\text{Rotational angle} / 2$. If you adjust the End Image, the Rotational Angle is re-set to be the value of the adjusted End Image. |
| Image by Image | Used to select an individual image in the CINE loop. |

VOCAL

You use VOCAL (Virtual Organ Computer-aided Analysis) to visualize and calculate the volume of anatomical structures, such as a tumor lesion, cysts, and the prostate. VOCAL is available after a Static 3D or Real-Time 4D acquisition.

1. Press **Vocal**. Specify the volume calculation method (**Manual**, **Contour Detect**, **SemiAuto Detect**, or **Sphere**). Select the reference image you want to use to perform the trace by selecting **Ref Image** A, B, or C. Press **Start**.
2. Trace the anatomy using the **Trackball**. Press **Set** to start and end the trace. You must go across the dotted line for the trace to take effect (it turns yellow). The trace is performed on each image slice, separated by the rotational step angle. Rotate the **Rot. Ref** dial until you have completed the total of the required rotations (for example, if you've selected 30 degrees, you need to complete six traces if you've selected Manual). After you've completed the trace target, the **Calc Volume** button is active for you to press. The calculated VOCAL image appears in the lower, right-hand corner of the display. You are now in the edit state.

NOTE: *Trace not used for Sphere. For Sphere, set the Poles.*

3. Edit as necessary. You can apply a shell, adjust its thickness, navigate through the reference angles, or restart the VOCAL.

VOCAL Touch Panel states are described in the following tables.

Table 13-13: VOCAL Parameters on Setup Touch Panel

| Parameter | Description |
|-----------------|--|
| Manual | When you select the Manual method, you need to perform a manual trace on each of the rotation angles. |
| Contour Detect | When you select the Contour Detect method, you need to perform a manual trace on each of the rotation angles. |
| SemiAuto Detect | When you select the Semi Automatic Detect method, you need to perform a trace on only two rotation angles. The system applies an algorithm to define the traces. |
| Structure | Structure is only available with the SemiAuto Detect method. Select Hypo, Cystic, or Hyper/Iso. |
| Sphere | Calculates the volume based on the pole settings. |
| Pole 1 | Adjust the upper contour point (green arrow) of the structure. |
| Pole 2 | Adjust the lower contour point (green arrow) of the structure. |

Table 13-13: VOCAL Parameters on Setup Touch Panel (Continued)

| Parameter | Description |
|-----------------------|---|
| Rotational Step Angle | Specify the angular spacing between contour traces. Typical values are 6, 9, 15, and 30 degrees. The number of planes varies by this formula: 180 degrees / selected rotational step angle. |
| Ref Image | Use this to select the image you want to use to perform the trace. |
| Start | Press Start when you're ready to perform the trace. |
| Rot.Ref #/# Back/Next | Select Next/Back to move to the next image for contour definition in the rotation step. |

Table 13-14: VOCAL Calculate Volume Touch Panel

| Parameter | Description |
|---------------|--|
| Calc Volume | Press Calc Volume to initiate the VOCAL image calculation. |
| Clear | Press Clear to remove the trace from the image. |
| Restart Vocal | Press Restart Vocal to return to the initial VOCAL state. |

The Shell Modes allows you to construct a shell or contour “around” the structure of interest, which enables you to distinguish between the contour of the targeted structure and the contours the inside and outside of the structure.

Table 13-15: VOCAL Parameters on Edit Touch Panel

| Parameter | Description |
|-----------------|--|
| Shell Off | Select Shell Off if you do not want a shell around the VOCAL image. |
| Inside | Select Inside if you want a shell inside the volume. |
| Outside | Select Outside if you want a shell outside the volume. |
| Symmetric | Select Symmetric if you want half of the shell thickness inside and half outside the volume's perimeter. |
| Shell Thickness | Adjust to vary the thickness of the shell. |

Static 3D Render Setting

Table 13-16: 3D After Acquisition Parameters - Render View - Page 1

| Preset Parameter | Description |
|------------------|--|
| Edit/Accept ROI | Selections include Edit, Accept. Edit - Select to adjust the size of the Region of Interest (ROI). Accept - accepts the active 3D image. |
| 3D Orient | When selected, changes the orientation of the image on the monitor display. Selections include: 0 degrees, 90 degrees, 180 degrees, and 270 degrees. |

Static 3D Volume Review

You can post process VOI (the entire volume of interest) and scroll through acquisition planes via Volume Review. This allows you to review all of the frames within this volume set.

In Volume Review, start in Run/Stop so that every frame in the volume is displayed.

NOTE: If you adjust the screen while in Volume Review, these changes ARE NOT reflected on the Static 3D volume.

Storing 4D Images

You store 4D images exactly as you would your 2D images. Because 4D images contain more data, they also require more space. Pay close attention to the size of the volumes.

- Still image: Store as Raw Data
- CINE: Store as Raw Data when “Enhanced DICOM” is selected for printing 4D.

Tomographic Ultrasound Imaging (TUI)

Tomographic Ultrasound Imaging (TUI) is a visualization mode which presents data as parallel slices (planes) through the dataset. This method of visualization is consistent with CT and MRI. The distance between the different planes can be adjusted.

1. Select TUI as the Visualization mode.
2. Press 'L' to start acquisition.
3. If in 4D, press 'R' to end the acquisition. This step is not required in Static 3D.

The reference image + the number of specified slices appears. The reference image always displays and indicates which slices you are currently viewing as solid lines.

Tomographic Ultrasound Imaging (TUI) (continued)

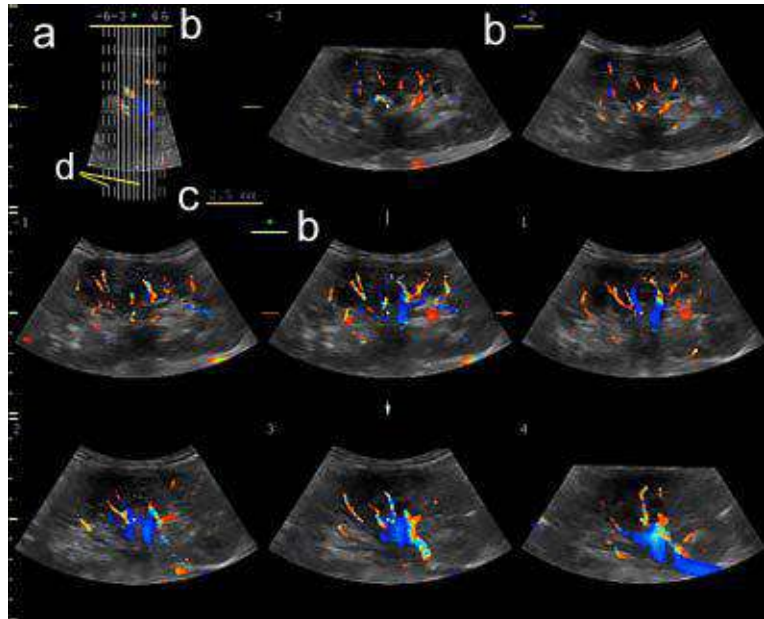


Figure 13-23. TUI 3x3 Example

- a. The TUI reference image that shows the slice position. This image is orthogonal to the reference image.
- b. The number and green asterisk shows the position of each slice. A green asterisk indicates the center image (A, B or C-plane).
- c. Slice distance displays when the slices are in certain intervals.
- d. A solid line indicates the slice appears on the monitor. A dotted line indicates the slice did not appear on the monitor.

NOTE: *TUI with Color is only available with Static 3D, not with 4D.*

Tomographic Ultrasound Imaging (TUI) (continued)

4. Adjust the number of slices and slice distance.

You can adjust the number of slices by using the **Slices** rotary. You can adjust the distance between the slices using the **Slice Distance** rotary. Max value is 40mm.

- Move forward/backward through the slices via **Prev./Next Slice**.
- Change the center image via **Ref. Image** if needed (Reference image A, B or C).
- Select **Display Format** from 1X1, 1X2, 2X2 and 3X3.
- The following features are supported in TUI: Zoom, Rotation (X/Y/Z), Trackball (Move the position), Translation and Gain.
- To hide the color, select **Color Off** from the Touch Panel.

Tomographic Ultrasound Imaging (TUI) (continued)

You can adjust each slice position with **Adjust Slices**.

1. Press **Adjust Slices** on the Touch Panel.
2. The pointer displays. Select a slice by using the **Trackball**.

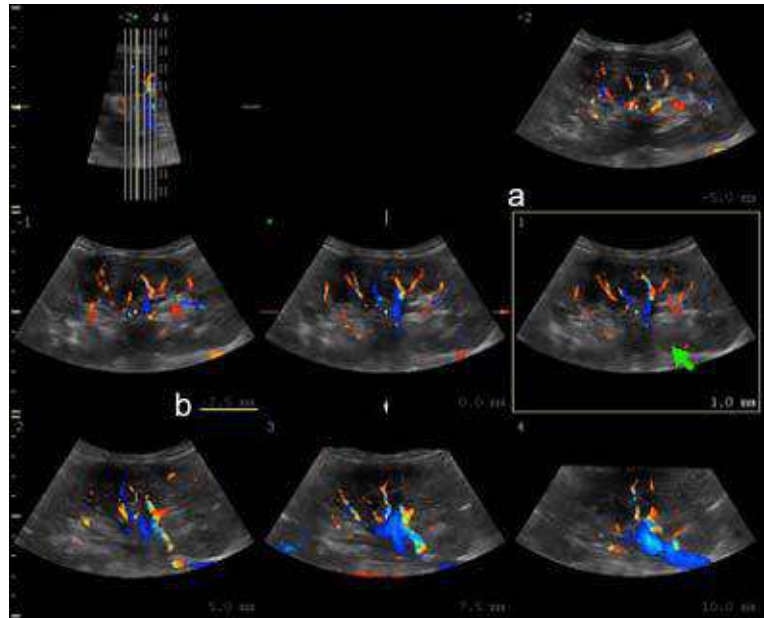


Figure 13-24. Adjust Slice screen (example)

- a. Selected slice displays with yellow border
- b. Distance from the center image
 - Adjust the slice distance from the reference image by using **Slice Position**. Slice Position only affects the selected slice.

NOTE:

*If you place the pointer on the reference image and rotate **Slice Position**, the position of the reference image and all slices are moved.*

- Adjust the number of right and left slices off the center image by using **Left Slices** or **Right Slices**.
3. After the adjustment is finished, press **Set**. The slice is marked with an "X". To print this slice, press a print key.

SonoRenderlive

SonoRenderlive helps to find the render start position to easily separate solid tissue in front of the render object.

The SonoRenderlive algorithm “looks” for the transition from solid to liquid tissue and positions the “Render Start” into the liquid area visualized by the green render start line. The render start line is not a straight line but a “free” trace for optimal adaptation to the render object.

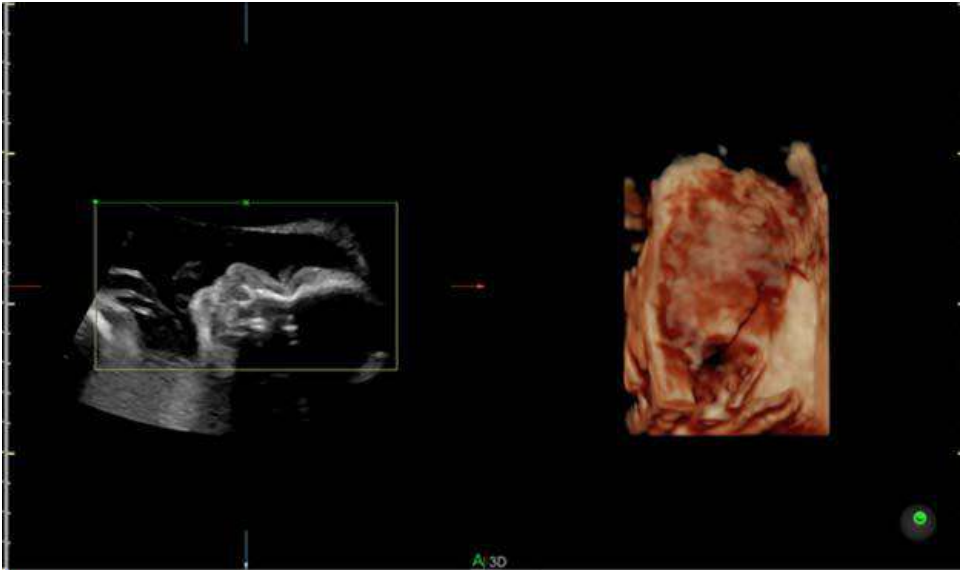


Figure 13-25. Screen Display Off

SonoRenderlive (continued)

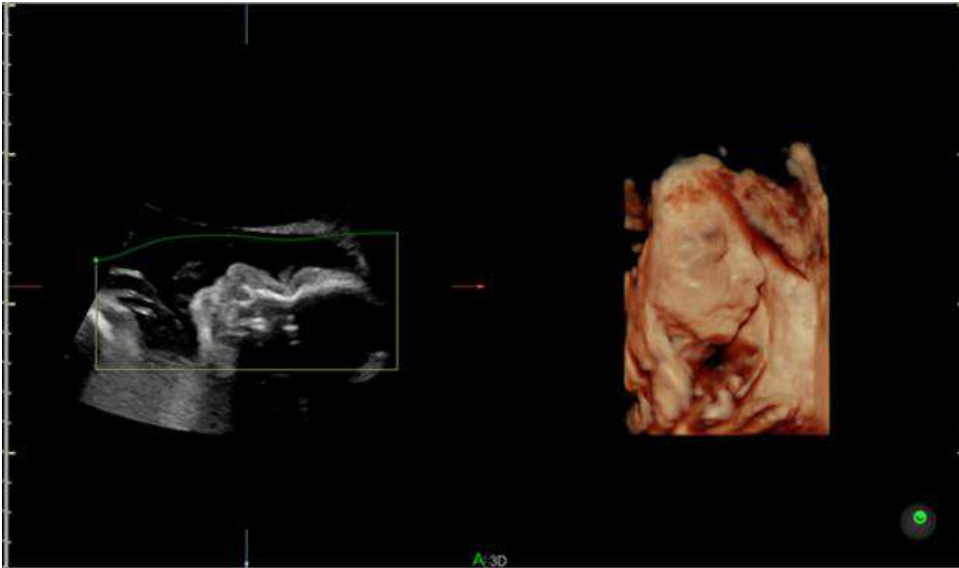


Figure 13-26. Screen Display On

Using SonoRenderlive

1. Start the Render Visualization Mode.
2. Press the **SonoRenderlive** Rotary control.
3. To adjust the distance between the render start position and the render object, rotate the **Sensitivity** control below the Touch Panel. A high value indicates a smaller distance.

NOTE: *If SonoRenderlive is not used, the Render Start line can also be modified manually. Press the trackball button Curve to activate Curved Render Start and move the trackball to modify the line.*

OmniView

OmniView provides an arbitrary cross-sectional plane, as opposed to a strict coronal plane. In VCI OmniView, the rendering box is very thin so you can visualize the tissue information of a thick slice. The resulting image shows the average (integrated) gray value of the tissue contained within the narrow box.

VCI OmniView improves the contrast resolution and the signal/noise ratio and therefore facilitates the detection of diffuse lesions in organs. The result is an image with no speckle pattern and a highly improved tissue contrast.

- 4D Real Time
- 3D Static
- STIC

OmniView Workflow

1. Press **3D/4D**.
2. Select **OmniView**.
3. Adjust Volume Angle and B Quality as necessary.
4. Press the right **Set** key to start acquisition.
The volume acquisition starts and the acquired images are displayed.
5. The cross cursor displays on the reference image.
6. Select the appropriate trace mode to display the sectional plane.
 - Line: Select the sectional image by using straight line.
 - Curve: Select the sectional image by using curved line.
Move the cursor to the start point and press **Set**. Move the cursor to the end point and press **Set**. Use the **Trackball** to make a curved line and press **Set**.
 - Trace: Select the sectional image by using any arbitrary curve.
 - Polyline: Select the sectional image by using a continuous line composed of one or more line segments. You can create a polyline by specifying the endpoints of each segment by press **Set**.

OmniView Main Menu

Table 13-17: OmniView Parameters on Edit Touch Panel

| Parameter | Description |
|-----------------|---|
| View Icon | Show or hide the OmniView Icon. |
| View Line | Show or hide the OmniView Line. |
| VCI OmniView | Switch to VCI Omniview. |
| Trace Mode | Four tracking line methods are available. |
| Tile | Select a display format (Single, Dual, Quad) |
| Clear All | All existing lines are deleted and a new line entry is started. |
| Ref. OmniV | To activate OmniView Ref. Line view. |
| Ref. Image | Select the Reference image. |
| OmniV. Rot | Rotates the OmniView line. |
| Undo | To re-adjust the traced line. |
| Mix | Selections: 0-100% in increments of 2. Allows you to mix a Rend Mode 1 mode with a Rend Mode 2 mode. Always select two modes. |
| Slice Thickness | Select the slice thickness |

OmniView Control



Figure 13-27. OmniView Control

Table 13-18: OmniView Parameters on Line Edit Mode: New

| Parameter | Description |
|-----------|--|
| Img. | Activate the image. |
| Redo | Restart the line. |
| OmniView | Activate OmniView Line |
| View# | Select the next OmniView image and line as 1, 2, or 3. |
| Next | Select to activate the next OmniView Ref. Line view. |

STIC (Spatio-Temporal Image Correlation)

Overview

With this acquisition method the fetal heart or vascularity can be visualized. It is not a Real Time 4D technique, but a post processed 3D acquisition.

STIC is designed for beating (fetal heart) as well as blood perfused organs. Only STIC can synchronize structures that have a pulsation in Doppler mode, but no visible pulsation in B-Mode.

Data is acquired for a predefined period of time. The acquired images are post processed to calculate a Volume Cine sequence representing one complete heart cycle.

In order to achieve a good result, try to adjust the size of the volume box and the sweep angle to be as small as possible. The longer the acquisition time, the better the spatial resolution will be. The user must be sure that there is minimal movement of the participating persons (e.g., mother and fetus), and that the probe is held absolutely still throughout the acquisition period. Movement will cause a failure of the acquisition. If the user (trained operator) clearly recognizes a disturbance during the acquisition period, the acquisition has to be canceled.

A good STIC data set shows a regular and synchronous beating of the fetal heart or of an artery. Please make sure that the borders of the fetal heart or the artery are smooth and there are no sudden discontinuities. Always adopt a critical attitude to images created in STIC mode.

If the expected frame rate is too low (10Hz) for a good STIC quality, a warning is displayed in STIC mode.

After the STIC acquisition is finished the calculation process starts to calculate the volume cine sequence. If a result is detected by the system, the Volume cine sequence is shown in run mode and the STIC accept menu appears. As soon as the result is accepted the system releases the volume cine mode. If the result is not accepted but canceled, the system switches back to STIC pre mode.

Overview (continued)

One or more of the following artefacts in the data set indicate a disturbance during acquisition:

- Sudden discontinuities in the reference image B: These are due to the motion of the mother, the fetus or fetal arrhythmia during acquisition.
- Sudden discontinuities in the color display: Motion of the mother, the fetus or fetal arrhythmia affects the color flow in the same way it affects the gray image.
- Fetal heart rate far too low or far too high: After acquisition the estimated fetal heart rate is displayed. If the value does not correspond to the estimations based on other diagnostic methods at all, the acquisition failed and has to be repeated.
- Asynchronous movement in different parts of the image: e.g., the left part of the image is contracting and the right part is expanding at the same time.
- The color does not fit the structures displayed in gray mode: The color is displayed above or below the actual vessel.
- Color “moves” through the image in a certain direction: This artefact is caused by a failure in detecting the heart rate due to low acquisition frame rate. Use higher acquisition frame rate for better result.

NOTE: *In all of the above cases the data set has to be discarded and the acquisition has to be repeated.*

When is it not allowed to perform the STIC fetal cardio acquisition?

- Severe fetal arrhythmia

Following STIC acquisition modes are available:

- STIC
- STIC CFM
- STIC PDI

Performing STIC Scan

NOTE: STIC can only be used in OB applications.

1. Select a 4D probe from the probe indicator.
2. After obtaining a feasible 2D image of the fetal heart or an artery, press 3D/4D to activate the Volume mode.
3. Select **STIC**.
4. Set the Volume of Interest (VOI) to be rendered. Use the Trackball to move and resize the VOI.

NOTE: Press top Trackball key to switch Pos and Size.

5. Adjust the **Acquisition Time**.
6. Set the volume sweep angle by using **Volume Angle**.

NOTE: In order to acquire a good result, try to adjust the ROI and the sweep angle to be as small as possible. The longer the acquisition time, the better the spatial resolution will be.

7. Hold the probe still and ask the patient not to move.
8. Press the right **Set** key to start the acquisition.

NOTE: When the STIC acquisition begins, the Stop Acquisition button appears. If the user recognizes a movement of the probe, fetus or the patient during the scan, press Stop acquisition to cancel the acquisition.

9. Hold the probe steady until the system stops automatically. Estimated Fetal Heart Rate and Accept/Cancel buttons appears on the Touch Panel.
10. Press **Accept** if the fetal heart rate displayed on the Touch Panel is accepted. STIC image is displayed.

If the result is not accepted, select **Cancel**. The system switches back to STIC-pre mode.

NOTE: If the user (trained operator) clearly recognizes a disturbance during the acquisition period, the acquisition has to be canceled.

Screen Layout

The yellow caution icon and the calculated heart rate are displayed as well.

NOTE: *Displayed Heart Rate indicates the heart rate [B/min] calculated from the delta time length per beat. A yellow caution icon indicates that the displayed heart rate is only an estimation. Do not diagnose based on this value.*



Figure 13-28. Screen Layout

STIC Controls

Touch Panel/All hard key and trackball controls are the same as in 4D/Static 3D mode. Therefore only the STIC relevant controls are described here:

Table 13-19: STIC Pre-mode Touch Panel

| Relevant controls | Description |
|-------------------|--|
| Acq. Time | Only available in STIC. Acquisition time can be set. |
| Volume Angle | Adjusts the volume angle. |

Contrast Imaging

Overview

NOTE: *The LOGIQ Fortis 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.*



Misdiagnosis based on image artifacts

Misdiagnosis in ultrasound contrast images may be caused by several artifacts, most importantly:

Motion artifacts: Give rise to signals independent 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 the system failing to detect the contrast agent due to erroneous settings induced by the operator.

Tissue harmonics: Creates contrast-like signals independently of the presence of contrast agent.



Cardiac rhythm disturbances during cardiac 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.



Read and follow contrast agent instructions provided by the manufacturer.

Contrast Imaging Overview

By adjusting the acoustic output, you can enhance either contrast harmonics or stimulated acoustic emission (SAE).

See Chapter 11 for probe availability.

Coded Contrast Imaging utilizes three technologies: Amplitude Modulation (AM), Phase Inversion (PI), and Coded Harmonic Angio (CHA).

- Contrast: Amplitude Modulation and Phase Inversion (AM and PI) is included in the Contrast option.

Table 13-20: Available Contrast Display Settings

| Label | Description | Clinical Use |
|---|--|--------------------------------------|
| Low MI B--Single Low MI B-Mode image display mode | Find the tumor before/after contrast agent injection | Tumor detection and characterization |
| Contrast Only—single contrast image display mode | Use contrast agent nonlinearity to detect contrast agent signal. | Tumor detection and characterization |
| Single View--Single Contrast enhanced image display with low MI B-Mode image data acquisition mode | Use contrast agent nonlinearity to detect contrast agent signal. | Tumor detection and characterization |
| Dual View—Real-time side-by-side dual image display with the right side contrast image and the left side B-Mode reference image | Use contrast agent nonlinearity to detect contrast agent signal. | Tumor detection and characterization |

Benefits

The contrast imaging technique, facilitated by the use of a contrast agent, detects non-linear signals while suppressing linear signals from surround 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.

Contrast Imaging Overview (continued)

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, Rejection, and Suppression).

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.

The **Power Output** key has been enhanced to provide more subtle gradations for use while contrast imaging. The Mechanical Index displays values less than 0.1. These values are displayed on CINE Loops and on archived images.

Feature Availability

3D and Volume Navigation are available; Multi Image and LOGIQView are not available.

Technique Availability by Probe

Use the table in Chapter 11 to determine which contrast technique is available by probe.

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.

Contrast MVI Mode

Contrast MVI uses MVI (Micro Vascular Imaging) in Contrast mode. The characteristics of MVI's higher sensitivity and higher spatial resolution can be used in Contrast Imaging.

In addition to the MVI features, Flash, Flash + Capture, Max Enhance, and Contrast Clock can be used.

The choice of AM, PI, CHA mode in Contrast is not in Contrast MVI.

Support probes: C1-6-D, C1-6VN-D, L2-9-D, L2-9VN-D, L3-12-D and ML6-15-D.

Contrast Presets

You access the Contrast Imaging Presets via Utility -> Imaging -> Ref or Con tabs.

Acoustic Output Presets

To set the acoustic output value for Contrast Imaging, press the down arrow next to *Acoustic Output (%)* on Con tab to select the value.

To set the acoustic output value for the tissue image while in Single and Dual View mode, press the down arrow next to *Acoustic Output for Single & Dual View (%)* on Ref tab to set the value.

To set the acoustic output value for the tissue image while in Low MI B-Mode, press the down arrow next to *Acoustic Output (%)* on the Ref tab to set the value.

Time Delay

To set the Trigger time delay, press the down arrow next to *Time Delay*.

Dual View

To set the default contrast mode, press the down arrow next to *Default Mode* on Con tab to select the mode.

Additional Presets

To adjust other Contrast Imaging presets (Map, Frame Average, etc.), press the down arrow to adjust the setting. See 'Imaging Presets' on page 10-29 for more information.

Sonazoid™ Contrast Agent

Sonazoid™ is a contrast agent approved in some countries. Refer to local clearances and availability in your respective market(s).

Sonazoid is a different microbubble, compared to Sonovue. You can select the Sonazoid contrast agent via Utility--> Imaging--> CON.

Contrast Controls

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. |

Contrast Clock (Timer)

| | |
|--------------------|--|
| Description | <p>You can use the Contrast Clock by activating it at the time of injection and deactivating it at the end of the exam.</p> <p>Two timers, Contrast Clock1 and Contrast Clock2 can be displayed on the bottom, left-hand corner in the image area and info area for several injections.</p> <p><i>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.</i></p> |
| Values | <p>On/Off. You deactivate the Contrast Clock via the Touch Panel control or by starting a new patient.</p> |
| Display | <p>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.</p> <p>The timer also appears on CINE Loops and archived images.</p> |
| Benefits | <p>The Contrast Clock measures the time since injection.</p> <p>You can save the data of contrast clock to an external file by using Export Traces of TIC.</p> <ol style="list-style-type: none">1. Press Freeze. Scroll with the Trackball to show Cine tab.2. Press TIC Analysis on the Touch Panel to enter TIC application.3. Put a ROI on the image.4. Press Export Traces. Type the file name and store it to the storage device. |

Accumulation

| | |
|---------------------|---|
| Description | Accumulation enhances the flow in an image. |
| Values | 8 settings: 0=Off, 0.2, 0.4, 0.6, 0.8, 1.6, 3.2, and Infinite. 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, and PDI. |
| Benefit | Accumulation detects the maximum signal and holds it for the level specified (1-7). |

SRI Usage

| | |
|--------------------|---|
| Description | You can use SRI-HD for the tissue image and the contrast image independently or together. |
| Adjusting | You can preset SRI Usage in Utility -> Imaging -> Ref tab. |

Visualization

| | |
|--------------------|--|
| Description | Define the display technique. Only available for Single View or Dual View. |
| 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. |

Hybrid Map

Description Select the hybrid map for the Hybrid Contrast visualization in the Dual/Hybrid Display.

Flash

Description This feature provides a way to expose the higher acoustic power for a specified time duration by pressing a control once.

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 Con menus, 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 Con menu.

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 a recalled CINE, 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.
- Advanced 3D/Tru3D
 - Build volume data from active visualization.
 - For the Single/Dual View data set of contrast mode, both reference and contrast data are rendered in individual volume segments. Each volume data is manipulated using Active Data and Visual Data.
- 3D
 - Hybrid Map is disabled and forces “Contrast” visualization.
 - The Cine frames have “Contrast” data only.
- 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.

Static 3D with Contrast

Static 3D is available while in Contrast imaging mode while imaging with 4D probes.

1. Activate Contrast imaging.
2. Adjust the image, as necessary.
3. Activate the Contrast Clock (if you want the acoustic output set at 100%). Or, you can activate these when you inject the contrast agent.

NOTE: To restart the Contrast Clock, you need to turn it off, then back on.

4. Activate 3D--> Static 3D. Specify the quality, angle, and render mode (Sectional, Render, and VCI Static are supported).

Wait to inject the contrast agent until after you have set up your pre-mode data. Adjust the ROI and other parameters before injecting the agent.

NOTE: Accumulation and Trigger turns off or resets to 0 when you activate Pre-mode.

5. Activate the Contrast Clock and inject the contrast agent, then press the Start Key to activate the Static 3D acquisition as soon as the contrast agent washes in.

The system automatically 'stores' the sweep (to internal memory, not to the clipboard).

NOTE: You may want to set up a Fast Key to automate these keystrokes. See Chapter 6 for more information.

Static 3D with Contrast (continued)

6. To store this VOI, press a print key. All CINE and volume data loops are saved in 3D when you press P1. Store loops from Static 3D or from the Volume Review tab in order to store the complete volume.

NOTE: You can also configure the system to perform a count down for the contrast injection via Utility-->System-->System Imaging.

7. At the completion of the sweep, the Static 3D tab appears.

NOTE: The Contrast Timer on the Volume Review images represents a timestamp of when the image was captured relative to when the timer was started.

8. Press the **Start** key to acquire volume data.

Time Intensity Curve (TIC) Analysis

Overview

Time Intensity Curve (TIC) enables the user to perform the following analysis:

- Time-Intensity analysis allows instant time-intensity calculation from up to eight regions of interest.
- Curve fitting analysis for research studies of contrast agent concentration rates.

The basic TIC process works as follows:

1. Scan the patient after injecting the contrast agent.
2. Observe 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

Starting TIC in cine loop

1. Open an examination and select a contrast cineloop.
2. Select **TIC Analysis** on the Touch Panel.

Starting TIC in live mode

1. Scan and freeze the patient in Contrast live mode.
2. Move the trackball to activate Cine.
3. Select **TIC Analysis** on the Touch Panel..

Exiting TIC Analysis

There are several methods to exit TIC Analysis.

- Select **Exit TIC Analysis** on the TIC Touch Panel.
- Press **Freeze** to unfreeze and resume scanning.
- Press any other button that returns the system to real-time scanning.

TIC Analysis Screen Description

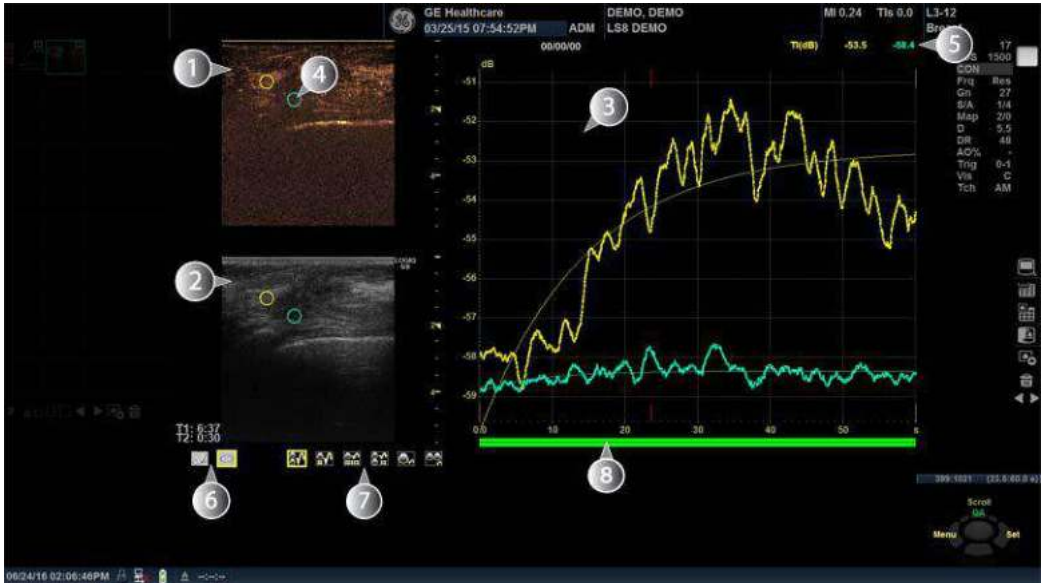


Figure 13-29. TIC Analysis Screen - Graph with dual image layout (example)

- | | |
|-----------------------------|---|
| 1. Contrast cineloop window | 5. Time and velocity at cursor position |
| 2. B-Mode cineloop window | 6. Sample area tools |
| 3. Analysis window | 7. Layout icons |
| 4. Sample area | 8. Frame marker |

Table 13-21: Cineloop windows

| Graphic | Description |
|---------|---|
| | <p>Displays Contrast image data</p> <p>Sample area: Indicates sampling position of the intensity trace. The sample area is color-coded: the first sample area is yellow, the second blue...etc.</p> |

Table 13-21: Cine loop windows (Continued)

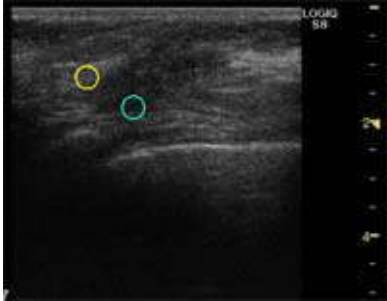
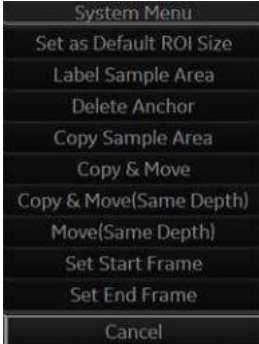

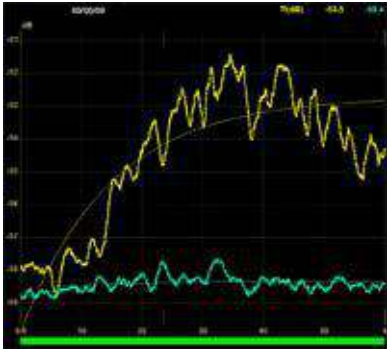
| Graphic | Description |
|--|---|
|  | <p>Displays B-Mode data</p> <p>Sample area: Indicates sampling position of the intensity trace. The sample area is color-coded: the first sample area is yellow, the second blue...etc.</p> <p>NOTE: B-Mode image is not displayed when cine clip stored in contrast only mode.</p> |
|   | <p>System menu on Sample Area</p> <p>This menu is displayed by pressing the left Set key when the cursor is placed over a sample area in one of the Cine loop windows.</p> <p>Note: The system menu is dependent on mode.</p> <ul style="list-style-type: none"> • Set As Default ROI Size: Displays on elliptical ROI. • Label Sample Area: Sets a descriptive name to the sample area. The label is useful for identification of the sample area when exporting data. • Delete Anchor (On ROI setting as anchor point only) • Copy Sample Area • Copy & Move • Copy & Move (Same Depth) • Move (Same Depth) • Set Start Frame: Set start frame for current ROI to calculate the TIC parameters and fitting curves. • Set End Frame: Set end frame for current ROI to calculate the TIC parameters and fitting curves. • Cancel: exits the System menu. <p>System menu on Image when copy sample area is selected.</p> <ul style="list-style-type: none"> • Paste Sample Area |
|  | <p>Displays time-intensity curve.</p> <ul style="list-style-type: none"> • 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): displays ECG trace (where available). • Frame Marker: the current frame marker and the start and stop markers for the cine loop. • 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) |

Table 13-21: Cineloop windows (Continued)

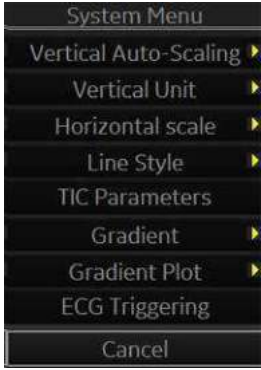
| Graphic | Description |
|---|---|
|  | <p>System menu of the analysis window This menu is displayed by pressing left Set key when the cursor is in the Analysis window. Note: The system menu is dependent on mode.</p> <ul style="list-style-type: none"> • Vertical Auto-Scaling: selects between full unit range or a range according to the maximum and minimum values of the displayed trace(s). Delayed, On, Off. • Vertical Unit: toggles between logarithmic (dB) and linear acoustical units (AU). Vertical unit of previous analysis is retained. • Horizontal scale: Only on a loop including different frame rate. • Line Style: selects between solid line only or solid line with square markers at each data point. • TIC Parameters: The TIC parameters dialog appears. • Curve Fitting Parameters: toggles between Wash-in, Wash-out, Gamma Variate and off. • Gradient: On or Off. • Gradient Plot: Gradient, Gradient Derivative, All or Off (On Graph with Dual Image Layout and Small Data Layout only). • ECG Triggering: Only on a loop including the ECG cycle. • Cancel: exits the System menu. |

Table 13-22: Analysis windows

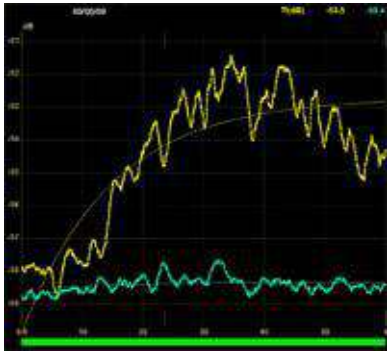
| Graphic | Description |
|--|---|
|  | <p>Displays time-intensity curve.</p> <ul style="list-style-type: none"> • Y axis: Intensity scale (logarithmic) (db) or linear acoustic units (AU). • X axis: Time(s) or Dt(s) [Diastolic time in seconds], elapsed time from previous frame. • ECG (where available -- not shown): displays ECG trace (where available). • Frame Marker: 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) |

Table 13-22: Analysis windows (Continued)

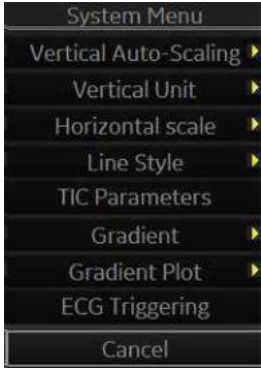
| Graphic | Description |
|---|---|
|  | <p>System menu of the analysis window This menu is displayed by pressing left Set key when the cursor is in the Analysis window. Note: The system menu is dependent on mode.</p> <ul style="list-style-type: none"> • Vertical Auto-Scaling: selects between full unit range or a range according to the maximum and minimum values of the displayed trace(s). Delayed, On, Off. • Vertical Unit: toggles between logarithmic (dB) and linear acoustical units (AU). Vertical unit of previous analysis is retained. • Horizontal scale: Only on a loop including different frame rate. • Line Style: selects between solid line only or solid line with square markers at each data point. • TIC Parameters: The TIC parameters dialog appears. • Curve Fitting Parameters: toggles between Wash-in, Wash-out, Gamma Variate and off. • Gradient: On or Off. • Gradient Plot: Gradient, Gradient Derivative, All or Off (On Graph with Dual Image Layout and Small Data Layout only). • ECG Triggering: Only on a loop including the ECG cycle. • Cancel: exits the System menu. |

Table 13-23: Layout icon





| Graphic | Description |
|---|--|
|  | <p>You can select layout from following.</p> <ul style="list-style-type: none"> • Graph with Dual Image Layout • Small Data Layout • Large Data Layout • Everything Layout • Single Image Layout • Dual Image Layout |
|  | <p>Indicates an analysis graph.</p> |
|  | <p>Indicates an image One icon means Contrast image. Two icons mean Contrast and B-Mode.</p> |
|  | <p>Indicates parameters. 10 dots means that all parameters display. 4 dots means that only displays high level parameters.</p> |

Table 13-24: Sample area drawing tool




| Graphic | Description |
|---|---|
|  | Creates a sample area based on freehand drawing. |
|  | Creates a sample area with a pre-defined circular/elliptic shape. |

Table 13-25: Trackball Assignment

| Graphic | Description |
|---|--|
|  | <p>Press the top Trackball key to toggle the trackball assignment between QA and Scroll.</p> <ul style="list-style-type: none"> • QA Pointing tool in TIC mode. • Scroll When the cinelooop is stopped, enables scrolling through the cinelooop. • Menu Press left Set key to display System Menu. • Set |

TIC Touch Panel

Table 13-26: TIC Touch Panel Description

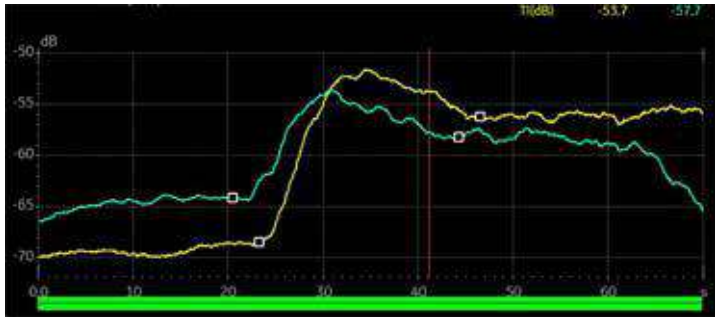
| Parameter | Description |
|--------------------|---|
| Exit TIC Analysis | Exit TIC. |
| Motion Tracking | Users use TIC to analyze tumor characteristics precisely, without distortion due to patient movement. Motion Tracker enables the system to automatically adjust the ROI's placement across multiple frames in order to accommodate patient breathing or body movements. To activate, press Motion Tracking on the Touch Panel. This starts the calculation to adjust the all ROI positions for every image frame. After completion, the ROI graphic on each frame is changed to the ROI with the anchor. |
| Accumulation | Enhances the flow in an image. |
| Enable All Frames | Re-enables disabled frames. |
| Curve Fitting | Toggles between Wash-In, Wash-Out, Gamma Variable and Off. |
| 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. |
| Auto Calc Range | Auto Calc Range enables system to automatically estimate the ROI's start frame and end frame to calculate TIC parameters and fitting curves. The start and end frames for each ROIs are displayed by small squares on the graph. Toggles between Current Sample, All Samples and Reset All.  |
| First | Move to the first frame of cineloop. |
| Last | Move to the last frame of cineloop. |
| Run/Stop | Start/Stop the cineloop review. |
| Loop Speed | Adjust the cine loop playback speed. |
| ROI width/height | Move the rotary left/right or up/down to adjust ROI width/height. |
| ROI tilt angle | Rotate the rotary to adjust ROI tilt angle. |

Table 13-26: TIC Touch Panel Description (Continued)

| Parameter | Description |
|------------------|--|
| Start Frame | Rotate the rotary to select the start frame and push to set the frame. |
| End Frame | Rotate the rotary to select the end frame and push to set the frame.. |
| Frame by Frame | Rotate the rotary to review the CINE image frame by frame manually. |
| Disable frame | Push the rotary to disable the selected 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 (Ellipse ROI)

1. Press the top **Trackball** key until the QA trackball assignment is selected.
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.

Copy, move and paste a Sample Area

To copy and paste the ROI,

1. Move the cursor over the ROI and press the left **Set** key. The system menu displays.
2. Select **Copy sample area**.
3. Move the cursor to the desired location for the copied ROI and press the left **Set** 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 the left **Set** key. 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.

To move the ROI,

1. Move the cursor over the ROI and press the left **Set** key. The system menu displays.
2. Select **Move (same depth)**.
3. Move the ROI using the **Trackball**. Press **Set** to fix the position.

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 the top **Trackball** key until the QA trackball assignment is selected.
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 the top **Trackball** key until the scroll trackball assignment is selected.
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 top Trackball key until the scroll trackball assignment is selected.
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 top Trackball key until the QA trackball assignment is selected.
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 left **Set** 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 the top Trackball key until the QA trackball assignment is selected.
2. Move the cursor over one of the sample area. Confirm that cursor is changed to hand icon.
3. Press the **Delete Sample Area** on the touch panel.
4. Select **Current Sample** or **Delete all** as necessary.

NOTE: *The corresponding traces for the deleted ROIs are erased from the plot.*

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 on the Frame Marker which you want disable.
2. Press **Set** to disable the 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 on the Frame Marker.
2. Press and hold down **Set**
3. Move the cursor with the Trackball to the last frame to be disabled and release Set.

The marker is turn red and the data from that frame is removed from the trace and any subsequent trace processing.

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 analysis window and press left **Set** key. 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

1. Select **Enable all frames** on the Touch Panel.
2. All disabled frames are re-enabled.

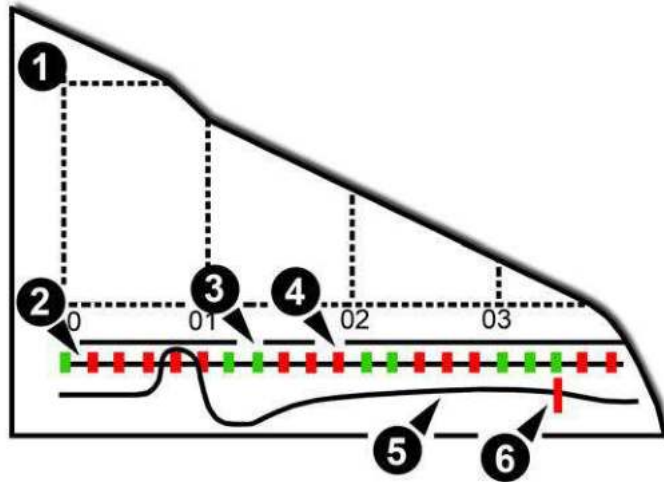


Figure 13-30. Frame markers

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. Place the cursor on the sample area.
2. Press left **Set** key. The system menu displays.
3. Select **Set as Default ROI Size**.
4. The current ROI size is set as the default for subsequent Ellipse ROIs.

Reshaping a Sample Area

To reshape the sample area:

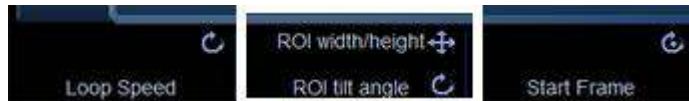


Figure 13-31. ROI

- Move the rotary up and down to change the height.
- Move the rotary left and right to change the width.
- Rotate the rotary to change the tilt angle.

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 the left **Set** key.
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**.

TIC Plot Control

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. The unit of previous analysis is retained.

- **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.

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.

Y-Scale

1. When you select “Off” for Vertical Auto-Scaling, Y-Scale dialog displays.
2. Enter maximum and minimum value for vertical scale on the graph.
3. Press **OK**. The vertical scale is updated.

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.

Horizontal Scale

Set the horizontal unit as time scaling (s) or time interval (dt) between frames.

NOTE: Only on a loop including different frame rate.

Smoothing

The system can smooth the traces displayed by applying a filter over a defined time window. The type of filter available is depending on the analysis signal displayed.

1. Select **Smoothing** on the Touch Panel.

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: When smoothing is turned on, it applies to all traces in the plot window.

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).

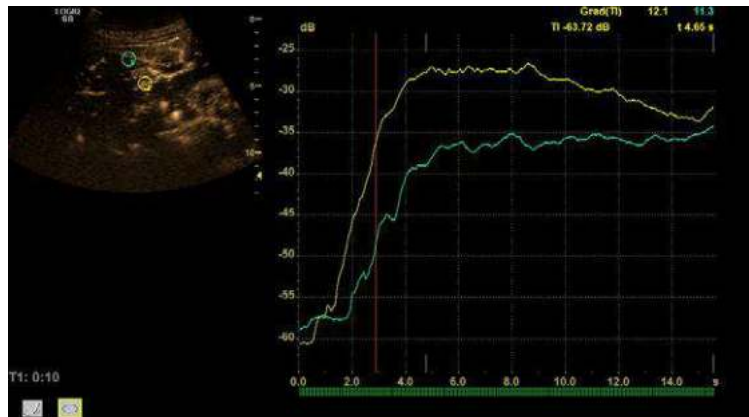


Figure 13-32. Gradient

Trace Measurement (continued)

TIC Parameters

Following parameters are automatically calculated and displayed with the graph.

Table 13-27: TIC Parameters

| | |
|--------------------|---|
| MGrad | Maximum Gradient |
| MGT | Max Gradient Time |
| Grad. | Mean Gradient for the peak intensity. |
| ArT | Arrival Time |
| TtoP | Time to Peak |
| PI | Peak Intensity |
| TWH | Time Width at Half maximum intensity |
| TWR | Time Width Ratio for wash-in and wash-out |
| AUC | Area Under the Curve |
| WiAUC | Wash-in Area Under the Curve |
| WoAUC | Wash-out Area Under the Curve |
| A, B, C, k and MSE | The coefficients and the mean square error for fitting curve equation. These parameters are displayed only on Large Data Layout with curve fitting. |

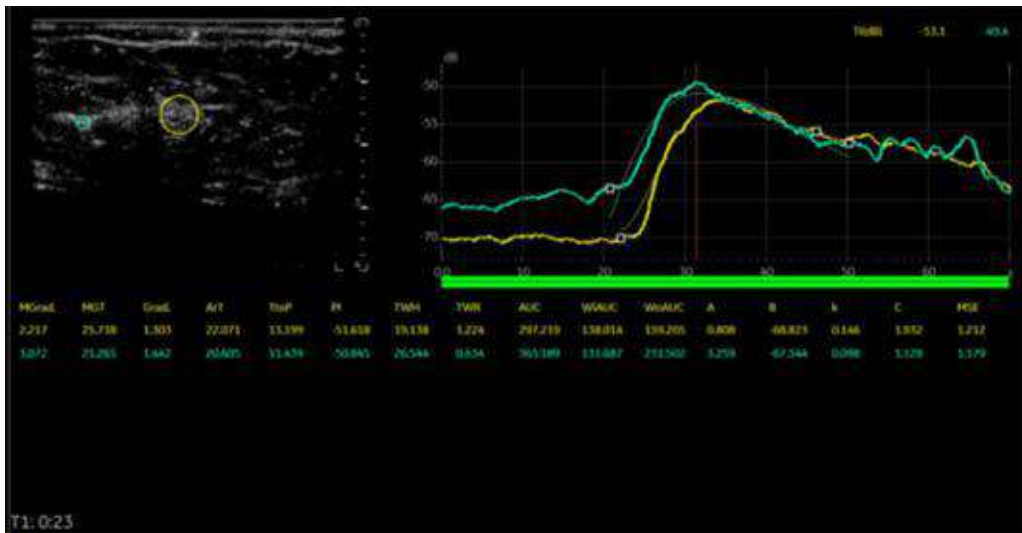


Figure 13-33. TIC Parameters

Trace Measurement (continued)

Show graph (Gradient plot)

1. Select **Gradient Plot** from the pull-down menu.
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 $d(\text{dB})/dt$ or $d(\text{AU})/dt$ in case of the intensity gradient.
 - Gradient values for the current frame are displayed in the upper right corner of the graph.
 - Gradient Derivative: Two graphs plot TIC and TIC gradient derivative.
 - The Y-axis units is $d^2(\text{dB})/dt^2$ or $d^2(\text{AU})/dts$ in case of the intensity gradient derivative.
 - Gradient derivative values for the current frame are displayed in the upper right corner of the graph.
 - All: Three graphs plot TIC, TIC gradient and TIC gradient derivative.

Curve Fit

1. Select **Curve Fitting** on the Touch Panel.
2. The Curve Fit selection list displays.

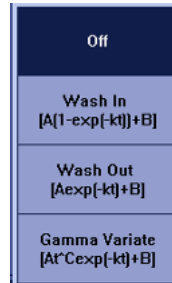


Figure 13-34. Curve Fit Selection List

- **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. Exponential 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: $A + B = \text{contrast} + \text{tissue} = \text{plateau level}$.

- k (1/s) is a time constant.

- **Wash-out**—Used to find and estimate a local wash-out rate. Exponential wash-out is described by the function:

$Y(t) = A\exp(-kt)+B$, 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**

$Y(t) = At^c\exp(-kt)+B$

Parameters of Gamma curve fitting

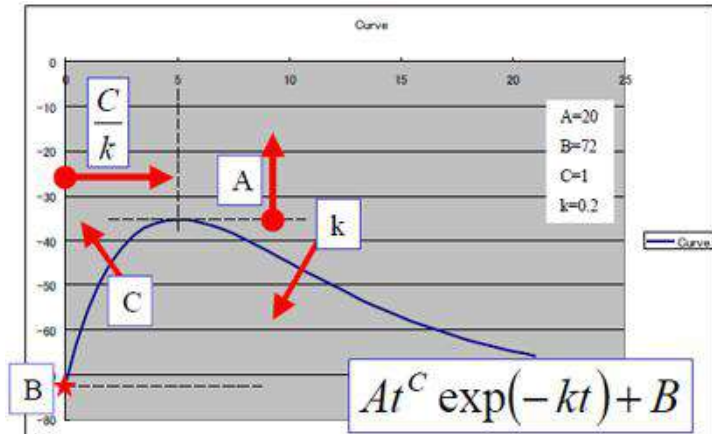


Figure 13-35. Gamma Curve

- 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.
2. Push Auto Calc Range on Touch Panel and select All Samples. Then the start and end frames for each ROI are automatically estimated.

If you need to optimize the start and/or end frames,

1. Select the start frame as with Cine or move the cursor to the desired position on the graph and press the right **Set** key.
2. Move the arrow pointer on the ROI (hand cursor appears) and press the left **Set** key. The system menu appears.
3. Select **Set Start Frame** from the menu.
4. Select the End Frame as with Cine or move the cursor to the desired position on the graph and select the right **Set** key.
5. Move the arrow pointer on the ROI (hand cursor appears) and select the unmarked key (the left Set key). The system menu appears.
6. Select **Set End Frame** from the menu. The ROI colored line displays.
7. 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 select the TIC parameters for Small Data Layout and Everything Layout.

1. Place the cursor on the analysis graph and press left Set key. Select TIC Parameters from the pull-down menu.
2. The TIC Parameters dialog appears.
3. Select a maximum of 6 parameters to display for each TIC.
 - Save As Default : saves as a system preset.
 - Save : saves as temporary.
 - Cancel

NOTE: *If you select more than 6 parameters and select Save or Save as default, you will be prompted to select up to 6 parameters.*

4. The selected parameter displays for Small Data Layout and Everything Layout. Press the Large Data Layout button to display all parameters; or press the other Layout button to hide all parameters.

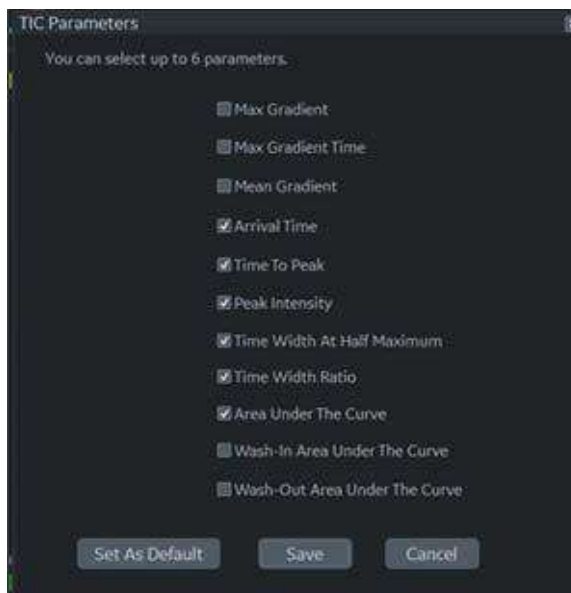


Figure 13-36. Curve Fitting Parameters Dialog

Raw Data store with TIC Setting

You can store the raw data with TIC setting.

1. Run TIC cineloop.
2. During cine running mode, press appropriate print key.

When you recall the raw data clip with TIC data, you can add, delete or modify the analysis measurements on the recalled raw data in TIC mode.

Printing TIC Data

1. Press **Run/Stop** to freeze the image.
The still image can be get when cineloop is stopped by Run/Stop button.
2. The system captures a single still frame which consists of the plot, the reference image and user annotation.

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.

SaveAs (Save image file and export trace data)

You can save the image file and trace data.

1. Select **SaveAs**.
2. The following dialog displays.
 - Location: Select Location which to save.
 - Filename: Enter the file name. (Only Text)
 - Export Trace: If you check this box, LOGIQ Fortis exports trace data to csv file.

Note: Name of exported file has same name as the image file saved at the same time.
3. Select **OK** to save the image and 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.

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 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.

TIC cineloop store

When you transfer TIC cineloop to the external server, check “Add Multiframe Data” in Utility -> Connectivity -> Button and then store the cineloop to the system.

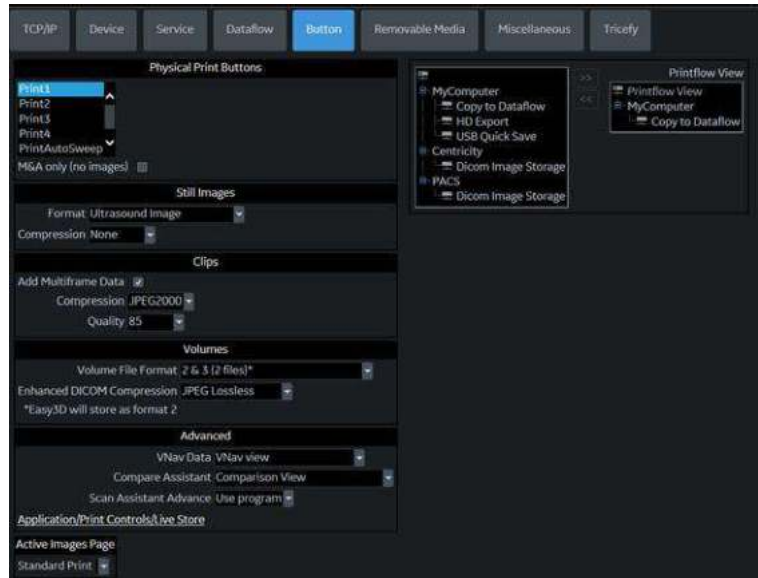


Figure 13-37. Button page

Parametric Imaging

Overview

The Parametric Imaging is the application to mainly visualize the contrast agent "arrival time" in colors by processing cine loops with pre-defined threshold value for each pixel.

Parametric Imaging is available for cineloop of B-Mode (includes CHI mode), Contrast mode and B-Flow mode.

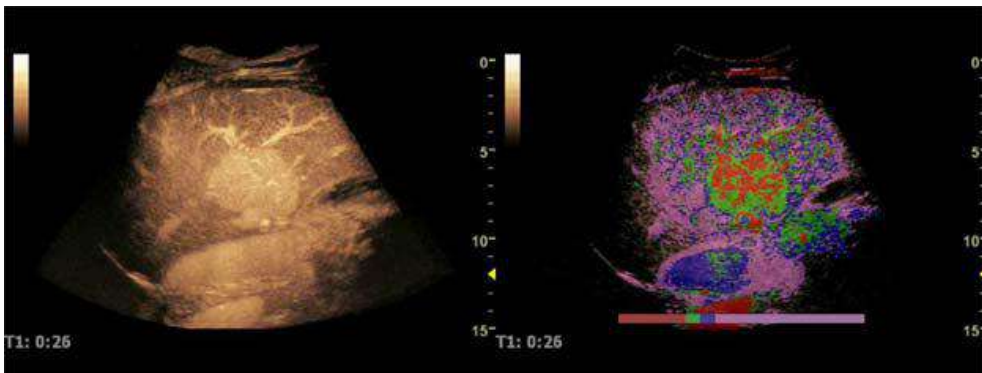


Figure 13-38. Parametric Imaging - Example

NOTE: *Parametric Imaging mode is available only if the LOGIQ Fortis has a valid option key.*

Typical Workflow

Here is the typical workflow for Parametric Imaging:

1. Enter Contrast Mode.
2. Inject the contrast agent.
3. Store the Contrast images until the contrast agent reaches the anatomy of interest in a very early phase.
4. Activate Cine mode and select the start frame/end frame of calculation if needed.
5. Select background image type as needed.
6. Press **Parametric Image** on the CINE Touch Panel.

Typical Workflow (continued)

Calculate and color encode according to the arrival time to CINE image with motion correction.

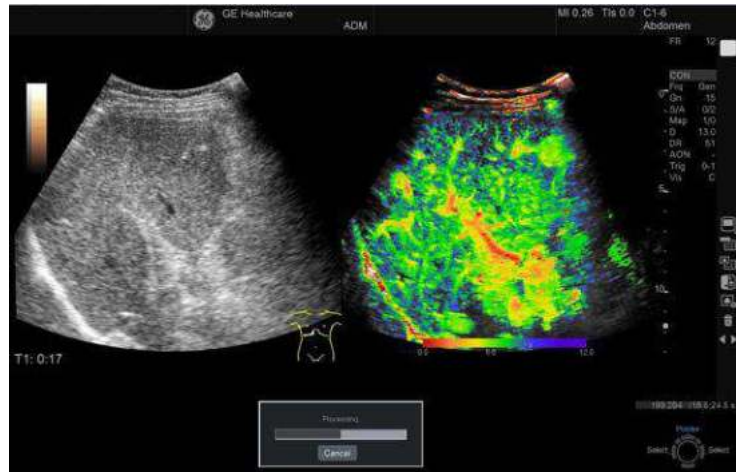


Figure 13-39. Calculating

7. Cine playback stops automatically when the calculation is done. You can playback/stop using Run button as normal cineloop.

NOTE: *You can cancel in the process of the calculation.*


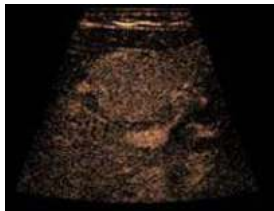
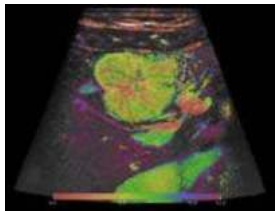
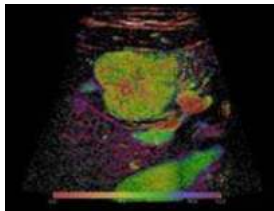
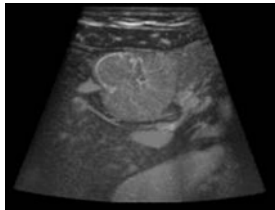

8. Measure the arrival time and time difference.
9. Save the data.
10. Unfreeze the image.

Background selection

You can select background image depending on the display setting of the contrast image.


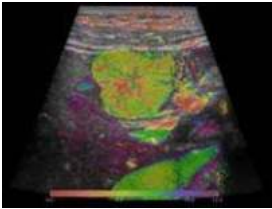
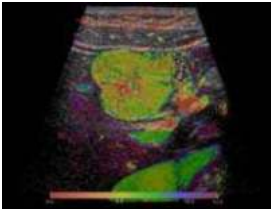
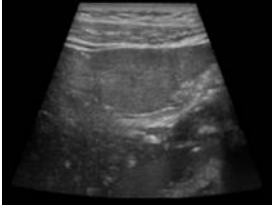
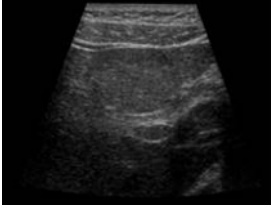
- Gray map, Tint map: Black/White Contrast image
- Hybrid visualization: Black/White Reference Image

Table 13-28: Background selection - Gray map/Tint map

| | Gray map | Tint map |
|--------------------------|---|--|
| |  |  |
| | Capture On | Capture Off |
| Parametric Image Map On |  |  |
| Parametric Image Map Off |  |  |
| | Background: Contrast image | |

Background selection (continued)

Table 13-29: Background selection - Hybrid Visualization

| | Hybrid visualization | |
|--------------------------|--|---|
| |  | |
| | Capture On | Capture Off |
| Parametric Image Map On |  |  |
| Parametric Image Map Off |  |  |
| | Background: Reference Image | |

Configuration parameters

You can adjust the following parameters. Press **Parametric Property** on the Cine Touch Panel.

- Color bars
- Transparent
- Gradation
- Capture
- Threshold
- Motion correction method
- Preset Load/Save



Figure 13-40. Parametric Property widow

Color bar

Select the colors for parametric imaging, the numbers of color and the timing for color change.



Figure 13-41. Color bar window

Adjustment and change color bar

Click on the color bar and select for

- Change color: Click **Change Color**. The color window displays. Select appropriate color and click **OK**.
- Change length of each color: Drag the right border line left or right to change the length.
- Entire length of color bar (length of most right color): Click left or right triangle icon under the color bar to change the length.
- Delete color: Click **Delete**.

Add color bar

Click **Add** and select color.

Save As

1. Click **Save As**. The Save As preset window displays.
2. Click on the color bar which you want save to select.
3. Press **Save**. You can save up to 8 color bars with:
 - Color bars
 - Transparent
 - Gradation
 - Capture
 - Threshold level
 - Motion correction method



Figure 13-42. Save As window

Load the parameters

1. Click **Load...**
2. Select appropriate map and click **Load** on the Load preset window.
3. After you change map, you have to click **Recalculate** to recalculate the arrival time.

NOTE: *If you want reload factory default setting, click **Reload Factory Defaults** on the Load preset window.*

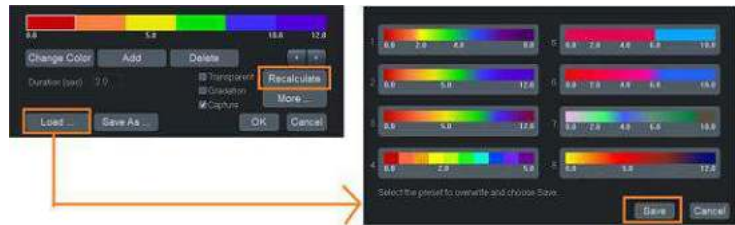


Figure 13-43. Load Preset window

Other parameters



Figure 13-44. Transparent, Gradation, Capture

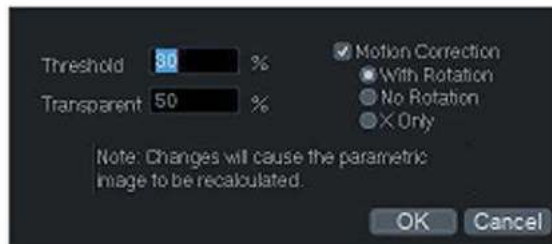


Figure 13-45. Threshold, Transparent %, Motion Correction

Other parameters (continued)

Transparent Click the checkbox next to **Transparent** to bring out the contrast image behind the parametric image.

You can change the percentage of transparency.

1. Click **More** on the Parametric property window.
2. Type the percentage. The higher the number, the more transparent the background contrast image.

NOTE: You can adjust the percentage by CF Volume key.

Gradation Check the checkbox next to **Gradation** to smooth the color gradient of adjacent colors.

Capture Check the checkbox next to **Capture** to use the captured image of background image.

Threshold Type threshold level (0 - 100%) to decide the arrival time.

Motion correction Select Motion Correction On/Off and correction method.

- Off: No motion correction
- On: Motion correction on
- With rotation: X-Y direction with rotation
- No rotation: X-Y direction without rotation
- X Only: X direction only

Other parameters (continued)

Table 13-30: Transparent, Gradation, Capture

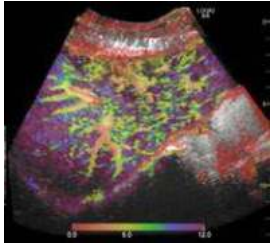
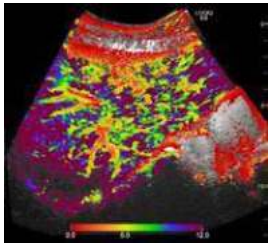
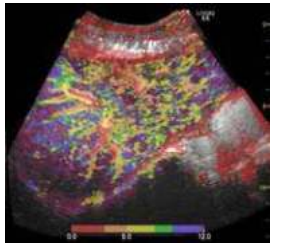
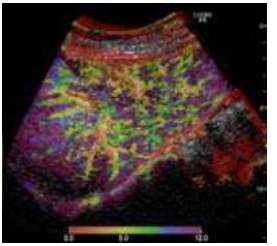
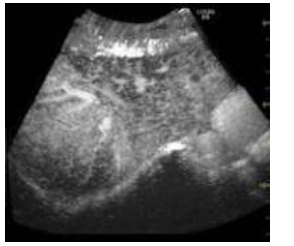

| | | |
|---|---|--|
|  | <ul style="list-style-type: none"> • Transparent On • Gradient On • Capture On | |
| Transparent Off | Gradient Off | Capture Off |
|  |  |  |

Table 13-31: Background image

| | |
|--|---|
| Capture On | Capture Off |
|  |  |

Trackball key for Parametric Imaging

Press Upper Trackball key to select Parametric Imaging Control. Parametric Imaging controls are assigned to each Trackball key.

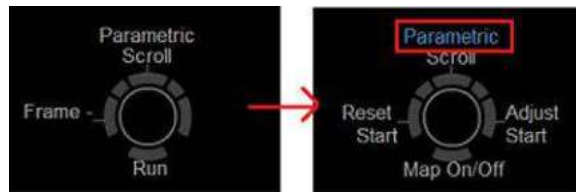


Figure 13-46. Trackball key map

Map On/Off

Display the Parametric Image On/Off. If you select Map Off, the background image displays temporarily.

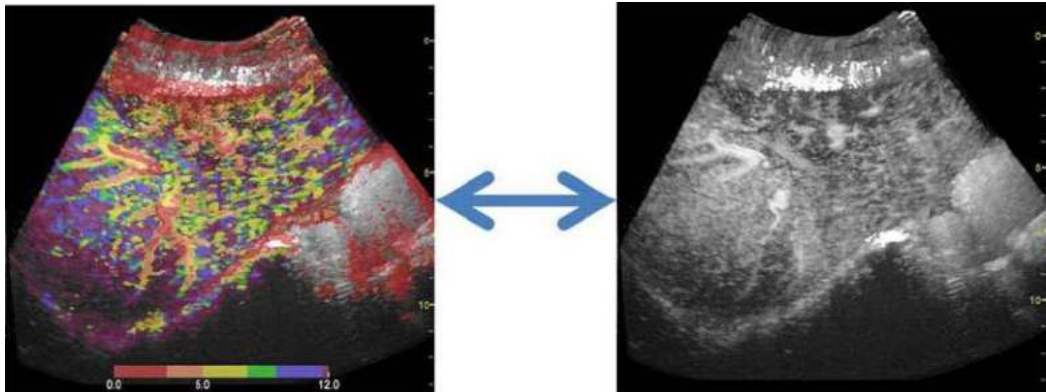


Figure 13-47. Map On/Off

Trackball key for Parametric Imaging (continued)

Adjust start

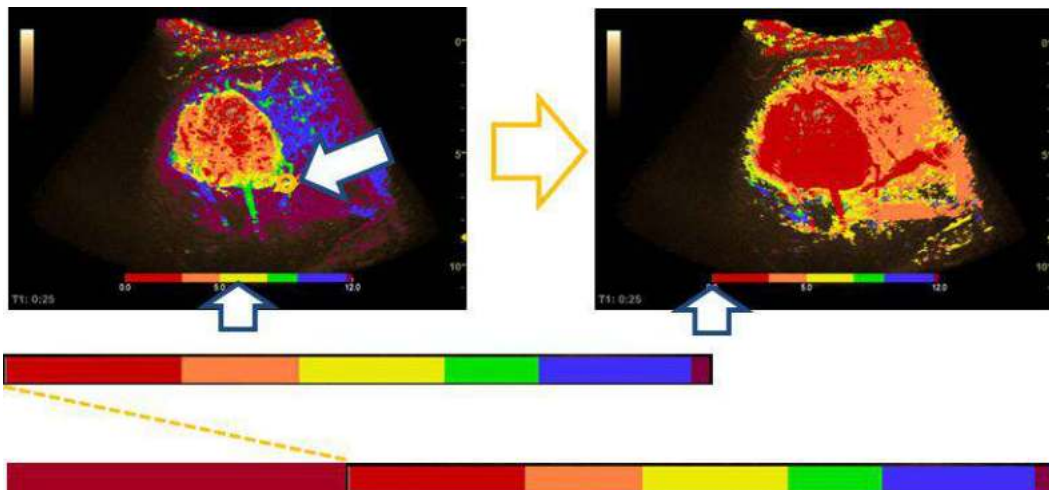


Figure 13-48. Adjust start

Press **Adjust Start** to change zero point where you place the cursor.

NOTE: Points before new zero point, change the color same as zero point.

NOTE: The cursor displays on the reference image, too.

Reset start

Press **Reset Start** to reset zero point to the start frame of the cineloop.

Measurement

Arrival time

1. Press **Measure** and move the cursor on the image. The pointer changes to green cross type.
2. The arrival time of the cursor position displays in the measurement result window.

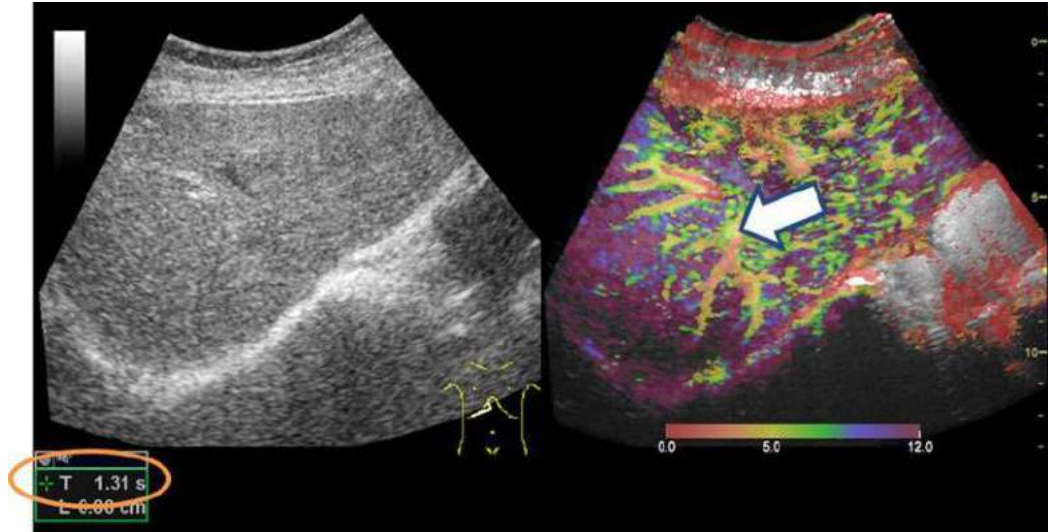


Figure 13-49. Measurement on the parametric image

Arrival time and Standard deviation

You can calculate the average arrival time and standard deviation of the traced area.

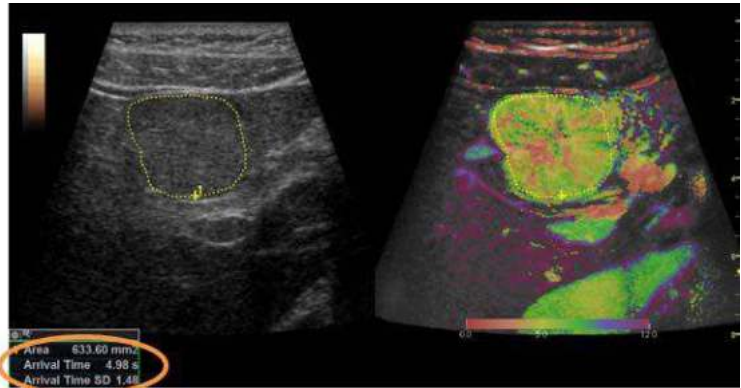


Figure 13-50. Trace measurement

- Arrival time
2D point caliper
- Arrival time and Standard deviation
2D ellipse, 2D 3 point ellipse, 2D circle, 2D area trace, 2D spline trace
- Arrival time and Standard deviation for dual view
2D dual area trace, 2D dual ellipse, 2D dual spline trace, 2D dual circle

NOTE: You can create measurement preset (Dual trace, etc.) in Utility -> Measure -> M&A tab. See 'Adding a Measurement' on page 7-89 for more information.

Strain Elastography

Description

Strain 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 Strain Elastography. The image is displayed in dual mode with the color map/bar of the Strain Elastography on the left side and the imaging parameters on the right side of the display below E.

You activate Elastography via the Elasto hard key on the Control Panel.

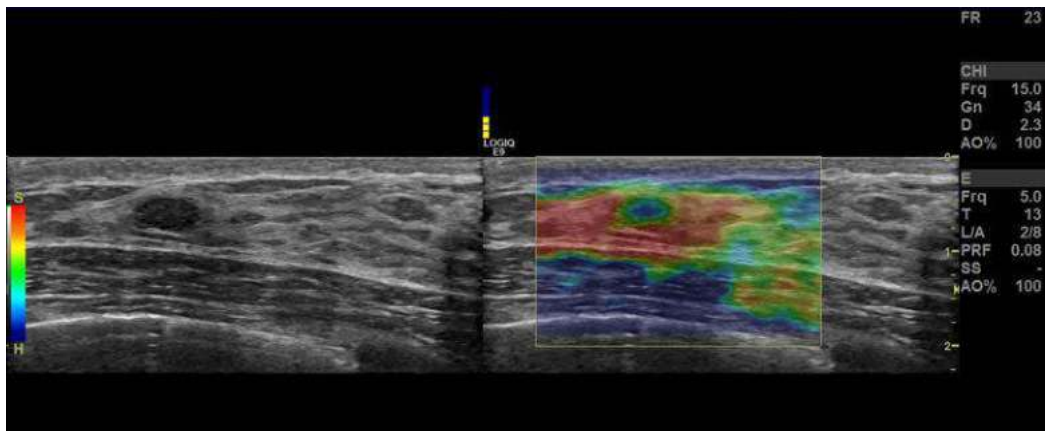


Figure 13-51. Strain Elastography Example

Using Strain Elastography

The Strain 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.

Strain Elastography displays firmer tissue in blue and softer tissue in red. To enhance Blue, increase Hard Compress; to enhance Red, increase Soft Compress on the Touch Panel. To enhance strain elastography contrast, reselect the Color Map.

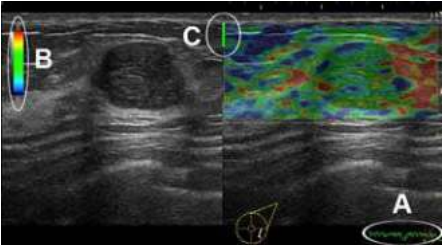
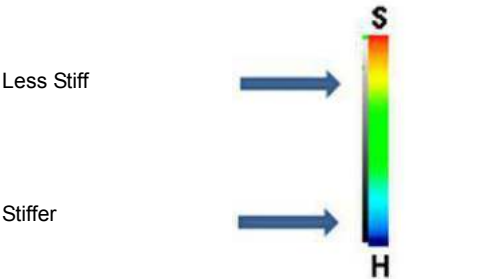
If you need more resolution, reduce Smoothing, increase Frequency, or reduce Window.

If you need a smoother image, increase Window or Smoothing.

If the images seem too flashy, decrease Frame Reject to 1.0 and Noise Reject to have consistent imaging throughout.

Using Strain Elastography (continued)

Table 13-32: Strain Elastography

| Using Strain Elastography | |
|---|--|
| <p>Manual Compression:</p> <ol style="list-style-type: none"> 1. Press “Elasto” button at the console to activate. 2. Select Strain on Touch Panel. 3. Adjust the position of the ROI to place the suspicious area at the center. 4. Adjust the size to include surrounding tissue (sample area size = x3 dimension of the lesion per axis). <p>Manual compression depends on the type of probe.</p> <ol style="list-style-type: none"> 1. Linear probes: Perform slight compressions keeping transducer perpendicular to the skin. Duration: 5 sec or 10 compressions. 2. Convex probes: Turn the patient on his left side more than 90 deg. Pressing with the probe above the lesion, allowing the heart and lungs to create the compressions. 3. Endocavitary probes: Perform soft, angular movement in plane of the probe. Duration: 5 sec or 10 compressions. <p><i>Note 1: Any very soft (vessel, cyst, air) or very stiff (bone) tissue above the lesion or the reference area may cause interference with the compressions. You may want to attempt from a different view.</i></p> <p><i>Note 2: Keep the lesion within the image and watch the quality graph for consistent high nearly flat (plateau-like) peaks.</i></p> | <p>Select the frame to analyze</p> <ol style="list-style-type: none"> 1. Press “Freeze.” 2. Using the trackball or “frame by frame” knob, select a frame on a plateau of the quality graph (Image 1, A) or when consistent frames with green bars are visualized (Image 1, B).  <p><i>Image 1: Elastography image with quality graph (A), quality bar (C) and elasto color bar (B).</i></p> <p>The relation between elastography colors and area's stiffness is given at the elastography color bar (Image 1, B).</p>  |

Clinical Applications

Table 13-33: Clinical Applications

| Application | Compare the suspicious lesion with: | Probe |
|-----------------|---|--|
| Breast | A fatty area in the breast or the average rounding breast tissue. | <ul style="list-style-type: none"> • L2-9-D/L2-9VN-D • ML6-15-D • L3-12-D |
| Thyroid | A normal area in the parenchyma of the gland. | <ul style="list-style-type: none"> • L2-9-D/L2-9VN-D • ML6-15-D • L3-12-D • L8-18i-D |
| MSK | A normal area in the same part of the body. | <ul style="list-style-type: none"> • L2-9-D/L2-9VN-D • L8-18i-D • L3-12-D • L8-18i-D |
| Liver | A normal area in the parenchyma of the liver. | <ul style="list-style-type: none"> • C1-6-D/C1-6VN-D • C2-9-D/C2-9VN-D • L2-9-D/L2-9VN-D |
| Prostate | A normal area in the parenchyma of the prostate. | <ul style="list-style-type: none"> • IC5-9-D • BE9CS-D |
| Uterus | A normal area in the parenchyma of the uterus. | <ul style="list-style-type: none"> • IC5-9-D |

Strain Elastography Controls

Table 13-34: Strain Elastography Touch Panel Description

| Parameter | Description |
|-------------------|---|
| Axial Smoothing | Controls the smoothness of the strain elastography image in the axial direction. A higher value means a smoother image. |
| Lateral Smoothing | Controls the smoothness of the strain 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 | <p>Controls the strain elastography maps. Seven different maps are available with various contrast and color schemes, including a grayscale map. Selections: E0-5, E-Gray, and S Map.</p> <p>The E Map calculates the mean strain for the whole ROI and assigns this mean value to a green (center) color. This is best suited for imaging a localized mass compared to the surrounding tissue with external forces (the movement of the hand-held probe).</p> <p>The S Map is useful for imaging diffusely-distributed diseases and local strain changes brought about by internal forces such as the movement of a beating heart and moving vessels. The default strain sensitivity is unique by probe/application. You can adjust the strain scale by adjusting the strain sensitivity tool.</p> |

Table 13-34: Strain Elastography Touch Panel Description (Continued)

| Parameter | Description |
|--------------------|---|
| Frame Average | Controls the persistence of the strain elastography images. |
| Frequency | Controls the transmit frequency. |
| Strain Sensitivity | If S0 Map (in live) is selected, the user can control Strain Sensitivity (SS). |
| 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 strain 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. |
| 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. |
| 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. |

Application Parameters

You can set the Quality Bar and Quality Graph on the Utility--> Application--> Settings --> Elasto page.

For Quality Bar:

- Check to display a Quality Bar for Elastography.

For Quality Graph:

- Off (No elasto quality graph is displayed in the image)
- Small, Medium or Large for display size of Quality Graph.

General Imaging Parameters by Application/Probe/Feature

Select the Default Elasto Mode via Utility--> Imaging--> General.

You can specify Strain to be the default setting by application and probe.

1. To specify a default probe per application, select Utility --> Imaging --> General.
2. Select the application.
3. Select the default probe from the pull-down menu.
4. Specify the Default Elasto setting:
 - Strain
 - Shear

Elastography Analysis

Overview

The Elastography Mode detects strains by correlating the echo amplitudes of the tissue when compressed and uncompressed. Different displacement of echoes is an indicator for different stiffness (strain) of the tissue. High strain means that the tissue is softer, low strain means that it is stiffer. Zero is absolutely stiff without any elasticity. Elastography Analysis is a strain ratio comparative tool that enables users to compare the strain of one tissue to the surrounding tissue.

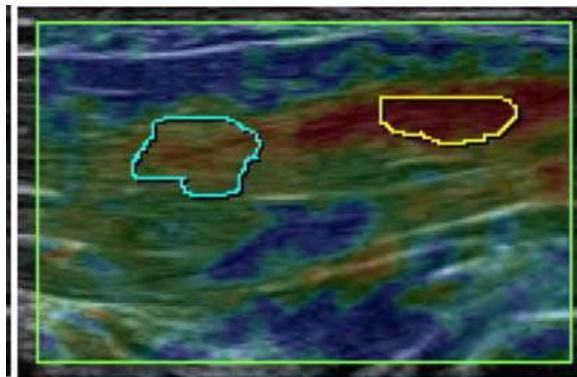
Using Elastography Analysis

1. If not yet in Elastography Mode press Elasto.
2. Perform the scan. Proper manual compression/decompression is indicated by a fully green quality bar.
3. Press Freeze and scroll the Trackball to bring up the CINE tab on the Touch Panel.
4. Press Analysis on the Touch Panel. The Elastography Analysis Touch Panel appears and the monitor screen shows the Elastography Analysis display. The valid Elastography frames are marked green.
5. Adjust the start and end of the CINE Loop within the green frames using the rotary buttons below the Touch Panel (Start Frame/End Frame). Press Set to confirm. .
6. Activate the cursor and move it over the Elastography image on the top left side of the screen. A white sample area appears. By default this sample area is a circle. It will be the reference sample area and should be placed in the normal breast tissue.
7. Position this reference sample area and press Set. A yellow plot curve displays the strains over time on the right side of the monitor screen.
8. Move the Trackball again. A new sample area appears (sample area 1) which should be placed in the lesion.
9. Position the sample area and press Set. A second plot curve is displayed (blue curve).

Using Elastography Analysis (continued)

In total you can create 7 sample areas and 1 sample area. Each sample area can be edited, moved, copied, or deleted. A sample area can also be drawn manually.

1. To edit an existing sample area, move the cursor over the sample area then press the left Trackball control (Menu) to bring up the menu. Select "Set Sample Area Shape" to enter a dialogue window where Height and Width can be adjusted. You can also label, delete, copy, move the sample area by selecting corresponding options in the menu.
2. To draw a sample area manually, select the pencil icon. Then the cursor becomes a cross inside the strain image. Start to draw the sample area by pressing "Set." Press "Set" again to stop drawing.



3. Both Stiffness and Ratio plots can be displayed: Switch to Ratio plots by pressing the Ratio control on the Touch Panel.
4. Press Exit Analysis to return to Elastography Mode.

Using Elastography Analysis (continued)



HINTS

Use the trackball to scroll the Cine Loop quickly.

NOTE: The maximum strain value in human tissue can be up to 2%.

NOTE: The ratio value indicates how many times the tissue of a sample area is harder or softer than the tissue of the Reference sample area.

Elastography Analysis Display Description

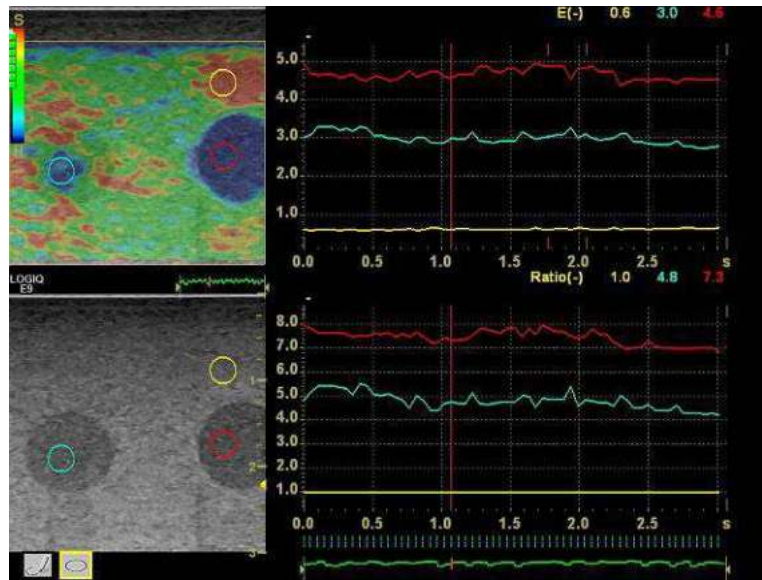


Figure 13-52. Elastography Analysis Example

1. Reference sample area
2. Lesion
3. Harder compression
4. Lower compression
5. Strain plot
6. Ratio plot
7. Frame indicator lines: green lines indicate frames with color in the Elastography image, red lines indicate invalid frames without color.
8. Reference sample area is set to 1
9. Lesion is 0.8 times as rigid as the Reference sample area

Additional Notes for Elastography Analysis



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 LOGIQ Fortis 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 Analysis and setting the sample area in the blue portion of the three-layer pattern on the cyst and then setting the sample area in the “normal” tissue may cause you to misinterpret the Elastography Analysis ratio as the cyst to be hard as compared to the “normal” tissue.

Shear Wave Elastography

Overview

Shear wave elastography on the LOGIQ Fortis is an ultrasound imaging mode in which shear waves are generated in-vivo acoustically via the imaging ultrasound transducer. The motion of the shear waves is then tracked using ultrasound to determine their velocity of propagation, which is a quantifiable indicator of the mechanical properties of the tissue through which it traveled. The steps associated with performing this analysis on the LOGIQ Fortis include correctly placing a user-specific region of interest (ROI) over the anatomy of interest. Next, the user activates the shear wave analysis mode where the shear wave generation and tracking occurs. Up to four (4) sites may be analyzed. After acquiring the data, the user either stores the image or analyzes it via measurement tools which can produce shear wave velocity or stiffness statistics of areas within the ROI.

Overview (continued)

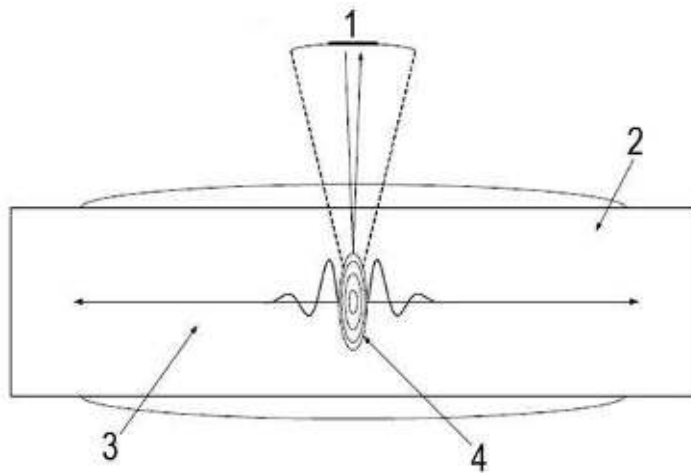


Figure 13-53. Shear wave Probe Characteristics

1. Excitation and imaging transducer
2. Tissue
3. Propagating Wave
4. Focus

Intended Uses

Shear wave elastography Intended Uses are:

- Abdomen
- Small Parts
- Musculoskeletal
- Gynecological
- Urological



CAUTION

Shear wave elastography IS NOT intended for use for Obstetrical exams.

Configuring Shear Wave

To configure Shear Wave parameters, you need to adjust the following Utility pages:

- ELASTO Imaging Parameters (Utility -> Imaging -> Elasto)
- General Imaging Parameters (Utility -> Imaging -> General)
- System Imaging Parameters (Utility -> System -> System Imaging)
- Measurement Parameters (Utility -> Measure -> Advanced -> for both Abdomen and Small Parts Breast)

ELASTO Imaging Parameters

To configure Shear Wave Elastography settings, select Utility--> Imaging--> ELASTO.

- Push Output (%) — The acoustic output of the shear wave push
- Track Output (%) — The acoustic output of the shear wave tracking pulse
- Transparency — The transparency of the shear wave image overlay
- Gain — Gain, as can be manipulated by the CF knob
- Width — ROI Width (values vary by probe)
- Vertical Size (cm) — ROI Vertical Height (values vary by probe)
- Center Depth (cm) — ROI Center Depth (values vary by probe)
- Color Map — Select shear wave Map 0 or shear wave Map 1 (SW0 or SW1) plus other ELASTO Maps (E1, E2, E3, E4, E-GRAY)
- Enter ELASTO DualView by Default — Check to select entering shear wave in DualView.

ELASTO Imaging Parameters (continued)

Shear wave Color Bars:

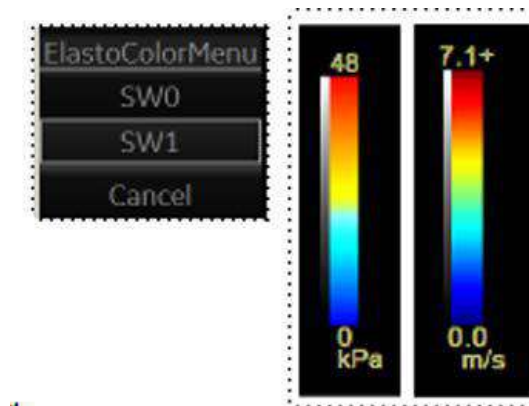


Figure 13-54. Shear wave Maps

The illustration shows the color maps for kiloPascals and velocity (meters per second). The images look the same, regardless of the unit (m/s or kPa). You can preset which color on the map represents stiffness (Red as Hard or Blue as Hard).

General Imaging Parameters by Application/Probe/Feature

Select the Default Elasto Mode via Utility--> Imaging--> General.

You can specify shear wave to be the default setting by application by probe.

1. To specify a default probe per application, select Utility --> Imaging --> General.
2. Select the application.
3. Select the default probe from the pull-down menu.
4. Specify the Default Elasto setting:
 - Shear
 - Strain

System Imaging Parameters

You can set the shear wave Display Units and specify which color on the shear wave map represents stiffness on the Utility--> System--> System Display--> Display page.

Set the Shear Elasto Display Units to either of the following settings:

- m/s (meters per second)
- kPa (kiloPascals)

Specify which color on the shear wave map represents stiffness:

- Red as Hard
- Blue as Hard

Measurement Parameters

On the Utility--> Measure--> Advanced--> Abdominal page, set the following:

- Shear Measure Size — Sets the Default Diameter size of the shear wave measurement circle
- Shear Measure Fixed Size — Sets to ON to move the shear wave measurement circle with keeping the fixed size.
- Shear Calculation Method — Specify Mean (Mean averages of all of the shear wave points within the measurement circle) or Median (Median sorts, then selects the middle point of all points within the measurement circle)
- Shear Units Determine Folder — When On is specified, the unit specified pre-selects the measurement folder. If m/s is specified as the unit, then the Velocity folder is used; if kPa is specified as the unit, then the Stiffness folder is used

Measurement Parameters (continued)

On the Utility--> Measure--> Advanced--> Small Parts page, specify the Calculation Method (Mean/Median).

- Shear Measure Size - Sets the Default Diameter size of the shear wave measurement circle.
- Shear Measure Fixed Size - Sets to ON to move the shear wave measurement circle with keeping the fixed size.
- Shear Calculation Method — Specify Mean (Mean averages all of the shear wave points within the measurement circle) or Median (Median sorts, then selects the middle point of all points within the measurement circle)

Activating Shear Wave

To activate shear wave, press **ELASTO** and Touch Panel **Shear** controls. (1) To position and size the shear wave ROI, or to Start or return to Pre-Mode shear wave, touch the right-most **Trackball** control. (2) To save the Shear Elasto image, activate the P1 control.



Figure 13-55. Shear wave Operator Panel Controls

ELASTO -- When you activate ELASTO, the default Elasto Mode appears on the display and Touch Panel. If shear wave is preset as the default Elastography Mode, then Shear Wave Elastography mode appears; if Strain Elastography is set, then Strain Elastography mode appears.

Shear Wave Display

Shear wave displays as follows while performing a measurement:



Figure 13-56. Shear wave Display with Measurement

1. Measurement Window
2. Shear wave Map
3. Measurement(s)
4. Shear wave ROI
5. Trackball Controls
6. Imaging Parameters
 - E = Elastography, Shear Wave
 - Gn = Gain
 - T = Transparency
 - SVD = Sample Volume Depth
 - PO% = Push Output Percentage
 - TO% = Track Output Percentage
 - f50-200Hz = Shear Wave Frequency range
 - Gen/Pen = General/Penetration.
 - “Gen” appears when viewing an image where general settings were applied.
 - “Pen” appears when viewing an image optimized for penetration.
 - “Clock” displays in Low Frame Rate Use cases.

Note: The measurements' Median and Inter-Quartile Range (IQR) are displayed by default in the Measurement Window and Worksheet. The Caliper Area, Depth of Caliper Center, and average Quality within the measurement area can also be displayed on the Worksheet, along with how many measurements used for the median calculation.

Selecting Measurements to Display

The following measurements are displayed by default, except those marked with an asterisk (*):

- Shear Stiffness (kPa)
- Standard Deviation within the Shear Stiffness Measurement Area*
- Shear Velocity (m/s)
- Standard Deviation within the Shear Velocity Measurement Area*
- Measurement Area (cm²)*
- Depth of Caliper Center (cm)*
- Average Quality within the measurement area (%)*

*Items not displayed by default can be added via Utility--> Measure. See below.

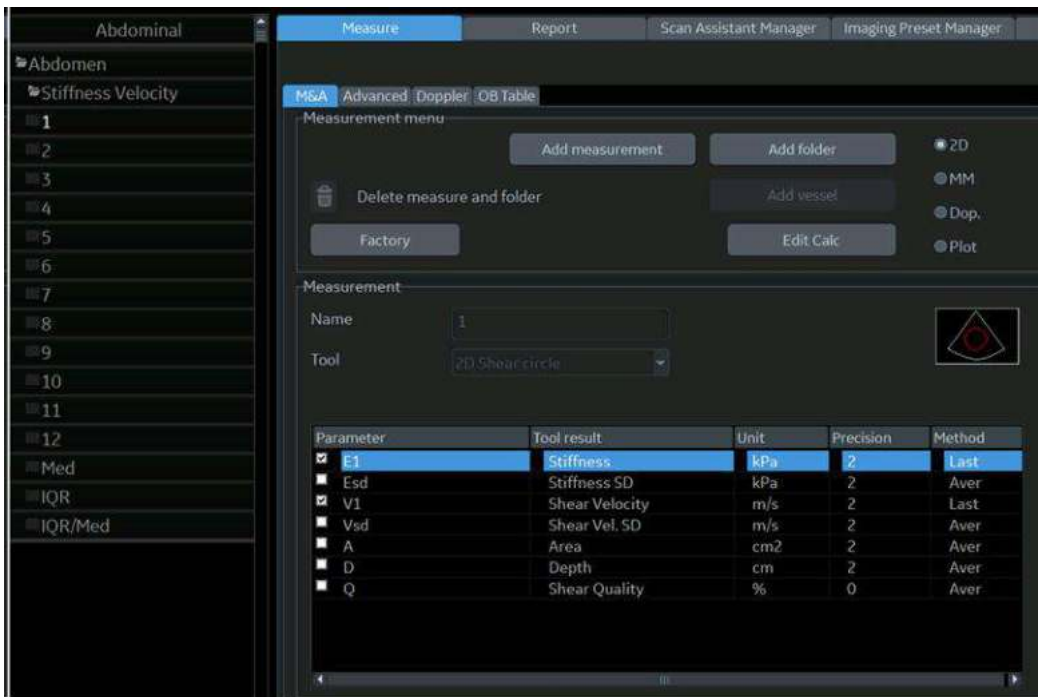


Figure 13-57. Configure Shear Wave Measurements

Selecting Measurements to Display (continued)

Checkmark the Shear Wave measurements to be displayed on the monitor and on the Extended Worksheet.

| Parameter | Tool result | Unit | Precision | Method |
|--|----------------|-----------------|-----------|--------|
| <input checked="" type="checkbox"/> E1 | Stiffness | kPa | 2 | Last |
| <input type="checkbox"/> Esd | Stiffness SD | kPa | 2 | Aver |
| <input checked="" type="checkbox"/> V1 | Shear Velocity | m/s | 2 | Last |
| <input type="checkbox"/> Vsd | Shear Vel. SD | m/s | 2 | Aver |
| <input type="checkbox"/> A | Area | cm ² | 2 | Aver |
| <input type="checkbox"/> D | Depth | cm | 2 | Aver |
| <input type="checkbox"/> Q | Shear Quality | % | 0 | Aver |

Figure 13-58. Selecting Default Shear Wave Measurements

| | | |
|---|-----|----------------------|
| 1 | E9 | 2.35 kPa |
| | Esd | 0.22 kPa |
| | V9 | 0.88 m/s |
| | Vsd | 0.27 m/s |
| | A | 1.25 cm ² |
| | D | 4.96 cm |
| | Q | 29 % |

Figure 13-59. Shear Wave Measurement Results Window

| Shear Elasto (Site1) | | | | | | | |
|----------------------|-----------|--------------|----------|-------------|----------------------|---------|---------|
| | Stiffness | | Velocity | | | | |
| Med | 2.26 kPa | | 0.87 m/s | | | | |
| IQR | 0.08 kPa | | 0.01 m/s | | | | |
| IQR/Med | 3.4 % | | 1.7 % | | | | |
| N | 6 | | 6 | | | | |
| | Stiffness | Stiffness SD | Velocity | Velocity SD | Area | Depth | Quality |
| 1 | 2.34 kPa | 0.23 kPa | 0.88 m/s | 0.28 m/s | 0.96 cm ² | 4.86 cm | 3 % |
| 2 | 2.26 kPa | 0.21 kPa | 0.87 m/s | 0.27 m/s | 1.66 cm ² | 4.60 cm | 3 % |
| 3 | 1.98 kPa | 0.12 kPa | 0.81 m/s | 0.20 m/s | 1.03 cm ² | 6.15 cm | 3 % |
| 4 | 2.24 kPa | 0.18 kPa | 0.86 m/s | 0.24 m/s | 2.04 cm ² | 5.82 cm | 3 % |
| 5 | 2.49 kPa | 0.23 kPa | 0.91 m/s | 0.27 m/s | 0.72 cm ² | 4.85 cm | 4 % |
| 6 | 2.25 kPa | 0.25 kPa | 0.87 m/s | 0.29 m/s | 1.47 cm ² | 4.35 cm | 3 % |
| 7 | | | | | | | |
| 8 | | | | | | | |

Figure 13-60. Shear Wave Extended Worksheet

Shear Wave Quality Indicator

The Shear Wave Quality Indicator displays the reliability of the Shear Wave image. A Quality value is computed for every pixel of the Shear Wave image and displayed as an image in a color-coded ROI. Locations with higher quality values have more reliable Shear Wave data.

To View the Shear Wave Quality Image

The Quality Image can only be displayed in Dual Mode. It can be turned on and off using the Quality button on the Shear Elasto page on the Touch Panel.

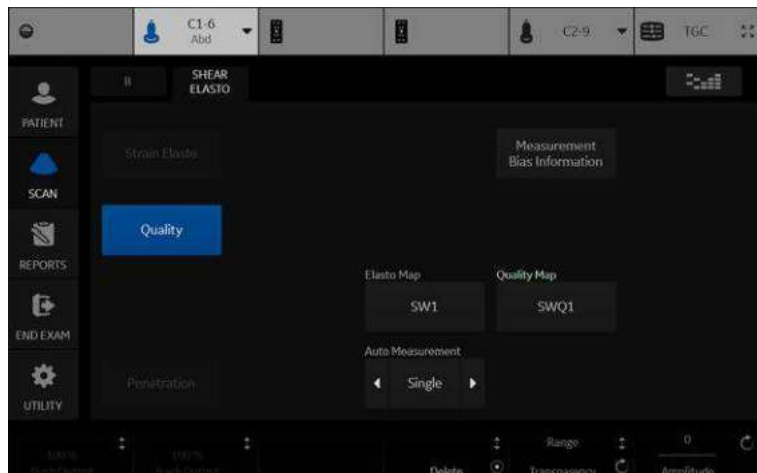


Figure 13-61. Quality Image Button

NOTE: You must be in Elasto Dual Mode to select the Quality button.

To View the Shear Wave Quality Image (continued)

When the Quality Image display is turned on, the Quality Image is displayed on the left and the Shear Elasto image on the right.

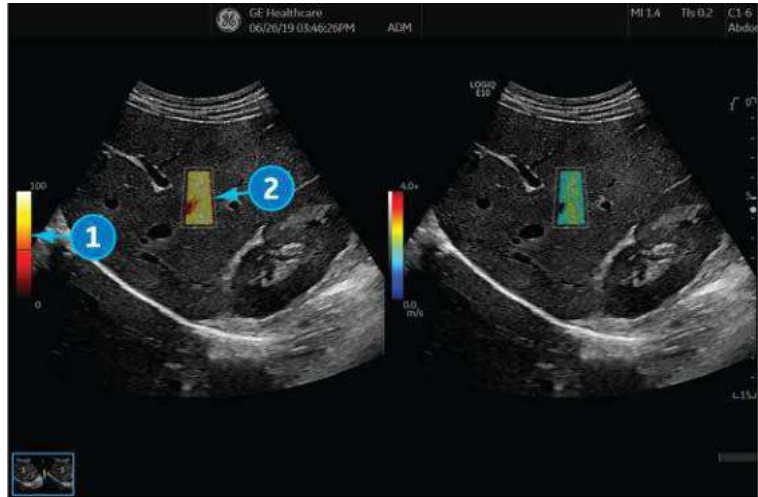


Figure 13-62. Shear Wave Display with Quality Image Enabled

1. Color Bar for Quality Image
2. Quality Image

The Color Bar on the left of the Quality Image shows the quality value corresponding to the colors in the Quality Image. Low quality is indicated by the colors at the bottom of the bar, and high quality by colors at the top.

Quality Map

There are two Quality Maps available to choose from on the Shear Elasto screen (under Quality Map), each with a specific color range:

- SWQ0 - Black/red/orange/yellow/white (low to high quality)
- SWQ1 - Red/orange/yellow/green (low to high quality)

Elements of a good Shear Wave image

Elements of a good shear wave image contain the following:

- Good contact
- ROI placed in the middle of image
- Gain at or near factory default
- Uniform color fill-in
- Homogeneous color pattern

Shear Wave Touch Panel

Table 13-35: Shear wave elastography Touch Panel Parameters

| Preset Parameter | Description |
|------------------------------|--|
| Strain or Shear Elasto | Toggle touch key between Strain and shear wave elastography. |
| Measurement Bias Information | Press to bring up measurement bias information. |
| Quality | Press the Quality button to open the Quality Indicator screen (while in Dual Mode). |
| Phantom | Press the phantom button to get good performance when measuring stiff, motion-free phantoms. The 049A phantom is recommended. For more information, refer to the CIRS website at http://www.cirsinc.com/products/all/74/elasticity-qa-phantoms/?details=specs . |
| Penetration | Press Penetration for instances measuring especially hard tissue (fibrotic or cirrhotic livers or technically difficult tissue in general). |
| Map | Shear wave Color Map. |
| Push Output | The acoustic output of the shear wave push. |
| Track Output | The acoustic output of the shear wave tracking pulse. |
| Range | Min/Max Velocity, or Stiffness displayed. |
| Transparency | The transparency of the shear wave image overlay. |

Measurement Bias Information Tables

The Measurement Bias Information tables display the bias and precision percentage at different spatial resolutions (Bias/Precision vs Object Size, in millimeters) and at incremental depths (Bias/Precision vs Depth, in centimeters) for each shear wave probe.

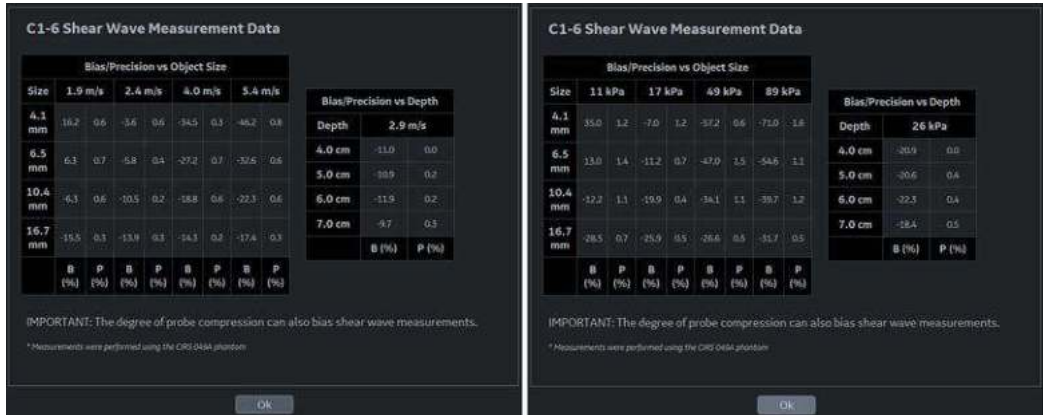


Figure 13-63. C1-6-D/C1-6VN-D Measurement Bias Information (Velocity on the left and Stiffness on the right)

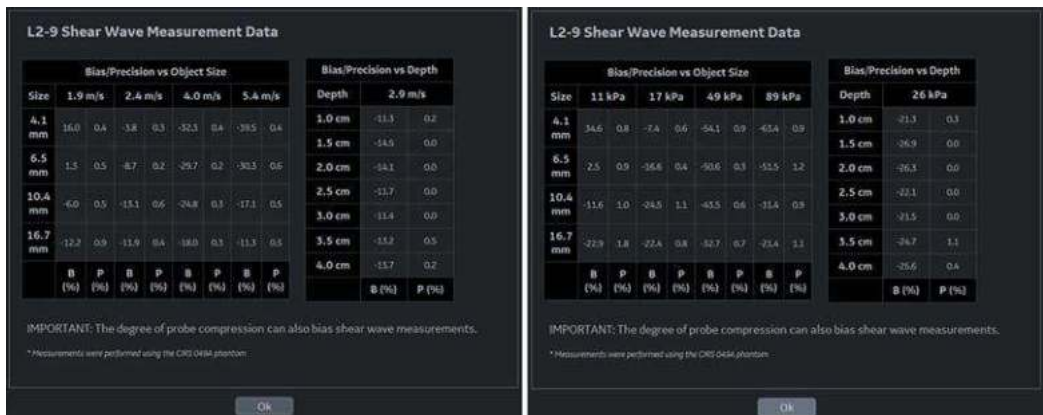


Figure 13-64. L2-9-D/L2-9VN-D Measurement Bias Information (Velocity on the left and Stiffness on the right)

Measurement Bias Information Tables (continued)

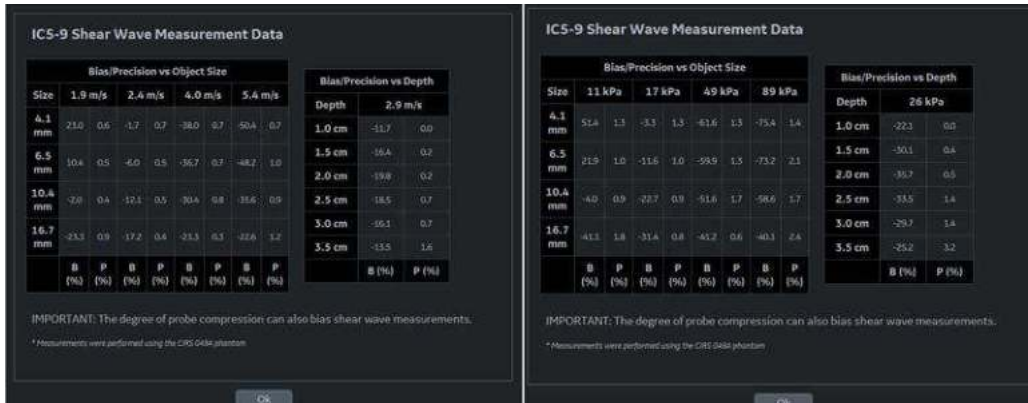


Figure 13-65. IC5-9-D Measurement Bias Information (Velocity on the left and Stiffness on the right)



Figure 13-66. L8-18-D Measurement Bias Information (Velocity on the left and Stiffness on the right)

Measurement Bias Information Tables (continued)

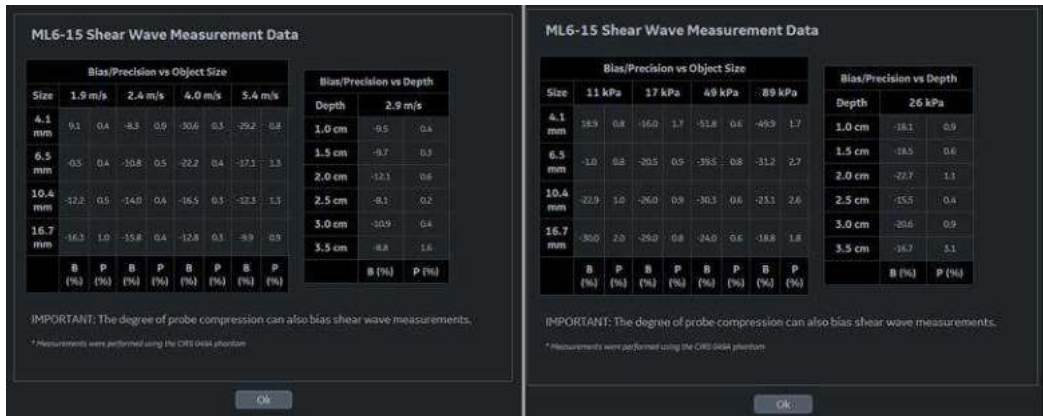


Figure 13-67. ML6-15-D Measurement Bias Information (Velocity on the left and Stiffness on the right)

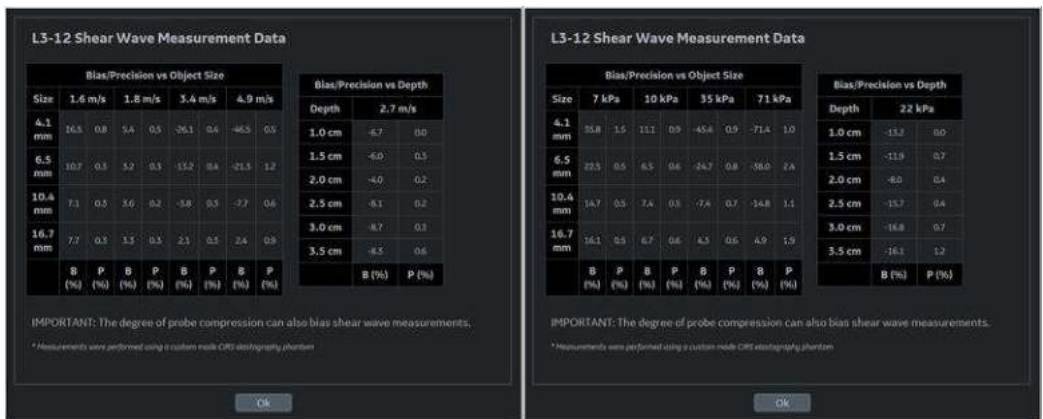


Figure 13-68. L3-12-D/L3-12VN-D Measurement Bias Information (Velocity on the left and Stiffness on the right)

Speed Ranges and Accuracy are shown at the top of the Bias/Precision vs Object Size tables.

Using Shear Wave (SW)

There are three shear wave states:

- Pre-shear wave acquisition
Pre-shear wave acquisition is an intermediate mode between B-Mode and shear wave acquisition. During Pre-mode, the previous B-Mode imaging mode is still active.

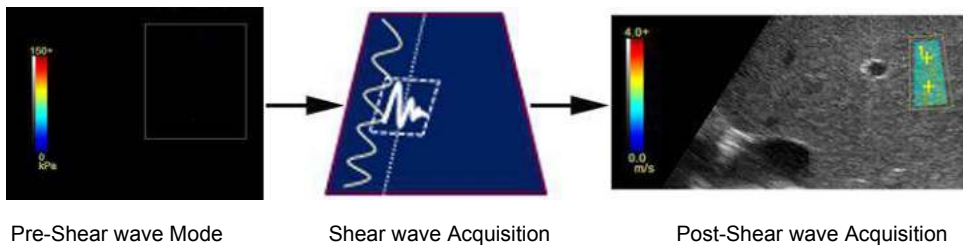
NOTE:

You cannot store images in Pre-Mode.

- Shear wave acquisition
Pressing the "Start" set key initiates SW acquisition.
- Post-shear wave acquisition (Freeze)
The system displays the acquired SW image and background B-Mode image. The User can cycle through the acquired frames, perform measurements, and annotate the image.

SW images can be stored in both raw data and DICOM format.

Table 13-36: Using Shear wave



Typical Exam Protocol (Liver)

A recommended shear wave elastography protocol to scan the liver is,

1. Image the right lobe of the liver intercostally in Pre-shear wave Mode.
2. Position and size the ROI.



HINTS

The smaller the ROI, the faster the Frame Rate.

3. Instruct the patient that during the exam they can mostly breathe normally. However, advise the patient that they will need to suspend their breathing mid breath so that you can obtain an optimum image while performing the scan.
4. Adjust ROI as needed, avoiding vessels and fluid-filled structures. It is advisable to avoid rib shadows whenever possible.
5. Start the shear wave acquisition.
6. Freeze the image when desired frame is obtained.
7. Perform the measurement. The system prompts you through the measurement.
8. The system will auto sequence the measurements and walk you through all of the measurements (Abdominal Application Preset), if preset.

NOTE:

For Breast measurements, users typically take single measurements to measure the lesion once. Or, users can perform a ratio of two different tissues (one of the lesion and non-lesion tissue).

9. Repeat steps 3 through 9 for the remaining samples.
10. Typically, users obtain ten (10) samples.

Typical Exam Protocol (Liver) (continued)

- Once measurements are complete, you can elect to add another site to the exam. To add another site, press **Add Site** on the Touch Panel. Select **Enter Site Name** to add the name for the new site.

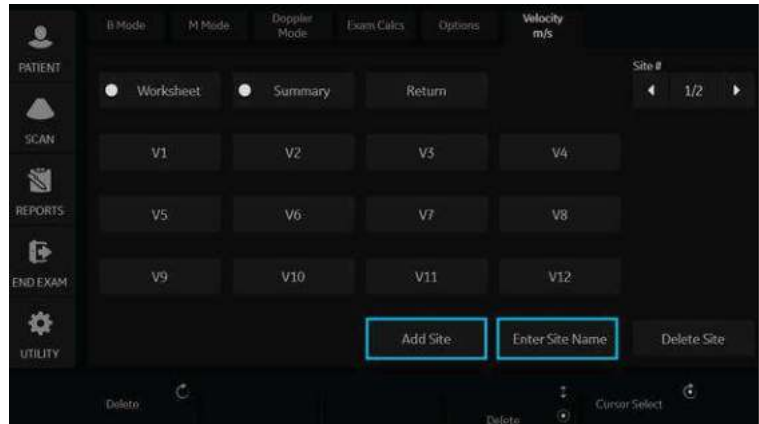


Figure 13-69. Add Additional Shear Wave Site and Enter Site Name

NOTE: *If you no longer need the added site, you can select to delete the site via **Delete Site** on the Touch Panel.*

- Once measurements for all sites are complete, select Summary on the Touch Panel to view saved measurements.



CAUTION

Excessive manual compression of the underlying tissue with the probe can lead to biased shear wave measurements.

Shear Wave Measurements

The higher the velocity, the stiffer the tissue.

Types of Shear Wave Measurements

There are two types of measurement units for quantifying stiffness:

- Velocity (meters per second)
- Stiffness (kiloPascals)

Measurement used to quantify stiffness: Shear wave imaging measures the velocity of shear waves generated by acoustic radiation force impulse in tissue. The velocity, in units of meters per second (m/s), can be converted to Young's Modulus (stiffness), in units of kiloPascals (kPa), under simplifying assumptions. Velocity or stiffness can be used to quantify the local tissue elasticity.

NOTE: *Acoustic radiation force is generated by a transfer of momentum from an acoustic wave to the medium through which it is propagating, caused by absorption and scattering in soft tissue. Impulsive application of focused acoustic beams in tissue can generate shear waves which propagate away from the focal region of the beam.*



CAUTION

Tissue inhomogeneities and other factors may bias shear wave measurements.

Measurement Analysis

To take shear wave measurements, typically users get ten (10) samples.

1. After you have acquired the desired image, avoiding vessels and fluid-filled structures, press Freeze.
2. Press Measure. Select the measurement (Stiffness or Velocity) unless preset to "Shear Units Determine Folder" is turned on.

NOTE: *This step only needs to be done in the Breast Small Parts Application Preset and is not needed in Abdomen.*

Measurement Analysis (continued)

3. Perform the measurement. The system prompts you through the measurement.
 - a. Position the first caliper at the desired location on the ROI. Place the first control point and press Set on the Trackball control.
An ROI ellipse appears and a second caliper.
 - b. Adjust the size of the ROI. Adjust ellipse and place the last control point.

NOTE: This step only needs to be done in the Breast Small Parts Application Preset and is not needed in Abdomen.

4. Repeat the scan and measurement. The system will auto sequence the measurements and walk you through all of the measurements, if preset.
5. Measurements are transferred to the Worksheet.

NOTE: The measurements' Median and Inter-Quartile Range (IQR) are displayed by default in the Measurement Window and Worksheet. The Caliper Area, Depth of Caliper Center, and average Quality Percent within the caliper, and Standard Deviation within the caliper can also be displayed by going to Utility--> Measure, as shown in Figure 13-57 on page 13-132.

Shear Wave Worksheets

There are two types of Worksheets (Overall and Extended).

| Shear Elasto / UGAP (Site1) | | | | |
|-------------------------------|-----------------|----------------|-------------------------------|------------------------|
| Name | Stiffness Site1 | Velocity Site1 | Attenuation Coefficient Site1 | Attenuation Rate Site1 |
| Med | 2.26 kPa | 0.87 m/s | 0.50 dB/cm/MHz | |
| IQR | 0.08 kPa | 0.01 m/s | 0.02 dB/cm/MHz | |
| IQR/Med | 3.4 % | 1.7 % | 3.7 % | |
| N | 6 | 6 | 5 | |
| 1 | 2.34 kPa | 0.88 m/s | 0.49 dB/cm/MHz | |
| 2 | 2.26 kPa | 0.87 m/s | 0.50 dB/cm/MHz | |
| 3 | 1.98 kPa | 0.81 m/s | 0.51 dB/cm/MHz | |
| 4 | 2.24 kPa | 0.86 m/s | 0.51 dB/cm/MHz | |
| 5 | 2.49 kPa | 0.91 m/s | 0.49 dB/cm/MHz | |
| 6 | 2.25 kPa | 0.87 m/s | | |
| 7 | | | | |
| 8 | | | | |

Figure 13-70. Shear Wave Overall Worksheet

| Shear Elasto (Site1) | | | | | | | |
|------------------------|-----------|--------------|----------|-------------|----------------------|---------|---------|
| | Stiffness | Velocity | | | | | |
| Med | 2.26 kPa | 0.87 m/s | | | | | |
| IQR | 0.08 kPa | 0.01 m/s | | | | | |
| IQR/Med | 3.4 % | 1.7 % | | | | | |
| N | 6 | 6 | | | | | |
| | Stiffness | Stiffness SD | Velocity | Velocity SD | Area | Depth | Quality |
| 1 | 2.34 kPa | 0.23 kPa | 0.88 m/s | 0.28 m/s | 0.96 cm ² | 4.86 cm | 3 % |
| 2 | 2.26 kPa | 0.21 kPa | 0.87 m/s | 0.27 m/s | 1.66 cm ² | 4.60 cm | 3 % |
| 3 | 1.98 kPa | 0.12 kPa | 0.81 m/s | 0.20 m/s | 1.03 cm ² | 6.15 cm | 3 % |
| 4 | 2.24 kPa | 0.18 kPa | 0.86 m/s | 0.24 m/s | 2.04 cm ² | 5.82 cm | 3 % |
| 5 | 2.49 kPa | 0.23 kPa | 0.91 m/s | 0.27 m/s | 0.72 cm ² | 4.85 cm | 4 % |
| 6 | 2.25 kPa | 0.25 kPa | 0.87 m/s | 0.29 m/s | 1.47 cm ² | 4.35 cm | 3 % |
| 7 | | | | | | | |
| 8 | | | | | | | |

Figure 13-71. Shear Wave Extended Worksheet

Deleting or Excluding Measurements from the Worksheet

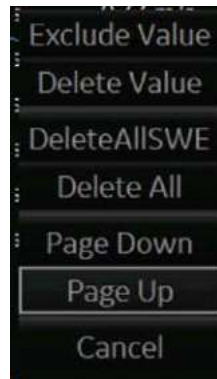
Measurements can be deleted from the Extended Worksheet. Once a measurement has been deleted, it cannot be re-added. Deleted measurements show as a blank.

NOTE: You can also choose to delete all Shear Wave measurements, without deleting non-Shear Wave measurements from the worksheet.

Measurements can also be excluded from the Extended Worksheet -- and added back in at a later time. Excluded measurements show as a blank.

To delete/exclude a measurement,

1. Highlight the measurement you want to delete/exclude.
2. Right click on the Extended Worksheet to bring up the Delete/Excluded pop-up menu.



3. Select the appropriate action.

Deleting or Excluding Measurements from the Worksheet (continued)

In the example below, measurements from line 4 with the blue rectangle have been excluded (and can be added back in); and measurements from line 2 have been deleted (and cannot be added back in).

| ShearElasto (Site1) | | | | | | | |
|-----------------------|-----------|--------------|----------|-------------|----------------------|---------|---------|
| | Stiffness | | Velocity | | | | |
| Med | 2.41 kPa | | 0.90 m/s | | | | |
| IQR | 0.39 kPa | | 0.07 m/s | | | | |
| IQR/Med | 16.3 % | | 8.0 % | | | | |
| Cnt | 3 | | 3 | | | | |
| | Stiffness | Stiffness SD | Velocity | Velocity SD | Area | Depth | Quality |
| 1 | 2.90 kPa | 0.38 kPa | 0.98 m/s | 0.36 m/s | 1.25 cm ² | 4.86 cm | 31 % |
| 2 | | | | | | | |
| 3 | 2.12 kPa | 0.13 kPa | 0.84 m/s | 0.21 m/s | 1.25 cm ² | 3.79 cm | 15 % |
| 4 | | | | | | | |
| 5 | 2.41 kPa | 0.21 kPa | 0.90 m/s | 0.27 m/s | 1.25 cm ² | 5.38 cm | 27 % |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | | | | | | | |

Figure 13-72. Example showing both deleted and excluded measurements

Shear Wave Graph

The Shear Wave Graph displays an average of Shear Wave stiffness and velocity measurements for a patient over a period of time. To see the Shear Wave Graph, select **Worksheet** and then **Graph** on the touch panel.

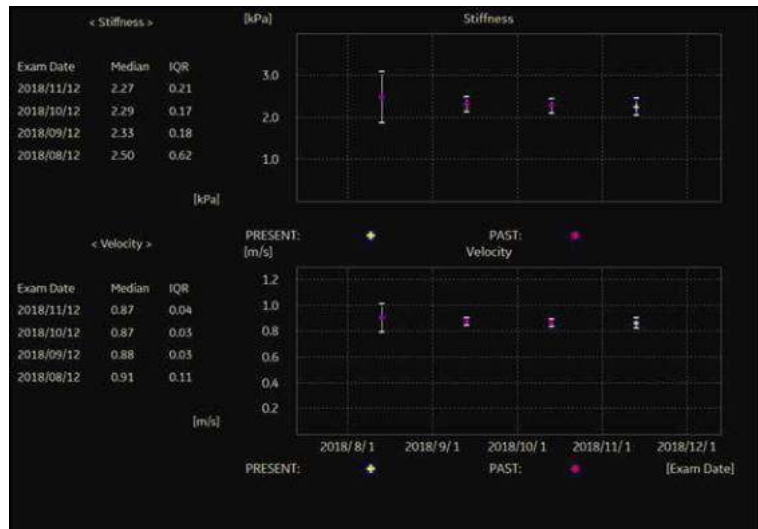


Figure 13-73. Shear Wave Graph

Measurement Information

Shear wave Measurements and Accuracies:

Table 13-37: System Measurements and Accuracies

| Measurement | Units | Useful Range | Accuracy | Limitations or Conditions |
|-------------|-------|----------------|---|---|
| Velocity | m/s | Shear wave ROI | ±10%, or 0.5 m/s, for the 9L-D and ±15%, or 0.5 m/s, for the C1-6-D and C1-6VN-D, whichever is greater over the range of depths for which measurements can be made, limited by shear wave penetration. | SD less than or equal to 5% for multiple repeated measurements over the range of depths for which measurements can be made, limited by shear wave penetration. |
| Stiffness | kPa | Shear wave ROI | ±20%, or 0.75 kPa, for the 9L-D and 30%, or 0.75 kPa, for the C1-6-D and C1-6VN-D, whichever is greater over the range of depths for which measurements can be made, limited by shear wave penetration. | SD less than or equal to 10% for multiple repeated measurements over the range of depths for which measurements can be made, limited by shear wave penetration. |

The formula for Stiffness: $E = 3 * \rho * c^2$

Where E = Young's modulus of tissue

ρ = density of tissue (assumed to be 1 g/cc)

c = shear wave speed in m/s

Note: The conversion from shear wave speed (m/s) to Young's modulus is done under the assumption that the underlying material in which the shear wave propagates is linear, isotropic, incompressible, and homogenous.



CAUTION

The values for shear wave speed and tissue modulus are relative indices intended only for the purpose of comparison with other measurements performed using the LOGIQ Fortis. Absolute values for these measurements may vary among different measurement devices.

Shear Wave Elastography Calculation

An Interquartile Range/Median (IQR/Median) Shear Wave Elastography ratio has been added. You can use this ratio to evaluate the reliability of Shear Wave measurements in the liver. This ratio is displayed as a percentage (%) on the worksheet (Display Accuracy to 1 decimal place). Values <30% are recommended for a reliable Shear Wave Liver exam.

NOTE: The IQR/Median ratio is calculated automatically for both Velocity and Stiffness and displayed by default to the user.

Scanning Hints



HINTS

You may find the following recommendations helpful when performing a Liver shear wave scan:

- Locate right lobe of liver intercostally.
- Place the ROI away from the capsule in an area free of vessels and fluid-filled structures.
- Suspend Patient breathing in mid-breath during the scan
- Position the ROI between 2-5 cm deep for an optimal shear wave scan

You may find the following recommendations helpful when performing a Breast shear wave scan:

- Locate lesion
- Place lesion in center of ROI, including a sufficient amount of the surrounding tissue
- Only compress slightly, if necessary (compression changes the elastic tissue properties).

To increase frame rate:

- Reduce ROI Width
- Turn off Penetration Mode
- Reduce Push Output

To increase penetration:

- Turn on Penetration Mode
- Keep Push and Track Output at 100%
- Place ROI away from edges of image

To reduce artifacts:

- Minimize motion during acquisition
- Ensure there are no vessels within the ROI or near the left or right edge of the ROI. It is advisable to avoid rib shadows whenever possible.
- Keep ROI at least 1cm away from the liver capsule.

Ultrasound-Guided Attenuation Parameter (UGAP) Option

Overview

Ultrasound-Guided Attenuation Parameter (UGAP) measures the attenuation value (i.e. attenuation coefficient [dB/cm/MHz] or attenuation rate [dB/m]) in the liver to evaluate diffuse liver disease. There are three visualizations: B Ref, Color Ref and Color Dual. All visualizations measure a representative attenuation value. Color Ref and Color Dual measure a representative attenuation value in 2D color map and dual display of B-Mode and 2D color map, respectively.

UGAP is available on the C1-6-D, C1-6VN-D, C2-9-D and C2-9VN-D probes in the Abdomen (ABD) application.

Activation

To activate UGAP, select the appropriate probe Abdominal application, then press BT1 (configured as UGAP). UGAP parameters are displayed as “U” (Frequency and Acoustic Output Percent) in Simple Mode. Unit of attenuation coefficient values are displayed as dB/cm/MHz.

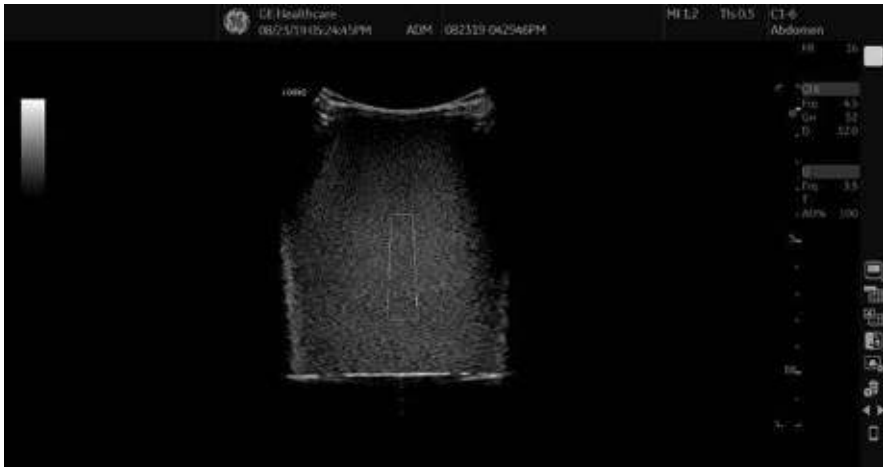


Figure 13-74. UGAP Display

Measurement and Worksheet

Measure the Coefficient Value

1. Scan to get the appropriate view to measure.
2. Press Start (right Set key).

NOTE: *The Measurement ROI can be moved using the Trackball; more than one ROI can be placed in one frame. Avoid structures such as vessels to obtain UGAP measurement.*



Figure 13-75. UGAP Study

Measurements can be performed afterwards using CINE or recalled data where multiple frames can be selected to measure attenuation coefficients.

Add a New Site

Once measurements are complete, you can elect to add another site to the exam. To add another site:

1. Press the **Measurement** button on the console.
2. Select **Add Site** on the Touch Panel.
3. Select **Enter Site Name** to add the name for the new site.

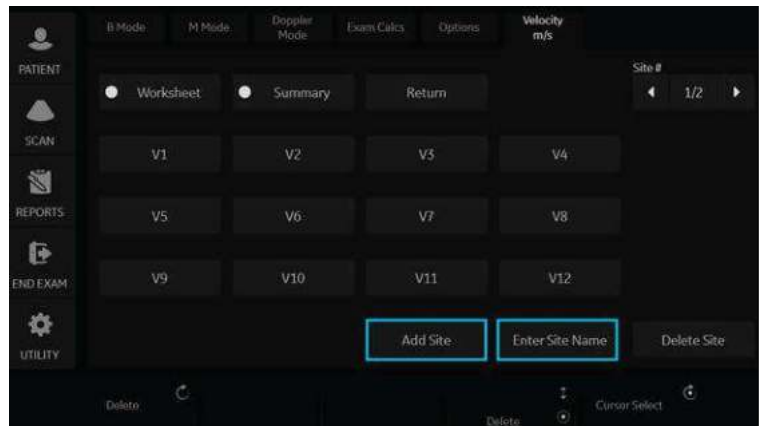


Figure 13-76. Add Additional Shear Wave Site and Enter Site Name

NOTE: *If you no longer need the added site, you can select to delete the site via **Delete Site** on the Touch Panel.*

Summary and Overall Worksheets

Measurements are transferred to the Summary and Overall Worksheets.

| Shear Elasto / UGAP (Site1) | | | | |
|-------------------------------|-----------|----------|-------------------------|------------------|
| | Stiffness | Velocity | Attenuation Coefficient | Attenuation Rate |
| Name | Site1 | Site1 | Site1 | Site1 |
| Med | 2.26 kPa | 0.87 m/s | 0.50 dB/cm/MHz | |
| IQR | 0.08 kPa | 0.01 m/s | 0.02 dB/cm/MHz | |
| IQR/Med | 3.4 % | 1.7 % | 3.7 % | |
| N | 6 | 6 | 5 | |
| | | | | |
| 1 | 2.34 kPa | 0.88 m/s | 0.49 dB/cm/MHz | |
| 2 | 2.26 kPa | 0.87 m/s | 0.50 dB/cm/MHz | |
| 3 | 1.98 kPa | 0.81 m/s | 0.51 dB/cm/MHz | |
| 4 | 2.24 kPa | 0.86 m/s | 0.51 dB/cm/MHz | |
| 5 | 2.49 kPa | 0.91 m/s | 0.49 dB/cm/MHz | |
| 6 | 2.25 kPa | 0.87 m/s | | |
| 7 | | | | |
| 8 | | | | |

Figure 13-77. UGAP Summary Worksheet

| Parameter | Value | m1 | m2 | m3 | m4 | m5 | m6 | Method |
|-----------------------|------------|------|----|----|----|----|----|--------|
| B Mode Measurements | | | | | | | | |
| Attenuation,dB/cm/MHz | | | | | | | | |
| C1 | 0.91 dB/cm | 0.91 | | | | | | Last |
| C2 | 0.85 dB/cm | 0.85 | | | | | | Last |
| C3 | 0.87 dB/cm | 0.87 | | | | | | Last |
| C Median | 0.87 dB/cm | 0.87 | | | | | | |
| C IQR | 0.03 dB/cm | 0.03 | | | | | | |
| C IQR/Median | 3.2 % | 3.2 | | | | | | |
| N | 3 | 3 | | | | | | |

Figure 13-78. UGAP Overall Worksheet

Attenuation Coefficients are displayed (C1, C2, C3), Median, IQR, IQR/Median, and number of measurements (N).

2D Color Map

2D color map is available on Color Ref, B/Color Dual and Qual./ Att. Dual. There are two 2D color maps: Attenuation Map and Quality Map. Attenuation Map provides the distribution of attenuation values. Quality Map provides the distribution of the signal quality to support ROI placement.

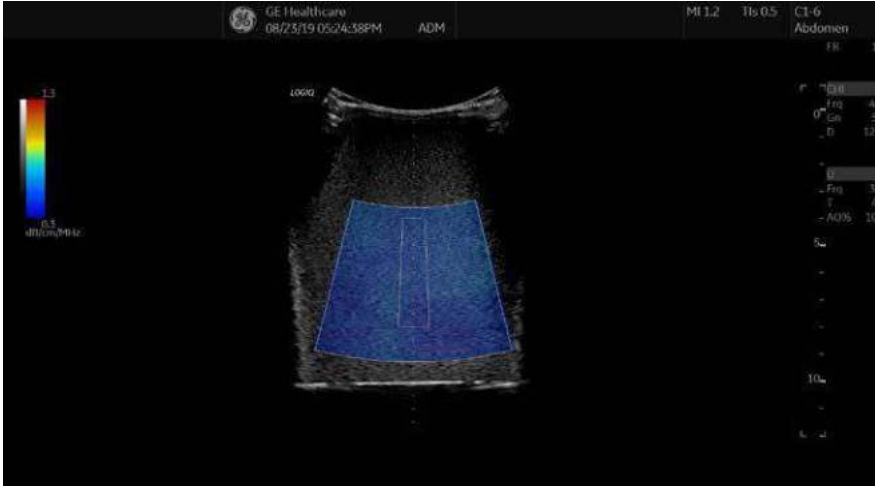


Figure 13-79. Attenuation Map

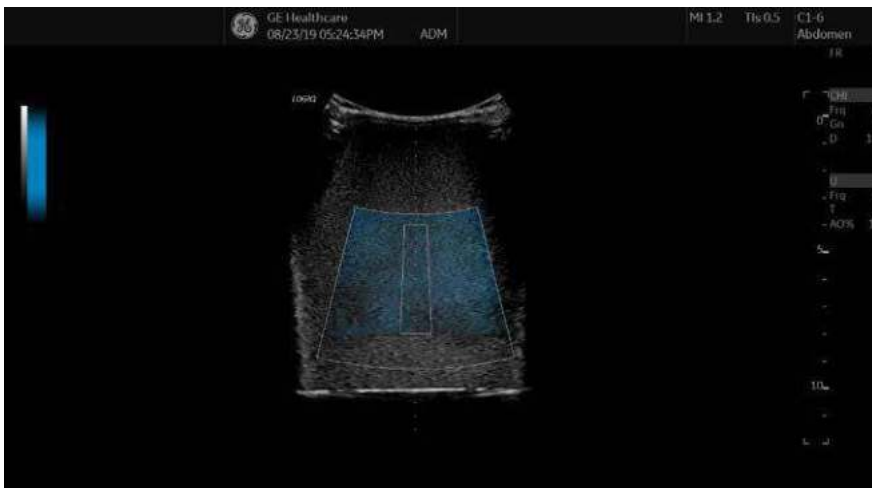


Figure 13-80. Quality Map

Continuous Wave Doppler (CWD)

Overview

There are two CW Doppler operating modes: Steerable and Non-Imaging.

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.

Non-Imaging

Provides only Doppler Spectrum and Audio for ascending/ descending aortic arch, other hard-to-get-to spaces or higher velocities.

Activating CW Doppler

To activate CW Doppler Mode, press **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.

Update toggles between real time B-Mode with Doppler Mode and real time spectral display.

Exiting CW Doppler

To exit CW Doppler Mode, press **CW**.

Tissue Velocity Imaging (TVI)

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 Cardiac Sector and TEE probes only.

Activating TVI

1. Select the desired probe.
2. While in B-Mode, press the **TVI** key located above the PDI control on the Touch Panel. The TVI image and Touch Panel display.

NOTE: *To set up TVI on the Imaging Preset page, go to Utility--> Imaging--> TVI.*

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.

TVI and TVD

TVI

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.

Table 13-38: TVI Parameters

| Control | Details |
|--|---|
| Visible Description Adjusting Values | In LIVE/Freeze/Archive, you can display TVI Color with TVI. Select Visible on the Touch Panel. On or Off. |
| Invert | Color Invert |
| Baseline | Adjusts the Baseline. |
| Angle Steer | Steers the angle |
| Line Density | Optimizes B-Mode frame rate or spatial resolution for the best possible image. |
| Map | Values: TV1 and TV2. |
| Frame Average | Averages color frames. |
| Threshold | High values display more color. Low values limit the color to lower tissue echo (Opposite of Threshold in Color Flow Mode). |
| Transparency Map | Values 0-5. |
| Spatial Filter | Values 0 and 1. |
| Duplex | Allows two modes to be active at the same time. |
| 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

While in TVI, press **PW** to activate Tissue Velocity Doppler.

You can preset all parameters in Utility -> Imaging ->TVD.

Quantitative Analysis (QAnalysis)

Overview

Quantitative Analysis is available for the following CINE loops obtained in the following modes: Tissue Velocity Imaging, Color Flow Mode, and Power Doppler Mode. All of the Quantitative Analysis modes operate similarly, with some variation.

The Touch Panel may be slightly different, for example; and the type of information you quantify varies by mode as well. Please see a summary of each mode below; followed by general instructions on how to perform Quantitative Analysis.

Quantitative Flow Analysis

Provide tools for semi-quantitative assessment of inflammation in joints and vascularization in tumors.

NOTE: There is frame number limitation for color quantification as 400 frames.

Statistics

The LOGIQ Fortis extracts various statistics from the image data within each sample area. The statistics depends on the imaging mode in use.

Press **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 pixels over total sample area area.
- Area (mm²): The size of sample area
- Max Ratio/Time of Max Ratio: Maximum Ratio of Color (Power) Doppler pixels in each sample area, and which frame that occurs in.
- Min Ratio/Time of Min Ratio: Minimum Ratio of Color (Power) Doppler pixels in each sample area, and which frame that occurs in.

Quantification supports two different statistical display formats: Short Form and Long Form.

Statistics (continued)

- Short Form: Ratio and Area.



Figure 13-81. Color Flow Mode Short Form - Example

- Long Form: Ratio, Area, Max Ratio/Time of Max Ratio, Min Ratio/Time of Min Ratio



Figure 13-82. Color Flow Mode Long Form - Example

QAnalysis - Tissue Velocity Imaging

Multiple Time -Motion trace display from selected points in the myocardium.

QAnalysis Screen Description



Figure 13-83. Q-Analysis Screen

Table 13-39: 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. <ul style="list-style-type: none"> • Y axis: Velocity scale (cm/s) • X axis: Time(s) • ECG • 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. <ul style="list-style-type: none"> • Pencil Icon: Creates a sample area based on freehand drawing. • Shape Icon: Creates a sample area with a pre-defined circular/ellipse shape. |

QAnalysis Plot Control

The following controls are user configurable presets which are configurable through the pull-down menu in QAnalysis mode. When using the pull-down menu:

1. Place the cursor over the analysis window and press the left **Set** key. The system menu displays at the cursor position.
2. Select the appropriate parameter.

To switch trace (Analysis signal)

Analysis Signal toggles the trace display between velocity, displacement or gray scale intensity curves.

1. Position the cursor over the plot window and select Analysis Signal from the pull-down menu.
2. Select **Velocity**, **Displacement** or **Grayscale Intensity** as necessary.

Vertical Unit

NOTE: *Vertical Unit is only available when Grayscale intensity is selected in Analysis Signal.*

When analyzing the data, the Y-axis can be set to display either logarithmic scale (dB) or linear, acoustic units (AU).

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 Qanalysis.

Drift Compensation

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.*

NOTE: *Drift Compensation is inactive if ECG data cannot be acquired.*

Trace Measurements

Gradient

Select Gradient entry on the pull-down menu that is obtained when the cursor is placed over the plot.

Gradient is displayed on the screen instead of velocity. The gradient calculates from 7 points (includes previous and next frames).

Max Gradient

Displays the time and gradient that becomes the maximum gradient between the CINE start and end frame.

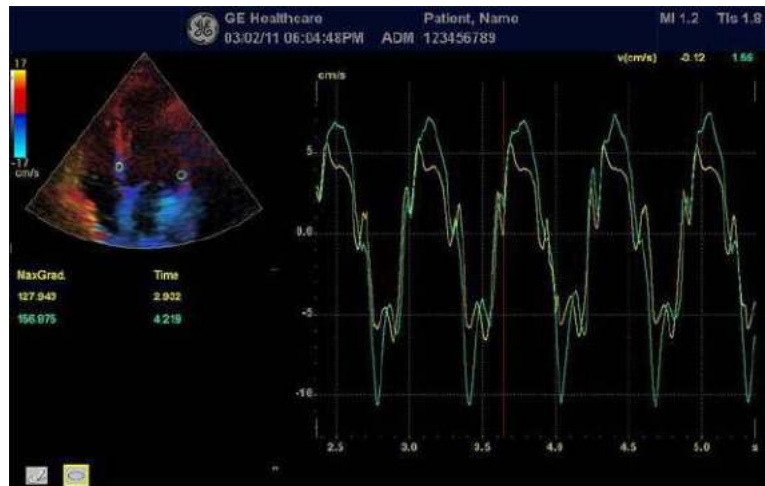


Figure 13-84. Max Gradient

Selecting QAnalysis Image Range

A range of frames is selected for the QAnalysis in Cine mode (before accessing QAnalysis). Only the frames in this range are used for the QAnalysis.

If a range is not selected prior to accessing the QAnalysis, the system uses the default Cine start and end frames as the default start and stop frames.

1. The first frame in the analysis series is selected by adjusting the **Start Frame** control to the desired frame
OR
using the **Trackball** or the **Frame by Frame** control to select the desired first frame and then selecting the **Start Frame** control.
2. The last frame in the analysis series is selected by adjusting the CINE **End Frame** control to the desired frame
OR
using the **Trackball** or the **Frame by Frame** control to select the desired end frame and then selecting the **End Frame** control.

Activating QAnalysis

1. Scan and Freeze the patient in the desired live mode or recall a desired cine loop from the stored images.

NOTE: QAnalysis is only available when the system is in CINE mode.

NOTE: Images from the current scan session acquired in the desired analysis mode (already in CINE) or from a saved image loop can be used for QAnalysis.

2. **QAnalysis** displays on the Cine Touch Panel.
3. Select **QAnalysis**. The QAnalysis screen and Touch Panel displays. To toggle the trackball function between QA and Scroll, press the top **Trackball** key.

Common QAnalysis Function

Display the System Menu

Place the cursor to the desired position and press the left **Set** key. The system menu displays at the cursor position.

The system menu is dependent on the area which you place the cursor.

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 cinelooop.

Trace from a pre-defined sample area

1. If the trackball assignment is not on QA, press the top **Trackball** key until QA highlights.
2. If necessary, select the sample area Ellipse sample area button (shape icon on the monitor display).
3. Move the cursor to one of the Cinelooop windows using the **Trackball**.
4. Press **Set** to anchor the sample area.

In this frame, the sample area is marked with an anchor. If the cinelooop 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 sample area button (pencil icon on the monitor display).
2. Move the cursor to one of the Cineloop windows using the **Trackball**.
3. Press and hold down the **Set** key while drawing a sample area using the **Trackball**.
4. Release the **Set** key.

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)

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 the top **Trackball** key until the QA trackball assignment is selected.
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.

7. Press the top **Trackball** key until the scroll trackball assignment is selected.
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.

Generating a Trace (continued)

Moving a dynamic anchored sample area

1. Press the top **Trackball** key until the scroll trackball assignment is selected.
2. 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.

3. Press the top **Trackball** key until the QA trackball assignment is selected.
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 a new location.
7. 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.

Manipulating the Sample Area

Up to eight sample areas can be saved on the reference image, with the corresponding eight traces plotted simultaneously on the graph. Each sample area display has a different color, and its corresponding trace data is plotted using that same color.

Once eight sample areas have been saved, the system does not automatically generate an active sample area when the cursor is positioned over the displayed reference image.

The saved sample areas can be a mixture of elliptical and freehand sample areas.

When the user repositions a sample area, the old trace data is erased from the plot and the trace data for the new position replotted.

If the sample area position on the last frame of the selected image range is moved, the corresponding sample areas on all frames are repositioned to match the last frame.

The user shall also have the capability of setting separate sample area positions on different frames of the contrast images, and the system shall linearly interpolate the sample area positions for the frames in between the selected frames.

Setting the default sample area shape

1. Select **Set sample area shape**. The Information Box displays.

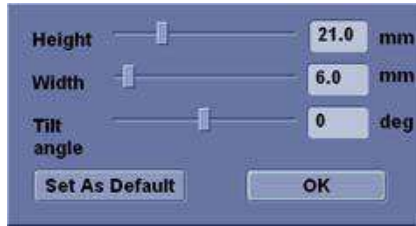


Figure 13-85. Sample Area Information Box

2. Select Height, Width and Tilt angle.
3. Select **Set as default**. The current sample area size is set as the default for subsequent Ellipse sample areas.

Sample Area Shapes

There are two different methods for determining the shapes of the sample area.

Ellipse sample area

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 sample area is automatically generated and displays on the reference image(s).
3. The average velocity 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 sample area, 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 sample area, press **Set** to fix the sample area position and freeze its corresponding trace on the plot. A new active sample area is generated whose position is manipulated by the trackball and whose velocity curve traces will be plotted as before, while the previous sample area and trace remain fixed at the points they were saved at.

NOTE: Elliptical sample areas can be positioned in any manner that keeps their center within the image boundaries. In the case that part of the sample area is outside the image boundary, only data from within the image boundary is used for calculating the mean velocity value.

NOTE: You can change the size of the Ellipse sample area by adjusting the Ellipse control.

Freehand sample area

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. While holding down the **Set** key, trace the outline of the desired sample area by moving the caliper with the **Trackball**.

Reshaping a Sample Area

To reshape the sample area:

1. Position the cursor on the sample area to reshape and press the left **Set** key.
2. The sample area system menu displays. Select **Set sample area shape**.

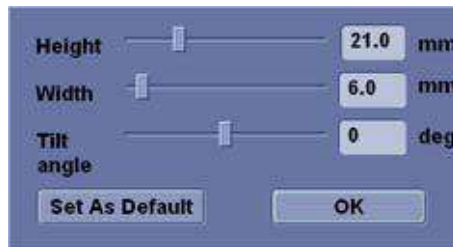


Figure 13-86. Sample Area Information Box

3. Adjust Height, Width and Tilt angle.
4. Press **OK**. The selected sample area 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 sample area to label and press the left **Set** key.
2. The sample area system menu displays. Select **Label sample area**. The Label Dialog box displays.



Figure 13-87. Label Dialog Box

3. Enter a name for the sample area.
4. Select **OK**.

Copy, move, and paste a Sample Area

To copy and paste the sample area,

1. Move the cursor over the sample area and press the left Set key. The system menu displays.
2. Select **Copy sample area**.
3. Move the cursor to the desired location for the copied sample area and press the left Set Key. The system menu displays.
4. Select **Paste sample area**.

To copy and move the sample area,

1. Move the cursor over the sample area and press the left Set key. The system menu displays.
2. Select **Copy & move**. Or if you want to move to the same depth as the original sample area, select **Copy & move (same depth)**.
3. Move the copied sample area using the **Trackball**. Press **Set** to fix the position.

Deleting a Sample Area

Sample sample areas and their corresponding traces can be deleted using **Delete Sample Area**.

1. Select **Delete Sample Area**; a pull-down menu displays.



Figure 13-88. Delete Sample Area pull-down menu

2. Select **Current sample** to delete the currently active sample area.

Select **Delete all** to delete all currently set sample areas and all of their traces.

NOTE: *The corresponding traces for the deleted sample areas are erased from the plot.*

NOTE: *Deleting a sample area causes the sample areas to be deleted from all frames in the analysis loop.*

QAnalysis Plot Control

NOTE: Plot Control is available only with TVI and Elastography modes.

The following controls are user configurable presets which are configurable through the pull-down menu in QAnalysis mode. When using the pull-down menu:

1. Place the cursor over the analysis window and press the left **Set** key. The system menu displays at the cursor position.
2. Select the appropriate parameter.

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 sample area 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) sample area 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.

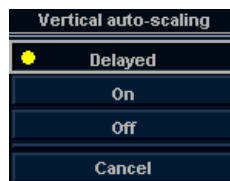


Figure 13-89. Vertical Autoscale Pop-up menu

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.

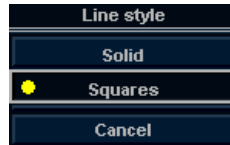


Figure 13-90. Line style Pop-up menu

Smoothing

The system can smooth the traces displayed by applying a filter over a defined time window. The type of filter available is depending on the analysis signal displayed.

1. Select **Smoothing**.

OR

Position the cursor over the analysis window and press the left **Set key**. 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 analysis curve.

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.

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 left **Set** key in the Analysis window. The system menu displays.
2. Select **Unzoom**.

Disabling/Enabling the frame

NOTE: Frame disable/enable is available only with Elastography, CF, and PDI modes.

Frame disabling excludes the actual frame from the cine loop display.

Disabling the frame from the frame marker

To disable One Frame:

1. Use the **Trackball** to move the cursor to the frame marker to disable.
2. Press **Set** to disable the 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 marker to disable.
2. Press and hold down **Set**
3. Move the cursor with the Trackball to the last frame to be disabled and release Set.

The marker is turn red and the data from that frame is removed from the trace and any subsequent trace processing.

Disabling a frame from the cineloop window

1. Use the trackball to move the cursor to the cineloop window.
2. Press the left **Set** key. The system menu displays.
3. Select **Disable frame**.

The current frame is disabled and the corresponding frame marker displays red.

Disabling Frames - Auto

When the user enters Elasto Quantification, the useless frames are disabled automatically. The LOGIQ Fortis uses Elastography Index value to find useless frame (low quality frames).

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 left **Set** key. 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 left **Set** key. The system menu is displayed at the cursor position.
2. Select **Enable all frames**.
3. All disabled frames are re-enabled.

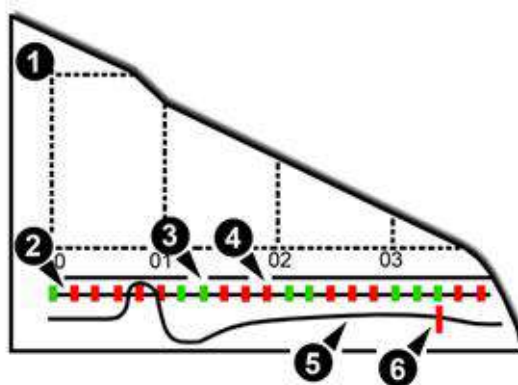


Figure 13-91. Frame Markers

1. Analysis Window
2. Frame markers axis
3. Enabled frame (Green)
4. Disabled frame (Red)
5. ECG (where available)
6. Current frame

Exporting Traces (Saving the Trace Data)

You can save the trace data to an external file in ASCII format, readable in spreadsheet programs.

1. Select **Export Traces** to save the trace data.
2. Specify the following:
 - 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 sample area traces are saved in the exported file.

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.

Printing QAnalysis Data

Press the appropriate print key in the desired analysis mode mode.

The system captures a single still frame which consists of the plot, the reference image, and user annotation.

Exiting QAnalysis

There are several methods to exit QAnalysis.

- Toggling **Exit QAnalysis** on the QATouch Panel.
- Press **Freeze** to unfreeze and resume scanning.
- Press any other button that returns the system to real-time scanning.

Stress Echo

Introduction

The LOGIQ Fortis 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, press the **Protocol** tab on the Touch Panel. The protocol screen displays the layout of the default stress protocol for the current probe. This layout is also known as a template.

Table 13-40: 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 13-92. Template List

3. **Trackball** to the desired template and press **Set**.

Getting started with a stress study (continued)

- The selected template displays.



Figure 13-93. Template (Example)

- Level
 - Projection
 - Current Acquisition (green)
- 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

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 the **P1** (Image Store) 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 the **Protocol** tab is selected during acquisition, the following Touch Panel displays.

Table 13-41: Protocol Tab 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** 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. Press **Begin/Cont.** to initiate scanning.
3. 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 images and loops acquired during the session in a storage buffer in system memory. 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.



Leaving a Stress Echo exam **PRIOR TO** saving portions of the Continuous Capture through “select cycle” or triggering a “Store All” could result in the loss of Continuous Capture data.

The continuous capture acquisition obtained using the P1 print key while in protocol is stored in temporary memory. Loss of power before properly ending the patient or before selecting cycles will result in the loss of this information in certain configurations.

Upon completion of cycle selection or when ending current patient, the user will be prompted as to what they would like to do with this temporary buffer. If they choose "store all," the information will then be placed in permanent memory on the system's hard drive.



DO NOT change modes or power off the system while in Continuous Capture Mode. Doing so causes images and data acquired during the session to be lost.

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 temporary images and loops to system memory 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

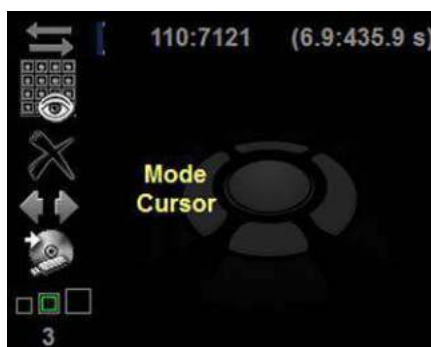


Figure 13-94. Buffer Bar

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 **Protocol** tab to enter the Stress Echo mode. 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.

Refer to the next section if additional image acquisitions are necessary after the buffer is full.



Figure 13-95. Continuous Capture Selection Screen

Activating Continuous Capture (continued)

12. Assign the cine loops to the four views.

1. **Trackball** to the desired loop.
2. Press **Set**. A drop-down menu appears with the available choices.
3. **Trackball** to the appropriate view.
4. Press **Set**.
5. 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.

6. Select **Done** when complete. A dialogue window displays, asking whether the entire Continuous Capture acquisition should be saved.

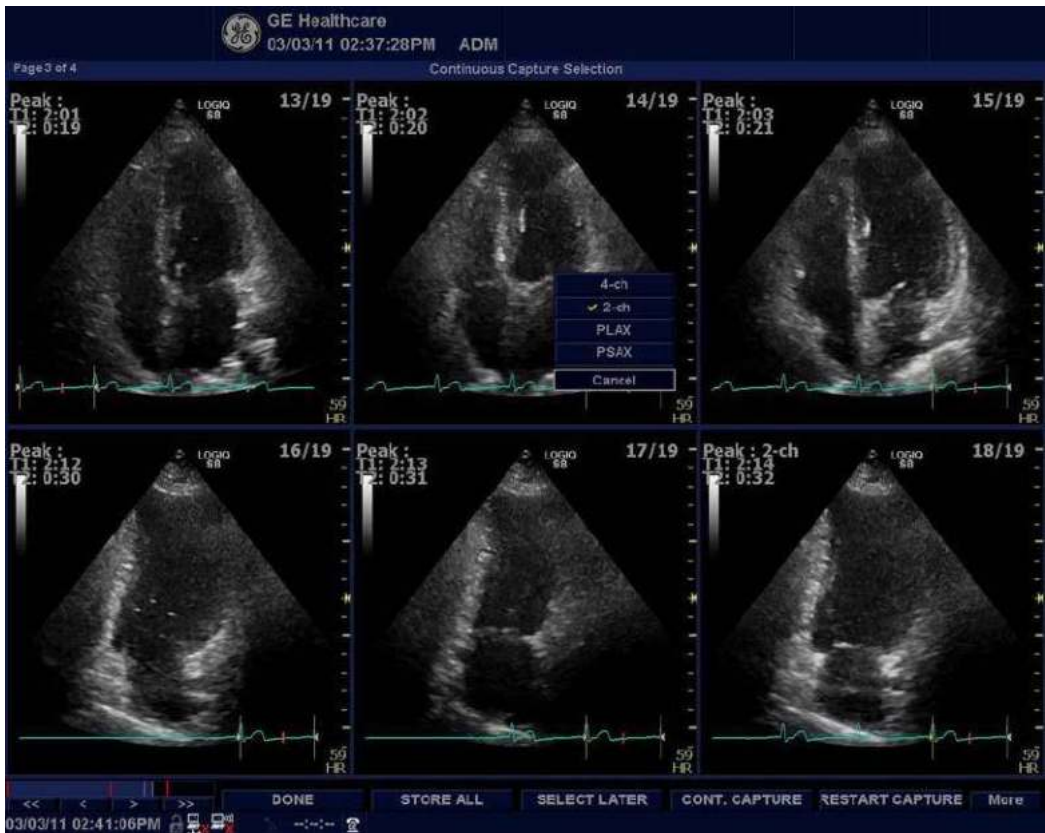


Figure 13-96. Drop-down Menu

Activating Continuous Capture (continued)

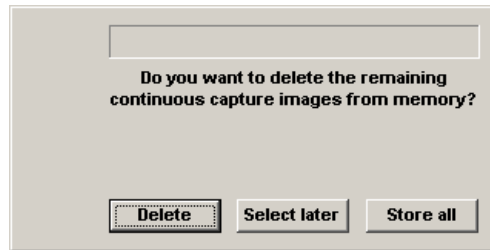


Figure 13-97. Dialogue Window

13. Press **Delete** to discard the loop or press **Store** 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 13-196 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 **Protocol**. 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 13-196 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 13-196 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 **Protocol**. 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 13-196 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).

Assigning 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.

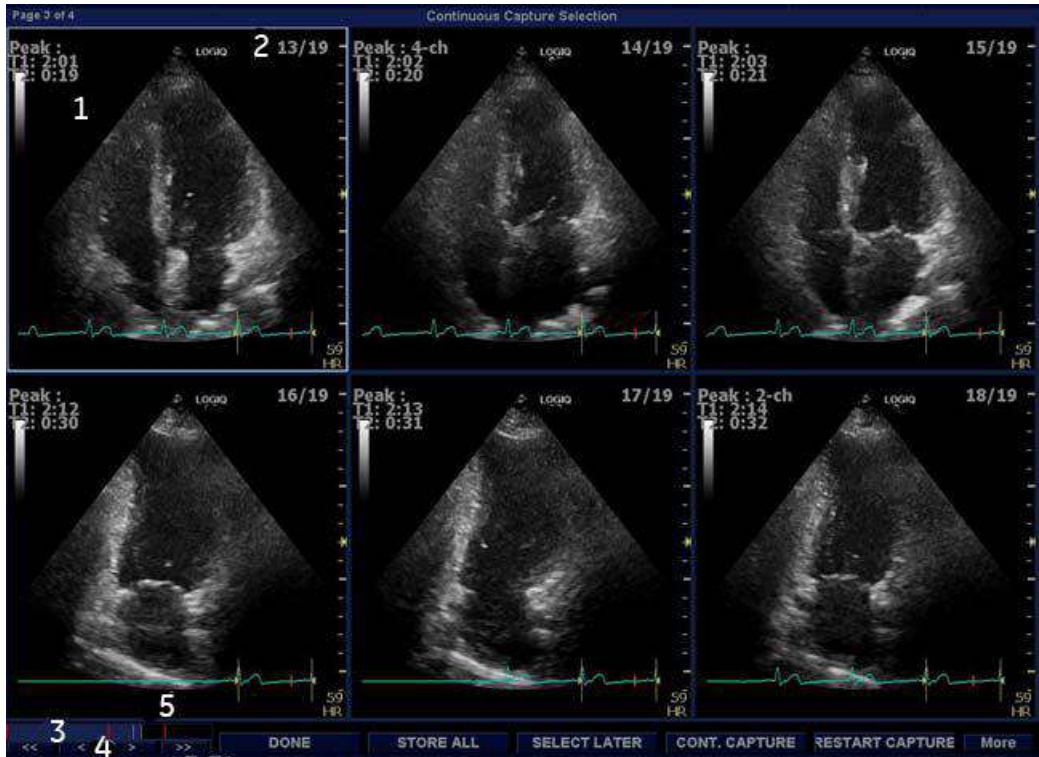


Figure 13-98. Continuous Capture Selection Screen

1. Highlighted loop
2. Cycle number and total number of cycles
3. Blue Gauge: Position of the highlighted loop within buffer area.
4. Red bar: Pause session.
5. 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.

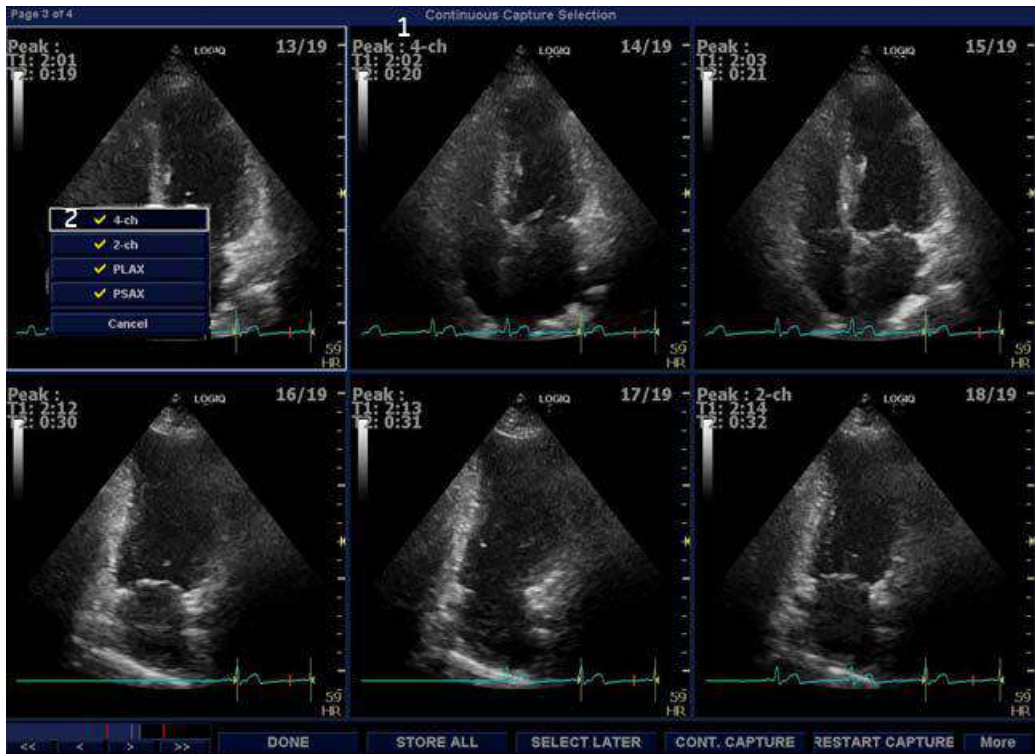


Figure 13-99. Loop Assignment

1. Already assigned view
2. 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 **Protocol**. A preview of the acquisition displays.
2. Press **Analysis**. 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 E in Figure 13-100.

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 **Protocol**. 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.

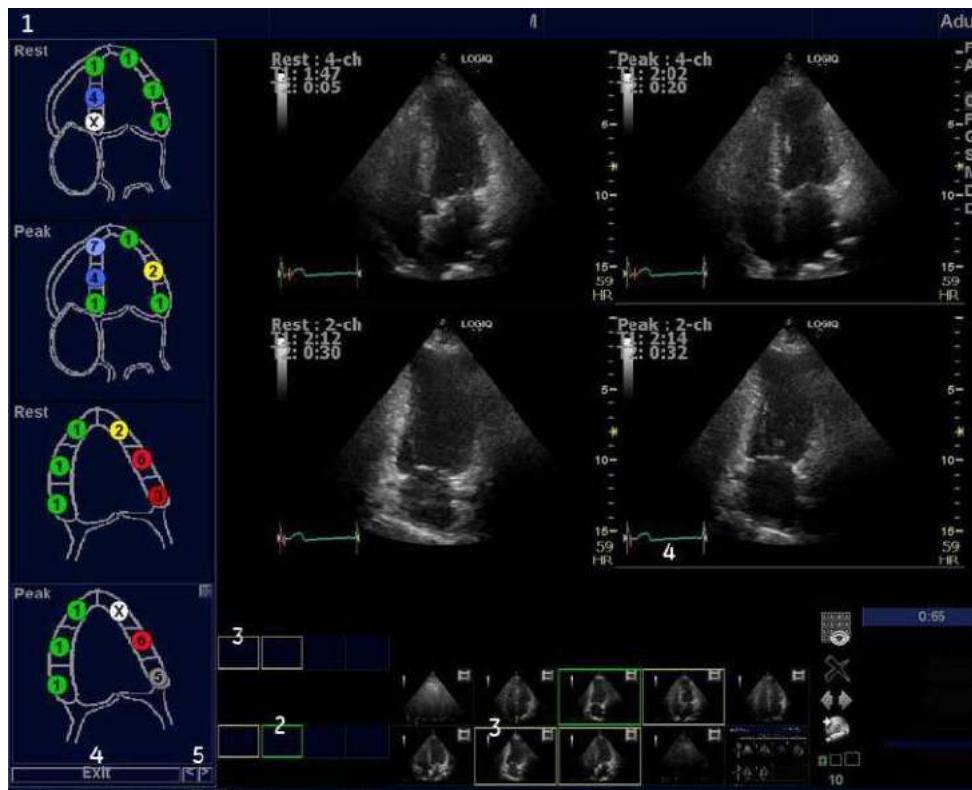


Figure 13-100. Analysis Screen

1. Wall segment diagram
2. Selected loop (Highlighted frame)
3. Displayed loops (Highlighted frames)
4. Exit Wall motion scoring
5. Change page or enter next image group

Scoring acquired loops (continued)

2. Use the **Trackball** to move the cursor to a score.
3. 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.*

4. Repeat step 1 through 3 to score relevant segments.
5. Press the **Change Page** arrow to display the next group of images.
6. Repeat step 1 through 3 to score relevant segments on the new loops.

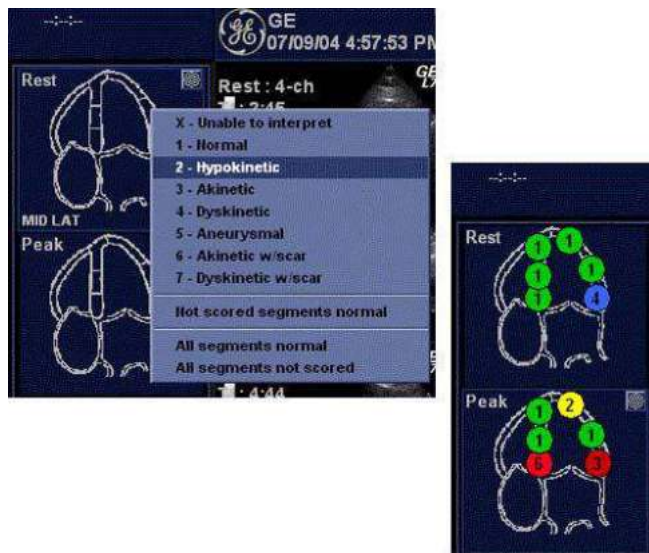


Figure 13-101. Segment Scoring

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 **Protocol** to enter the stress echo mode.
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 **Protocol** to enter the stress echo mode.
2. Press **Template Editor** on the Touch Panel. The Template Editor screen displays.

Template Editor screen overview

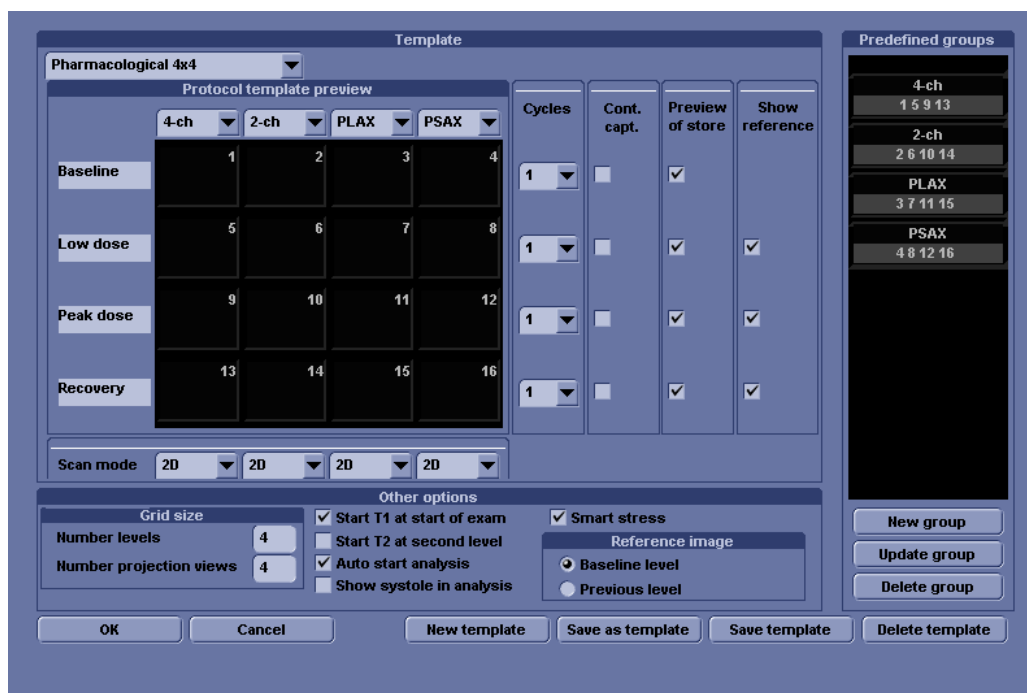


Figure 13-102. Template Editor Screen

Table 13-42: Template

| Parameter | Description |
|-----------|---|
| Template | Select a pre-defined template from the pull-down menu. The protocol template preview updates accordingly. |

Table 13-43: Protocol Template Preview

| Parameter | Description |
|---------------------------|---|
| Protocol Template Preview | <ul style="list-style-type: none"> 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 13-44: Template Settings

| Parameter | Description |
|-------------------|--|
| Template Settings | <ul style="list-style-type: none"> • 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 13-45: Scan Mode

| Parameter | Description |
|------------|--|
| Scan Modes | <ul style="list-style-type: none"> • 2D, Color, PW (Pulsed Wave Doppler), CW (Continuous Wave Doppler), MM (M-Mode), Color MM, Color PW, Color CW |

Table 13-46: Other options

| Parameter | Description |
|---------------|---|
| Other Options | <ul style="list-style-type: none"> • 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 and automatically reuse a subset of the image acquisition settings from a previous level in the corresponding views in the next level. When smart stress is used with "preview to store" function the timeline modes (PW, CW, M Mode, TDI) will only transfer image acquisition settings from baseline. • 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 13-47: Pre-defined groups

| Parameter | Description |
|--------------------|--|
| Pre-defined groups | <ul style="list-style-type: none"> • 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. |

Editing/Creating a template

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 Touch Panel 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 from a previous level in the corresponding views in the next level. When smart stress is used with "preview to store" function the timeline modes (PW, CW, M Mode, TDI) will only transfer image acquisition settings from baseline.

Editing/Creating a template (continued)

Configuring levels

The following options can be set up for each level:

Number of cycles to be stored in the cine loop:

1. Enter the desired number (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20) 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).

Editing/Creating a template (continued)

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: A selected group is highlighted by a blue 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 blue 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.

Editing/Creating a template (continued)

Saving the Template

You can save the template using controls at the bottom of the Template Editor page, or use the controls on the Touch Panel.

Table 13-48: 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).

Table 13-49: 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

Table 13-50: Protocol Parameters

| Parameter | Description |
|-------------------|--|
| Show Protocol Tab | Show/Hide the Protocol tab for that preset (Bicycle Normal, Bicycle Sporty, Contrast Pharmacological, Pharmacological 4x4, Pharmacological 8x5, Exercise 2x4, Exercise 2x4 B, Pharmacological US 4x4, or User-configured). |
| 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 13-103. Bull's Eye Report Sample

Report (continued)

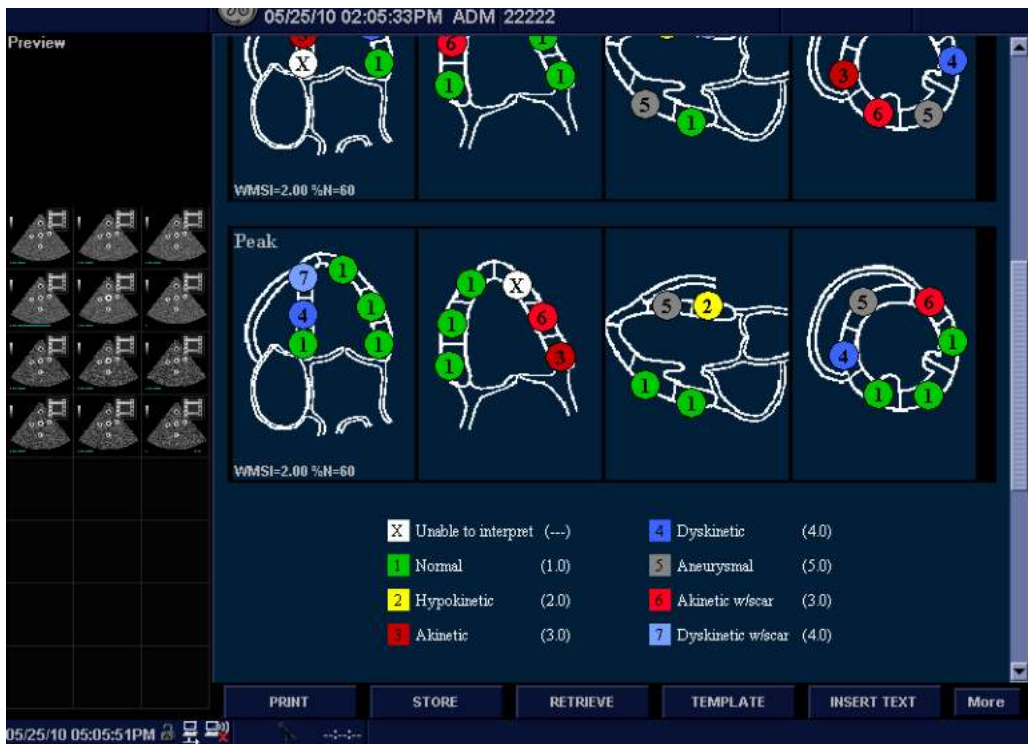
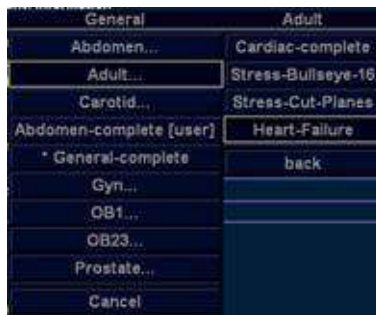


Figure 13-104. Cut Planes Report Example



HINTS

Select either Bull's Eye or Cut Plane on the Reports--> Adult Template.



Cardiac Automated Functional Imaging (Cardiac Strain)

Cardiac Strain

Cardiac Automated Functional Imaging (Cardiac Strain) is a decision support tool for regional assessment of the LV systolic function. Cardiac Strain is a tool derived from 2D Strain, which calculates the myocardial tissue deformation based on feature tracking on B-Mode grey scale loops.

Cardiac Strain is performed on apical views in the following order: apical long-axis, 4-chamber and 2-chamber view, following an on screen guided workflow. The apical views may be acquired sequentially in B-Mode.

Cardiac Strain is also available for standard apical views acquired with a TEE probe.

The result is presented as a Bull's eye display showing color coded and numerical values for peak systolic longitudinal strain.

All values are stored to the worksheet. In addition, Global Strain for each view, Average Global Strain for the whole LV and the Aortic Valve Closure time used in the analysis are stored to the worksheet.

Table 13-51: Cardiac Strain Workflow

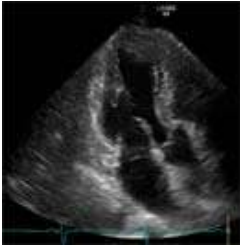
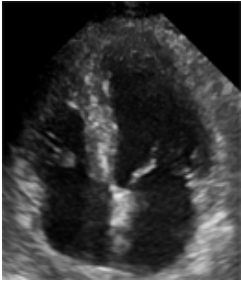
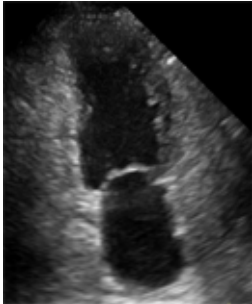
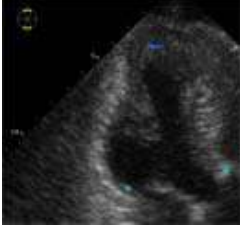
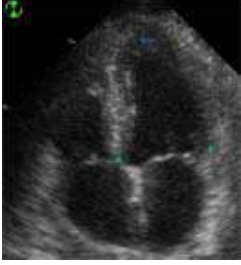
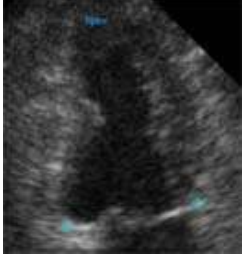

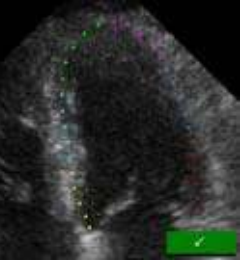
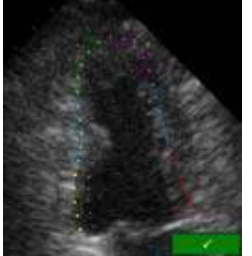


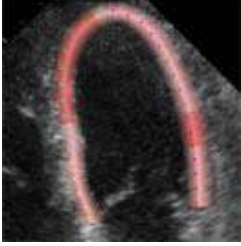
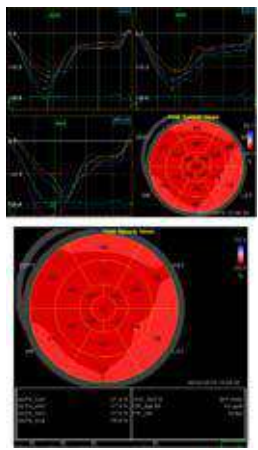
| | 1 | 2 | 3 | Step |
|---|---|---|---|-------------------------|
| | APLAX | 4-CH | 2-CH | |
| 1 |  |  |  | Acquired views |
| 2 |  |  |  | Defining a ROI |
| 3 |  |  |  | Tracking Validation |
| 4 |  | - | - | AVC Timing Adjustment |
| 5 |  |  | - | Parametric image result |

Table 13-51: Cardiac Strain Workflow (Continued)

| | 1 | 2 | 3 | Step |
|---|-------|------|---|-----------------------------|
| | APLAX | 4-CH | 2-CH | |
| 6 | - | - |  <p>The image displays two sets of cardiac strain analysis results. The top set shows four strain traces (red, green, blue, and black) plotted against time, with a corresponding bull's eye plot to the right. The bottom set shows a single large bull's eye plot. Both plots use a color scale from red (low strain) to blue (high strain) to represent strain distribution across the myocardium.</p> | Trace and Bull's eye result |

Acquisition



CAUTION

Cardiac Strain is only recommended for adult cardiac images acquired with the M5Sc-D and 6Tc-RS.

1. Specify Cardiac Strain-specific values for certain parameters in M&A Advanced Preset if needed.
 - Cardiac Strain/AutoEF auto processing
 - Cardiac Strain/AutoEF ROI method
 - Cardiac Strain/AutoEF YOYO
 - Cardiac Strain Default Color Palette
 - Cardiac Strain segment model
 - Cardiac Strain PSS/PSI Mode
2. Create an exam, connect the ECG device and make sure to obtain a stable ECG trace.
3. Select **CARD** -> **Adult** from the Application Preset menus. Acquire a sequential acquisition.

Acquire B-Mode gray scale cine-loops of an Apical long axis (APLAX) view.

NOTE:

It is recommended to acquire all three apical views sequentially in order to get similar heart rate in all views.

- The frame rate should be between 37 and 80 frames per second. A higher frame rate is recommended for high heart rate.
 - The system should be configured to store 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 to last heart cycle.
 - The entire myocardium should be visible.
 - A depth range that includes the entire left ventricle should be used.
4. Press **Freeze**. Run the cine and press **P1** to store the cine into the clipboard.
 5. Acquire and store B-Mode gray scale cine-loops of an Apical 4 chamber view and an Apical 2 chamber view as described above.

Starting Cardiac Strain

Starting Cardiac Strain from sequential acquisition.

1. Open an APLAX view and press **Measure**.
2. Select **AFI** on the Touch Panel.
3. Three apical view buttons appears on the left side menu.

When performing Cardiac Strain on all three apical views, the user is asked to start with the APLAX view. This allows manual adjustment of the Aortic Valve Closure (AVC) event timing that is used in the calculation of the longitudinal systolic strain in all apical views.

Cardiac Strain on the APLAX view

1. Select **APLAX**.
A ROI following the endocardium is created and the Tracking validation screen is displayed.

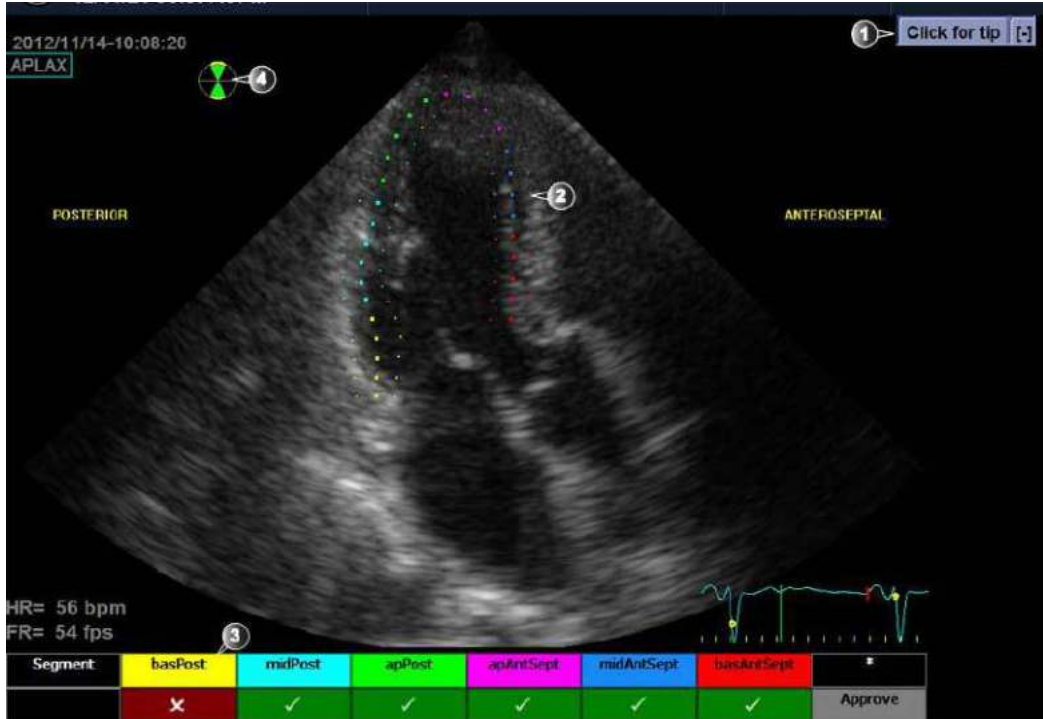


Figure 13-105. Tracking Validation screen

1. Display Quick Tips on tracking quality assessment
2. The ROI divided in segments
3. The scoring table
 - acceptable tracking
 - not acceptable tracking
4. Bull's eye icon
 - Green sectors with yellow border: views being analyzed.
 - Green sectors: views already analyzed.
 - Black sectors: view not analyzed.

Cardiac Strain on the APLAX view (continued)

2. Pay attention on the left/right orientation of the image: compare the LV wall names with a visual inspection of the image.

If the image orientation is wrong, create a new ROI manually as described in the section 'To create a new ROI' on *page 13-230*. Make sure to place the basal points correctly relative to the image landmarks when defining the ROI.

NOTE: *You may alternatively exit Cardiac Strain, invert the image and start Cardiac Strain again.*

The ROI is divided into segments. The tracking quality for each segment is automatically evaluated and summarized in the Scoring table (see Figure 13-105 on *page 13-225*).

The tracking for each segment must be visually controlled and validated as described below.

Tracking Validation



CAUTION

Poor tracking quality may lead to incorrect measurement results. The tracking for each segment must be visually controlled and validated.

Poor tracking quality could result from a variety of causes. Select Quick tips (see Figure 13-105 on page 13-225) to get tips on the most common causes for bad tracking. The common causes for bad tracking are:

- Erroneous placement of the basal points when defining the ROI. If the basal points are placed too far from the annular region, the ROI segments at the annular base will not move together with the underlying 2Dimage throughout the entire heart beat (see example cineloops in the Quick tips).
- Erroneous placement of the apex point when defining the ROI. The point should be placed so that the resulting ROI covers mainly the myocardium. If the apex point is placed too high, the ROI will mainly cover the epicardium resulting in poor tracking (see example cineloops in the Quick tips).
- Too narrow ROI width. Narrowing the ROI too much will result in poor tracking due to lack of tissue data in the ROI (see example cineloops in the Quick tips).
- Too much clutter. Images with too much static clutter will result in poor tracking (see example cineloops in the Quick tips).

Tracking Validation (continued)

1. Inspect each segment and make sure that the center line is moving together with the underlying 2D image.

The tracking quality is automatically evaluated for each segment and displayed in the Scoring table.

The tracking in each segment is scored as either Acceptable (v) or Not acceptable (x).

If the tracking needs to be improved for some segments, the user can modify the ROI or create a new ROI as described in 'ROI adjustment' on *page 13-229* or create a new ROI as described in 'To create a new ROI' on *page 13-230*.

The user may override the tracking quality evaluation done by the system by clicking on the evaluation result in the Scoring table.

2. Once the tracking quality has been controlled for all segments, press Approve in the Scoring table.

The user is asked to confirm or adjust the AVC timing setting (see Figure 13-108 on *page 13-234*).

ROI adjustment

To adjust the ROI

1. Press **Recalc**.
2. The following adjustments can be done to the existing ROI:
 - Adjust ROI Width.
 - Adjust the shape of the existing ROI: move the cursor over the inner ROI border, select an anchor point and move it to a new location. The shape of the ROI is updated accordingly.

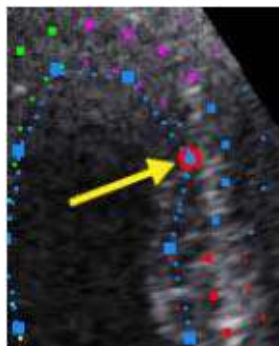


Figure 13-106. Selected anchor point on the inner ROI border

Data processing is started automatically if the cursor is not moved for a few seconds.

NOTE: *If the ROI needs to be adjusted make sure to make the changes immediately after the ROI is displayed.*

NOTE: *The auto processing function is configurable (from Utility -> Measure -> Advanced -> AFI auto processing).*

The Tracking validation screen is displayed.

3. Perform Tracking validation (see 'Tracking Validation' on page 13-227).

To create a new ROI

1. Press **Recalc**.
2. Press **3 Points** to re-define the ROI.
The system automatically displays a frame where the endocardial border is usually clearly visible.
3. To define a ROI, place three points at the endocardial border; two annular points and one at the apex (see Figure 13-107). Follow the indications displayed next to the pointer and on the Status bar when placing the three points.

NOTE: *The Yo-yo function is turned on to help find correct location for the points.*

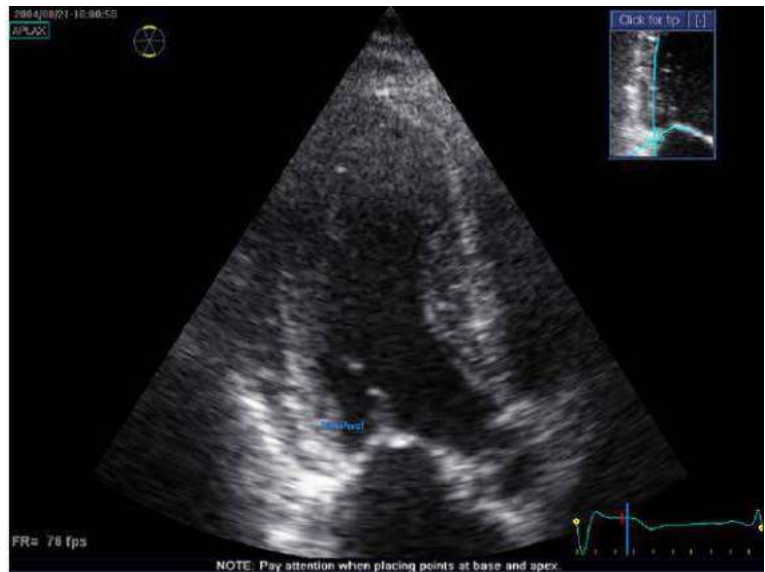


Figure 13-107. Defining a ROI

After placing the apex point, the ROI is displayed.

NOTE: *Correct ROI definition is important for an accurate strain measurement. The system has an adaptive ROI function: using the endocardial three points as a guide, the system will analyze the image and automatically adapt the ROI to an optimal position.*

Data processing is started automatically if the cursor is not moved for a few seconds.

The Tracking validation screen is displayed.

4. Perform Tracking validation (see 'Tracking Validation' on page 13-227).

Quick tips when re-creating the ROI

Correct ROI definition is crucial to get good tracking. Refer to the example displayed in the Tip window for correct point placements. To display additional guidelines, select Click for Tip. Make sure to follow the recommendations when placing the three points (see below).

Table 13-52: Tips for re-creating the ROI


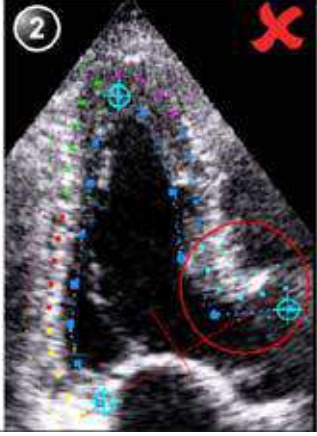
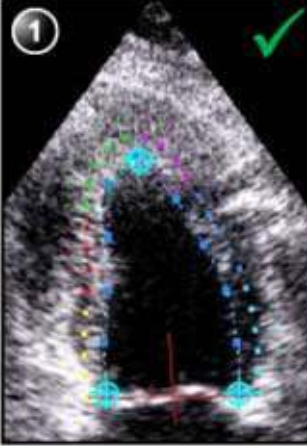





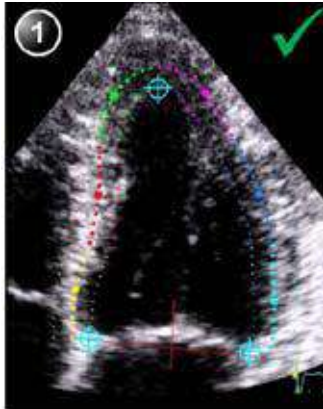
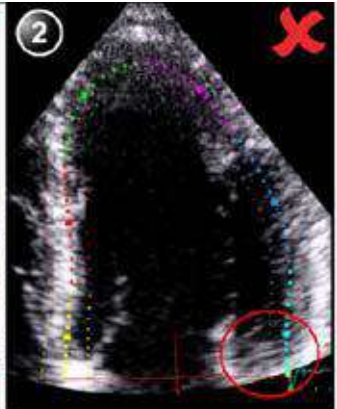
| Tips | Correct | Incorrect |
|---|--|---|
| <p>Base</p> <ol style="list-style-type: none"> 1. Correct position of the base points. 2. The ROI extends into the aortic tract. |  <p>Figure 1: A B-mode echocardiogram showing a correct ROI placement for the base. Three cyan crosshair markers are positioned at the top of the left ventricle. A green checkmark is in the top right corner.</p> |  <p>Figure 2: A B-mode echocardiogram showing an incorrect ROI placement for the base. The ROI extends into the aortic tract, indicated by a red circle and a red 'X' in the top right corner.</p> |
| <p>Apex</p> <ol style="list-style-type: none"> 1. Correct position of the Apex points. 2. The apex point is placed too high. The ROI is extending beyond the epicardium. |  <p>Figure 1: A B-mode echocardiogram showing a correct ROI placement for the apex. Three cyan crosshair markers are positioned at the bottom of the left ventricle. A green checkmark is in the top right corner.</p> |  <p>Figure 2: A B-mode echocardiogram showing an incorrect ROI placement for the apex. The apex point is placed too high, causing the ROI to extend beyond the epicardium. A red 'X' is in the top right corner.</p> |

Table 13-52: Tips for re-creating the ROI (Continued)

| Tips | Correct | Incorrect |
|--|---|--|
| <p>Apex</p> <ol style="list-style-type: none"> 1. Correct position of the Apex points. 2. The apex point is too high; the ROI is extending beyond the epicardium. |  |  |
| <p>Bulges</p> <ol style="list-style-type: none"> 1. Correct ROI. 2. ROI should not be bulging or follow the papillary muscle. To edit the ROI, see 'ROI adjustment' on page 13-229. |  |  |
| <p>General</p> <p>The left ventricle must be visible through the entire cycle.</p> <ol style="list-style-type: none"> 1. End systole frame: the entire left ventricle is displayed.. 2. End diastole frame: the annulus is not displayed. |  |  |

Timing Validation

Timing information may be crucial to accurate diagnosis. The most important event timing is the aortic valve closure (AVC), since it is part of the definition of the end systolic strain parameter.

Determination of the AVC timing by the system is as follows, depending on the situation:

- An automatic AVC estimate determined by the temporal contraction of all LV segments (Strain curves) is used.
- From the APLAX view, the user can adjust the estimated AVC timing. The adjusted AVC timing will then be used in the other apical views when running Cardiac Strain on these views.

This option is only available from the APLAX view.

AVC Timing Adjustment

This procedure is available in the APLAX view only.

1. After validation of the tracking quality, the frame for the automatic AVC setting is displayed and highlighted on the ECG.
2. To keep the current AVC setting, press **Set**. To change the AVC setting, use the Trackball to display another frame and press **Set**.

If the AVC setting was changed, a Confirmation window is displayed. Select one of the following options:

- Manual to accept the manual AVC setting.
- Auto to discard the manual AVC setting and use the automatic AVC timing.

The parametric systolic strain APLAX view is displayed.

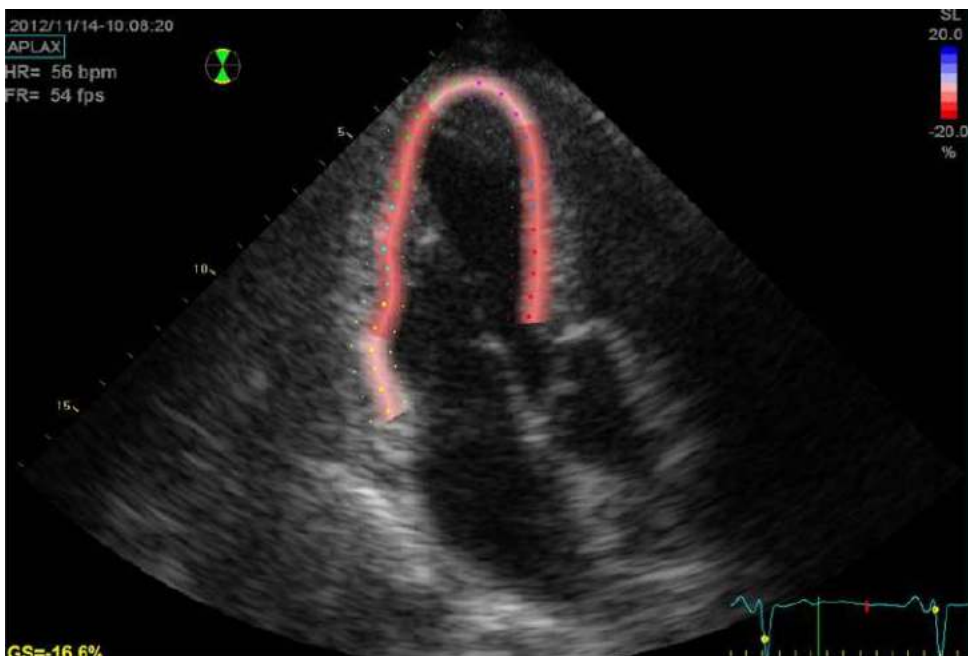


Figure 13-108. Parametric systolic strain APLAX view

AVC Timing Adjustment (continued)

NOTE: *The image will not be saved unless Print key is pressed.*

To activate a quad display, press and hold down **L**.

- 2D image with the ROI
- 2D image with Peak systolic strain parametric data
- Segmental curves with peak marker
- M-Mode image with strain parametric data

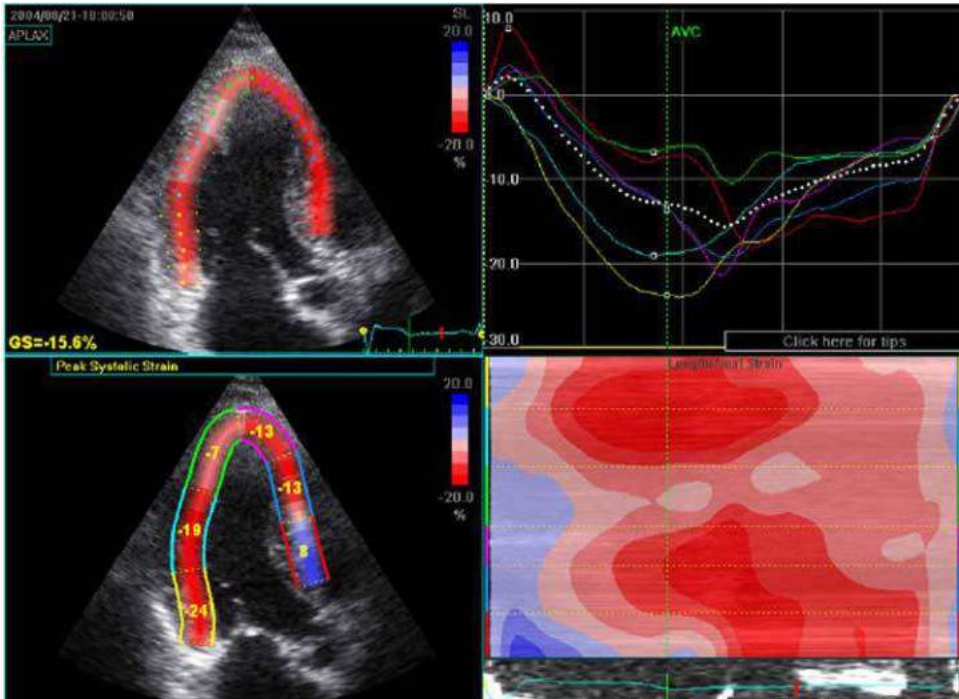


Figure 13-109. Quad screen for the APLAX view

NOTE: *The Quad screen will not be saved unless Print key is pressed.*

Cardiac Strain on A4-Ch and A2-Ch views

The procedure for Cardiac Strain on Apical 4-chamber and 2-chamber views is similar to the one used in the APLAX view.

For sequential acquisition,

1. Open the apical view from the clipboard.
2. Select the corresponding view in the View selection menu.
3. Validate tracking (see 'Tracking Validation' on page 13-227).

NOTE: *The AVC timing setting defined in the APLAX view is used by the system when running Cardiac Strain on the other apical views.*

Results

For the APLAX and apical 4-chamber views the following results are available:

- Single screen (see Figure 13-108 on page 13-234) displaying a 2D image with strain parametric data.
- Quad screen (see Figure 13-109 on page 13-235) displaying:
 - 2D image with the ROI
 - 2D image with Peak systolic strain parametric data
 - M-Mode image with strain data
 - Segmental curves

If Auto-AVC is used as AVC timing calculation method when running Cardiac Strain (see Figure 13-108 on page 13-234), the strain values displayed in the Quad screen for the APLAX and 4 Chamber views may differ from the strain values obtained after the system has performed the final calculation from all three views.

The reason for this is that the Auto-AVC calculation derived from all three views is most accurate and may be different from the intermediate AVC calculations used for each view.

Results (continued)

The strain values displayed in the Quad screen on APLAX and 4 Chamber views are therefore preliminary values (A warning text about this is displayed on the Quad screen). Only final strain values should be reported.

NOTE: *If you enter Quad screen again after all three loops have been processed, the strain values will be correct.*

When performing Cardiac Strain on all three apical views the following results are also available:

- Bull's Eye and Traces screen displaying:
 - Segmental curves for each three Apical views
 - Bull's eye presentation with segmental Peak systolic strain color coding and segmental Peak systolic strain values.

Select **BE+Trace** to display.

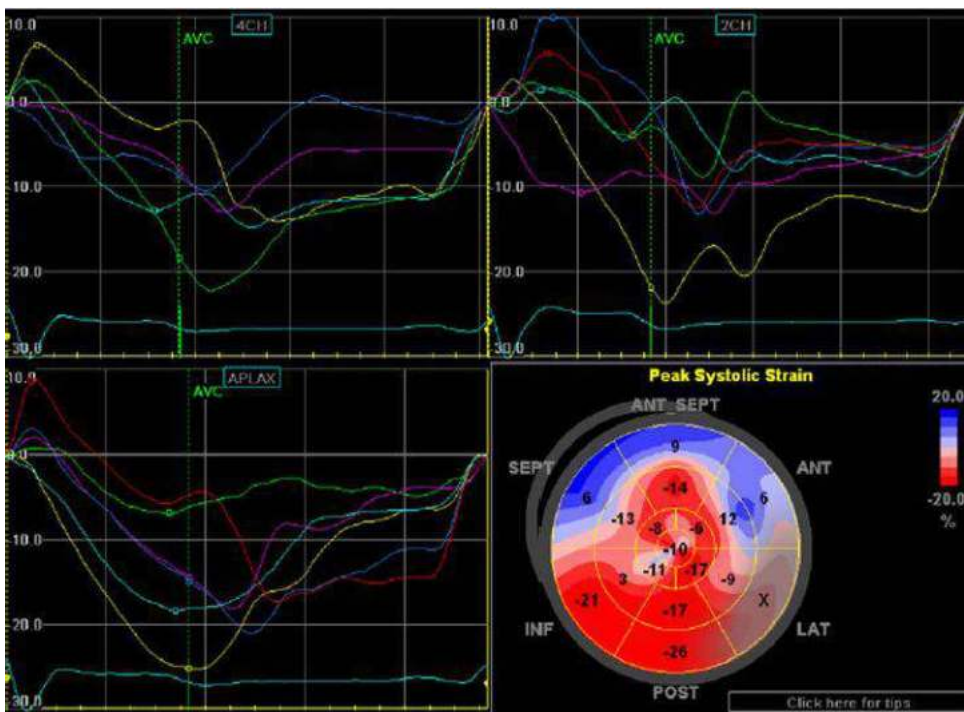
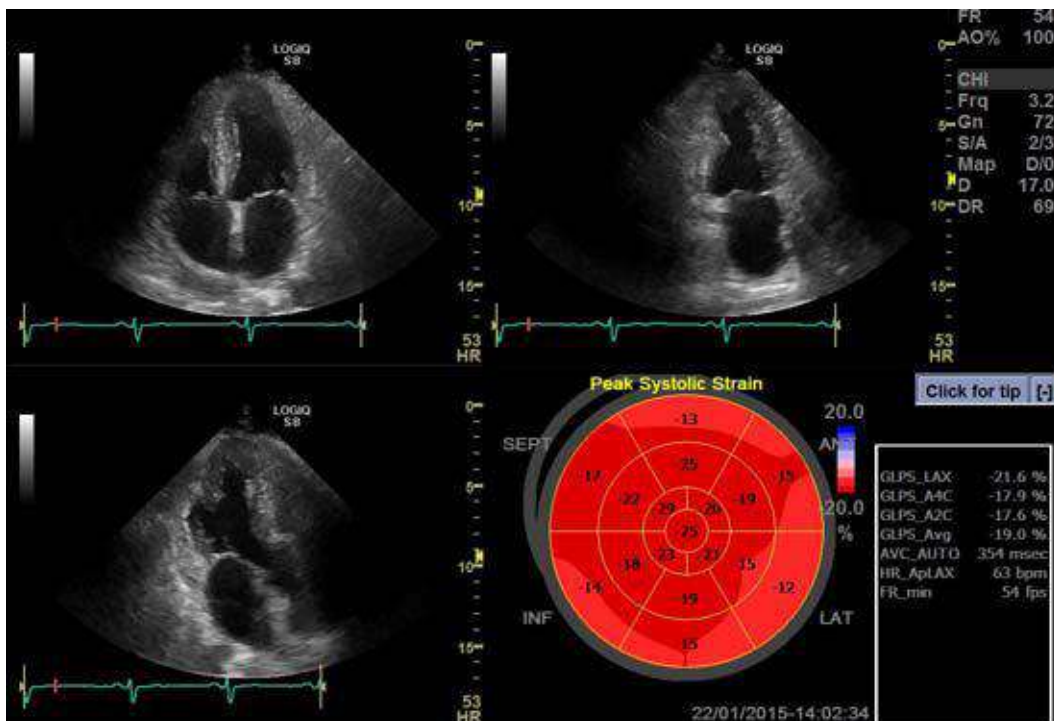


Figure 13-110. BE+Trace screen

Results (continued)

- Bull's Eye and Review screen displaying:
 - Bull's Eye together with cine clips for all 3 views.
 - Cine Stop or Cine Play (changed in toggle) on the Touch Panel controls the cine stop or play of the displayed image.

Select **BE+Review** to display.



Results (continued)

- Bull's Eye Only screen displaying:
 - Bull's eye presentation with segmental Peak systolic strain color coding and segmental Peak systolic strain values

NOTE: The Bull's eye can be configured to display either 18 or 17 segments (from Utility/Measure/Advanced/AFI segment model).

NOTE: Press BE Maps to select another color map for the Bull's eye.

NOTE: The system can be configured so that the user can also choose to display Post systolic strain index (PSI) color coding and segmental PSI values in the Bull's eye (from Utility/Measure/Advanced/AFI PSS/PSI Mode).

- Global Strain (GS) values for all three apical views.
In a given view the Global Strain (GS), also called Global Longitudinal Peak Strain (GLPS), is defined as the percentage of maximal contraction over the whole cardiac cycle of the entire myocardial wall relative to its end diastolic length.
- Averaged Global Strain value from all three apical view data.
- AVC measurement (either automatic or manual, see Figure 13-108 on page 13-234)

Results (continued)

Select **BE+Only** to display.

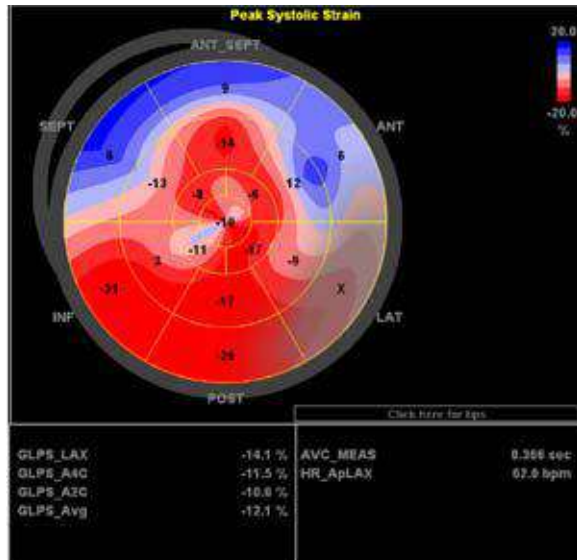


Figure 13-112. Bull's Eye Only screen

Getting the result

To save the results, exit Cardiac Strain and answer yes to the question "Do you want to store AFI Results?". Once the results are saved, the measurements are available in the worksheet and can be used in the report.

If the tracking quality of a segment was scored as Not acceptable (x), the colorimetric display on the Bull's eye is greyed.

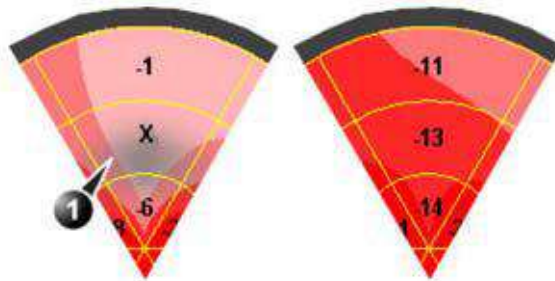


Figure 13-113. Colorimetric display

1. Segment with tracking quality scored as Not acceptable (x).

Peak detection

The peak systolic strain detection for each segment can be verified and eventually manually changed.

To adjust the peak detection:

1. Press **BE+Traces**.

The Bull's Eye and Traces screen is displayed showing:

- Trace plots for all three loops
- Bull's Eye with Peak systolic strain values

2. To change the peak marker position on a curve:

- Press **Set** on the peak marker (square point) on one of the curves, move the peak marker to a new position and press **Set** again to fix the point.

or

- Place the cursor on a segment in the Bull's Eye. The corresponding curve is highlighted.

Click on the segment to select the corresponding peak marker and move it to a new position. Press Set to fix the point.

NOTE: *You can change Peak Maker only during Start point of Heart Cycle and AVC Time.*

The position of the AVC marker can also be checked in the Bull's Eye and Traces screen. If needed, the APLAX view should be reprocessed to change the AVC time.

About the results

Be aware of the following:

- Clinical assessments should be made based on both color and segmental Peak systolic strain values.
- The Save As function is intended for research purposes and should not be used to archive diagnostic data.
- To populate the worksheet and the report the Bull's Eye Only screen must be saved.
- All results shown (curves, colors and values) are based on drift compensated values. Any strain drifting is linearly compensated throughout the cycle. If the drift compensation in a given segment is too high, the tracking quality is automatically set to Not acceptable (X).
- If the tracking quality was scored as Not acceptable (X) in more than one segment, the Global Strain value is not calculated.

Auto EF Measurements

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 See 'Tracking Validation' on page 13-252 for more information.).

NOTE: *The AutoEF tool is intended for pediatric cardiology and is intended to be used in pediatric cardiology.*

Acquisition

NOTE: AutoEF is only available on the M5Sc-D and 6Tc-RS probes.

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.
 - LOGIQ Fortis 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 Touch Panel, select **AutoEF**.
The View selection menu is displayed.
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 13-114 on page 13-248).

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 13-115 on page 13-249). 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.

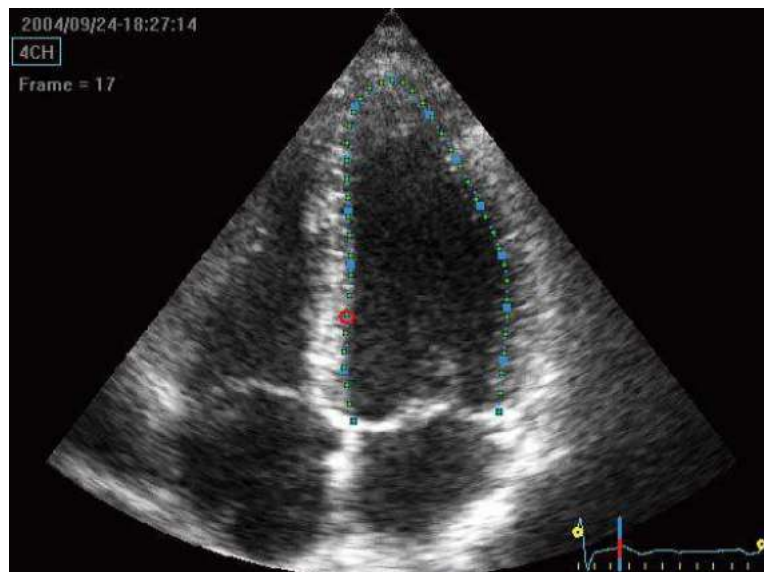


Figure 13-114. Defining a ROI

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.

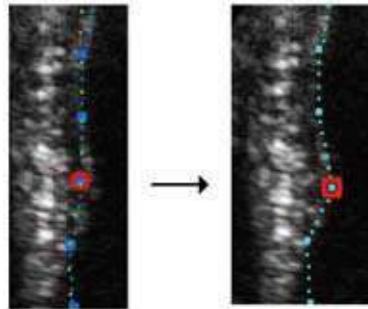


Figure 13-115. Selected anchor point on the inner border trace

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 13-116 on page 13-251).

NOTE: The bi-plane results (BiP) will only appear on screen (Figure 13-116) 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)

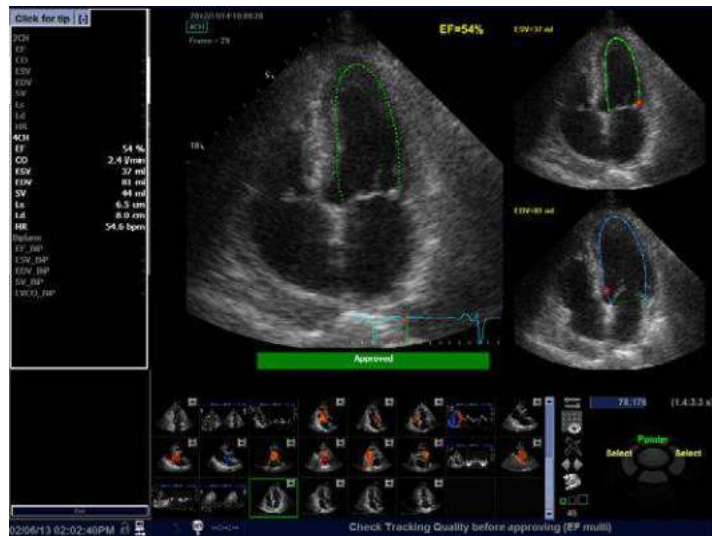


Figure 13-116. AutoEF Result Multi Screen

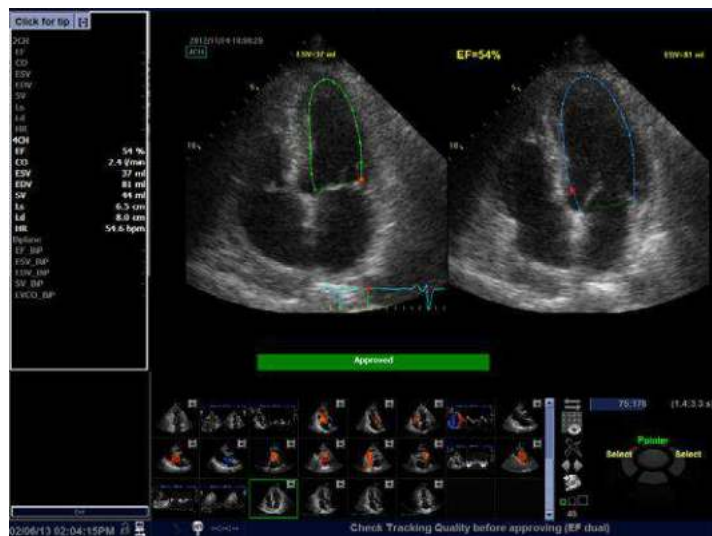


Figure 13-117. AutoEF Results Dual Screen - Alternative screen mode

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:

1. Press **EF Dual** to enlarge ES and ED frames and position them side-by-side (Figure 13-117 on page 13-251).
2. You may manually select a different ED frame or ES frame using the ED frame or ES frame rotary.
3. 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.

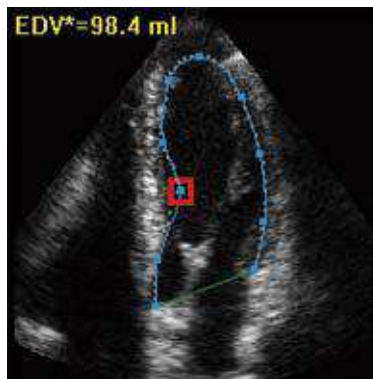


Figure 13-118. Border trace edit

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 13-246*).
- 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 13-246*).

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 13-116 on page 13-251) in a mini-report. The mini-report appears on the left side of the results window.

| 4CH | |
|--------|-----------|
| HR | 57.0 bpm |
| EF | 51 % |
| CO | 4.5 l/min |
| ESV | 75 ml |
| EDV | 153 ml |
| SV | 78 ml |
| Ls | 8.3 cm |
| Ld | 10.1 cm |
| EF_BP | 50 % |
| ESV_BP | 78 ml |
| EDV_BP | 156 ml |
| SV_BP | 78 ml |

Figure 13-119. Mini Report

The results are summarized in the worksheet and in the report.

| Height | Weight | BSA | Age |
|-------------|---------|-------|------|
| Parameter | Value | Min | Max |
| HR 2Ch Q | 54.0bpm | Level | 54.0 |
| HR 4Ch Q | 54.0bpm | Level | 54.0 |
| LVEDV 2Ch Q | 70.8ml | Level | 70.8 |
| LVEDV 4Ch Q | 81.4ml | Level | 81.4 |
| LVEDV BP Q | 70.2ml | Level | 70.2 |
| LVEDV 2Ch D | 71.4ml | Level | 71.4 |
| LVEDV 4Ch D | 77.2ml | Level | 77.2 |
| LVEDV BP D | 70.6ml | Level | 70.6 |
| LVEF 2Ch Q | 65.6% | Level | 65.6 |
| LVEF 4Ch Q | 54.2% | Level | 54.2 |
| LVEF BP Q | 60.6% | Level | 60.6 |
| LVEF 2Ch D | 48.8ml | Level | 48.8 |
| LVEF 4Ch D | 44.2ml | Level | 44.2 |
| LVEF BP D | 46.2ml | Level | 46.2 |
| LVEDV 2Ch D | 2.07min | Level | 2.0 |
| LVEDV 4Ch D | 2.48min | Level | 2.4 |

Figure 13-120. Results on the Worksheet and 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.

Overview

A physiological input panel is available for the LOGIQ Fortis. This panel has inputs for ECG, PCG and auxiliary signals.

The physiological module consists of three channels:

1. ECG and Resp.
2. PCG
3. AUX

AUX is capable of handling external ECG signals from other diagnostic ECG devices.

The scanned image that is displayed is synchronized with the ECG and PCG traces. In Doppler or M-Mode, the traces are synchronized to that particular mode's sweep.

Approved accessory cables provide the proper signals to the Physiological Panel.



There will be a slight time gap between the ECG signal and the Doppler waveform when the selected PRF is low (less than 1.0 kHz).



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

To display the ECG Signal on the monitor, go to Utility--> Imaging--> General--> ECG Display.

Overview (continued)

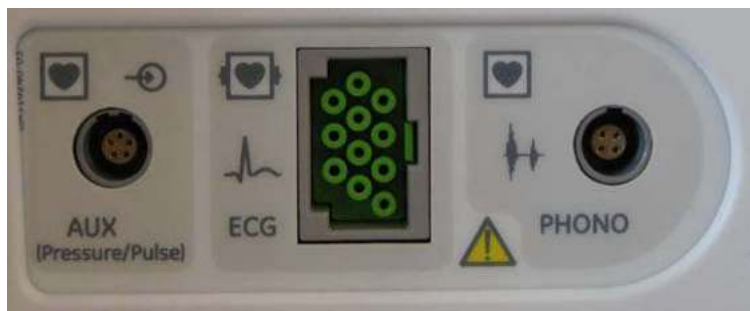


Figure 13-121. Optional Physiological Input Panel



WARNING

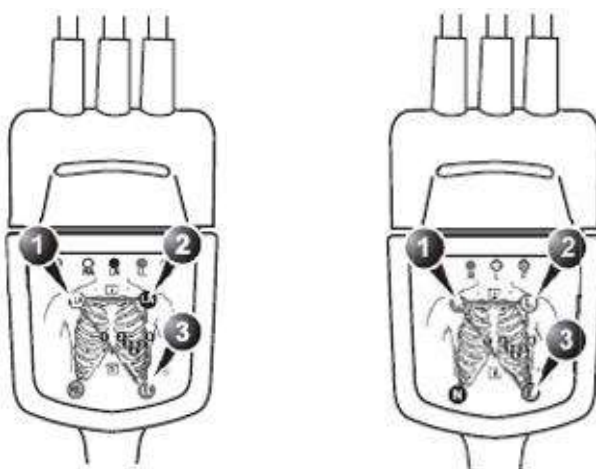
- Do not use with a defibrillator except with DEFIBRILLATION PROOF APPLIED PARTS. Only the ECG connection port is a defibrillator proof applied part.
- DO NOT USE the physiological traces of the LOGIQ Fortis Ultrasound system for diagnosis and monitoring in lieu of ECG.
- Only approved and recommended peripherals and accessories should be used.
- After the defibrillator stimulates the patient, the ECG requires 4 to 5 seconds recovery time.

ECG Cable/Respiration

The ECG Cable is a modular cable consisting of two different cable parts:

- Single cable with a system connection at one end and a cable splitter at the other.
- A triple color-coded electrode cable to be inserted into the splitter device. Each electrode cable hooks up to the appropriate stick-on electrode by a color-coded clip type connector.

The color-coding of the electrodes follows one of two standards that are common in different parts of the world. The cable splitter device has a drawing defining the color codes, names and body location for the two standard color codes.



IEC (Europe, Asia, Rest of World)

1. R: Red
2. L: Yellow
3. F: Green

AHA (USA)

1. RA: White
2. LA: Black
3. LL: Red

Table 13-53: ECG Color Code Cable

| IEC (Europe, Asia, ROW) | | AHA (USA) | | Position of the human body surface |
|----------------------------|------------|----------------|------------|---------------------------------------|
| Electrode Mark | Color Code | Electrode Mark | Color Code | |
| R | Red | RA | White | Right Arm |
| L | Yellow | LA | Black | Left Arm |
| F | Green | LL | Red | Left Leg |

Physiological Trace Monitor Display

The scanned image is synchronized with the ECG and PCG 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 using the Touch Panel controls.



Figure 13-122. Physiological Trace Monitor Display

1. PCG
2. AUX
3. ECG
4. Auto Heart Rate Display
5. Respiration

ECG Touch Panel

The ECG Touch Panel provides for control of the physiological input signals.

Without the ECG option, the ECG Touch Panel is not displayed.

Table 13-54: 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. Value: 1 - 16. |
| ECG Lead | ECG Lead Pattern: 1, 2, 3 1: RA (-) to LA (+) (Right, Left, or Lateral) 2: RA (-) to LF (+) (Superior Inferior) 3: LA (-) to LF (+) (Superior Inferior) <i>NOTE: RA=Right Arm; LA=Left Arm; LF=Left Foot</i> |
| Timer Trigger | Enables intermittent imaging based on a timer. <i>NOTE: If Timer Trigger is turned on, the ECG Trigger is set to None.</i> Value: On or Off. |
| 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. Adjusting: Press ECG Trigger and select one of the options and adjust the delay time using the Delay Time key. <ul style="list-style-type: none"> • 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. <i>NOTE: If other than None is selected, Timer Trigger is turned off.</i> Value: None, Trig1, Trig2, and Both. |
| AUX Display | Provides the ability to turn the AUX trace on for display on the monitor. Adjusting: When the key is selected, the AUX trace toggles between on and off. Value: On or Off |
| PCG Display | Provides the ability to turn the PCG (phonocardiogram) trace on for display on the monitor. Adjusting: When the key is selected, the PCG trace toggles between on and off. Value: On or Off |
| ECG Display | Provides the ability to turn on the ECG trace and Auto Heart Rate for display on the monitor. Adjusting: When the key is selected, the ECG trace and Auto Heart Rate toggles between on and off. Value: On or Off |
| Resp Display | Provides the ability to turn on the respiration tracer. Adjusting: When the key is selected, the respiration trace toggles between on and off. Value: On or Off |

Table 13-54: ECG parameters (Continued)

| Parameter | Description |
|--------------------|---|
| Resp Lead | Respirometer Lead Pattern: 1, 2 1. RA (-) to LA (+) (Right, Left or Lateral) 2. RA (-) to LF (+) (Superior Inferior) NOTE: RA = Right Arm, LA = Left Arm, LF = Left Foot |
| 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; 2= skip 1 cycle. Adjusting: Adjust the corresponding control. Value: 1 - 30 |
| 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: Rotating the knob changes the delay time between images. <i>NOTE: Delay time may be different for Trig1/2 (0-2 seconds) and Timer Trigger.</i> Adjusting: Adjust the corresponding control. Value: 0.10 - 10.00 |
| AUX Gain/Position | Allows for the amplitude control of the AUX trace or allows for the vertical positioning of the AUX trace on the image display. Adjusting: Press the knob to toggle between Gain and Position. The default is Gain. |
| PCG Gain/Position | Allows for the amplitude control of the PCG trace or allows for the vertical positioning of the PCG trace on the image display. Adjusting: Press the knob to toggle between Gain and Position. The default is Gain. |
| 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. Adjusting: Press the knob to toggle between Gain and Position. The default is Gain. |
| Resp Gain/Position | Allows for the amplitude control of the respiration trace or allows for the vertical positioning of the respiration trace on the image display. Adjusting: Press the knob to toggle between Gain and Position. The default is Gain. |

Volume Navigation

Introduction



DO NOT use the Volume Navigation feature on any patient relying on life-sustaining electronic equipment, such as a pacemaker or defibrillator. Failure to follow this instruction could lead to interference with patient electronic device(s).



When performing interventional procedures, remember that the pre-acquired dataset is not live and should not be used as sole guidance for interventional procedures.

Using a position sensor attached to the probe, or using a probe with V Nav Inside, Volume Navigation Fusion (V Nav) lets you import a pre-acquired DICOM volume dataset, register the location of the live Ultrasound image with the 3D volume image, and then use the position sensing system to simultaneously show the live Ultrasound image side-by-side with the corresponding multi-planar reformatted (MPR) slice from the pre-acquired dataset.

NOTE: *DICOM datasets must have positional data to allow for V Nav to treat the datasets as a volume. Most CT, MR, and PET datasets have this information as do some X-Ray Angiography datasets.*

In addition, you can use V Nav as a type of “GPS” positioning marker to track an anatomy of interest.

The V Nav Trackers allow you to use a V Nav sensor to track where the needle/needle tip is inside the body.

V Nav is available in B-Mode, Color Flow, Elastography, PDI, and Contrast Modes; it is not available while in 3D/4D or when timeline modes are active. Biopsy capability is available while in V Nav. Dual Caliper is available while in V Nav.

You can load Auto Sweep data for V-Nav, after the data stored as volume data in Easy 3D/Advanced 3D.

Introduction (continued)

V Nav displays in Split Screen, with the Ultrasound Image on the left side of the display and the 3D Dataset on the right side of the display.



Figure 13-123. V Nav Example

V Nav-Specific Definitions

3D Datasets. Computed Tomography (CT)-, or Magnetic Resonance Imaging (MR), Positron Emission Tomography (PET), XA (X-Ray Angiography), hand held SPECT datasets (NM) and Invenia (US) series stored in DICOM format. Ultrasound datasets acquired using Tru3D and AutoSweep.

Registration. Linking the 2D Ultrasound image to the 3D dataset. You can register the 3D dataset to the Ultrasound image via two techniques, Parallel Plane Registration or Point Registration.

Auto Registration. Auto-registration is available when fusing to a Tru3D dataset. When entering V Nav directly from a Tru3D acquisition, the Tru3D volume is automatically loaded into V Nav and automatically registered.

Parallel Plane Registration. This registration technique requires that the user mark a plane parallel to the 3D dataset slices and one common anatomical point, referred to as a Translation Point since it performs an x, y, and z correction at the point.

Image-Based Registration. This registration technique is available that automatically aligns CT/MR volume with the Ultrasound live image.

V Nav-Specific Definitions (continued)

Point Registration. This registration technique requires that the user mark three or more anatomical point pairs. Performing a Plane Registration first may make the process of matching the anatomical point pairs easier.

Anatomical Point Pair. Marking the same anatomical location in the 2D Ultrasound and the 3D dataset creates an anatomical point pair.

Lock. After you have set the registrations between the 2D image and 3D dataset by either plane or point registration, you lock this registration in place. This means that the image content of the B-Mode image and the corresponding cut plane through the 3D dataset remains the same when you move the probe.

Magnetic Distortion. A magnetic field is generated by the position sensing system. It can become distorted in the presence of ferrous or highly conductive metal.

Environmental Quality. On-screen visual quality map that indicates distortion and proximity to the transmitter. Monitoring and controlling these two variables contribute to the highest quality environment.

RMSD, Root Mean Square Deviation. Root Mean Square Deviation, which equals the 'goodness' of fit. After the user has completed a Point Registration, there's a numeric indicator to describe the goodness of fit. The lower the number, the better the fit. <1 to 10 would be good, 30-40 not so good.

Window Levelling. Balances the brightness/contrast in the 3D Dataset.

Position Sensing System. Consists of four components: Transmitter, Receiver (2), Probe Bracket, Probe/Receiver Cable Clips.

GPS Marker. Used in GPS to track the position of an anatomical structure while scanning or while performing a biopsy.

Virtual Tracker . The V Nav Virtual Tracker allows you to attach a sensor to the shaft of the needle (away from the tip). The position of the needle tip and the projected needle path are projected onto the 2D Ultrasound image.

V Nav-Specific Definitions (continued)

Active Tracker. The Active Tracker is a device that consists of at least four markers that show up in a volume imaging dataset such as CT or MR. The markers are in known positions relative to each other such that the orientation of the Active Tracker can be uniquely determined based on the marker positions in the image. The device also holds a position sensor in a known position relative to the markers. Holes are provided in the Active Tracker so that its location can be marked on the body.

Needle Tip Tracker. The V Nav Needle Tip Tracker allows you to insert a V Nav tracker inside the Needle to track the projected path and needle tip location inside the body.

Clinical vs. Research. You can specify which V Nav controls you want to appear on the Touch Panel. You can set these via Utility -> Application -> Imaging Controls -> Clinical Controls V Nav.

Environment Quality

In order to obtain best results when registering, setting GPS markers, it is important to have the highest quality environment (minimal distortion and proximity to the transmitter).



Figure 13-124. Environmental Indicator

An Environmental Quality reading for each sensor is provided via the Environmental Quality indicator (located in the upper, left-hand corner of the display).

Environment Quality (continued)

Each sensor has a quality reading from 1 (low quality) to 7 (high quality). In addition, the distance between the two probe sensors is used to adjust the environmental quality reading presented to the user.

If needle tracking is being used, an overall environmental quality reading is provided.

The Overall Environmental Quality reading is based on the environmental quality readings of the probe sensors and the needle sensor as well as the distance between the needle tip and the transducer face.

The environmental quality readings update in real time and are retained so that they can be displayed during cine scrolling.

Moving the cursor over the Environmental Quality indicator for each sensor provides the following information:

Sensor 1 displays a quality reading.

Sensor 2 displays a quality reading and a Distortion reading between the 2 probe sensors in [mm]. The magnetic distortion is represented as a measured distance between the two sensors relative to the expected distance between the two sensors.

The Needle Sensor displays a quality reading.

The Overall indicator displays an overall Quality reading, and a Probe to Tip distance in cm.

Calibration

To calibrate V Nav, contact GE Service.

Configuration

You can specify the maximum retrospective loop length to store via Utility -> Application -> Print controls -> Time span.

Accuracy

Accuracy depends on precise registration, minimal distortion, and controlling the patient's breathing during a scan.

Load the Volume Dataset

If you are using media to load the 3D dataset, you may want to store the CT, MR, PET, XA, DX, NM or Invenia Dataset on a USB flash drive, USB HDD or DVD so that you can clearly label the media in a way that identifies the patient information stored on the disk.

We recommend that you load the 3D Dataset onto the Ultrasound system prior to starting the V Nav exam to ensure that it loads properly and to ensure that the quality is acceptable.

Ultrasound volume datasets need to have been acquired using Tru3D, i.e., a volume dataset that was previously acquired using a position sensor.

Query/Retrieve

NOTE: For Query/Retrieve to find a patient, the patient **MUST** have a Patient ID.

Query



Figure 13-125. VNav Query

1. Press **Patient** and select **Data Transfer**. The Data Transfer screen displays.
2. Select Q/R.
3. Select the Query/Retrieve server from the Transfer From pull-down menu.
4. Type Patient name in the name field.
5. Press **Query** in the Transfer From section.
6. All studies for that patient and that modality will list.

Retrieve

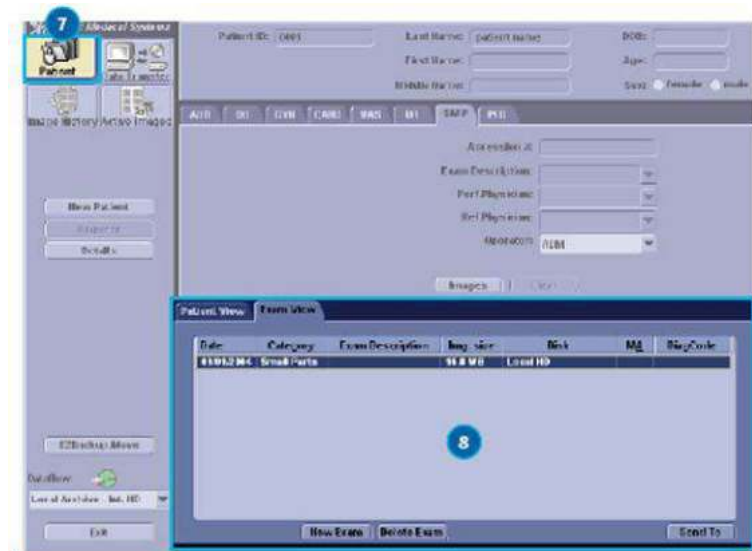


Figure 13-126. VNav Retrieve

7. Select the specific series or study which use in V-Nav exam.
8. Press **Transfer**.

NOTE: *Transfer time will vary based on network and file size.*

Load DICOM Volume Dataset

Load a pre-acquired 3D DICOM volume dataset,

- Exit and re-enter V Nav and retain the 3D Dataset by pressing the V Nav control.

OR,

Discard the pre-acquired 3D Dataset,

- Press Exit and Clear on the Touch Panel.

From CD/USB



Figure 13-127. Loading Dataset From CD/USB

1. If applicable, insert the media containing the pre-acquired 3D dataset. Volume datasets that can be loaded from disk may include CT, MR, PET, XA, DX, CBCT, and GE ABUS (US).
2. Select VNav. Press **Load** and select **From CD/USB**.
3. Double click on the DICOMDIR or database file (or single click and select the Open button).

From CD/USB (continued)

4. Navigate to the location of the 3D dataset. A list of patients and a list of image series for each patient displays. Highlight the Series you want to import and select **Import Series**.
5. The Check Patient Data screen appears. Confirm that the patient information matches the patient associated with the current exam. After verifying patient information, press **Accept** (or Reject). You can also specify to display Patient Data by checking the Display Patient Data box.

If you turn on "Display Patient Data", Patient name, ID and birth date are displayed on the Volume data. These remain on the live scanning image.

NOTE:

If Hide Patient Data preset or Hide Date Time preset (Utility->System->General) is set to "On Store", then the patient data is removed from the volume dataset prior to image storage and then redisplayed after image storage.

6. B-Mode image displays on the left side and the loaded volume data displays on the right side.

From Database

NOTE: Volume datasets that can be loaded from the database: CT, MR, PET, XA, DX, CBCT, and GE ABUS (US).

1. Press **Load** and select **from Database**.
2. Select the desired volume from the Image History screen and press **Load**.
3. The Check Patient Data screen appears. Confirm that the patient information matches the patient associated with the current exam. After verifying patient information, press Accept (or Reject). You can also specify to display Patient Data by checking the Display Patient Data box.

If you turn on "Display Patient Data", Patient name, ID and birth date are displayed on the Volume data. These are remained on the live scanning image.

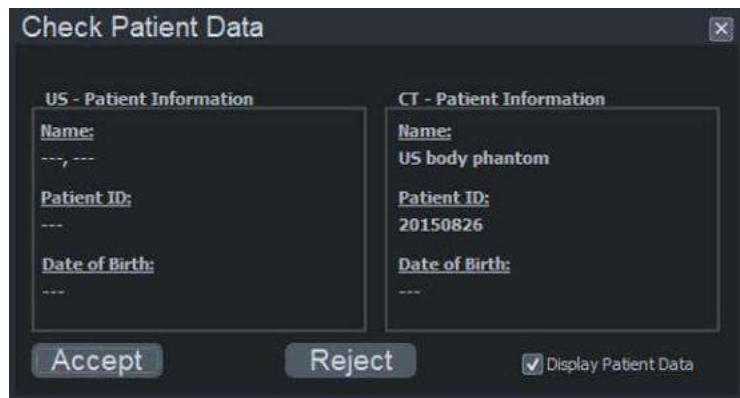


Figure 13-128. Check Patient Data Dialog

NOTE: If Hide Patient Data preset or Hide Date Time preset (Utility->System->General) is set to "On Store", then the patient data is removed from the volume dataset prior to image storage and then redisplayed after image storage.

NOTE: If you load a Tru3D volume data, Check Patient Data is not displayed.

NOTE: If you Load From Database and want to cancel out, use the Exit button on the Image History screen.

4. B-Mode image displays on the left side and the loaded volume data displays on the right side.

Load Multi Volume Datasets

You can load multiple datasets (up to 10 datasets) of same study at the same time:

When loading multiple volume data at the same time, they must all be configured in the same direction (eg, Axial plane).

Sometimes there are multiple acquisitions stored within a single series. When you select Load All, these are loaded as one dataset (if they are not overlapping) or as two datasets (if two or more datasets are overlapping).

1. Load dataset From CD/USB, check data of the Select Series pop-up.



Figure 13-129. Select Series pop-up

Load dataset from database, select one image from each exam and press **Load** in the Image History screen.

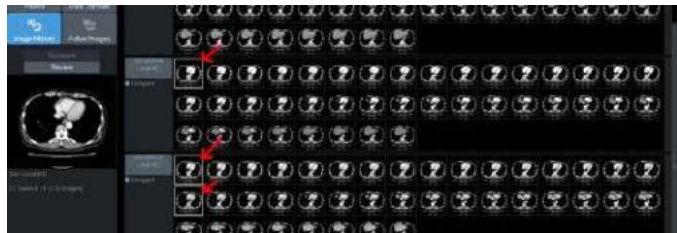
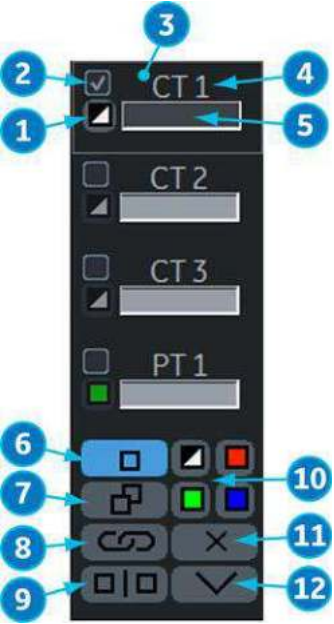


Figure 13-130. Image History screen

Load Multi Volume Datasets (continued)

2. V Nav screen and multiple dataset menu are displayed.


Table 13-55: Multiple dataset menu

|  | Item | Description |
|---|------|--|
| | 1-5 | Dataset List (CT and PT in this example) |
| | 1 | Display Color |
| | 2 | Active Dataset Indicator |
| | 3 | Active Dataset |
| | 4 | Name of dataset |
| | 5 | Display Weighting |
| | 6-12 | Control Area |
| | 6 | Single Display |
| | 7 | Multiple Overlapping Display |
| | 8 | Volume-to-Volume Registration |
| | 9 | Compare Volume |
| | 10 | Color Control |
| | 11 | Delete |
| | 12 | Expand/Collapse Dataset list |

Load Multi Volume Datasets (continued)

Using the Touch Panel control, you can adjust:

Table 13-56: Touch Panel Controls

|  | Item | Description |
|---|------|--|
| | 1 | Dataset number and its Weight (%) |
| | 2 | Toggle Up/Down: Select the dataset. |
| | 3 | Push: Fix the selected dataset. |
| | 4 | Rotate: Weight Dataset. You can weight the overlay amount of the volume dataset. |

NOTE: When you select **Save Volume** on the Touch Panel, all volumes are saved to a single file on the Clipboard, including GPS Markers.

Load additional volume datasets

Whenever a dataset is loaded and you want to load another dataset From CD/USB, from clipboard or from a database or if you generate a Tru3D dataset and then switch then back to VNav, the system asks you if you want to add the dataset as an additional dataset or to replace the existing dataset(s).

If you choose to add the dataset, the necessary adaption of the datasets with regard to size and resolution will be performed automatically at the end of the load.

Easy Access to PACS

The LOGIQ Fortis is set up to easily receive exams from PACS.

The system displays DICOM image transmission status at the bottom of the screen as:

- Incoming DICOM Images: In Progress.
- Incoming DICOM Images: Completed.
- Incoming DICOM Images: Failed - check spooler.

Refer to the Spooler to identify specific failed operations. See 'DICOM Job Spooler' on page 13-477 for more information.

User operation takes precedence and will cancel any ongoing image receive operation.

Setting Up V Nav sensors

Positioning Rules



CAUTION

When using fusion or GPS Markers, it is important to place the transmitter so that its location does not move relative to the working space. If you rearrange the working space (patient or transmitter location), you need to redo the registration or replace the GPS marker.



CAUTION

Place the transmitter such that the entire area of interest is in the front hemisphere of the transmitter. The front hemisphere generates the magnetic field used by the system.

The transmitter needs to be placed such that the face of the transmitter opposite of the cable (the field side) faces the working area

To avoid magnetic distortion, the following is recommended:

- Remove all ferrous or highly conductive metal from the vicinity of the transmitter and the working area.
- If the patient's bed contains ferrous or highly conductive metal, place the transmitter 20cm or more above the bed so that the central portion of the magnetic field sits well above the bed.
- To check for magnetic distortion, place a phantom that can be scanned from multiple directions in the planned working space. Using the 2D Marker on the GPS control on the Touch Panel, select Point. Scanning the phantom, place the Windows Pointer on a specific point in the phantom and then scan the same point from different directions. The distance between the graphical point (green cross) and actual structure is an indication of the amount of error. Larger than expected discrepancies could be the result of metal distortion or the transmitter field could be facing the wrong direction or be too far away from the working area.

Setting up the Position Sensing Apparatus

To set up the position sensing apparatus,



For accurate image registration, ensure that you connect the two probe position sensors to the probe as described in the instructions below. Match the numbers when you attach the sensors connectors to the sensor unit.

1. Attach the receiver probe bracket to the probe (refer to 'Multi Angle Biopsy Guide Assembly' on *page 11-63*). Ensure that it is attached securely.
2. Fix the position sensor to the bracket.

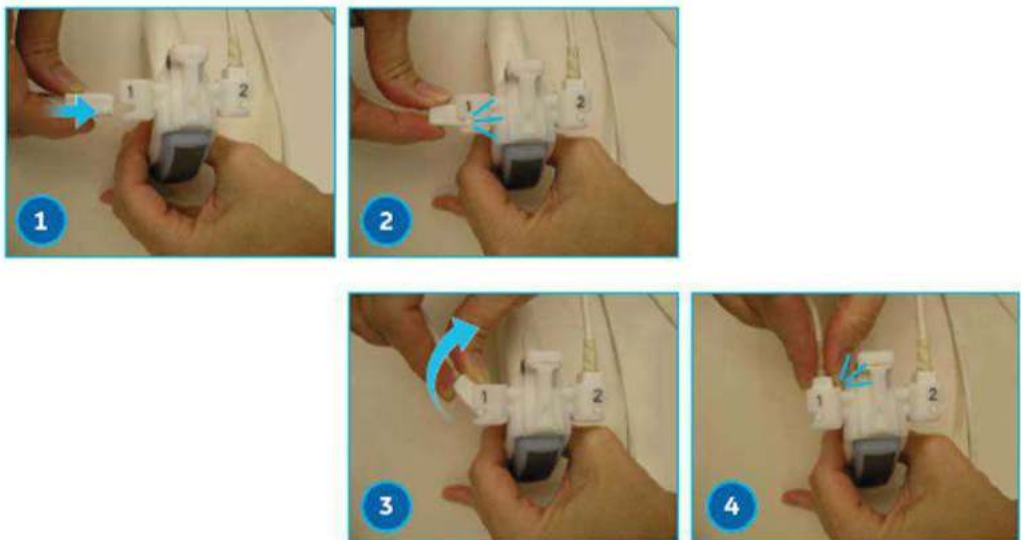


Figure 13-131. Set up the position sensor

1. Position the sensor's nub to the bracket's indentation.
2. Push the sensor into the bracket.
3. Tilt the sensor to position it in the bracket.
4. Tilt the sensor until positioned firmly in the bracket.

Setting up the Position Sensing Apparatus (continued)

3. Connect the receiver cable from the Position Sensor to the front of the Ultrasound system.

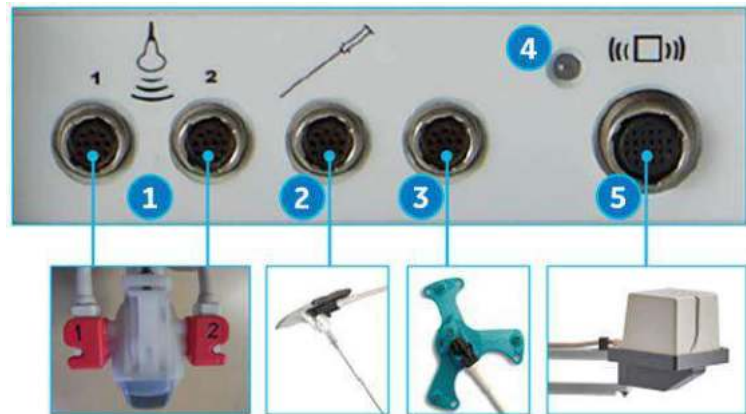


Figure 13-132. Volume Navigation Connections

1. V Nav Receiver Connector (2 cables)
 2. V Nav Needle Tip Tracker/Virtual Tracker Sensor Connector
 3. V Nav Active Tracker Connector
 4. V Nav Transmitter Indicator
 5. V Nav Transmitter Connector
4. Trace back each cable physically to insure the cable in position 1 on the probe is connected to position 1 on the console and that the cable in position 2 on the probe is connected to position 2 on the console.
 5. Use the probe/receiver cable clips to hold the receiver cables to the probe cable.
 6. Attach the transmitter cable to the front of the Ultrasound system where the transmitter label is shown.



CAUTION

Place the transmitter such that the entire area of interest is in the front hemisphere of the transmitter (indicated by the '1' in the illustration above). The front hemisphere generates the magnetic field used by the system.

Setting up the Position Sensing Apparatus (continued)

7. Now that all the cables are connected, press the **V-Nav** key. The light above the transmitter cable blinks until the position sensing system has been initialized by the system. Once initialization is complete, the light remains green.

NOTE: *Error message displays if the connection is incorrect.*

8. Place electromagnetic transmitter next to patient with front toward scanning area of interest.

NOTE: *Be sure patient and sensors are on the best position to start the exam.*

NOTE: *Patient must be in the same position as in the previous acquired exam.*



CAUTION

If you need to connect/disconnect sensors, first use the V Nav key to exit V Nav. If you need to connect/disconnect the transmitter, make sure the light on the V Nav position sensing system is off. If it is on, enter V Nav and use the Exit & Clear Touch Panel control to leave V Nav.



HINTS

For information on how to set up the V Nav Needle Tip Tracker, see 'Setting up the V Nav Needle Tip Tracker' on page 13-313.

For information on how to set up the V Nav Virtual Tracker, see 'Setting up the V Nav Virtual Tracker' on page 13-316.

V-Nav Inside Probe

V Nav Inside is a feature where the V Nav sensor is not external to the probe but is part of the probe.

Probes with V Nav Inside transmit/receive automatically after you activate V Nav.

Activate V-Nav

1. Begin an exam and optimize the image.
2. Press **V Nav** to activate Volume Navigation.
3. Perform Volume Navigation.
4. Press **V Nav** to exit V Nav. The following actions also exits V Nav: switching probes, recalling an image from the clipboard, starting a new patient, ending an exam, or selecting Exit and Clear from the Touch Panel.

V Nav Controls



Figure 13-133. V Nav Controls

- | | |
|---|--|
| 1. V Nav On/Off | 9. Zoom and Depth |
| 2. Touch Panel and Joystick Rotary Controls | 10. P1 |
| 3. 3D Dataset X Axis Rotation Control | 11. Left Set |
| 4. 3D Dataset Y Axis Rotation Control | 12. Right Set |
| 5. 3D Dataset Z Axis Rotation Control | 13. Trackball |
| 6. Windows Pointer | 14. Bottom Trackball key locks the V Nav Plane |
| 7. Comment | 15. Left/Right Key: Switches Display Mode |
| 8. Measure | |

V Nav Touch Panel

V Nav Setup Touch Panel Menu

Prior to using V Nav, set up the following parameters:

Table 13-57: V Nav Volume Touch Panel descriptions

| VNav Parameter | Description |
|---------------------------------------|--|
| Load | Loads the 3D Dataset From CD/USB (CD, DVD, or USB storage device) or From Database. |
| Save Volume | Saves current volume, including any GPS markers shown in the volume. |
| Image-Based Registration | The system automatically aligns CT/MR volume with the real time ultrasound live image. |
| Patient Data Check | Confirms patient's data |
| Reference Sensor | Specify which sensor you are using. |
| Orientation | Select Axial, Sagittal, or Coronal |
| Orientation Markers | Places orientation markers on the image. |
| Display Mode | Select Ultrasound only, 3D only, or Split Screen (both) |
| Clear/Reset | Allows you to clear plane registration(s), point registration(s) or reset all, which clears all registrations and resets the 3D Dataset to its initial position. |
| Exit and Clear | Clears the current 3D Dataset and exits V Nav; the 3D dataset is no longer available. |
| Virtual Tracker | Setup and select the Virtual Tracker. [Appears when the Virtual Tracker is present.] |
| Active Tracker | Select the Active Tracker sensor. |
| Window/Level (or Center/Width) Rotary | Set the brightness/contrast for the 3D Dataset. To set the brightness, adjust the Level; to set the contrast, adjust the Window. |

V Nav Touch Panel Menus

Table 13-58: V Nav Touch Panel 1 Descriptions

| V Nav Parameter | Description |
|---------------------------|--|
| Scan | Specifies which image is moving with probe motion: Ultrasound (US), 3D, or Both |
| Registration | Select the type of Registration, Plane, Point/All, Point/Best 3, or None. Auto Registration is an additional choice if a Tru3D Ultrasound dataset is loaded using auto registration. |
| Save Current Registration | Select to save the current registration |
| Control Priority | Specifies the priority of shared image controls: Ultrasound image or 3D Dataset. |
| Restore Registration | Select to restore a stored registration. |
| Display Mode | Select Ultrasound only, 3D only, or Split Screen (both) |
| Clear/Reset | Allows you to clear plane registration(s), point registration(s) or reset all, which clears all registrations and resets the 3D Dataset to its initial position. |
| Overlay | Displays the 3D dataset superimposed on top of the Ultrasound image. |
| Overlay Brightness | Adjusts the intensity level of the 3D Dataset. |
| Overlay Weight | Adjusts the intensity level of the 3D Dataset. |
| Show Needle Tip | Shows or hides the needle graphics. [Appears when the Needle Tracker is present.] |

V Nav Touch Panel Menus (continued)

Table 13-59: V Nav Touch Panel 2 Descriptions

| V Nav Parameter | Description |
|-----------------------------|---|
| Save Volume | Saves current volume, including any GPS markers shown in the volume. |
| Measure Accuracy | Press Measure Accuracy, then select a point on both the 2D Ultrasound image and on the 3D Dataset to tell you the distance as an indication of accuracy. |
| Calibration Delete | Used for calibration purposes, which is only available with a service key and performed by GE Service. |
| Store Registration to File | Press to save the current registration to a file. This is useful when you want to load another dataset with the same geometry. For example, both a T1 and T2 weighted MR series may be available. |
| Read Registration from File | Press to read a stored registration from a file. |
| Read Markers from File | Press to recall saved GPS markers from a file. |
| Show Scan Area | Shows or hides the Ultrasound scan area on the 3D Dataset. |
| Cut Mode | Select the cut mode: Cubic Plane, the 3D dataset slice in reference to the whole volume of data; Overview, fixed orientation slice; or Detailed, a slice in the same orientation as the current Ultrasound image. |
| Exit and Clear | Clears the current 3D Dataset and exits V Nav; the 3D dataset is no longer available. |

DICOM and Image Storage

Still Images

To store a still image, press **Freeze**, and then press P1. If you want to CINE back to find an image, you may need to set the Priority on the Touch Panel to Ultrasound.

Loops

To store a loop after you have frozen the image, CINE back, change the Priority to Ultrasound (if necessary), indicate the start and end points, Run the CINE Loop, Press P1.

Image-by-Image

To store individual images to a USB memory stick or external hard drive via the USB port, recall the image from the Clipboard, select Menu -> SaveAs. Type in the file name. We recommend that you select Image Only, Jpeg compression, Quality level 99. For CINE Loops, save as WMV. For stills, save as type Jpeg. Then press Save. Repeat for as many images as desired. When you take the USB device to another computer, the images are stored in the Export directory.

Entire Exam

You can use MPEGvue to store images for the entire exam. Insert the media (CD, DVD, USB device). Select Patient -> Data Transfer -> MPEGvue -> To. Select the patients (multiple patients can be stored using the Ctrl+Shift keys). Then press Transfer. The still images are stored in Jpeg format and Loops are stored in MPEG format. Images are stored in the Images directory, unless you select RunMeToStart. Then the images are displayed in a special viewer.

Save Volume

The system can save the volume and associated GPS markers as an image file in the exam.

The Save Volume key on the Touch Panel stores using the settings of whichever print key has Copy to Dataflow associated with it.

A saved volume can be loaded from the database and used as the pre-acquired volume.



The Volume is stored in Raw Data format. If you send the volume to PACS without the raw data, the volume will not be available if you later Query/Retrieve it from PACS.

Measurements and Comments

You can measure distance, angle, circumference, or area on the 3D Dataset. You can annotate and perform any system measurement on the Ultrasound image.

Using V-Nav

Magnetic field range of V-Nav Transmitter

The position of the V-Nav sensor can be detected correctly within the range shown below. Make sure that the V-Nav sensor is within this range.

Check the Environmental Quality indicator on the monitor for the detection accuracy while scanning.

NOTE: Remove the metal product from the region of the magnetic field to increase accuracy of position detection.

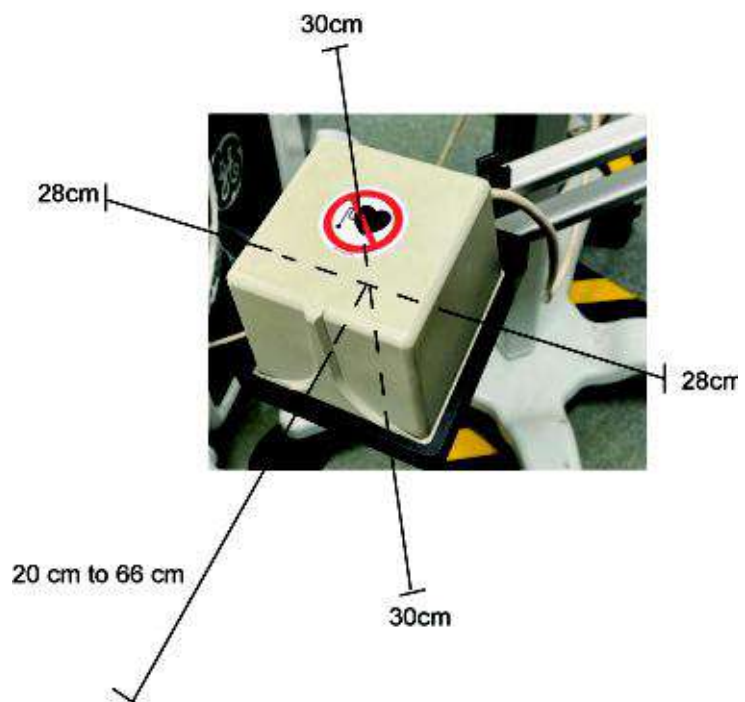


Figure 13-134. Magnetic Field Range from the Transmitter

From the center of the transmitter,

1. 30cm above and below
2. 28cm left and right
3. 20 - 66cm forward

Perform V-Nav Exam

In order to perform a V-Nav exam, you need to have acquired the 3D Dataset and set up the position sensing apparatus.

The workflow for V-Nav is to:

1. Import the dataset if using Query/Retrieve.
See 'Query/Retrieve' on *page 13-268 for more information.*
2. Perform the Setup (attach the sensors) as needed.
See 'Setting Up V Nav sensors' on *page 13-276 for more information.*

NOTE: *Probes with V-Nav Inside transmit/receive automatically after you activate V-Nav.*

3. Begin an exam; optimize the image.
4. Enter V-Nav.
5. Load the dataset.
6. Perform the registration.

NOTE: *Confirm that the plane orientation of the ultrasound image is the same as that of the loaded volume data before starting registration.*

7. Perform the exam.
8. Take measurements and store images via the Print key.



HINTS

Since Volume Navigation uses magnetic field to acquire probe position information, it may be affected by surrounding metal products.

If the image is flicked or misaligned, check the surroundings, such as the bed, the IV stand or the accessory, and move away those metal products from the magnetic field. If you use the bed with metal frame, it is desirable to be able to secure the distance from the metal frame using a thick mattress.

Ending an Exam

Press **V-Nav**, select **End Exam**, select **End Current Patient**, then select **Store all**. The system is ready for the next patient.

Perform the registration

Orient the Dataset and Pick a Slice

You can manipulate the 3D Dataset the same way you adjust any 3D volume.

Manipulate the dataset to pick a slice that most closely matches the area where you will hold the probe initially.

1. After the dataset has loaded, use the Zoom rotary to see the dataset in a larger size.
2. Use the Orientation key to select Axial, Sagittal, or Coronal to easily view the Dataset from different orientations.

You want the orientation that best matches the orientation of the patient.

NOTE: *If the data appears unacceptably blurred or smeared in one of these views, the dataset was not acquired with the appropriate settings for viewing the data in 3D.*

3. Pushing the X rotary rotates the dataset 90 degrees about the X-axis. Dialing the X rotary rotates the dataset about the X-axis in smaller increments. Same for Y and Z.

Note which points are identifiable in both the live Ultrasound image and in the 3D dataset. Remember that a point needs to be identifiable in all three dimensions. A point along a surface is often difficult to identify in three dimensions; but intersections of vessels, calcifications, or centers of structures can often be identified clearly in three dimensions.

Registering, Locking, and Translating the Image with the 3D Dataset

After you've loaded the 3D Dataset, you need to link the 2D Ultrasound image to the 3D dataset via Registration. You can register the 3D dataset to the Ultrasound image by Parallel Plane Registration or Point Registration.

Lock Plane: Align the section of displayed volume data with the vertical and horizontal orientations of the ultrasound scan plane. Match the state of inspiration and expiration with the loaded volume data and setting the probe orientation correctly to reduce the misalignment during the examination.

Lock Point: The position in the depth direction is adjusted at Lock Point. Synchronous display starts after setting Lock Plane. Set the reference point (Landmark) on the ultrasound and volume data. It can be set repeatedly.

NOTE: *Confirm that the plane orientation of the ultrasound image is the same as that of the loaded volume data before starting registration.*

NOTE: *DO NOT move the patient once you have registered the image; if you move the patient, you lose registration.*

Select the type of registration on the Touch Panel.

NOTE: *When switching probes in V Nav, the registration is maintained. You can register with one probe, then scan with any probe.*

Parallel Plane Registration

A plane registration constitutes a plane lock and a translation point.

To perform a Parallel Plane Registration,

1. Select **Registration** -> **Plane** from the Touch Panel.
2. Hold the probe parallel to the acquired (imported) 3D dataset, being careful not to tilt, twist, or rotate the probe.
3. Press the **Lock Plane** (bottom Trackball key) to lock the plane as parallel.
4. Define a translation point, by marking a common point in each image (Ultrasound and 3D Dataset) using the Windows Pointer and Trackball key labelled **Lock Point**. This allows the system to do an x, y, and z correction at that point.
5. Move the probe and ensure that this registration is correct.
6. Press **Save Current Registration** on the Touch Panel to save this registration. You can save up to five (5) registrations.

Adjusting the Registration

To adjust the registration, you could try several things.

1. Save the registration. It's always a good idea to save the registration first.
2. Update the translation point in the area of interest.
3. Turn on Overlay and use the Z Rotary to adjust the 3D overlay relative to the Ultrasound image.
4. Holding the probe still during the following steps: move the windows pointer over the overlay image, select the Overlay XY Trackball control, move the overlay relative to the Ultrasound image, press the Overlay XY key to lock in the adjustment.
5. Manually adjust the parallel plane lock. Use the scan key on the Touch Panel to select only the 2D Ultrasound or the 3D dataset. Adjust the probe to make the scanned image match the locked image and then press **Lock Plane**.
6. Start over by using the Clear/Reset -> All control on the Touch Panel.

Point Registration

To perform a Point Registration,

1. Select **Registration** -> **Point** from the Touch Panel.
2. Find a common point on both the 3D Dataset and Ultrasound image. Use the Windows Pointer to select each point, then press Set Point each time. Do this 3 times.

NOTE: *You can select either a Point/Best 3 or Point/All. If you identify more than three point pairs, Point/Best 3 takes the best 3 point pairings. Point/All uses all point pairs that you identify when calculating the Point Registration.*

3. Move the probe and ensure that this registration is correct.
4. Press **Save Current Registration** on the Touch Panel to save this registration. You can save up to five (5) registrations.

NOTE: *Point and Plane registrations are stored separately.*

To switch between Point and Plane Registration, change the registration via the Touch Panel.



HINTS

Performing a plane registration is not necessary to do a point registration, but is recommended because it simplifies the process as the probe can easily be used to search for the point pairs in both the Ultrasound image and in the 3D Dataset.



HINTS

When using a point pair to complete or update a registration, registration error is minimized at that point and will increase further away from that point. Therefore, registration accuracy near the anatomy of interest may be improved by marking the last point pair, or adding a point pair, in close proximity to the anatomy of interest.

Auto Registration with Tru3D

Auto-registration is available when fusing to a Tru3D dataset.

When entering V Nav directly from a Tru3D acquisition, the Tru3D volume is automatically loaded into V Nav and automatically registered.

When a Tru3D data set from the current exam is loaded into V Nav from the clipboard or by loading from the database, the user shall be prompted to automatically register to the data set.

NOTE: *Tru3D auto registration is possible if the magnet and patient have not been moved since the Tru3D data set was acquired. If the magnet or the patient have moved since the Tru3D dataset was acquired, you need to perform a parallel plane or point registration.*

Auto Registration appears as a choice on the Registration control only if auto registration was initially used. You can manually select a different registration method even if Auto registration was initially selected when the volume was loaded.

Overlay

Use the Overlay control on the Touch Panel to overlay the 3D Dataset image onto the Ultrasound image. Use the Overlay Brightness and Overlay Weight joysticks to adjust the intensity level of the 3D Dataset.

By pointing at the overlay (Overlay XY) with the Windows pointer and clicking on it with the Left Set Key, the overlay can be dragged via the Trackball in X and Y directions in an effort to achieve a better registration. To lock in the adjustment, press the Left Set Key again.

By pointing at the overlay with the Windows Pointer and clicking on it with the Right Set Key (Overlay Z), the overlay can be dragged via the Trackball in the Z direction in an effort to achieve a better registration. To lock in the adjustment, press the Left Set Key again.

One technique to improve registration is to adjust the overlay in X and Y as stated above and to also do any necessary Z axis rotation as well. Then, turn the probe 90 degrees and repeat these same adjustments. These steps can be repeated iteratively.



In an area with bony structures that show up bright with the 3D Dataset, applying an overlay with a low percentage can be a nice way to show bone structure with an Ultrasound tissue image.



When performing Overlay XY or Overlay Z adjustments, it is important to hold the probe still from the time the adjustment key is pressed until it is pressed a second time to lock in the change.

Volume to Volume Registration

Datasets can come from different exams, can be from different orientations, and can be from different imaging modalities. Because datasets are not registered to one another, the system allows auto or manual volume-to-volume registration

To register multiple volumes,

1. Load multiple volumes (not restricted to one exam).
2. Clicks on the “link” icon. The “Select volumes for registration’ pop-up window appears.
3. Select the primary and secondary moving volumes. The primary volume is used for registration, the secondary volumes are transformed using the registration parameters of the primary volume.

For example, If the user has a CT1 volume and a CT2 + PET volume loaded, they would select the CT1 as the fixed and the CT2 as primary, and the PET as the secondary moving volumes. After the registration they will have CT2 + PET registered to CT1.

4. Specify if the result should be added as a new registered volume or overwrite the moving dataset. You can also or create the result as an additional volume (‘Add registered volume’ is not an option if 5 volumes already exist).

A user can perform two types of manual registration: a registration based off of a single common point pair identified in each volume (Translation); or a registration based off of three or more common point pairs identified in each volume (Registration).

Volume to Volume Registration (continued)

- Choose Manual, Auto, Semi Auto or Indirect volume to volume registration.



Figure 13-135. Select volumes for registration

NOTE: *If you select Auto registration, also choose the type (bone, tissue or some combination). If you select Manual registration, identify three point pairs between the two volumes. Only one point pair is usually needed for datasets with different orientations from the same exam.*

During manual volume to volume registration, the user is able to scroll through either the fixed volume (shown on the left) or the moving volume (shown on the right) by moving the Windows Pointer over the image, pressing the trackball key labeled Scroll Z and then using the trackball to perform the scrolling.

Volume to Volume Registration (continued)

NOTE: *During manual volume to volume registration, the user is able to move the volume up and down or left and right on the screen by moving the Windows pointer over the image, switching from Primary to Secondary with the top trackball key, pressing the trackball key labeled Move XY and then using the trackball to perform the XY movement.*

When doing manual registration, the left volume is the fixed volume and the right volume is the moving volume. The right trackball key is used to scroll through the datasets and find anatomical points while the left trackball key is used to mark the points. Once a single point pair is marked, the bottom trackball key is labeled Apply Translation which is all that is needed to register the moving volume (oblique, e.g.) to the fixed volume (axial, e.g.).

NOTE: *A single point pair is sufficient if the two datasets have the same orientation but are shifted with respect to each other.*

Once three point pairs are marked, the bottom trackball key is labeled Calculate Registration which then registers the moving volume to the fixed volume.

NOTE: *Three point pairs or more are needed if the datasets do not have the same orientation or are at oblique angles with respect to each other.*

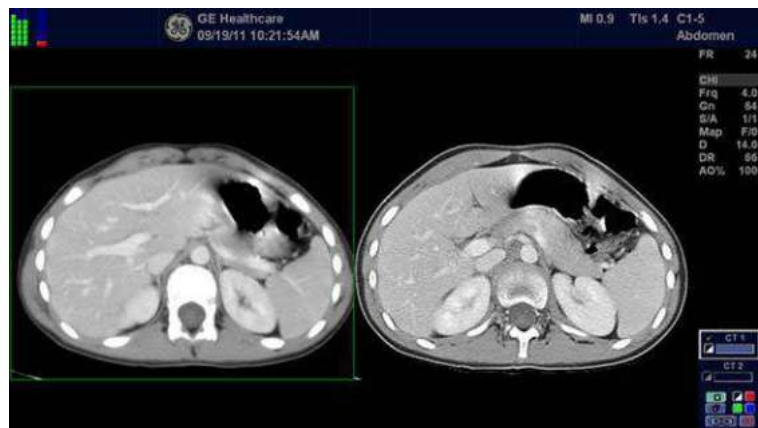


Figure 13-136. Volume to Volume Registration

Volume to Volume Registration (continued)

Once three point pairs are marked, the bottom trackball key is labeled Calculate Registration which then registers the moving volume to the fixed volume.

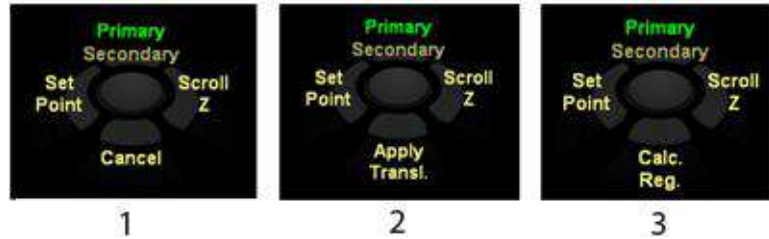


Figure 13-137. Trackball key status

1. No point pairs identified
2. One point pairs identified
3. Three or more point pairs identified

Image-Based Registration

NOTE: If you load the volumes beforehand, the calculation will start immediately when you press **Image-Based Registration** button.

NOTE: The liver vasculature must be included in both the 3D ultrasound and CT/MR volume in order for the registration to succeed.

1. Press **VNav** to enter Volume Navigation.
2. Press **Image-Based Registration** on the Touch Panel.
Select **Acquire** to acquire a new 3D ultrasound volume or **Load** to load an existing 3D ultrasound volume according to a navigate window.

NOTE: Need sensor information for 3D ultrasound volume.

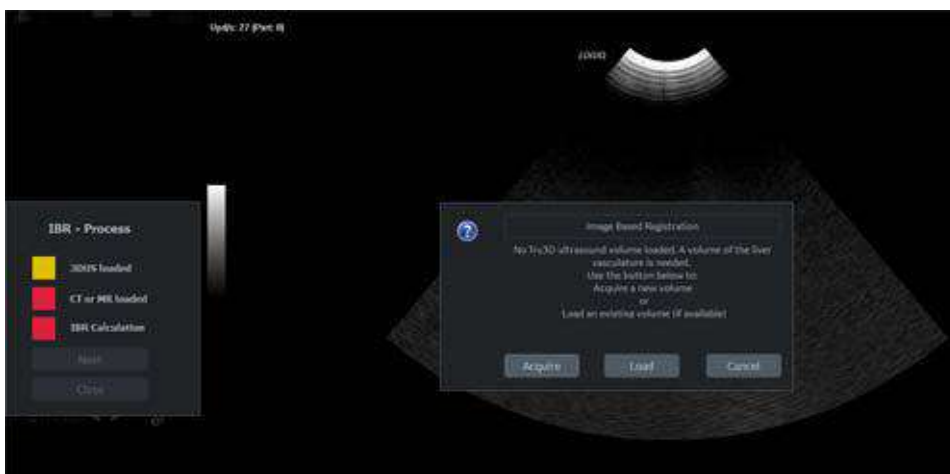


Figure 13-138. Navigate window for 3D US Volume

3. After 3D ultrasound volume is loaded, 3D US loaded icon turns green. Press **Next** on IBR-Process window.

Image-Based Registration (continued)

4. Load portal phase volume of CE-CT or hepatobiliary phase volume of EOB-MR from CD/USB or Database according to a navigate window.

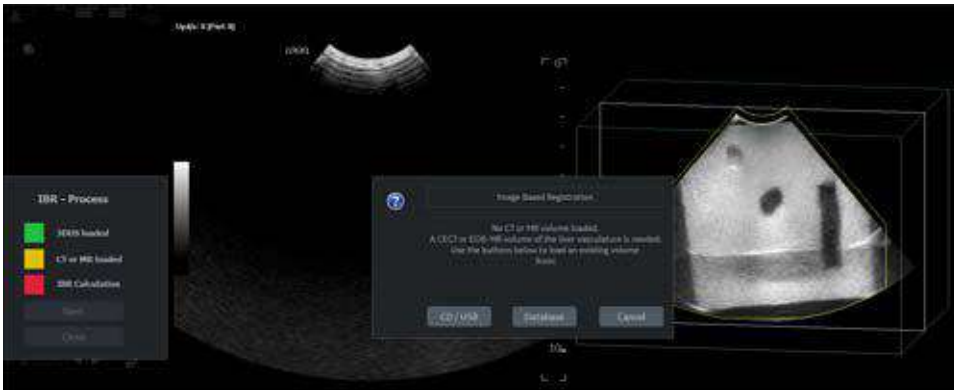


Figure 13-139. Navigate window for CT/MR volume

5. After CT/MR volume is loaded, CT or MR loaded icon turns green. Press **Next**.
6. If multiple volumes are loaded, select volumes as below. Press **Auto** to start the calculation.

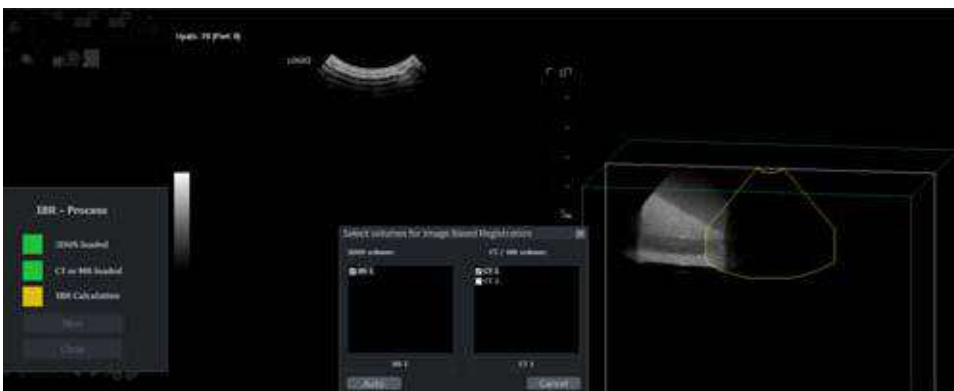


Figure 13-140. Select volumes

Image-Based Registration (continued)

7. When the calculation is done, LOGIQ Fortis displays the aligned ultrasound live image and CT/MR image.

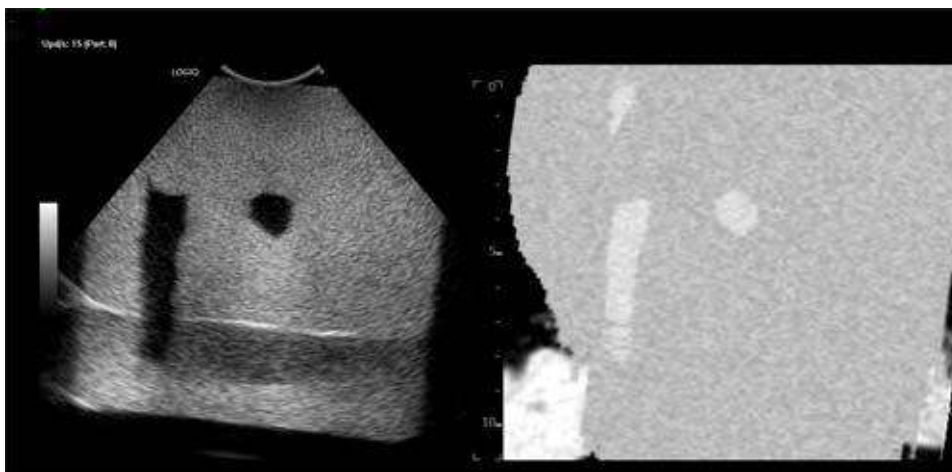


Figure 13-141. Image-Based Registration

Compare Volume

You can compare pre-registered volumes in a side by side display.

1. Press **Volume Compare** button in the multi volume menu.
2. The dialog for selecting left and right side volumes displays. Multiple selection is possible.

NOTE: *Volumes need to be from the same group of pre-registered volumes.*

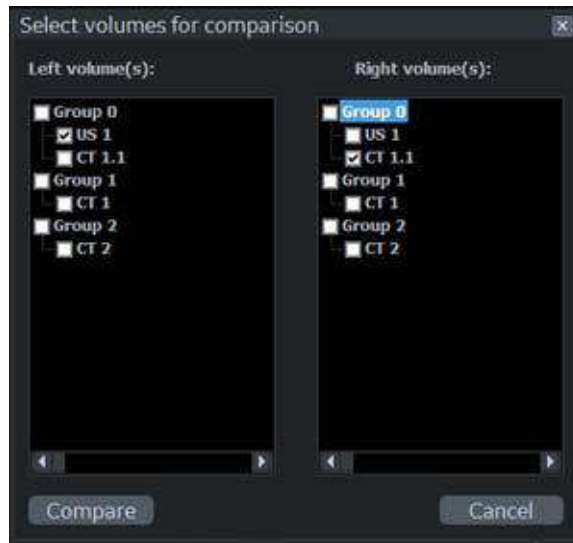


Figure 13-142. Select volumes for comparison

3. The selected volumes is shown side by side and any interaction (scroll, zoom, rotation etc.) is applied to both sides simultaneously.

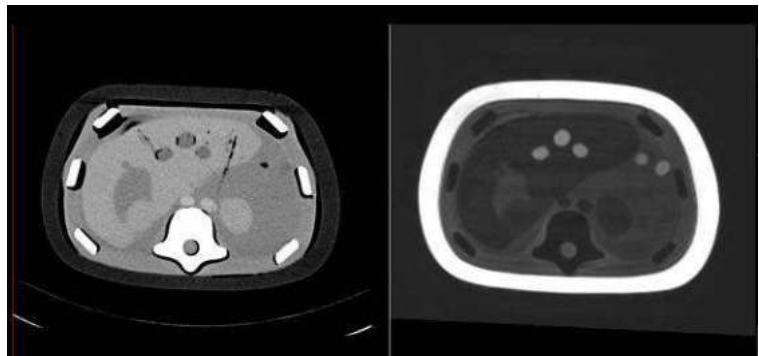


Figure 13-143. Compare Volume

Advanced GPS Markers

"GPS" -- Position Marking V Nav

Position markers can be 'placed' on a stationary anatomical structure within the body and then tracked with the existing position sensing system. The marker position is projected onto the current Ultrasound image in a graphical way that indicates the relative position of the point compared to the image. GPS markers track a particular point in space.

Controls

Selecting the GPS tab switches trackball control to GPS markers with 2D Marker or 3D Marker activated.

Table 13-60: GPS Controls

| Preset Parameter | Description |
|---------------------|---|
| 2D Marker | Allows the user to select between a Point Marker and a Target Marker. |
| 3D Marker | Allows the user to select between an Ellipsoid and Spherical Marker. |
| Show All Markers | Shows all markers, independent of Active State. |
| Show Active Markers | Shows/Hides all markers with Active State "On". |
| Active State | An individual GPS marker can be shown/hidden using the Active State control (turn to select, push to toggle state). |
| Delete | Rotate the control to select a specific GPS Marker to delete; then push the control to delete the marker. |
| Delete Markers | Deletes all active GPS Markers following the user's confirmation. |
| Mark Needle Tip | Mark Needle Tip allows a 2D or 3D GPS Marker (whichever is selected) to be put at the current tracked needle tip location. The marker is not attached to the needle and will not move as the needle moves. |
| Show Distance | Toggles between showing and hiding all defined distances. |
| Attach to Needle | If the 3D Marker key is selected and needle tracking is active, the "Attach To Needle" key initiates a 3D GPS Marker whose center (in the case of a sphere) or whose first long axis point (in the case of an ellipsoid) is placed at the needle tip. |
| 3D Edit | The 3D Edit key is available only if a 3D GPS Marker is currently selected via the Delete or Active State rotaries. Selecting the Edit key causes the Edit GPS Touch Panel menu to appear. |

Table 13-60: GPS Controls (Continued)

| Preset Parameter | Description |
|---------------------------|---|
| Dist Start/Dist End/Clear | <p>Rotating the Distance Start and Distance End rotaries cycles through the list of GPS markers including the Needle Tip if needle tracking is active. When two different GPS markers are identified on the Distance Start and Distance End Rotaries, the Distance End rotary is labeled "Define" or "Clear". If the distance is not already defined, the label is "Define". If the user then pushes the rotary, the distance between the Start and End GPS Markers is defined, and the label switches to "Clear".</p> <p>The initial value of the Distance Start rotary is the first GPS marker. The initial value of the Distance End rotary is the needle tip if needle tracking is active or the 2nd GPS marker if not. In the case of a 3D GPS Marker, its center point is used for all distance calculations.</p> |

2D GPS Markers

GPS Markers track a particular point in space. As you adjust the probe/image position, the point is projected onto the current image. If the point intersects the current image, it is displayed as a green cross. As the point gets further away from the current image, the cross turns into a bigger and bigger square. The color of the square indicates the direction; red represents one direction and blue represents the other direction. You can use 'GPS' to track an anatomical marker on the Ultrasound image or for biopsy needle guidance, for example.

You can use GPS Markers with an imported dataset, or independently of an imported dataset.

There are two types of GPS Markers: Point and Target. A Point Marker assigns a number. Each point marker you set has a unique number. A Target Marker only allows one target point. If you try to place another target marker, the target moves to the newly-indicated position.

To place a Target or Point Marker, use GPS Marker to specify Target or Point. Place the Windows Pointer in the location where you want to set the marker, then press the Set GPS Key.

3D GPS Markers

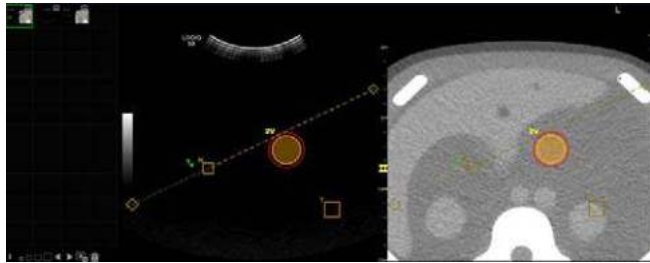


Figure 13-144. 3D GPS Marker example

NOTE: When using GPS Markers with a registered 3D dataset, a point marked in either image shows up in both images. GPS Markers are stored with the image.

NOTE: All 3D GPS Markers are appended with the letter "V" (for volume).

NOTE: The inner surface of the 3D GPS marker and margin contours can be colored using the colors of the marker/margin. This color is transparently overlaid on top of the US image below.

Type of Markers

- **Ellipsoid**

The user places one GPS Marker (Set GPS on the right trackball key) at one end of the desired long axis. The point is marked with a marker named LA that behaves like a point marker. The distance between this first long axis point and the current cursor position is displayed in the status bar to allow the user to mark an ellipsoid with a defined long axis length. The user then places a second GPS Marker (Set GPS on the right trackball key) at the other end of the desired long axis. The ellipsoid will be drawn and the long axis endpoints will be marked with crosses that will be displayed only if they are hit by the plane.
- **Spherical**

The user places the GPS Marker (Set GPS key on right trackball key) at the center point of the anatomical structure of interest. The center of the sphere is marked with a cross, that is only displayed if the plane hits the center.

Editing a 3D Marker

Upon creating a 3D GPS marker, the Edit GPS menu appears on the Touch Panel.

Table 13-61: Edit GPS Marker - Sphere/Ellipsoid

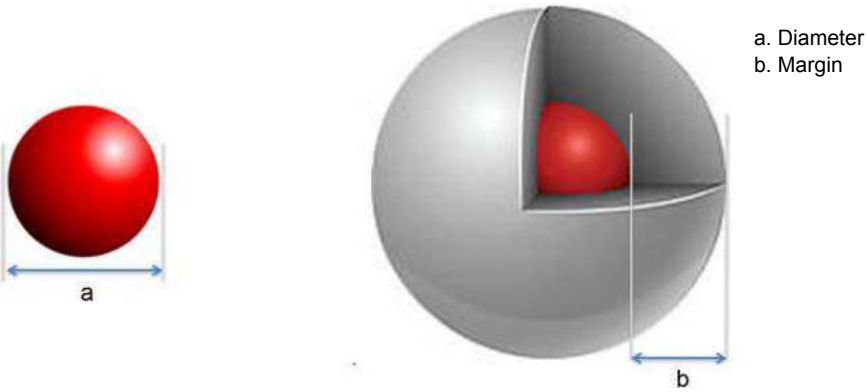
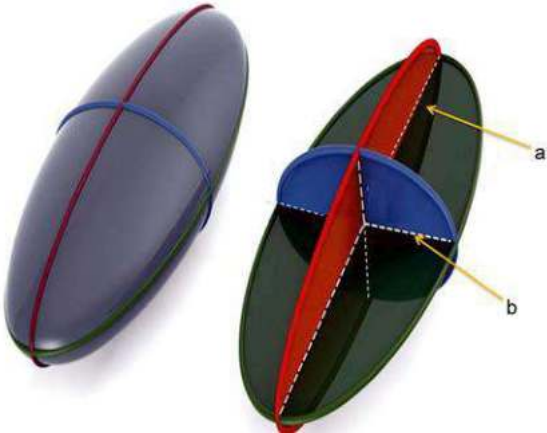
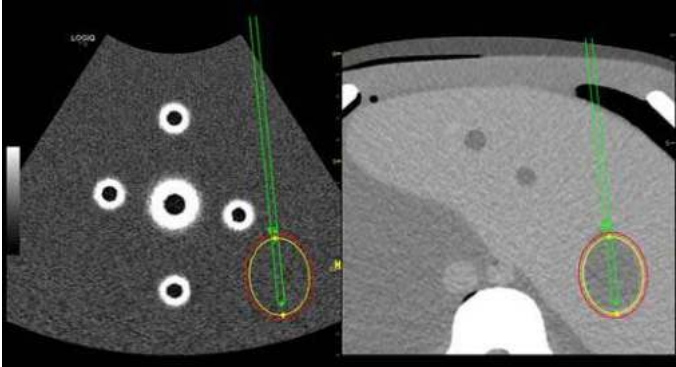
| Preset Parameter | Description |
|---|---|
| Done | Return to main GPS Touch Panel. |
| Reposition | Set Key on the image will reposition the sphere when Reposition key is on (otherwise Set Key creates a new sphere). |
| Select | Select attributes that were previously saved. |
| Save As | Save and name the current sphere attributes (size, margin, colors and transparency). |
| Color | Change color (yellow, Red, orange, blue, purple, pink or white). |
| Margin Color | Change margin color. |
| Margin Dist. | Adjust margin size. |
|  | |
| Diameter | Adjust sphere diameter. |
| Inner Alpha/Margin Alpha | Adjust transparency of main area and margin in percent i.e. between 0 (= only ultrasound image) and 100 (= only marker/margin color). |
| Detach from Needle | The Detach From Needle key is only available if the 3D GPS Marker being edited is attached to the needle. Pressing the key causes the 3D GPS Marker to be removed from the needle and placed at the current location of the tracked needle tip. It will no longer move with the needle tip. |

Table 13-61: Edit GPS Marker - Sphere/Ellipsoid (Continued)

| Preset Parameter | Description |
|---|--|
|  | <p>a. The length of the red ellipse is the long axis of the ellipsoid. b. The diameter of the blue circle is the short axis of the ellipsoid.</p> |
| Shift/Rotate (Ellipsoid) | Shift along long axis or rotate about end of long axis. |
| Short Axis/Long Axis (Ellipsoid) | Adjust short and long axis lengths. |
| Show Ablation Needle Path | <p>For ellipsoids, the user can display the needle path and tip position.</p>  |

NOTE: Default of the parameters is configurable in Utility -> System -> System Imaging -> V Nav 3D Marker.

Editing a 3D Marker (continued)

Move XY GPS allows the 3D Marker to be dragged to a new location in the current image plane.

Repos. GPS allows the 3D Marker to be recentered on the current image plane.



Figure 13-145. Trackball key for GPS Marker

NOTE: *The initial attributes of a 3D GPS marker match the last 3D GPS marker that was created.*

NOTE: *While on the Edit Menu, the 3D GPS marker being edited is shown in its normal color while all other 3D GPS markers are dimmed. After exiting the Edit Menu, all markers are returned to their normal color appearance.*

Saving and Selecting a 3D GPS Marker

To save a 3D GPS Marker,

1. For markers that are used often, such as kill zones associated with a particular ablation needle, select **Save As** from the Edit GPS Touch Panel.
2. The Save 3D GPS Marker pop-up menu appears. Name the GPS Marker.

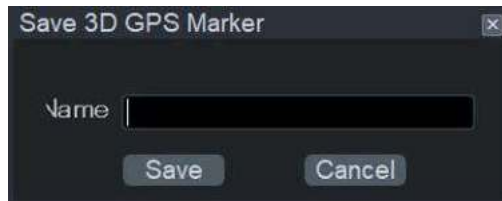


Figure 13-146. Saving a 3D GPS Marker

To select a 3D GPS Marker,

1. Select **Select** from the Edit GPS Touch Panel. The Select 3D GPS Marker pop-up menu appears.



Figure 13-147. Select 3D GPS Marker

2. Highlight the desired Sphere or Ellipsoid, then press **Select**.

Attach to Needle/Detach from Needle

The user attaches (and detach) 3D GPS markers to (from) a tracked needle tip and places a 2D GPS marker at the location of a tracked needle tip.

If the 3D Marker key is selected and needle tracking is active, the **Attach To Needle** key initiates a 3D GPS Marker whose center (in the case of a sphere) or whose first long axis point (in the case of an ellipsoid) is placed at the needle tip.

In the case of an Ellipsoid, it's long axis is aligned with the needle direction, i.e. both long axis points are placed on the needle axis. The 3D GPS Marker is not in a fixed location, but is attached to the needle and therefore moves with the needle tip.

The key is only available if needle tracking is enabled and the 3D Marker key is selected.

To detach the 3D Marker from the needle, the user can either press the **Detach from Needle** button on the GPS Edit page or the Mark Needle Tip on the GPS page.

Mark Needle Tip

Mark Needle Tip allows a 2D or 3D GPS Marker (whichever is selected) to be put at the current tracked needle tip location. The marker is not attached to the needle and will not move as the needle moves.

NOTE: *You must use Tip Tracking or Virtual Tip Tracking.*

1. Place a needle.
2. Before extracting the needle, select **Mark Needle Tip** to get a 2D or 3D GPS marker at the needle tip.

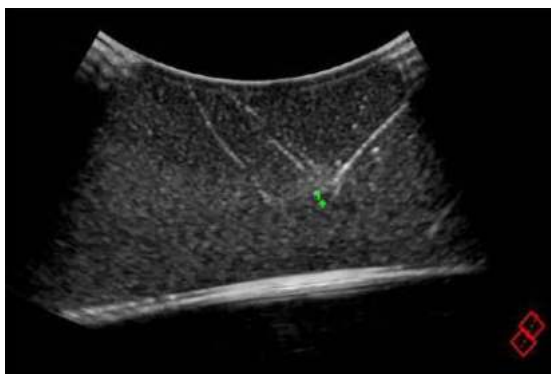


Figure 13-148. Mark Needle Tip - Example

GPS Distance

The user displays the distance between two GPS markers or a GPS marker and a tracked needle.

- Between any two GPS markers (2D Point, 2D Target, 3D Sphere, 3D Ellipsoid)
- Between any GPS Marker and the tracked needle tip (Tip-Tracked, virtual tip-tracked)

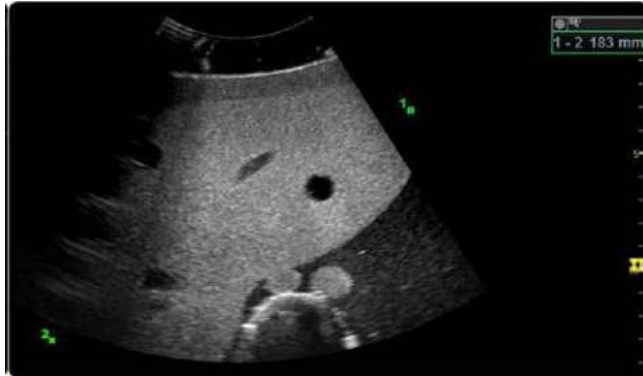


Figure 13-149. GPS Distance - Example

Procedure

1. After marking GPS locations, rotate Dist. Start to select 1st marker.

NOTE: *Cycle through the list of GPS markers including the Needle Tip if needle tracking is active.*

2. Rotate Dist. End to select 2nd Marker. Push Define to display the distance.

NOTE: *If the distance is not already defined, the label is "Define". If the user then pushes the rotary and the distance between the Start and End GPS Markers is defined, the label switches to "Clear".*

In the case of a 3D GPS Marker, it's center point is used for all distance calculations.

When distances are defined to be displayed, they are displayed in the same location as 3D measurement results. When regular 3D measurements are displayed, the distance measurements are not shown. The label of a distance measurement is the numerically lowest GPS Marker followed by the numerically larger GPS Marker. If the needle tip is one of the markers, it is listed second. Some examples are "1-2V", "3X-Needle", and "5-7P".

V Nav Trackers

V Nav supports the V Nav Needle Tip Tracker, the Virtual Tracker and Active Tracker.



Figure 13-150. Volume Navigation Connections

1. V Nav Receiver Connector (2 cables)
2. V Nav Needle Tip Tracker/Virtual Tracker Sensor Connector
3. V Nav Active Tracker Connector
4. V Nav Transmitter Indicator
5. V Nav Transmitter Connector

NOTE: *Pink probe brackets and sensors are necessary when using the Needle Tracker or Virtual Tracker*

V Nav Trackers (continued)



HINTS

- Remember to exit V Nav with the V Nav control BEFORE disconnecting and connecting the V Nav Trackers.
- With the V Nav Trackers attached, tracking can be turned on/off using the Show Needle Tip button.
- When using V Nav Tracking, it is important to have high Environmental Quality readings.
- When Needle Tracking is turned on, the Needle Tracking graphics show the:
 - Needle Tip and projected path on the live image
 - The intersection point with the current image when not in plane
 - Markers to assist with guiding the needle in plane with the current image
- The combination of Fusion and Needle Tracking is available once the volume dataset is registered. By selecting the Needle in Plane button, the volume dataset can show the needle in plane rather than the same plane as the live Ultrasound image.
- You can push the Z-Rotation Rotary to rotate the needle path plane about the needle axis (coarse adjustments). Rotating the Z-Rotation Rotary can be used for fine adjustments.

Setting up the V Nav Needle Tip Tracker

The V Nav Needle Tip Tracker allows you to insert a V Nav tracker inside the Needle to track where the needle tip is inside the body. The Needle Tip Tracker makes use of a needle assembly (combination of stylet and sheath) where the stylet has a hollow core in which a position sensor receiver may be placed, thereby placing the sensor near the tip of the stylet. The Needle Tip Tracker tip is annotated with an “N.”

To set up the V Nav Needle Tip Tracker, you need the CIVCO eTRAX Needle System Starter Kit.

1. The Kit includes the eTRAX Sensor as well as 5 sterile packages. Each sterile package contains a needle assembly (combination of stylet and sheath) and a cover for the sensor handle and cable.



Figure 13-151. Needle Tip Sensor and Cable Close-up

2. The Needle Sensor fits inside the needle assembly. Prior to performing the procedure, you need to cover the sensor handle and cable.
3. Advance the sensor all the way into the needle assembly.

Setting up the V Nav Needle Tip Tracker (continued)

4. The Needle assembly locks into place with the Sensor handle.



For illustration purposes only, the needle sensor is shown without a cover. Always place a cover over needle sensor to protect patients and users from cross-contamination.

5. Using proper sterile technique, insert needle sensor through opening in cover, taking care to minimize bending of needle sensor.
6. Extend cover over needle handle.
7. Inspect cover to ensure there are no holes or tears.
8. After you have the Needle Assembly placed at the desired anatomical location, you can unscrew the stylet from the sheath and remove the stylet (and sensor). The procedure needle can be placed in the sheath to perform the procedure.
9. Remove the Sensor and Needle
10. The site is now ready for the procedure (core biopsy, ablation, etc.).

Setting up the V Nav Needle Tip Tracker (continued)

NOTE: Dispose of the needle assembly and sensor cover. The Needle sensor should not be disposed.

NOTE: You DO NOT need to sterilize the Needle Sensor. Instead, clean and disinfect the needle sensor the same way you would a probe, taking care not to bend the sensor.

NOTE: The Tracker must be used in conjunction with a probe that has a V Nav Bracket. You need three (3) sensors: two (2) sensors attached to the probe and one (1) Tracker sensor. However, if you are using a V Nav Inside probe, no sensors need to be attached to the probe and only the sensor for the tracker is needed.

V Nav Virtual Tracker (Part of V Nav Option)

The V Nav Virtual Tracker allows you to attach a sensor to the shaft of the needle (away from the tip). The position of the needle tip and the projected needle path are projected onto the 2D Ultrasound image. The virtual needle tip is annotated with a "V."

Setting up the V Nav Virtual Tracker

To set up the Virtual Tracker, you need the CIVCO VirtuTRAX Starter Kit.

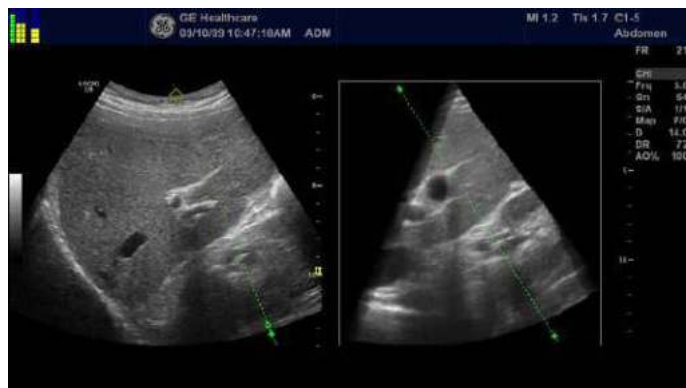


Figure 13-152. V Nav Virtual Tracker

1. The kit includes the VirtuTRAX Sensor as well as 5 sterile packages. Each sterile package contains a sensor bracket, a cover for the sensor, and rubber bands for the cover. Insert sensor inside cover. Place covered sensor in sensor bracket. Push down on sensor. Push down until sensor snaps into place.

Setting up the V Nav Virtual Tracker (continued)

2. Insert needle into insertion point of the bracket, making sure that the arrow on the side of the bracket points toward the needle tip. Rotate knob to tighten needle holder to adjust it to the needle's gauge.
3. Assembled V Nav Virtual Tracker
4. Attach Virtual Sensor to the system. Connect V Nav sensors to the system.
5. You are ready to calibrate the Virtual Tracker. See Calibrating the V Nav Virtual Tracker procedure below.
6. To track the needle, the system needs to know the distance from the sensor bracket to the needle tip.
7. To provide the distance, select the V Nav Virtual Tracker control. Details are provided below.



8. On the display the virtual needle tracker appears like the needle tip tracker except that the needle tip is annotated with a "V."

NOTE: *Dispose of the sensor bracket and sensor cover. The sensor should not be disposed.*

NOTE: *You DO NOT need to sterilize the sensor. Instead, clean and disinfect the sensor the same way you would a probe.*

NOTE: *The Tracker must be used in conjunction with a probe that has a V Nav Bracket. You need three (3) sensors: two (2) sensors attached to the probe and one (1) sensor attaching to the needle sensor bracket.*



Because the sensor is away from the tip of the needle, the system cannot detect needle bending. When the needle bends, the projection of the needle trajectory and the representation of the needle tip will vary with respect to the actual needle trajectory and tip position.

Calibrating the V Nav Virtual Tracker

Method 1. You enter the needle length.

1. Select Virtual Tracker.
2. Enter a device name and specify a length. Press OK (Length is measured from the tip of the needle inserted to the far surface of the sensor bracket, measured along the needle shaft).
3. Check the length by placing the needle tip on the center of the probe face.
4. There should be a 'V' on the probe face in the image.

Method 2. You define the needle length via the image.

1. Select Virtual Tracker.
2. Enter a device name, and click on Define via Image. Press OK in the dialog.
3. Set the tip on the center of the probe face, move windows cursor to that point on the image and press Set.
4. The tip becomes marked with a 'V' on the image, initially on the probe face.

Existing Virtual Tracker devices can be selected and their calibrations modified if needed.

Active Tracker

The Active Tracker is a device that consists of four markers that show up in a volume imaging dataset such as CT or MR. The markers are in known positions relative to each other such that the orientation of the Active Tracker can be uniquely determined based on the marker positions in the image. The device also holds a position sensor in a known position relative to the markers. Holes are provided in the Active Tracker so that its location can be marked on the body.

When the Active Tracker sensor is attached to the Active Tracker device, it can be used as a reference sensor. This means that all tracking is done in relationship to this sensor rather than in relationship to the transmitter.



Figure 13-153. Left, Active Tracker - Right, CT of Active Tracker

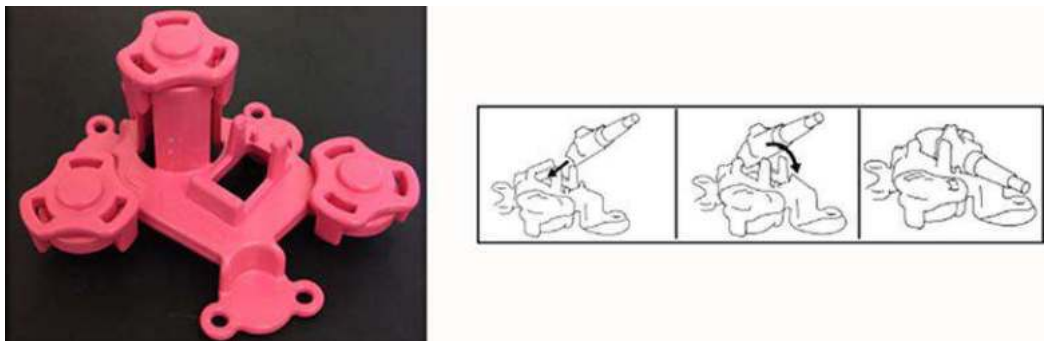


Figure 13-154. MR Active Tracker

Active Tracker (continued)

The Active Tracker adds sensor-based auto registration for CT/MR. An Active Tracker device, which can hold a sensor, is placed on the patient during the CT/MR scan and then detected in the CT/MR images to facilitate an auto registration. CT/MR uses the same Active Tracker device as a Reference Sensor, meaning that tracking is done relative to the sensor attached to the Active Tracker. Provides some breathing compensation, and allows registration and GPS markers to be maintained in case the transmitter/patient moves.



Figure 13-155. Active Tracker Setup and Positioning

1. Connect the following sensors to the V Nav Module. V Nav Probe Connectors (into Slots 1 and 2). Active Tracker Connector. Transmitter Connector.
2. Ensure that the probe has the V Nav attachment in place, along with the two V Nav Sensors.
3. Attach the CT/MR Active Tracker to the sensor.
4. Position the Active Tracker on the patient.

Using the Active Tracker

Perform CT/MR exam.

1. Apply sensor.

For an MR Exam, avoid having the MR coil touch the MR Active Tracker.

- a. Place the MR Active Tracker where there is a gap in the coil.

NOTE:

The MR Active Tracker must be in the area being scanned during the MR. It is good to place the Active Tracker on a rigid area, such as the xyphoid, and good to place it in the vicinity of the intervention, but still out of the way.

- b. Use pads (available in the MR suite) to keep the coil from touching the MR Active Tracker.

2. Perform CT/MR scan.

Scanning the patient,

1. Use the Active Tracker to hold the sensor.
2. Tape the sensor to the body. First, clean the area, then peel and stick the sensor to the body.
3. Choose the reference sensor on the Touch Panel.

NOTE:

If you choose the Active Tracker for Auto Registration, the sensor is automatically selected as the reference.

4. Load MR/CT dataset.

With Sensor and Active Tracker

In order to acquire an ultrasound volume and auto register live ultrasound to it at a future time, perform the following steps:

1. Use a probe with VNav position sensors attached to or built into the ultrasound probe.
2. Attach the Active Tracker device to the patient and connect the active tracker sensor to the device.
3. Using a body marking pen, mark the position of the Active Tracker on the body using a body marking pen and the four holes in the base of the Active Tracker.
4. Enter Tru3D and select the acquisition as "With Sensor + Active Tracker"
5. Perform a Tru3D sweep as usual and store it as usual.

Entering VNav directly from Tru3D or entering VNav and then loading the saved Tru3D data set will allow automatic registration of the live ultrasound to the Tru3D data set. If you want to automatically register to the Tru3D data acquired with Active Tracker at a future time, perform the following steps:

1. Follow steps 1 and 2 above except when placing the Active Tracker device use the four body marks to recreate the same position as before.
2. Enter VNav and load the Tru3D data set that was previously acquired with the active tracker attached. Perform sensor-based auto registration in the same way as for CT/MR.
3. Manually adjust the registration as needed.

Breast Productivity Package

Overview

There are three features in the Breast Productivity Package:

- Breast Lesion M&A — includes lesion measurement folders, show features, summary, etc.
- Breast Measure Assistant — contains the Auto Contour feature. It also has measurements related to Breast (distance to nipple, ratio).
- Breast Assistant, Powered by Koios DS — breast lesion analysis option.

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).

ACR BI-RADS® lesion classification can be notated via Show Features and Show Assessment.

The Breast Measure Assistant (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 Application Preset, select the Breast Application. Next, select the Right/Left Lesion (Select RtSide/LtSide below the Touch Panel).

Table 13-62: Breast Lesion M&A Touch Panel Controls

| Preset Parameter | 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 | <p>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 Trackball. Below is a list of each Feature with its possible notations:</p> <ul style="list-style-type: none"> • Shape: Oval, Round, Irregular, None (-) • Orientation: Parallel, Not Parallel, None (-) • Margin: Circumscribed, Indistinct, Angular, Microlobulated, Spiculated, None (-) • Echo Pattern: Anechoic, Hyperechoic, Complex, Hypoechoic, Isoechoic, Heterogeneous, None(-) • Posterior Features: No posterior features, Enhancement, Shadowing, Combined Pattern, None(-) • Associated features: Architectural distortion, Duct changes, Skin thickening, Skin retraction, Edema, Absent, Internal vascularity, Vessels in rim, Soft, Intermediate, Hard, None(-) • Calcifications: Calcifications in a mass, Calcifications outside of mass, Intraductal calcifications, None(-) • Special Cases: Simple Cyst, Clustered microcysts, Complicated cysts, Mass in or on skin, Foreign body including implants, Lymph nodes-intramammary, Lymph nodes-axillary, Vascular abnormalities AVMs, Vascular abnormalities, Mondor disease, Postsurgical fluid collection, Fat Necrosis, None(-) |
| Show Assessment | Specify the ACR BI-RADS Assessment: None (-), 0, 1, 2, 3, 4a, 4b, 4c, 5, 6. A comment field is available directly below the ACR BI-RADS Assessment. |
| Return | Press to return to the previous Touch Panel. |
| 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. |

Table 13-62: Breast Lesion M&A Touch Panel Controls (Continued)

| Preset Parameter | Description |
|--------------------|---|
| 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 (-), Homogeneous background echotexture-fat, Homogeneous background echotexture-fibroglandular, or Heterogenous background echotexture. |
| Delete Lesion | Press to delete this lesion. |

Worksheet and Summary Worksheets

Worksheets and Summary Worksheets are provided for all documented Breast Lesions.

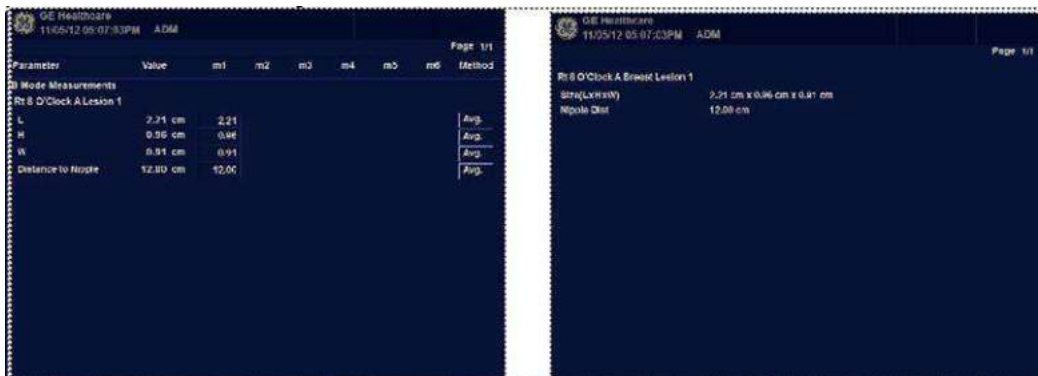


Figure 13-156. Breast Lesion Worksheet and Summary

To move to the next page, select the Page Change control beneath the Touch Panel.

NOTE: Only defined features are displayed on the Summary. To display the undefined features, select “Show Undefined Features” at the bottom of the Summary Worksheet.

Breast Measure Assistant (Auto Contour)

You can request that the system trace/outline the border of a breast lesion using Breast Measure Assistant (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.

To automatically detect the breast lesion on the display,

1. Press **Measure**.
2. Press **Auto Contour (HxW)** on the Touch Panel.
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 up and to the left.

NOTE: Include the entire lesion, even if additional surrounding tissue is included.

4. Press **Set** on the Trackball. A trace appears around the lesion.

NOTE: Multiple breast lesion traces may be generated by the system. To cycle through the generated contours, use the Select Contours rotary on the Touch Panel.

5. Inspect the generated contour for accuracy. If edits are necessary, execute steps 6-7 to edit the contour prior to accepting the measurement. Otherwise, skip to step 8.
6. To edit the selected contour, move the Trackball to appropriately size the edit region and then press **Set** on the Trackball.
7. The blue portion of the contour can be edited by moving the Trackball to the portion of the contour you want to edit.

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.

8. After you have completed your edits, press Done on the bottom Set Key or press Print to accept the measurement.

Breast Assistant, Powered by Koios DS (not available in all countries)

Breast Assistant, Powered by Koios DS is a Breast Lesion Analysis Option. Koios DS is integrated with the LOGIQ Fortis via DICOM. Koios DS is configured similar to a DICOM Service. The user can accept/dismiss analysis results. If accepted, these results are included in the DICOM Structured Report.

To perform Breast lesion analysis using Koios DS:

1. In B-Mode in the Breast Application, select the Breast Productivity Package Lesion # then press **Koios** via the Touch Panel.

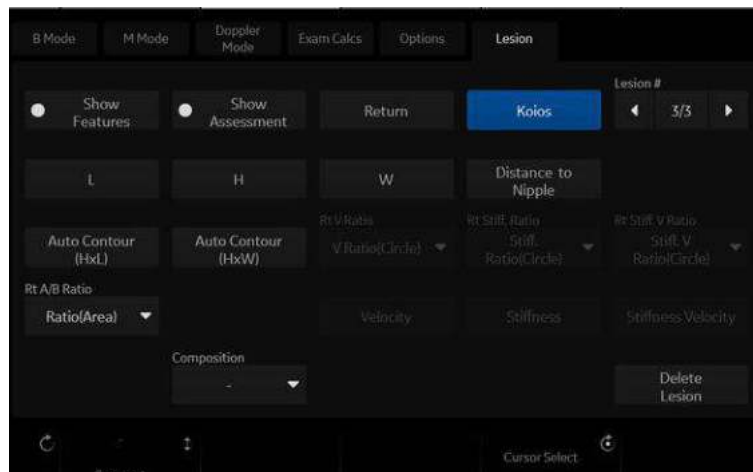


Figure 13-157. B-Mode Touch Panel in Breast Application

NOTE: *Koios DS analysis requires a frozen dual B-Mode image with a Length, Width, and Height measurement.*

2. Measure the breast lesion (Length, Width, Height) over 2 orthogonal scan planes; or measure the lesion using Auto Contour.
3. Using the Trackball control, press **Analyze**.

Breast Assistant, Powered by Koios DS (not available in all countries) (continued)

4. Koios DS analyzes the lesion (a pop-up appears, “Analyzing”).



Figure 13-158. Koios DS Analysis

5. A pop-up appears with the result of the Koios DS risk assessment and its alignment to an ACR BI-RADS® or U1-U5 risk category.
6. If the assessment is accepted, it becomes part of the exam including being displayed on the exam's Summary Report and included in the DICOM SR data associated with the exam. If the assessment is dismissed, the results are not stored as part of the exam.

NOTE: For additional details of the Koios DS assessment, refer to Koios Medical's Koios DS product documentation.

Thyroid Productivity Package

Overview

A Thyroid Productivity Package is available.

Table 13-63: Thyroid/Parathyroid/Lymph Node/Nodule Touch Panel Controls

| 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/Isthmus Lymph Node Rt/Lt/Isthmus Nodule | To initiate a Left/Right Thyroid/Parathyroid or Left/Right/Isthmus Lymph Node/Nodule, select the corresponding folder on the Touch Panel. 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: Supraclavicular fossa, Lower cervical, Middle cervical, Upper cervical, Parotid, Submandibular, Submental, Posterior triangle Nodule: <ul style="list-style-type: none"> • Location A: Upper, Lower, Mid, None • Location B: Lateral, Medial, Midline, None |
| 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: <ul style="list-style-type: none"> • Overall Thyroid (Top Level Touch Panel) <ul style="list-style-type: none"> • Resected: Totally, Partially, None (-) • Appearance: Within normal limits, Abnormal, Symmetric, Asymmetric R>L, Asymmetric L>R, None (-) • Comment |

Table 13-63: Thyroid/Parathyroid/Lymph Node/Nodule Touch Panel Controls

| Preset Parameter | Description |
|---|---|
| <p>Show Features - Lt/Rt Thyroid / Parathyroid and/ Lt/Rt/Isthmus Lymph Node / Nodule</p> | <p>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.</p> <p>Below is a list of each Feature with its possible notations by measurement type:</p> <ul style="list-style-type: none"> • Lt/Rt Thyroid <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Visibility: Visualized, Not Visualized, None (-) • Comment • Lt/Rt/Isthmus Lymph Node <ul style="list-style-type: none"> • Appearance: Within normal limits, Suspicious, Pathologic, None (-) • Composition: Cystic, Complex, Solid, None (-) • Vascularity: Normal, Increased hilar, Increased non-hilar, None (-) • Comment |

Table 13-63: Thyroid/Parathyroid/Lymph Node/Nodule Touch Panel Controls

| Preset Parameter | Description |
|---|---|
| Show Features - Lt/Rt Thyroid / Parathyroid and/ Lt/Rt/Isthmus Lymph Node / Nodule | <ul style="list-style-type: none"> • Lt/Rt/Isthmus Nodule <p>The selections for each category/feature and associated points match the ACR® TI-RADS™ (Thyroid Imaging Reporting & Data System) risk-stratification system as published in 2017 by ACR*. Once one or more values are assigned for each feature, the points are summed and the corresponding ACR TI-RADS level is determined. Additional information including feature assignment guidelines and criteria for fine needle aspiration or follow up ultrasound can be found at the American College of Radiology website at: https://www.acr.org/-/media/ACR/Files/RADS/TI-RADS/TI-RADS-chart.pdf?la=en</p> <ul style="list-style-type: none"> • Composition (choose one): Cystic (0 point), Spongiform (1 point), Mixed cystic and solid (1 point), Solid (2 points), - • Echogenicity (choose one): Anechoic (0 point), Hyperechoic (1 point), Isoechoic (1 point), Hypoechoic (2 points), Very hypoechoic (3 points), - • Shape (choose one): Wider-than-tall (0 point), Taller-than-wide (3 points), - • Margin (if more than one type, choose the most suspicious one): Smooth (0 point), Ill-defined (0 point), Lobulated (2 points), Irregular (2 points), Extra-thyroidal extension (3 points), -. Note: If more than one type, choose the most suspicious. • Echogenic foci (choose all that apply): None (0 point), Comet (0 point), Macrocalcifications (1 point), Peripheral calcifications (2 points), Punctate echogenic foci (3 points), - • Comment • TI-RADS level: TR1, TR2, TR3, TR4, TR5 <ul style="list-style-type: none"> - TR1 - 0 points - Benign - TR2 - 2 points - Not Suspicious - TR3 - 3 points - Mildly Suspicious - TR4 - 4-6 points - Moderately Suspicious - TR5 - 7+ points - Highly Suspicious <p>NOTE: Although it is possible for a nodule to be awarded zero points and hence be characterized as TR1, all other nodules merit at least two points because a nodule that has a mixed cystic and solid composition (one point) will also gain at least one more point for the echogenicity of its solid component.</p> <ul style="list-style-type: none"> • Koios DS Assessment <p>* Tessler FN, Middleton WD, Grant EG, Hoang JK, Berland LL, Teefey SA, Cronan, JJ, Beland MD, Desser TS, Frates MC, Hammers LW, Hamper UM, Langer JE, Reading CC, Scoutt LM, Stavros AT. ACR Thyroid Imaging, Reporting and Data System(TI-RADS): White Paper of the ACR TI-RADS Committee. J Am Coll Radiol. 2017May;14(5):587-595. doi: 10.1016/j.jacr.2017.01.046. Epub 2017 Apr 2. PubMed PMID:28372962.</p> |
| Return | Press to return to the previous Touch Panel. |
| H | Height |
| W | Width |
| L | Length |
| Isthmus AP | Used to measure the Isthmus anterior to posterior distance. |

Table 13-63: Thyroid/Parathyroid/Lymph Node/Nodule Touch Panel Controls

| Preset Parameter | Description |
|-------------------------|---------------------------------------|
| Cortical Thickness | Cortical thickness of the lymph node. |
| Delete | Press to delete this anatomy. |

Worksheet and Summary Worksheets

Worksheets and Summary Worksheets are provided for all documented Thyroid anatomies.

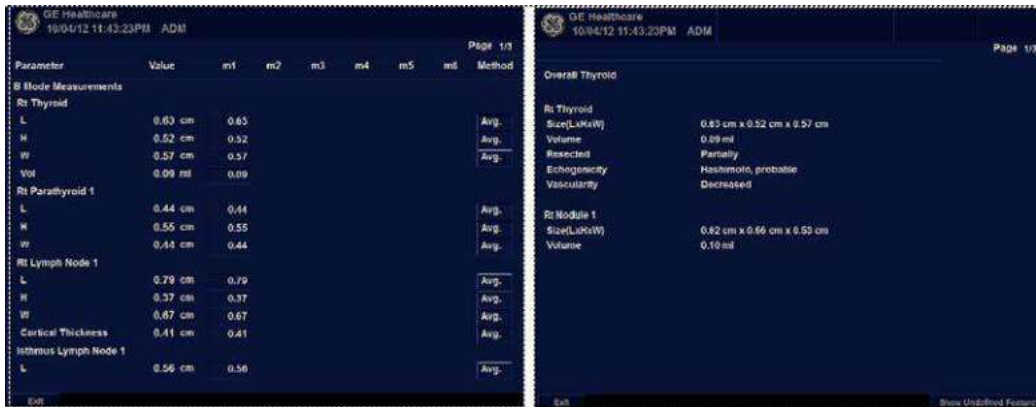


Figure 13-159. Thyroid Worksheet

To move to the next page, select the Page Change control beneath the Touch Panel.

NOTE: Only defined features are displayed on the Summary Report. To display the undefined features, select “Show Undefined Features” at the bottom of the Summary Worksheet.

NOTE: To exit back to the previous measurement screen, press Set on exit.

NOTE: To exit back to the scan screen, press Worksheet/Summary on the Touch Panel.

Thyroid Assistant, Powered by Koios DS (not available in all countries)

Thyroid Assistant, Powered by Koios DS is a Thyroid Nodule Analysis Option. Koios DS is integrated with the LOGIQ Fortis via DICOM. Koios DS is configured similar to a DICOM Service. The user can accept/dismiss analysis results. If accepted, these results are included in the DICOM Structured Report.

To perform Thyroid nodule analysis using Koios DS:

1. In B-Mode in the Thyroid Application, select the Thyroid Productivity Package Nodule # then press **Koios** via the Touch Panel.

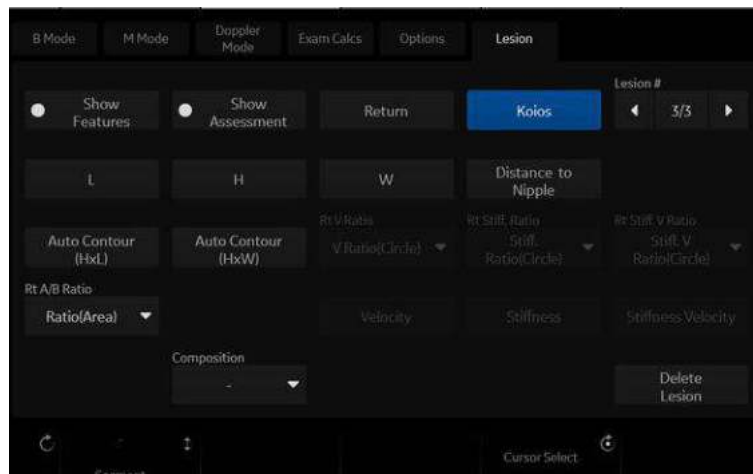


Figure 13-160. B-Mode Touch Panel in Thyroid Application

NOTE: *Koios DS analysis requires a frozen dual B-Mode image with a Length, Width, and Height measurement.*

2. Measure the thyroid nodule (Length, Width, Height) over 2 orthogonal scan planes; or measure the nodule using Auto Contour.
3. Using the Trackball control, press **Analyze**.
4. Koios DS analyzes the nodule (a pop-up appears, “Analyzing”).

Thyroid Assistant, Powered by Koios DS (not available in all countries) (continued)



Figure 13-161. Koios DS Analysis

5. A pop-up appears with the result of the Koios DS risk assessment and its alignment to an ACR TI-RADS® risk category.
6. If the assessment is accepted, it becomes part of the exam including being displayed on the exam's Summary Report and included in the DICOM SR data associated with the exam. If the assessment is dismissed, the results are not stored as part of the exam.

NOTE: *For additional details of the Koios DS assessment, refer to Koios Medical's Koios DS product documentation.*

Start Assistant

Introduction

Start Assistant automatically saves exam settings as Exam Mappings when the first image is acquired during an exam. Saved Exam Mappings are automatically recalled when a Worklist item is loaded, keying off the Worklist Exam Description.

Start Assistant has two functional modes:

- On: Use Exam Description (default mode)
- On: Use Scan Assistant only

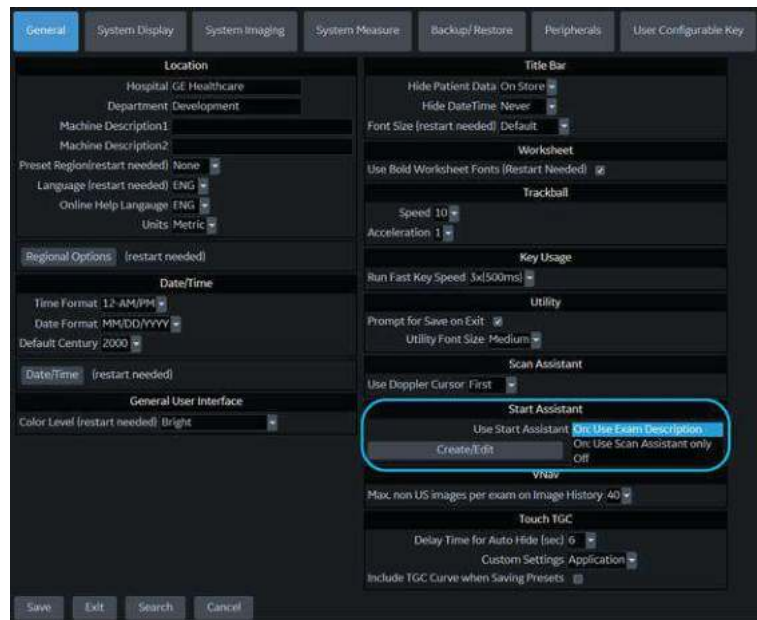


Figure 13-162. Start Assistant Modes

NOTE: An Exam Description or Scan Assistant program entry must be present for Start Assistant to save the Mapping.

On: Use Exam Description Mode

In *On: Use Exam Description* mode, Start Assistant saves and loads the following exam settings:

- Exam Description - Populated from the Worklist item, the Exam Description is the default key by which the exam Mapping is saved.
- Category
- Scan Assistant
- Preset
- Probe

If a new Patient is entered manually (without using a Worklist), and no Exam Description is entered, Scan Assistant will become the key by which the Mapping is saved.

On: Use Scan Assistant only Mode

In *On: Use Scan Assistant only* mode, the exam description is ignored and the selection of the Preset and Probe is based on the Scan Assistant protocol only. The Exam Category and Scan Assistant program are not automatically selected and Start Assistant Editor does not show the Exam Description column. Manual entry of an Exam Description for table entry is prevented.

Saved Start Assistant Exam Mappings can also be added, edited or deleted with the Start Assistant Mapping Editor - See 'Start Assistant Mapping Editor' on *page 13-338* for more information.

NOTE: *When using Start Assistant Mapping Editor in "On: Use Scan Assistant only" mode, the Exam Description field will not appear on the Start Assistant Mapping Editor, Add Start Assistant Mapping or Edit Start Assistant Mapping screens.*

Start Assistant Mapping Editor

The Start Assistant Mapping Editor can be accessed from the Utility->System->General screen by selecting “Create/Edit” under the Start Assistant section (see Figure 13-163).

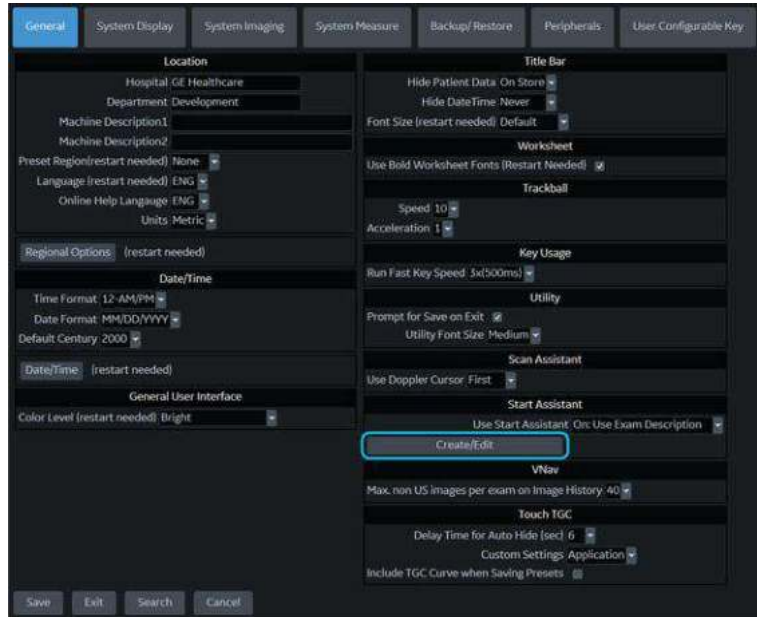


Figure 13-163. Start Assistant Create/Edit

On the Start Assistant Mapping Editor screen you can Add, Edit or Remove a Start Assistant map (see Figure 13-164).

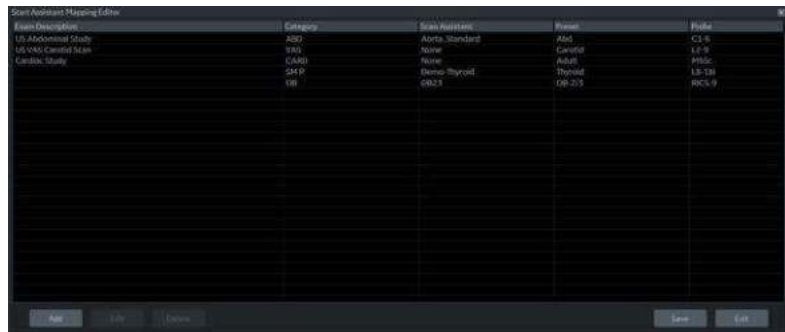


Figure 13-164. Start Assistant Mapping Editor

NOTE: When using Start Assistant Mapping Editor in “On: Use Scan Assistant only” mode, the Exam Description field will not appear on the Start Assistant Mapping Editor, Add Start Assistant Mapping or Edit Start Assistant Mapping screens.

Add a Start Assistant Mapping

Select **Add** from the Start Assistant Mapping Editor screen to add a new mapping (see Figure 13-165).

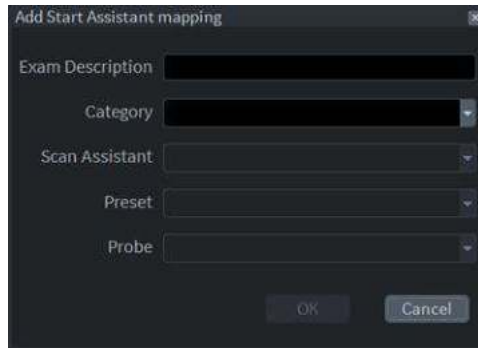


Figure 13-165. Add Start Assistant Mapping

Edit a Start Assistant Mapping

Highlight an existing mapping on the Start Assistant Mapping Editor screen and select **Edit** or double-click the item to edit a mapping (see Figure 13-166).

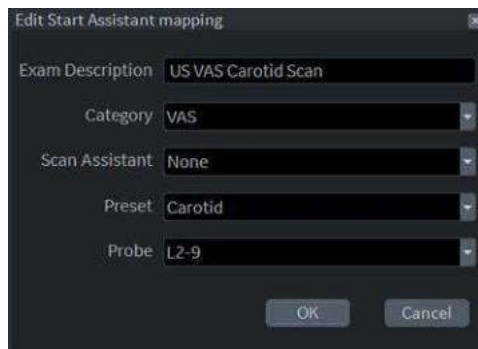


Figure 13-166. Edit Start Assistant Mapping

Delete a Start Assistant Mapping

Highlight one or more existing mappings and select **Delete** to delete.

Save and Exit Start Assistant Mapping Editor

Before exiting Start Assistant Mapping Editor, select **Save** to save any changes you have made.

Select **Exit** to exit Start Assistant Mapping Editor.

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.

NOTE: *Scan Assistant Creator (off-board) only supports 64-bit Windows.*

Availability

The following additional imaging parameters and preferences are available for use in a Scan Assistant program: Contrast, Contrast Clock, 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 LOGIQ Fortis.
- **Export.** Used to move Programs from one LOGIQ Fortis system to another LOGIQ Fortis.
- **Scan Assistant Creator.** Used to create Scan Assistant Programs.

Scan Assistant Description



Figure 13-167. Scan Assistant Display Description

1. Program name, completed steps/out of total number of steps, and step description area.
2. 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.
3. This column indicates the mode or when a measurement needs to be made.
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. Navigation: Stop, Pause, Pause/Resume. Edit (Pencil Icon). Also available via the left/right keyboard arrow keys. Stop also allows the program to be stopped, restarted, or a new program selected.

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 LOGIQ Fortis program.
 - a. Insert the media with the saved Program from the Scan Assistant Creator or exported program from another LOGIQ Fortis.
 - b. Press Utility -> Scan Assistant.
 - c. Select Import from the Scan Assistant Manager page.
 - d. In the Source field at the top of the Import Programs pop-up, select the media that the Program is stored on.
 - e. Highlight the Program(s) to be imported. If a folder is highlighted, all programs in the folder are selected.
 - f. Select Import. The Program(s) you selected are stored to the LOGIQ Fortis. You can add it to the exam category and user.
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 press the right arrow button to move the imported Program to the exam category and user selected above.

Setting up Scan Assistant (continued)

4. The Program list you created in Utility ->Scan Assistant is visible in the Program field on the Patient menu. Pressing **New Patient** erases any patient data and Scan Assistant program you entered. First press **New Patient** and then set up patient data, Scan Assistant program, and finally, press **Register Patient**.

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, left-hand corner 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 13-168. Scan Assistant Display

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 or press the left/right arrow on the keyboard.
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 keys.

Reference Images

Overview

Reference images can be attached to a step of Scan Assistant protocol. The reference image is displayed in an extra window on the scan screen during scanning with the protocol.

Any image (JPEG/DICOM) can be attached to (or removed from) a protocol with Scan Assistant Creator.

Using Reference Images

A reference image window appears when a protocol with a reference image attached is active. The window is positioned over the preview window and can be moved anywhere on the screen (the system will remember the last image position).

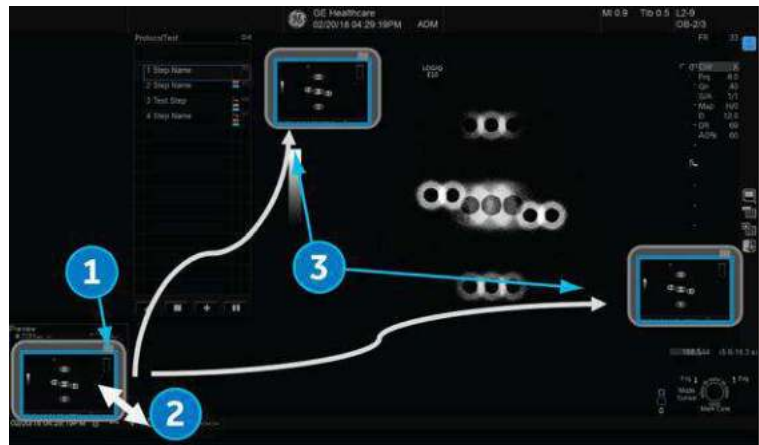


Figure 13-169. Reference Image Window

1. Minimize window by clicking minimize button in upper left window corner.
2. Change window size by dragging window corners.
3. Drag to move window anywhere on screen.

Inserting a step

1. To insert a pre-defined step to the active Scan Assistant Program, press the Plus Sign (+) on the Scan Assistant Display.



Figure 13-170. Insert Steps

The Insert Steps Pop-Up Menu appears.

2. Select the steps to be inserted via the pull-down Scan Assistant menu.



Figure 13-171. Select from pull-down menu

3. Press Insert. All the steps in the inserted program are added immediately after the active step in the current program.

To undo inserted steps, use Edit button to edit the program and delete the recently inserted steps.

NOTE: After the exam is completed, the system removes the temporarily saved Scan Assistant program with inserted steps.

NOTE: The inserted steps is not adapt the annotation and body pattern from the active step.

Breast Measurement Auto Insert Steps

To add a program to be inserted whenever the Add Lesion key is selected,

1. Press the Plus Sign (+) on the Scan Assistant Display.



Figure 13-172. Insert Steps

2. Select the "Add Lesion" tab.
3. Identify a breast lesion while using a breast scan assistant program. Freeze on the lesion and press "Add Lesion" on the measurement menu.
4. Complete the length measurement of the lesion. Unfreeze the image.
5. Upon unfreeze, the predefined program is inserted into the existing program and the next step is started.



Figure 13-173. "BreastLesionAssess"

In this example, BreastLesionAssess contains four (4) steps, as indicated within the brackets on the figure above.

Exporting Scan Assistant Programs to Another LOGIQ Fortis

Exporting Scan Assistant Programs allows them to be imported to another LOGIQ Fortis or to be edited offline with the Scan Assistant Creator tool. To export a Program,

1. Insert the media to save the Program to.
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. Highlight the Program(s) to be exported. If a folder is highlighted, all programs in the folder are selected.
7. Select Export. The Program(s) you selected are stored to the media. You can now import it to a new LOGIQ Fortis.

Scan Assistant Creator

Overview

Scan Assistant Creator is used to build customized Programs that can be imported onto the LOGIQ Fortis. 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.

The Scan Assistant Creator tool can be used both on the scanner and as an off scanner tool.

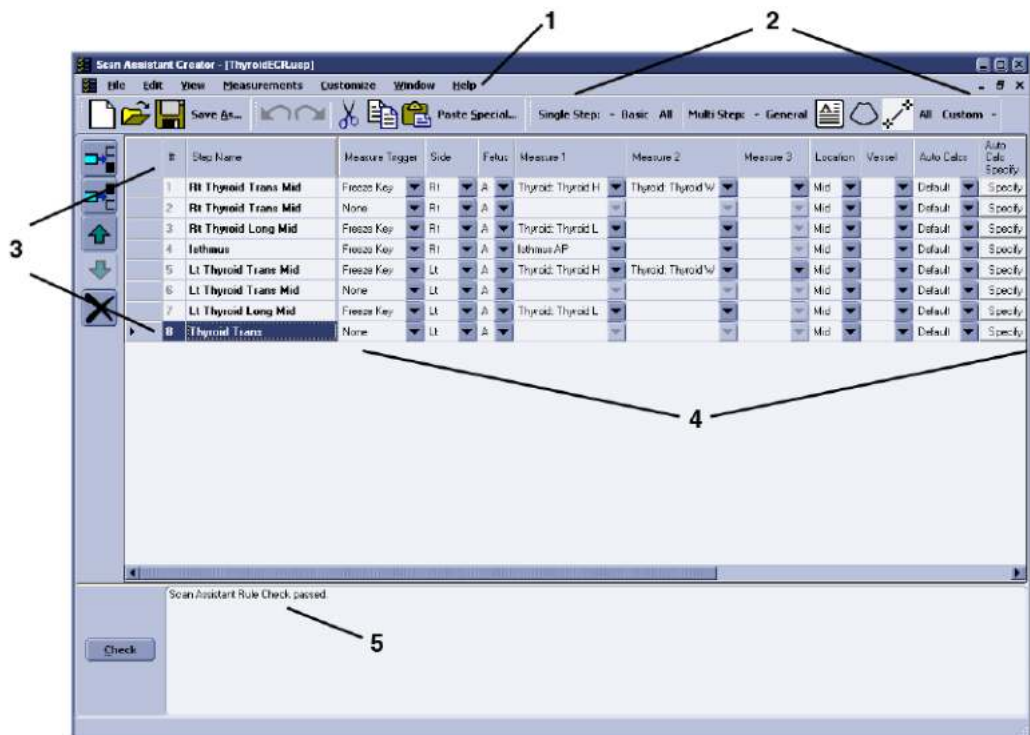


Figure 13-174. Tool Layout Overview

1. Menu
2. Toolbars
3. Steps
4. Step Attributes
5. Rule Checking

Help

Help is available via the F1 key.

File Handling

When using Scan Assistant 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 Assistant Creator.

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 Assistant Creator, but only user-defined Programs are created. If a factory Program is read into the Scan Assistant Creator and then edited, it is saved as a user-defined Program.

Off-Scanner Directory Structure

The Scan Assistant Creator organizes the Programs in a directory structure that allows easy importing into the LOGIQ Fortis. In order to be imported, all Programs must be stored in a LOGIQ_SCAN_ASSISTANT 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_ASSISTANT directory (root directory) and to either select an existing User Program Directory or create a new one.

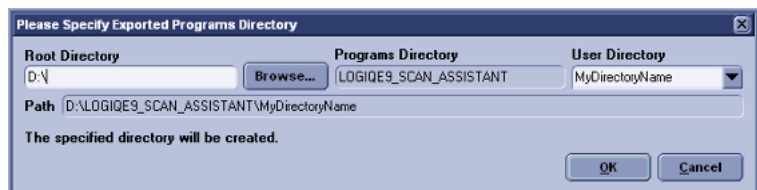


Figure 13-175. Directory Structure

Exporting Programs from LOGIQ Fortis

Factory or user-defined Programs on the LOGIQ Fortis are easily exported for editing with the Scan Assistant Creator.

On the LOGIQ Fortis:

1. Insert a USB storage device (or CD/DVD).
2. Select **Utility** -> **Scan Assistant**.
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.

On the computer with the Scan Assistant Creator installed:

1. Insert the USB storage device (or CD/DVD) used above.
2. Copy the LOGIQ_SCAN_ASSISTANT directory from the USB storage device (or CD/DVD) to the hard drive. The hard drive directory that you copy to is the root directory. If you want to work with the Programs directly on the USB storage device, this step can be skipped.
3. Either open a Program by double-clicking it or selecting File '-> Open from the Scan Assistant Creator.

Importing Programs to LOGIQ Fortis

Programs created with the Scan Assistant Creator are easily imported to the LOGIQ Fortis.

On the computer with the Scan Assistant Creator installed:

Copy the complete LOGIQ_SCAN_ASSISTANT directory from the computer hard drive to a USB device (or CD/DVD). The LOGIQ_SCAN_ASSISTANT directory needs to be at the top level (not in a subdirectory) on the USB device (or CD/DVD).

Table 13-64: Directory Structure Example

| |
|----------------------|
| LOGIQ_SCAN_ASSISTANT |
| MyUserNameDirectory |
| ABD |
| CARD |
| GYN |
| OB |
| PED |
| SMP |
| UR |
| VAS |

On the LOGIQ Fortis:

1. Insert the USB device (or CD/DVD).
2. Select **Utility** -> **Scan Assistant**.
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.

Sharing Programs

To share a program with someone else, the file can be sent via e-mail as an attachment or copied onto a media. If the person receiving the program has the Scan Assistant Creator tool installed, open the file and use “Save As” to save it to an appropriate directory.

If the person receiving the program does not have the Scan Assistant Creator tool installed, the program can still be loaded onto a scanner by creating the following structure at the top level directory on a media device, copying the file to one of the category directories and then importing the protocol onto the scanner.

Table 13-65: Media Directory Structure

| |
|--|
| LOGIQ_SCAN_ASSISTANT |
| User Program Directory (Any user name) |
| Category Directories (e.g. ABD, CARD) |

To share an entire portfolio of programs with someone else, the entire user program directory can be zipped. Make sure to set the options to include subfolders and to include relative path information. On the receiving end, the user can unzip the directory into a LOGIQ_SCAN_ASSISTANT directory.

Exporting the Scan Assistant Creator to a PC

To export the Scan Assistant Creator to a PC,

1. Insert a USB Flash Drive in a USB port on the Control Panel.
2. Press **Utility** -> **Scan Assistant**.
3. Press **Export**.
4. Place a checkmark in the Export Scan Assistant Creator Installation.
5. Press **Export**.

Creating and Editing Programs

To access Scan Assistant Creator on the LOGIQ Fortis:

1. Select **Utility -> Scan Assistant**.
2. Select **Creator** on the Scan Assistant Manager tab on the monitor.

Creating New Programs

1. Select File -> New.
2. Before creating a New Program, select **Single Step** or **Multi Step** in the Toolbar.



Figure 13-176. File Toolbar

3. Proceed to add/update your settings for the Step: Step Name, Instructions, etc.
4. Once finished, highlight the finished Step.
5. Select **Edit -> Copy**
6. In the Toolbar along the left, select **Insert Step Before Selected** or **Insert Step After Selected**.



Figure 13-177. Insert Step

7. Highlight the copied step and proceed to edit accordingly.
8. Proceed to follow the same procedure to add more steps to your Program.

Creating New Programs (continued)

9. When done, select **Check** to verify your Steps.



Figure 13-178. Rule Check and results area

10. The results are listed as to whether the Scan Assistant 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.*

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.

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 13-179. Step Toolbar and Edit Toolbar and Menu

- | | |
|---|--|
| 1. Insert Step above selected step (Ctrl+I) | 5. Delete selected step(s) |
| 2. Insert Step below selected step | 6. Edit Toolbar (Undo, Redo, Cut, Copy, Paste and Paste Special) |
| 3. Move selected step(s) up (Ctrl+Up Arrow) | 7. Edit Menu (same toolset as the Edit Toolbar) |
| 4. Move selected step(s) down (Ctrl+Down Arrow) | |

When selecting multiple steps for Cutting or Copying, the Shift + Left Mouse and Ctrl + Left Mouse key combinations can be used.

Editing Steps (continued)

Paste Special

The Paste Special control allows copied steps to be pasted with some modification. Select the desired Conversion and select **Paste**. An added feature to the Paste Special control is the Define Conversions function, which 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 a 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.

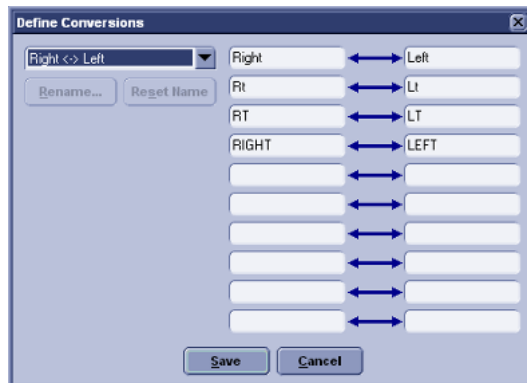


Figure 13-180. Define Conversions Dialog

Editing Step Attributes

To edit a step attribute, select the step attribute and edit it, such as picking from a drop down menu, checking or unchecking a box, or typing in text. To edit multiple steps in a Multi Step view, select the step attribute of choice and do the following actions:

- Set the value of the step attribute as desired.
- Left click (and release) in the square in the bottom right-hand corner of the attribute.
- Drag to highlight the other steps to be changed in the same way.
- Left click (and release) again.

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.

To edit multiple steps in the single step view, highlight the multiple steps that you want to edit and then change the step attribute. If a step attribute is highlighted in green, this indicates that its current value varies across the selected steps.

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 13-66: 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 |

Editing the Current Program on the Scanner

If you are currently using a Scan Assistant program and choose to edit that program while using it (by selecting the pencil icon at the bottom of the Scan Assistant steps), 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 Assistant navigation window and selecting restart.

Opening Existing Programs

Multiple Programs can be open at the same time by selecting File -> Open. Each Program will open within the primary Scan Assistant Creator window. Finding the Program file (.ep or .uep) and opening the file automatically opens the file in the Scan Assistant Creator.

To switch between Programs, the title banner of the window is selected or the Program is selected from the Window Menu. An asterisk indicates that the Program has been edited but not saved.

With multiple Programs open, steps copied from one Program can be inserted into another Program via the paste or paste special features.

Saving Programs

Programs are saved via Save or Save As.

When Saving a Program, the Scan Assistant Creator provides an opportunity to run a rule check on the Program before saving.

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*

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 Assistant Creator. The different ways to look at the data are called Views.

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.

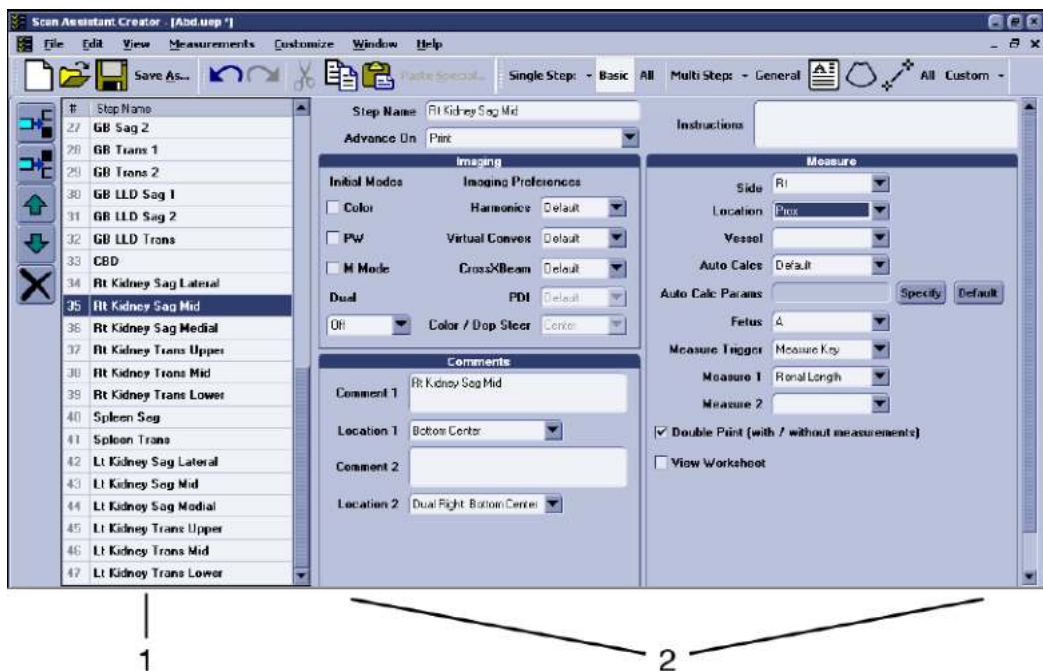


Figure 13-181. Basic Single Step View

1. Steps

2. Step Attributes

Multi Step Views

Multi Step views show certain step attributes for all the steps in a Program. There are six Multi Step views: General, Comment, Scan, Measure, Custom and All.

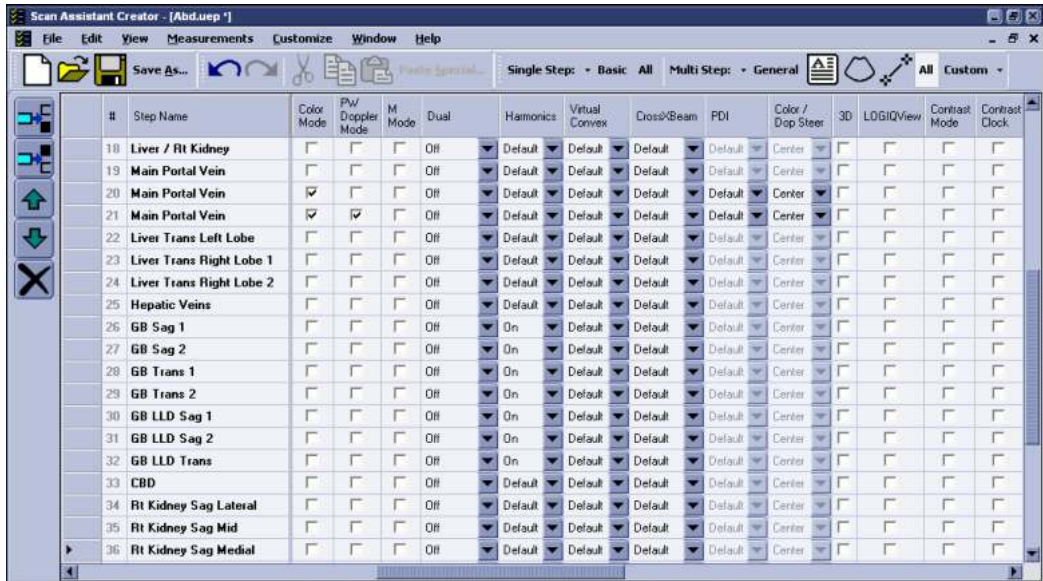


Figure 13-182. Multi Step Scan View

1. Steps

2. Step Attributes

Customizing Multi Step Views and HTML Export

The contents of the Multi Step Views and the HTML Export is configurable via the Customize Menu or the small downward pointing arrow next to the word "Custom" on the View Toolbar Menu.



Figure 13-183. Customize Menu

The Language selection allows the Scan Assistant Creator language to be configured.

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 Assistant 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 Assistant Creator.

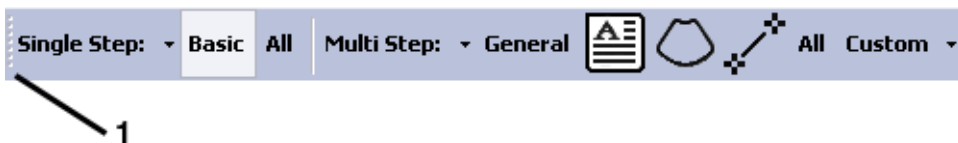


Figure 13-184. Gripper used for Toolbar placement

1. Toolbar Gripper

Customizing Multi Step Views and HTML Export (continued)

Multi Step View

In the Customize Multi Step Views dialog, each tab represents a different Multi Step view. Within a tab, the checked boxes are the step attributes that are displayed in that Multi Step view. The views are independent of one another, so if a step attribute is desired in both views, it needs to be selected in both views.

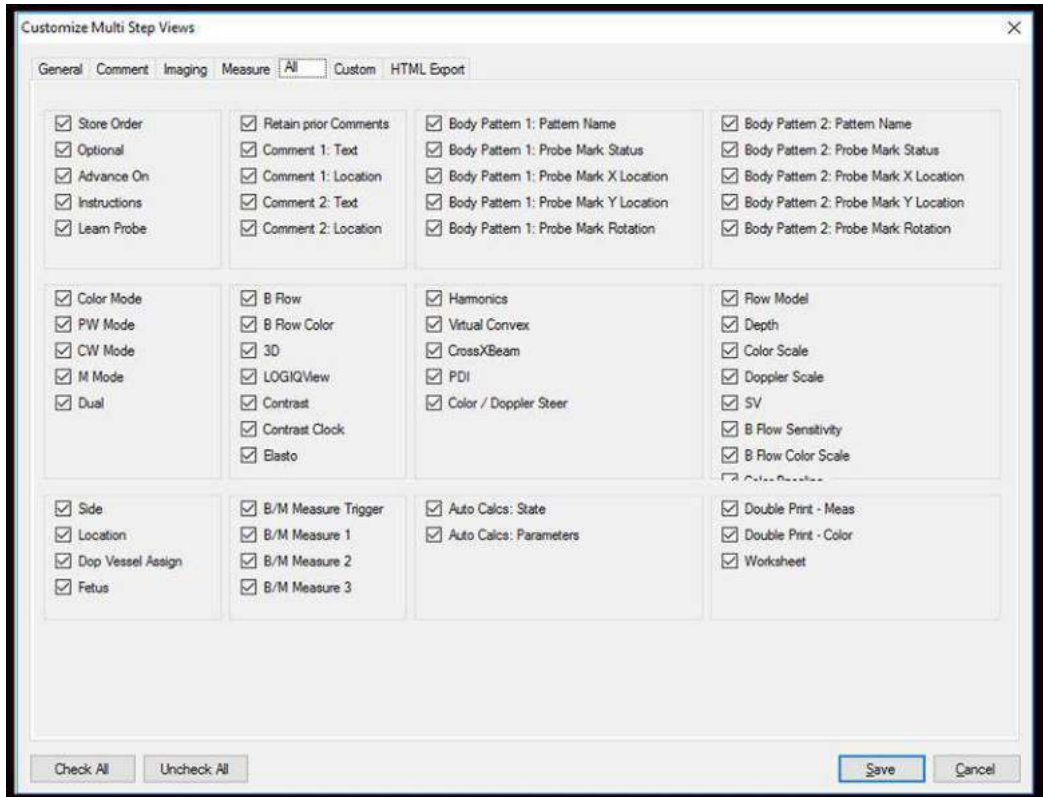


Figure 13-185. Customize Multi Step Views Dialog

Customizing Multi Step Views and HTML Export (continued)

HTML Export

The HTML Export feature allows a Program to be stored in a file format (*.mht) that is compatible with Windows Internet Explorer. This file is useful for printing the Program or viewing the Program, but is not useful for editing the Program. HTML Export is available via the File Menu.

An example of how a Program looks in HTML format is shown below.

| # | Step Name | Optional | Advance On | Instructions | Comment 1 | Location 1 | Comment 2 | Location 2 | Color Mode | DW Doppler Mode | H Mode | Dual | Harmonics | Virtual Convex | CrossXBeams | PDI | Color / Dep Steer | 3D LOGIQView | |
|---|----------------------|----------|------------|--------------|----------------------|---------------|------------------------------|---------------------------|------------|-----------------|--------|------|-----------|----------------|-------------|---------|-------------------|--------------|----|
| 1 | RT Thyroid Trans Mid | No | Print | | rt Thyroid Trans Mid | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 2 | RT Thyroid Trans Mid | No | Print | | rt Thyroid Trans Mid | Bottom Center | | Dual Right: Bottom Center | Yes | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 3 | RT Thyroid Long Mid | No | Print | | rt Thyroid Long Mid | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 4 | Isthmus | No | Print | | Isthmus | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 5 | Lt Thyroid Trans Mid | No | Print | | Lt Thyroid Trans Mid | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 6 | Lt Thyroid Trans Mid | No | Print | | Lt Thyroid Trans Mid | Bottom Center | | Dual Right: Bottom Center | Yes | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 7 | Lt Thyroid Long Mid | No | Print | | Lt Thyroid Long Mid | Bottom Center | | Dual Right: Bottom Center | No | No | No | Off | Default | Default | Default | Default | Center | No | No |
| 8 | Thyroid Trans | No | Print | | Isthmus | Middle Left | Right Lobe Thyroid Left Lobe | Bottom Left | No | No | No | Off | Default | On | Default | Default | Center | No | No |

Figure 13-186. HTML Export

Keyboard Navigation

In addition to moving the windows pointer and selecting an item, there are several keyboard controls to help navigate through the Views.

Table 13-67: Keyboard Program Navigation

| Keyboard Entry | Step Selected | Step Attribute Selected |
|----------------|---|--|
| Enter | Moves to next step. If on the last step, it creates a new step and selects it. | Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to same step attribute in the next step. If on the last step, it creates a new step and selects it. |
| Tab | Single Step View: Moves to next step. On the last step it moves to the first step attribute. Multi Step View: Moves to the first step attribute. | Moves to next step attribute. If last attribute for the step, moves to next step. |
| Alt+Tab | Single Step View: Moves to previous step. On the first step it moves to the last step attribute. Multi Step View: Moves to the last step attribute of the previous step. | Moves to next step attribute. If first attribute for the step, moves to previous step. |
| 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. |
| Left Arrow | No action | Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to the previous step attribute. |
| Right Arrow | Single Step View: No action. Multi Step View: Moves to the first step attribute. | Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to next step attribute. |
| Page Up | Scrolls to previous page of steps | Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to same step attribute in the previous step. |
| Page Down | Scroll to next page of steps | Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to same step attribute in the next step. |

Scan Assistant Features

Scan Assistant 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 Assistant Program behavior. The tables below provide the names of all attributes along with a description.

General Attributes

Table 13-68: General Attributes

| Attribute Name | Description |
|---------------------|---|
| Store Order Specify | Used to enable the Store Order Definition dialog so that the Store Order can be set |
| Store Order | Specifies the Store Order number associated with the Step |
| Step Number | Number of the step that appears in the Scan Assistant Navigation menu |
| Step Name | Name of the step that appears in the Scan Assistant Navigation menu |
| Advance On | <ul style="list-style-type: none"> • Print: 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 & 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 | User notes displayed in the Scan Assistant Navigation menu when the step is active |
| Optional | <p>Optional: An optional step is given a check mark during Program execution even if no image is acquired</p> <p>Mandatory: A mandatory step is give a check mark only if an image is acquired for the step</p> |
| Learn Probe | On or Off. Learn and change the probe for the user, when selected. |

Comment Attributes

Table 13-69: Comment Attributes

| Attribute Name | Description |
|------------------------|---|
| Comment 1, Comment 2 | User annotation associated with the step. When editing in a Multi Step View, use Alt+Enter to create a new line. |
| Location 1, Location 2 | Choose where the annotation is located on the image area for single or dual screens. |
| BP 1,2 | Blank: Body Pattern not specified. Selected Body pattern graphic with or without probe position will be set, if selected |
| BP Specify | 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 | Clears BP 1, BP 2 defined for the step |
| BP Probe | BP Probe mark set by Scan Assistant, when selected |
| BP X/Y/Rot | Displays the X/Y/Rot information of the Probe mark set from Body Pattern Selection dialog |

Imaging Mode and Imaging Preference 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 Assistant program and automatically selects them the next time the program is started.

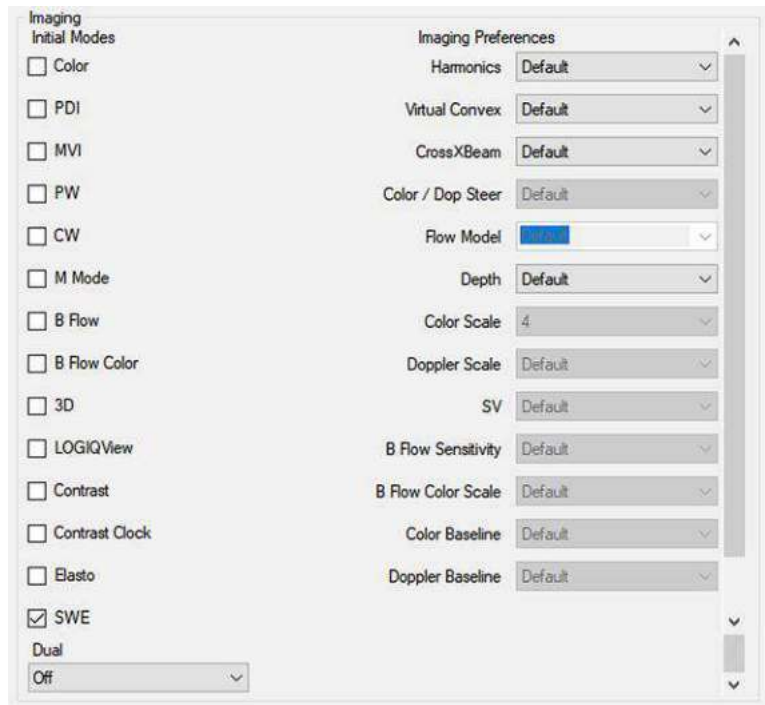


Figure 13-187. Imaging Mode and Imaging Preference Attributes

Table 13-70: Imaging Mode Attributes

| Attribute Name | Description |
|--|--|
| Color, PDI, MVI, PW, CW, M Mode, B Flow, B FLOW Color, 3D, LOGIQView, Contrast, Contrast Clock, Elasto (Strain Elastography) and SWE (Shear Wave Elastography) | <ul style="list-style-type: none"> • On - when selected, the mode is on. • Off - when not selected, the mode is off. |
| Dual | <ul style="list-style-type: none"> • Off - Dual screen is not in use. • 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). |

Imaging Mode and Imaging Preference Attributes (continued)

NOTE: *B Flow Color is not supported by the LOGIQ Fortis. It still exists in Scan Assistant Creator because other products that offer B Flow Color use the Scan Assistant Creator program.*

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 Assistant 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), 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 Assistant 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 Assistant and not as individual steps.

Table 13-71: Imaging Preference Attributes

| Attribute Name | Description |
|---------------------|--|
| Harmonics | <ul style="list-style-type: none"> • On - when selected • Off - when unchecked • Default - Not specified so Scan Assistant does not set this attribute. |
| Virtual Convex | |
| CrossXBeam | |
| Color/Doppler Steer | <ul style="list-style-type: none"> • Left - Color/Doppler steered to the left • Center - Color/Doppler not steered • Right - Color/Doppler steered to the right |
| Flow Model | <ul style="list-style-type: none"> • Specified Flow Model is selected - Aorta, Renal, Penetration, Slow Flow, Med Flow, Fast Flow • Default - Not specified so Scan Assistant does not set this attribute. |
| Depth | <ul style="list-style-type: none"> • 2.0 to 36.0. • Default - Not specified so Scan Assistant does not set this attribute. |
| Color Scale | <ul style="list-style-type: none"> • 1 to 200. • Default - Not specified so Scan Assistant does not set this attribute. |
| Doppler Scale | |
| SV | <ul style="list-style-type: none"> • 1 to 16. • Default - Not specified so Scan Assistant does not set this attribute. |
| B-Flow Sensitivity | <ul style="list-style-type: none"> • 1.0 to 50. • Default - Not specified so Scan Assistant does not set this attribute. |
| B-Flow Color Scale | <ul style="list-style-type: none"> • 0.02 to 1.5. • Default - Not specified so Scan Assistant does not set this attribute. |
| Color Baseline | <ul style="list-style-type: none"> • 0 to 100. • Default - Not specified so Scan Assistant does not set this attribute. |
| Doppler Baseline | <ul style="list-style-type: none"> • 5 to 95. • Default - Not specified so Scan Assistant does not set this attribute. |

Measurement Attributes

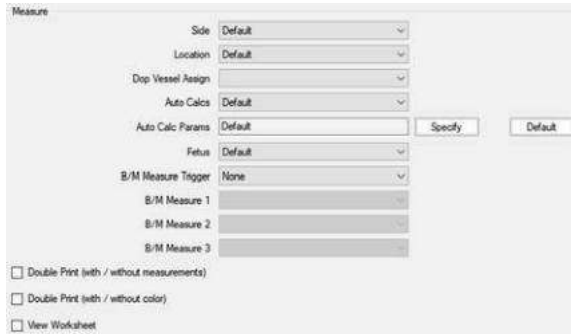


Figure 13-188. Measurement Attributes

Table 13-72: Measure Attributes

| Attribute Name | Description |
|-------------------|--|
| Side | When selected, the side measurement qualifier is set to: <ul style="list-style-type: none"> • Rt - Right side of the body • Lt - Left side of the body • None - Not used (neither Right nor Left) • Default - Side not specified so Scan Assistant does not set Side |
| Location | When selected, the location measurement qualifier is set to: <ul style="list-style-type: none"> • Prox - Proximal • Mid - Middle • Dist - Distal • None - Not used • Default - Location not specified. Scan Assistant does not set Location |
| 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 (e.g. P1 key). |
| Auto Calcs | When selected, the Auto Calcs state is set to: <ul style="list-style-type: none"> • Frozen • Live • Off • Default - Auto Calcs state not specified. Scan Assistant does not set Auto Calcs state. |
| Auto Calc Params | <ul style="list-style-type: none"> • Various Auto Calc parameters - specifies the auto calc parameters to be used. • Default - Auto Calc parameters are not specified. Scan Assistant does not set the Auto Calc parameters. |
| Auto Calc Specify | Used to enable the Auto Calcs Parameter Selection dialog so that the Auto Calc Params attribute can be set |
| Auto Calc Default | Used to set the Auto Calcs Params attribute to Default. |

Table 13-72: Measure Attributes (Continued)

| Attribute Name | Description |
|----------------------|--|
| Fetus | When selected, the fetus measurement qualifier is set to: <ul style="list-style-type: none"> • A - Fetus A • B - Fetus B • C - Fetus C • D - Fetus D • Default - Fetus not specified so Scan Assistant does not set Fetus |
| B/M Measure Trigger | When selected, the following action initiates the "Measure 1" attribute: <ul style="list-style-type: none"> • Measure Key • Freeze Key • Image Store - 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 Assistant. The "Measure 1" attribute is ignored. |
| B/M 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. |
| B/M 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. |
| B/M Measure 3 | Various 2D or M-Mode measurements Specifies the third 2D or M-Mode measurement to be initiated after the measurement associated with the Measure 2 attribute is completed. |
| Double Print - Meas | <ul style="list-style-type: none"> • On - If an Image Store / Print (e.g. P1 key) is performed on an image with measurements, the image is stored / printed two times, once with the measurements and once without. • Off - No special Store / Print behavior. |
| Double Print - Color | <ul style="list-style-type: none"> • On - If an Image Store / Print (e.g. P1 key) 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 - No special Store / Print behavior. |
| View Worksheet | <ul style="list-style-type: none"> • On - The worksheet is turned on • Off - The worksheet is not turned on |

Measurements

Because there are many measurements available on the LOGIQ Fortis 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.

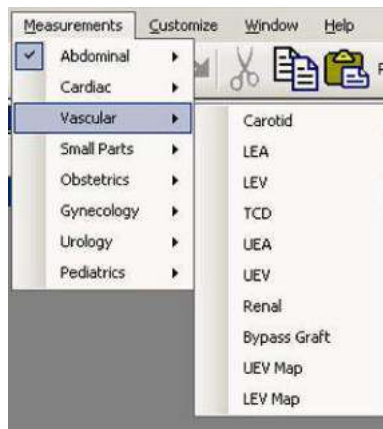


Figure 13-189. Measurements Menu

User-Defined Measurements

User-defined subcategories and individual measurements can be used with the Scan Assistant feature. To do so, the Scan Assistant Creator needs to know about the user-defined measurements on the LOGIQ Fortis.

On the LOGIQ Fortis, use the Scan Assistant 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 Assistant Creator is used.

Rule Checking

Scan Assistant Creator allows Programs to be checked. During a rule check, Scan Assistant 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 LOGIQ Fortis. 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 13-190. 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.

Compare Assistant

Overview

Compare Assistant allows you to perform serial scans on a patient when you can compare the images from a patient's previous exam(s) to the patient's current exam.

NOTE: *In order to reload imaging parameters from a previous exam, the image must have been stored as raw data.*

NOTE: *Side-by-side scanning comparison is present whether or not you are able to import the scanning parameters.*

In Comparison Mode the system can automatically reload scanning parameters from a previous exam performed on a LOGIQ Fortis archived as raw data and allow for side-by-side scanning for image comparison. This allows you to use consistent scanning parameters from exam to exam on the same patient and may assist in assessing the progress of the patient.

Compare Assistant is available in B-Mode, Harmonics, Contrast, and in Color Flow and Power Doppler Imaging Modes.

In B-Mode the following parameters can be transferred from the Compared Image to the Active B-Mode Image: Gain, Depth, Frequency, CrossXBeam, Virtual Convex (linear probes), SRI, Frame Averaging, Map, Dynamic Range, Acoustic Output, Harmonic state, Focal Zone Number and Position, Width, and Line Density.

In Color Flow/PDI Mode the following parameters can be transferred from the Compared Image to the Active Color Flow/PDI Mode image: Gain, ROI Size/Position, Frequency, Frame Averaging, Packet Size, Flow Model, Scale (PRF), Wall Filter, Spatial Filter, Acoustic Output, Invert, Threshold, Sample Volume, Color Map, Virtual Convex (linear probes), and Line Density.

Overview (continued)

Image parameter copy is supported for the following additional modes: Contrast (supports depth, focal zone position, acoustic output, and frequency), Elasto (supports ROI size, ROI position, frequency, and scale), and B-Flow (supports depth, frequency, focal zones, and sensitivity).

Annotations and Body Patterns can also be transferred from a patient's previous exam to the patient's current active exam.

Up to four (4) exams, three (3) other exams and the current active exam, can be compared. Each exam is displayed on the bottom of the display, with Tabs indicating each exam. Tabs are shown in chronological order with the most recent exam displayed on the left.

Compare Assistant is not supported with V Nav, 3D/4D, Quantitative Analysis, Stress Echo, or LOGIQView.

Only measurements taken during the active exam are transferred to the current exam's Worksheet; previous exam measurement information is not included on active worksheets.

In order to utilize the Compare Assistant tool, images should have RawDICOM data. The RawDICOM data is saved locally when available. Some scanning modes do not provide raw data. If the raw data associated with the comparison image cannot be displayed in dual image format, the DICOM image data is used to display the image. RawDICOM data is typically removed when images are sent to PACS; therefore, images that are loaded using Query/Retrieve will likely be standard DICOM only.

NOTE: *Images from some other 'unsupported' modes (PW Mode, CW Mode, and M-Mode) can be recalled in Compare Assistant, but the tool will not attempt to copy over imaging parameters unless it is one of the types listed above (it will still attempt annotation copy). Imaging parameter copy will also not be attempted unless the current probe is the same as the probe used to capture the original image and RawDICOM data for the original image is available.*

Workflow example

NOTE: If you use DICOM images for comparison, check the "Compare" checkbox on the DICOM Image folder and press Compare on the Image History page.

1. Place the cursor on the Compare Assistant icon and press Set to activate Compare Assistant.
2. Place the cursor on the date tab of the desired comparison exam and press **Set**.
3. Place the cursor on the desired comparison image and press **Set**.
4. Start scan and freeze the image at the same position to make a comparison.

Use Copy Setting Icon as necessary. Comparison Image parameters transfer to the Active Image based on your preset (automatic or manual)

5. Place the cursor on the Compare Assistant icon and press Set to deactivate Compare Assistant.



Figure 13-191. Compare Assistant Screen (example)

1. Active Image
2. Comparison Image
3. Active Exam clipboard
4. Date tab of comparison exam
5. Comparison exam clipboard

Setting Up Compare Assistant

Compare Assistant allows you to set the following parameters:

- Side to place the compared image (left/right)
- Date settings for the compared image
- Imaging and Annotation parameters to be copied from the patient's Compared to the Current image
- Clipboard, Active Image, and Image History Label Layout and Color

You can set these parameters on the System Imaging page via Utility--> System--> System Imaging.

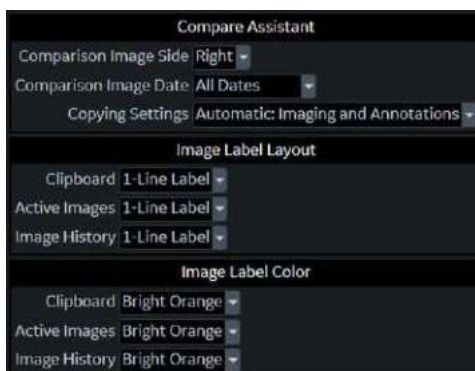


Figure 13-192. Setting Up Compare Assistant Parameters

Table 13-73: Compare Assistant Parameters

| Parameter | Settings |
|-----------------------|---|
| Comparison Image Side | <ul style="list-style-type: none"> • Left • Right (Default) |
| Comparison Image Date | <ul style="list-style-type: none"> • All Dates (Default): The date is always displayed on the comparison image. • Different Date: Date only displayed when the date of the comparison image is different than the active exam date. • None: No comparison image date is displayed. |

Table 13-73: Compare Assistant Parameters


| Parameter | Settings |
|--|--|
| Copying Settings | <p>You can set the default Compare settings on the System Imaging Utility page or you can select the Compare setting via the On-screen controls. Comparison Image parameters transfer to the Active Image based on your preset (automatic or manual).</p> <p>Automatic Settings are copied from the Comparison Image to the current image as soon as the comparison image is loaded.</p> <ul style="list-style-type: none"> • Automatic: Imaging & Annotations (Default): Imaging Parameters, Annotations, and Body Patterns copied • Automatic: Imaging Only: Only Imaging Parameters copied • Automatic: Annotation Only: Only Annotations and Body Patterns copied <p>Manual Settings are copied from the Comparison Image to the current image when you manually select the control.</p> <ul style="list-style-type: none"> • Manual: Imaging & Annotations: (Default) Imaging parameters, Annotations, and Body Patterns copied • Manual: Imaging Only: Only Imaging Parameters copied • Manual: Annotations Only: Only Annotations and Body Patterns copied <p>Off: No parameters copied.</p> |
| <p>Note: Copy settings are restored to the default whenever Compare Assistant is turned on and the active exam or current patient has changed since the last time it was on.</p> | |
| <p>Image Label Layout: Clipboard Active Images Image History</p> | <ul style="list-style-type: none"> • No Label • 1-Line Label (Default) • 2-Line Label |
| <p>Image Label Color: Clipboard Active Images Image History</p> | <ul style="list-style-type: none"> • Bright/Soft White • Bright/Soft Yellow • Bright/Soft Red • Bright/Soft Orange • Bright/Soft Blue • Bright/Soft Purple |

To set Compare Assistant print parameters, select Utility--> Connectivity--> Button--> Advanced. You can set the system to print the Comparison image only, to store the New Image only; or to store both the Comparison and New Image.

Compare Assistant Controls













The following controls can be used while in Compare Assistant:

Table 13-74: Compare Assistant Controls

| Control | Description |
|---|--|
|  | <ol style="list-style-type: none"> 1. Image Display Area Icon 2. Worksheet 3. Active Image Screen 4. Compare Assistant On/Off. Select the Compare Assistant Icon to activate Compare Assistant. 5. Copying Settings 6. Save As Menu 7. Next/Previous Image, or Press [Ctrl]+[Next Image Arrow] to start a Slide Show. |
| Keyboard Arrow Keys | You can also use the Arrow Keys on the Keyboard to move to the next/previous clipboard image. |
| Operator Panel L/R Keys | If comparison mode is on and the single image display is active, to enter dual comparison display press the L (Left) or R (Right) key. If dual comparison display is on and the dual comparison display is active, to enter single image display, press the L (Left) or R (Right) key. |
| Freeze Key | To deactivate Comparison Mode, select the comparison image side while in Dual Comparison Display and press Freeze. |
| Print Key | When you store an image while in Dual Comparison Display, the system automatically switches to the active exam side prior to storing the image. |

Compare Assistant Controls (continued)

Table 13-75: Compare Assistant icon and Copy Setting icon

| | | | |
|---|--------------------------------------|---|-------------------------------------|
|  | Compare Assistant On. Copy to Right. |  | Compare Assistant On. Copy to Left. |
|  | Off |  | Off |
|  | Automatic: Imaging and Annotations |  | Automatic: Imaging Only |
|  | Automatic: Annotation Only |  | Manual: Imaging & Annotations |
|  | Manual: Imaging Only |  | Manual: Annotations Only |
|  | Off. No parameters copied. |  | Disabled. |

NOTE: Compare Assistant icon is disabled when the system does not have Compare Assistant Option.

Comparison Clipboard

In Comparison Mode two (2) image clipboard areas display images from the active exam and the selected comparison exam. The Comparison Clipboard can display up to four (4) exams, including the active exam. Each exam has a tab that you click on to select the desired comparison or active exam. The active exam is always displayed (either on the Left or Right side, depending on your preset).



Figure 13-193. Comparison Clipboard

The comparison exam(s) are identified by the date of the exam on the tab; the active exam is identified by the word, “Active” and by the asterisk (*). You can activate the Image History screen by clicking on the “...” tab.

Each image clipboard has its own scroll bar that can be used to scroll through all the images.

The highlighted image in the clipboard is the image that’s displayed along with the exam’s active image.

Query/Retrieve

You can use DICOM Query/Retrieve to search for a patient's previous exams. When you select a patient on the Patient Screen, select the "Query" button. This automatically registers the patient (if needed) and initiates a query via the Data Transfer page. Select the exams you wish to be transferred and press the "Transfer" button.

After the retrieve completes, the system automatically returns to the Patient Screen with the same patient and exam active as when you selected to Query this patient.

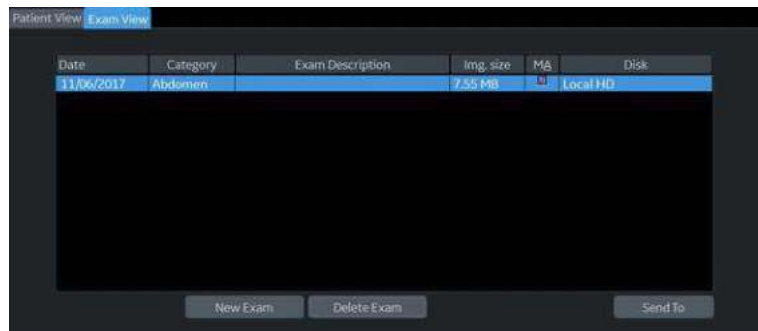


Figure 13-194. Patient Exam View

You can also push the data from the PACS device to the system. See 'Step 2 - Set up the PACS' on *page 13-468 for more information.*

Activating Compare Assistant

Compare Assistant displays an image associated with the active exam (live, frozen, or CINE) and the other side contains an image from the comparison exam.

Comparison Image parameters transfer to the Active Image based on your preset (automatic or manual). You can also use the Display Copying control adjacent to the clipboard to copy settings from the comparison image to the active image.

NOTE: *If an imaging parameter is not available for the current probe, a message in the status bar indicates that this parameter is not available.*

You activate Compare Assistant via the Comparison Mode Key adjacent to the Image Clipboard and On-screen Trackball Controls or you can activate Compare Assistant via the Patient Image History screen by selecting the image and pressing “Compare.”



Figure 13-195. Image History

At the start of an exam the system automatically checkmarks the three (3) most recent exams, excluding active exams and exams without any images as the comparison exams. You can adjust this by placing a checkmark next to the exam you wish to include in Compare Mode (the system automatically deselects the oldest checked exam). To activate Comparison Mode, select which specific image you would like to compare to the current image from the clipboard on the Image History screen. Select the image and press the “Compare” button.

Exiting Compare Assistant

To exit Compare Assistant Mode, select the Comparison Mode Key adjacent to the Image Clipboard, or change the exam Application Preset, change active exam, change patient, or recall an image from the active clipboard.

OB Measure Assistant

Overview

The user can request the system to trace/outline the borders of specified OB measurements using the OB Measure Assistant feature. You can auto-detect the Biparietal Diameter, Head Circumference, Abdominal Circumference, Femur Length and Humerus Length.

To automatically trace the fetal anatomy on the display,

1. Press **Measure Assist Settings** on the OB Touch Panel to set OB Measure Assistant parameters.

Table 13-76: OB Measure Assistant Touch Panel

| Touch Panel Settings | Description |
|--|--|
| Default | When you first activate the Measure Assistant Touch Panel, the following measurements are highlighted: BPD, HC, AC, and FL. This means that OB Measure Assistant is active for all these measurements. |
| There are four (4) BPD Auto Custom Settings: | |
| 1. BPD Highlighted | BPD and HC OB Measure Assistant is generated one at a time. BPD is auto generated--> Edit/Set--> HC is auto generated--> Edit/Set--> Done |
| 2. BPD + AutoSet BPD | BPD and HC generated at the same time. BPD and HC are auto generated--> Edit/Set HC--> Edit/Set BPD--> Done. |
| 3. BPD + BPD Only | Only the BPD is auto generated--> Edit/Set--> Done. |
| 4. No Highlight | User must perform these measurements manually |

2. Press the measurement (BPD, HC, AC, FL or HL). The trace is auto generated on the display.

Overview (continued)

3. To edit the selected measurement graphics:

- Move the Trackball to appropriately size the edit region of interest
- Edit the Calipers via Cursor Select.
- Adjust the circumference using the Ellipse key.

Press Set on the Trackball to complete the measurement.

NOTE:

Specify the mode to measure the BPD: Outer to Inner, or Outer to Outer via Utility--> Measure--> Advanced--> Obstetrics--> Measure Assistant BPD Method.

If the system was not able to detect the anatomy automatically, measurement calipers are displayed in the center of the screen in an editable state and a message is displayed on the status bar.

Hepatic Assistant

Overview

Hepatic Assistant is supported on C1-6-D and C1-6VN-D (Abd (Abdomen), AbdPen (Abdomen Penetration) and AbdDetail (Abdomen Detail)) to measure SWE and UGAP simultaneously.

See 'Shear Wave Elastography' on *page 13-124* and 'Ultrasound-Guided Attenuation Parameter (UGAP) Option' on *page 13-153* for detailed workflows.

Activate Hepatic Assistant

1. Configure presets for Hepatic Assistant in Utility -> Imaging -> UGAP -> Abdomen/Abdomen Pen/Abdomen Detail - C1-6 (Hepatic Assistant) if needed.
 - **Visualization:**
 UGAP/SWE (A/E)
 UGAP Q/SWE (A Qual./E)
 B/SWE & UGAP/UGAP A (BE -> A/Att.)
 SWE Q/SWE & UGAP Q/UGAP (E Qual./E -> A/Qual.)
 SWE Q/SWE & UGAP Q/UGAP (Qual./E -> Qual./Att.)
 - **SWE Display Side:** Right or Left.
 - **Frames to store:** UGAP frames to store for Auto Measurement Multi can be configured in increments of 10 from 0 to 300 (0, 10, 20, etc.).
 - **UGAP ROI Display in PreMode:** On or Off.



Figure 13-196. Presets for Hepatic Assistant

2. Assign Hepatic Assistant to any User Defined key in Utility -> System -> User Configurable key. Press **Save**.
3. Select C16-D/C1-6-VN-D probe and Abd, AbdPen or AbdDetail for application.

Activate Hepatic Assistant (continued)

4. Press assigned User Defined key. Pre Mode is displayed.

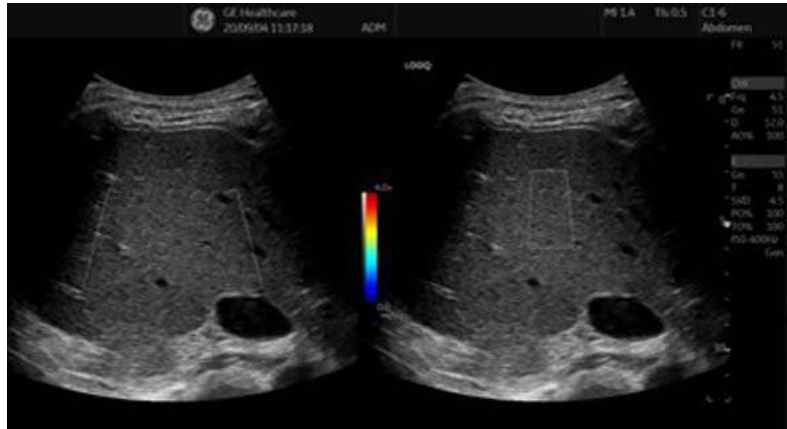


Figure 13-197. Pre Mode

5. Move SWE ROI to desired position, if needed.
6. Press **Start** to begin SWE and UGAP live data acquisition. The UGAP measurement is activated when the SWE measurement is completed.
 - The LOGIQ Fortis acquires one SWE frame data and one UGAP frame data for Auto Measurement Single.
 - The LOGIQ Fortis acquires SWE frames data until the user presses **Freeze**, and the specified number of UGAP data frames for Auto Measurement Multi.
 - The LOGIQ Fortis acquires SWE data frames until the user presses **Freeze**, and UGAP data frames until the user presses **Store** (when Auto Measurement is set to Off).
7. Press assigned User Defined Key to exit Hepatic Assistant.

Visualization

The below Visualizations are selectable in Utility.

- Dual view of UGAP and SWE



Figure 13-198. Example - UGAP/SWE (A/E)

- Dual view of UGAP Quality Map and SWE

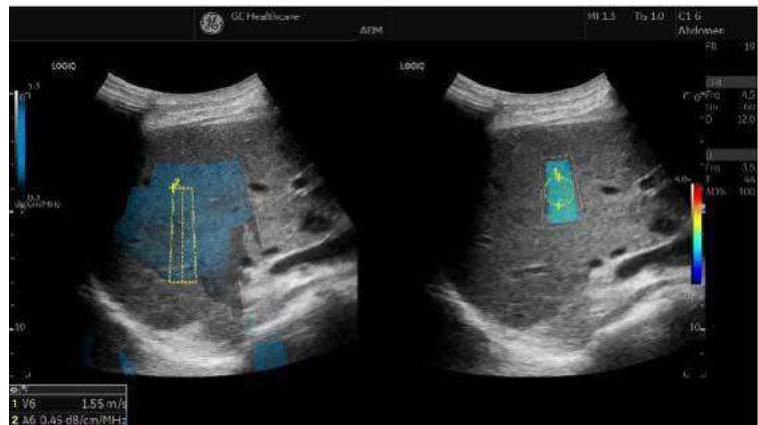


Figure 13-199. Example - UGAP Q/SWE (A Qual./E)

Visualization (continued)

- Dual view of B-Mode and SWE to UGAP and UGAP Attenuation Map

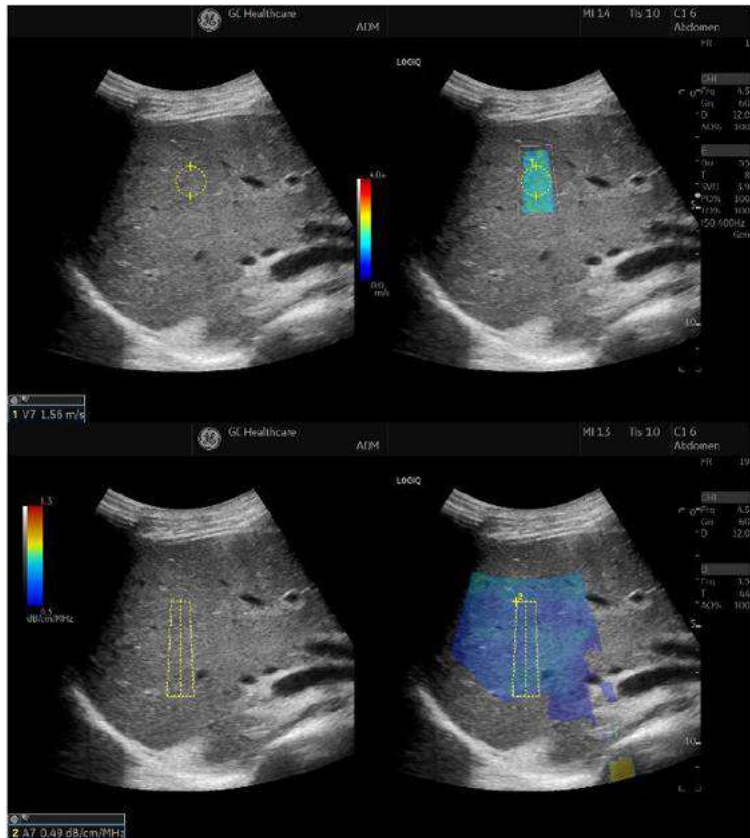


Figure 13-200. Example - B/SWE & UGAP/UGAP A (B/E " A/ Att.)

Visualization (continued)

- Dual view of SWE Quality Map and SWE and dual view of UGAP Quality Map and UGAP

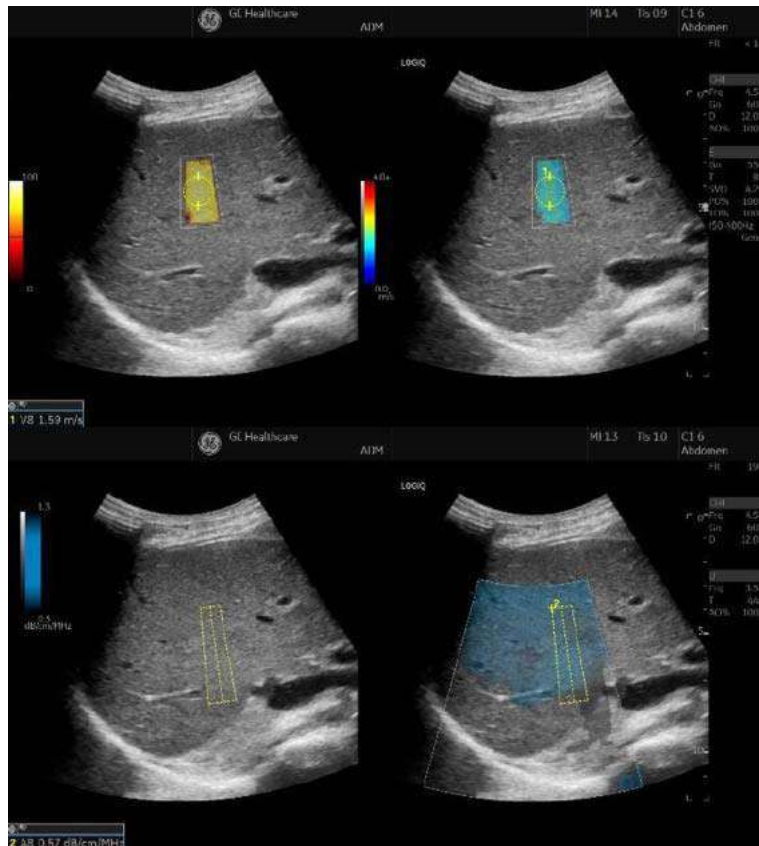


Figure 13-201. Example - SWE Q/SWE & UGAP Q/UGAP (E Qual./E " A/Qual.)

Visualization (continued)

Dual view of SWE Quality Map and SWE to UGAP Quality Map and UGAP Attenuation Map

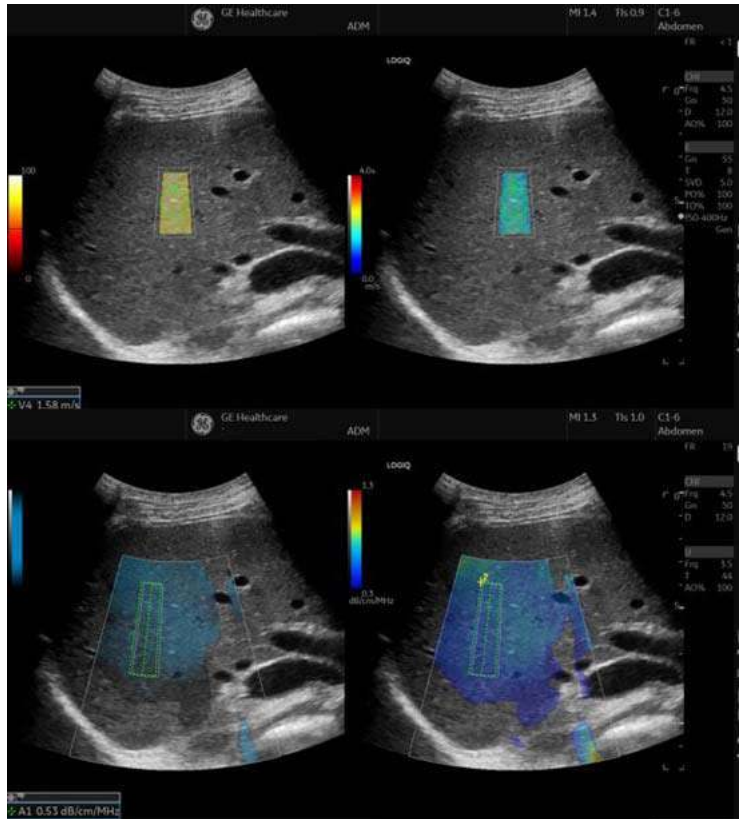


Figure 13-202. Example - SWE Q/SWE & UGAP Q/UGAP (Qual./E -> Qual./Att.)

EZ Imaging

Overview

EZ Imaging provides an efficient workflow to complete exams with minimal operator button input. EZ Touch Panel allows the operator quick access to change model, flow modes and Doppler modes without searching through multiple pages or many different parameters.

Quick Patient Change allows you to start a new exam without entering the patient page.

Activate EZ Touch Panel

1. Check **EZ Touch Panel Page** in Utility > System > System Imaging > EZ Settings.
2. Select “By Probe” (Default) or “By Category” for MyPreset Shortcuts.



Figure 13-203. EZ Settings

Activate EZ Touch Panel (continued)

3. EZ Touch Panel appears on the first page of B, flow and Doppler mode tabs.

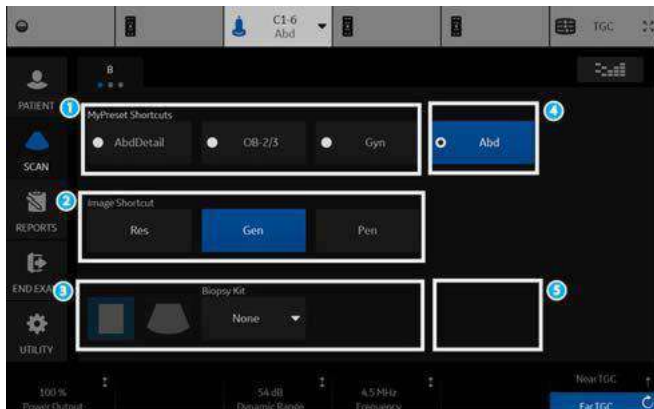


Figure 13-204. B-Mode - EZ Touch Panel (Example)

1. MyPreset Shortcuts
 - Change model quickly on the Touch Panel.
2. Image Shortcut
 - Change imaging frequency (Res > Gen > Pen). (Frequencies are not editable.)
3. Essential Control: Virtual Convex, Biopsy, Max Angle
4. MyPreset Shortcut: Last used or current model is displayed in the 4th position.
5. Essential Control: Configurable essential control is displayed in the 4th position. You can assign a desired control in the 4th position.

Activate EZ Touch Panel (continued)



Figure 13-205. Flow Mode - EZ Touch Panel (Example)

1. Flow mode buttons
 - Change Flow Technology quickly on the Touch Panel.
2. Flow Shortcut
 - CF/PDI: Displays available existing shortcuts.
 - B-Flow/MVI: No shortcut.
3. Essential Control
 - CF/PDI/MVI: Virtual Convex, Invert, Simultaneous
 - B-Flow: Virtual Convex, Biopsy, Max Angle
4. Essential Control: Configurable essential control is displayed in the 4th position. You can assign a desired control in the 4th position.

Activate EZ Touch Panel (continued)

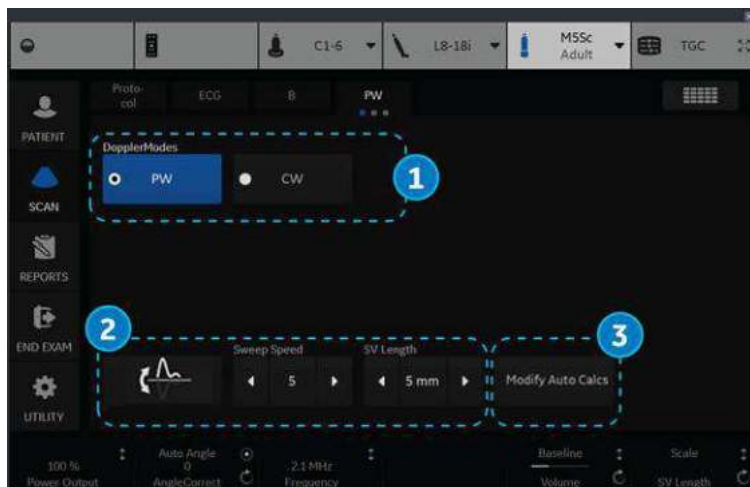


Figure 13-206. Doppler Mode - EZ Touch Panel (Example)

1. Doppler mode buttons
 - Change Doppler Technology quickly on the Touch Panel (if both PW and CW are supported).
2. Essential Control (Non-Configurable)
 - Invert, Sweep Speed, SV Length (for PW)
 - Wall Filter, Sweep Speed, Colorize (for CW)
3. Essential Control (Configurable)

Configurable essential control is displayed in the 4th position. You can assign a desired control in the 4th position.

Activate EZ Touch Panel (continued)

4. Switch to conventional Touch Panel by selecting to turn the Touch Panel page.

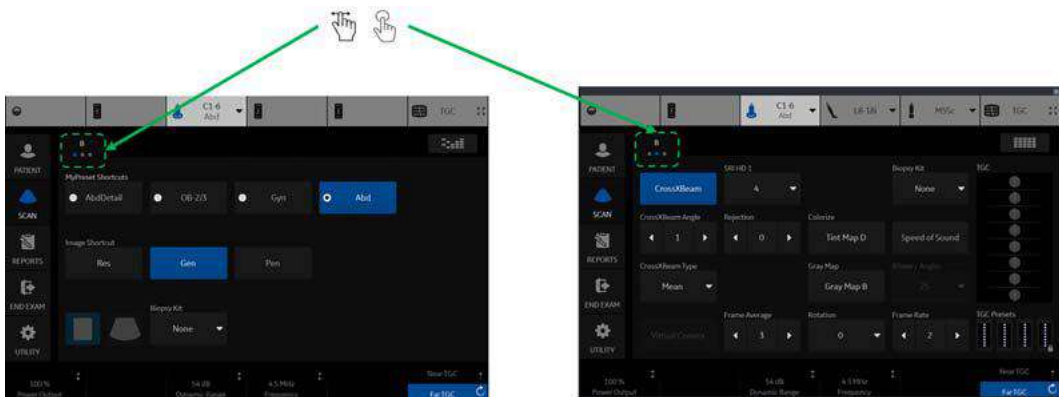


Figure 13-207. Switch between EZ Touch Panel and Conventional Touch Panel

MyPreset Shortcuts “By Probe”

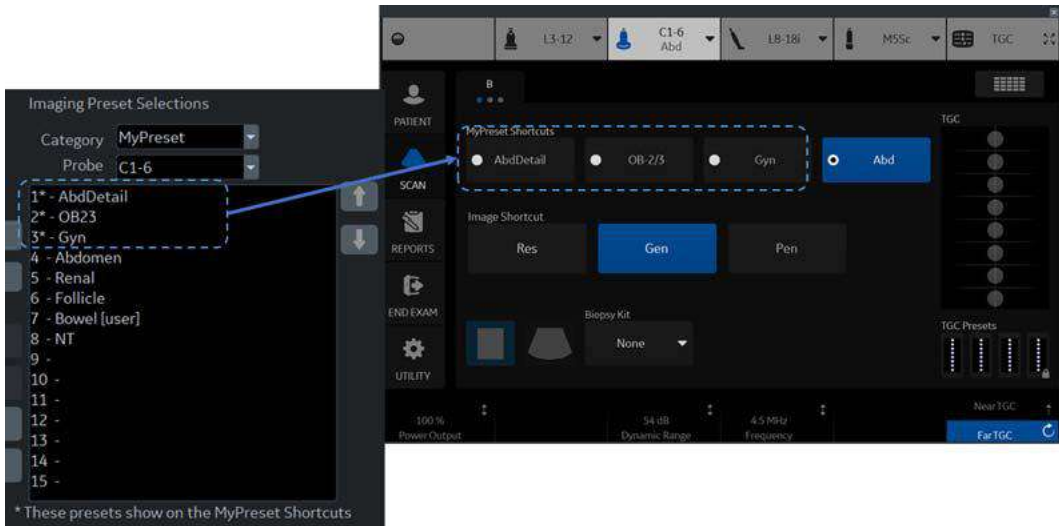


Figure 13-208. By Probe

- TOP 3 models on My Preset for the probe is displayed on the Touch Panel.
- * (Asterisk) indicates the preset appears on the MyPreset Shortcut.

MyPreset Shortcuts “By Category”

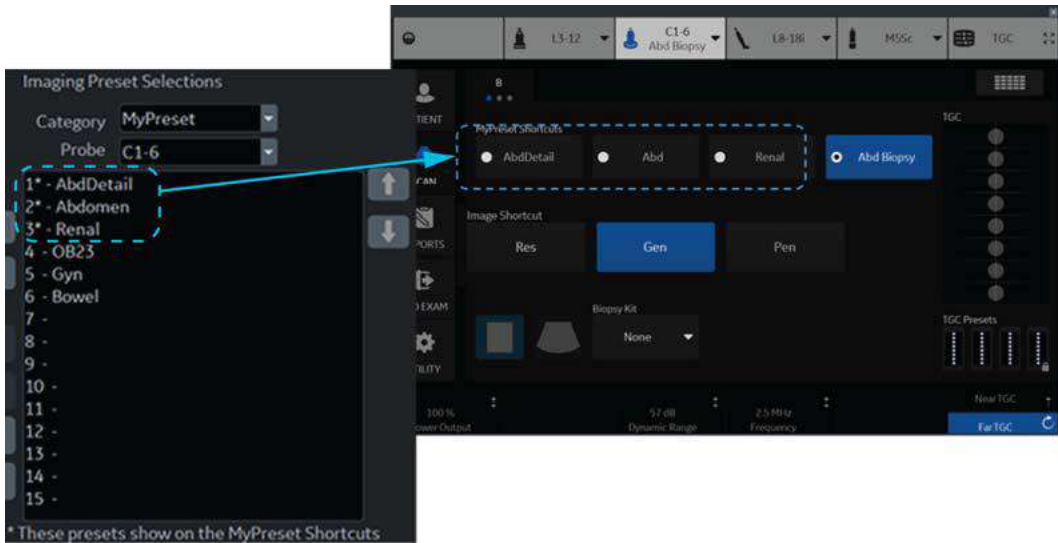


Figure 13-209. By Category

- TOP 3 models in same exam category on My Preset for the probe is displayed on the Touch Panel.

Quick Patient Change

1. Complete current patient exam.
2. Press the BT key assigned to Quick Patient Change.
3. All Patient data is stored for the current patient and the Patient ID for the next patient is generated automatically.

NOTE: *If you turn off Auto Patient Archive, a Confirmation Dialog for Data Archive appears. Select Store All, Delete All, or Cancel.*

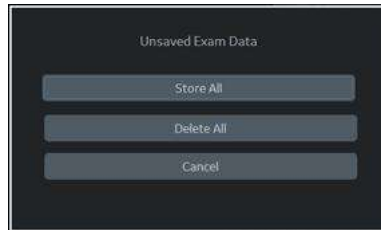


Figure 13-210. Confirmation Dialog for Data Archive

4. An information dialog displays to inform the user that the patient has been created.

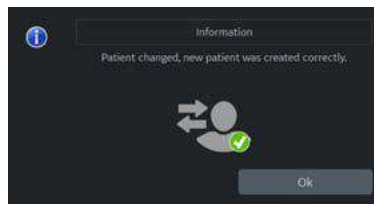


Figure 13-211. Information Dialog

5. Start the exam for the new patient. The B-Mode screen displays with the default preset for the connected probe.

Anonymize the patient

Overview

The LOGIQ Fortis offers an option to extract all measurements and DICOM tags from a selected patient in the Patient List when that patient is not active. This option makes the exam(s) anonymous and attaches this information to a newly created Anonymous Patient.

The LOGIQ Fortis warns the user on possible data loss, data mismatch and data that cannot be copied anonymously, including:

- Image data may have patient information burned into the pixel data. This information will not match the updated patient data in the DICOM tags.
- Patient identification on image pixel data which the user annotated. This information cannot be removed.
- Links to Reports will be lost.
- Non-ultrasound exams will not be anonymous.

Anonymize the patient

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 left click to bring up the “Anonymize” pop-up menu.
4. A confirmation dialog displays. Select **OK**.
5. The “Anonymize Patient” dialog displays. All the fields inherit the values from the original patient’s exam, except for Patient ID.

Fill in the Patient information fields.

Press **OK** to continue.

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

- **Empty Other DICOM Tags:** Check to clear all DICOM Tags.
- **Manage DICOM Tags:** Manage DICOM tags dialog displays. Select DICOM tags individually.

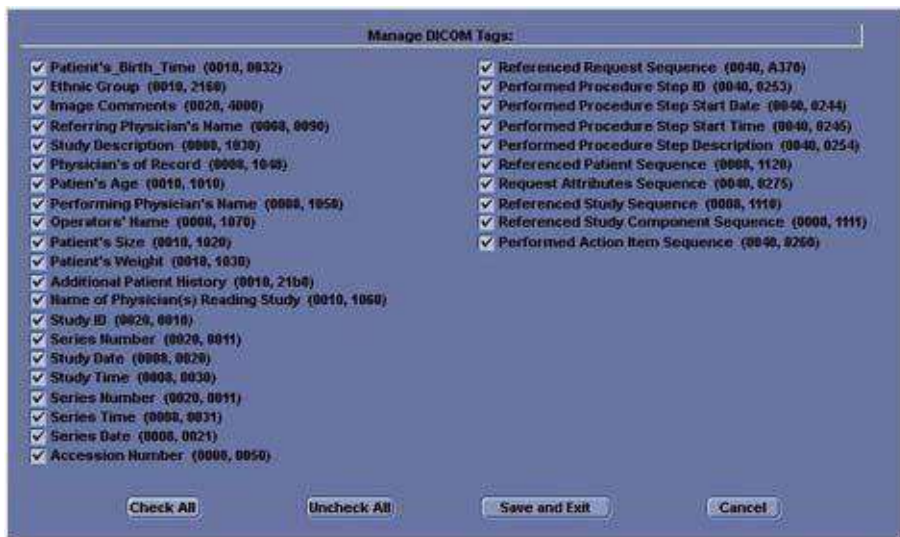


Figure 13-212. Manage DICOM Tags

Report Writer

Introduction

The LOGIQ Fortis 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 templates.

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.

The screenshot displays a report interface for GE Medical Systems. At the top left is the GE logo and the text "GE Medical Systems". Below this is a table with patient information:

| | | |
|----------------|-----------------------|-------------------|
| Name : GE Test | Patient ID : 123-4567 | Date : 07/09/2004 |
|----------------|-----------------------|-------------------|

Below the table are six medical images arranged in a 3x2 grid. Each image shows a dark scan with some highlights. At the bottom of the report is a "Comments" section with a text area containing the text "Test exam".

Figure 13-213. Report Example

Activating the Report

1. Select **Reports** on the Touch Panel.
2. 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.

NOTE: *The template is the skeleton of your report. It is composed of different objects that can be customized by the user.*

3. Adjust the **Page Change** control to move down the page.

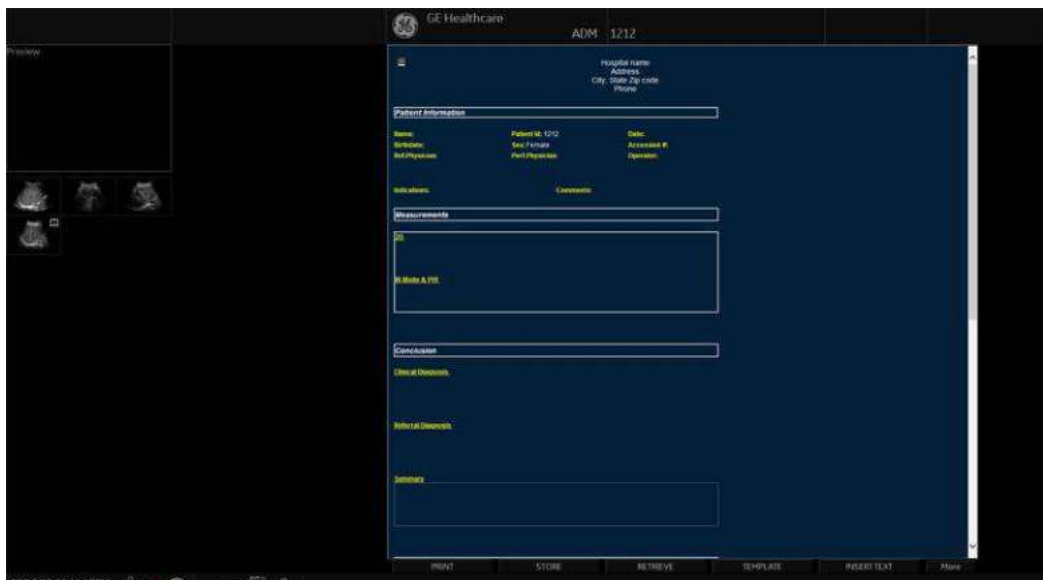


Figure 13-214. Report Page Example

Activating the Report (continued)

Table 13-77: Report Button Controls

| Button | Description |
|--------------------------------------|---|
| Print | Prints out the report to the default printer. |
| 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. |
| Template | Selects template from the list of selected applications. |
| Designer | Accesses template editor screen. |
| Save As | Exports the report page to storage media as CHM or PDF format. |
| 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** at the bottom of the monitor display or the Touch Panel.
2. A list of available templates and exam categories (Abdomen, Adult, Carotid, etc.) displays.
3. Select the desired template using the **Trackball/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 13-215. 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-->Report menu (OB for multiple gestation, Renal, etc.).

Editing a Report

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 13-453* for more information.

To modify the factory template:

1. Select **Reports**.
2. Select **Designer**.
3. Double-click on the area for the hospital information in the template. The Fixed Text dialogue box displays.

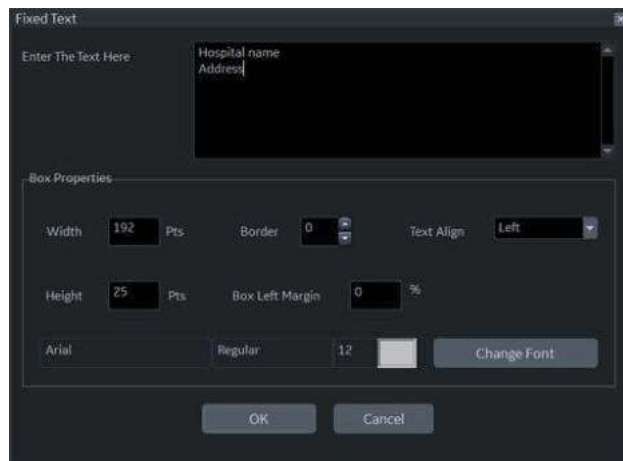


Figure 13-216. Fixed Text Dialogue Box

4. 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).
5. Select **OK**.

Entering the hospital address (continued)

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 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].

7. 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 13-453 for more information.

To modify the factory template:

1. Save the preferred hospital logo in either a jpeg or bmp format on a CD.

NOTE: Label the logo with a unique name (e.g. HospitalNameLogo.bmp).

2. Insert the CD into the CD/DVD drive.
3. Select **Reports**.
4. Select **Designer**.
5. Double-click the GE Logo so that the frame is highlighted. The logo box displays.

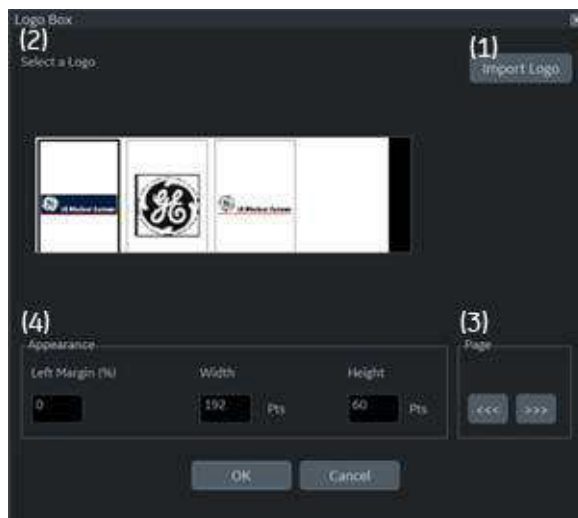


Figure 13-217. Logo Box

Inserting the hospital logo (continued)

6. Select **Import Logo** (1). Select the CD drive 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. Select 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.



| Patient Information | | |
|-----------------------|------------------|--------------|
| Name: GE, Medical | Patient Id: 1212 | Date: |
| Birthdate: 07/07/1985 | Sex: Female | Accession #: |
| Ref.Physician: | Perf.Physician: | Operator: |
| Indications: | Comments: | |

Figure 13-218. 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.

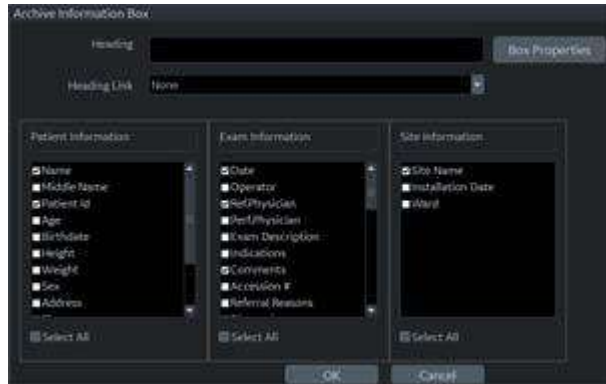


Figure 13-219. Archive Information Box

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.

Modifying the displayed objects of Archive Information (continued)

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.

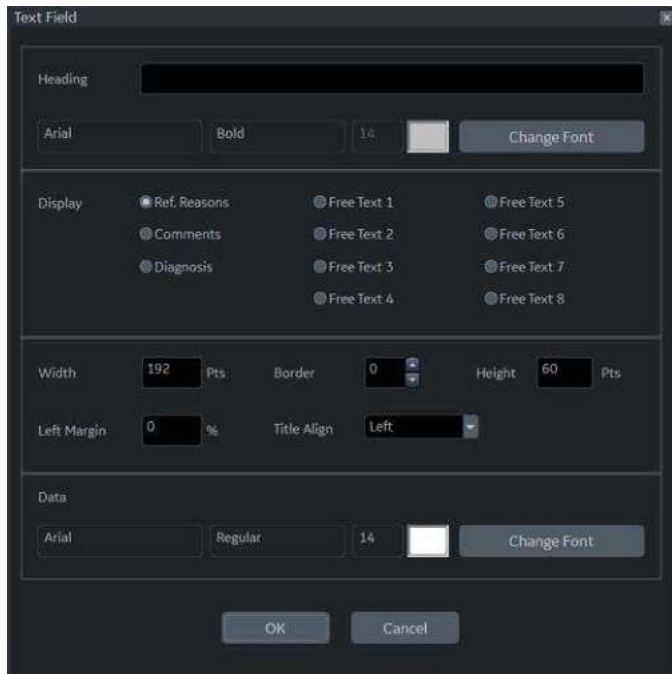


Figure 13-220. Text Field Dialogue Box

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 ‘Image Display Fields’ on *page 13-445* 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 13-451* for more information.



| Measurements | |
|---------------|----------|
| 2D | |
| Ut-L | 7.97 cm |
| Ut-H | 4.56 cm |
| Ut-W | 4.50 cm |
| Ut Vol | 85.71 ml |
| Rt Ov-L | 5.88 cm |
| Rt Ov-H | 4.82 cm |
| Rt Ov-W | 3.10 cm |
| Rt Ov Vol | 46.07 ml |
| Lt Ov-L | 4.95 cm |
| Lt Ov-H | 4.22 cm |
| Lt Ov-W | 2.98 cm |
| Lt Ov Vol | 32.65 ml |
| Rt Fo-D1 01 | 6.00 cm |
| Rt Fo-D2 01 | 5.15 cm |
| Rt Fo-D3 01 | 2.99 cm |
| Rt Fo-Mean 01 | 4.72 cm |
| Rt Fo Vol 01 | 48.44 ml |
| Lt Fo-D1 01 | 1.56 cm |
| Lt Fo-D2 01 | 1.12 cm |
| Lt Fo-D3 01 | 0.80 cm |

Figure 13-221. 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 'Image Display Fields' on page 13-445 for more information.

1. Display the worksheet on the monitor display.
2. Save the worksheet using the **Print** key.
3. Press **Report**.
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.

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. Select **Report**.
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.

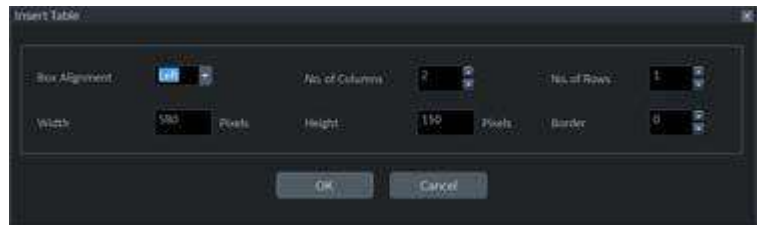


Figure 13-222. Insert Table Box

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.
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].

Placing objects side-by-side (continued)

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 13-437 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 applies to OB, GYN and Abdomen.*

1. Select either **Worksheet**, **Graph** or **Anatomical Page** on the Touch Panel.

NOTE: *There is also Fixed Text set up as hyperlinks for these pages. Cursor to the fixed text and press **Set**.*

2. The system displays the appropriate page (Worksheet, OB Graph or Anatomical Survey) with the corresponding Touch Panel.
3. Select **Report** to return to the Report page.

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.*

Retrieving an Archived Report

1. Select **Retrieve**. The Retrieve menu displays.



Figure 13-223. Retrieve Menu (Prefix "User1\" may not appear)

2. Select the desired report and press **Set**.

NOTE: *The retrieved report cannot be edited.*

Deleting a Report from Archive

1. Select **Delete**. The Retrieve menu appears on the screen.

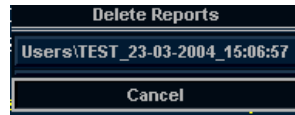


Figure 13-224. Delete Reports Menu (Prefix “User1\” may not appear)

2. Select the report to delete and press **Set**.

Printing the Report

To preview the Print Layout before printing, see ‘Preview the Print Layout’ on *page 13-435* 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.*

1. Select **Print** to print out the report.
The Report is printed on the default printer.

Exporting the Report to Media

1. Select **More**.
2. Select **Save As**.
The Save As dialog box appears on the screen.
3. Enter the Report title and select the file format.
4. Select the media to export the Report. The system supplies a name (numeric DICOM UID, unique identifier).



Figure 13-225. Save as Dialog Box

5. 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 another 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.

The screenshot displays a software window titled "Report Designer" with a dark blue background. The window contains a form layout for a report template. At the top right, there is a section for hospital information with labels: "Hospital name", "Address", "City, State Zip code", and "Phone". Below this is a section titled "Patient Information" which contains a grid of labels for data entry: "Name:", "Birthdate:", "Fetus #:", "Ref.Physician:", "Patient Id:", "LMP:", "Perf.Physician:", "Date:", "GA:", "EDD:", and "Operator:". Underneath the patient information is a section for "Indications:" and "Comments:". The bottom section is titled "Measurements" and contains a table with four columns and three rows of empty input fields. The window has a standard Windows-style title bar and scrollbars.

Figure 13-226. Report Designer

File Menu

Table 13-78: 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.
 - Cancel: Returns to 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 13-79: 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.*

Page Setup (continued)

4. Select **OK** or **Cancel**.

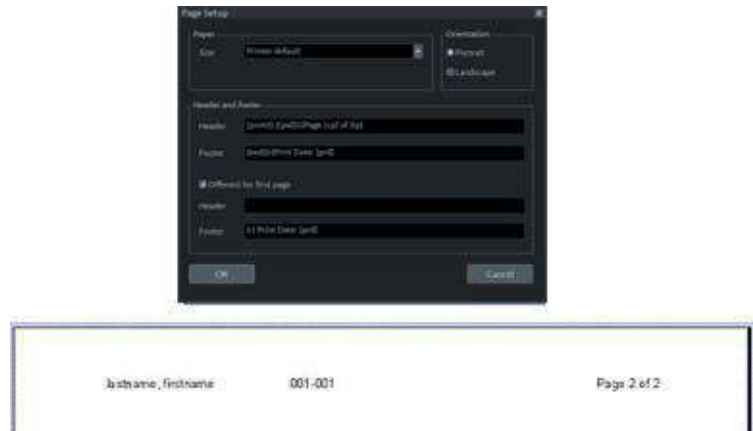


Figure 13-227. Page Setup with Header Example

Preview the Print Layout

1. Select **Template** to choose the Report Template.
2. 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 13-80: 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 13-81: 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. |
| Anatomical Survey | Selects OB, GYN or Abdomen. |
| 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 Anatomy. |
| Small Parts | Selects Breast or Thyroid. |
| Measurements | Inserts the measurement display field in the template. |
| Text Field | Edits text field. |
| Fixed Text | Enters any comments as Fixed 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.

NOTE: To edit the page break line, select the line and double click the **Set** key.

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.

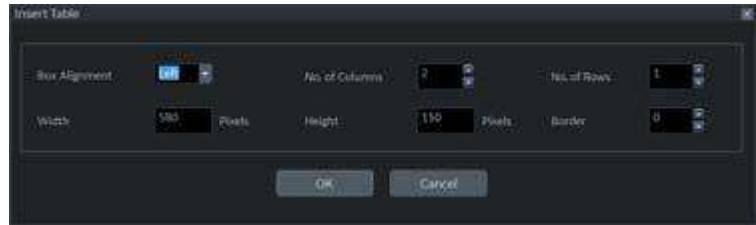


Figure 13-228. Insert Table Dialog

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 13-229. 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 13-230. 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=1
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=2; No. of Rows=1; Width=290 pixels.
Select **OK**.
 - d. Repeat steps a-c for the next 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.

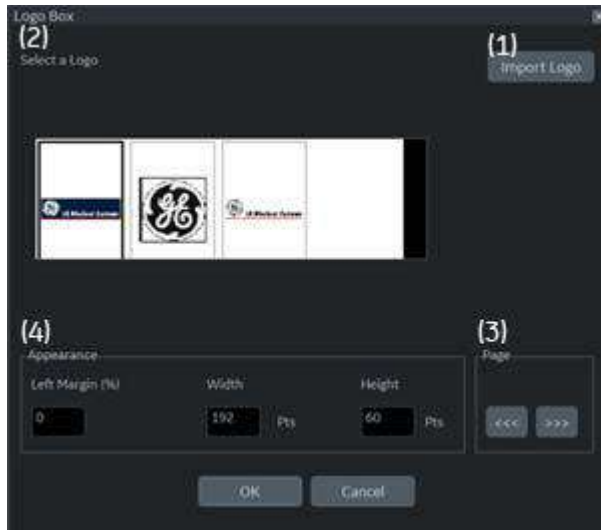


Figure 13-231. Logo Box

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).
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.

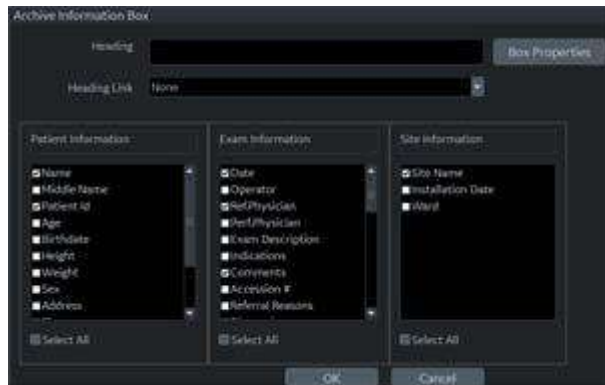


Figure 13-232. Archive Information Box

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*.

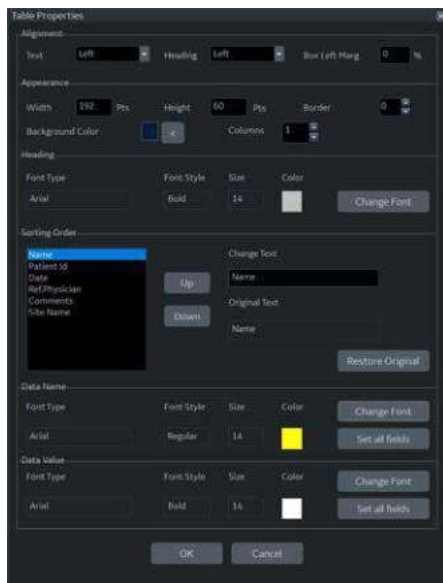


Figure 13-233. Table Properties

5. Select **OK** or **Cancel**. The contents of the Archive Information is inserted to the related page automatically.

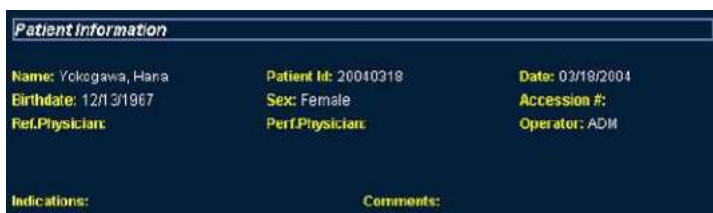


Figure 13-234. Patient (Archive) Information Example

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.
3. Select the desired category and press **Set**. The graphic box displays.

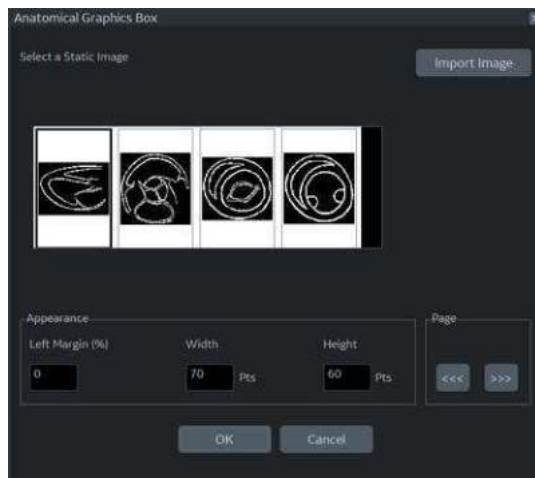


Figure 13-235. Anatomical Graphics Box Example

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.

Image Display Fields

1. Place the cursor where you want to insert the image.
2. Select image from the Insert menu and press **Set**. The Ultrasound Image Box displays.

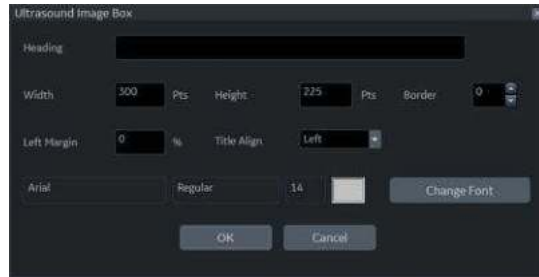


Figure 13-236. Ultrasound Image Box

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.

Cardiac Studies Wall Motion Analysis (continued)

- 3. Select and set up the desired parameter.
 - Bull's Eye



Figure 13-237. Bull's Eye Dialog Box

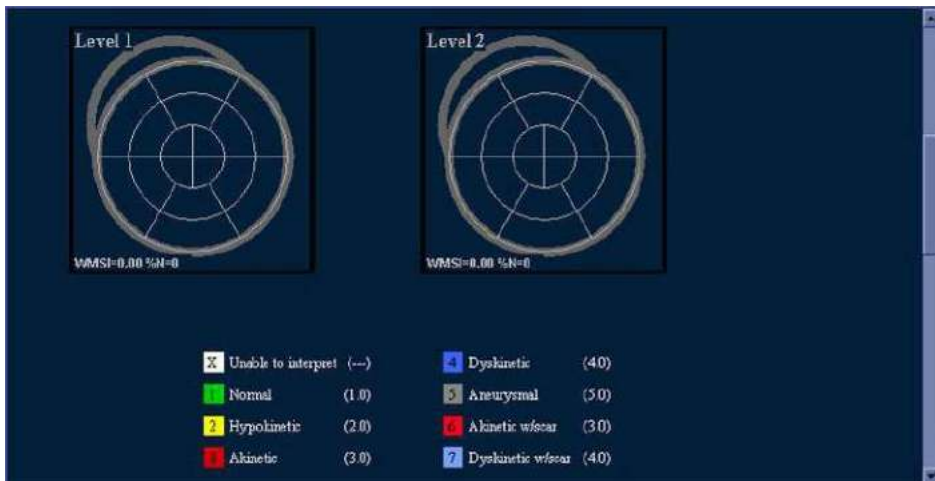


Figure 13-238. Bull's Eye Report Example

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 13-239. Cut Planes Report Example

- Score Table Box

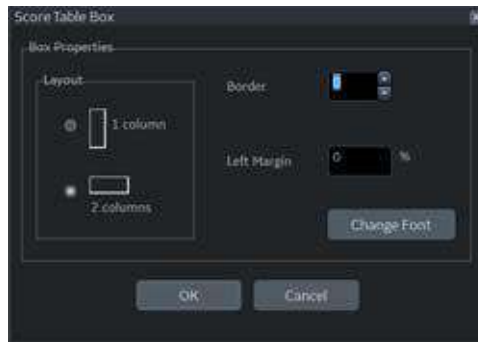


Figure 13-240. Score Table Box Dialog Box

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.
3. Select the appropriate item as necessary. A dialog box displays.
 - OB Graph

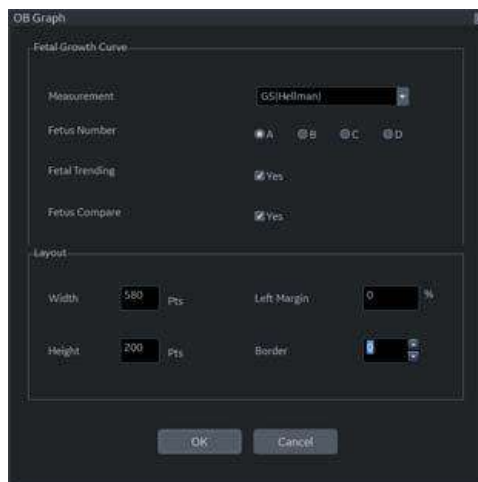


Figure 13-241. OB Graph Dialog Box

- 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**

OB/GYN (OB and GYN Only) (continued)

- Bar Graph

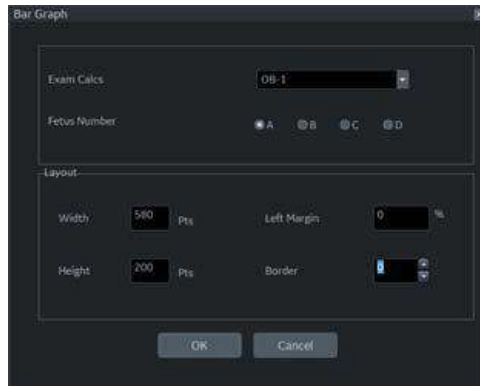


Figure 13-242. Bar Graph Dialog Box

- Select the exam and fetus number.
- Modify the Layout, if necessary.
- Select **OK**.

NOTE:

The Bar Graph already contains default application measurements.

OB/GYN (OB and GYN Only) (continued)

- Anatomy

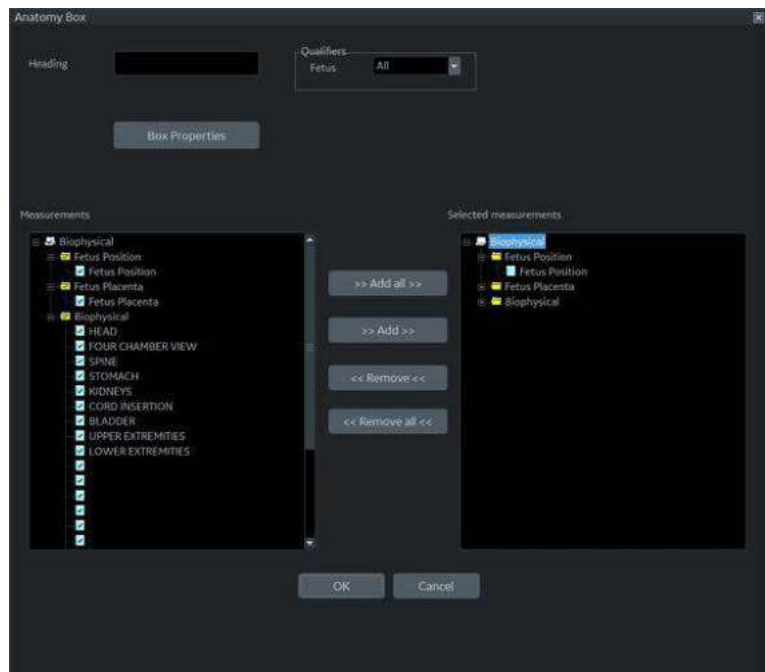


Figure 13-243. Anatomy Dialog Box

- Type the Heading.
- Select qualifiers from the pull-down menu.
- Select **"Add all"** to copy all measurements to the right column
- 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.
- 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"**.
- 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.

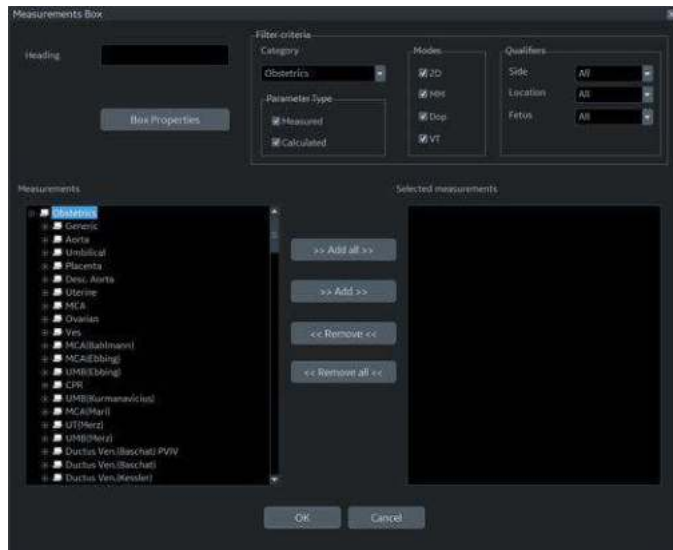


Figure 13-244. Measurement Box

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.

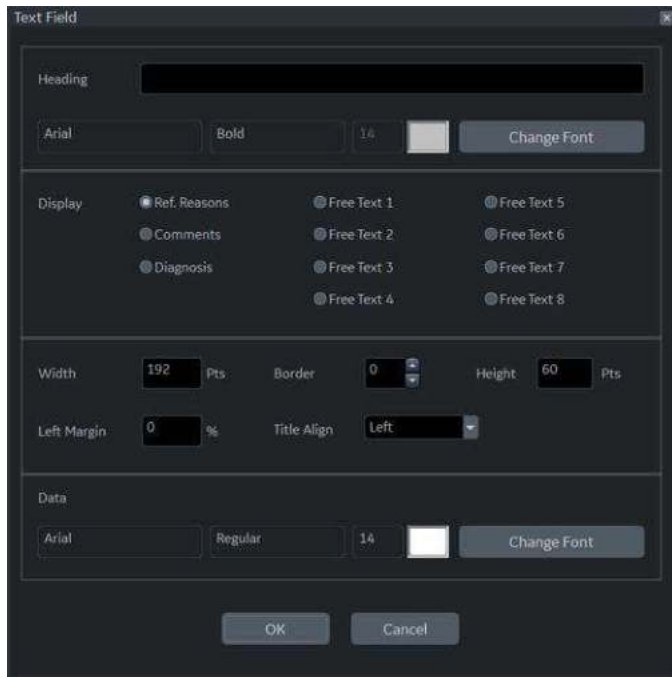


Figure 13-245. Text Field Dialog Box

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 Text Field from the Customize menu and press **Set**. The Fixed Text dialog box displays.

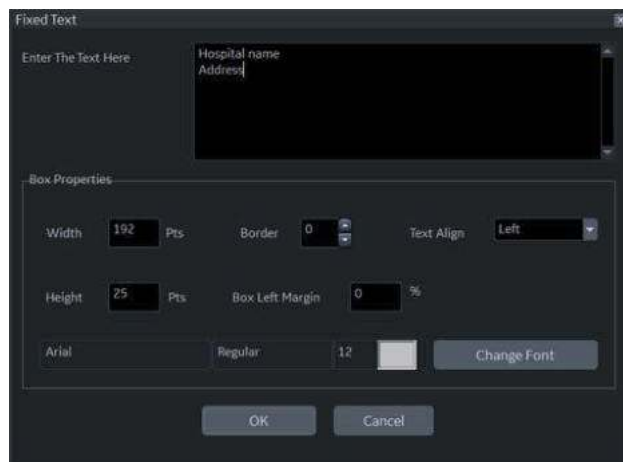


Figure 13-246. Fixed Text Dialog Box

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.

Customize Menu

Table 13-82: 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 13-247. 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.

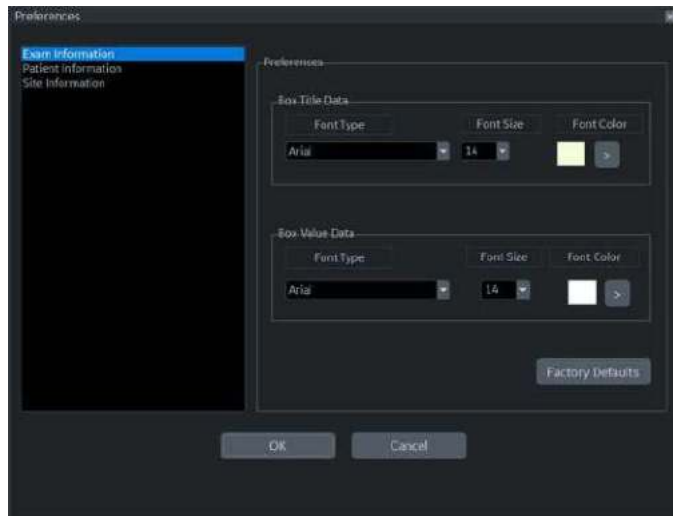


Figure 13-248. Preferences Box

2. Select the information to be modified and set the desired preferences.
3. Select **OK** or Cancel.
4. Save the template.

Direct Report

Direct Report

You can use Direct Report to enter Comments, Diagnosis, and Referral Reasons at any time during the examination that will be part of the final report. The comments are reflected on the Report if the Report is configured for those parameters.

1. Select **Direct Rep.** on the measurement Summary window. The Direct Report displays on the left side of the monitor display.



Figure 13-249. Measurement Summary Window

Direct Report (continued)

- The Direct Report displays on the left side of the screen.



Figure 13-250. Direct Report

- Select the type of information
NOTE: Comments entered under Diagnosis appear in the Clinical Diagnosis section of the final report. Comments entered under Referral Reasons appear in the Referral Diagnosis section of the final report.
- Create/insert pre-defined text
- Text field
- List of measurements completed
The measurement results display on the Measurement Overview field.
Double Click: inserts value only for selected line, e.g. 5.98 cm
Shift + Double Click: inserts whole line for selected line, e.g. BPD 5.98 cm
- Exits the Direct report

Direct Report (continued)

3. Select the appropriate parameter and type the free text with the alphanumeric keyboard or use Insert Text.

NOTE: You can configure the pre-defined text at the Utility Report screen.

- a. Select **Insert Text** to display the Insert Text Window.
- b. Use the **Trackball** to select the text to be inserted.
- c. Press **Set**. The selected text displays on the Direct Report.

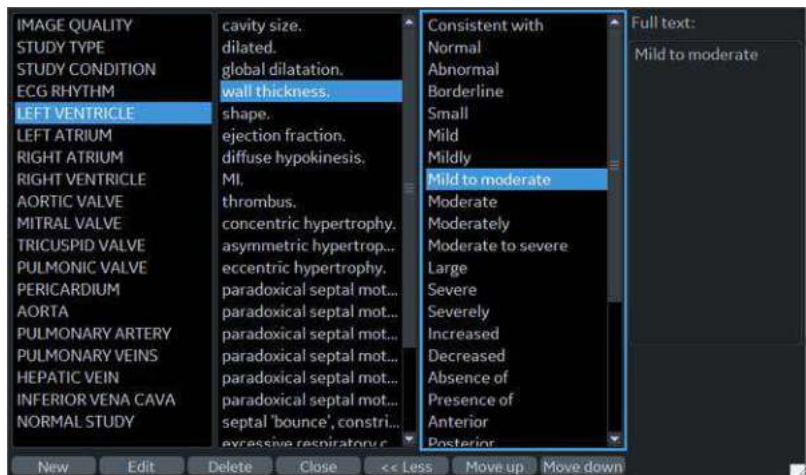


Figure 13-251. Full Insert Text Window

- New: Enters the new text
 - Edit: Edits the existing text
 - Delete: Deletes the existing text
 - Close: Closes the insert text window
 - More>>: Displays the Full Insert Text Window
 - <<Less: Minimizes the insert text window
 - Move up/Move down: Moves the text up or down
4. Move the cursor over the measurement result displayed in the overview window, and double click the **Set** key.

Direct Report (continued)

5. Select **Done** at the bottom of Direct Report to exit.

If you configure the field of comment, diagnosis, referral reasons or Measurement on the Report, the text and/or measurement results entered in the Direct Report are automatically displayed on the Report.



Figure 13-252. Direct Report and Report (Example)

Report Presets

Utility Report Page

You can edit the report template, diagnosis code, and text on the Utility Report 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.

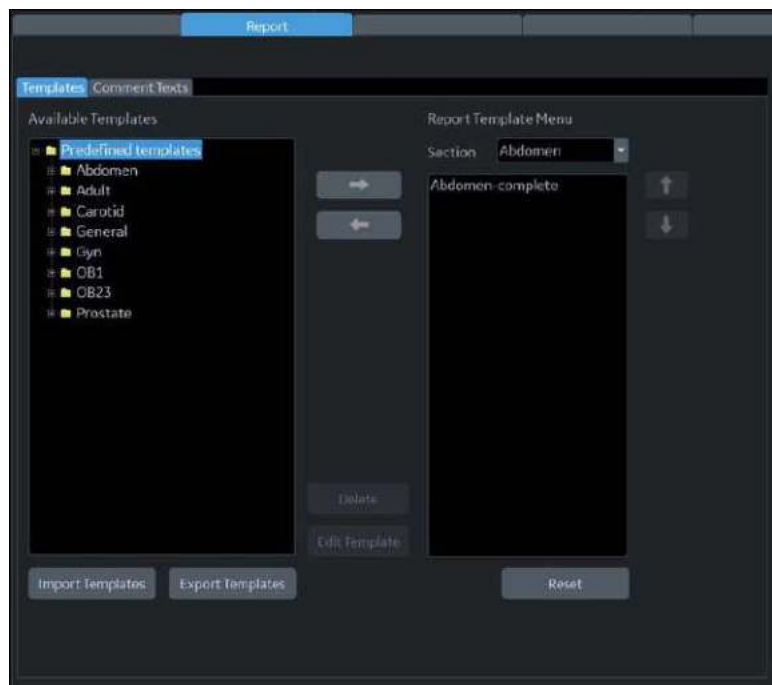


Figure 13-253. Report Template Tab

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 by the check the box.
 - 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 -> Report -> Template 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 13-431 for more information.*
- To delete the template:
 - a. Select the template to be deleted.
 - b. Press **Delete**.

Templates (continued)



HINTS

- To export the template:

Export templates to removable media (CDs, DVDs, USBs) so, at a later time, you can import those templates to a different system or a system with a different software version. 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.

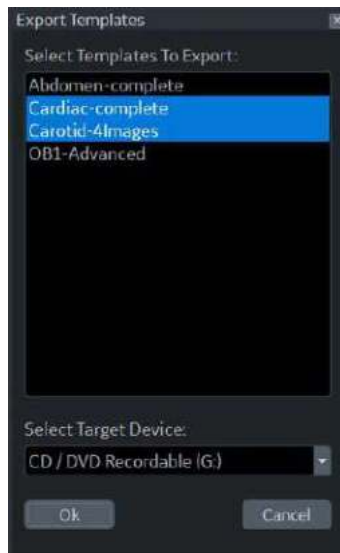


Figure 13-254. Export Templates

NOTE:

- c. Select the template(s) to be exported.
*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)



HINTS

- To import the template:

Import templates from a different system or a system with a different software version. Import only works on templates, not data.

- Insert the removable media with the report template(s) to be imported.
- Select **Import Template**. The Import Template window displays.



Figure 13-255. Import Templates

- Select the Source Device from the pull-down menu. Select **OK**.
- 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:
 - Select the template to be moved.
 - Select the Right Arrow or Left Arrow button.
- To move the template up or down in the right column:
 - Select the template to be moved.
 - Press the Up Arrow or Down Arrow button.

Comment Texts

You can edit the comment text on the Comment Texts tab.

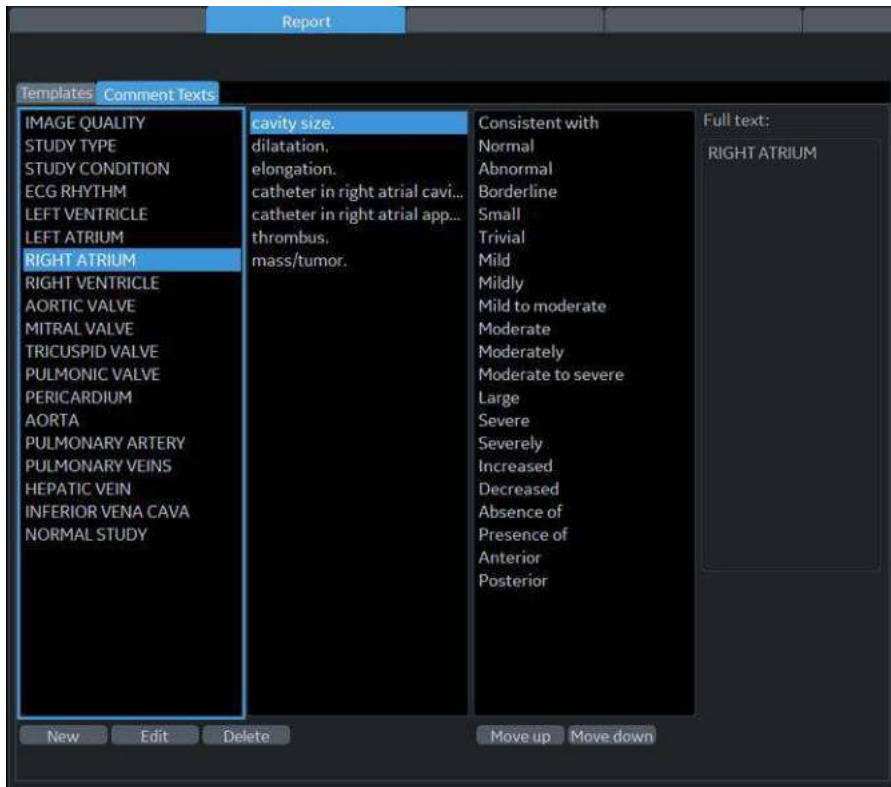


Figure 13-256. Comment Texts Tab

- New: Enters the new comment.
- Edit: Edits the existing comment.
- Delete: Deletes the existing comment.
- Move up/Move down: Moves the comment up or down.

Backup/Restore Report Templates

Backup moves templates to removable media (CDs, DVDs, USBs).

Restore moves templates, that were backed up onto media, to a similar system or a system with the same software version. For example, it allows templates to move from one LOGIQ Fortis to another LOGIQ Fortis.

To backup the report template:

1. Select **Utility**.
2. Select **System** and select the Backup/Restore tab.
3. Select the media.
4. Check User Defined configuration box of the Backup field.
5. Select **Backup**.
6. Select **Save** and eject the media.

To restore the report template:

1. Insert the media.
2. Select **Utility**.
3. Select **System** and select Backup/Restore tab.
4. Check Report Template box of the Detailed Restore of User Defined.
5. Select **Restore**.
6. After the system reboot, select **Utility** and **Report**.
7. Select the Template tab.
8. Select the appropriate template (See 'Templates' on *page 13-460 for more information.*)

Configuring DICOM

Overview

If you follow these instructions, you will be able to set up a DICOM PACS environment suitable for a typical daily routine in a typical Ultrasound clinical environment:

In these instructions, you will ensure that your LOGIQ Fortis and DICOM PACS are connected to and communicating back and forth on the hospital/clinic's network and between the devices. We will be setting up the most commonly used DICOM features typically used in a clinical setting.

NOTE: *For additional information on the DICOM parameters, detailed information is provided in Chapter 10, Customizing Your System.*

Step 1 - Set up the Network Addresses for the LOGIQ Fortis

Get the following information from your IT Team for the Utility > Connectivity > TCP/IP page:

The screenshot shows the 'TCP/IP' configuration page for a device named 'N01001'. The page is divided into two main sections: 'Wired Network Configuration' and 'Wireless Network Configuration'. The 'Wired Network Configuration' section includes fields for 'Enable DHCP' (checked), 'IPv6' (checked), 'IP-Address' (0.0.0.0), 'Subnet Mask' (255.255.255.255), 'Default Gateway', 'Primary DNS Server', 'Secondary DNS Server', and 'Network Speed' (Auto Detect). The 'Wireless Network Configuration' section includes fields for 'IP-Address' (169.254.180.17), 'Subnet Mask' (255.255.0.0), 'Default Gateway', 'MAC Address' (B4-69-21-9D-AA-17), 'Speed (Mbps)' (0), 'Connected (min)' (0), and 'Status' (Operational). A note at the bottom states: 'Restart the system to activate any changes saved from this page!'.

Figure 13-257. TCP/IP Wired and Wireless Connectivity Setup

For the Wired Connection, provide the following:

- Enable DHCP
- IPv6

And,

- IP-Address
- Subnet Mask
- Default Gateway
- Primary DNS Server (optional)
- Secondary DNS Server (optional)
- MAC Address
- Speed (Mbps)
- On the Device page, add AE Title and Port Number for MyComputer.

NOTE: For more information on configuring the Wireless LAN, refer to 'Configuring the Wireless Network' on page 13-480.

After you've filled in this information, press Save, then reboot the system.

Step 2 - Set up the PACS

Set up the PACS Device on the Utility > Connectivity > Device page. The “Allow Trusted (Configured) Devices Only” is checked by default.

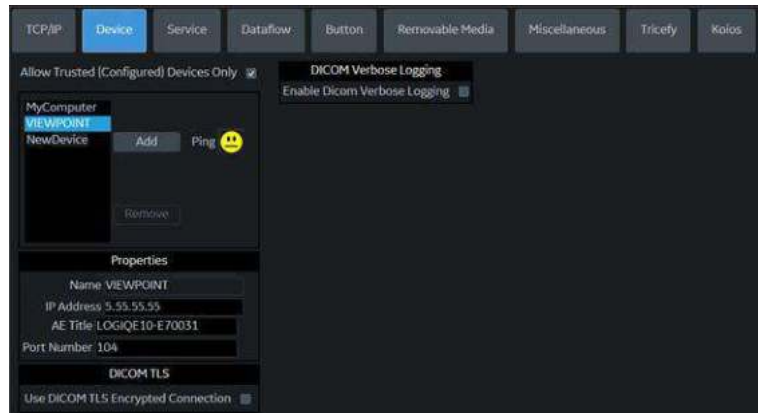


Figure 13-258. Add Device(s)

1. Select NewDevice and click Add to find the PACS device.
2. Under Properties, provide the following information:
 - PACS Name
 - PACS IP Address
3. Press Save at the bottom of the screen. Verify the connection by pressing the ping face icon. If a smiley face appears, the system is communicating with the PACS device and setup is complete.

NOTE: Supports TLS Encrypted and non-TLS Encrypted connections.

Step 3 - Set up the DICOM Services for the Device

Specify which DICOM Services will be performed using this Device for images/clips sent by the LOGIQ Fortis via the Utility > Connectivity > Service page. For all Services, you will need to provide the following information:

- Destination AE Title (Case Sensitive)
- Port Number to be used by the Device
- Save your selections and Verify the Service before adding the next Service.
- Be sure to send test images, pull from the Worklist, query/ retrieve a patient's exam, etc.

NOTE: For more information on the Use Button Settings DICOM Service Settings, see Chapter 10.



HINTS

Ensure the system's date and time are correct. This can affect the system's ability to pull the Worklist.

Table 13-83: Adding DICOM Services to the PACS

| Step | Screen |
|--|--------|
| <p>If you are setting up a DICOM Image Storage service, also provide the following information:</p> <ul style="list-style-type: none"> • Indicate whether you want Structured Reporting enabled for this DICOM Device. • Keep Default Values for the remaining fields. | |
| <p>If you are setting up a DICOM SR Storage service, fill in the required information.</p> | |

Table 13-83: Adding DICOM Services to the PACS (Continued)

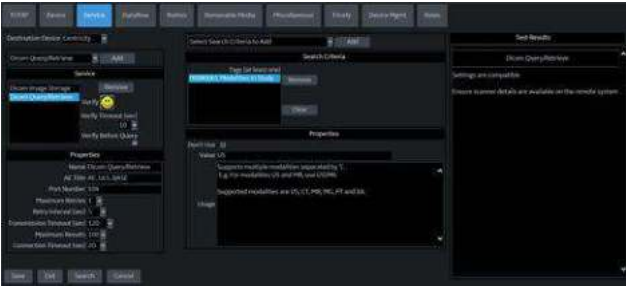
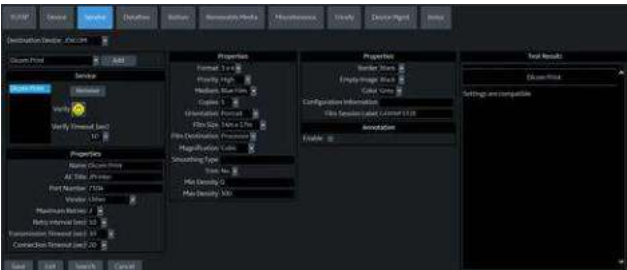
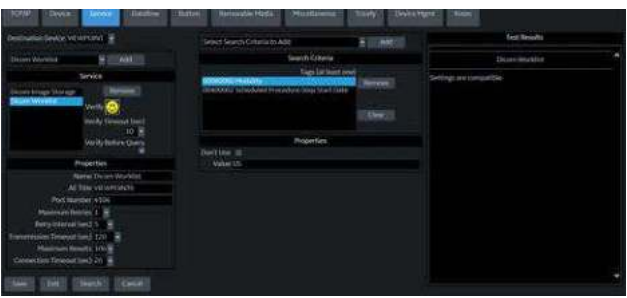
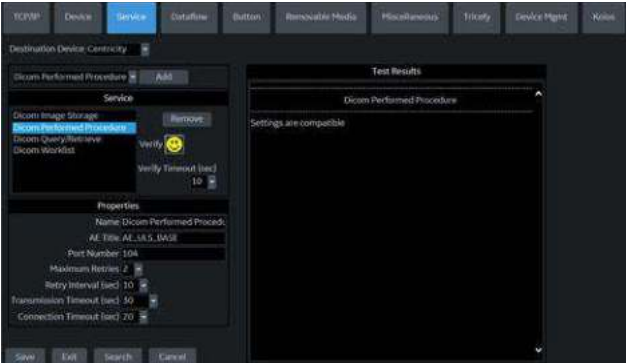
| Step | Screen |
|--|--|
| <p>If you are setting up a DICOM Query/Retrieve, also provide the following information:</p> <ul style="list-style-type: none"> • Add Search Criteria you will use to query/retrieve patient exams • Fill in “US” to narrow the query/retrieve search to Ultrasound exams <p>Note: You can leave this “Blank”, or “US”, “CT”, “MR”, etc., depending on the PACS. Confirm with your PACS Administrator Service Class User/Provider.</p> |  |
| <p>If you are setting up a DICOM Print service, also provide the following information:</p> <ul style="list-style-type: none"> • Vendor • Confirm Default Values for the remaining fields. |  |
| <p>If you are setting up a DICOM Worklist service, fill in the required information.</p> |  |
| <p>If you are setting up a DICOM Performed Procedure service, provide the following information:</p> <ul style="list-style-type: none"> • PACS’s AE Title (Case Sensitive) • Port Number to be used by the PACS |  |

Table 13-83: Adding DICOM Services to the PACS (Continued)

| Step | Screen |
|---|--|
| <p>If you are setting up a DICOM Storage Commitment service, also provide the following information:</p> <ul style="list-style-type: none"> • Associated Storage |  |

Step 4 - Set Up a Typical Dataflow

Set up a typical “Routine” Dataflow specifying where you want your images/clips to be sent by the LOGIQ Fortis via the Utility > Connectivity > Dataflow page.



The example below is more complex than you will probably encounter in your day-to-day workflow. In general, DO NOT add a device to the Local Archive - Int. HD. Also, DO NOT select Direct Store, as images could get stored to multiple locations, and each image is always stored by pressing the print key.

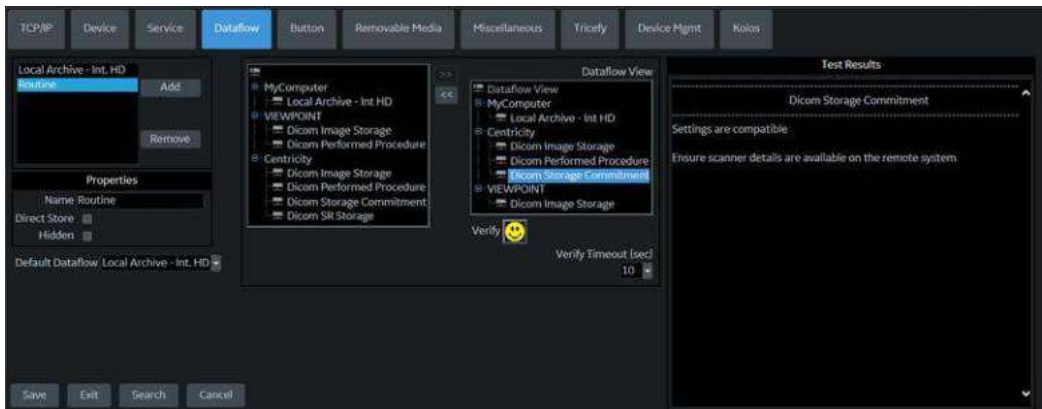


Figure 13-259. Add a Typical, Routine Dataflow

Provide the following:

- Press Add to specify the Name of the Dataflow.
- Set the Default Dataflow to the new Dataflow (“Routine”).
- Select the Device and Service to be included in the Dataflow. Use the arrows to move the Device and Service to the Dataflow View.

Step 4 - Set Up a Typical Dataflow (continued)

- Press Save, then Verify the Service you have selected under the Dataflow view by selecting the *Verify* button (“Smiley Face”). The *Verify* button checks the connection status with the server and the compatibility with the PACS device.

If the connection status and compatibility with the PACS device are successful, the *Verify* button exhibits a smile and the Test Results area displays the compatible settings, along with Print button details (if Use Button Settings is enabled). (See Figure 13-259 on page 13-472.)

If the connection status and compatibility results are unsuccessful, the *Verify* button exhibits a frown and the Test Results area displays the error with recommended actions. Examples of unsuccessful verify results are:

- Connection to the server not established
- PACS device refuses service
- DICOM objects are not supported
- Configured compression is not supported



HINTS

- DO NOT use the default, “Store to Hard Drive”.
- DO NOT select Direct Store. Rather, send images/clips at the end of the study.
- Be sure to test the Dataflow.

Step 5 - Set up the Print Keys

Assign Services to a Print key on LOGIQ Fortis via the Utility > Connectivity > Button page.



HINTS

- Print key behavior is also controlled under Utility > Application > Print Controls by Preset.
- DO NOT also send to PACS because you have already configured this in the Default Dataflow (“Routine” in the example above). Also, it is not necessary to add a device to the button as it is already assigned to a dataflow.
- The default setting for Clips is Raw Data with Compression. You can adjust this via the “Use Button Settings” selection.
- Compression on the LOGIQ Fortis and the PACS should match, as this affects the size of the information stored on the LOGIQ Fortis.

Table 13-84: Configuring Print Keys

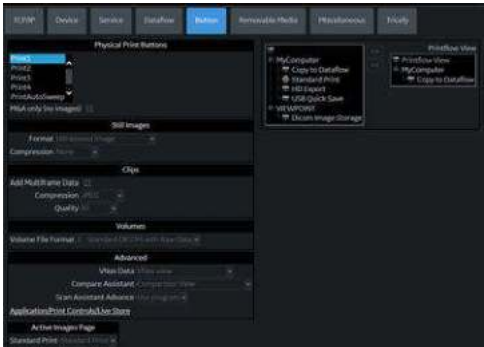
| Print Key Configuration | Example |
|--|---|
| <p>The functionality of the buttons (P1, P2, P3, etc) can be defined under the Button Tab. The example to the right shows that when P1 is selected, any image information will be sent to the dataflow that is selected for that study. If the default dataflow is Routine, it will be stored to the hard drive and sent to the DICOM store device(s) defined by that dataflow. It will either go at the end of the exam or after the operator acquires the image, depending on whether it is defined as direct store or not.</p> <p>Typical P1 Selections:</p> <ul style="list-style-type: none"> • Print 1 should go to Dataflow selected on the Patient information page. <p>Note: The Printflow View box defines what each Print key will do. And below (still images, clips, volumes) defines the formatting.</p> <p>Note: P1 can be disabled to prevent accidental presses.</p> |  |

Table 13-84: Configuring Print Keys (Continued)

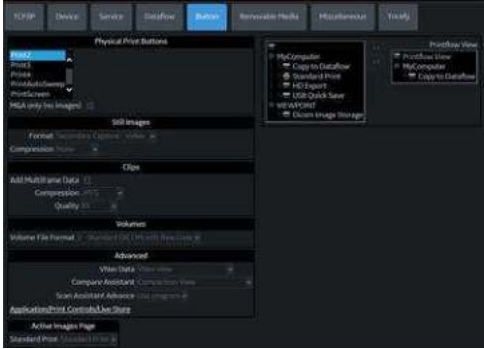
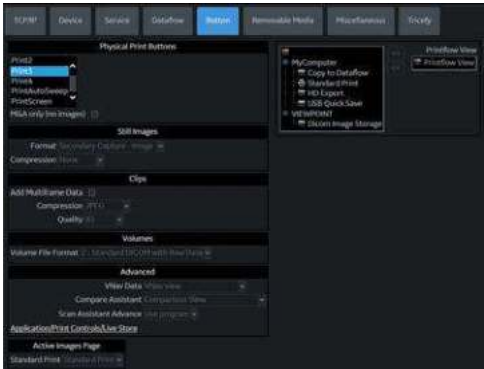
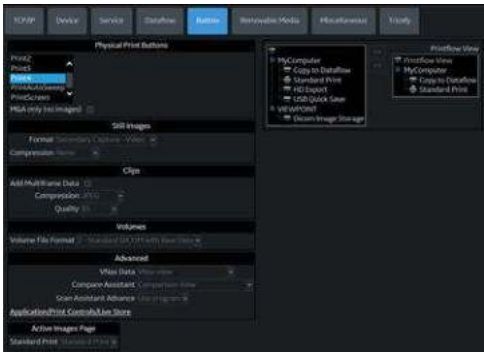
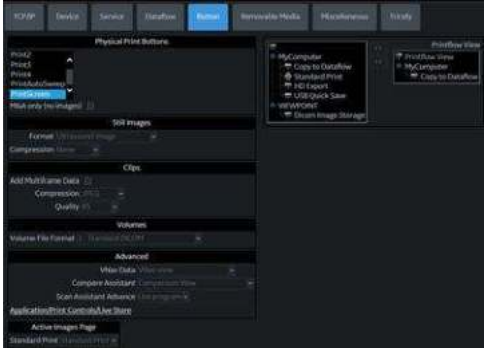
| Print Key Configuration | Example |
|---|--|
| <p>Typical P2 Selections:</p> <ul style="list-style-type: none"> This example to the right shows that P2 will be sent to the dataflow selected on the Patient information page and that still images will be formatted as secondary capture image of video area with no compression. The clips will be formatted as Raw Dicom with 85% JPEG compression and no multi-frame data added (this will be added upon export with the new Use File Settings). |  |
| <p>Typical P3 Selections:</p> <ul style="list-style-type: none"> The example to the right shows when the Print Key is not activated to do anything. |  |
| <p>Typical P4 Selections:</p> <ul style="list-style-type: none"> This print key is set to send to the dataflow selected on the Patient information page and also to send to whatever printer is set as default (BW printer or network printer). |  |

Table 13-84: Configuring Print Keys (Continued)

| Print Key Configuration | Example |
|--|--|
| <p>Typical PrintScreen Selections:</p> <ul style="list-style-type: none"> You would not have to copy a Dataflow under the Printflow view, but rather, use a USB Flash Drive; you may need to use a format of Ultrasound image for Still Images. |  |

DICOM Job Spooler

To check the status of each job, open the DICOM Job Spooler by pressing F4 (see Figure 13-260).

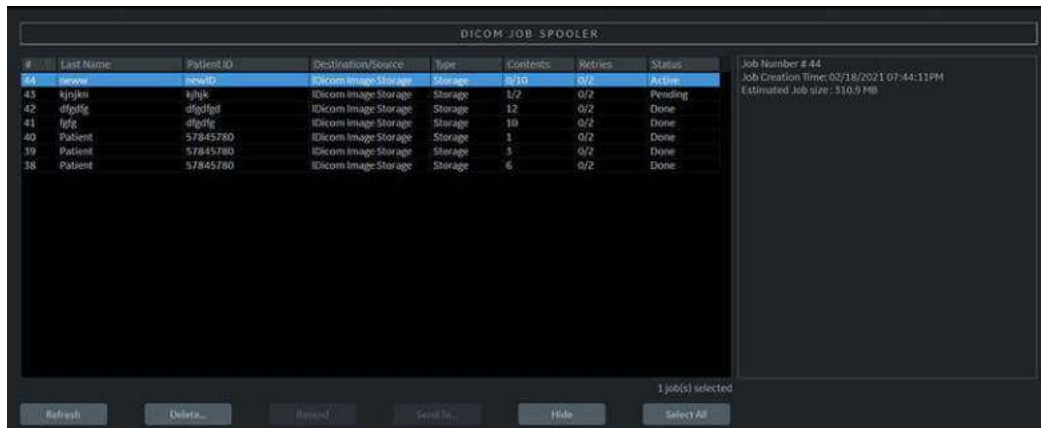


Figure 13-260. DICOM Job Spooler Active Jobs

The DICOM Job Spooler lists Pending, Active, Completed (identified as “Done”) and Failed jobs, with the status listed in the “Status” column on the far right. Select the desired job to see the job details in the Details Pane on the right side of the screen.

Failed jobs will include an Error Description and Recommendations to correct the error in the Details Pane (see Figure 13-261 on page 13-477).

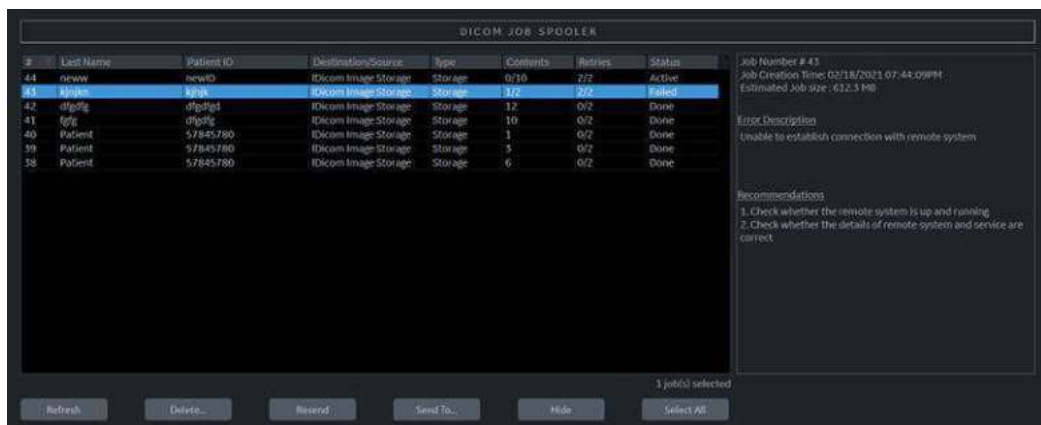


Figure 13-261. DICOM Job Spooler Failed Job

NOTE: Deleting jobs from the spooler does not delete images from the hard drive. They can be re-sent via the “Send To” function on the Patient--> Patient View, Exam View, or Image Review.

Troubleshooting DICOM Connectivity Issues

- If you ping/verify the device and receive a frown, confirm with your IT Team that you are using the correct IP Address, AE Title, Port Number, etc.
- If the image/clip is stuck in the Print Spooler, select the job and resend or send to an alternate device.

For Detailed descriptions of every DICOM parameter, refer to Chapter 10 of the Basic User Manual's (Configuration chapter). For more detailed instructions on setting up each DICOM page, refer to Chapter 3 of the Basic Service Manual (System Setup).

Configuring the Wireless Network

Wireless LAN (WLAN)

A Wireless Network (WLAN) is available on the LOGIQ Fortis. When the WLAN is active, an icon appears in the status bar to indicate whether the WLAN is installed or disconnected. See 'Network and Spooler Status Icons' on *page 13-484* for a description of the network icons.

Wireless LAN (WLAN) Specifications

The Wireless LAN (WLAN) supports the following network protocols:

Supported Standards

- Conforms to IEEE 802.11 ac/a/b/g/n WiFi with Bluetooth 4.0 Standard.
- FCC Part 15 Class B
- Japan's Radio Law
- R&TTE Directive
- Canada Requirements

Security Type (Encryption)

- None/Open
- WPA2-Enterprise
- WPA2-Personal

Encryption

- None
- WEP
- AES

Internet Protocol

- The LOGIQ Fortis supports IPv4 or IPv6.

Intel declaration of conformity

You can find the Intel Declaration of Conformity at this web link:

<https://www.intel.com/content/dam/support/us/en/documents/network-and-i-o/wireless-networking/9260NGW-EU-RED-DoC.pdf>

Wireless LAN (WLAN) Specifications (continued)

Authentication

- None
- Microsoft PEAP using MSCHAP v2
- Cisco EAP/LEAP/PEAP
- Username/password
- Limited support for server certificate verification using pre-installed trusted root CAs
- Client certificates not supported
- User authentication/confirmation prompts not supported

Antenna

- 2 integrated internal wireless antennae

Radio Data Rate

- 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, 54, 08, 140, 246, and 300 Mbps (Auto Rate Sensing)

Frequency

- 2.4 GHz to 2.5 GHz (CCK and OFDM Modulation)
- 4.9 GHz to 5.9 GHz (OFDM)

Country Compliance

The WLAN subsystem automatically detects location and adjusts the output to be compliant to country regulations. The following is a partial list of countries that the product is compliant with:

- United States: FCC Part 15 Class B
- Canada: Industry Canada Radio Standards Specification (RSS) license-exempt
- European Union: Radio Equipment Directive (RED) 2014/53/EU
- Japan: Japan Radio Law
- Brazil: National Telecommunications Agency (Anatel)
- Malaysia: Malaysian Communications and Multimedia Commission (MCMC)
- Singapore: Infocomm Development Authority of Singapore (IDA)

Connecting to the WLAN

To connect the LOGIQ Fortis to the WLAN,

1. Press Utility --> Connectivity --> TCP/IP --> Wireless Network --> Configuration (located under Wireless Network).

The Wireless Network Configuration tool appears. If enabled, Wireless Networks broadcasting in your area appear in the list.





















2. If necessary, check the box for “Enable Wireless Connection”.
3. Select the wireless network you want to use or set up.
4. Press **Connect** from the bottom of the Configuration tool. If prompted, enter the correct settings for this wireless network.

NOTE: *If the WLAN fails to connect, review and/or recreate the Wireless connection on the Security Tab.*

Network and Spooler Status Icons

The following icons identify network and spooler statuses:

Table 13-86: Network and Spooler Status Icons

| Network and Spooler Status Icons | | | | |
|---|---|---|--|---|
| Ethernet Active  | Ethernet Error  | Ethernet Active Spooler Active  | Ethernet Active Spooler Error  | Mobile  |
| Mobile Error  | Mobile Bluetooth  | Mobile Wifi  | Spooler Active  | Spooler Active Error  |
| Spooler Inactive  | Spooler Inactive Error  | Wifi 1 Bar  | Wifi 2 Bars  | Wifi 3 Bars  |
| Wifi 4 Bars  | Wifi Alert  | Wifi Spooler Active  | Wifi Spooler Error  | Wifi Error  |

Adding a Wireless Network

To add a WLAN profile (even for a network which is not yet available),

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Security. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the **Security** tab.
3. Select **Add...**
4. Obtain and enter the correct information for each wireless network setting:
 - a. Enter a Network Name (SSID), pre-select the security type, then press OK.
A new window appears so you can enter the settings for this network.
 - b. On the connection page, check the appropriate boxes based on how you want the LOGIQ Fortis to connect to this network.
The LOGIQ Fortis attempts to connect to available wireless networks based on the options you enable. If multiple networks are available, connection attempts begin with the network appearing topmost on the list.
 - c. Select the Security page.
 - d. Select the Security Type from the available options.
NOTE: *Dialog boxes vary, depending on the Security Type selected.*
 - e. Select the Encryption Type from the available options.
 - f. For Personal networks, enter the Network key.

Adding a Wireless Network (continued)

- g. For Enterprise networks, choose the network authentication method and press Settings.

Detailed settings for Enterprise networks are complex and must be correct for the connection to succeed. Ensure you have all the required information/settings and work with your site's IT Network Administrator as needed.

NOTE: *Credentials must be entered at this time. The LOGIQ Fortis does not support automatic prompting for user credentials.*

- For Microsoft PEAP networks, press Advanced and enter User authentication credentials (username and password).
- For Cisco networks, enter user credentials in the PEAP Properties dialog after pressing the Settings button.

NOTE: *IMPORTANT: User credentials are not validated until you attempt to connect to the network.*

- h. When you have correctly entered all required settings, press OK in the Wireless Network Properties dialog. Your settings will be validated and you may be prompted about certain settings which are not recommended or supported.

Examples: "Automatic connection to unencrypted networks is not recommended. Reminder to enter user credentials for Enterprise networks."

- i. If changes are necessary, press Customize. Make corrections, then press OK. Settings will be validated again.

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. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Security. 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. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the **Security** tab.
3. Select **Customize...**
4. Obtain and enter the correct information for each wireless network setting:
 - a. Enter a Network Name (SSID), then press OK.
A new window appears so you can enter the settings for this network.
 - b. On the connection page, check the appropriate boxes based on how you want the LOGIQ Fortis to connect to this network.

The LOGIQ Fortis attempts to connect to available wireless networks based on the options you enable. If multiple networks are available, connection attempts begin with the network appearing topmost on the list.
 - c. Select the Security page.
 - d. Select the Security Type from the available options.
Dialog boxes vary, depending on the Security Type selected.
 - e. Select the Encryption Type from the available options.
 - f. For Personal networks, enter the Network key.

NOTE:

Customizing Wireless Network Settings (continued)

- g. For Enterprise networks, choose the network authentication method and press Settings.

Detailed settings for Enterprise networks are complex and must be correct for the connection to succeed. Ensure you have all the required information/settings and work with your site's IT Network Administrator as needed.

NOTE: Credentials must be entered at this time. The LOGIQ Fortis does not support automatic prompting for user credentials.

- For Microsoft PEAP networks, press Advanced and enter User authentication credentials (username and password).
- For Cisco networks, enter user credentials in the PEAP Properties dialog after pressing the Settings button.

NOTE: IMPORTANT: User credentials are not validated until you attempt to connect to the network.

- h. When you have correctly entered all required settings, press OK in the Wireless Network Properties dialog. Your settings will be validated and you may be prompted about certain settings which are not recommended or supported.
- Examples: "Automatic connection to unencrypted networks is not recommended. Reminder to enter user credentials for Enterprise networks."
- i. If changes are necessary, press Customize. Make corrections, then press OK. Settings will be validated again.

5. After you have filled in all the required information, press **OK**. To cancel adding this profile, press **Cancel**.

Setting an IP Address

To set an IP Address (Static or Dynamic), select Utility--> Connectivity--> TCP/IP--> Properties.

Refreshing a WLAN

Refreshes the list of available Wireless Networks. To refresh the Wireless Network,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Press Refresh from the bottom of the Configuration tool.

Managing Connectivity to a Wireless Network

You can control which wireless networks can be connected to and which networks are preferred over other networks.

- Networks appearing on the Security page, Preferred Wireless Networks list are listed in decreasing preference. The network listed at the top of the list is the most preferred, and therefore the most likely to get connected. The network listed at the bottom of the list is the least preferred, and therefore the least likely to get connected.
- Networks with the check box unchecked for automatic connection will never connect unless you manually press the Connect button.
- Non-broadcasting networks will never connect unless the corresponding checkbox is checked; or, you manually press the Connect button.
- Once connected to a network, the system will not automatically switch over to a more preferred network unless the check box is checked.

Monitoring the WLAN

If there are wireless network communication problems, you can monitor the wireless network events.

To monitor Wireless Networking events,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the Monitor Tab.

WLAN Diagnostics

If the wireless network is connected, you can run diagnostics to determine how well, or poorly, the network itself is working. The diagnostic information displayed can help pinpoint causes of networking problems. Tests which pass are shown in green; tests which fail are shown in red.

To run diagnostics for the Wireless Network,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the Diagnostics Tab.
3. Select **Run Diagnostics**.

Repairing the WLAN

Occasionally you may need to repair a WLAN that has lost its connection to the LOGIQ Fortis. To repair the Wireless Network,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the Diagnostics Tab.
3. Select **Repair**.

NOTE: *DO NOT cancel the Repair operation after you have selected to repair the Wireless LAN connection.*

Available WLAN Channels

The available WLAN channels show availability of wireless connect points that the scanner can talk to. Each channel supports a finite number of users and has limited signal strength. This may effect the ability to connect, the throughput and the connection dropping out.

To check the available WLAN channels,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the Properties Tab.
3. Select **Available Channels...**

Disconnecting from the WLAN

To disconnect from the Wireless Network,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears.
2. Select **Disconnect**.

Tricefy Uplink

Introduction

Tricefy is a cloud-based image viewer and a platform to archive, collaborate, and share. The Tricefy DICOM server may be used in the way any DICOM server on the product may be used, i.e., Print keys, Send To, etc. The corresponding DICOM destinations can be used via the Print keys. An internet connection is necessary for uploading data to Tricefy.

NOTE: *To engage in service offerings with Tricefy, confirm that your country has entered into an agreement with Tricefy.*

NOTE: *Tricefy DOES NOT support IPV6 and cannot be used in conjunction with Tricefy.*



Figure 13-262. Tricefy Account

Introduction (continued)

The tab displays a general info area with a short description of Tricefy, an uplink ID, and an info badge for how to configure Print buttons on system setup (only available when an account is active). Furthermore the account area displays controls and information about the Tricefy account while the test connection area enables you to test a connection and gives detailed information about it.

Uploading Exam Information to the Tricefy Cloud

Enabling Tricefy

1. To enable Tricefy, fill out the information on Utility --> Connectivity--> Tricefy. As soon as this option is enabled, relevant Tricefy items are displayed (e.g. email text field, Activate button,.... and options within the system setup to share or store data to Tricefy via the print key or status bar icons (described below).
2. Enter your email address to register and click Activate account. (If you want to deactivate an active account, click Deactivate account.)
3. Depending on the account status, different account information is displayed:
 - green badge containing the account info, email address, account name, customer name and account status- account activated
 - blue badge - information about a disconnected account
 - orange badge - connection to Tricefy™ failed (due to timeout,...)
4. For testing the connection click Activate. Depending on the connection status, different information is displayed:
 - green badge - connection ok
 - blue badge - instruction for testing the connection (only displayed as long as Activate is not pressed)
 - orange badge - connection failed
5. Upon success activation, you will receive an Uplink ID.

NOTE: *When tricefy is successfully activated an image storage and Query//Retrieve service will be created with port number 8104.*

Configuring Tricefy

1. Set up the Tricefy Service via Utility > Connectivity > Service. Set the DICOM Image Storage and Query/Retrieve ports to Port 8104. Refer to the DICOM sections in this chapter and in Chapter 10 for more information. Verify the service.
2. Set up a Dataflow for Tricefy. Refer to the DICOM sections in this chapter and in Chapter 10 for more information. Verify the Dataflow.
3. Configure the Print buttons via Utility > Connectivity > button. Refer to the DICOM sections in this chapter and in Chapter 10 for more information. Verify the Print button(s).

Using Tricefy

You can send a patient's exam to the Tricefy Image Storage service via the Exam Tab.

1. Select the patient's exam and press the Send To button. Select the Tricefy Image Storage service. Press OK.

You can check the job status by pressing F4 (DICOM Job Spooler).










You can confirm the exam is on the Tricefy Server via a web browser. Navigate to <https://tricefy4.com>. Log in with your account information. The patient and image(s) you sent are on the Tricefy cloud.

2. To Query patient information on the Tricefy cloud, on the Patient page, go to the Data Transfer page. Select the Q/R radial button, then press Query. A list of patients on the Tricefy cloud is displayed. Select the patient you want to retrieve, then select Transfer.

Tricefy Icons

Tricefy icons are explained below.

Table 13-87: Tricefy Icons

| Connection Icons | Store Icons | Share Icons |
|---|---|--|
| <p>Connected to Tricefy. Ready to Store and Share</p>  | <p>Upload Image to Tricefy</p>  | <p>Share Image with Patient via Tricefy.</p>  |
| <p>Disconnected from Tricefy.</p>  | <p>Upload CINE to Tricefy</p>  | <p>Share CINE with Patient via Tricefy.</p>  |
| <p>Registration incomplete.</p>  | <p>Upload 4D Image to Tricefy</p>  | |
| | <p>Upload 3D Image to Tricefy</p>  | |

Tricefy Activation

Refer to Chapter 10 for more information.

Device Mgmt

Overview

Device Mgmt is a remote device management tool that enables bi-directional management capabilities on the device.

Device Mgmt allows Cloud management of system preset configurations to a fleet of systems on network, as well as one to one system preset configuration Cloud backup and restore.

For Device Mgmt connectivity configuration and activation, see 'Device Mgmt Configuration' on page 10-94.

NOTE: For Cloud operation please refer to Device Mgmt online user manual after sign-up at <http://AVURI.gehealthcare.com/signup>

Device Mgmt Fleet Management

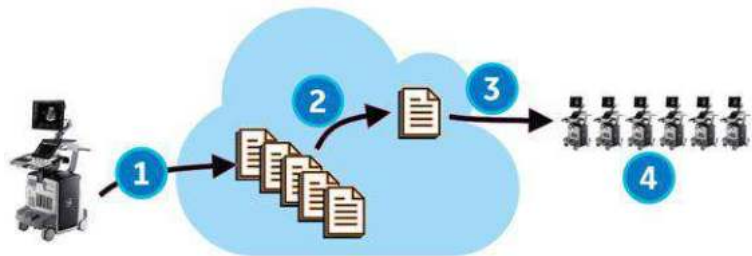


Figure 13-263. Device Mgmt Fleet Management

An account on the Cloud with access to Device Mgmt is required.

1. Upload preset configurations for fleet of systems
2. On the Cloud, assign configuration to fleet of systems
3. Receive installation notification (on each system in the fleet)
4. Install preset configuration (on each system in the fleet)

Device Mgmt Cloud Backup/Restore

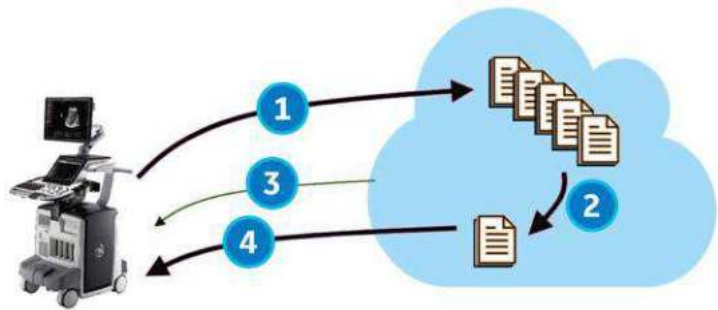


Figure 13-264. Device Mgmt Cloud Backup/Restore

An account on the Cloud with access to Device Mgmt is required.

1. Backup to the Cloud
2. On the Cloud, assign configuration to restore to originating system
3. Receive restore notification
4. Restore on system

NOTE: *Restoring to a system other than the originating system is not allowed.*

NOTE: *Cloud Backup jobs are queued and processed in the background and do not disturb user operation.*

Upload For Fleet and Manual Backup (Cloud Backup)

To upload preset information from the master system for the fleet:

1. Go to Utility > System > Backup/Restore.
2. Select **Upload For Fleet**.
3. Set Comment to identify configuration on the Cloud.
4. Press **Upload**.
5. The system displays the result in the status bar and the Notification dialog.

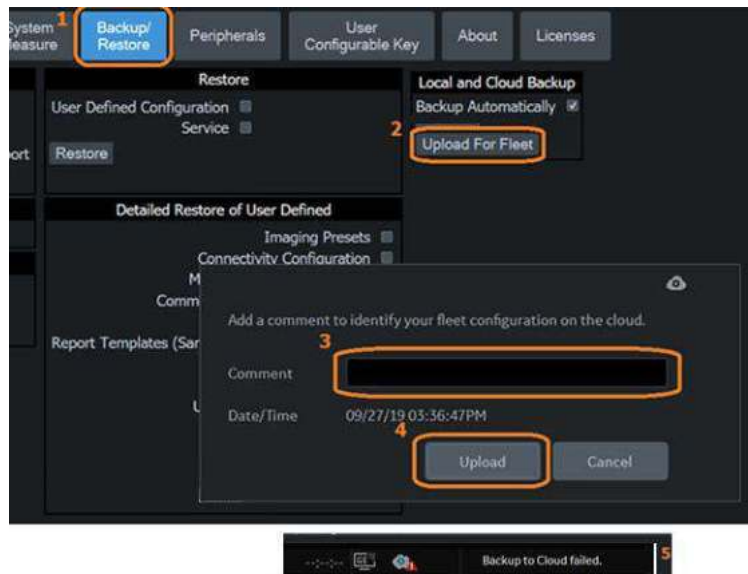


Figure 13-265. Upload For Fleet

NOTE: *Upload For Fleet can share the preset configuration across Fleet, while Cloud Backup can restore only to the originating device.*

NOTE: *Upload For Fleet and Cloud Backup copies all “User Defined Configuration” to the Cloud.*

NOTE: *The user must have Device Mgmt Administration Group Rights to begin the Upload For Fleet.*

Backup Automatically (Local and Cloud Backup)

1. Check **Backup Automatically** under Local and Cloud Backup.
2. Press **Save**.
3. User Defined Configuration files are automatically backed up to Cloud when configuration is changed and then saved.

NOTE: Cloud Backup requires activation. Even if it is not activated, files will automatically copy to Local Backup.

NOTE: If the administrator (ADM) login password is reset and reconfigured, a manual backup should be created to save the ADM password change.

Manual Backup (Cloud Backup)

To backup user defined configuration for Cloud manually:

1. Go to Utility > System > Backup/Restore.
2. Select **Cloud** under Backup To/Restore From.
3. Check **User Defined Configuration** under Backup
4. Press **Backup** under Backup.
5. Set Comment to identify fleet configuration on the Cloud.
6. Press **Backup**.
7. The system displays the result in the status bar and Notification dialog.

Assign Configuration to Fleet or to the Device (on Cloud)

Installation assignment for configuration files uploaded to the Cloud is performed on the Cloud (not on the device).

- Upload For Fleet - Configuration files can be assigned to the Fleet (group of devices).
- Cloud Backup - Configuration files can be assigned only to the device where they were backed up from.

NOTE: Configuration files that have been uploaded to the Cloud with Upload For Fleet and Cloud Backup are displayed in different lists on the Cloud.

Receive Installation Notification

When a configuration file is assigned for installation from the Cloud, the system displays a pop-up dialog notifying that a download is available by selecting the download icon in the status bar. The pop-up appears only at the following operation points, to avoid interrupting an exam:

- New Patient/End Current Patient
- Unlock Lock-screen
- Log off/Log on

The download icon also appears in the status bar.

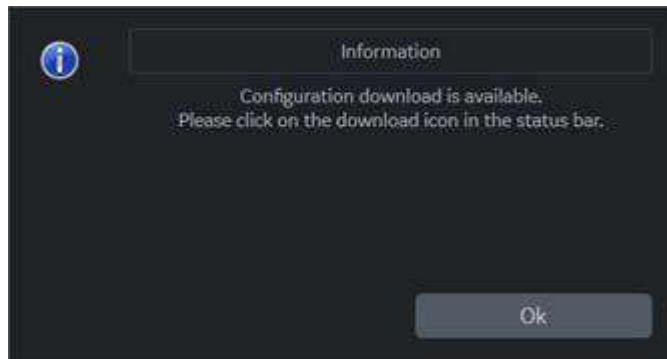


Figure 13-266. Notification Dialog and Installation Icon

NOTE: *The user must have Configuration Group Rights to begin the configuration download and installation. If the user does not have Configuration Group Rights, a Warning message is displayed (see Figure 13-269).*

Installation Dialog



Figure 13-267. Installation Icon

Selecting the Installation Icon in the status-bar initiates the Installation Dialog with three options:

- Install
- Delay Install Until Shutdown
- Download Only
- Discard

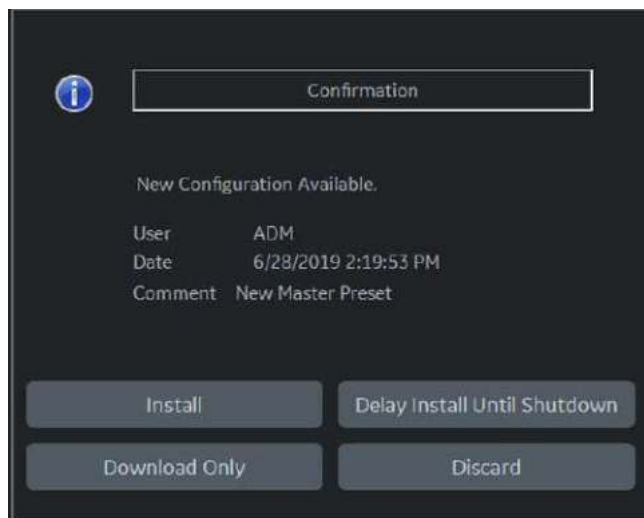


Figure 13-268. Installation Dialog

NOTE: *Discard and Download Only are available only when the Installation is marked as optional on the Cloud. Otherwise, no Discard or Download Only buttons appear in the Installation Dialog.*

Installation Dialog (continued)

NOTE: *Installation requires Advanced Configuration Group Rights. If the user does not have Advanced Configuration Group Rights, selecting the Installation Icon displays a Warning.*

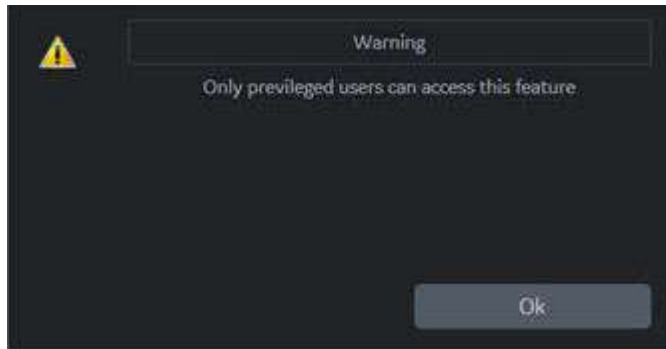


Figure 13-269. Advanced Configuration Group Rights Warning

Install

1. Select the Installation Icon in the status bar.



Figure 13-270. Installation Icon

2. Select **Install**.

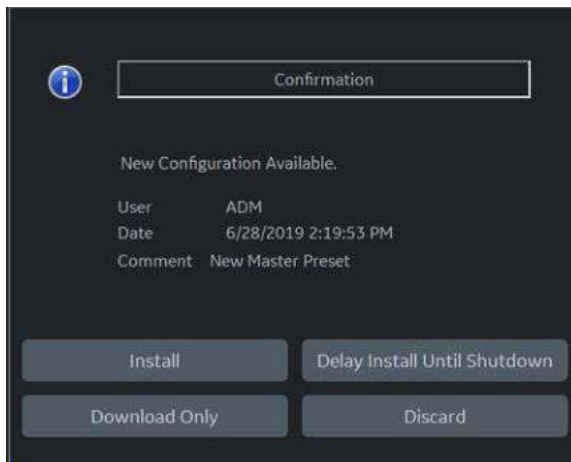


Figure 13-271. Install

3. Select **Continue** to acknowledge. The configuration installation begins and the result is displayed.

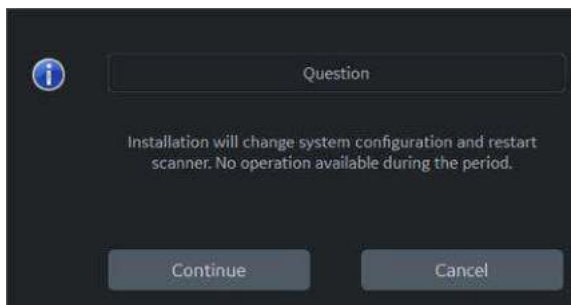


Figure 13-272. Continue Install

Install (continued)

4. Select OK to restart.



Figure 13-273. Select to Restart System

Delay Install Until Shutdown

1. Select the Installation Icon in the status bar.



Figure 13-274. Installation Icon

2. Select **Delay Install Until Shutdown**.

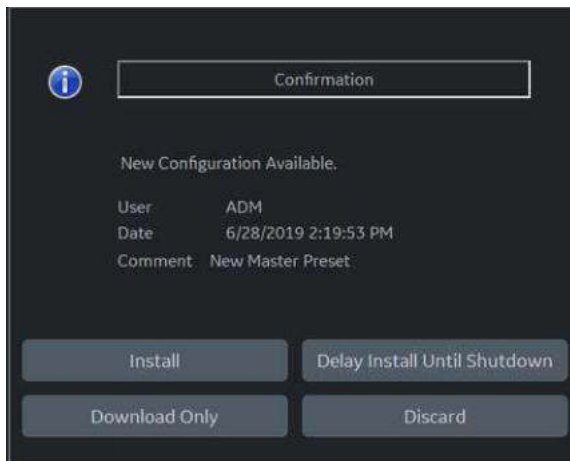


Figure 13-275. Select Delay Install Until Shutdown

3. Select **Continue** to acknowledge. Continue the exam.

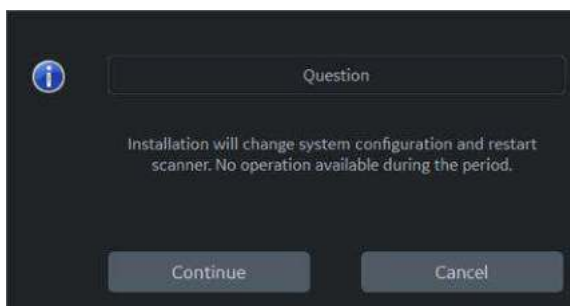


Figure 13-276. Continue Delay Install Until Shutdown

NOTE: Icon changes to "Delay Install Until Shutdown".



Figure 13-277. Delay Install Until Shutdown Icon

Delay Install Until Shutdown (continued)

4. Press Power button to display Exit dialog.
5. Select **Shutdown**. Installation begins automatically and the result is displayed.



Figure 13-278. Shutdown to Begin Installation

6. When installation is complete the system will shutdown automatically.

NOTE: *If the installation fails for any reason, a notification will be displayed after the system restarts.*

Discard

1. Select the Installation Icon in the status bar.



Figure 13-279. Installation Icon

2. Select **Discard**.

NOTE: *Discard is available only when the Installation is marked as optional on the Cloud. Otherwise, no Discard button appears in the Installation Dialog.*

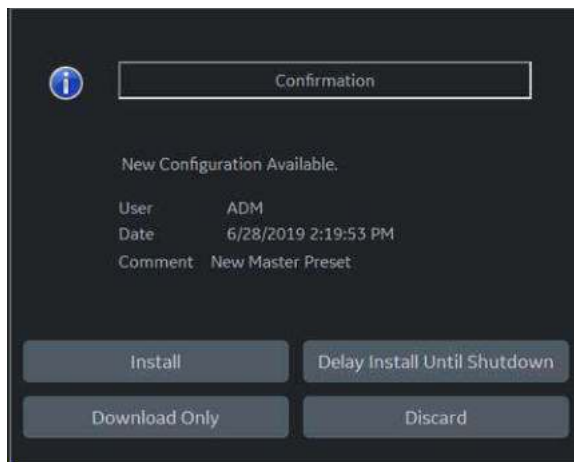


Figure 13-280. Select Discard

3. Select **Continue** to acknowledge.

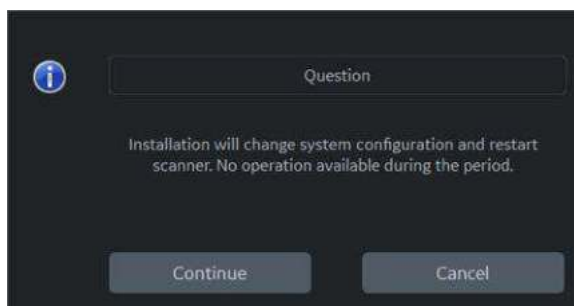


Figure 13-281. Continue Discard

Detailed Restore from Cloud

Download Only from Cloud

NOTE: Because Download from Cloud runs in the background, the download is already completed when selecting Install icon.

1. Select the Install icon.

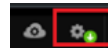


Figure 13-282. Install icon

2. Select **Download Only** which creates local backup of the preset.

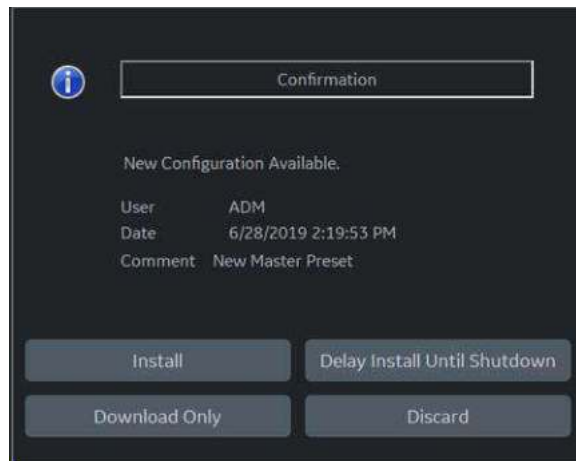


Figure 13-283. Select Download Only

NOTE: If installation of the preset is set as Mandatory, then the dialog enables only the Install or Delay Install until Shutdown.

Download Only from Cloud (continued)

3. Information displays when the download is completed.

Download completed. To install the downloaded configuration, go to Utility -> System -> Backup/Restore and select Cloud as the Location.

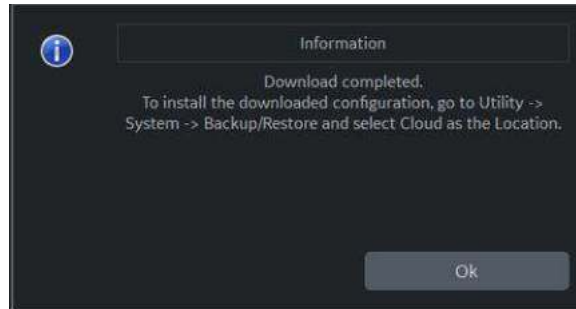


Figure 13-284. Download Completed

Detailed Restore From Cloud

1. Go to Utility > System > Backup/Restore.
2. Select **Cloud** as Location of Restore From
3. Select categories and press **Detailed Restore** under Detailed Restore of User Defined.

Restore from Cloud

1. Go to Utility > System > Backup/Restore.
2. Select **Cloud** as Location of Restore From
3. Select categories and press **Restore** under Restore.

Cancel a Failed Job

1. Select Notification Icon.



Figure 13-285. Notification Icon

2. The notification dialog displays on the monitor. Select a failed job and press **Cancel Selected Job**.

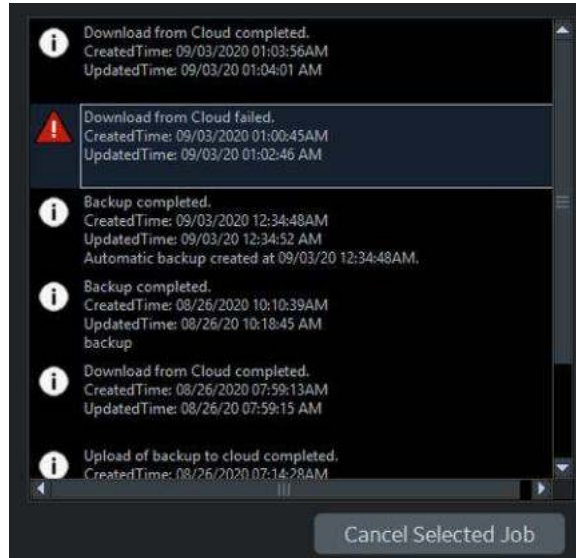


Figure 13-286. Select Failed Job

3. Select **Continue** on the dialog.

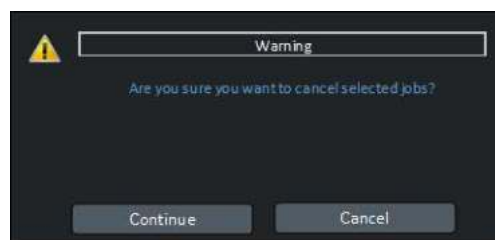






Figure 13-287. Warning Dialog

NOTE: *Successful jobs are removed automatically after a period of time. Failed jobs are deleted automatically after 2 weeks.*

Icon and Notification

One of the following icons is displayed in the status bar:

Table 13-88: Device Mgmt Icons

| Icon | Description |
|---|-----------------------------|
|  | Activated/Not Activated |
|  | Unread/Read Error message |
|  | Unread/Read Warning message |
|  | Unread/Read information |

When there is a notification, clicking on the icon displays a message (see Icon Message example below).

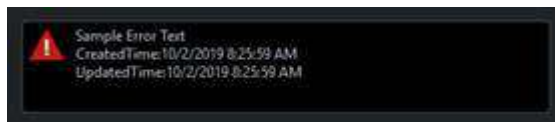


Figure 13-288. Icon Message

Smart Device Apps

LOGIQ Apps

Smart Device LOGIQ Apps are available for Android devices (both a phone and tablet) via Bluetooth: LOGIQ Remote Control App and LOGIQ Photo/Barcode Reader App.

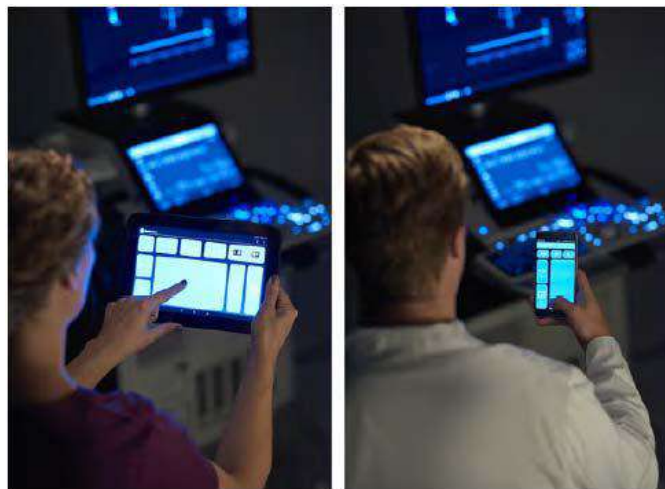


Figure 13-289. Smart LOGIQ Apps Devices

NOTE: *The communication between the LOGIQ Apps and the ultrasound system is Bluetooth which is a wireless, secure transmission. At no time is patient data stored on the device hosting the LOGIQ Apps. For the LOGIQ Photo App, photos are never written to a file, but rather directly transferred to the LOGIQ ultrasound system. Once on the ultrasound system they can be included with the diagnostic images sent to the reviewing/reading physician.*

LOGIQ Apps (continued)



DANGER

DO NOT use the Smart Device Apps if the patient has a life-sustaining device, such as a pacemaker or defibrillator. Failure to follow this instruction could lead to interference with patient electronic device(s).

NOTE: DO NOT use the USB Ports on the LOGIQ Fortis to charge LOGIQ Apps devices as these devices are not approved devices to connect to a medical device.

Connecting the Device

To link to the device:

Table 13-89: Linking the Device to the LOGIQ Fortis



| Steps | On LOGIQ Fortis | On Device |
|---|--|-----------|
| <p>1. Press the Mobile Icon on the LOGIQ Fortis that's located on the display.</p>  |  | |

Table 13-89: Linking the Device to the LOGIQ Fortis (Continued)

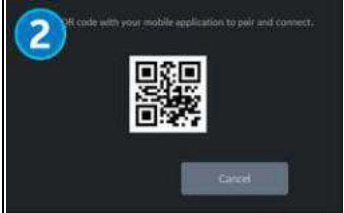

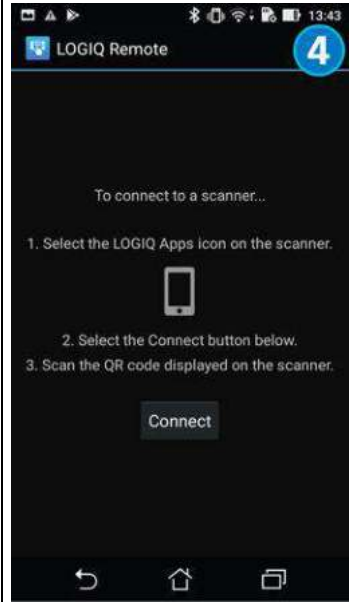
| Steps | On LOGIQ Fortis | On Device |
|---|---|---|
| <p>2. On the LOGIQ Fortis, the QR code appears on the display.</p> <p>3. On the device, press the LOGIQ Remote App.</p> |  |  |
| <p>4. Follow the instructions on the device.</p> <p>a. Press "Connect."</p> <p>b. Scan the QR Code with the device.</p> | |  |

Table 13-89: Linking the Device to the LOGIQ Fortis (Continued)


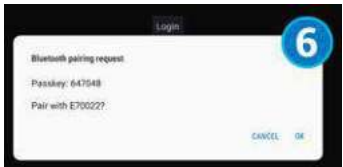
| Steps | On LOGIQ Fortis | On Device |
|---|-----------------|--|
| <p>5. Place the device in front of the LOGIQ Fortis as directed. "Scan QR code with your mobile application to pair and connect."</p> <p>The LOGIQ Fortis and the device are now ready to pair.</p> | |  |
| <p>6. The device displays the Bluetooth pairing request, "Confirm passkey is ##### to pair with the LOGIQ Fortis." Press OK.</p> | |  |

Table 13-89: Linking the Device to the LOGIQ Fortis (Continued)




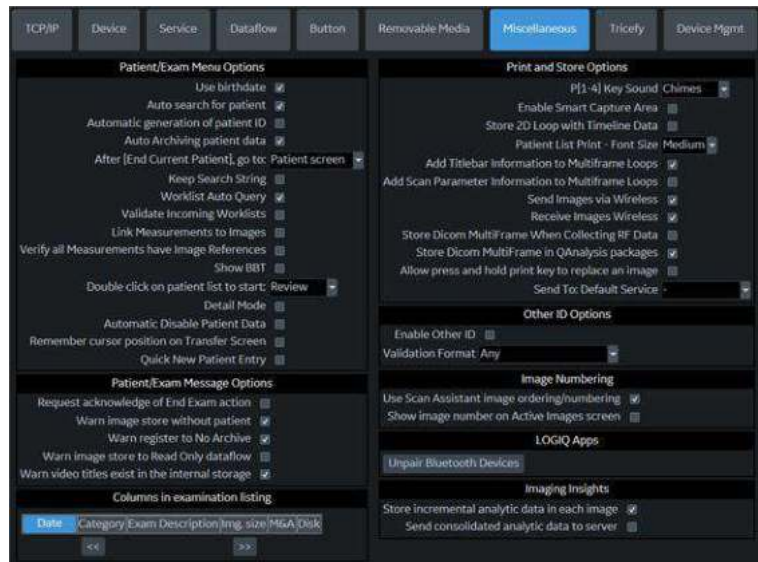
| Steps | On LOGIQ Fortis | On Device |
|---|---|---|
| <p>7. The Bluetooth icon on the LOGIQ Fortis is now paired to the device.</p> <p>8. The LOGIQ Remote application appears on the device. The Phone App and Tablet App displays are shown to the right.</p> |  |  |
| <p>To switch to the LOGIQ Photo App, press the Camera icon located on the top of the remote device's display. Note: The Camera Icon only appears if LOGIQ Photo App is already installed.</p> | | |

Table 13-89: Linking the Device to the LOGIQ Fortis (Continued)

| Steps | On LOGIQ Fortis | On Device |
|---|---|-----------|
| <p>To disconnect the LOGIQ Fortis from the device, click on the “Bluetooth Connected to the Device” icon on the bottom of the display and select to disconnect. Or, You can press “Disconnect” on the Device.</p> |  | |
| <p>To Unpair a Device from the LOGIQ Fortis, press “Unpair Bluetooth Devices” via Utility> Connectivity> Miscellaneous> LOGIQ Apps.</p> | | |

To completely break the association between the LOGIQ Fortis and the device (unpair the device from the LOGIQ Fortis):

1. Access the Utility-> Connectivity-> Miscellaneous screen.



2. In the LOGIQApps section, select **Unpair Bluetooth Devices**.

Assigning LOGIQ Apps to a User Defined Key

To assign LOGIQ Apps to a User Define key, select “LOGIQ Apps” to a User Defined key (restart needed)” via Utility> System> User Configurable Key.

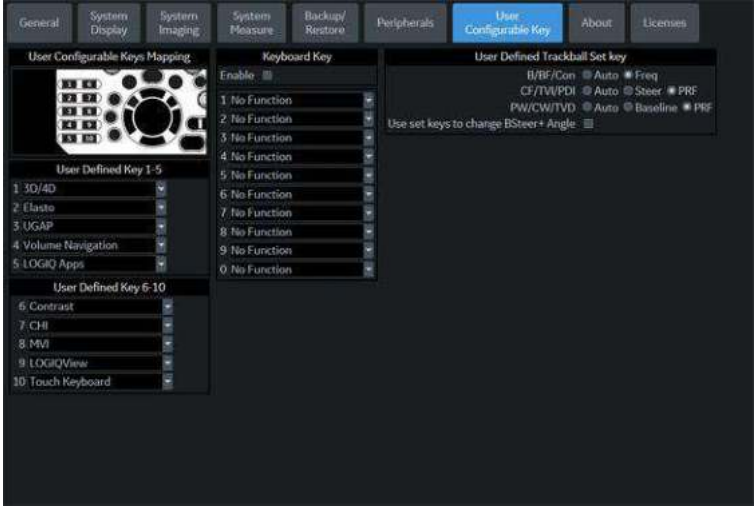



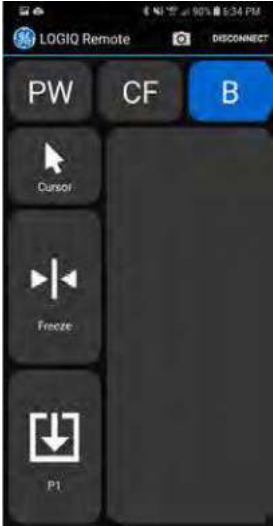
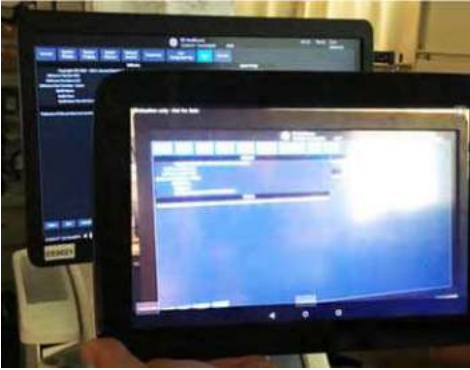
Figure 13-290. Assign LOGIQ Apps to a User Defined Key

Using the Apps

Table 13-90: Using Smart Device LOGIQ Apps

| Tablet/Phone Remote Control and Photo/Barcode reader Apps |
|---|
| <ol style="list-style-type: none">LOGIQ Remote Control AppLOGIQ Photo/Barcode Reader App |
|  |

Table 13-90: Using Smart Device LOGIQ Apps (Continued)

| Tablet/Phone Remote Control and Photo/Barcode reader Apps | |
|---|---|
| <p>LOGIQ Remote Control App:</p>  <p>Via the Tablet LOGIQ Remote Control App, you will be able to adjust the following controls: Depth, Gain (B-Mode, Color Flow Mode, PW Mode), Left/Right, Measure, Comment, Clear, Trackball, Freeze, Store, Color Flow Scale, and Cursor.</p>  <p>Via the Phone LOGIQ Remote Control App, you will be able to adjust the following controls: Activate PW, CF, or B-Mode, adjust the Cursor, Freeze the image, and sent images to the P1 control.</p> | <p>Photo/Barcode Reader App</p>  <p>You can use the LOGIQ Photo App to capture photos that will go to the patient's exam and to use as a barcode reader to scan in patient exam information.</p> <p>Note: The photo does not go directly into the exam; instead the image must be stored from the LOGIQ Fortis.</p> <p>Note: The barcode scanner scans the barcode into the Patient ID field on the Patient menu.</p> |

Barcode - Input Mode

Off

Enter the Patient ID using the keyboard.

Patient ID

Scan the barcode for the Patient ID or enter the Patient ID using the keyboard.

Complexation

Patient demographics can be entered by scanning the barcode, or manually, using the keyboard.

To enter patient demographics manually with the keyboard (instead of the barcode), select Cancel.

1. Enter a string in the Input Data field by scanning from a barcode or typing with the keyboard.
2. Scan a sample barcode. The following items can be included in the barcode:
 - Patient ID
 - First Name, Last Name, Middle Name
 - Birth Year, Month, Day

NOTE:

The character length for Year is four characters, Month is two characters and Day is two characters. The Year, Month and Day should always be provided together.

- Gender

Complexation (continued)

- 3. Configure the Start and End position for each item.

NOTE: *If the barcode does not contain information for an item, configure the Start and End position as "0."*

For example, if the scanned barcode is "000001LastNameFirstName1919901010F," the configuration and results display as seen in Figure 13-291.

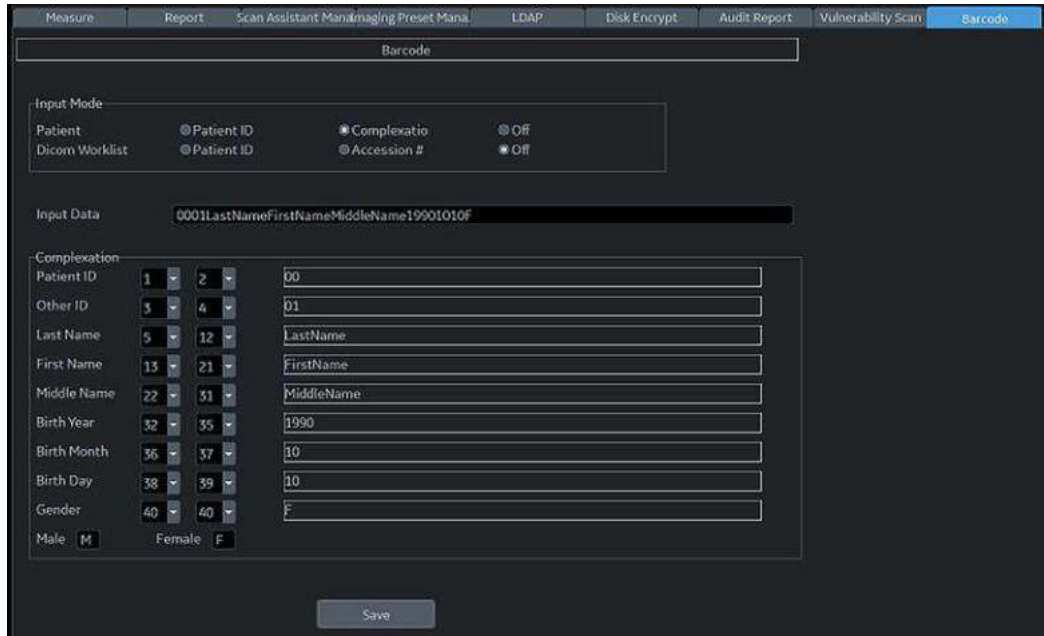


Figure 13-291. Barcode Configuration Page Example

Digital Expert

Digital Expert Remote Training

Digital Expert is a purchasable option which enables remote training between users and the GE Clinical Applications team, through scheduled and real-time sessions. Digital Expert is a self-contained, app-based companion solution, designed to pair with GE medical devices. Digital Expert utilizes Intelehealth software for remote connectivity.

NOTE: This tool is not for clinical diagnostics purposes.

Digital expert also enables customer to customer Enterprise Collaboration, where users can connect with each other within their own network. This provides on-demand access for guidance and consultation for clinicians from in-house experts.

Refer to the user manual included with Digital Expert for information on setting up and using Digital Expert.

Service and Applications Support

GE Connect Guide

The GE Connect Guide helps the user follow the necessary steps to setup the InSite ExC connectivity. To use the GE Connect Guide to begin the GE Backoffice Connectivity Troubleshooting wizard:

1. Select the Insite icon at the bottom of the display screen to open up the InSite ExC Icon Menu.



Figure 13-292. InSite ExC Icon Menu with Connection Unconfigured

2. Select GE Connect Guide from the menu to open the GE Backoffice Connectivity Troubleshooting wizard.

GE Backoffice Connectivity Troubleshooting Wizard

Use the following GE Backoffice Connectivity Troubleshooting wizard screens to setup the GE Backoffice connection.

1. **Agent Configuration** - The Serial ID is displayed (not editable). Verify CRM ID; edit if necessary and save changes. Select Next.

The screenshot shows the 'Agent Configuration Wizard' screen. On the left, a navigation menu lists: Agent Configuration (checked), Network Connection, Agent Proxy Configuration, DNS Configuration, and Network Firewall. The main area is titled 'Agent Configuration Wizard' and contains two input fields: 'Serial ID *' with the value 'engineer_E70012' and 'CRM ID *' with the value 'LE3ENGINEER_E70012'. Below these fields is a blue instruction box: 'Ensure the CRM Number displayed is correct. If not, update with the correct CRM and save changes. If the Serial and CRM Numbers are correct, please proceed to next step.' At the bottom right, there are 'Save Changes' and 'Refresh' buttons, and a 'Next >' button.

Figure 13-293. Agent Configuration

2. **Network Connection** - Ensure you are connected to the Network with a wired or wireless connection. Select Next.

The screenshot shows the 'Checking for Network Connection' screen. On the left, the navigation menu lists: Agent Configuration, Network Connection (checked), Agent Proxy Configuration, DNS Configuration, and Network Firewall. The main area is titled 'Checking for Network Connection' and shows two status indicators: 'Wired Connection' with a green checkmark and 'Connected' label, and 'Wireless Connection' with a red X and 'Not Connected' label. Below these is a blue instruction box: 'You are connected to Wired Network. Please proceed to next step.' At the bottom right, there are 'Refresh', '<< Previous', and 'Next >>' buttons.

Figure 13-294. Network Connection

NOTE: *If you are not connected to the network, see 'TCP/IP' on page 10-61.*

GE Backoffice Connectivity Troubleshooting Wizard (continued)

3. **Agent Proxy Configuration** - Ensure proxy configuration details and credentials are accurate. Edit if necessary, save changes and select Next.

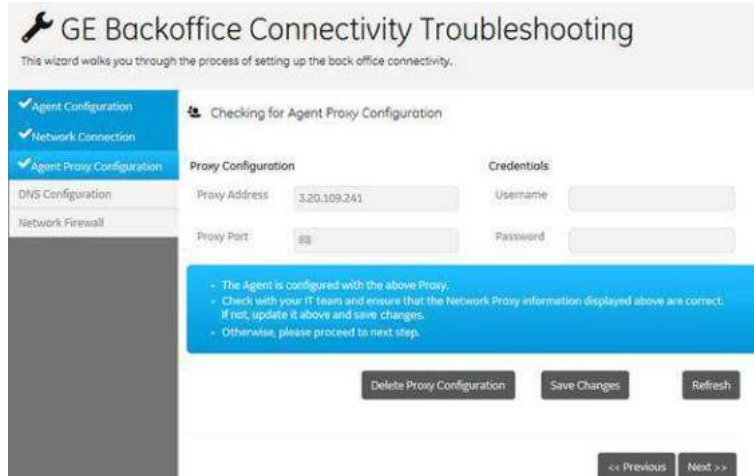


Figure 13-295. Agent Proxy Configuration

4. **DNS Configuration** - Ensure DNS is configured correctly for the system. Select Next.

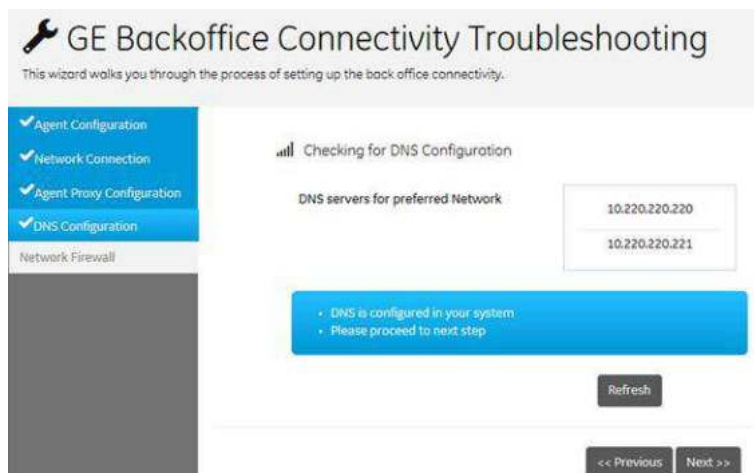


Figure 13-296. DNS Configuration

GE Backoffice Connectivity Troubleshooting Wizard (continued)

5. Network Firewall - Ensure the network firewall in the facility is configured correctly to allow GE InSite communication. Select Next.



Figure 13-297. Network Firewall

6. Summary Page - The Summary page will check the agent configuration and connection status for all configuration steps. When the process completes (may take up to five minutes) the status for each step is listed as “OK” or “Not OK.” If any step is reported as “Not OK” select the step from the menu on the left and correct the information on that screen, then proceed to the Summary page again for a connection status update.

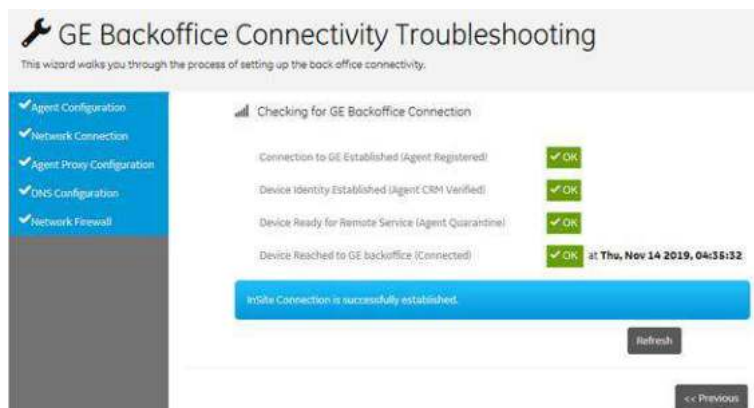


Figure 13-298. Summary Page

Support Requests

InSite ExC

InSite ExC is your direct link with a GE Online Service Engineer or Applications Support Engineer by creating a Request for Service via the InSite ExC link at the bottom of the display screen.

NOTE: *The Insite connection must already be configured with the GE backoffice for the InSite ExC Menu to appear. See 'GE Connect Guide' on page 13-526 for more information.*



Figure 13-299. InSite ExC Menu

Types of InSite ExC Service

1. **Contact GE** - Opens a service dispatch with GE Service.
2. **Connect Clinical Lifeline** - Sets the system in a state of readiness for Virtual Console Observation.
3. **Connect To GE** - Initiates a connection to the GE Backoffice.

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 bottom of the display.
2. Press the Right Trackball Set Key. Select Contact GE. This opens the RFS screen which sends a service dispatch directly to the Remote Service or Applications Team after you fill in the following information:
 - Last Name, First Name, Phone Number
 - Select correct Problem type
 - Choose Problem area
 - Type in Problem description
3. After you have completed filling in all of this information, press **Send** to initiate the Request for Service.

You can confirm if your RFS has been sent as well as RFS's automatically sent by the system. The LOGIQ Fortis can automatically submit a Request for Service. These are displayed on the Machine Queue.

In addition, you can use the Users screen to identify your institution's point of contact for service dispatches.

Initiating a Technical or Clinical Support Request

When the Remote Applications or Service person reaches you, they will ask you to click on the InSite icon and choose either Connect to GE or Connect Clinical Lifeline,






1. Position the Windows pointer on top of the GE InSite ExC icon at the bottom of the display.
2. Press the Left Trackball Set Key. This opens the following pop-up:
 - Connect to GE,
 - Connect Clinical Lifeline, or
 - Cancel
3. Select the option the GE representative asks you to select.

NOTE: *Selecting Connect to GE changes the polling time from 15 minutes to 15 seconds so that your call can be answered as quickly as possible. Selecting Connect Clinical Lifeline also activates disruptive mode.*

Initiating a Technical or Clinical Support Request (continued)

InSite ExC icons appear differently, depending on their state:

Table 13-91: InSite Icons

| | |
|---|--|
| <p>GE InSite - Connected - Disruptive Mode - Enabled</p> |  |
| <p>GE InSite - Connected - Disruptive Mode - Disabled</p> |  |
| <p>GE InSite - Idle - Disruptive Mode - Enabled</p> |  |
| <p>GE InSite - Idle</p> |  |
| <p>GE InSite - Not Configured</p> <p>For more info on the configuring the connection to the GE Backoffice, see 'GE Connect Guide' on page 13-526.</p> |  |

InSite ExC Definitions

Here are definitions for the different InSite ExC states:

Virtual Console Observation (VCO). Allows Technical Support to control LOGIQ Fortis functionality remotely.

Disruptive. Allows GE's Technical Support person to connect to your system via VCO, to run diagnostics directly on your LOGIQ Fortis 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, "Service Mode is Activated. Reboot required before patient use" 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. The GE Technical Support person will exit Disruptive Mode and VCO, then ask you to reboot your system.
2. Reboot your LOGIQ Fortis system before patient use.

For more information on InSite ExC refer to the LOGIQ Fortis Basic Service Manual.

Service Desktop

Overview

The Administrator (and others granted the “Access Service Desktop” privilege) can access the Service Desktop to:

- Access the Service Home Page.
- Perform the following Utilities
 - Change Password
 - Data Transfer
 - Delete Files
 - SSA License
 - Gather Logs
 - View Third Party Licenses
 - Disruptive Mode Utility
- View Installed Options
- InSite Agent Configuration



Figure 13-300. Service Desktop

For more information on Service Desktop, refer to the LOGIQ Fortis Basic Service Manual.

Accessing the Service Desktop

1. Select **Utility** and go to Page 2 of the Utility Menus.
2. Select **Service**.

Battery Power Mode

Overview

The LOGIQ Fortis supports either the Power Assistant (PA) battery Option or the Scan on Battery option (ScoB).

NOTE: Only GE Service personnel have access to the batteries. Please contact the technical service department or your local GE representative for replacement.

Power Assistant Battery Option

Overview

With Power Assistant (PA), the system power is maintained by the batteries when AC power is lost or the power cable is unplugged. PA can reduce system startup time for portable exams. The system will be able to run for at least 20 minutes after AC power is disconnected.

When the LOGIQ Fortis enters PA upon AC power loss, there is an initial temporary message stating that the system is “entering battery mode,” followed by a message that the system is “running on battery.”

If an operation was interrupted by AC power loss, the system displays a notification letting you know which operations were not completed successfully. In this case, you will need to redo the operation that was interrupted, such as an Export, Import, Query Retrieve, etc.

In PA mode, the following operations are allowed:

- Media Format, Finalize, Verify
- DICOM Image Storage, Performed Procedure, Print, Storage Commitment, Query of Q/R, Worklist.

Before starting Power Assistant Mode



CAUTION

The following operations must be completed before unplugging the AC cable.

- Any access to the external media, such as CD, DVD, USB HDD via Export, Import, MPEGvue, Save As, EZBackup.
- DICOM Retrieve from Query/retrieve
- DVR recording should be stopped.
- Volume Navigation should be exited by Exit and Clear Control.
- System brightness and backlighting is also dimmed/ stopped.
- Processing 3D/4D images in live.

NOTE: *If the system is switched to Power Assistant Mode when any of the operations above are in progress, the system terminates the operation.*

When in Power Assistant Mode

In Power Assistant Mode, most of the console devices, such as the keyboard and printers, are turned off to minimize battery usage.



When in Power Assistant Mode, **DO NOT** perform the following operation:

- Connect and disconnect probes.
- Remove peripheral devices, such as the Volume Navigation unit.
- Eject or insert CD/DVD media and the external USB storage device.

Failure to follow these instructions could lead to exposure to unexpected acoustic energy or electrical interference/loss of patient data.

NOTE: To shut down the system while in Power Assistant Mode, plug in the power cable, exit from Power Assistant Mode, and then perform regular shut down operations.

Recovering from Power Assistant mode

The system recovers from Power Assistant Mode when AC power is less than 10 seconds reconnected to the LOGIQ Fortis and the main breaker is on. The system returns to full functionality in 10 seconds.

Scan on Battery Option (ScoB)

Overview

Scan on Battery Option allows the user to scan using battery power (AC unplugged).

While running on the battery power, the LOGIQ Fortis can scan or perform post-processing and switch to Power Saving Mode.

With a fresh battery that is fully charged, the LOGIQ Fortis stays powered for approximately 50 minutes.

Before starting Scan on Battery



CAUTION

The following operations must be completed before unplugging the AC cable.

- Any access to CD/DVD.
- DVR recording to CD/DVD.

It is recommended to complete the following before unplugging the AC cable.

- Any access to the external media, such as USB HDD via Export, Import, MPEGvue, Save As, EZBackup.
- Any access to the Network device, such as DICOM transfer or Network Storage.
- Volume Navigation should be exited by Exit and Clear Control.
- Processing 3D/4D images in live mode.

Before starting Scan on Battery (continued)

Before starting Scan on Battery, go to Utility -> System > General page and select the appropriate value for “Auto Switch to Power Saving Mode” and “Freeze when AC is Unplugged” (Default: Off).

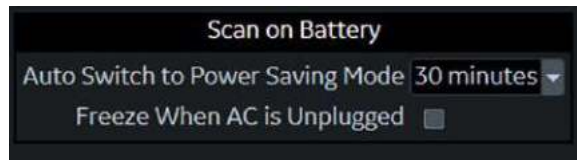


Figure 13-301. Extended Battery for Scanning

Auto Switch to Power Saving Mode

- Select 15, 30 minutes or 1 hour to automatically switch to Power Saving Mode after the time specified on battery operation.
- Select “Never” to never switch to Power Saving Mode.
- Select “Always” to always switch to Power Saving Mode.

Freeze when AC is Unplugged

- On: When selected, the system goes into Freeze mode when the AC cable is unplugged.

Starting Scan on Battery

When the AC cable is unplugged from AC power, the system automatically transitions to Scan on Battery Mode.

NOTE: *If the system does not transition to Scan on Battery Mode, contact the technical service department or your local GE representative.*



Do not use Scan on Battery Mode when you need to handle (transfer/ export/ import) patient data. (Export/ Import/ Backup/ Burn Media, Dicom Transfer, etc.) The system can unexpectedly shutdown when the battery capacity is too low and result in patient data loss. Please note the message in the status bar when Scan on Battery is activated. It is strongly recommend to use AC power when transferring, importing or exporting patient data.

System is using battery power. Make sure the battery has enough capacity to prevent potential data loss.

Figure 13-302. Warning message

Recommendation

Plug in AC power if possible, keep using the battery power can impact to the battery life.

When the battery capacity becomes low

The LOGIQ Fortis displays a dialog for the user to guide to switch to Power Saving Mode when the battery capacity becomes low. User can either keep scanning until the system shuts down or go to Power Saving Mode to extend time before shutdown.

Switch to Power Saving Mode



The system switches to Power Saving Mode automatically when the capacity is low.

You can switch to Power Saving Mode by selecting “Switch to power-saving” in the battery status popup anytime you want.

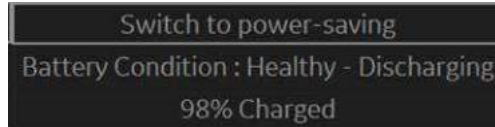


Figure 13-303. Battery status pop-up

The LOGIQ Fortis allows going back to Scan on battery mode by pressing the **Power** button or **Freeze** button.

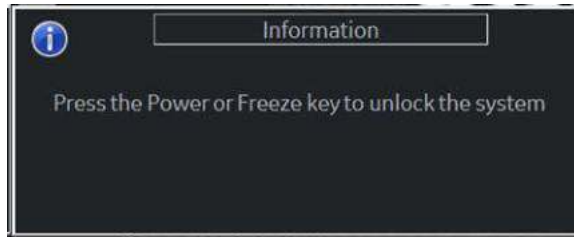


Figure 13-304. Dialog during Power Saving Mode

View current battery status

When the system is running under Power Assistant/Scan on Battery, battery icons appear in the title bar and on the status bar, indicating how much charge is left in the battery.

Battery Status Icon on the status bar

The system displays the battery's current charge and posts a notification message on the display when battery power needs attention.

Detailed battery information is available by clicking on the icon and display the popup, which includes the battery's current capacity displaying.

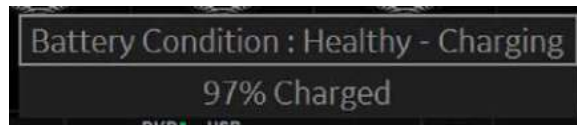


Figure 13-305. Battery status pop-up

NOTE: *When the Front Battery LED is blinking, the system is in standby mode and the batteries are charging.*

Table 13-92: Battery status icons










| Icon | Description |
|---|---|
| No icon | AC Plugged; no battery present |
|  | AC Unplugged; battery is fully charged (81 - 100%) |
|  | AC Unplugged; battery is partially charged (61 - 80%) |
|  | AC Unplugged; battery is partially charged (31 - 60%) |
|  | AC Unplugged; battery is partially charged (0 - 30%) |

Table 13-92: Battery status icons (Continued)

| Icon | Description |
|---|--|
|  | AC Plugged; battery is fully charged (81 - 100%) and charging |
|  | AC Plugged; battery is partially charged (61 - 80%) and charging |
|  | AC Plugged; battery is partially charged (31 - 60%) and charging |
|  | AC Plugged; battery is partially charged (0 - 30%) and charging |
|  | <p>Battery error icon</p> <p>When an abnormal status of the battery is detected, the system displays the following icon:</p> <ul style="list-style-type: none"> • Battery Temperature error • Communication error or battery charge error <p>NOTE: If this icon displays, do not initiate Power Assistant. Contact the technical service department or your local GE representative.</p> |

Battery status Icon in the title bar

Fuel Gauge icon appears in the title bar.

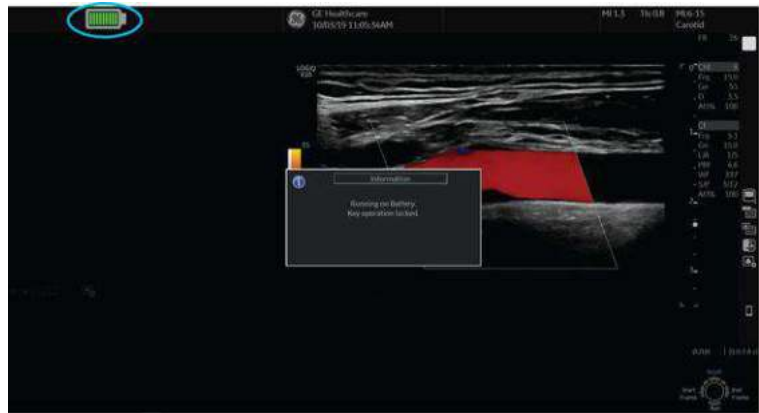


Figure 13-306. Fuel Gauge icon

Table 13-93: Battery status icons (AC unplugged)

| Icon | Description | Icon | Description |
|------|-------------|------|-------------|
| | 91 - 100% | | 41 - 50% |
| | 81 - 90% | | 31 - 40% |
| | 71 - 80% | | 16 - 30% |
| | 61 - 70% | | 0 - 15% |
| | 51 - 60% | | |

NOTE: To avoid an unintended shutdown of the system, and to avoid risk of losing patient data, it is strongly recommended to connect to AC power when the fuel gauge icon is yellow or red.

Battery charging

NOTE: *Whether the LOGIQ Fortis is on or off, the battery will charge as long as the system is connected to AC power via the power cable, and the break is on.*

A fan will run while the battery is charging. The fan stops automatically when the battery is done charging.

While the battery is charging, the front battery LED will blink. When the battery is fully charged, the LED will stop blinking and remain on.



Figure 13-307. LED location of the battery

Approximate charging time (from empty to full)

- Power Assistant battery: About 2.5 hours
- Scan on Battery: About 2.5 hours

Refreshing the battery

To maintain battery life and accuracy of the fuel gauge, and to avoid unexpected shutdowns, it is recommended to refresh the battery every 6 months with the following procedure:

1. Plug the AC cable to the wall outlet and turn on the circuit breaker.
2. Wait until the battery is fully charged. It takes about 2.5 hours to fully charge the battery (depend on the remaining battery capacity).
3. Wait at least 1 hour.
4. Remove all probes.
5. Turn on the system.
6. Unplug the AC cable, letting the system run on battery until it automatically shuts down. It may take at least 30 minutes (Power Assistant Battery)/ 50 minutes (Scan on Battery) to complete shutdown.
7. Wait at least 5 hours.
8. Plug the AC cable to the wall outlet and turn on the circuit breaker.
9. Wait until the battery is fully charged. It takes about 2.5 hours to fully charge the battery.

Battery deterioration

When the system detects battery deterioration, the following dialog displays:

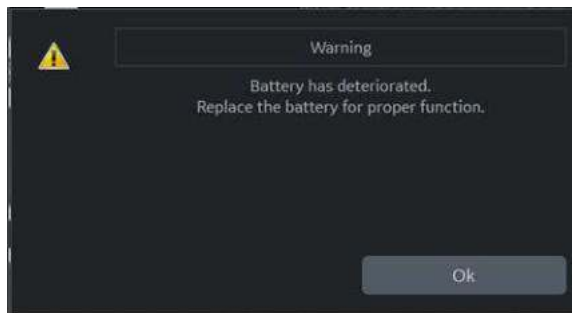


Figure 13-308. Battery life message

If this message appears, the LOGIQ Fortis disables both of Power Assistant and Scan on Battery.

Contact the technical service department or your local GE representative.

Battery Disposal

Lithium Ion

Used batteries must be disposed of properly and as chemical waste. They cannot be treated as regular waste. Contact your building administration for proper disposal.

NOTE: *When removing a defective battery, ensure that it is disposed of in accordance with local regulations. Alternatively, provide it to GE for proper disposal.*

Magstripe Card Reader

Magstripe Magnetic Card Reader

The Magstripe Card Reader can be attached to the LOGIQ Fortis by connecting it to any LOGIQ Fortis USB port.



Figure 13-309. Magstripe Card Reader

The Magstripe Card Reader can be used in Patient screen, Worklist and Image Display.

- **Patient screen:** Patient ID, First Name, Last Name, Middle Name, Perf. Physician, Ref. Physician
- **Worklist:** Patient ID, Search String
- **Image Display:** Comments (Annotation)

Footswitch

Wired Footswitch

You can attach this Footswitch to the system by connecting it to any USB port on the system.



Figure 13-310. Footswitch and USB Cable

This is a 3-pedal Footswitch. You can configure its functionality via the Utility -> Applications -> Footswitch parameters.



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.

Setting up the DVR

To set up the Digital Video Recorder (DVR), configure the LOGIQ Fortis **PRIOR TO** using the DVR since the system **MUST BE** restarted after updating these configuration parameters.

1. Set up following parameters in **Utility --> System --> Peripherals**.

- Media: DVD, USB

NOTE: Pre-format USB device as NTFS; pre-format DVD-R/-RW/+RW as NTSC or Pal.

- DVD Format: NTSC, PAL

NOTE: For DVD-RW, NTSC is preferred; for DVD+RW, Pal is preferred.

- Picture Quality: HQ, SP, LP, EP
- Microphone Level: 1 to 5
- DVD Chapter Record Interval (sec.): 15, 30, 60, 120
- USB Playback Skip Interval (sec.): 15, 30, 60, 120

2. If needed, assign [DVR Record/Pause] to a Print key in following steps.

- a. Add [Video Capture] and select [DVR Record/Pause] as the Type, in Utility -> Connectivity -> Service.

- b. Assign the [Video Capture] to the Print Button, in Utility -> Connectivity -> Button.

3. Restart the system.

DVR functionality is now set to record the scan.

Using the DVR



WARNING

Loss of patient data may occur during an AC failure. Ensure that you are not using Power Assistant and that you do not disconnect AC power while saving an exam to the DVR.

1. Create a patient record or open an existing one.
2. Press the Video-assigned key.
3. Insert a DVD media or USB storage, which is selected as DVR media (Utility -> System -> Peripherals).

NOTE: *There must be a formatted DVR-R disk installed in the system for Software DVR to record.*

NOTE: *The DVD formatted using Utility > Connectivity > Removable Media is for data archiving; it cannot be used for DVR recording.*

4. Press **Record** to start recording.

The status bar updates with the recording information. While recording, you can only pause or stop the recording and cannot perform any other DVR functionalities.

NOTE: *Recording automatically pauses when you access the Utility screen.*

NOTE: *When more than one USB storage is connected, the DVR records to the first drive letter, in alphabetical order.*

NOTE: *The system does not start the recording while the following operation is in progress: Data Transfer, EZBackup, Utility screen.*

5. Press **Record** or **Pause** to pause/resume recording.
6. Press **Stop** on the Touch Panel to stop recording.
When you stop recording, the DVR writes the title data. During this period of time, the busy state icon is displayed in the status bar (green arrow circling) and you cannot operate any DVR functionalities.

NOTE: *It may take up to 2 minutes for the DVD-RW/DVD+RW to stop recording.*

NOTE: *The DVR automatically stops recording before the media fills up.*

7. Press **Eject** on the Touch Panel or the **F3** key to eject.
8. Press **Scan** tab to return to scanning.

Recording Functionality - DVD Media

Support media

DVD-R, DVD+RW, DVD-RW

Support video format

NTSC or PAL

Support Picture Quality

- HQ (Record length: approx. 70 minutes)
- SP (Record length: approx. 90 minutes)
- LP (Record length: approx. 140 minutes)
- EP (Record length: approx. 280 minutes)

Number of Titles and Chapters

You can create up to 99 titles on a disk and 92 chapters in a title.

While recording to DVD, each chapter is automatically created at a specific interval that is configured (Utility -> System -> Peripherals).

When you stop recording, the DVR writes the title. When you end an exam (e.g. press New Patient, End Current Patient, ...), the DVR automatically stops recording and creates a title.

Volume label

The system automatically labels following string to DVD media:
YYYYMMDD_XX

- YYYY - Year (4 digit)
- MM - Month (2 digit)
- DD - Day (2 digit)
- XX - Serial number of the day (2 digit)

NOTE: Volume label of DVD+RW/-RW can be edited via the Utility -> Connectivity -> Removable Media page.

Recording Functionality - DVD Media (continued)

Video title

The title name on the DVD is titled as follows: <Date>_<Time>_<Patient Last name>_<Patient First name>

NOTE: If the patient's name is not provided, then a serial number is used as follows: <Date>_<Time>_<serial number>.

Compatibility

DVD media recorded on the LOGIQ Fortis is compatible with the following players:

- Player on LOGIQ Fortis

NOTE: DVD media recorded on previous versions of the LOGIQ Fortis is playable on the system.

- DVD video player on a PC
- Commercial DVD video player

Recording Functionality - USB Storage

Supported media

USB-HDD (NTFS only), USB Flash Device (NTFS only)

NOTE: You cannot record or play FAT (exFAT, FAT32, etc) on a USB Device. Please format the USB device to the NTFS file system on a PC.

Supported format

MPEG video file

Recording to USB storage creates an mpeg video file (*.mpg) (LOGIQ_Series_DVR\folder) for each title. The file size can be up to 2GB.

NOTE: The mpeg video file does not have a chapter.

Support Picture Quality

- HQ (Record length: approx. 30 minutes)
- SP (Record length: approx. 40 minutes)
- LP (Record length: approx. 60 minutes)
- EP (Record length: approx. 130 minutes)

NOTE: The maximum size of each video file: 4GB.

Video file name

The mpeg video file name is titled as follows:

<Date>_<Time>_<Patient Last name>_<Patient First name>..

When the patient's name is not provided, then the video file name is as follows, <Date>_<Time>_<serial number> where the serial number is the number of video files on the media plus one.

Recovery (DVD only)

While recording to DVD (DVD-R or DVD+RW/-RW), if a power failure occurs, the system will automatically start recovery of the media right after the system restarts.

NOTE: *If the recording has not finished before the power failure, the last title may be unreadable. Recovery copies the last cached title to the media.*

If the DVD media in the tray does not have sufficient free space, the following Recovery message appears (instead of the system starting auto recovery):

"Last title was not burned to DVD. Free space on the media is too small. Insert blank DVD for the recovery. Do you want to start recovery?" Select "Yes," "Remind me later," or "Delete Data."

- Remind me later

If you select "Remind me later", you can cancel the Recovery operation. But if you press the Record button, the recovery menu displays again and you cannot start to record.

Select "Yes" (Recover) or "Delete Data" to enable the recording.

- Yes (Recover)

If you select "Yes", the following dialogue displays ("Insert blank DVD for the recovery."). Insert the blank media and press "OK".

During recovery, the message "Recovery of DVR media is in progress" displays in the status bar.

- Delete Data

If you select "Delete Data", you get the following confirmation menu ("Are you sure you want to delete unburned DVR data?").

OK: Deletes the unburned cached data.

Cancel: Goes back to the Recovery menu.

Video Touch Panel Menu

DVR Touch Panel menus:

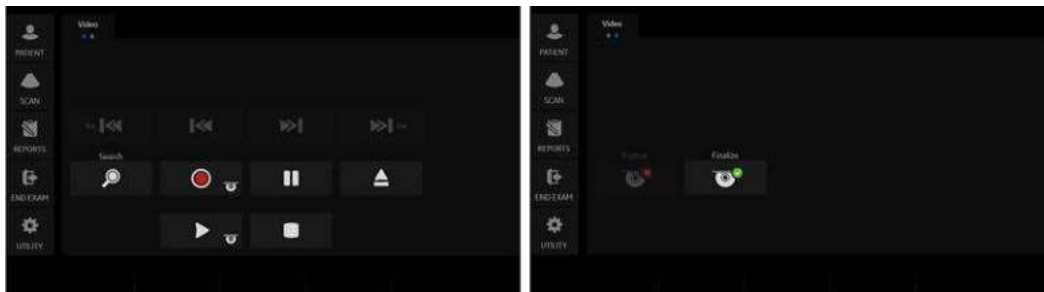


Figure 13-311. Video Touch Panel

Table 13-94: Touch Panel Keys

| Touch Panel Key | Explanation |
|--|---|
| Skip (<</>>) | DVD media: Skip to the previous/next chapter. USB storage: Skip specific time to forward/backward. |
| 4x Skip (4x <</>> 4x) | DVD media: Skip four chapters forward/forward. USB storage: Quad time interval skip to backward/forward. |
| Search | Press Search to start the Search dialog. Select Title, adjust offset then press Search Counter to start the Search. The title name is as follows: <Date>_<Time>_<Patient's Last name>_<Patient's First name> |
| Record (Red circle with Media Inserted) | Start recording. |
| Pause () | Pauses and resume Recording and Playback. NOTE: The Freeze key works the same as the Pause button, when in Playback. |
| Open Media Drawer | Press to open the Media Drawer. |
| Eject | Eject the DVD media/USB storage device. Also you can eject media pressing the F3 key. |
| Play (> with Media Inserted) | Play a video from DVD or USB storage device. Note: A DVD-R ONLY plays back AFTER the entire disc has been finalized. Note: A DVD-RW/+RW plays back after finalizing each session. |
| Stop (Box) | Stop playback or recording. |
| Format (Media Inserted with Red X) | Reformats a DVD+RW/-RW. NOTE: Format deletes all the content on the media. |
| Finalize (Media Inserted with Green Checkmark) | Finalize a DVD-R. NOTE: DVD+RW/-RW is automatically finalized when you stop recording. |

DVR Display Icons

Displays the following icons in the status bar:



Figure 13-312. DVR Disk Status

Table 13-95: DVR icons

| | | | |
|--|---------------------------|--|----------------------|
| 1. DVR status | | | |
| | Recording | | Stopping |
| | Pause Recording | | Pause Playback |
| | Playback | | Busy |
| | No media | | |
| 2. DVD Media status Displays device availability and available free space. | | | |
| | DVD+RW/-RW is in the tray | | DVD-R is in the tray |
| 3. USB storage status Displays the device availability and the free space size. | | | |
| | USB Storage is attached | | |
| 4. Current Title Number. Displays while recording | | | |
| 5. Time counter. | | | |

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