Technical Publications

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Rev. 5

CE 0197

LOGIQ P8/P9/P10 Basic User Manual

Version R4.5

Operating Documentation

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Regulatory Requirement

LOGIQ P8/P9/P10 **complies with regulatory requirements of the following European Regulation 2017/745 EU concerning medical devices.**

CE 0197

This manual is a reference for the LOGIQ P8/P9/P10. It applies to all versions of the Version R4.5 software for the LOGIQ P8/P9/P10 ultrasound system.

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Revision History

Reason for Change

REV	DATE (YYYY/MM/DD)	REASON FOR CHANGE
Rev. 1	2021/04/21	Initial release
Rev. 2	2021/12/09	Enhancement feedabck
Rev. 3	2022/04/21	Enhancement feedabck
Rev. 4	2023/07/07	Update of Probes User Manual Inputs for Consoles
Rev. 5	2025/05/10	Update Authorized Representative information in Belarus and Kazakh

List of Effective Pages

PAGE NUMBER	REVISION	PAGE NUMBER	REVISION
Title Page	Rev. 5	Chapter 6	Rev. 5
Revision History	Rev. 5	Chapter 7	Rev. 5
Regulatory Requirements	Rev. 5	Chapter 8	Rev. 5
Table of Contents	Rev. 5	Chapter 9	Rev. 5
Chapter 1	Rev. 5	Chapter 10	Rev. 5
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Chapter 3	Rev. 5	Chapter 12	Rev. 5
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Chapter 5	Rev. 5	Index	Rev. 5

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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 Medical Devices Regulation, this is Class IIa Medical Device.
- According to IEC/EN 60601-1,
  - Equipment is Class I, INTERNALLY POWERED ME EQUIPMENT, Type BF or CF Applied Parts.
- According to CISPR 11,
  - Equipment is Group 1, Class A ISM Equipment.
- According to IEC 60529,
  - The footswitch rate IPX8 is suitable for use in surgical rooms.
  - Probe head (immersible portion) and cable are IPX7

    Probe connector is not waterproof.

Conformance Standards (continued)

This product complies with the regulatory requirement of the following:

- European Regulation 2017/745 EU concerning medical device: 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.

EC REP

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CH REP

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Switzerland

- Classified to ANSI/AAMI ES60601-1 2005 R1 2012 Medical Electrical Equipment, Part 1: General Requirements for Safety by a Nationally Recognized Test Lab
- Certified to CSA CAN/CSA-C22.2 No60601-1 :14 General requirements for safety
- CE Marked to European Regulation 2017/745 EU concerning medical device Conforms to the following standards for safety:
- IEC/EN 60601-1 3.1 Edition. Medical electrical equipment - Part 1: General requirements for basic safety and essential performance

Conformance Standards (continued)

- IEC/EN 60601-1-2 Medical electrical equipment - Part 1-2: General requirements for safety - Collateral Standard: Electromagnetic compatibility - requirements and tests
- IEC/EN 60601-1-6 Medical electrical equipment Part 1-6: General requirements basic safety and essential performance - Collateral Standard: Usability
- IEC/EN 60601-2-37 Medical electrical equipment - Part 2-37: Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment
- IEC 61157 (Standard means for the reporting of the acoustic output of medical diagnostic ultrasonic equipment)
- IEC/EN 62366 Application of usability engineering to medical devices
- IEC/EN 62304 Software Life Cycle Processes
- IEC/EN 62359 Ultrasonic - Field characterization - Test methods for the determination of thermal and mechanical indices related to medical diagnostic ultrasonic fields
- EN ISO 15223-1 : Symbols to be used with medical device labels, labelling and information to be supplied
- ISO 10993-1 Biological evaluation of medical devices - Part 1 Evaluation and testing
- ISO 14971:2019 (Medical devices - Application of risk management to medical devices)
- EMC Emissions Group 1, Class A device requirements as per Sub clause 4.2 of CISPR 11
- WEEE (Waste Electrical and Electronic Equipment)
- ROHS according to 2011/65/EU Including national deviations
- Wireless equipment shall be certified to FCC, RED and Japan Radio Law.
- Medical Device Good Manufacturing Practice Manual issued by the FDA (Food and Drug Administration, Department of Health, USA)

Certifications

- General Electric Medical Systems is ISO 13485 certified.

Original Documentation

- The original document was written in English.

Country Specific Approval

The following optional features ARE NOT available in the USA and its territories:

- Elastography Quantification

Importer Information

- Turkish Importer

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Kazakhstan - Authorized representative in Kazakhstan

This information is only valid for Kazakhstan

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This information is only valid for Belarus

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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 P8/P9/P10 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 unit.

LOGIQ P8/P9/P10 documentation consists of various manuals:

- The Basic User Manual, User Guide, and Online Help (TRANSLATED) provides information needed by the user to operate the system safely. It describes the basic functions of the system, safety features, operating modes, measurements/calculations, probes, and user care and maintenance.
- The Advanced Reference Manual (ENGLISH ONLY) contains data tables, such as OB and Acoustic Output tables.
- AIUM Booklet (USA Only)
- The Service Manual (ENGLISH ONLY) supplies block diagrams, lists of spare parts, descriptions, adjustment instructions or similar information which helps qualified technical personnel in repairing those parts of the system which have been defined as repairable.

The LOGIQ P8/P9/P10 manuals are written for users who are familiar with basic ultrasound principles and techniques. They do not include sonographic training or detailed clinical procedures.

NOTE: The Basic Service Manual referenced in this manual is part number 5604324. The latest version of the Service Manual is available at: https://www.gehealthcare.com/documentation.

NOTE: The eDoc USB includes English and all translations.

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.

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 P8/P9/P10 is intended for use by a qualified physician for ultrasound evaluation.

United States Indications for Use Statement

The LOGIQ P8/P9/P10 is intended for use by a qualified physician for ultrasound evaluation of Fetal/Obstetrics; Abdominal; 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 (abdominal, 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

Types of use

multiple patients, multiple use

Frequency of Use

Daily (Typically 8 hours)

Clinical Benefit (System and Probes)

The clinical benefit of a diagnostic ultrasound device and probe is to help healthcare professional 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

NOTE: Extreme obesity may affect operation of the device

WARNING

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

Clinical Applications

Specific clinical applications and exam types include:

- Fetal/Obstetrics
- Abdominal (includes renal, GYN/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
- Intraoperative (abdominal, vascular)
- Transesophageal

Image Acquisition is for diagnostic purposes, including measurements on acquired images.

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

Contraindication

The LOGIQ P8/P9/P10 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.

CE mark statement

Table 1-1: CE mark statement

Product model with software version	Complies with European Medical Device Regulation	CE mark and Notified Body No.
LOGIQ P8/P9/P10 (software version R4.5)	Regulation (EU) 2017/745	CE0197
LOGIQ P8/P9/P10 (software version R4)	Directive 93/42/EEC	CE0459
Upgraded LOGIQ P8/P9/P10 R4 to R4.5 (R4 + R4-R4.5 upgrade kit)	Regulation (EU) 2017/745	CE0197

Contact Information

Contacting GE Ultrasound

For additional information or assistance, please contact your local distributor or the appropriate support resource listed on the following pages:

INTERNET

http://www.gehealthcare.com

http://www3.gehealthcare.com/en/Products/Categories/Ultrasound/Ultrasound_Probes

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

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 Médico- 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 C.N.P.J.: 00.029.372/0001-40.	TEL: 3067-8010 FAX: (011) 3067-8280 Registro ANVISA No: 80071260351
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, 1º y 2º 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		
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, Australia	TEL: 1300 722 229
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: 4008108188 (24h)

Table 1-3: Asia (Continued)

ASIA		
INDIA	Wipro GE Healthcare Pvt Ltd No. 4, Kadugodi Industrial Area Sadaramangala, Whitefield Bangalore, 560067	TEL: +(91) 1-800-425-8025
KOREA	15F, 416 Hangang Dae ro, Chung-gu Seoul 04637, Korea	TEL: +82 2 6201 3114
NEW ZEALAND	8 Tangihua Street Auckland 1010 New Zealand	TEL: 0800 434 325
SINGAPORE	ASEAN 1 Maritime Square #13-01 HarbourFront Center Singapore 099253	TEL: +65 6291 8528

Table 1-4: Europe

EUROPE		
AUSTRIA	General Electric 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 Koutervelds traat 20 1831 DIEGEM	TEL: (+32) 2 719 7204 FAX: (+32) 2 719 7205
CZECH REPUBLIC	GE Medical Systems Ceská Republika, s.r.o Vyskocilova 1422/1a 140 28 Praha 4	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) 211-73-74440 FAX: (+49) 212-28 02-380

Table 1-4: Europe (Continued)

EUROPE		
GREECE	GE Healthcare 8-10 Sorou Str. Marousi Athens 15125 Hellas	TEL: (+30) 210 8930600 FAX: (+30) 210 9625931
HUNGARY	GE Hungary Zft. Division, Akron u. 2. Budaörs 2040 Hungary	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
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
NORWAY	GE Vingmed Ultrasound AS Sandakerveien 100C 0484 Oslo, Norway GE Vingmed Ultrasound Strandpromenaden 45 P.O. Box 141, 3191 Horten	TEL: (+47) 23 18 50 50 FAX: (+47) 23 18 60 35 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/ Gobelas 35-37 28023 Madrid	TEL: (+34) 91 663 2500 FAX: (+34) 91 663 2501

Table 1-4: Europe (Continued)

EUROPE		
SWEDEN	GE Healthcare Sverige AB FE 314, 182 82 Stockholm Besöksadr: Vendevagen 89 Danderyd, Sverige	TEL: (+46) 08 559 500 10 FAX: (+46) 08 559 500 15 Service Center (+46) 020-120 14 36
SWITZERLAND	GE Medical Systems (Schweiz) AG Europastrasse 31 8152 Glattbrugg	TEL: (+41) 1 809 92 92 FAX: (+41) 1 809 92 22
TÜRKIYE	GE Healthcare Türkiye Istanbul Office Levent Ofis Esentepe Mah. Harman Sok. No:8 Sisli-Istanbul	TEL: +90 212 398 07 00 FAX: +90 212 284 67 00
UNITED ARAB EMIRATES (UAE)	GE Healthcare Dubai Internet City, Building No. 18 First Floor, Dubai - UAE	TEL: (+971) 4 429 6101 or 4 429 6161 FAX: (+971) 4 429 6201
UNITED KINGDOM	GE Medical Systems Ultrasound Pollards Wood Nightingales Lane Chalfont St Giles Buckinghamshire HP8 4SP	TEL: (+44) 1494 544000 FAX: (+44) 1707 289742
For all other European countries not listed, please contact your local GE distributor or the appropriate support resource listed on www.gehealthcare.com.		

Contacting GE Ultrasound (continued)

Manufacturer

GE Ultrasound Korea, Ltd.
9, Sunhwan-ro 214beon-gil, Jungwon-gu, Seongnam-si,
Gyeonggi-do, 13204
KOREA

NOTE: In case of a serious incident occurred in relation to LOGIQ P8/ P9/P10 ultrasound products, the incident should be reported to GE Healthcare and the competent Authority

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.

CAUTION

For USA only:

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

Safety Precautions

Precaution Levels

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.

WARNING

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

- Severe personal injury
- Substantial property damage.

CAUTION

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

- Minor injury
- Property damage.

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

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

Hazard Symbols

Icon Description

Potential hazards are indicated by the following icons:

Table 2-1: Potential Hazards

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

Important Safety Considerations

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

CAUTION

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

Disregarding information on safety is considered abnormal use.

CAUTION

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

Patient Safety

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

Patient identification

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

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

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

Diagnostic information

The images and calculations provided by the system are intended for use by competent 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.

Diagnostic information (continued)

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

Features that facilitate measurements such as SonoAVC™, 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.

Be certain to ensure privacy data of patient information.

Mechanical hazards

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.

Never use excessive force when manipulating intracavity probes. Become familiar with all instructions and precautions provided with special purpose probes.

Electrical Hazard

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

ALARA

CAUTION

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

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

WARNING

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

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

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

Ensure that unauthorized personnel do not tamper with the unit.

Electrical Hazard

To avoid injury:

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

Smoke & Fire Hazard

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

Related Hazards (continued)

Explosion Hazard

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

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

CAUTION

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

CAUTION

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

CAUTION

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

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

CAUTION

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

Related Hazards (continued)

Biological Hazard

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

- Use protective barriers (gloves and probe sheaths) whenever possible. Follow sterile procedures when appropriate.
- Thoroughly clean probes and reusable accessories after each patient examination and disinfect 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 and equipment.

DANGER

Reusable accessories should be cleaned and disinfected or sterilized as stated by the manufacturer, after each patient examination.

CAUTION

Pacemaker hazard

The possibility of the system interfering with pacemakers is minimal. However, as this system generates high frequency electrical signals, the operator should be aware of the potential hazard this could cause.

CAUTION

Be cautious to avoid contacting with the needle tip in biopsy procedure.

Moving Hazard

Take extra care when moving the system.

The equipment weighs approximately 67 kg (148 lbs) (69 kg with HD Display (152 lbs)). To avoid possible injury and equipment damage when transporting from one area of use to another:

- 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.

Allergic reactions to latex-containing medical devices

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

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

Transesophageal probe safety

Never use excessive force when manipulating the transesophageal probe. The detailed operator manual enclosed with the transesophageal probe must be read carefully.

Classifications

Type of protection against electric shock

Class I (*1) & Internally powered ME (*4)

Degree of protection against electric shock

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

Type CF (Defibrillation-proof CF) Applied part (*3) (for ECG marked with CF symbol)

Continuous Operation

System is Ordinary Equipment (IPX0)

Footswitch is IPX8

Probe head (immersible portion) and cable are IPX7

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.

3. Type CF (Defibrillation-proof 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.

4. Internally powered

Term referring to electrical equipment that is able to operate from an INTERNAL ELECTRICAL POWER SOURCE

Table 2-2: Type BF Equipment

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

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 European Regulation 2017/745 EU concerning medical device as stated in IEC/EN 60601-1-2. However, there is no guarantee that interference will not occur in a particular installation.

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

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

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

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

EMC (Electromagnetic Compatibility) (continued)

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

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

WARNING

Portable RF communication equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the LOGIQ P8/P9/P10 including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

WARNING

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

CAUTION

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

CAUTION

Typically an ESD/EMC event results in an intermittent ultrasound image degradation for the time the ESD/EMC event is present. In rare cases the ultrasound system might show an error message that can be confirmed by the operator. In other cases the ultrasound system might stop to perate and require a re-boot to re-establish the functionality.

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.

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)

CAUTION

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:

Table 2-4: Portable and mobile radio communications equipment distance requirements

Frequency Range:	**150 kHz - 80 MHz**	**80 MHz - 800 MHz**	**800 MHz - 2.5 GHz**
Calculation Method:	d=[3.5/V_1] square root of P	d = [3.5/E_1] square root of P	d = [7/E_1] square root of P
Where: d= separation distance in meters, P = rated power of the transmitter, V_1=compliance value for conducted RF, E_1 = compliance value for radiated RF			
If the maximum transmitter power in watts is rated	**The separation distance in meters should be**		
5	2.6	2.6	5.2
20	5.2	5.2	10.5
100	12.0	12.0	24.0

EMC Performance (continued)

Notice upon Installation of Product

Separation distance and effect from fixed radio communications equipment: field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast transmitter cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the ultrasound system is used exceeds the applicable RF compliance level as stated in the immunity declaration, the ultrasound system should be observed to verify normal operation. If abnormal operation is observed, additional measures may be necessary, such as re-orienting or relocating the ultrasound system or using an RF shielded examination room may be necessary.

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

General Notice

1. Designation of Peripheral Equipment Connectable to This Product.

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

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

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

   Modification of the product includes changes in:

   a. Cables (length, material, wiring, etc.)

   b. System installation/layout

   c. System configuration/components

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

WARNING

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

Table 2-5: Main Power Cable

No	Type	Cable Construction / Manufacturer	Max. Length (m)	Type of Cable
1	AC cable	H05VV-F 3G1.0mm2 Manufactured by VOLEX / FELLER	4	Non-Shielded
2	AC cable	RVV 3G1.0mm2 Manufactured by VOLEX / FELLER	4	Non-Shielded
3	AC cable	VCTF 3GG2.00mm2 Manufactured by VOLEX / FELLER	4	Non-Shielded

Table 2-5: Main Power Cable

No	Type	Cable Construction / Manufacturer	Max. Length (m)	Type of Cable
4	AC cable	SJT 3/14AWG Manufactured by VOLEX / FELLER	4	Non-Shielded

Table 2-6: External Interface Cable (Patient Cable without Probes)

No	Type	Parts No. / Manufacturer	Max. Length (m)	Type of Cable
1	ECG Cable AHA Type	Multi-Link ECG Care Cable_AHA Type Manufactured by Vyaire Medical Oy	3.6	Shielded
2	ECG Cable IEC Type	Multi-Link ECG Care Cable_IEC Type Manufactured by Vyaire Medical Oy	3.6	Shielded
3	ECG Cable AHA Type	ECG Trunk Cable_AHA Type Manufactured by GE Healthcare Finland Oy	3.6	Shielded
4	ECG Cable IEC Type	ECG Trunk Cable_IEC Type Manufactured by GE Healthcare Finland Oy	3.6	Shielded

Table 2-7: List of all cables and maximum length of cables

No	Type	Model name	Max. Length (m)	Type of Cable	Remark
1	Convex array probe	C1-5-RS Manufactured by GE Healthcare	2.2	Shielded	
2		IC9-RS Manufactured by GE Healthcare	2.2	Shielded	
3		8C-RS Manufactured by GE Healthcare	1.6	Shielded	
4		E8C-RS Manufactured by GE Healthcare	2.15	Shielded	
5		E8Cs-RS Manufactured by GE Healthcare	2.1	Shielded	
6		BE9CS-RS Manufactured by GE Healthcare	2.1	Shielded	

Table 2-7: List of all cables and maximum length of cables

No	Type	Model name	Max. Length (m)	Type of Cable	Remark
7		C1-6-D Manufactured by GE Healthcare	2.2	Shielded	LP9/LP10 only
8		C3-10-D Manufactured by GE Healthcare	2.0	Shielded	LP10 only
9		C2-7-D Manufactured by Humanscan Co.,Ltd	2.2	Shielded	
10		10C-D Manufactured by Ueda Japan Radio Co., Ltd	2.2	Shielded	
11	Linear array probe	9L-RS Manufactured by GE Healthcare	1.95	Shielded	
12		12L-RS Manufactured by GE Healthcare	1.95	Shielded	
13		ML6-15-RS Manufactured by GE Healthcare	2.25	Shielded	
14		L8-18i-RS Manufactured by GE Healthcare	2.1	Shielded	
15		L6-12-RS Manufactured by GE Healthcare	2	Shielded	
16		L4-12t-RS Manufactured by GE Healthcare	1.95	Shielded	
17		L10-22-RS Manufactured by GE Healthcare	1.85	Shielded	LP9/LP10 only
18		L3-9i-RS Manufactured by GE Healthcare	3.05	Shielded	LP9/LP10 only
19		L3-12-RS Manufactured by GE Healthcare	2.2	Shielded	

Table 2-7: List of all cables and maximum length of cables

No	Type	Model name	Max. Length (m)	Type of Cable	Remark
20	Sector phased arrary probe	3Sc-RS Manufactured by GE Healthcare	1.95	Shielded	
21		12S-RS Manufactured by PDI, Phoenix	2.15	Shielded	
22		6S-RS Manufactured by Parallel Design SAS	2.1	Shielded	
23		M5Sc-RS Manufactured by GE Healthcare	2.2	Shielded	LP10 only
24	volume convex array probe	RIC5-9A-RS Manufactured by GE Healthcare	2.4	Shielded	
25		RAB2-6-RS Manufactured by GE Healthcare	2.1	Shielded	
26	Pencil probe	P2D Manufactured by Humanscan Co., Ltd	1.9	Shielded	
27		P6D Manufactured by Humanscan Co., Ltd	1.9	Shielded	
28		P8D Manufactured by Humanscan Co., Ltd	1.9	Shielded	
29	Tee probe	6Tc-RS Manufactured by GE Healthcare	2.1	Shielded	
30	Linear/Convex array probe	E7C8L-RS Manufactured by GE Healthcare	2.5	Shielded	

Table 2-8: Accessories for LOGIQ P8/P9/P10

No	Type	Parts No. / Manufacturer	Remark
1	Foot Switch	Foot Switch FSU-3000G Manufactured by WHANAM Electronics	Included 2.9m Shield cable
2	USB Barcode Reader	1950GHD-2USB-A by Honeywell	Included 2.7m Shield cable

Table 2-8: Accessories for LOGIQ P8/P9/P10

No	Type	Parts No. / Manufacturer	Remark
3	Nortel Isolation Transformer	IMEDi 300WR by Noratel Germany AG	
4	B/W Printer	UP-D898MD by Sony corporation	
5	Color Printer	UP-D25MD by Sony corporation	
6	Universal video converter	UVC-S300 by OPHIT CO.,LTD	
7	ACDC adapter for Video Converter	MPU31-105 Series by Sinpro Electronics Co Ltd	Option for Japan
8	ACDC adapter for Video Converter	VEP24US12 Series by XP Power LLC	
9	EMI Filter	BF-10A by TNC Co., Ltd.	Option for Japan
10	Wireless LAN Dongle	A6210 by Netgear	
11	Bluetooth dongle	BT820-02 by Laird Technologies	
12	120V UPS	ABCE1442-11MED by Powervar	
13	230V UPS	ABCE1442-22MED by Powervar	
14	Ethernet protection cable	GES.2203369.01 by Prysmian Group - General Cable	Included 2.7m Shield cable
15	Digital Expert	Microsoft-Surface by Microsoft	

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 P8/P9/P10 to image recording and other devices or communication networks.

Peripherals used in the patient environment

The LOGIQ P8/P9/P10 has been verified for overall safety, compatibility and compliance with the following image recording devices:

- SONY B/W Printer UP-D898
- SONY Color Printer UP-D25MD

The LOGIQ P8/P9/P10 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 or IEC/EN 62368-1 compliant.

The LOGIQ P8/P9/P10 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.

Peripheral Update for EC countries (continued)

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC/EN standards (i.e., IEC/EN 60950 or IEC/EN 62368-1 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore, all complete configurations shall comply with the valid version of the system standard IEC/EN 60601-1. Everyone who connects additional equipment to the signal input part or signal output part of the LOGIQ P8/P9/P10 system configures a medical system, and is therefore responsible to ensure that the system complies with the requirements of the valid version of IEC/EN 60601-1. If in doubt, consult the technical service department or your local GE representative.

General precautions for installing an alternate off-board, remote device or a network 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 P8/P9/P10 and are used simultaneously, must be less than or equal to the rated supply of the LOGIQ P8/P9/P10.
3. There must be adequate heat dissipation and ventilation to prevent overheating of the device.
4. There must be adequate mechanical mounting of the device and stability of the combination.
5. Risk and leakage current of the combination must comply with IEC/EN 60601-1.
6. Electromagnetic emissions and immunity of the combination must conform to IEC/EN 60601-1-2.

General precautions for installing an alternate 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.

Peripheral Update for EC countries (continued)

Peripheral used in the non-patient environment

The LOGIQ P8/P9/P10 has also been verified for compatibility, and compliance for connection to a USB HDD/USB memory via the system USB port, provided the USB HDD/USB memory are IEC/EN 60950 or IEC/EN 62368-1 compliant.

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

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 2-9: Declaration of Emissions

<table>
<tr><th colspan="3">Guidance and manufacturer’s declaration - electromagnetic emissions</th></tr>
<tr><th colspan="3">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.</th></tr>
<tr><th>Emission Type</th><th>Compliance</th><th>Electromagnetic Environment</th></tr>
<tr><td>CISPR 11/EN55011 Conducted and radiated RF EMISSIONS</td><td>Group 1</td><td>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.</td></tr>
<tr><td></td><td>Class A</td><td rowspan="3">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: This system is intended for use by healthcare professionals only. This system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the system or shielding the location.</td></tr>
<tr><td>Harmonic Emissions IEC/EN 61000-3-2</td><td>Class A</td></tr>
<tr><td>Voltage Fluctuations/Flicker Emissions IEC/EN 61000-3-3</td><td>Complies</td></tr>
<tr><td colspan="3">NOTE
The EMISSION characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.</td></tr>
</table>

Declaration of Immunity

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

Declaration of Immunity (continued)

Table 2-10: Declaration of Immunity

Guidance and manufacturer's declaration - electromagnetic immunity			
The 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.			
Immunity Type	**Equipment Capability**	**Regulatory Acceptable Level**	**Electromagnetic environment - guidance**
IEC/EN 61000-4-2 ELECTROSTATIC DISCHARGE (ESD)	± 6, ± 8 kV contact ± 2, ± 4, ± 8, ± 15 kV air	Edition 3 ± 6 kV contact ± 2, ± 4, ± 8 kV air Edition 4 ± 8 kV contact ± 2, ± 4, ± 8, ± 15 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthettic material, the relative humidity should be at least 30%.
IEC/EN 61000-4-4 Elecrical fast transients / bursts	± 2 KV for power supply lines 5 kHz and 100 kHz repetition frequency ± 1 kV for input/output lines 5 kHz and 100 kHz repetition frequency	Edition 3 ± 2 kV for power supply lines 5kHz repetition frequency ± 1 kV for input/output lines 5kHz repetition frequency Edition 4 ± 2 kV for power supply lines 100 kHz repetition frequency ± 1 kV for input/output lines 100kHz repetition frequency	Main power quality should be that of a typical commercial and/ or hospital environment.
IEC/EN 61000-4-5 Surge Immunity	± 0.5 kV, ± 1 kV line to line ± 0.5 kV, ± 1 kV, ± 2 kV Line to earth	Edition 3 and 4 ± 0.5 kV, ± 1 kV line to line ± 0.5 kV, ± 1 kV, ± 2 kV Line to earth	Main power quality should be that of a typical commercial and/ or hospital environment.
IEC/EN 61000-4-8 Power frequency magnetic field	3 A/m, 50/60Hz 30 A/m, 50/60Hz	Edition 3 3A/m, 50/60Hz Edition 4 30A/m, 50/60Hz	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial and/or ospital environment.

Table 2-10: Declaration of Immunity

Guidance and manufacturer's declaration - electromagnetic immunity			
The 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.			
Immunity Type	**Equipment Capability**	**Regulatory Acceptable Level**	**Electromagnetic environment - guidance**
IEC/EN 61000-4-11 Voltage dips and interruptions	< 5%U_T (> 95% dip) for 0.5 cycle; 40%U_T (60% dip) for 5 cycles; 70%U_T (30% dip) for 25 cycles; < 5%U_T (>95% dip) for 5 sec 0% U_T; 0.5 cycle, Phase: 0,45,90,135,180,225,270,315 degree 0% U_T; 1 cycle, Phase: 0 degree 70% U_T; 25/30 cycle, Phase: 0 degree 0% U_T; 250/300 cycle *Applicable deviations standard IEC 60601-2-37 (202.6.2.7)	Edition 3 < 5%U_T (> 95% dip) for 0.5 cycle; 40%U_T (60% dip) for 5 cycles; 70%U_T (30% dip) for 25 cycles; < 5%U_T (>95% dip) for 5 sec Edition 4 0% U_T; 0.5 cycle, Phase: 0,45,90,135,180,225,270,315 degree 0% U_T; 1 cycle, Phase: 0 degree 70% U_T; 25/30 cycle, Phase: 0 degree 0% U_T; 250/300 cycle	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.
NOTE: UT is the a.c. mains voltage prior to application of the test level			

Table 2-10: Declaration of Immunity

Guidance and manufacturer's declaration - electromagnetic immunity			
The 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.			
Immunity Type	**Equipment Capability**	**Regulatory Acceptable Level**	**Electromagnetic environment - guidance**
IEC/EN 61000-4-6 Conducted RF	3 Vrms at 0.15MHz - 80 MHz, 80% AM at 1 kHz 80 % AM at 1kHz	Edition 3 3 Vrms at 0.15MHz - 80 MHz, 80% AM at 1 kHz Edition 4 3 Vrms at 0.15MHz - 80 MHz 6 Vrm in ISM bands between 0.15 MHz - 80 MHz 80 % AM at 1kHz	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 applicable to the frequency of the transmiter. Recommended separation distance $d = [\frac{3,5}{V_1}]\sqrt{P}$ $d = [\frac{3,5}{E_1}]\sqrt{P}$ 80 MHz to 800 MHz $d = [\frac{7}{E_1}]\sqrt{P}$ 800 MHz to 2,5 GHz where P is the maximun output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separaion distance in meres (m). Field strengths from fixed RF transmiters, as determined by an electromagnetic site survey, a) should be lessthan the compliance level in each frequency range. b) Interference may occur in the vicinity of equipment marked with the following symbol:
IEC/EN 61000-4-3 Radiated RF EM fields	3V/m 80MHz - 2.7GHz 80 % AM at 1 kHz	Edition 3 3V/m, 80 MHz - 2.5 GHz, 80% AM 1 kHz Edition 4 3V/m, 80MHz - 2.7GHz 80% AM at 1kHz	

Table 2-10: Declaration of Immunity

Guidance and manufacturer's declaration - electromagnetic immunity			
The 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.			
Immunity Type	**Equipment Capability**	**Regulatory Acceptable Level**	**Electromagnetic environment - guidance**
IEC/EN 61000-4-3 Proximity fields from RF wireless communications equipment	385 MHz: 27 V/m, PM at 18 Hz 450 MHz: 28 V/m, FM at ± 5 kHz deviation 1 kHz sine or PM at 18 Hz 710 MHz: 9 V/m, PM at 217 Hz 745 MHz: 9 V/m, PM at 217 Hz 780 MHz: 9 V/m, PM at 217 Hz 810 MHz: 28 V/m, PM at 18 Hz 870 MHz: 28 V/m, PM at 18 Hz 930 MHz: 28 V/m, PM at 18 Hz 1720 MHz: 28 V/m, PM at 217 Hz 1845 MHz: 28 V/m, PM at 217 Hz 1970 MHz: 28 V/m, PM at 217 Hz 2450 MHz: 28 V/m, PM at 217 Hz 5240 MHz: 9 V/m, PM at 217 Hz 5500 MHz: 9 V/m, PM at 217 Hz 5785 MHz: 9 V/m, PM at 217 Hz 50 % Duty cycle	385 MHz: 27 V/m, PM at 18 Hz 450 MHz: 28 V/m, FM at ± 5 kHz deviation 1 kHz sine or PM at 18 Hz 710 MHz: 9 V/m, PM at 217 Hz 745 MHz: 9 V/m, PM at 217 Hz 780 MHz: 9 V/m, PM at 217 Hz 810 MHz: 28 V/m, PM at 18 Hz 870 MHz: 28 V/m, PM at 18 Hz 930 MHz: 28 V/m, PM at 18 Hz 1720 MHz: 28 V/m, PM at 217 Hz 1845 MHz: 28 V/m, PM at 217 Hz 1970 MHz: 28 V/m, PM at 217 Hz 2450 MHz: 28 V/m, PM at 217 Hz 5240 MHz: 9 V/m, PM at 217 Hz 5500 MHz: 9 V/m, PM at 217 Hz 5785 MHz: 9 V/m, PM at 217 Hz 50 % Duty cycle	Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the system, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result. 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.

Declaration of Immunity (continued)

Table 2-11: Declaration of Immunity

Immunity Type	Equipment Capability	Regulatory Acceptable Level	EMC Environment and Guidance
NOTE: This guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.			
a) Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, and 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 re-orienting or relocating this system. b) Over the frequency range 150 kHz to 80 MHz field strengths should be less than 3 V/m.			

Declaration of Immunity (continued)

Table 2-12: Test specifications for IEC/EN 61000-4-3 proximity fields from RF wireless communications equipment

Test frequency (MHz)	Band	Service	Modulaion	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 ± 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 18Hz	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 217Hz	2	0.3	28
1845						
1970						
2450	2400-2570	Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse modulation 217 Hz	2	0.3	28
5240	5100-5800	WLAN 802.11 a/n	Pulse modulation 217 Hz	0.2	0.3	9
5500						
5785						

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

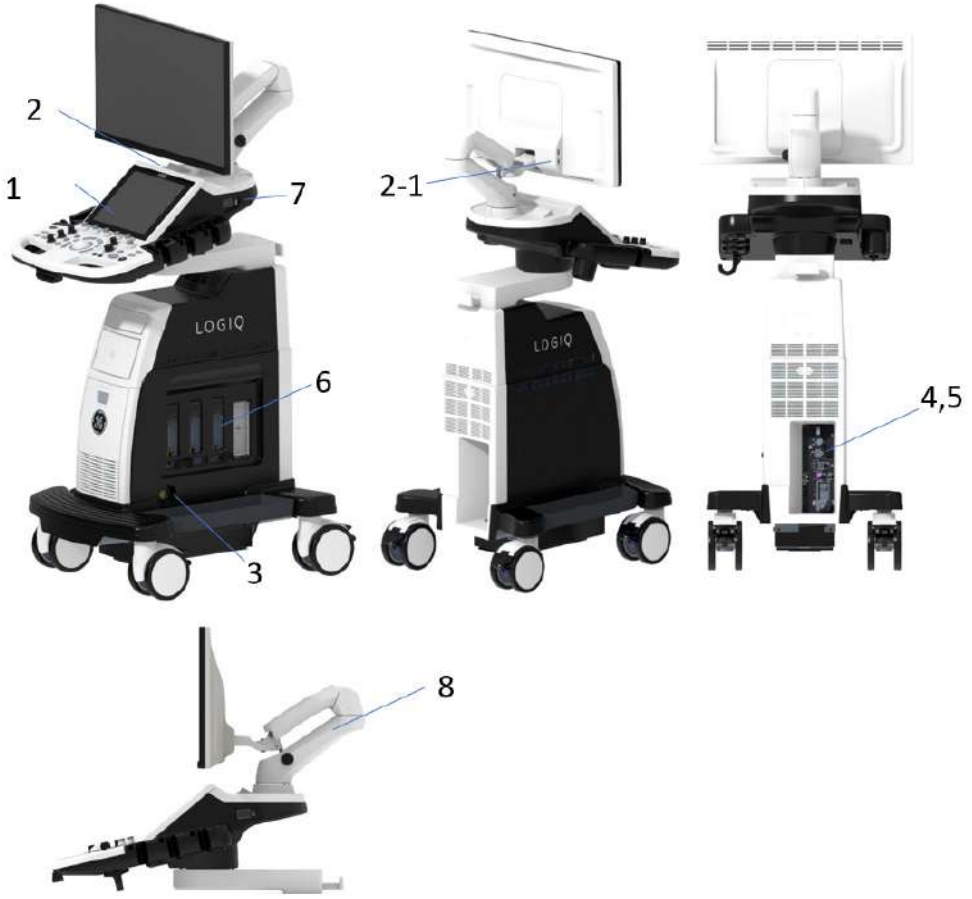


Figure 2-1. Patient Environmental Devices

1. Power On/Off
2. USB Port
   2-1 > USB Port (additional option with HD Display)
3. CW pencil probe port
4. Power In/Out (Signal I/O port, Power line (AC~), Ground line, Power cable with Protective earth)
5. Signals I/O Port (USB Ports, Network Connector, Audio In/Out, HDMI)
6. Imaging probe ports
7. ECG Connector
8. Articulating arm

CAUTION

DO NOT place a PC printer and a card reader inside the patient environment.

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 2-26 for more information.*

Unapproved Devices

DO NOT use unapproved devices.

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

Any device connected to the LOGIQ P8/P9/P10 must conform to the requirements for IEC or equivalent standards appropriate to devices.

Accessories, Options, Supplies

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

Acoustic Output

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

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

Acoustic Output Display Specifications

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

The TI and MI are displayed at all times. The TI display starts at a value of 0.0 and increments in steps of 0.1. The MI display values between 0 and 0.4 increment in steps of 0.01 and for values greater than 0.4, increments in steps of 0.1.

Thermal Index

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

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

Acoustic Output Display Specifications (continued)

Mechanical Index

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

Changing the Thermal Index Type

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

Controls Affecting Acoustic Output

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

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

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

Always observe the Acoustic Output display for possible effects.

Best practices while scanning

HINTS

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

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

WARNING

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

Acoustic Output Hazard

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

Acoustic Output Default Levels

In order to assure that an exam does not start at a high output level, the LOGIQ P8/P9/P10 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.

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://customer-doc.cloud.gehealthcare.com/#/cdp/dashboard
2. Select the modality “Ultrasound (UL)”.
3. Enter the document name or the keyword “WEEE”.
4. Press “Search”.
5. Select the desired WEEE passport.

India Battery Waste Management

India Battery Waste ERP Certificate No.: 12331169

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 P8/P9/P10 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 table describes the purpose and location of safety labels and other important information provided on the equipment.

Table 2-13: Label Icons

Label/Icon	Meaning/Reference Standard	Location
Identification and Rating Plate	Manufacturer's name and address EN ISO 15223-1:2016 and ISO 7000-3082	Rating Plate
Identification and Rating Plate	Date of manufacture EN ISO 15223-1:2016 and ISO 7000-2497	Rating Plate
	Serial Number ISO 7000-2498 and EN ISO 15223-1:2016	Rating Plate
	GE Part Number ISO 7000-2493 and EN ISO 15223-1:2016	Rating Plate
Type/Class Label	Used to indicate the degree of safety or protection. IEC 60601-1:2005+A1:2012	Rear of the system
	GE Logo	Various

Table 2-13: Label Icons (Continued)

Label/Icon	Meaning/Reference Standard	Location
	Equipment Type CF indicates equipment containing a floating applied part with a degree of protection suitable for direct cardia contact. IEC 60601-1; IEC60417-5336	Phono and AUX connectors Probe connectors
Rx Only	United States only Prescription Requirement 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	Rear of the system
	Authorized European Representative address EN ISO 15223-1:2016	Rear of the system
	Authorized Representative for Switzerland name and address MDR Annex I section 23.2 (d), Art.51 para. 1 MedDO	Rear of the system
IP Code (IPX8)	Indicates the degree of protection provided by the enclosure per IEC60 529. Can be used in operating room environment. IEC 60601-1:2005+A1:2012 Annex D.3 and IEC 60529	Footswitch
	ECG symbol GE created	Right side of the OPIO
	Type BF Applied Part (man in the box) symbol is in accordance with IEC 60878-02-03. IEC 60601-1:2005+A1:2012 Annex D.1 and IEC 60417-5333	Probe marked Type BF
	Defibrillation-proof CF applied part IEC 60601-1:2005+A1:2012 Annex D.1 and IEC 60417-5336	ECG connector

Table 2-13: Label Icons (Continued)

Label/Icon	Meaning/Reference Standard	Location
	Follow instruction for use. IEC 60601-1:2005+A1:2012 Annex D.1 and ISO 7010-M002	Rear of the system Probe connector
IPX7	Protected against the effects of temproary immersion in water. IEC 60529	Applied parts of probes
	“General Warning Sign” IEC 60601-1:2005+A1:2012 Annex D and ISO 7010-W001	Rear of the system
	“Warning” - Dangerous voltage” (the lightning flash with arrowhead) is used to indicate electric shock hazards. IEC 60601-1:2005+A1:2012 Annex D.2 and ISO 7010-W012	Internal
	“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	Rear of the system
	“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	Rear of the system
	“ON” indicates the power on position of the power switch. **CAUTION:** This Power Switch **DOES NOT ISOLATE** Mains Supply. IEC 60601-1:2005+A1:2012 Annex D.1, IEC 60417-5007 and IEC 60417-5009	Operator control panel
	“Protective Earth” indicates the protective earth (grounding) terminal. IEC 60601-1:2005+A1:2012 Annex D.1 and IEC 60417-5019	Internal

Table 2-13: Label Icons (Continued)

Label/Icon	Meaning/Reference Standard	Location
	“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. IEC 60601-1:2005+A1:2012 Annex D.1 and IEC 60417-5021	Rear of the system
	This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment. WEEE Directive 2012/19/EU	Rear of the system Probe connector

Table 2-13: Label Icons (Continued)

Label/Icon	Meaning/Reference Standard	Location
	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). "10" 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. China ElectronicIndustry Standard SJ/T11364-2014	Probe connector
	China Electronics Industry Standard SJ/T 11364-2024 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 Electronics Industry Standard GB/T 26572, include the hazardous substances of Lead, Mercury, Hexavalent chromium, Cadmium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs), Dibutyl phthalate (DBP), Diisobutyl phthalate (DIBP), Butyl benzyl phthalate (BBP), and Bis (2-ethylhexyl) phthalate (DEHP). "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.	Rear of the system

Table 2-13: Label Icons (Continued)

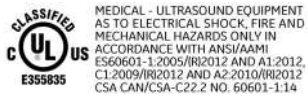
Label/Icon	Meaning/Reference Standard	Location
	Do not use the following devices near this equipment: cellular phone, radio receiver, mobile radio transmitter, radio controlled toy, broadband power lines, etc. Use of these devices near this equipment could cause this equipment to perform outside the published specifications. Keep power to these devices turned off when near this equipment. ISO 7010-P013	Rear of the system
	UL conformity mark according to ANSI/AAMI ES60601-1:2005/(R) 2012 and CAN/CSA C22/2 NO. 601.1:14. ANSI/ AAMI ES60601-1:2005/(R) 2012 and CAN/CSA-C22.2 No. 60601-1:14	Rear of the system
	How to lock Monitor Arm prior to transport GE created	Rear of the system.
	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	Rear of the LCD monitor.
	DO NOT push the system. Use the handle to push/pull the system, e.g., DO NOT use the LCD. Failure to do so may cause serious injury or system damage. IEC 60601-1:2005+A1:2012 Annex D.2 and ISO 7010-P017	Rear of the system
	Caution IEC 60601-1:2005+A1:2012 Annex D.1, ISO 7000-0434A and EN ISO 15223-1:2016	Probe connector

Table 2-13: Label Icons (Continued)

Label/Icon	Meaning/Reference Standard	Location
EAC	Eurasian Confirmity 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. conformity with the technical regulation	SIDE OF FAN BRKT, Country specific label
	INMETRO Certification: TUV Rheinland Brazil Brazil INMETRO	SIDE OF FAN BRKT, Country specific label
	Non-Ionizing Electromagnetic Radiation IEC 60417-5140 IEC TR 60878-5140	SIDE OF OPIO
	GOST Symbol. Russia Regulatory Country Clearance. National standards of the Russian Federation and CIS countries	Rear Panel

Table 2-13: Label Icons (Continued)

Label/Icon	Meaning/Reference Standard	Location
	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 P8/ P9/P10 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. GE created	Rating Plate
	e-IFU symbol	Rear of the system
CE 0197	The CE Mark of Conformity indicates this equipment conforms with the MDR 2017/745 EU.	Rear of the system
MD	The MD symbol indicates this equipment is a medical device.	Rear of the system

Table 2-13: Label Icons (Continued)

Label/Icon	Meaning/Reference Standard	Location
	The MR Unsafe label is to warn that this Ultrasound System poses risks to the patient, medical staff or other persons within the MR environment and that the Ultrasound system should remain outside of the MR environment.	Rear of the system
	Use two people to transport system on inclines. This label also indicates the system weight. The equipment weights approximately 67kg (148 lbs) (69 kg with HD Display (152 lbs)). To avoid possible injury and equipment damage when transporting from one area of use to another. • Be sure the pathway is clear. • Use two or more persons to move the equipment on inclines or long distance.	Rear of the system
	Use no hooks To indicate that hooks shall not be used for handling the transport package. ISO7000-0622	System packing
	This way up To indicate correct upright position of the transport package. ISO7000-0623	System packing
	Fragile, handle with care Indicate a medical device that can be broken or damaged if not handle carefully ISO15223-1: 5.3.1 ISO7000-0621	System packing
	Do not stack ISO7000-2402	System packing

Table 2-13: Label Icons (Continued)

Label/Icon	Meaning/Reference Standard	Location
	Keep dry Indicates a medical device that needs to be protected from moisture. ISO15223-1: 5.3.4 ISO7000-0626	System packing
	Temperature limitation Indicates the temperature limits to which the medical device can be safely exposed. ISO15223-1: 5.3.7 ISO7000-0632	System packing
	Humidity limitation Indicates the range of humidity to which the medical device can be safely exposed. ISO15223-1: 5.3.8 ISO7000-2620	System packing
	Atmospheric pressure limitation Indicates the range of atmospheric pressure to which the medical device can be safely exposed. ISO15223-1: 5.3.9 ISO7000-2621	System packing
	To indicate that the marked item or its material is part of a recovery or recycling process. ISO 7000-1135	System packing

Label location

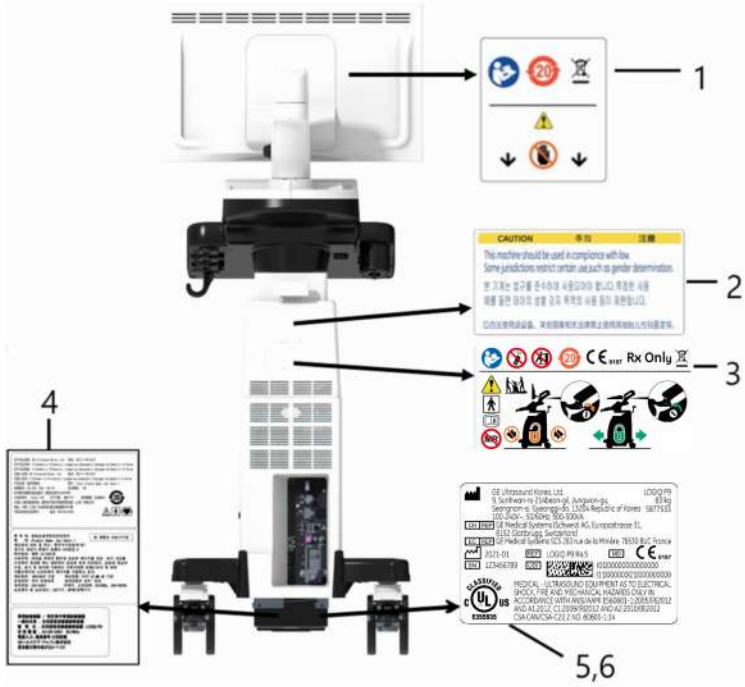


Figure 2-2. Label location

* Required for Asia.

1. LCD Caution Label
2. Gender Caution Label (Only for India, China, Korea)
3. Multi Caution Label
4. LOGIQ P8/P9/P10 Rating Label (Only for China, Korea, Japan)
5. LOGIQ P8/P9/P10 Rating label
6. UL Label

Label on the packing box

Figure 2-3. Package label

This label is printed on the packing box of the system to indicate the humidity, temperature and air pressure condition for the storage and shipment.

RoHS LOGIQ P8/P9/P10 Hazardous Substances

The following product pollution control information is provided according to SJ/T 11364-2024 Marking for Control of Pollution caused by Electronic Information Products.

The symbol above 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 2-14: Table of Hazardous Substances' Name and Concentration for LOGIQ P8/P9/P10

Component Name	Hazardous Substances' Name									
	Pb	Hg	Cd	Cr(VI)	PBBs	PBDEs	DBP	DIBP	BBP	DEHP
Display	O	O	O	O	O	O	O	O	O	O
Circuit Boards	X	O	X	O	O	O	O	O	O	O
Touch Panel	O	O	O	O	O	O	O	O	O	O
Console Cabinet	O	O	O	O	O	O	O	O	O	O
Operator Panel	O	O	O	O	O	O	O	O	O	O
Console Frame (Base Casting, Castings, Card Rack)	O	O	O	O	O	O	O	O	O	O
System Covers	O	O	O	O	O	O	O	O	O	O
System Cables	O	O	O	O	O	O	O	O	O	O
Ultrasound Probes	X	O	O	O	O	O	O	O	O	O

This table is prepared according to SJ/T 11364.
O: Indicates that hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.
X: Indicates that hazardous subsstance 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.

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

All the warnings in the Safety chapter should be read and understood before operating the unit.

Do not unpack the LOGIQ P8/P9/P10. This must be performed by qualified service personnel only.

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

Do not attempt to install the system alone. General Electric, Affiliate, or Distributor Field Engineers and Application Specialists will install and setup the system. See ‘Contact Information’ on *page 1-9 for more information.*

Perform regular preventive maintenance.

Maintain a clean environment. Turn off, and if possible, disconnect the system before cleaning the unit.

Training

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

Before the system arrives

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

Power Requirements

- A separate power outlet with a 15 amp circuit breaker.
- Frequency: 50 Hz, 60 Hz (+/-2%)
- 100V - 240V AC

Electromagnetic interferences

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

Ensure that the following is provided for the new system:

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

  Precautions include:

  - Operate the console at least 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.

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

Environmental Requirements

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

Table 3-1: System Environmental Requirements

	Operational	Storage	Transport
Temperature	10° - 35°C/50° - 95°F with 2D probe 18° - 30°C/64.4° - 86°F with 4D probe	-10° - 50°C 14° - 122°F	-10° - 50°C 14° - 122°F
Humidity	10 - 80% non-condensing	10 - 90% non-condensing	10 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

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

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

Operating Environment

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

Do not cover the ventilation holes of the LOGIQ P8/P9/P10.

Operating altitude

Maximum operating altitude for use: 3000m

Probe

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: Probe Environmental Requirements

	Operational
Temperature	10° - 35 °C for 2D probe 18° - 30 °C for 4D probe
Humidity	10 - 80% (non-condensing) for 2D probe 30 - 80% (non-condensing) for 4D probe
Pressure	700 - 1060hPa

Console Overview

Console Graphics

Figure 3-1. LOGIQ P8/P9/P10 System (High cabinet type example)

1. LCD Monitor
2. USB port
   2-1> USB Port (additional option with HD Display)
3. Touch panel
4. Probe holder
5. Control panel swivel button
6. Control panel up/down button
7. A/N keyboard (Option)
8. Multi purpose holder (Option)
9. DVD Drive (Option)
10. BW printer (Option)
11. Drawer (Option)
12. Foot rest
13. CW pencil probe port (Option)
14. Side tray (Standard)
15. Probe ports - 4 active probe ports (3 RS, 1 DLP)
16. Paper tray (Option)
17. Audio speaker
18. OPIO tray (Option)
19. Rear handle (Option)
20. ECG connector (Option)
21. Articulating arm
22. External I/O panel
23. Extended Battery Life (Option)
24. Probe Light

Low cabinet type

Figure 3-2. Low cabinet

a. DVD Drive (Option)

High cabinet type

Figure 3-3. High cabinet

a. DVD Drive (Option)
b. B/W Printer or Drawer

Speakers

Audio is provided by speakers. For the location of the speaker, see Figure 3-1 *on page 3-6*.

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

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

Peripheral/Accessory Connection

Peripheral/Accessory Connector Panel

LOGIQ P8/P9/P10 peripherals and accessories can be properly connected using the Peripheral/Accessory Connector Panel.

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

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

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

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

When using peripheral device, observe all warnings and cautions given in peripheral operator manuals.

Peripheral/Accessory Connector Panel (continued)

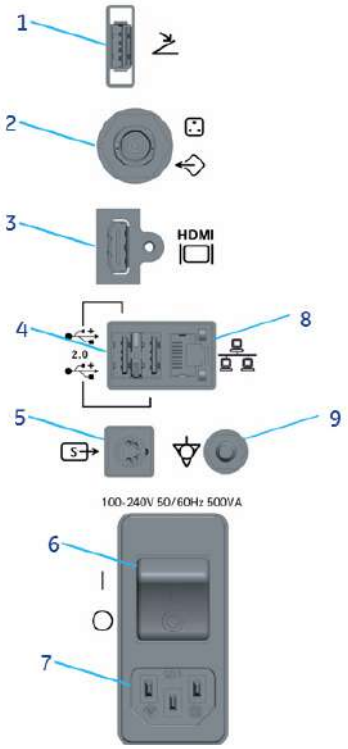


Figure 3-4. Peripheral/Accessory Connector Panel

1.	USB Port	USB2.0 Full Speed
2.	Composite connector	Composite connector for external monitor
3.	HDMI connector	HDMI connector for external monitor
4.	USB Port	USB2.0 Full Speed
5.	S-Video connector	S-Video connector for external monitor
6.	Circuit breaker	10A
7.	AC Inlet	100-240Vac
8.	Ethernet	LAN for InSite, DICOM, Network storage Connection
9.	Equipotential terminal	

Peripheral/Accessory Connector Panel (continued)

CAUTION

When connecting external peripherals on USB port, composite connector, HDMI connector or S-video connector, the external peripheral and external monitor shall be powered through a medical grade isolation transformer (Figure 1-5) if it requires external AC power source. Please contact GE Service Representative for installation of medical grade isolation transformer.

Figure 3-5. MED 300 WR (medical grade isolation transformer)

Storage areas

Probe holder and Gel warmer

Figure 3-6. Probe holder and Gel warmer (Gel holder)

a. Probe holder
b. Gel warmer (Gel holder)

Turn on the system, then turn on the gel warmer.

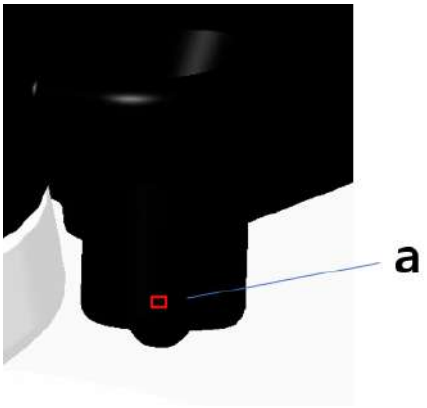


Figure 3-7. On/Off switch of Gel warmer

a. On/Off switch (Left: Off, Right: On)

Trays (Option)

Figure 3-8. Trays

a. OPIO tray
b. Paper tray

CAUTION

DO NOT place the probe, the footswitch and/or any peripherals on the side tray when moving/transporting the system.

Multi purpose holder (option)

Figure 3-9. Multi purpose holder (Option)

a. Optional multi purpose holder

Attachment for small probe (Option)

Figure 3-10. Attachment (Option)

Push the attachment into the probe holder as below.

Figure 3-11. Push the attachment

Figure 3-12. Attachment in the proper position

Extended Battery (Option)

Figure 3-13. Extended Battery

a. Optional Extended Battery

The recommended battery usage is:

- Power Assistant: 15 minutes of offline scanning
- Extended battery: 60 minutes of offline scanning

View current battery status

When the system is running on battery power, the following icons display on the status bar at the bottom of the display:

Table 3-3: Battery status icons

Icon	Description
No icon	AC Plugged; no battery present
	AC Plugged; battery is fully charged (100%)
	AC Plugged; battery is partially charged (50%-94%)
	AC Plugged; battery is partially charged (20%-49%)
	AC Plugged; battery is partially charged (0%-19%)
	AC Unplugged; battery is fully charged (100%)
	AC Unplugged; battery is partially charged (50%-94%)
	AC Unplugged; battery is partially charged (20%-49%)
	AC Unplugged; battery is partially charged (0%-19%)

View current battery status (continued)

Battery error icon

When an abnormal status of the battery is detected, the system displays the following icon:

Table 3-4: Battery error icon

Icon	Description
	• Battery Temperature error • Communication error or battery charge error

NOTE: If this icon displays, do not inititate Power Assistant. Contact the technical service department or your local GE representative.

Starting Power Assistant

When the AC cable is unplugged or if there is an AC power failure, the system transitions to Power Assistant. The following dialog displays before entering Power Assistant.

Figure 3-14. Power Assistant mode

NOTE: Verify that the system is in Power Assistant after unplugging the power cable. The following message "Running on Battery. Key operation locked" appears on the display during Power Assistant.

NOTE: If the system does not transition to Power Assistant, contact the technical service department or your local GE representative.

When in Power Assistant

In Power Assistant, most of the console devices, such as the keyboard, gel warmer and printers, are turned off to minimize battery usage.

CAUTION

When in Power Assistant, DO NOT perform the following operation:

- Connect and disconnect probes.
- Remove peripheral devices.
- Eject or insert CD/DVD media and the external USB storage device.

NOTE: To shut down the system while in Power Assistant, plug in the power cable, exit from Power Assistant, and then perform regular shut down operations.

CAUTION

When remaining battery capacity is 30% or less, the LED on the operator panel starts blinking. Plug in the AC cable without delay if the LED starts blinking.

If the remaining battery capacity is too low, the system will automatically start the full shutdown sequence.

When in Power Assistant (continued)

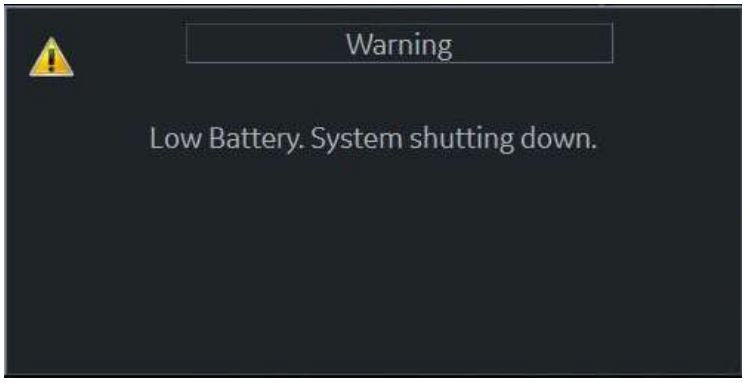


Figure 3-15. Battery low power warning message

CAUTION

Verify battery functionality is available by the battery Icon in bottom-left corner of the status area. It is imperative to confirm the battery icon indicator before unplugging power cord from wall power. Full charging condition is recommended for Battery Power Mode. Unplugging system from wall power with <30% battery could result in a sooner than expected shutdown warning.

Recovering from Power Assistant

The system recovers from Power Assistant when power is supplied to the LOGIQ P8/P9/P10. The system returns to full functionality in 10 seconds.

Refreshing the battery

To maintain the battery life, it is recommended to refresh the battery every 6 months. Refresh procedure:

1. Turn on the system.
2. Wait until the battery is fully charged. it takes at least 1 hour to fully charge the battery.
3. Turn off the system.
4. Remove all probes.
5. Turn on the system.
6. Unplug the AC cable and wait until the system shuts down. It may take 30 minutes or more to complete shutdown.
7. Wait at least 5 hours.
8. Plug in the AC cable.
9. Turn on the system.
10. Wait until the battery is fully charged. It takes about 3 hours to fully charge the battery.

Battery deterioration

When the system detects battery deterioration, the following dialog displays:

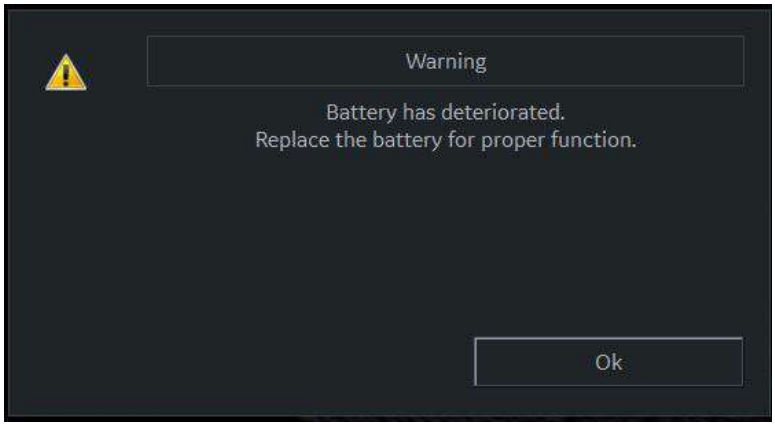


Figure 3-16. Battery life message

If this message displays, contact the technical service department or your local GE representative.

Battery Disposal

Power Assistant uses a Lithium Ion battery. Used battery will require to discard as chemical waste. Please contact your local authority for the directions.

NOTE: When removing a defective battery, ensure that it is disposed of in accordance with local regulations. Alternatively, forward it to GE for proper disposal.

Offline Scanning (Option)

Offline scanning feature allows user to scan using battery power (AC unplugged) and automatically switches to power assistant mode (power saving mode) when the battery is running out to prevent data loss.

Activating Offline Scanning

To use offline scanning feature, please go to utility and check “Allow Offline Scanning (restart needed)” from System > General page to activate offline scanning. You need to restart application after updating the check box.

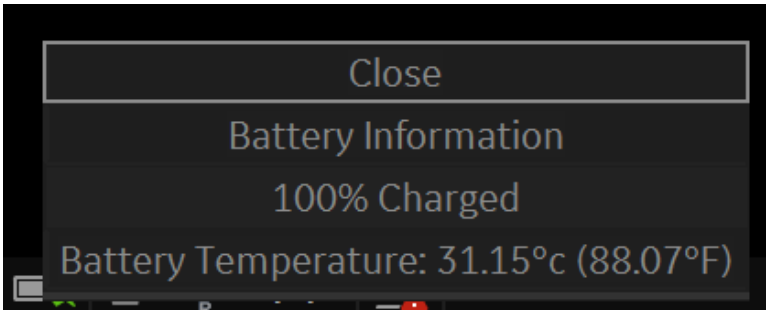


Figure 3-17. Allow Offline Scanning check

How to use Offline Scanning

When Offline scanning is activated, the system enters an offline scanning mode automatically when the system is disconnected from AC power. (When Offline Scanning is disabled, the system enters power assistant mode.)

WARNING

The fresh battery allows user to keep scanning for 20 minutes (B Mode). However, it depends on scan condition and hardware configurations.

WARNING

Do not use offline scanning mode when you need to handle (transfer/ export/ import) patient data.(Export/Import/ Backup/ Burn Media, Dicom Transfer, etc.) The system can be unexpectedly shutdown when the battery capacity is not enough and resulted in losing patient data. Please note the message in the status bar when offline scanning is activated. It is strongly recommend to use AC power to use patient data handling actions.

Figure 3-18. Warning message

How to see the current battery status

There is a battery icon in the status bar, but also user can access to detailed information from battery information popup.

Click battery icon in the status bar to display the battery information popup, which is including the current battery capacity, brief condition, and current temperature.

WARNING

Please note that the system switches to power saving mode automatically when the capacity is under 50%.

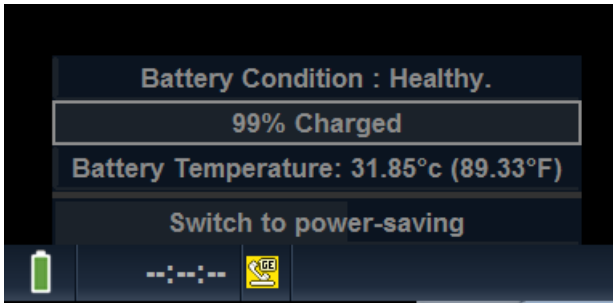


Figure 3-19. Battery Condition

Recommendation

Please plug in AC power if possible, keep using the battery power can impact to the battery life.

Optional Battery Power Saving Mode

When the system located away from AC power, user can switch to optional power-saving mode using the button in the battery status popup. The system allows back to Offline Scanning mode with the pressing Power button or Freeze button when the system is in optional power-saving mode.

Information

To notify that the battery is running out, the system displays a dialog to confirm user want to keep scanning or not. User can keep scanning more as possible or, go to optional power saving mode to find near AC power.

Powering the System

Connecting the System

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

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

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

CAUTION

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

CAUTION

Ensure that the retaining clamp for the power plug is fixed firmly.

CAUTION

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

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

Connecting the System (continued)

WARNING

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

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

Voltage level check

Check the rating label on the rear side of the system. Check the voltage range indicated on the label.

Connecting to the electrical outlet

WARNING

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

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 and secure it in place by using the retaining clamp.
5. Push the power plug securely into the wall outlet.

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

CAUTION

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

Power On

Press the ***Power On/Off*** switch to turn the power on. The circuit breaker must also be in the on position. For circuit breaker location, see ‘Circuit breaker’ on *page 3-43* 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 3-29). 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 3-29).
4. The system should now go through its boot-up process with no further user intervention (approximately 1 to 2 minutes).

Figure 3-20. Power On/Off Switch Location

a. Power On/Off switch

Power Up Sequence

The system is initialized. During this time:

- The system boots up and the status is reflected on the monitor.

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

- Peripheral devices are activated on power up.

After initialization is complete, all lighted controls on the Control Panel light and the default B-Mode screen is displayed on the monitor.

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. Please refer to Chapter 10, System Administration section, for more information (Utility -> Admin -> Logon).

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 P8/P9/P10

When first logging in to the LOGIQ P8/P9/P10,

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

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

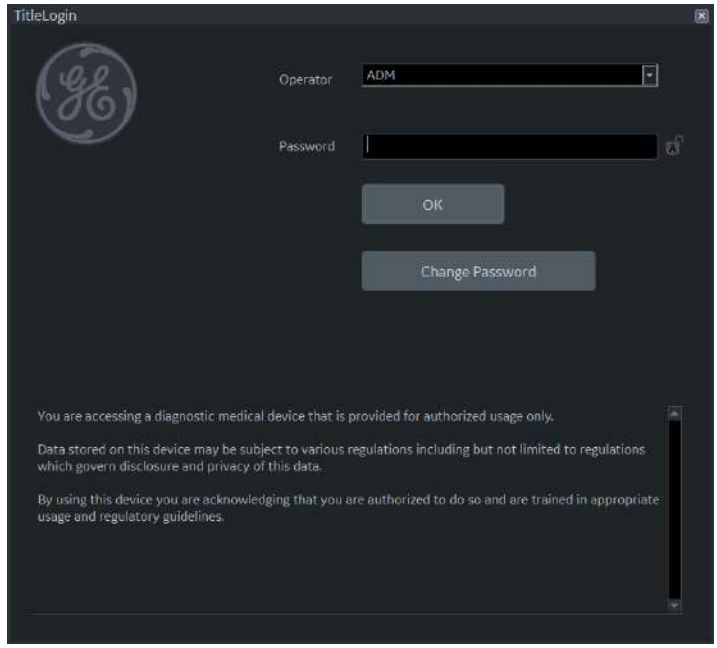


Figure 3-21. First Admin Login to the LOGIQ P8/P9/P10

Initial Login to the LOGIQ P8/P9/P10 (continued)

2. Upon ADM Login, specify the institution's Default Security Level for the LOGIQ P8/P9/P10: 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.

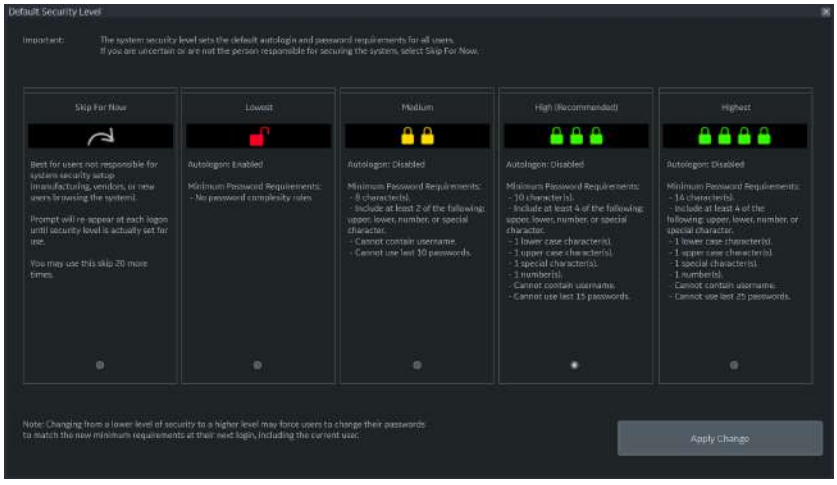


Figure 3-22. Default Security Level

Initial Login to the LOGIQ P8/P9/P10 (continued)

Table 3-5: Security Levels

Security Level	Complexity Rules
Skip For Now	Best for users not responsible for system security setup. Prompt will re-appear at each logon until security level is set up for you. 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: • 8 characters. • Include at least two of the following: upper case character, lower case character, number or special character. • Password cannot contain username. • Cannot use the last 10 passwords.
High (Recommended)	Autologon disabled. Minimum Password Requirements: • 10 characters. • Include at least one of each of the following: upper case character, lower case character, number or special character. • Cannot contain username. • Cannot use last 16 passwords.
Highest	Autologon disabled. Minimum Password Requirements: • 14 characters. • Include at least one of each of the following: upper case character, lower case character, number or special character. • Cannot contain username. • Cannot use last 25 passwords.

Initial Login to the LOGIQ P8/P9/P10 (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.

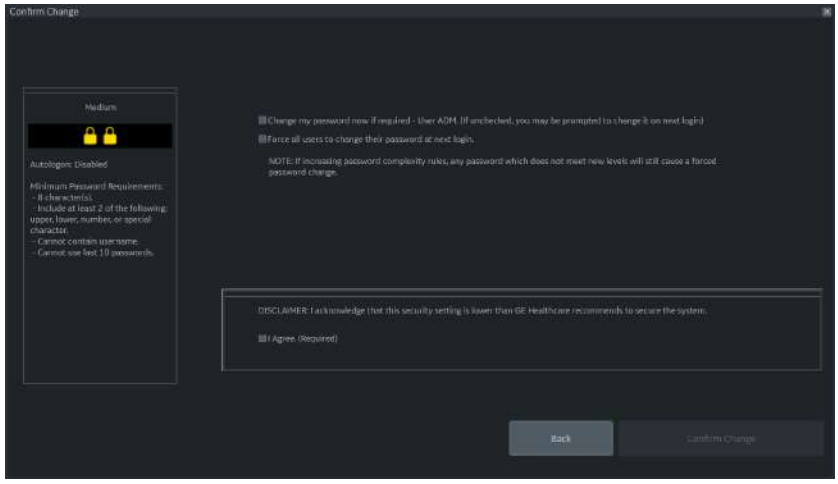


Figure 3-23. Confirm Change Screen

Initial Login to the LOGIQ P8/P9/P10 (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.

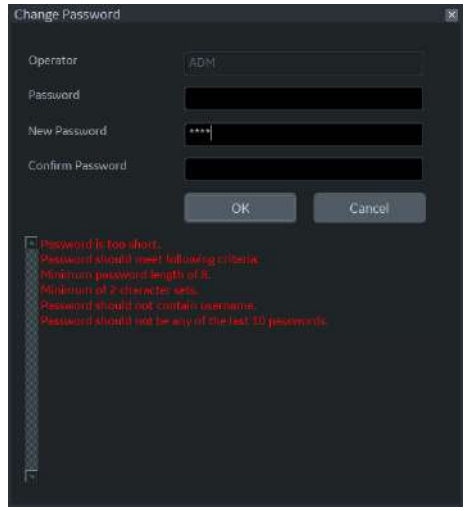


Figure 3-24. Change Password

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.

Figure 3-25. Password Change

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

Emergency User

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

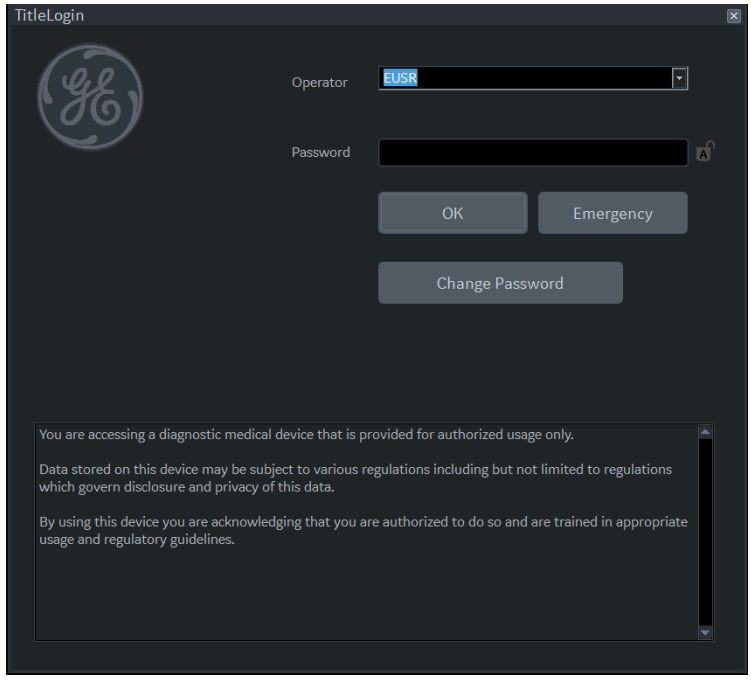


Figure 3-26. Emergency User

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 3-27. Patient Information Not Accessible

Logoff

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

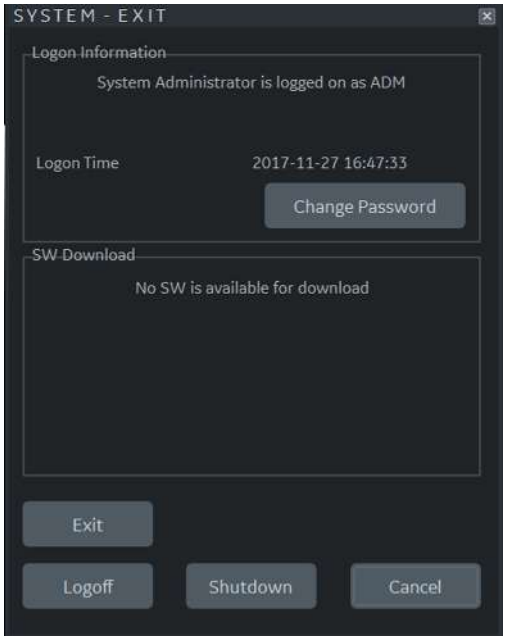


Figure 3-28. System Exit Window

Power Off

CAUTION

DO NOT turn off the circuit breaker before the monitor display turns off.

Data may be lost or system software damaged if the circuit breaker is turned off before the system shuts down.

To power off the system:

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

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

   The shutdown process takes a few seconds and is completed when the control panel illumination shuts down.

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

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

4. 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.

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; **DO NOT** hold the switch in the **On** position. If the Circuit Breaker switch remains **On**, follow the Power On procedure.

Figure 3-29. Circuit Breaker (located on the rear panel)

a. Circuit Breaker

*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.

Probes

Introduction

Only use approved probes.

Selecting probes

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

NOTE: Selecting a new probe unfreezes the image.

Chirping noise

- Probes may generate slight audible noise emissions when operated in volume mode
- The repetitive transmission of ultrasound-pulses can generate audible high frequency sounds in the transducer. The frequency and loudness of these sounds (chirping sound) varies with operating mode and U/S image penetration. This sound is due to normal operation and does not indicate degradation of probe safety, performance, or reliability.

Unpacking

If the packaging has been

- Damaged.
- Unintentionally opened before use.
- Exposed to environmental conditions outside of those specified.

Contact your GE HealthCare representative

Connecting the Probe

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

Remove any dust or foam rests from the probe pins.

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

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

Figure 3-30. Probe port

a. Active probe port
b. Pencil probe port

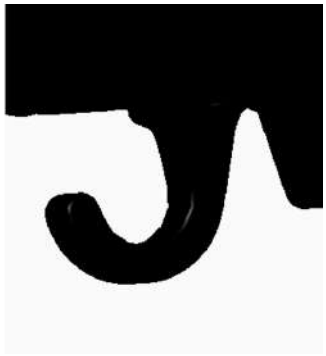
Connecting the Probe (continued)

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. Put the probe in the probe holder.

CAUTION

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.



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.

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

   Before inserting probes, inspect the probe connector pin. If the pin is bent, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative.
7. Push the connector locking handle to the right to secure the probe connector.
8. Carefully position the probe cord so it is free to move and is not resting on the floor.

Connecting the CW Pencil Probe

Insert the probe connector into the probe port all the way, seated in. Carefully position the probe cord so it is free to move and is not resting on the floor.

Cable Handling

Take the following precautions with probe cables:

- Keep free from wheels.
- Do not bend the cable acutely
- Avoid crossing cables between probes.

Activating the Probe

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

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

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

Deactivating the Probe

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

To deactivate a probe:

1. Ensure the LOGIQ P8/P9/P10 is in freeze mode. If necessary, press the **Freeze** key.
2. Gently wipe the excess gel from the face of the probe.
3. Ensure that the probe is placed gently in the probe holder.

Disconnecting the Probe

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

1. Ensure the probe is deactivated. Deactivate by selecting another probe or pressing Freeze.
2. Move the probe locking handle to the left.
3. Pull the probe connector straight out of the probe port carefully.

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.

4. Ensure the cable is free.
5. Be sure that the probe head is clean before placing the probe in its storage box.

Transporting Probes

- Secure the probe in its holder for moving short distances.
- When transporting a probe a long distance, store it in its carrying case.

Storing the Probe

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

Carrying case:

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

DO NOT store probes in the side tray. To avoid damage, store the probe in its carrying case.

System Positioning/Transporting

Before moving the system

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

CAUTION

When the system is not in use AND/OR before moving/ transporting the system, make sure that the control panel/ monitor arm locks firmly and flip down the monitor to prevent system damage.

CAUTION

DO NOT place probes or the footswitch into the side tray when moving/transporting the system. This is not a storage space for probes, footswitch and any peripheral devices.

CAUTION

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

CAUTION

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

CAUTION

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

CAUTION

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

Before moving the system (continued)

1. Adjust the OPIO to the lowest position.
2. Adjust the monitor as shown in Figure 3-31 *on page 3-53*

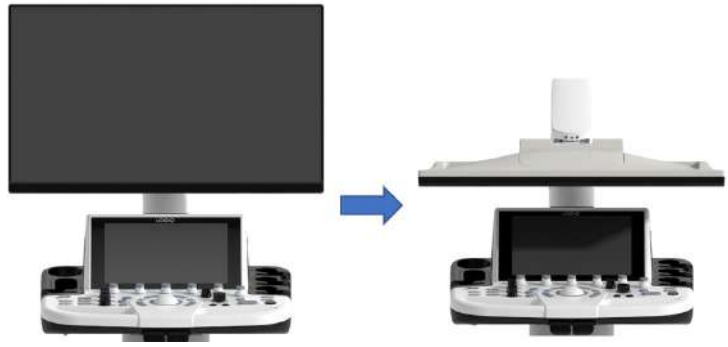


Figure 3-31. Monitor position for moving system

3. Ensure that the monitor arm is locked as shown in Figure 3-32 *on page 3-53*

Figure 3-32. Monitor locking

Before moving the system (continued)

4. Turn the system off, including the circuit breaker (see 'Power Off' on *page 3-42 for more information*), and removed the plug from the wall.
5. All cables from off-board peripheral devices must be disconnected from the console.
6. Disconnect the footswitch from the console.
7. Wind the power cable around the cable hook.

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

8. 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.

   Store all other probes in their original cases or in soft cloth or foam to prevent damage.
9. Put the coupling gel in the gel holder.
10. Ensure that no loose items are left on the console and unlock the wheels.

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 3-33. Wheel lock and Swivel lock

1. Wheel Lock Engaged
2. Unlocked
3. Unlocked
4. Wheel Lock Engaged
5. Swivel Lock Engaged
6. Wheel and Swivel Lock Engaged

Moving Hazard

Never move the system with locked wheels.

CAUTION

When two or more people are releasing the wheels, take extra precaution to prevent unexpected movement which could result in possible toe injuries.

CAUTION

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

Moving the System

1. The system weighs approximately 67 kg (148 lbs.) (69 kg with HD Display (152 lbs.)), depending on which peripherals are loaded onto the system. 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.
2. Grasp the rear handle bar and push the system.

NOTE: The swivel lock on the left-rear caster helps control the system while moving.

Moving the system, no incline

Moving the system on incline

- Take extra care when moving the system long distances and on inclines (>5 degrees). Ask for help if necessary.
- DO NOT attempt to move the console using any cables or fixtures, such as the probe connectors.
- DO NOT attempt to move the system by pulling cables or belts placed around the monitor and/or monitor arm.
- Use the foot brake (pedal) when necessary.
- Avoid ramps that are steeper than ten degrees to avoid tipping over the system.

NOTE: Wheel chair ramps are usually less than five degrees.

Moving the System (continued)

- Utilize additional care and personnel when loading into a vehicle for transport.
- Do not let the system strike walls or door frames.
- Use extra care when crossing door or elevator thresholds.

NOTE: When you cross the threshold with the LOGIQ P8/P9/P10, move quickly.

3. Once the destination is reached, lock the wheels.

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 3-52* for more information), also perform the following:

- Only use vehicles that are designed for transport of the LOGIQ P8/P9/P10 system.
- Ensure that the transporting vehicle can handle the weight of the system plus the passengers.
- Employ two to three persons to load and unload safely from a vehicle.
- Ensure that the load capacity of the lift (a minimum of 100kg [220 lbs] is recommended) is capable of handling the weight of the system.
- Ensure that the lift is in good working order.
- Secure system with straps or as directed otherwise to prevent motion during transport.
- Prevent vibration damage by driving cautiously. Avoid unpaved roads, excessive speeds, and erratic stops or starts.

Load the system onto a vehicle

1. Load and unload the system to a vehicle parked on a level surface.
2. 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.
3. 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.

4. Ensure that the unit is secured inside the vehicle. Strap the LOGIQ P8/P9/P10 with belt to prevent movement while in transit.

   Twist the belt around the rear handle (1) and the footrest/ caster (2).

NOTE: DO NOT restrain the LOGIQ P8/P9/P10 at the monitor or the monitor neck using a belt.

Figure 3-34. Wrapping position of the belt

5. Drive cautiously to prevent vibration damage.

Reinstalling at a new location

1. When the unit is in place at a new location, lock the wheel brakes.
2. Follow the installation procedure described in ‘Connecting the System’ on *page 3-28* .

Acclimation Time

After being transported or stored, the system requires one hour for each 2.5 degree increment when its storage or transport temperature is below 10 degree C or above 40 degree C.

Table 3-6: System Acclimation Time Chart

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

Operator Controls

Control Panel Map

Controls are grouped together by function for ease of use. See the callout for this figure on the following page.

Figure 3-35. Console Panel Map

1. Probe Holder and Cable Management
2. Touch Panel Joystick controls
3. Power On/Off
4. User Define keys (include BT Keys)
5. Mode/Gain/XYZ (3D/4D) Controls
6. Trackball, Trackball Keys, Pointer, Measure, Comment, Body Pattern, Clear, Programmable Keys
7. L/R, Start/Stop, Freeze, Simultaneous
8. Steer/Zoom/Depth
9. Auto, PW Auto Positioning
10. P1(Print) key
11. Freeze key

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.

CAUTION

To avoid injury or damage while moving or adjusting other equipment, ensure that no parts of the system (such as the control panel or monitor) are within the range of motion of the other equipment.

The control panel position can be adjusted for easy viewing and easy-to-use.

To raise/lower the Control panel

1. Push the up/down button of the right front handle and hold it.
2. Release the button at the desired height.

Figure 3-36. Up/Down Control

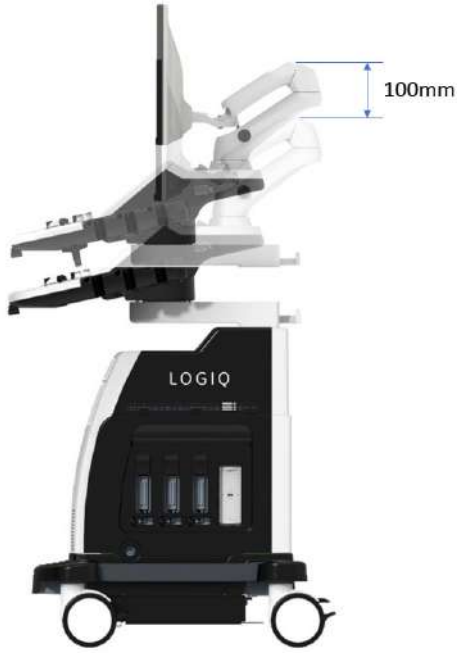


Figure 3-37. Up/Down

To swivel the Control panel

1. Push the swivel button of left front handle and hold it.
2. Release the button at the desired position.

Figure 3-38. Swivel Control

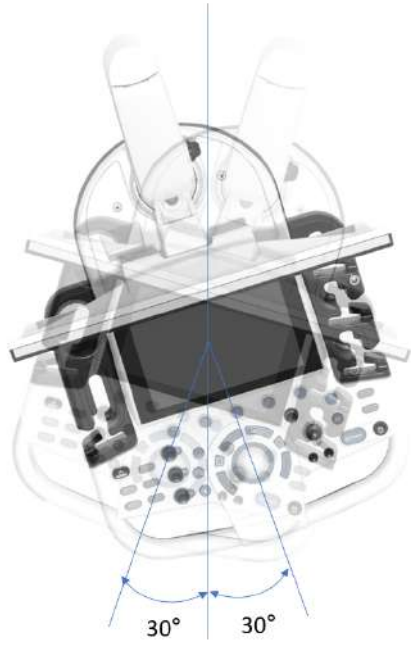


Figure 3-39. Swivel range

Key Illumination

All the keys on the front panel, except for the keyboard, and some rotaries have a two-level backlight capability. The following backlighting indicates availability.

The keyboard area must have task lighting or equivalent to allow operation in a dark room.

Table 3-7: Key Illumination

Backlight Capability	Availability
OFF	Function is not available
Green	Activated/ON
Blue	Inactive/Available

Keyboard (Optional)

	The standard alpha-numeric keyboard has some special functions.
Esc	Exit current display screen.
Help (F1 Key)	Access Online help / user manual.
Arrow (F2 Key)	Annotation arrow.
Eject (F3 Key)	Eject media.
Spooler (F4 Key)	Activates DICOM Job Spooler screen.
Create a Fast Key (F5 Key)	Creates a Fast Key.
Play a Fast Key (F6 Key)	Plays a Fast Key.
Home/Set Home (F7 Key)	Move annotation cursor to home position; shift+key to set current annotation cursor position as the new home position.
Text1/Text2 (F8 Key)	Switch between user text annotation overlays.
Grab Last (F9 Key)	Activate the last selected data for edit.
Word Delete (F10 Key)	Erase word associated with comment cursor.
	If you encounter a problem and cannot collect the logs immediately:
Alt+1 or Alt+2	Place a time stamp 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.
Ctrl + N	Create New Model.
Ctrl + S	Overwrite Current Model.

On Screen Keyboard

You can use "On Screen Keyboard" on touchscreen. Keyboard will show up when you press "Keyboard" button on touchscreen. And you can hide it with "Exit" button on Keyboard. see Figure *on page 3-67* .

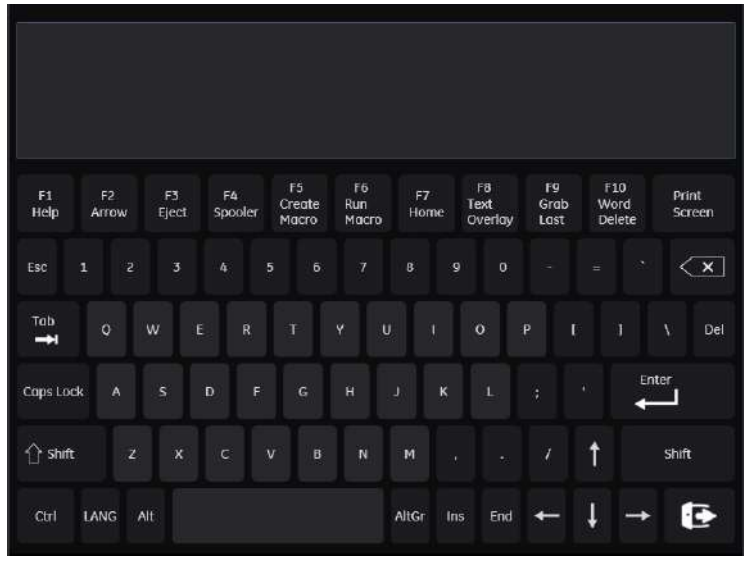


Figure 3-40. On Screen Keyboard

User defined hard key

You can arrange the order of User defined hard key on the control panel as you have programmed in the Utility page.

Figure 3-41. User defined hard key

1. Assign the function to each key in Utility -> System -> User Configurable Key -> User Defined Hard Key

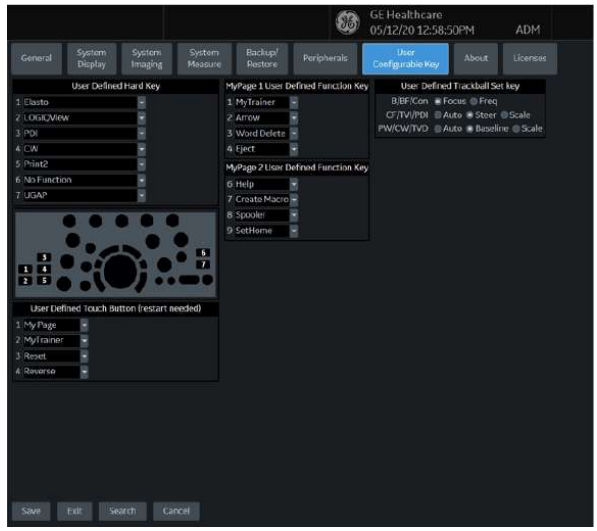


Figure 3-42. Utility page

User defined hard key (continued)

2. On the Control Panel, remove the key cap and replace it in the order shown on the Utility Screen.

NOTE: Number 1 is located at the top, on the left key; Number 5 is located at the bottom, on the right key.

a. Stick the flat-blade screwdriver in the hole on the upper side of the key cap and bring up.

Figure 3-43. Remove the key cap

b. Push the key cap until it clicks into the new position.

CAUTION

Before cleaning the control panel, make sure the key cap is firmly in place.

Touch Panel

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

Exam Function Controls

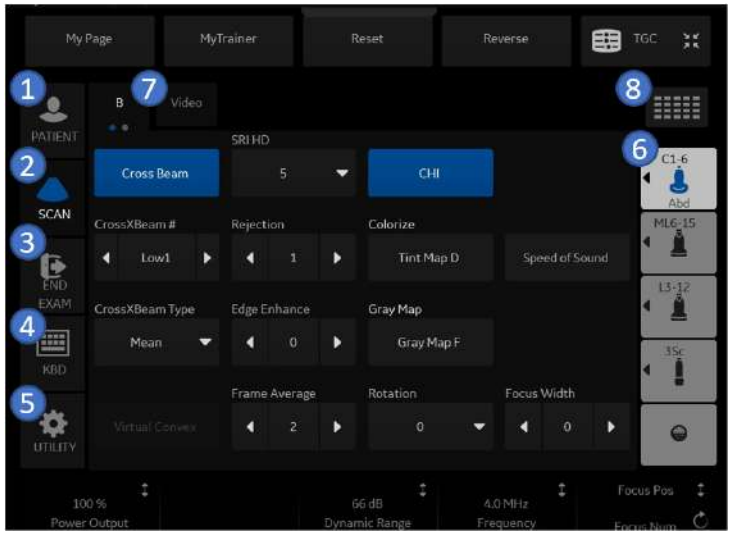


Figure 3-44. Exam Function Controls

1. Patient: Enters Patient screen
2. Scan: Enters scanning mode screen
3. End Exam: Activates Image Management and Touch Panel with end of exam options.
4. Keyboard: Activates on screen keyboard.
5. TGC: Activates TGC function.
6. Probe Indicator: Indicates and selects the probes, changes models as well as Create New or Save As.
7. 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.
8. To view all/fewer of the controls for this Touch Panel, press this Research/Clinical button.

Touch Panel (continued)

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

At the bottom of the Touch Panel, there are five 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:

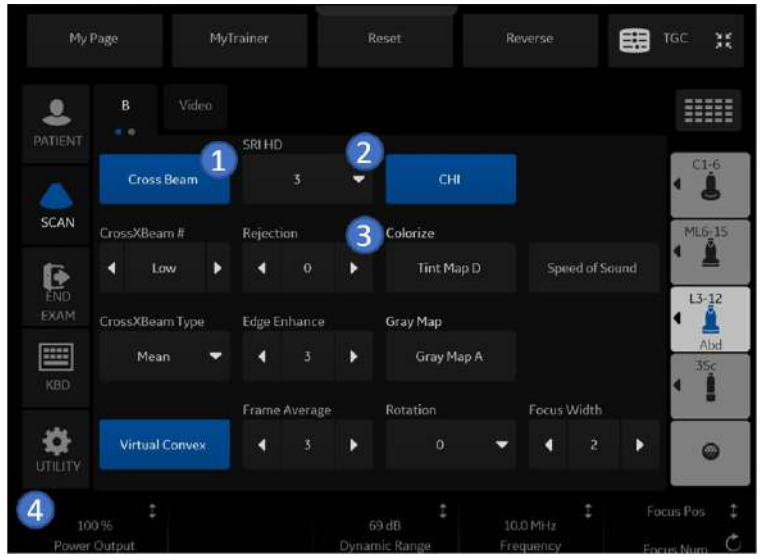


Figure 3-45. Mode/Function Specific Controls

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. 6-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).

Key descriptions

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.
- Auto is used to:
  - initiate auto optimize
  - turn off auto optimize.
- Depth controls the image display depth.
- 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.

  The gain is control by rotating the mode assigned rotary button below the touch panel.

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.

LCD Monitor

Related Hazards - LCD Monitor

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

  If an object or liquid falls/spills into the monitor or the cabinet, unplug the system immediately. Call a Service Representative for information.
- **DO NOT** scratch or press on the panel with any sharp objects, such as a pencil or pen, as this may result in damage to the panel.
- 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.
- Before moving the system to another location, be sure to lock LCD/LCD arm in transport position.
- The LCD 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 LCD panel 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.

Moving the LCD monitor

The LCD monitor moves in the range of below.

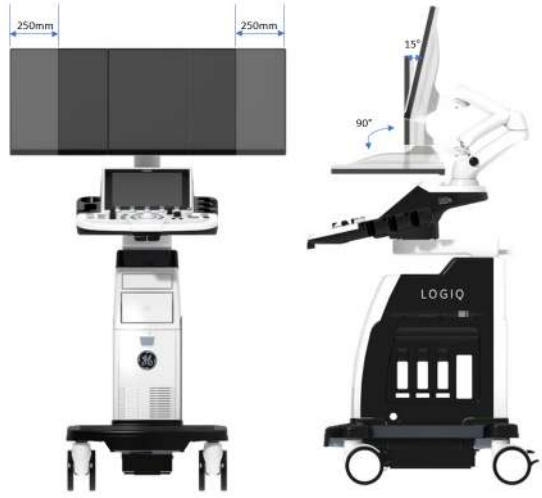


Figure 3-46. Monitor moving range

Adjusting the LCD Monitor Position

Grab the bottom of the LCD monitor when you adjust the position of the monitor and monitor arm.

Figure 3-47. Positioning the LCD monitor

Figure 3-48. Positioning the HD Display

Locking/unlocking the monitor

1. Turn the release knob counter clockwise to unlock the LCD monitor. The LCD monitor can be moved freely in all directions.
2. Turn the release knob clockwise to raise the lock and move the LCD monitor into the parked position.

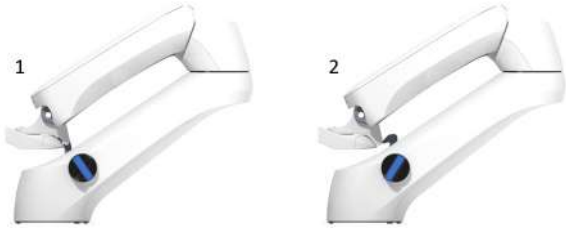


Figure 3-49. Positioning the LCD monitor

1. Unlocked LCD monitor
2. Locked LCD monitor

Monitor Display

Monitor Display Tour

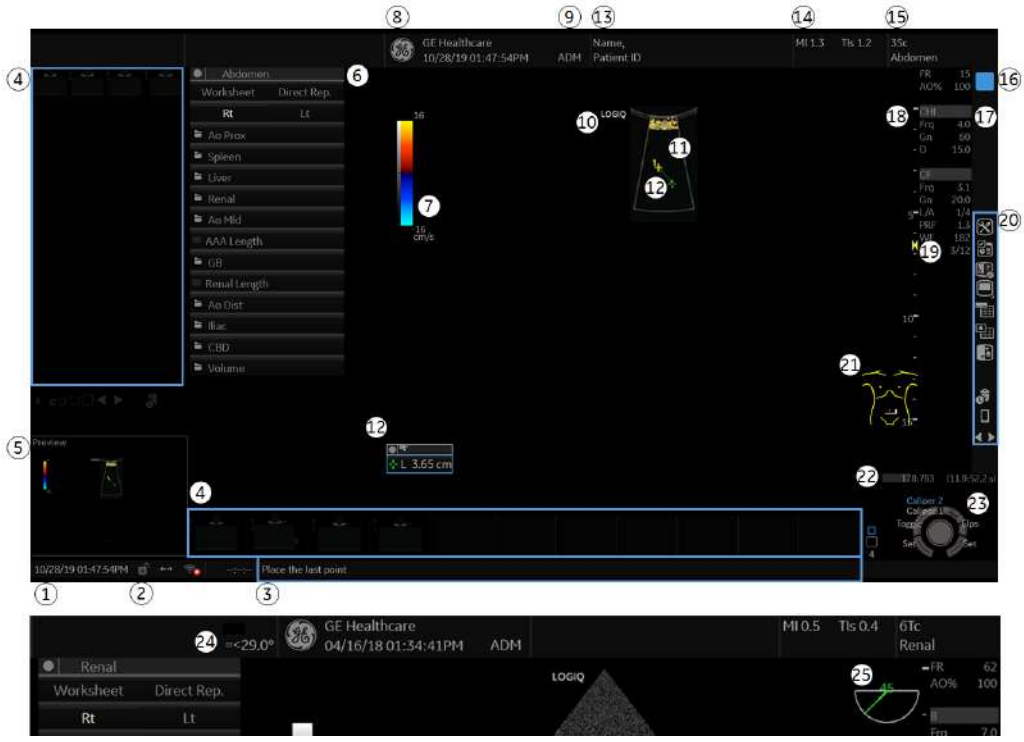


Figure 3-50. Monitor Display Tour

Monitor Display Tour (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 (lit when on), Network Connection Indicaor (Wireless LAN, Wired, Mobile Bluetooth), Battery Status, DVR status, InSite Indicator. (if applicable)
3. Measurement Calipers and System Message Bar
4. Image Clipboard
5. Image Preview
6. Worksheet/Direct Report
7. Gray/Color Bar.
8. Institution/Hospital Name, Date, Time
9. Operator Identification
10. Probe Orientation Marker
11. Image and Color Window
12. Measurement Calipers and System Message Bar
13. Patient Name, Patient Identification
14. Power Output Readout
15. Probe Identifier, Exam Preset
16. Live/Freeze Indicator
17. Imaging Parameters by Mode, Speed of Sound(SoS) Indicator (if applicable)
18. Depth Scale.
19. Focus Indicator and Color FLow Focal Zone Marker
20. Image Management Icons and LOGIQ Apps Icon (not shown)
21. Body Patern
22. CINE Gauge
23. Trackball Controls and Status
24. 6Tc-RS Probe temperature display
25. 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 3-8: Live/Freeze Indicator

Live		Update	
Not Live		B Pause	

Monitor Display Layout

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

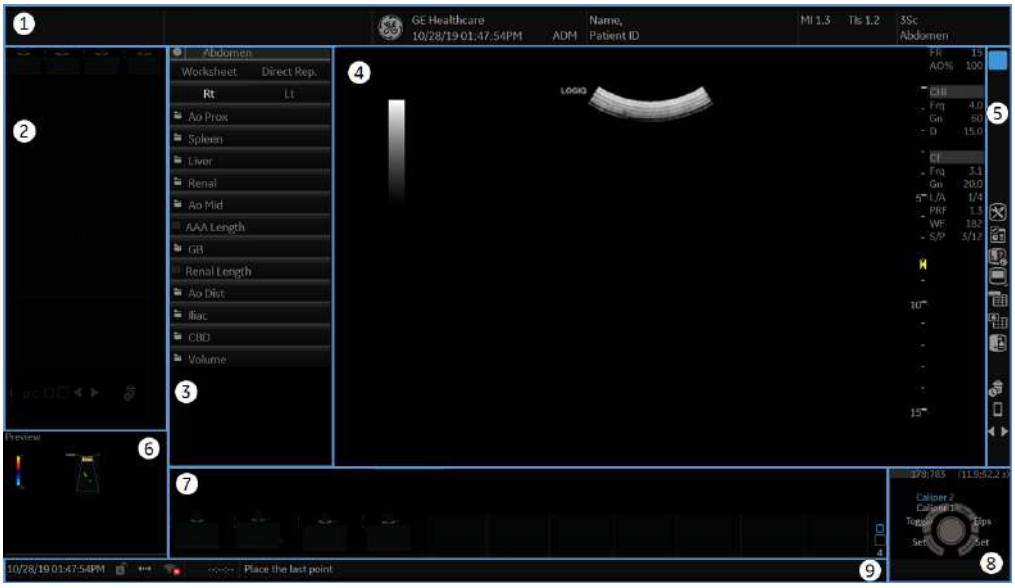


Figure 3-51. Defalt Image Format (4:3)

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

Figure 3-52. 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.

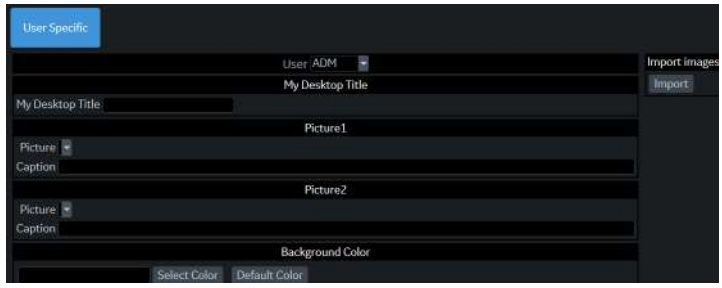


Figure 3-53. User Specific

Table 3-9: User Specific

Preset Parameter	Description
My Desktop Title	Free text
Picture 1 and 2	Browse to load jpeg and type the caption.
Background Color	Background 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.

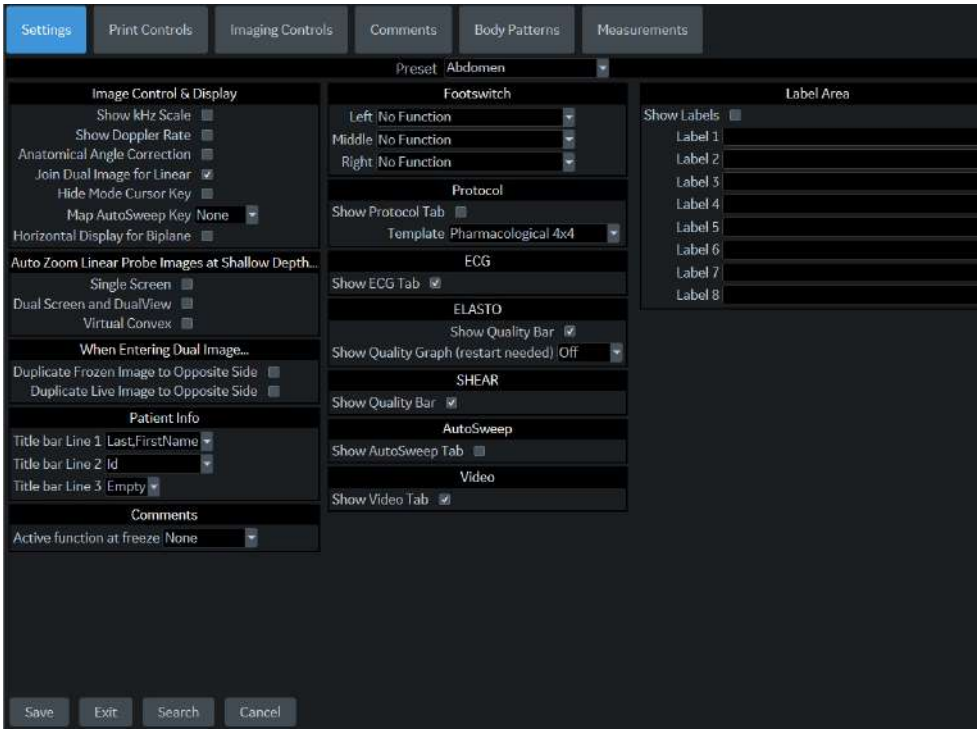


Figure 3-54. Application Settings Preset Menu

Table 3-10: User label

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 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 3-11: Display Image Area Selections

Display Image Area icons	Click Image Display Area icon to toggle current display area and extra large area. Default Layout • (4:3 Layout) Standard • (16:9 Layout) Full Wide Large Image Layout • (4:3 Layout) Standard • (16:9 Layout) Full Wide Extra Large Layout • (16:10 Layout) Partial Wide

Table 3-12: Display Image Area Examples

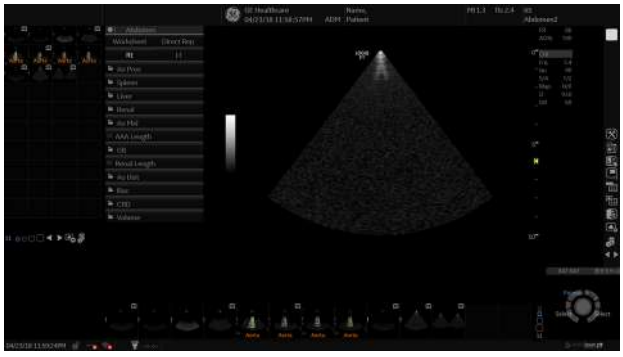
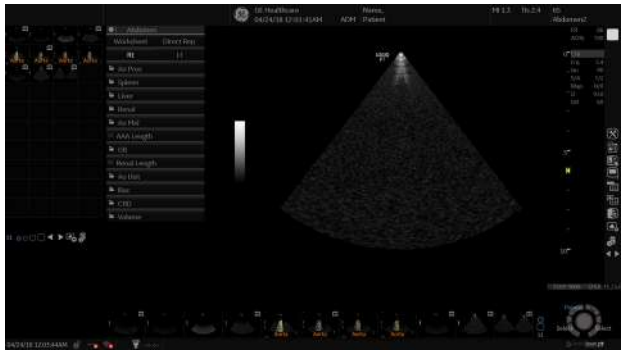
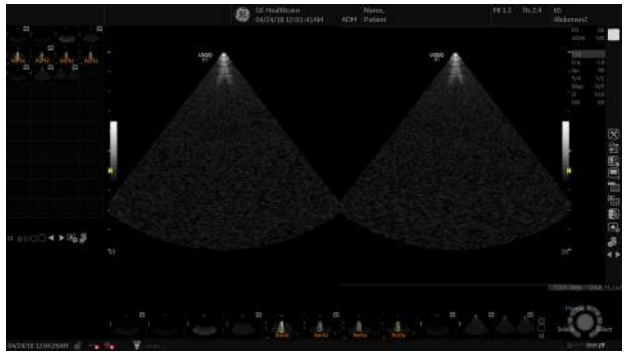
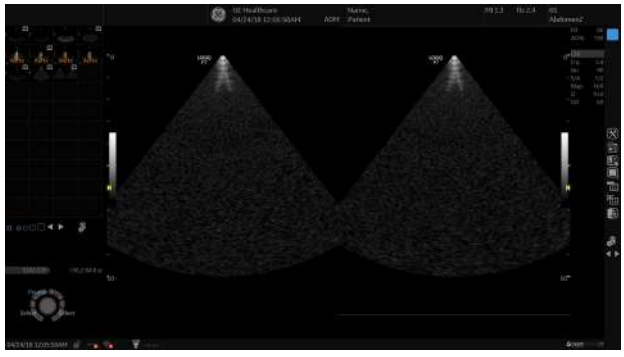
Default Layout Standard	
Default Layout Full Wide	

Table 3-12: Display Image Area Examples (Continued)

Large Image Layout Standard	
Large Image Layout Full Wide	
Extra Large Layout Partial Wide	

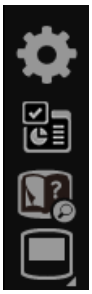
NOTE: Even If there are buttons on the rear cover of the monitor, DO NOT use those buttons for adjustment. The LOGIQ P8/P9/P10 system will override the parameter(s) and the monitor does not have capability to retain parameters.

Using the Monitor Display Controls to Manage Images

Image Management Icons

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

Table 3-13: Image Management Icons

	Utility Activate the Utility page
	Report Activate the Report writer page
	My Trainer Plus Activate the My Trainer Plus
	Image Display Area Press Image Display Area to select Image Display Area - Default/Large/Extra large. See ‘Change the Display Image Area’ on *page 3-85 for more information.*
	Worksheet Activate the Worksheet.
	Active Images Press Active Images to go to the Patient Active Images page.
	Compare Assistant Press to activate Compare Assistant.
	Activate Save As Menu - Note: Save As Menu icon is displayed only when an image is recalled or scan state is frozen/CINE Loop.
	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.**
	LOGIQ Apps Activate the LOGIQ Apps
	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]. • 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.

Trackball Key Map

The current mapping is shown on the trackball mapping display area in the lower, right-hand corner of the display screen. Six Trackball keys surround the Trackball. These Trackball keys are mapped based on the current state of the system (live imaging, frozen imaging, measurements, etc.)

Trackball functionality is labeled on the display. To activate new functionality for the Trackball, press the correct key adjacent to the Trackball, as indicated on the display.

If there are more than 2 functions assigned to a single key, the selected function is highlighted.

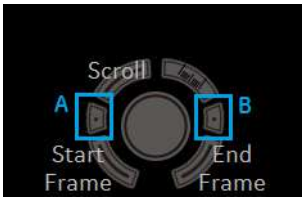
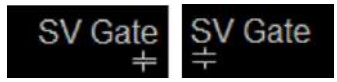


Figure 3-55. Example: Trackball Functionality for Cine

NOTE: For Live B, B-Flow and Contrast mode with linear probes. Top Trackball key allows user to select "Steer" function (when B Steer+ is not enabled). When "Steer" function is selected, B Steer is activated to left or right as user presses Trackball A or B key.

Trackball Key Map (continued)

Table 3-14: Trackball smart keys (A and B)

	Keys A and B	
Imaging Mode	**Symbols**	**Function**
Live B, B-Flow, Contrast		Focal Zone Down/Up
		Frequency Down/Up
Live Color Flow, TVI, Power Doppler, B-Flow Color		ROI box steer
		Scale Down/Up
PW, CW, TVD		Baseline Down/Up
Mode Cursor		Scale Down/Up
B Steer+		ROI box steer+
Live Color Flow, Power Doppler		Auto Doppler Assist

Chapter 4

Preparing for an Exam

Describes how to begin an exam.

Beginning an Exam

Introduction

Begin an exam by entering new patient information.

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

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

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

CAUTION

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

Beginning a New Patient

Pressing the ***Patient*** Touch Panel key displays the Patient Screen on the monitor.

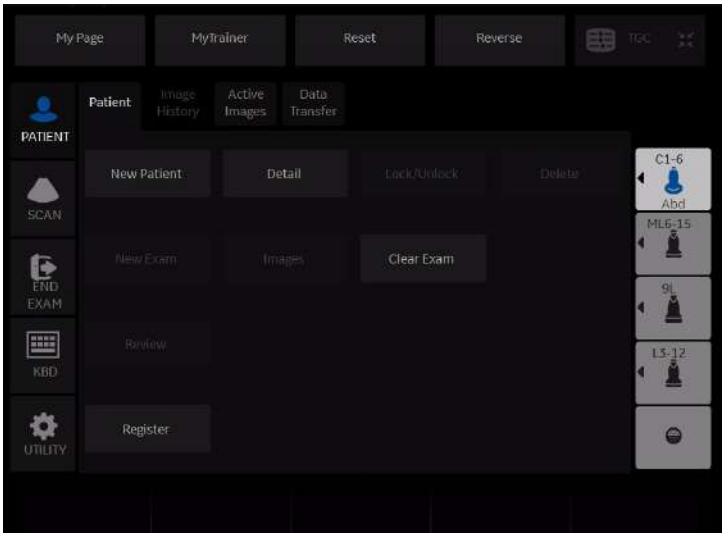


Figure 4-1. Patient Touch Panel

New Patient should be selected at the beginning of each new patient exam. End Exam should be pressed at the end of each exam. Pressing **New Patient** automatically stores all patient data, annotations, measurements, calculations and worksheets of the last exam. Images are not automatically stored. A warning message appears regarding images being erased or saved. It is always best to select “Store All” if you are unsure of saving. Exams and patients can always be erased later.

*NOTE: If the current patient does not exist, selecting the **Patient View** tab activates the Patient Search screen.*

*NOTE: If the current patient exists, selecting **Exam View** activates the Exam History screen.*

Patient Screen

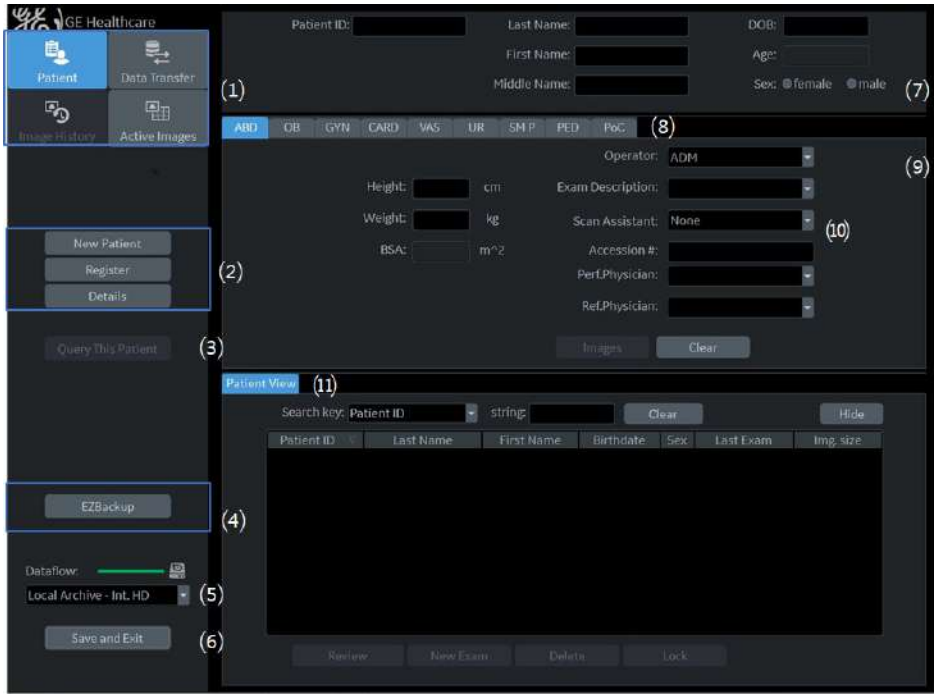


Figure 4-2. Patient Screen

1. Image Management
2. Function Selection
3. Query This Patient
4. EZBackup
5. Dataflow Selection
6. Save and Exit
7. Patient Information
8. Category Selection
9. Exam Information
10. Scan Assistant Program
11. Patient View/Exam View

Patient Screen (continued)

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.

Image Management

- 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.

Function Selection

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

NOTE: If you are using the auto-generate Patient ID feature, do not select Register. It is always a good practice to Register all patients.

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

NOTE: The Exam Description pull-down selection is used as the DICOM identifier.

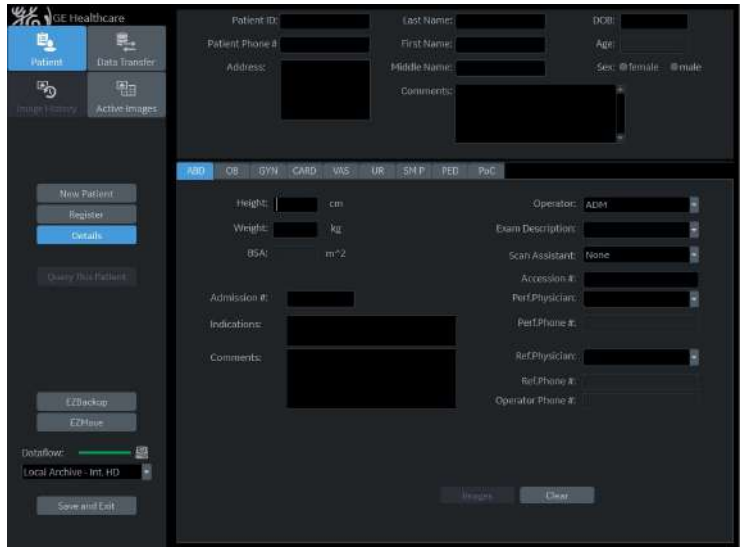


Figure 4-3. Details Window

EZBackup

One-step method to backup patient images to an external media.

Dataflow Selection

Select the appropriate dataflow.

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

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

Figure 4-4. Dataflow Pop-up

Save and Exit

Used to save all changes and exit the Patient Menu.

Patient Information

- Patient ID Number
- Alternate (Other, Second) Patient ID Name and Number. The system now 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

Category Selection

Select from 9 exam application categories: Abdomen, Obstetrics, Gynecology, Cardiology, Vascular, Urology, Small Parts, Pediatrics or PoC.

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

Exam Information

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

- Images–Displays the selected exam's images.
- Clear–Clears existing data.
- Past Exam (only for OB)–Input past exam data (register the patient before using).

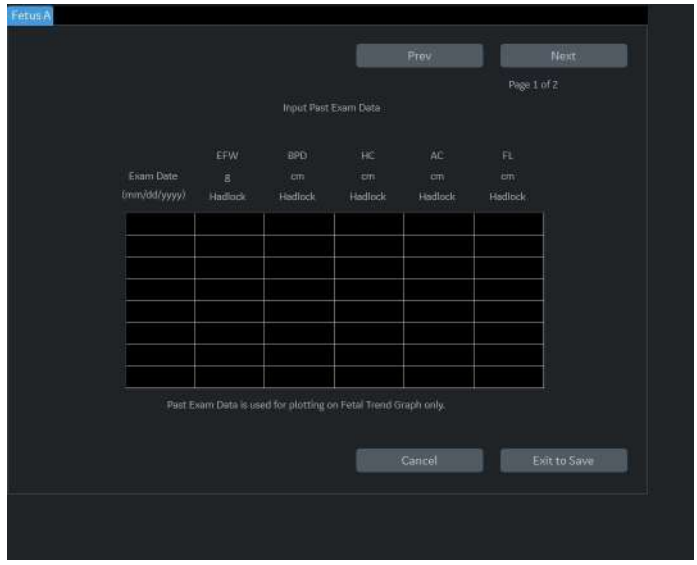


Figure 4-5. Input Past Exam

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.

Patient View/Exam View

Lists the patients in the database.

*NOTE: When you double-click the patient on the patient list using the **Set** key, the Review screen or New Exam entry screen displays depending on the preset. You set this preset via Select Review or New Exam in Utility -> Connectivity -> Miscellaneous -> "Double click on patient list to start" preset.*

- Search key–select search item from Patient ID, Last Name, First Name, Birthdate, Sex, Exam Date, Exam Today, Accession Number, Exam Description, Exam Date Before, Exam Date Between, Exam Date After, Locked (Y, N) or Img. Archived (Y, N).
- String–enter appropriate information.

  If you select Locked (Y, N) or Archived (Y, N) for the Search key, enter Y (Yes) or N (No).
- Clear–Clears the entered string.
- Listing XX of XXX -- Displays the quantity of patients that match the search criteria in the search window and the quantity of patients in the database.
- Review–Select Patient/Exam for review.
- Resume Exam–Continues the exam for that patient if you select the last exam of the day.
- New Exam–Creates a new exam based on a current or searched patient.
- Delete–Deletes Patient/Exam.

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

Patient View/Exam View (continued)

- Lock/Unlock–Locks the exam/patient. Prevents move and delete functions.

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

  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.

  To unlock, select the locked exam or patient and select ***Unlock***.

- Exam View

  Displays the Exam History of the selected patient by date.

  The system can display the Detail Mode instead of Exam View when you select the patient on the patient list and press Review or Register. If the Detail Mode preset on Utility -> Connectivity -> Miscellaneous menu is selected, the Detail Mode displays.

  - Disk - Displays the disk name on which you saved the exam's image data. If "+" displays behind the disk name, the data is saved on two or more disks.

Patient Screen (continued)

CAUTION

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

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

1. Before starting EZBackup, select “Unlock All” on the Utility -> Admin -> Logon screen.

   Prepare the unformatted CD-R or DVD-R before EZBackup.

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

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

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

We recommend attaching the patient list to the EZBackup media. Insert the media and select DICOM CD Read for the dataflow (if you use a USB drive, select DICOM USB Drive Read). Press the right **Set** key to select the patient. Press the left **Set** key to bring up the print menu. Select Print and press the right **Set** key to print the patient list.

Printing the Patient List

You can print the patient list on a connected printer.

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

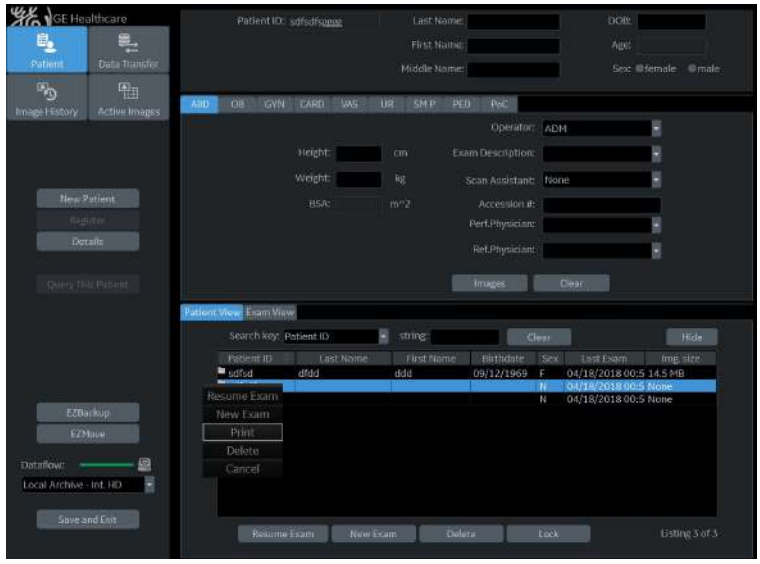


Figure 4-6. Print the patient list

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

Scanning a New Patient

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

Ensure you have selected a dataflow. If No Archive is selected, no patient data is saved. A ? appears next to Dataflow if No Archive is selected.

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.

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

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

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.

Scanning a New Patient (continued)

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

1. Press **Patient**.
2. Press ***New Patient*** on the Patient menu.
3. If there are images on the clipboard, a pop-up menu appears. Specify whether you want to store images permanently, delete images, or go to active images.
4. Choose the 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. Fill in patient information.

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

Columns drive the ordering of the patients displayed. The column that you select drives the order of the displayed patient database.

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

" ' \ / : ; . , * < > | + = [ ] &

7. Select ***Register***.
8. Select the probe to start scanning (or select Exit, Esc, Scan, or Freeze).
9. Perform the exam.

Scanning a New Patient (continued)

10. Store the images/loops 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 **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).

11. When you have completed the study, press ***End Exam***. 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.

CAUTION

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

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

Starting a new exam on an existing patient

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

Ending a Patient Exam

When you have completed the study, press ***End Exam***, End Current Patient or New Patient, then Store All Images Permanently.

Entering a Patient List

All patient information can be entered before starting an exam.

1. Press **Patient** to display the Patient Screen.
2. Press ***New Patient*** to erase the current patient data.
3. Enter the Patient ID.
4. Enter the patient and exam information.
5. Press ***Register***.
6. Repeat above steps as required.

Or, select the patient from the Patient List and select ***Resume Exam*** to start an exam.

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***.

Retrieving and editing archived information

Searching for an existing patient

1. Press ***Patient*** to display the Patient Screen. The Patient Search Screen is displayed on the bottom portion of the Patient Menu.
2. Select the search key (Patient ID, First Name, Last Name, etc.). Type the search string.

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

- *Uncheck the "Auto search for patient" preset, found under Patient/Exam Menu Options in Utility -> Connectivity -> Miscellaneous.*
- *Delete unnecessary patient data.*

3. An appropriate patient is displayed.

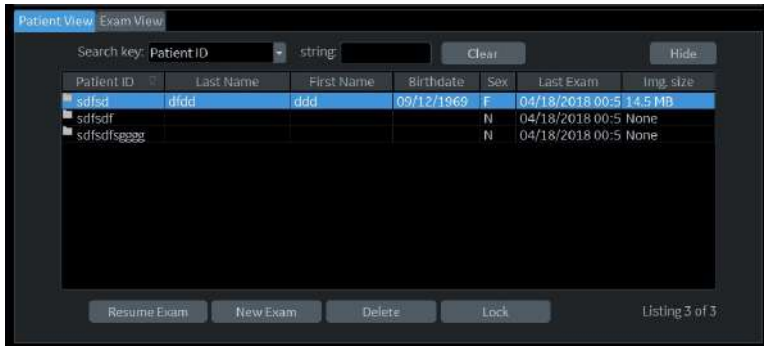


Figure 4-7. Patient Search Screen

a. Select ***Review*** to review the exam history of this patient.

   If you select the patient of the day, Resume Exam in place of Review displays to continue the exam.

b. Select ***New Exam*** to create a new exam for this patient.

c. Select ***Delete*** to delete this patient.

d. Lock. See 'Patient View/Exam View' on *page 4-11 for more information.*

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.

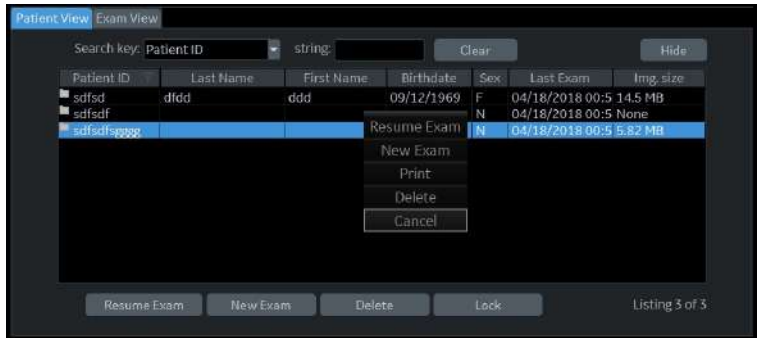


Figure 4-8. Archived Patient

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

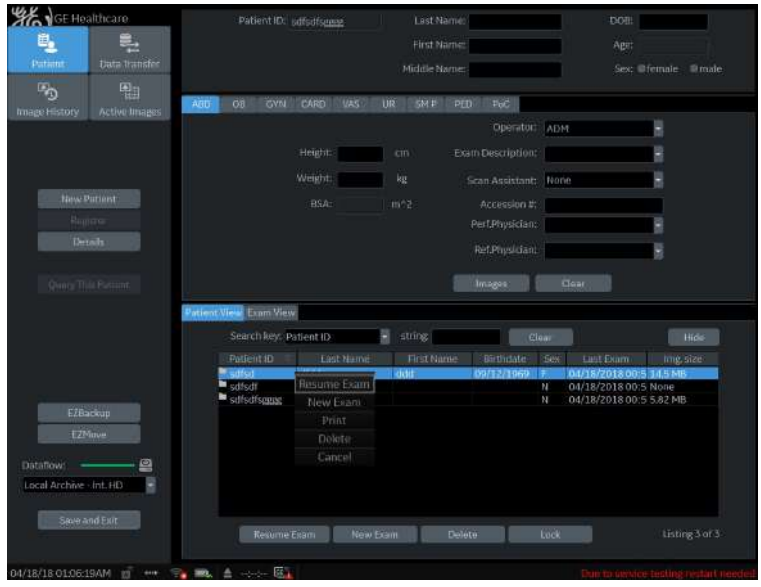


Figure 4-9. Patient of the Day

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

Edit and Copy Patient

The “Edit and Copy Patient” function:

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

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. Remove the report link from the database for copied patient.

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

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

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

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

CAUTION

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

Edit and Copy Patient (continued)

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

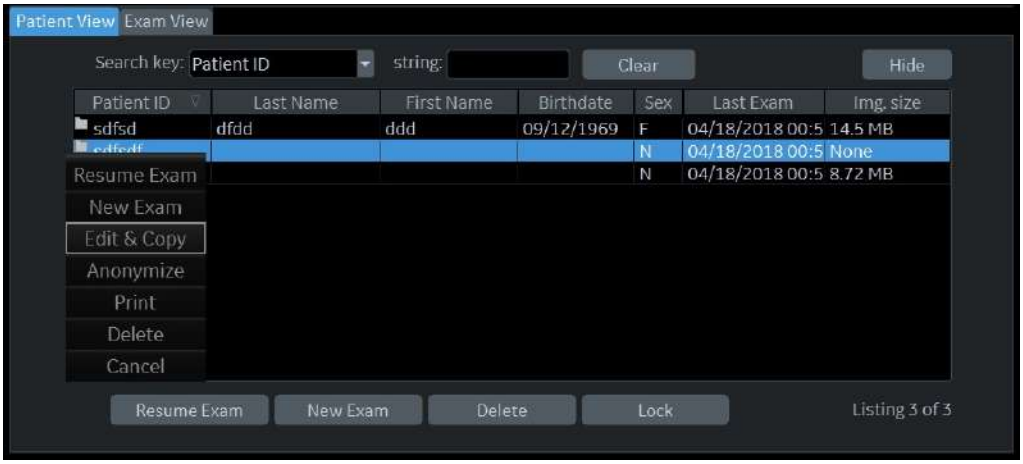


Figure 4-10. Select an Exam to Copy and Edit

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

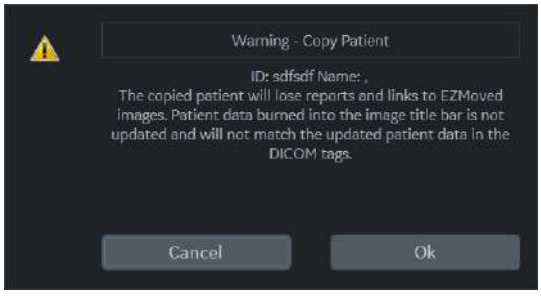


Figure 4-11. Copy Patient Pop-Up Confirmation

Edit and Copy Patient (continued)

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

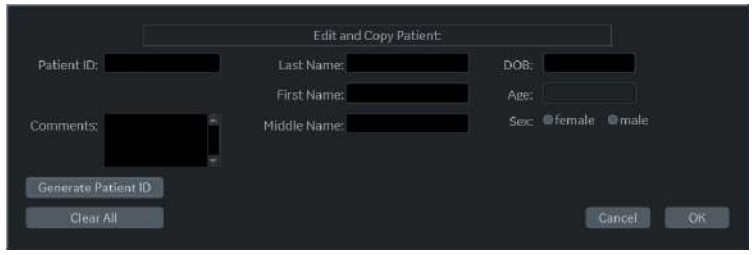


Figure 4-12. Edit and Copy Dialogue

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

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

NOTE: If the 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.

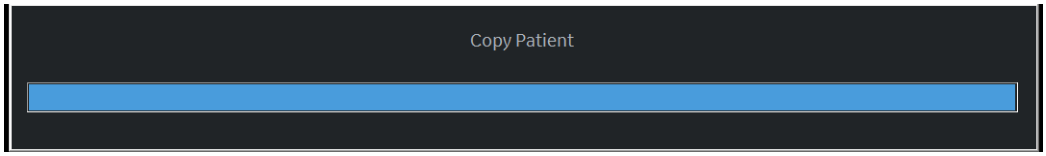


Figure 4-13. Copy Status Bar

Edit and Copy Patient (continued)

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

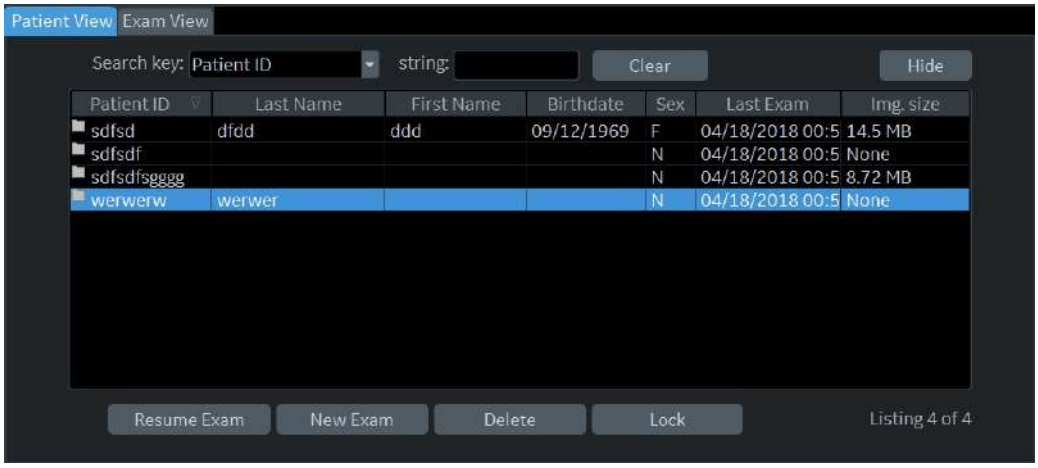


Figure 4-14. Completed Patient Copy

Changing Patient Information or an Exam

CAUTION

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

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

If the patient is still active, you can go to the New Patient page and choose the tab that is desired. The exam changes in the Exam View area.

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

1. Display the Patient screen by pressing ***Patient***.
2. Select patient from the Patient list. 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.*

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

CAUTION

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.

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.

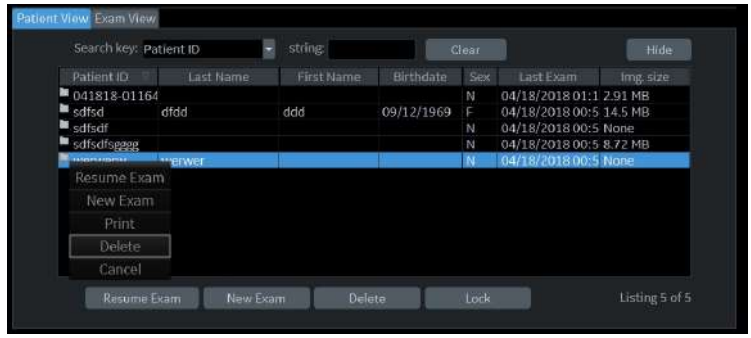


Figure 4-15. Select the patient in the patient list

3. Select **OK** to delete or **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.

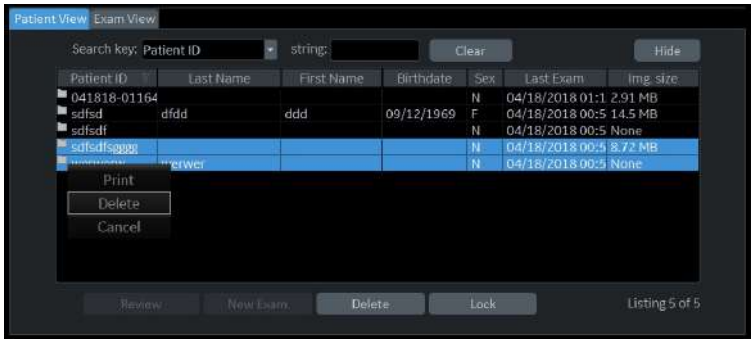


Figure 4-16. Select Patients to Delete

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.

Selecting a Model

Selecting an Application Preset

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

A typical example for the Abdomen exam category is shown below.

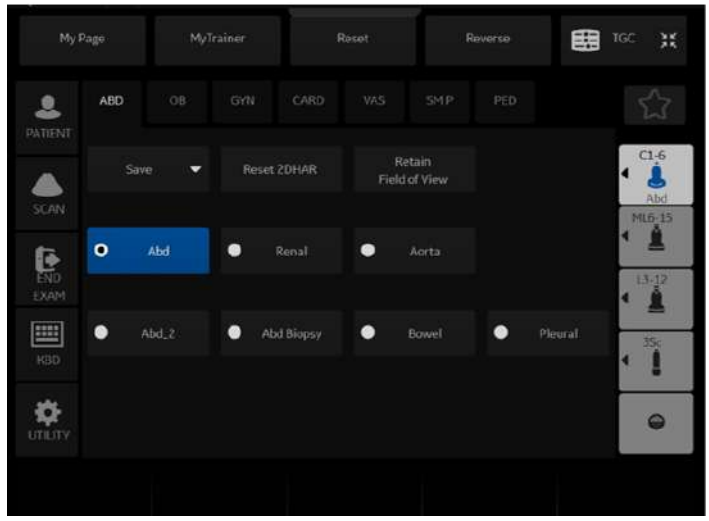


Figure 4-17. Abdomen Preset Selection Touch Panel

Use these parameters as a starting point for the exam.

Selecting a probe

Select the appropriate probe from the probe indicator. Probes can be used in more than one exam category/application.

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

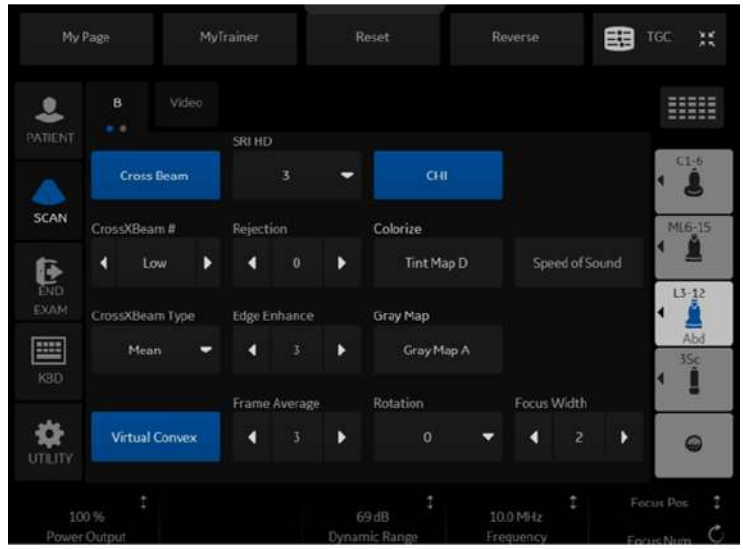


Figure 4-18. Probe Indicators (Example)

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, Contrast Enhanced Ultrasound, Elastography, and 3D Mode and 4D 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.

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

Typical B-Mode Exam Protocol

A typical examination using B-Mode might proceed

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

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.

CAUTION

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

B-Mode Scanning Hints

HINTS

These B-Mode controls produce the following results:

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.

Focal Zones. Focal zones should be placed roughly in the lower half of the display depth, at or below the organ of interest.

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

Depth

Description

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.

Adjusting

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

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

Preset

You can reverse how the Depth control functions on the Utility -> System -> General page. You can set the depth by probe and application on the Utility --> Imaging page.

Values

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

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

Benefits

Depth adjusts your field of view. It increases your field of view to look at larger or deeper structures; it decreases your field of view to look at structures near the skin line.

Affect on other controls

After adjusting the depth, you may need to adjust the **TGC** and focus.

Changing Depth,

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

Bioeffects

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

HINTS

Make sure enough space is left below the anatomy of interest to demonstrate shadowing or enhancement.

Gain

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

Adjusting To decrease/increase, rotate **Gain** (Mode key).

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

NOTE: TruAccess allows you to change the gain on a frozen image. B-Mode gain is independent of M-Mode and Doppler and Color Flow Gain. Changing the M-Mode Gain while in M-Mode does not affect the B-Mode image gain.

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

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

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

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

Benefits Gain allows you to balance echo contrast so that cystic structures appear echo-free and reflecting tissue fills in.

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

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

NOTE: Always optimize gain before increasing the Power Output.

Focus

Description Increases the number of focal zones, moves the focal zone(s) and changes the zone width so that you can tighten up the beam for a specific area. A graphic caret corresponding to the focal zone position(s) appears on the right edge of the image.

Adjusting To increase/decrease the number of focal zones, adjust ***Focus Num***.

To move the focal zone to the near/far field, adjust Focus Position.

To change the zone width, use ***Focus Width***.

NOTE: Focus Position and Focus Number share the same control. The Focus control turns to move focus position when Focus Position is shown. Push in to show Focus Number. Turn to change the focus number.

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

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

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

Benefits Focus optimizes the image by increasing the resolution for a specific area.

Affect on other controls Changing the focal number affects the frame rate. The greater number of focal zones, the slower the frame rate.

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

Auto Optimize

Description

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.

Auto is available in single or multi image, on live, frozen or CINE images (in B-Mode only), and while in zoom.

Auto optimize status shown in Info Window. It is displayed as X in the Map X/N where X shows the selected Map type, and N shows the Auto Optimize status.

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.

Benefit

Auto can be found in reduced optimization time and a more consistent and accurate optimization process.

Adjusting

To activate, press **AO** key.

Preset

Specify the ATO Level: Low, Medium, or High via Utility --> Imaging --> B-Mode.

Specify the Auto Invert on ASO for Doppler mode: On or Off via Utility --> System --> System Imaging. If you select On, automatically the spectrum displays in the upper side of baseline with ASO.

Specify the AO key operation: ATO, CTO, or Both (ATO + CTO).

Values

Auto is active until you deactivate it or when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Affect on other controls

You may need to adjust the Gain.

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.

NOTE: Probe orientation mark color is changed to Turquoise and has over and under line.

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 is selected, both ATO and CTO work.

Adjusting To activate, press right **Auto** key.

Press **Auto** key again to turn off CTO.

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.

NOTE: When investigating anatomical structures of very low echogenicity the user may turn off CTO in order to assure the visualization of all reflected echoes, even if obscured by surrounding noise.

NOTE: When activating CTO with M-Mode, only the B-mode image is optimized.

CrossXBeam

Description

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

CrossXBeam combines multiple co-planar images from different view angles into a single image at real-time frame rates, using bi-cubic interpolation.

Adjusting

CrossXBeam combines frames steered from a minimum of three different angles and up to a maximum of five steer angles (Convex probes) or up to a maximum of seven (7) steer angles (Linear probes).

To activate CrossXBeam, press the ***CrossXBeam*** key on the Touch Panel.

To adjust the number of frames being compounded, press the ***CrossXBeam#*** Touch Panel key. Select Low, Mid or High (Convex probes); or select Low, Mid High, or Max (Linear probes).

Select CrossXBeam Type (Hybrid, Mean, Max) via CrossXBeam Type on the Touch Panel. ***Max*** detects maximum values; ***Mean*** detects averaged values; ***Hybrid*** detects a mix of both average and maximum values.

Preset

You can preset B-Mode CrossXBeam:

- To activate upon entering B-Mode/Color Flow Mode/PW Doppler Mode
- Preset the CrossXBeam #
- Preset Focus Number for CrossXBeam
- Preset Line Density CrossXBeam
- Frame Average CrossXBeam
- CrossXBeam Usage (B, B/CF, B/CF/Elasto, B/Dop, B/CF/Dop, B/CF/Dop/CF+Dop, or B/CF/Elast/Dop/CF+Dop)

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

CrossXBeam (continued)

Values

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

The following controls are not available:

- Harmonic Imaging
- CINE Loops acquired using CrossXBeam.
- Read Zoom
- All Measurement and Analysis packages
- Virtual Convex (Linear probe)
- SRI HD, Line Density, Depth, Map, TGC, Gain, Edge Enhance, Frame Averaging, Compression, Colorize, Acoustic Output, Rejection, Rotation, Auto, Reverse, Dynamic Range, Biopsy, LOGIQView, 3D Imaging

The following features are supported in CrossXBeam:

- Anatomical M-Mode
- B-Flow

Benefits

The combined single image has the benefits of reduced speckle noise, reduced clutter, and continuity of specular reflectors. Therefore, this technique can improve contrast resolution with increased conspicuity of low contrast lesions, better detection of calcifications, biopsy needle visualization, and cystic boundary definition.

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

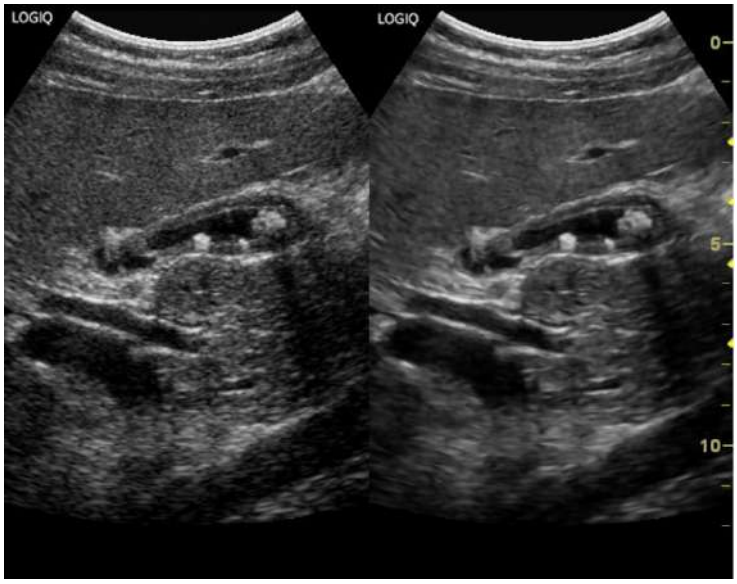


Figure 5-2. B-Mode Image before SRI-HD (left) and After SRI-HD (right)

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

Values

Varies, depending on the probe.

NOTE: We recommend that you select the SRI-HD level by observing the enhanced image in side-by-side dual image comparison with the original, unprocessed image. Dual display mode is activated by pressing the L and R keys simultaneously.

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

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

SRI-HD is available on 3D.

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

Benefits

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

Coded Harmonic Imaging (CHI)

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

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

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

NOTE: Multi frequency is not active when the image is frozen.

Values On/Off. `CHI' appears in place of 'B' in the Info Window.

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

Multi frequency values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Application, or New Patient.

Benefits Coded Harmonics 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.

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

Frequency

Description Multi Frequency mode lets you downshift to the probe's next lower frequency or shift up to a higher frequency.

Adjusting To select a new frequency, adjust ***Frequency*** up or down.

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

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

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

Values Vary, depending on the probe and application.

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

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

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

Steer

Description

You can slant the B-Mode or Color Flow linear image left or right to get more information without moving the probe. The angle steer function only applies to linear probes.

Adjusting

To slant the linear image to the left/right, select Steer and then move the Trackball in the left/right direction or select Trackball left/right smart key.

To set default direction, select Left or Right in B Steer Beam Direction menu located in Utility --> Imaging --> B.

Values

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

Steer is not available while using CrossXBeam.

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

Preset

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

B Steer Beam Direction via Utility --> Imaging --> B.

Benefits

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

Bioeffects

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

Mode Cursor

Description Displays the M/D-Mode cursor on the B-Mode image.

Adjusting 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.

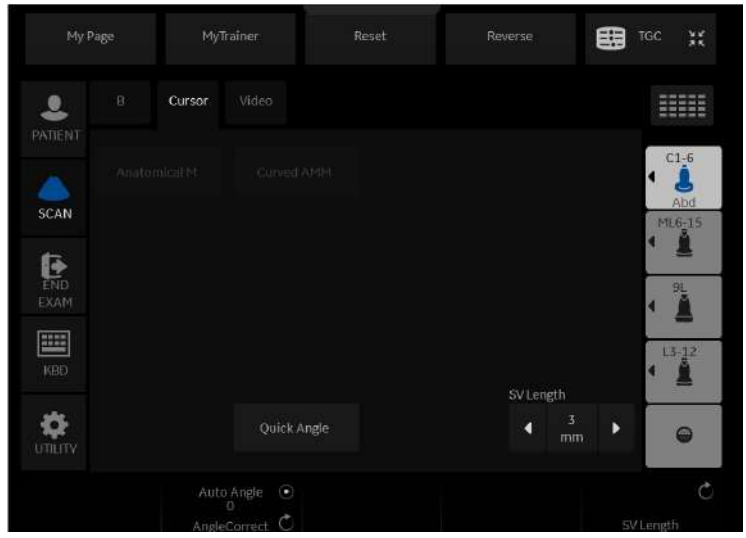


Figure 5-3. Cursor tab

Benefits Lets you position the cursor before you go into M-Mode or Doppler Mode so that you can make optimum use of the larger B-Mode image.

Virtual Convex/Max Angle

Description On Linear and Sector probes, Virtual Convex/Max Angle provides a larger field of view in the far field. Virtual Convex/Max Angle is always active with Sector probes.

NOTE: Virtual Convex is not available in CW while in Triplex.

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

Values On/Off.

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

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

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

TGC

Description TGC amplifies returning signals to correct for the attenuation caused by tissues at increasing depths. TGC slide pots are spaced proportionately to the depth. The area each 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.

Adjusting To decrease/increase TGC, move slide pot to the left/right (TGC slider display on touch screen by pressing TGC icon button on touch screen).

NOTE: TGC adjusts automatically when using zoom.

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

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

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

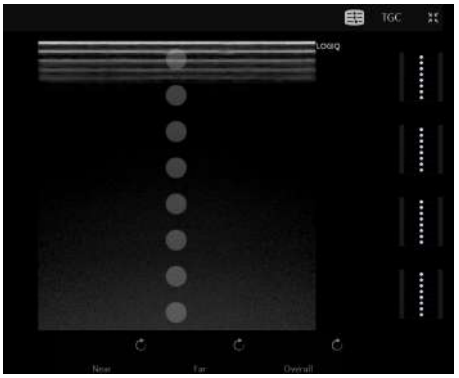


Figure 5-4. Digital TGC

1. 8 TGC Slider
2. Reset TGC
3. 3 User Defined TGC
4. Exit TGC Screen

Width

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

Tilt

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

Dynamic Range

Description

Dynamic Range controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast.

The Dynamic Range control name changes to Compression on frozen images.

Adjusting

To increase/decrease, adjust Dynamic Range.

Values

The settings cycle in 3dB or 6dB steps from 36 dB to 96 dB. The current value displays. Dynamic Range values vary by probe, application, and frequency setting.

Dynamic Range levels are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient, or Multi Frequency.

Benefits

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.

Affect on other controls

Dynamic range operates in realtime, Freeze, CINE, and CINE Timeline, but is not available while in DVR playback. It also affects Gain.

Reverse

Description

Flips the image 180 degrees left/right.

Adjusting

To flip the image 180 degrees, press the assigned **Reverse** key on the touch panel user-defined button or user-defined hard key.

Values

The image rotates in 180 degrees left/right. Reverse settings vary by probe and application.

Reverse settings are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits

Used for anatomical correctness.

When reading a reverse image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal.

Line Density

Description Optimizes B-Mode frame rate or spatial resolution for the best possible image.

Adjusting Press ***Line Density*** right to increase resolution or left to increase frame rate.

Select the default value for Line Density on the Utility -> Imaging -> B preset page and press ***Save***.

Values Varies by probe.

NOTE: *Not available in timeline.*

Values vary by probe and application. Line Density values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits A lower line density is useful in fetal heart beat, adult cardiac applications and in clinical Radiology applications requiring significantly higher frame rates.

A higher line density is useful in obtaining very high resolution, e.g., thyroid, testicles.

Affect on other controls Line density changes the vector density and frame rate.

Bioeffects Activating color flow line density may change the TI and/or MI. Observe the output display for possible effects.

Line Density Zoom

Description You can set the default value for Line Density in zoom independently.

Adjusting Select the default value on the Utility -> Imaging -> B -> Line Density Zoom and press ***Save***.

Colorize

Description

Colorize is the colorization of a conventional B-Mode image or Doppler Spectrum to enhance the user's ability to discern B, M, and Doppler Mode intensity valuations. Colorize is NOT a Doppler Mode.

NOTE: You can colorize realtime or CINE images or Timeline CINE.

Colorizes the gray scale image to enhance the eye's discrimination capability.

Spectrum Colorize colorizes the spectrum as a function of power using the inverse of the Colorize map for the signal intensity in each Doppler line.

Colorize enhances the visibility of the spectrum's characteristics and enhances your ability to identify spectral broadening and the edge contours of the spectrum used to define the peak frequency/velocity.

The gray bar displays while Colorize is activated.

Adjusting

To activate Colorize,

1. Select ***Colorize*** on the Touch Panel.
2. **Trackball** to cycle through available maps.
3. Press **Set** to select.

To deselect, select a gray map.

PRF

Description

Reduces noise artifacts in the image. When you activate PRF, the frame rate decreases and the noise artifacts are filtered.

NOTE: Available for only Cardiac application.

Edge Enhance

Description

Edge Enhance brings out subtle tissue differences and boundaries by enhancing the gray scale differences corresponding to the edges of structures. Adjustments to M-Mode's edge enhancement affects the M-Mode only.

Benefits

Edge Enhance cleans out the B-Mode image/M-Mode timeline by subduing some of the gray scale in order to highlight the vessel wall or organ. This is helpful when you cannot differentiate between the chambers of the heart.

Affect on other controls

Edge Enhance operates in real-time only; not in Freeze or CINE.

Frame Average

Description Temporal filter that averages frames together, thereby using more pixels to make up one image. This has the effect of presenting a smoother, softer image.

Benefits Smooths the image.

Maps

Description

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 most contrasty map on the bottom of the menu.

The only exception is Map J, which is a very soft map.

In Doppler mode, the Clear map offers a bluish coloring compared to the standard gray map. Clear Maps provide a more transparent map. Clear maps are displayed under gray maps.

Adjusting

To select a map, press the ***Gray Map*** Touch Panel key. A map window displays. The image reflects the map as you go through the selections.

Values

Map values vary by probe, application, and frequency setting. Map values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Rejection

Description Selects a level below which echoes will not be amplified (an echo must have a certain minimum amplitude before it will be processed).

Benefits Allows for the elimination from the display of low level echoes caused by noise.

Rotation

Description Rotates the image 90, 180 and 270 degrees.

Benefits 180° Beneficial in transvaginal and transrectal scanning.

90° and 270° beneficial for pediatrics hip scanning and measurement.

When reading a rotated image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal.

Suppression

Description Suppresses the noise in the image.

Speed of Sound (SoS) Tissue Imaging

Speed of Sound is available on all probes for the following applications: Abdomen, Abdomen 2, Renal, 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 Model--> 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/Number 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).

B-Flow / B-Flow Color (Option)

B-Flow

Description

B-Flow is intended to provide a more intuitive representation of non-quantitative hemodynamics in vascular structures.

B-Flow is digitally-encoded Ultrasound, using digital codes to enhance weak signals from small particulate reflectors (blood flow) and suppress signals from strong reflectors (tissue). Flow and tissue are displayed simultaneously without threshold decision and overlay.

All B-Mode measurements are available with B-Flow active: depth, distance along a straight line, % stenosis, volume, trace, circumference, and enclosed area.

Presetting

Preset the default B Flow Mode, either B Flow or B Flow Color via Utility--> Imaging--> General--> BF/BFC button. Specify the default to be either B Flow or B Flow Color.

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

Activating

To activate/deactivate B-Flow, press **B-Flow** button on the touch panel or user-defined hard key. Doppler Mode is available while in B-Flow; however, M-Mode and Color Flow/PDI Modes are not available.

Using B-Flow

To optimize the image:

Adjust the frequency, display depth, and focal zone location basded on the patient body type and anatomy of interest. Adjust Sensitivity/PRI and Background setting as needed (see below).

Adjust the remaining Imaging parameters and presets as needed; functionally is the same as B-mode when in B-Flow mode.

B-Flow (continued)

Scanning Hints

B-Flow is especially intuitive when viewing blood flow, for acute thrombosis, parenchymal flow, and jets. B-Flow helps you visualize complex hemodynamics and highlights moving blood and tissue. B-Flow was implemented using Digitally Encoded Ultrasound (DEU). There are no artifacts such as bleeding, blooming, or aliasing.

The greater the speed, the better the image scatter density and size. If the scan direction is the same as the flow direction, then the image scatter is elongated; if the scan direction is the opposite as the flow direction, then the image scatter is tighter. Therefore, have the scan direction opposite to that of flow direction. Switch the way you hold the probe, with the probe orientation marker inferior to maintain correct orientation on the monitor. Flow starts from where the focal zone is located.

Lower the background when imaging the kidney, liver, and spleen. Keep the focal zone as close to flow as possible. It is beneficial to narrow the sector width and increase the frame rate.

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.

Benefits

Compared to Color Doppler mode, B-Flow provides better spatial and temporal resolution, displays blood flow in the entire image, i.e. NO ROI, and is not angle dependent as it does not use the Doppler Principle. B-Flow is therefore a more realistic (intuitive) representation of flow information, allowing you to view both high and low velocity flow at the same time.

Affect on other controls

When you activate B-Flow, the system remembers the imaging parameters set while in B-Mode. When you optimize the frame rate via Line Density, you compromise the resolution and when you optimize the resolution, you compromise the frame rate. B-Flow is not available in 3DView.

Bioeffects

When you select B-Flow, the PRF increases.

B-Flow (continued)

Accumulation

Description Accumulation enhances the flow in an image; ideal to capture dynamic flow in a still picture.

Values Off - Infinite. Infinite provides the same result as applying CINE Capture to a B-Flow CINE clip.

Benefit Accumulation detects the maximum signal and holds it (accumulates it) for the level specified (Off - Infinite).

Background

Description Adjusts the amount of tissue displayed on the B-Flow image. Works along with the Tissue control.

Value 0, 1, 2, 3

- 0 = Least amount of tissue displayed.
- 3 = Most tissue displayed.

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.

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

B-Flow (continued)

Sensitivity/PRI

Description Sensitivity/PRI (Pulse Repetition Interval) is proportional to the time interval between the pulses sent to develop the B-Flow image.

In general, a larger value is recommended for slow flow as slow flow detection requires more time separation between pulses so the system can detect the difference in flow profile. However, a larger value could cause bar artifacts on the image. Therefore, it is suggested to not increase the PRI value more than needed. A small value of PRI should be used when the interest is in fast flow only, e.g. viewing a jet in a stenosis case, where the jet is of interest.

NOTE: Sensitivity/PRI is Probe and Model dependent.

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.

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 L3-12-RS, ML6-15-RS, 12L-RS, L4-12t-RS, C1-6-D, C2-7-D, C3-10-D, 10C-D and C1-5-RS probe.

B-Flow Color (BFC)

Description

B-Flow Color is intended to provide a B-Flow representation with colorized flow and background B-Mode image.

Although the BFC is based on B-Flow technology, the BFC image is processed and made by the Color Flow processor and therefore has both the advantages of B-Flow and Color Flow. Consequently, imaging parameters and presets are functionally the same as Color Flow/PDI.

Refer to ‘Color Flow Mode’ on *page 5-45* for details on each parameter.

NOTE: You can select the steering relation between Doppler cursor and B-Flow Color window in Utility --> System --> System Imaging --> Controls.

NOTE: While in BFC, you can steer the PW cursor or CF ROI independently.

Activating

To activate B-Flow Color,

- While in B-Mode, press **B-Flow** on the touch panel or user-defined hard key to activate B-Flow. Then press **Color** on the Touch Panel.
- Adjust the parameters to get the best image.

B-Flow Color (BFC) (continued)

Enhance (B-Flow Color)

Description ***Enhance*** provides a range of choices for B-Flow Color image quality.

Values Enhance “Off” is the original B-Flow Color setting which gives you the dynamic appearance of the flow with high frame rate.

Enhance “On” adds sensitivity and stability/continuity to the flow’s appearance, along with lower frame rates than Enhance “Off.”

Scale

Description Same as Scale in Color Flow/PDI Mode.

Values Increase for higher flow states.

Decrease to display smaller vessels and slower flow.

HD Color

Description High Definition Color to visualize smaller vessels and slower flow.

Value On, Off

NOTE: Only available L3-12-RS, ML6-15-RS, 12L-RS, L4-12t-RS, C1-6-D and C1-5-RS probe.

NOTE: Triplex is not available in HD Color.

B-Flow Quick Card

B-Flow

Table 5-1: B-Flow Technology

Digitally encoded technology: Using digital codes to enhance weak signals from small particulate reflectors and suppress signals from strong reflectors (tissue). Coded excitation and tissue equalization are key to B-Flow. **Activation** Created by the B-Mode processor. B-Flow is located on the keyboard next to the B-Mode button. B-Flow gain is controlled by turning the B-Mode gain button.	**Limits of B-Mode and Color Doppler** B-Mode blood flow is displayed as black. **Color Doppler** 1. Lack of true hemodynamics representation 2. Color writing on bright interfaces 3. Color outside vessel wall, over gain and high threshold 4. Inferior spatial resolution compared to B-Mode 5. ROI angle dependency

Table 5-2: Clinical Advantages of B-Flow

Advantages 1. Visualize both high and low velocity flow simultaneously 2. No ROI to generate image 3. True hemodynamics, no overwriting on vessel wall 4. Helps enhance spatial resolution of blood flow and less angle dependence than color flow **Examples** 1. High grade stenosis 2. Soft plaque or plaque ulcerations 3. Early thrombus 4. Organ perfusion such as Renal or placenta	

B-Flow (continued)

Table 5-3: B-Flow System Tool

System Tools	Definition	Use
Background	Display option for background B-Mode image.	Turn background off to suppress tissue signal allowing enhanced visualization of small vessels. Turn background on to display tissue signal to help identify surrounding landmarks in the image.
PRI/Sensitivity	Pulse repetition interval is the time interval between the pulses that are sent to develop the B-Flow* image	For sensitivity to slow flow and small vessel identification, increase the PRI. Decreasing the PRI is useful in high flow conditions and helps minimize flash. The balance ill vary based on probe and application used.
Accumulation	Detects the maximum signal and holds it for a specified time	Use in slow flow states to help increase the time of optimal vessel visualization. During live scanning choose from the dropdown the fraction of a second the image will accumulate.
Frame Average	Temporal filter to enhance the smoothness of the flow appearance	Increase frame average to help with smoother flow appearance. If accumulation is used, frame average will be ignored.
Frequency	Multiple B-Flow scan frequencies are available depending on probes used	Increase the frequency to enhance the detail. Decrease the frequency for additional penetration.
Dynamic Range	Adjusts the amount of gray scale information displayed	Increase dB level when less contrast is desired for a softer image. To enhance the appearance of the flow, decrease dB level. A decrease in dB level increases contrast.
SRI	Speckle Reduction Imaging is an adaptive algorithm that reduces image noise from small specular	To enhance the flow profile, increase SRI. This can be done in post-processing images if desired.
Cine Capture	Maximum intensity projection algorithm to detect the strongest signal between the frames and display the results	Cine 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.
Visualization	Define the display technique.	• **B-Flow**. Displays only B-Flow image. • **Dual**. Displays B-Mode and B-Flow image simultaneously using dual screen. • **Hybrid**. Displays the B-Flow image over the B-Mode image using Hybrid Map.

B-Flow Color

Table 5-4: B-Flow Color

Digitally encoded technology: Provides a B-Flow representation with colorized flow and a clear background B-Mode image. Uses an ROI box giving the advantages of both B-Flow and Color Flow. **Activation** Turn on B-Flow, activate B-Flow Color by choosing “Color” on the B-Flow touch panel menu.	**Limits of Color Doppler** 1. Lack of true hemodynamics representation 2. Color writing on bright interfaces 3. Color outside vessel wall 4. Inferior spatial resolution compared to B-Mode 5. ROI angle dependency

Table 5-5: Advantages of B-Flow Color

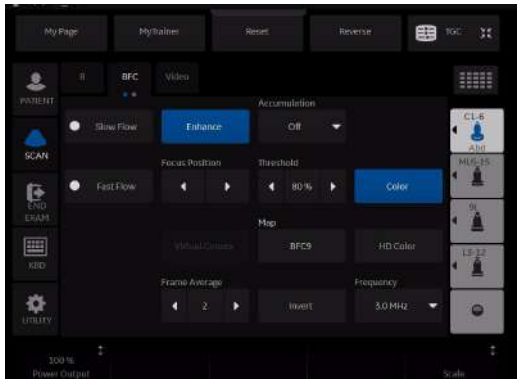
Advantages 1. Dynamic flow appearance 2. High frame rate 3. Clear background tissue with vessel hemodynamics 4. Less tissue motion artifact **Examples** 1. High grade stenosis 2. Aneurysm formation 3. Access graft 4. Organ perfusion such as renal transplant	

Table 5-6: B-Flow Color System Tool

System Tools	Definition	Use
Enhanced	Increases packet size for sensitivity versus frame rate.	Use when imaging many small vessels such as renal parenchyma. Turn off when higher frame rate is needed.
Accumulation	The system detects the maximum signal and holds it for the specified time.	Use in slow flow states to help increase the time of optimal vessel visualization. During live scanning choose from the dropdown the fraction of a second the image will accumulate.
Focal Zone	By adjusting the Focal Zone position within the ROI box the user affects the sensitivity to flow in these vessels.	The focal zone will track with the ROI until the user selects this button. Locate the focal zone at or below the area of most interest for more consistent flow through the ROI.
Frequency	Multiple B-Flow* Color frequencies are available depending on the probe in use.	Select Frequency from the touch panel and select the dropdown to utilize the bandwidth of frequencies available for each transducer and mode.

Table 5-6: B-Flow Color System Tool (Continued)

System Tools	Definition	Use
Wall Filter	W0 and W1, use to decrease overwriting of vessel wall movement.	Two settings, Use W1 in higher velocity flow states. W0 to help display low flow velocities.
Scale	The number of pulses being sent per second. Scale is the reciprocal of PRI.	Decrease to display smaller vessels and slower flow. Increase for higher flow states to help reduce overwriting of vessel wall.
HD Color	Visualize the smaller and slower flow in B-Flow Color.	On, Off NOTE: Only available on L3-12-RS, ML6-15-RS, 12L-RS, L4-12t-RS, C1-6-D and C1-5-RS probe.

Table 5-7: B-Flow System Cine Tool

System Tools	Definition	Use
Cine Capture	Cine Capture uses a Maximum Intensity Projection algorithm to detect the strongest signal between the frames and displays the result. Adjustments can be made to modify the start and end frames used in the process.	Acquire a B-Flow or B-Flow Color clip and select Cine Capture from the cine tab on the touch panel. Cine Capture allows the user to represent the dynamic flow situation of the vasculature in a single still image or across a loop.
Enhancement	Applied to a Cine Capture image to express the vessel structure. Shade Forward (FW) and Shade Reverse (RV) will provide a 3D appearance of vessel structures in a 2D image. Enhance Levels 1-3: Data from selected frames are enhanced and then superimposed on the Cine Capture images.	Use to visualize parenchymal perfusion with added depth of information. The shade process allows the anterior and posterior portions of the vessel to be displayed. Shade Forward (FW) brings the first frame to the front of Cine Capture. Shade Reverse (RV) brings the last frame to the front of the Cine Capture. Enhance levels are especially useful in allowing the user to see the vessel structure built by the Cine Capture and the hemodynamics of the blood flow enhanced simultaneously.
Sync Mode	Phase synchronizes multiple cine loops. Used most often in Stress echo and contrast.	User can select two Cine loops, recall them, and select Sync Mode to sync the loops. Image Sync can also be done on two Cine loops acquired with ECG leads.

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 P8/P9/P10 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)

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, and Focus Position, 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 Display

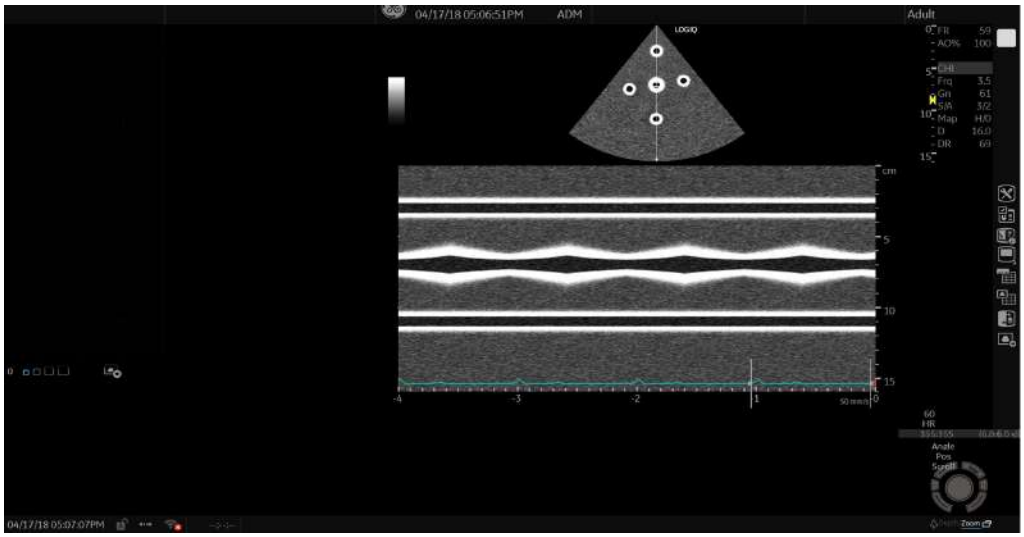


Figure 5-5. M-Mode Display -- Representative Example

Scanning Hints

These M-Mode controls produce the following results:

Sweep Speed. Controls speed of M-Mode update.

Dynamic Range. Affects the amount of gray scale information displayed.

Sweep Speed

Description Changes the speed at which the timeline is swept.

Available in M-Mode and Doppler Mode.

Available in M Color Flow Mode.

Adjusting To increase/decrease, select ***Sweep Speed***.

Values Each selection represents a different sweep time.

Sweep Speed values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits You can speed up or slow down the timeline to see more or fewer occurrences over time.

NOTE: The sweep speed information represents the user selected sweep speed and should be used only as a reference to confirm that the image was acquired at the selected sweep speed. It is not to be used for measurements or analysis. This is not an absolute value, but simply a reference number. Users performing studies using standardized protocols may find this sweep speed information useful for reading studies from other institutions.

Anatomical M-Mode

Description

Anatomical M-Mode gives you the ability to manipulate the cursor at different angles and positions. The M-Mode display changes according to the position of the cursor.

Anatomical M-Mode displays a distance/time plot from a cursor line, which is independent from the axial plane. AMM is available in B, Color and TVI.

NOTE: To set up AMM, go to Utility--> Imaging--> AMM. Select the specific probe and parameters.

NOTE: Turn off CrossXBeam before activating AMM/CAMM.

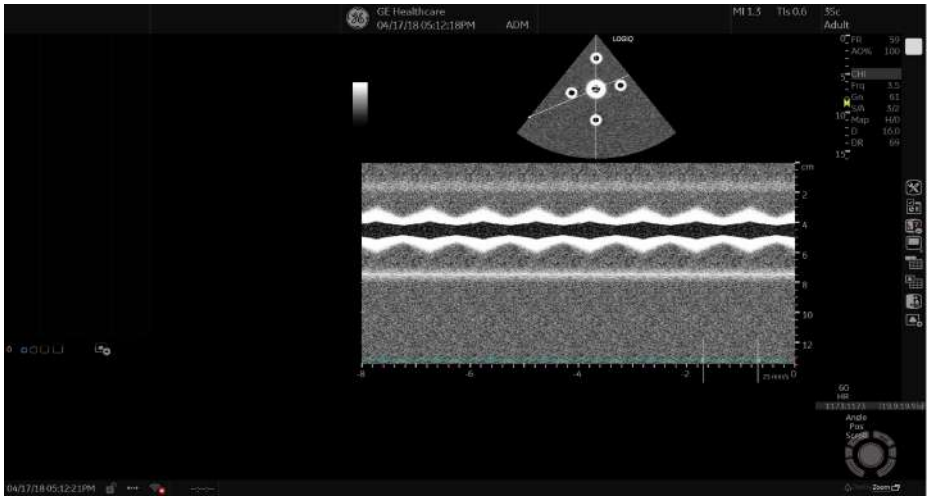


Figure 5-6. Anatomical M Mode

Anatomical M-Mode (continued)

Activating

To activate Anatomical M-Mode:

1. While in M-Mode, press the ***Anatomical M*** knob on the bottom of the Touch Panel.

   or

   Press **Set** (Mode Cursor) while in B/B+CF/B+PDI and select ***Anatomical M*** to go to live B/B+CF/B+PDI + AMM.

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.

2. Use the trackball (assigned function: Pos) to position the M cursor over the required area of the image.
3. 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.

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.

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

1. While in AMM mode, Change Curved AMM to ON in the M Mode tab.
2. Use the Trackball to position the start point of the time motion curve in the B-Mode image.
3. Press **Set** to fix the start point.
4. Use the Trackball to position the next point.

   The time motion curve is drawn by the green line.
5. Press **Set** to fix the point.
6. Repeat step 4 and 5 to draw a complete time motion curve.

NOTE: The time motion curve can be edited by following the curve back to the desired point and redrawn as desired. Following the curve back to the starting point will delete the time motion curve.

7. Press **Set** twice to complete.

*NOTE: Move the cursor to the desired anchor point and press **Set**. Move the point to the desired position and press **Set**.*

8. The arrow cursor appears on the M-Mode image and the red bar appears on the time motion curve.

   The red bar indicates the position of the time motion curve relative to the arrow cursor on the CAMM image. They move relative to one another.

*NOTE: Press **Set** to clear a cursor line.*

Optimizing Color Flow

Intended Use

Color Flow Mode 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

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

A typical examination using Color Flow Mode,

1. Follow the same procedure as described under B-Mode to locate the anatomical area of interest.
2. After optimizing the B-Mode image, add Color Flow.

NOTE: Use all noise reduction controls with care. Excessive application may obscure low level diagnostic information.

3. Move the color flow area of interest as close to the center of the image as possible.
4. Optimize the color flow parameters so that a high frame rate can be achieved and appropriate flow velocities are visualized.
5. Press **Freeze** to hold the image in memory.
6. Record color flow images as necessary.
7. If more definitive information is needed about flow, utilize the procedures described under Doppler Mode.
8. To exit Color Flow, press **CF**-Mode or **B**-Mode.

Color Flow Mode

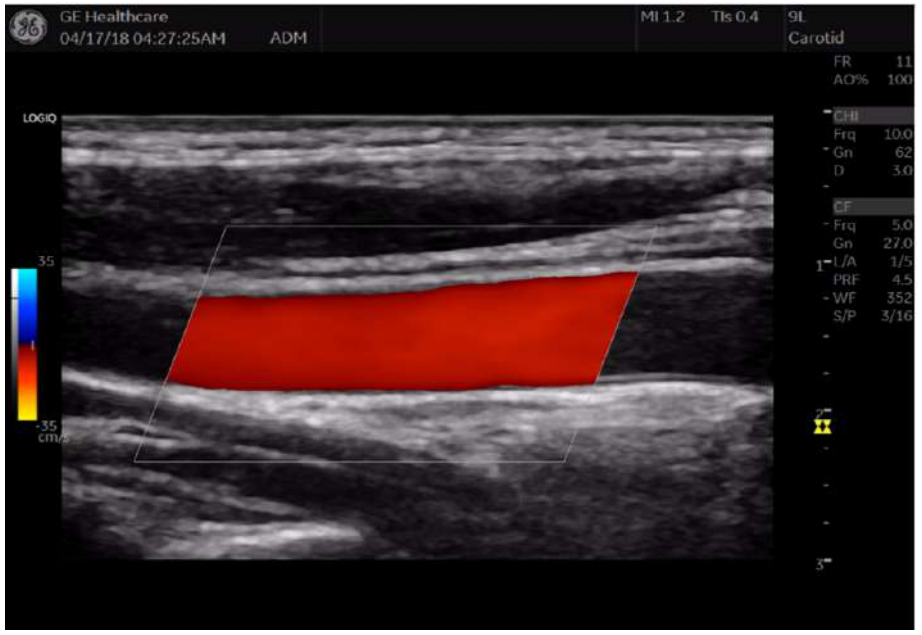


Figure 5-7. Color Flow Mode screen - Representative Example

Uses

Color Flow is useful to see flow in a broad area. Color Flow allows visualization of flow in the CF ROI, whereas Doppler Mode provides spectral information in a smaller area.

Color Flow is also sometimes used as a stepping stone to Doppler. You use Color Flow to locate flow and vessels prior to activating Doppler.

Flow Model Shortcuts

Flow Model Shortcuts values vary by application. Below is an example of the Abdominal Flow Model Shortcuts and the following table lists all the following Flow Model Shortcuts by application.

In the Abdominal application on the Color Flow Touch Panel, you will see Aorta, Renal, Renal Art or Penetration flow selections.

In the Vascular Exam Category--> LEV Application on the Color Flow Touch Panel menu, you will see Low Flow or Fast Flow selections.

Table 5-8:

Renal	• Aorta • Twinkle • Fast Flow (Renal Art) • Penetration
OB	• Fetal Echo
Gyn	• Ovary
Card	• Fast Frame Rate • Penetration
Vasc	• Vert Art
SMP	• Slow Flow • Med Flow • Carotid
Ped	• Resolution • Med Flow • Penetration

Gain

Description	Gain amplifies the overall strength of echoes processed in the Color Flow window or spectral Doppler timeline.
Adjusting	To decrease/increase Gain, rotate Gain (the mode assigned rotary key). Gain values change depending on the probe and application; they are not associated with a particular position of the button.
Values	Values vary by probe, application, and multi frequency setting. Gain displays as dB. Gain values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient, or Multi Frequency.
Benefits	Allows you to control the amount of color within a vessel or to fill in or clean out spectral information.
Bioeffects	Gain has no affect on Power Output. However, with increased Gain, the power output level can usually be reduced to produce an equivalent image quality.

Scale (Velocity Scale)

Description	Increases/decreases the Scale on the color bar.
Adjusting	To raise/lower the velocity scale, adjust **Scale**.
Values	Scale is in kHz. Velocity Scale values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Imaging of higher velocity flow requires increased scale values to avoid aliasing.
Affect on other controls	Changing the Velocity Scale may affect Power Output and frame rate. When you adjust the velocity scale, CINE memory is cleared.
Bioeffects	Changing the Velocity Scale range may change the TI and/or MI. Observe the output display for possible effects.

Wall Filter

Description Filters out low flow velocity signals. It helps get rid of motion artifacts caused from breathing and other patient motion.

Adjusting To raise/lower the wall filter, press ***Scale***/***Wall Filter*** until you reach Wall Filter, then adjust ***Wall Filter*** up/down.

Values Values vary, depending upon probe, application, and packet size. The wall filter is displayed numerically on the monitor (Hz).

Wall Filter values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits Gets rid of excess, unnecessary low frequency signals caused by motion.

Size/Position of the color window

Description	Adjust size and position of the color window.
Adjusting	The window grows from the center of the color window. To adjust the size, press the Upper trackball key on the left side to select ***Size*** (Size/Position appears in the **Trackball** keys on the monitor display) then move the Trackball left/right, up/down. To adjust the position, press the Upper trackball key on the left side to select ***Pos*** then move the **Trackball** to position the color window.
Values	Sector and Convex Probes. Ranges from 5 degrees to full B-Mode image. Linear Probe. Ranges from 5mm to full B-Mode image.
Benefits	Increase the color window to see a larger area; decrease the color window to improve frame rate and spatial resolution.
Affect on other controls	The smaller the color window, the faster the frame rate and vice versa.
Bioeffects	Sizing the color window may change the TI and/or MI. Observe the output display for possible effects.

CF/PDI Width

Description	You can set the default CF/PDI ROI width.
Adjusting	Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

CF/PDI Vertical Size

Description You can set the default CF/PDI ROI vertical size.

Adjusting Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

Invert (Color Invert)

Description Lets you view blood flow from a different perspective, e.g., red away (negative velocities) and blue toward (positive velocities). You can invert a real-time or frozen image.

NOTE: Invert reverses the color map, NOT the color Scale.

Adjusting To reverse the color flow, press ***Invert (Color Invert)*** .

In Triplex, both Color Flow and Doppler Mode velocity scales are inverted.

Values Invert and non-Invert. Values vary by probe and application.

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

Benefits Allows you to view blood flow according to your personal preference, without flipping the probe.

Baseline

Description Changes the Color Flow or Doppler spectrum baseline to accommodate higher velocity blood flow. Minimizes aliasing by displaying a greater range of forward flow with respect to reverse flow, or vice versa.

Baseline adjusts the alias point. The default baseline is at the midpoint of the color display and at the midpoint of the color bar reference display.

Adjusting To adjust the baseline, adjust ***Baseline*** up/down, as necessary.

Values Zero velocity follows the baseline. The total Scale range remains the same. Values vary by probe and application.

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

Benefits Unwraps the alias during color flow imaging. Higher velocities can be displayed without reversal of colors.

Angle Steer

Description — You can slant the ROI of the Color Flow linear image left or right to get more information without moving the probe. The Angle Steer function only applies to linear probes.

Adjusting — To slant the linear image to the left/right, adjust **Angle Steer**.

Angle Steer can be set in Utility -> Imaging -> CF/PDI Limit to 3 Angle Steer if you want to use all angles or just available only 3 angles (left 20, 0, right 20).

Values — Linear probes can be steered left (20, 15, 10 degrees), center, or right (20, 15, 10 degrees). Angle Steer values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New patient

NOTE: *9L-RS probe and L3-12-RS probe can be steered left (30, 20, 15, 10 degrees), center, or right (30, 20, 15, 10 degrees).*

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

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

Accumulation

Description — Accumulation enhances the flow in an image.

Values — 8 settings: Off, 6 Various levels, or frames, of accumulation, and Infinite. If Accumulation is turned off, then Frame Averaging is used; if Accumulation is set, then Accumulation is used.

Availability — Available in Contrast, Color Flow, PDI, and B-Flow.

Benefit — Accumulation detects the maximum signal and holds it for the level specified.

Color Flow Line Density

Description	Optimizes the Color Flow frame rate or spatial resolution for the best possible color image.
Adjusting	To adjust the line density, select the ***Line Density*** Touch Panel key. Select the default value on the Utility -> Imaging -> CF -> Line Density and press ***Save***.
Values	The current frame rate is shown on the Touch Panel. Frame Rate/Resolution values vary by: Probe, Exam Category, Exam Calcs, New Patient, and Frequency. Settings are returned to factory or user preset value when you change any of the above.
Benefits	Low line density is useful in fetal heartbeat, adult cardiac applications, and clinical Radiology applications which require significantly higher frame rates. High resolution is useful in situations where very small vessels are being imaged, e.g., thyroid, testicles.
Affect on other controls	Line density changes the vector density and frame rate.
Bioeffects	Modifying line density may change the TI and/or MI. Observe the output display for possible effects.

Line Density Zoom

Description	You can set the default value for Line Density in zoom independently.
Adjusting	Select the default value on the Utility -> Imaging -> CF -> Line Density Zoom and press ***Save***. Allows you to select a specific color map. After you have made your selection, the color bar displays the resultant map.

Map

Description Allows you to select a specific color map. After you have made your selection, the color bar displays the resultant map.

Adjusting After you activate Color Flow, the Color Flow Touch Panel displays. To cycle through available maps, select ***Map***, move the **Trackball** to view available maps, and press **Set** to select.

Values Velocity Maps (V). Flow shown as blue away/red toward the probe.

Velocity Variance Maps (VV). Provides a measure of turbulence (stenosis). Adds green to velocity maps.

Benefits Shows the direction of the flow and highlights the higher velocity flows.

Map Compress

Description When you increase the value, high velocity elements in the map are compressed so that the map darkens. When you decrease the value, low velocity elements in the map are compressed so that the map lightens. The effect is visible in the color bar.

Benefits Changes the gradation in the map.

Threshold

Description	Threshold assigns the gray scale level at which color information stops.
Adjusting	To increase/decrease the gray scale threshold, select ***Threshold*** left/right.
Values	The settings cycle through various values: 0%-100% of the gray scale. High values display more color; low values displays more B-Mode gray scale data. The Color Threshold level is displayed on the Touch Panel. Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Limits color flow overlay to low level echoes inside vessel walls. Helps minimize color `bleeding' outside vessel walls.

Frame Average

Description	Averages color frames.
Adjusting	To smooth temporal averaging, select ***Frame Average***. The selected value displays on the Touch Panel.
Values	Frame Average values vary by probe and application. The values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Higher frame averaging keeps the color displayed longer for increased flow visualization while lower frame averaging provides greater flow dynamics.
Affect on other controls	Trades off between frame rate and color quality. As the color quality increases, the frame rate may decrease and as the frame rate increases, the color image quality decreases.

Transparency Map

Description Brings out the tissue behind the color data.

Adjusting Select ***Transparency Map*** to adjust

*NOTE: Select the default value on the Utility -> Imaging -> CF -> Transparent select and press **Save**.*

Benefits Helps demonstrate the tissues behind the color.

Spatial Filter

Description Smooths out the color, makes it look less pixely.

Adjusting Select ***Spatial Filter*** to adjust.

*NOTE: Select the default value on the Utility -> Imaging -> CF -> Spatial Filter and press **Save**.*

Benefits Smooths the image.

Flash Suppression

Description	Activates/deactivates Flash Suppression, a motion artifact elimination process.
Values	Values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Beneficial to suppress flash.

Packet Size

Description Controls the number of samples gathered for a single color flow vector.

Adjusting To increase/decrease the packet size, select ***Packet Size*** left/right.

Values Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient. Values are displayed on the monitor display as P.

Benefits Allows you to improve the color sensitivity and accuracy of color averaging (increase packet size) or frame rate (decrease packet size), as needed.

Affect on other controls When you decrease the packet size, you increase the frame rate at the expense of image quality. When you increase the packet size, you improve image quality at the expense of frame rate.

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

Sample Vol (Sample Volume)

Description Adjusts the size of the color flow doppler transmit wave (or pulse) and size (or length). Lower setting gives better flow resolution and a higher setting increases sensitivity.

CF/PDI Auto Sample Volume

Description You can set the default CF/PDI Auto Sample Volume.

Adjusting Select the value on the Utility -> Imaging -> CF -> CF/PDI Auto Sample Volume and press ***Save***.

CF/PDI Center Depth

Description You can set the default CF/PDI center depth.

Adjusting Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

CF/PDI Focus Depth (%)

Description You can set the default CF/PDI focus depth (%).

Adjusting Select the value on the Utility -> Imaging -> CF -> CF/PDI Focus Depth (%) and press ***Save***.

CF/PDI Frequency (MHz)

Description You can set the default CF/PDI Frequency (MHz).

Adjusting Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

CF/PDI Auto Frequency

Description You can set the default CF/PDI Auto Frequency.

Adjusting Select the value on the Utility -> Imaging -> CF mode and press ***Save***.

Power Doppler Imaging (PDI)

Description

Power Doppler Imaging (PDI) is a color flow mapping technique used to map the strength of the Doppler signal coming from the flow rather than the frequency shift of the signal. Using this technique, the ultrasound system plots color flow based on the number of reflectors that are moving, regardless of their velocity. PDI does not map velocity, therefore it is not subject to aliasing.

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.

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

M Color Flow is used for fetal cardiac applications. Color Flow overlays color on the M-Mode image using velocity and variance color maps. The Color Flow wedge overlays the B-Mode image and M-Mode timeline.

The Color Flow maps available in M-Mode are the same as in Color Flow Mode. The size and position of the Color Flow window in B-Mode determines the size and position of the Color Flow window in M-Mode.

All M-Mode measurements are available with M Color Flow active: depth, distance along a straight line, % stenosis, volume, trace, circumference, enclosed area, distance, time, slope, and heart rate.

M Color Flow mode can be activated on the sector probes only.

M Color Flow Mode (continued)

Activating

To activate M Color Flow Mode, press **M** (M-Mode). Then press **CF** (Color Flow) - or - press **CF**, then press **M**.

CM tab is displayed.

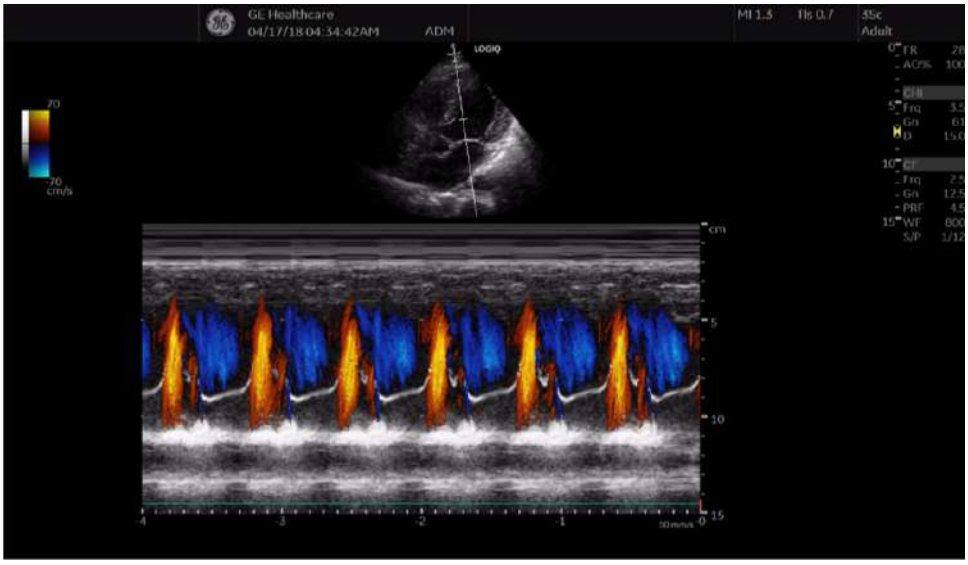


Figure 5-8. M Color Flow screen -- Representative Example

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 Sweep Speed, Packet Size, Frame Rate/ Resolution, Zoom, PRF, and ROI size may change the TI and/or MI. Observe the output display for possible effects.

Optimizing Spectral Doppler

Intended Use

Doppler is intended to provide measurement data concerning the velocity of moving tissues and fluids. PW Doppler lets you examine blood flow data selectively from a small region called the sample volume.

Typical Use - PW Doppler

In Pulsed Wave Doppler (PW) Mode, energy is transmitted from the ultrasound probe into the patient, as in B-Mode. However, the received echoes are processed to extract the difference in frequency between the transmitted and received signals. Differences in frequencies can be caused by moving objects in the path of the ultrasound signal, such as moving blood cells. The resultant signals are presented audibly through the system speakers and graphically on the system display. The X axis of the graph represents time while the Y axis represents the shift in frequency. The Y axis can also be calibrated to represent velocity in either a forward or reverse direction.

PW Doppler is typically used for displaying the speed, direction, and spectral content of blood flow at selected anatomical sites. PW Doppler operates in two different modes: conventional PW and High Pulse Repetition Frequency (HPRF).

PW Doppler can be combined with B-Mode for rapidly selecting the anatomical site for PW Doppler examination. The site where PW Doppler data is derived appears graphically on the B-Mode image (Sample Volume Gate). The sample volume gate can be moved anywhere within the B-Mode image.

Typical exam protocol

A typical examination using PW Doppler Mode might proceed as follows:

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

1. Connect the appropriate probe, leaving the probes in their respective holders.
2. Position the patient for the examination.
3. Press **Patient**. Enter the appropriate patient data using the appropriate exam category.
4. Select the preset, application and probe to be used.
5. Locate the anatomy to be examined. Get a good B Mode image. Press CF to help locate the vessel you wish to examine.
6. Press **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.
7. Position the sample volume cursor by moving the **Trackball** left and right. Position the sample volume gate by moving the **Trackball** up and down. Size the gate by clicking **SV Length**.
8. Optimize the PW Doppler spectrum, as necessary. Refer to the *Doppler Optimization* section of this chapter for more information.
9. Press **Update** to toggle between real time B-Mode with Doppler Mode (with audio).
10. Sample along the whole length of the vessel. Make sure that the probe is parallel to flow. Listen, then look, when positioning the sample volume cursor.
11. Press **Freeze** to hold the trace in memory and stop imaging. Activate CINE Timeline, as necessary.
12. Perform measurements and calculations, as necessary. Refer to the Measurements and Calculations chapter for more information.

Typical exam protocol (continued)

13. Record results by pressing the appropriate print key, depending on the setup of your recording devices.
14. Press **Freeze** to resume imaging.
15. Repeat the above procedure until all relevant flow sites have been examined.
16. Replace the probe in its respective holder.
17. To exit PW, press **PW**. To exit CW, press **CW**.

Spectral Doppler Display

Time zero (the start of the trace) appears on the left side of the graph. As time progresses, the trace moves to the right. The baseline of the graph (representing zero velocity, zero frequency shift, or no detected flow), appears as a solid line running horizontally across the display. By convention, movement toward the probe is positive and movement away from the probe is negative. Positive frequencies or velocities appear above the baseline. Negative frequencies or velocities appear below the baseline.

Typically, blood flow is not uniform but is composed of a mix of blood cells moving at different velocities and in different directions. Thus, the display is composed of a spectrum as gray scale values. Strong signals are displayed as bright while weak signals are displayed as varying shades of gray.

HPRF (High Pulse Repetition Frequency) is invoked when you are operating in PW Doppler Mode and conditions activate HPRF (when the velocity scale factor or sample volume gate depth exceeds certain limits). When HPRF is active, multiple sample volume gates appear along the Doppler mode cursor. Doppler information can be received from any of the multiple sample volume gates. The Doppler signals from all the gates are added together and displayed in one spectrum.

Information about the PW Doppler display is automatically written on the screen and updated when scanning parameters are changed.

This chapter includes:

- A discussion of PW Doppler.
- Activating Pulsed Wave Doppler.
- Optimizing the Doppler spectrum.

PW Doppler Mode Display

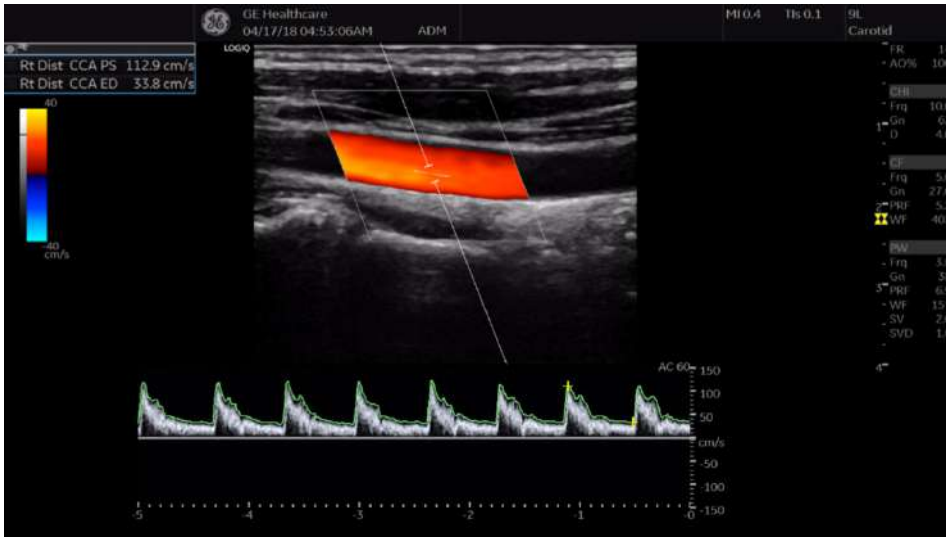


Figure 5-9. PW Doppler Mode Display -- Representative Example

Table 5-9: 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.

Auto Doppler Assist

Auto Doppler Assist automatically positions and steers Color Flow ROI and PW Cursor. This to 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 5-10. 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.

Doppler Sample Volume Gate Position (Trackball)

Description Moves the sample volume gate on the B-Mode's Doppler Mode cursor. The gate is positioned over a specific position within the vessel.

Adjusting To move sample volume gate position, press the top trackball key to select ***Pos***, move **Trackball** up or down until positioned inside the vessel.

To move sample volume gate position, press the top trackball key to select ***Pos***, move **Trackball** up or down until positioned inside the vessel.

Values Defaults to 50% of the depth and can move continuously throughout the field of view.

Benefits Positions the sample volume gate to sample blood flow.

Bioeffects Changing the sample volume gate position may change the TI and/or MI. Observe the output display for possible effects.

Doppler Sample Volume Length

Description Sizes the sample volume gate.

Adjusting To increase/decrease the gate size, adjust ***SV Length*** on the Touch Panel. Hold down key to continuously size gate.

You can adjust the sample volume gate length whenever the sample volume gate appears on the display.

NOTE: Adjustments to the sample volume gate size are made from the center point of the sample volume position.

Values Values vary by probe and application.

Benefits A smaller gate produces accurate sampling results because it is more sensitive. You can also enlarge the gate for sampling large vessels or areas.

Bioeffects Changing the sample volume gate size may change the TI and/or MI. Observe the output display for possible effects.

Angle Correct/Auto Angle

Description Estimates the flow velocity in a direction at an angle to the Doppler vector by computing the angle between the Doppler vector and the flow to be measured.

NOTE: When the Doppler Mode Cursor and angle correct indicator are aligned (the angle is 0), you cannot see the angle correct indicator.

Adjusting Flow toward the probe is mapped above the baseline and vice versa.

To adjust the angle relative to the probe face, adjust ***Angle Correct*** to the left/right. The velocity scale changes when you adjust angle correct.

Press ***Angle Correct*** to access ***Auto Angle***.

NOTE: Angle Correct can be adjusted in Triplex Mode when Update is activated.

Angle Correct values vary by probe and application. Angle Correct values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits Optimizes the accuracy of the flow velocity. This is especially useful in vascular applications where you need to measure velocity.

Quick Angle

Description Quickly adjusts the angle by 60 degrees.

Adjusting Press ***Quick Angle*** to toggle between Off, Right and Left.

Steer/Fine Steer

Description — You can slant the ROI of the Color Flow linear image left or right to get more information without moving the probe. The angle steer function only applies to linear probes.

Adjusting — To slant the linear image to the left/right, adjust **Steer** to the left or right.

Press ***Steer*** to access ***Fine Steer***.

Values — Linear probes can be steered left (10, 15, 20 degrees), center, or right (10, 15, 20 degrees).

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

Fine Steer value can be changed in 2 degree increments.

NOTE: 9L-RS probe and L3-12-RS probe can be steered left (30, 20, 15, 10 degrees), center, or right (30, 20, 15, 10 degrees).

Benefits — Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Vascular applications.

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

Audio Volume

Description Controls audio output.

Audio sounds change rapidly, often abruptly. Increase the volume in small steps to avoid startling the patient.

Benefits An audio representation of the flow within a vessel can be used to evaluate proper probe angle and position.

Auto Spectrum Optimize (Auto)

For details on Auto, See ‘Auto Optimize’ on *page 5-8 for more information.*

Cycles to Average

Description The average value over a number of cycles (from 1-5). For example, if you set the number of cycles at 3, values would be averaged for 3 cycles. If you have 5 cycles on the display, the PS would be the average of 3 of the 5 cycles, which are identified by a line drawn over the 3 averaged cycles.

Available for live and frozen images.

Display Format

Description Changes the horizontal/vertical layout between B-Mode and Doppler Mode or timeline only.

Benefits You can select how to have your Doppler timeline and anatomy displayed.

Update

Description Toggles between simultaneous and update presentation while viewing the timeline.

Adjusting 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 signalling a break in the timeline.

Values On/Off.

Benefits Update increases the Spectral Doppler display quality.

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

Simultaneous (Duplex/Triplex)

Description Duplex allows two modes to be active at the same time; Triplex allows three modes to be active at the same time.

- B + PW or B + CW or B + CF (Duplex)
- B + PW + CF or B + CW + CF (Triplex)

Update pauses the image while keeping the CW / PW 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.

Adjusting Select **Simultaneous** on Touch Panel.

Preset You can preset Duplex in Utility --> Imaging --> General.

Benefits Allows the user to have multiple modes active at the same time.

Baseline

Description

Adjusts the baseline to accommodate faster or slower blood flows to eliminate aliasing.

Adjusting

Baseline adjusts the point in the spectrum where the velocity trace is at zero. The default baseline is at the midpoint of the spectrum. To shift the baseline, adjust ***Baseline*** on the Touch Panel.

The baseline displays as a solid line running across the spectrum. The baseline is raised and lowered in equal increments, depending on the current Doppler scale factor. The control does not wrap when the maximum baseline shift (in either direction) has been reached.

Values

50% is the center of the display, +95% is the top edge of the display and 5% is the bottom edge of the display. Baseline values vary by probe and application and are returned to the factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits

Unwraps the alias. Rearranges the velocity scale without changing the velocity scale. Readjusts the positive and negative velocities limit without changing the total velocity range.

Compression

Description Compression controls how echo intensities are converted to shades of gray, thereby increasing the range of contrast you can adjust.

Values The current value displays on the Touch Panel. Compression values vary by probe and application and are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits Optimizes the image's texture and smoothness by increasing or decreasing the amount of gray scale.

Invert

Description Vertically inverts the spectral trace without affecting the baseline position.

The plus (+) and minus (-) signs on the velocity scale reverse when the spectrum is inverted.

Positive velocities display below the baseline.

Values Forward/reverse. The trace corresponds to flow direction (positive flow is forward flow toward the probe or negative flow is reverse flow away from the probe). The invert setting is returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient. In Triplex, both Color Flow and Doppler Mode velocity scales are inverted.

Benefits If you change the probe angle to accommodate anatomy, blood flow still moves in the same direction, but the Doppler information will be reversed. It is easier in cases like this to invert the spectrum instead of reversing the probe orientation.

Scale (Velocity Scale)

Description

Adjusts the velocity scale to accommodate faster/slower blood flow velocities. Velocity scale determines pulse repetition frequency.

If the sample volume gate range exceeds single gate Scale capability, the system automatically switches to high PRF mode. Multiple gates appear, and HPRF is indicated on the display.

High PRF

High Pulse Repetition Frequency (HPRF) is a special operating mode of PW Doppler. In HPRF mode, multiple energy pulses are used. This allows higher velocities to be detected without causing aliasing artifacts. HPRF mode is used when detected velocities exceed the processing capabilities of the currently selected PW Doppler scale or when the selected anatomical site is too deep for the selected PW Doppler scale. The pulse repetition frequency (PRF) is displayed to the left of the spectrum in frames per second.

NOTE: Ensure that only one gate overlays a blood vessel at a time. Otherwise, signals from more than one flow area are superimposed.

Adjusting

To adjust the ***Scale***, turn the rotary. The display updates velocity scale parameters after you adjust the velocity scale.

Values

Velocity Scale values vary by probe and application. In Triplex, when you change the velocity scale in Color Flow, the Doppler Mode velocity scale is also updated if Triplex is on.

Velocity Scale values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Scale (Velocity Scale) (continued)

Benefits	Blood flow information is not cut off due to the effect of aliasing.
Affect on other controls	When you raise the velocity scale, the spectral waveform may decrease in size; when you lower the velocity scale, the spectral waveform may increase in size. Changes in the spectrum are relative to changes in the velocity scale, that is, it sizes accordingly. When you adjust the velocity scale, CINE memory is cleared. Adjustments may affect sample volume size and Doppler wall filter.
Bioeffects	Changing the velocity range may change the TI and/or MI. Observe the output display for possible effects.

Wall Filter

Description	Insulates the Doppler signal from excessive noise caused from vessel movement.
Adjusting	To increase/decrease, select ***Wall Filter*** on the Touch Panel.
Values	Values vary, depending upon the probe and application. The current value displays on the Touch Panel and the monitor. Wall Filter values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient.
Benefits	Gets rid of excess, unnecessary information. Cleans out low level noise above and below the baseline so you don't see or hear it on the spectrum.
Affect on other controls	Wall filter may be changed by changes to the velocity scale.

Trace Method (Spectral Trace)

Description	Traces the average mean and peak velocities in realtime or frozen images.
Adjusting	To get a peak trace, click MAX. A green trace displays on the spectrum. To get a mean trace, click MEAN. A blue trace displays on the spectrum.
Benefits	Lets you trace the cardiac cycle.

Trace Sensitivity

Description	Adjust the trace to follow the waveform for signal strength.
Benefits	If the signal is very faint, increasing the Trace Sensitivity will allow the system to trace that signal strength.

Trace Direction

Description	Specifies trace direction.
Selecting Trace Position	You can select where on the waveform to perform the trace, above, below, or both (above and below).

Cursor Moving

Description

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 2/D/CF, this causes the B Mode/Color Flow image to go live while you move the Doppler cursor.

Time Resolution

Description 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.

Benefits Time Resolution = 3 (high) smooths the Timeline; Time Resolution =1 (low) increases the time resolution (sharpens the image).

PW Simultaneous Priority

Description Adjust spectrum appearance

Preset You can select Spectrum or Balanced via Utility -> Imaging -> PW.

Values Values Spectrum: Spectrum improves the appearance of the spectrum under a certain velocity range at Simultaneous mode.

Balanced: Balanced reduces the artifact. Appearance of the spectrum is inferior as compared with Spectrum mode.

NOTE: Not all probe have this prese

Auto CHI off in Simultaneous

Description	Turn off CHI in PW Simultaneous
Preset	On Utility -> Imaging -> PW, check the checkbox.
Values	If you select Spectrum mode with PW Simultaneous Priority, CHI image changes to the fundamental image automatically at Simultaneous mode for reduce the artifact.

CW Doppler - Continuous Wave Doppler (CWD) (Option)

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.

Works with the sector probes.

Non-Imaging

Provides only Doppler Spectrum and Audio for ascending/ descending aortic arch, other hard-to-get-to spaces or higher velocities.

Works with P8D, P6D and P2D as well.

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**.

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 Strain Elastography color map/bar appears, this image appears in dual image mode, and Strain Elastography imaging parameters appear on the right-side of the display below E.

You activate Strain Elastography via the **Elasto** key on user-defined hard key (If user is assign Elasto mode to User Defined Hard Keys).

Elasto is available on C1-5-RS, L6-12-RS, 12L-RS, 9L-RS, L4-12t-RS, L3-12-RS, E8Cs-RS, BE9CS-RS, IC9-RS, C1-6-D and ML6-15-RS probes.

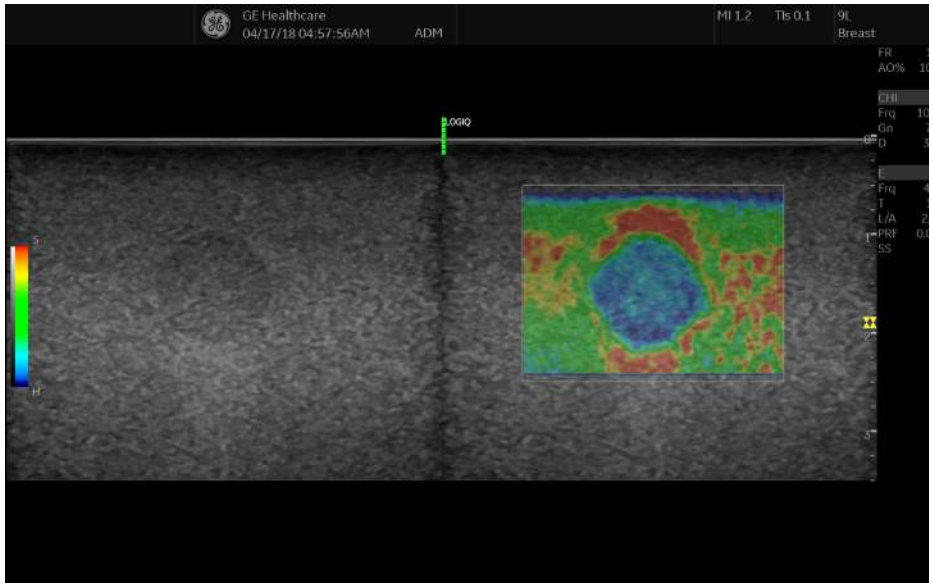


Figure 5-11. Strain Elastography Example

Activating Elastography

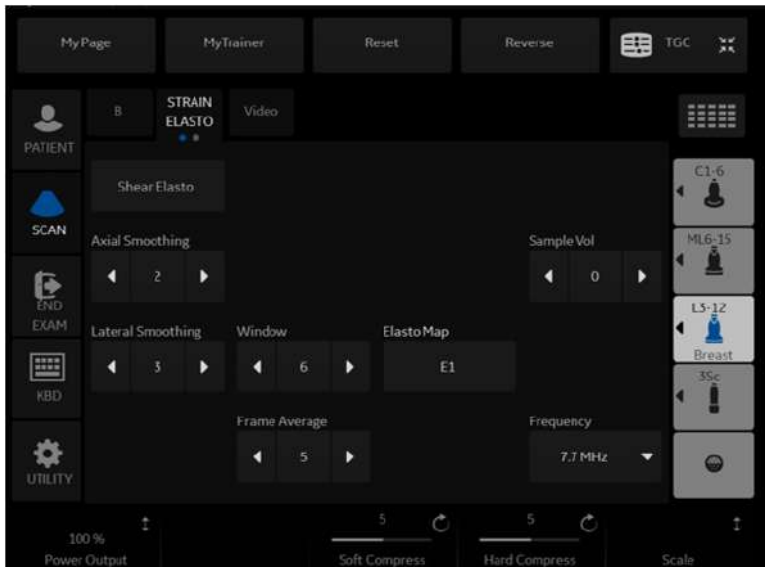


Figure 5-12. Strain Elastography Touch Panel 1

NOTE: You can specify which Strain Elastography controls you want to appear on the Touch Panel. You can set these via Utility -> Application -> Imaging Controls -> Clinical Controls Elasto.

Table 5-10: 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.
Sample Vol	Controls the transmit pulse length. A higher value means longer transmit pulse which gives better SNR (Signal to NoiseRatio) but reduces axial resolution.
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	Controls the strain elastography maps. Seven different maps are available with various contrast and color schemes, including a grayscale map.
Frame Average	Controls the persistence of the strain elastography images.
Frequency	Controls the transmit frequency.
Strain sensitivity	If S0 Map (in live) is selected, user can control strain sensitivity (SS).
Soft Compress	Individually controls the image enhancement for the softer than average tissues.

Table 5-10: Strain Elastography Touch Panel Description (Continued)

Parameter	Description
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.

Activating Elastography (continued)

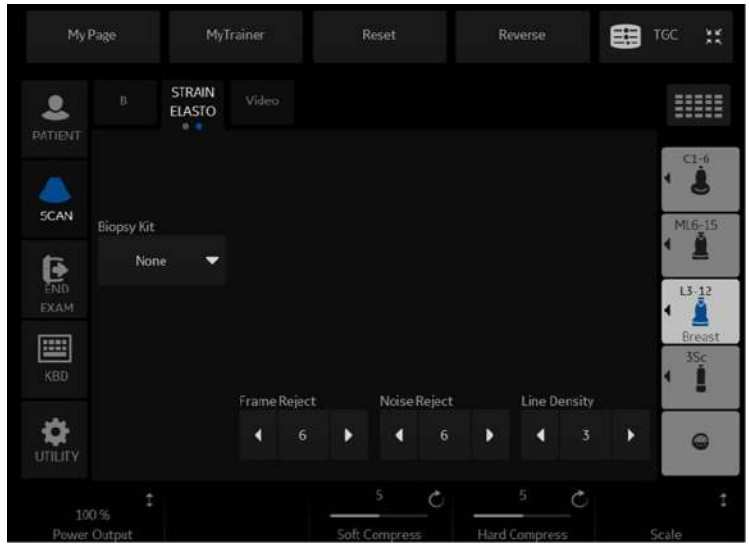


Figure 5-13. Strain Elastography Touch Panel 2

Table 5-11: Strain Elastography Touch Panel Description

Parameter	Description
Biopsy Kit	Biopsy Kit.
Sample Vol	Controls the transmit pulse length. A higher value means longer transmit pulse which gives better SNR but reduces axial resolution.
Frame Reject	Controls how many frames get rejected due to low quality vertical motion. A higher value means more frames get rejected. A rejected frame has a completely transparent ROI with the B-Mode background showing through.
Noise Reject	Controls how many frames get rejected due to lateral and elevational motion. A higher value means more frames get rejected. A rejected frame has a completely transparent ROI with the B-Mode background showing through.
Line Density	Optimizes B-Mode frame rate or spatial resolution for the best possible image.

How to Use

The 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 elastography contrast, reselect the Color Map.

If you need more resolution, increase Smoothing, increase Frequency, reduce Sample Volume, or reduce Window.

If you need a smoother image, increase Window, Smoothing, and Sample Volume.

If the images seem too flashy, decrease Frame Reject to 1.0 and Noise Reject to have consistent imaging throughout.

NOTE: Refer to Elastography Quantification of Chapter 13 Quantitative Analysis on how to use Elastography Quantification.

Application Parameters

You can set the Quality Bar and Quality Graph on the Utility--> Application--> Settings --> Elasto.

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

Strain Elastography maps

There are two (2) Strain Elastography maps: an E Map and a S Map.

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).

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.

Typical Exam Protocol

1. Press **Elasto** at the console to activate.
2. Adjust the position of the ROI to place the suspicious area at the center.
3. Adjust the size to include surrounding tissue.
4. 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.
5. Start the acquisition.
6. Freeze the image when desired frame is obtained. Using the trackball or "frame by frame" knob, select a frame on a plateau of the quality graph or when consistent frames with green bars are visualized.
7. Perform the measurement. The system prompts you through the measurement.

NOTE: To configure Strain Elastography settings, select Utility--> Imaging--> ELASTO.

Measurements

A/B Ratio

1. Press **Measure**.
2. Select A/B Ratio measurement and type Area.
3. Draw the first measurement at the elastography image and the second at the reference B-mode image.

NOTE: The two drawing areas should be placed at the borders of the lesion (B-Mode) and at the color pattern borders of the elastogram (Elastography image).

Measurements (continued)

E-Ratio

2D Measurement. Measures the elasticity index of a single ROI and calculates the ratio between two ROIs. You can label two different regions. You can also set the ROI on a reference screen (B mode) with dual screen.

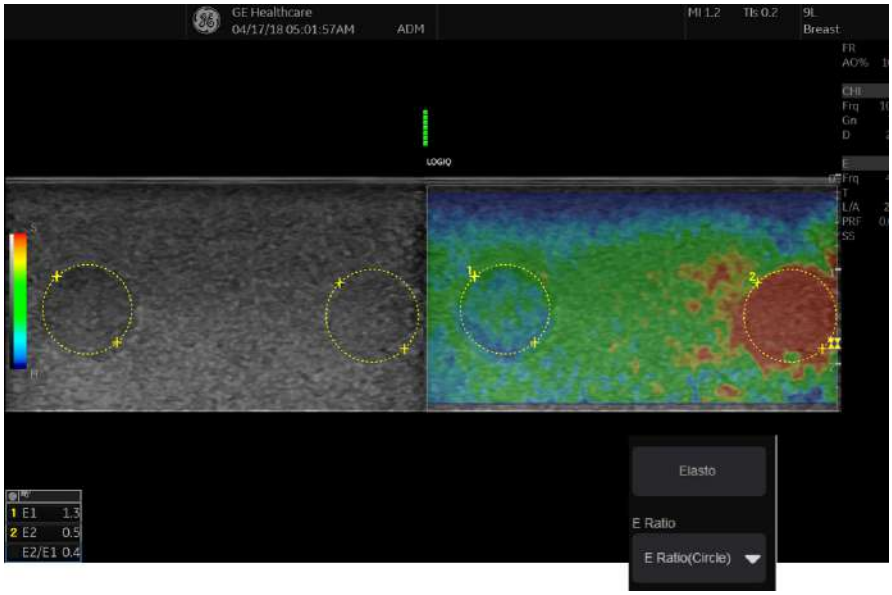


Figure 5-14. 2D Measurements

1. Press **Measure**.
2. Select E-Ratio measurement and type Circle or Area.
3. Draw the first measurement at the reference tissue and the second at the lesion of interest. This measurement results in the calculation of the ratio of the E-Indexes of the two areas (reference and lesion).

NOTE: These two areas should be approximately at the same depth (side-by-side position) and size.

NOTE: The value represents how many times stiffer the lesion is comparing to the reference tissue. If E-Ratio is less than 1, the lesion is softer than the reference tissue.

Measurements (continued)

E-Index

Definition. Elasticity index (E) is defined as the value from 0.0 to 6.0. This index shows the color distribution within the measured circle (ROI) relative to the whole ROI box. A higher value means “higher stiffness” and “blue color is dominant”.

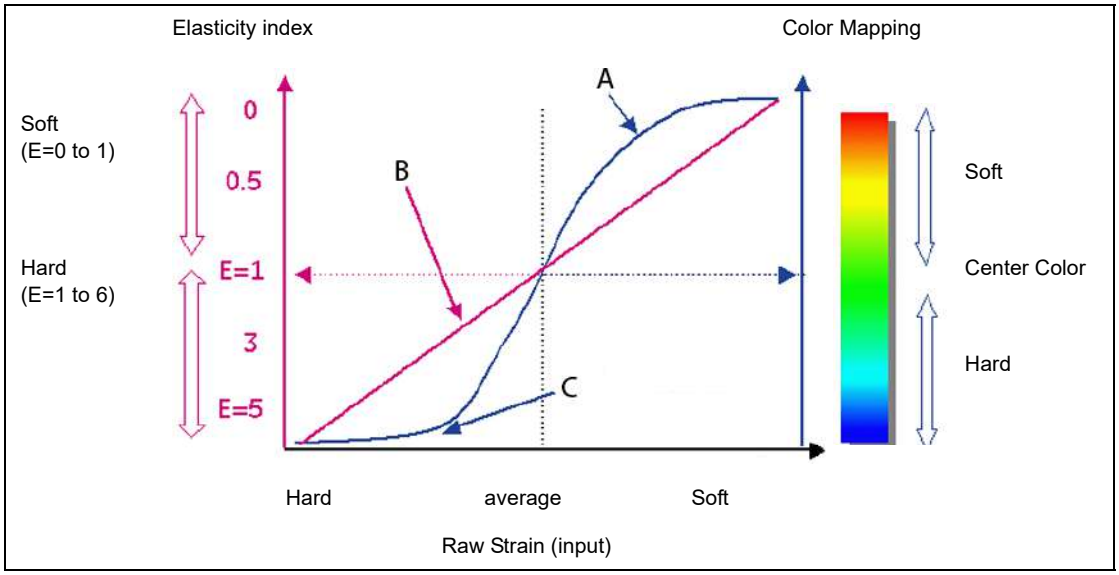
Elasto Raw Data has two data sets of index and color for each pixel. Therefore, this index is not affected by the color appearance change (color map and hard/soft compression). Index detects smaller strain difference of hard region by a assigning wider dynamic range for a smaller strain.

1. Press **Measure**.
2. Select Elasto measurement.
3. Draw the circle at the lesion of interest either on the elastogram or the B-Mode image. This measurement gives an absolute value between 0 (softest) and 6 (hardest).

NOTE: The circle should be placed at the borders of the lesion (B-Mode) or at the color pattern borders of the elastogram (Elastography image).

Measurements (continued)

Table 5-12: Elastography Index / Raw Strain Graph

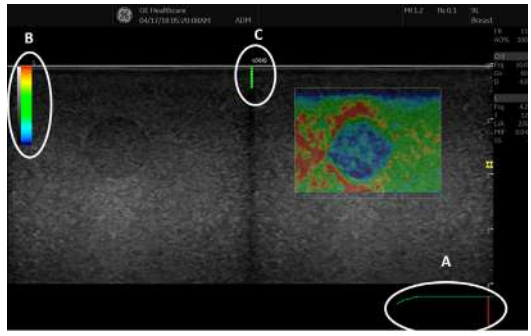
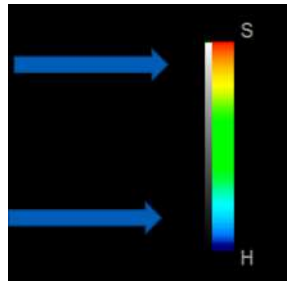


a. Compression Curve is given by Soft/Hard compress key
b. Unique Line (not changed by user)
c. Signal is much compressed for color score/appearance

Strain Elastography Quick Card

Strain Elastography Basics

Table 5-13: Strain Elastography

Graphic	Description
Manual Compression: 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 (ROI’s size = x3 dimension of the lesion per axis). Manual compression depends on the type of probe. 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. *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.* *Note 2: Keep the lesion within the image and watch the quality graph for consistent high nearly flat (plateau-like) peaks.*	**Select the frame to analyze** 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).  *Image 1: Elastography image with quality graph (A), quality bar (B) and elasto color bar (C).* The relation between elastogram colors and area’s stiffness is given at the elastography color bar (Image 1, C). Less Stiff Stiffer 

Strain Elastography Basics (continued)

Table 5-14: Clinical Applications

Application	Compare the suspicious lesion with:	Probe
Breast	A fatty area in the breast or the average rounding breast tissue.	• ML6-15-RS • 12L-RS • L4-12t-RS • L6-12-RS • L3-12-RS • 9L-RS
Thyroid	A normal area in the parenchyma of the gland.	• ML6-15-RS • 12L-RS • L4-12t-RS • L6-12-RS • L3-12-RS • 9L-RS
MSK	A normal area in the same part of the body.	• ML6-15-RS • 12L-RS • L4-12t-RS • L6-12-RS • L3-12-RS • 9L-RS
Liver	A normal area in the parenchyma of the liver.	• 9L-RS • C1-5-RS • C1-6-D
Prostate	A normal area in the parenchyma of the prostate.	• E8Cs-RS • BE9CS-RS • IC9-RS
Uterus	A normal area in the parenchyma of the uterus.	• E8Cs-RS • IC9-RS

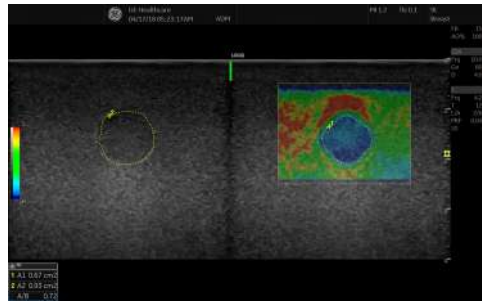
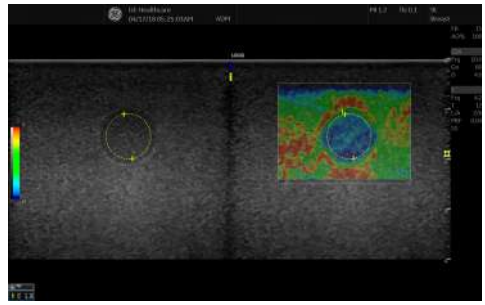
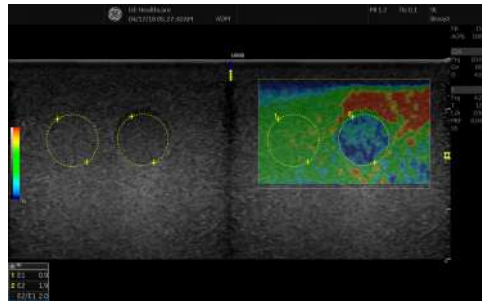
Strain Elastography Basics (continued)

Table 5-15: Strain Elastography Adjustments

Tool	Definition	Clinical Use
Frequency (1)	Range depends on probe.	Adjust the frequency depending on the suspicious lesion's depth. Lower frequency enhances sensitivity of the elastogram.
Scale (2)	Defines the elasto sensitivity to the manual compression speed.	Adjust the scale depending on user's compression speed. Perform two compressions per second (scale value between 0.1-0.18). For different speed, decrease the scale for slower technique and increase for faster. Additionally, deeper lesions demand harder and slower compression, decrease for this case.
Frame Average (3)	Temporal filter to enhance the smoothness of the elasto colors appearance.	Adjust the frame average inversely to scale. Decrease when scale is increased and increase when scale is decreased.
Frame Reject (4)	Defines the level of quality bar that frames are rejected.	Adjust the frame reject especially in Abdominal scanning (A weak signal is most often seen in ABD scanning when compressions are controlled by the internal body movement). Decrease frame reject to acquire an elastogram with lower than max quality at the quality bar but still a good elastogram.
Map (5)	Defines the relation between elasto color and tissue stiffness.	Adjust the Elasto map to provide a different visualization of the elastogram colors. Set to E3-E4 in order to have more redblue color levels instead of green (it is hard to recognize the small difference between many green tones). These maps are separating the elastogram color bar in three equal parts (redgreen-blue). Additionally, use E-Invert to invert the color indication for soft and hard tissue (red-hard, blue-soft).
Transparency	Defines the transparency of the overlaid elastogram in relation to B-mode. Controlled by CF gain.	Adjust the transparency to change the appearance of the elastogram. Decrease transparency in order to create an elastogram with more vivid colors.

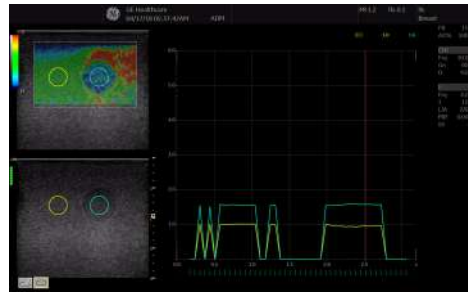
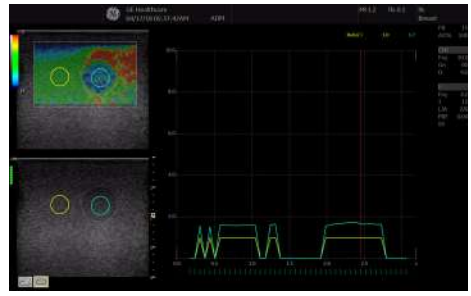
Strain Elastography Basics (continued)

Table 5-16: Strain Elastography Measure

A/B Ratio* • Press “measure.” • Select “A/B Ratio” measurement and type “Area.” • Draw the first measurement at the elastography image (right) and the second at the refernce B-mode image (left). *TIP: The two drawing areas should be placed at the borders of the lesion (B-Mode) and at the color pattern borders of the elastogram (Elastography image).*	
E-Index* • Press “measure.” • Select “Elasto” measurement. • Draw the circle at the lesion of interest either on the elastogram or the B-Mode image. This measurement gives an absolute value between 0 (softest) and 6 (hardest). *TIP: The circle should be placed at the borders of the lesion (B-Mode) or at the color pattern borders of the elastogram (Elastography image).*	
E-Ratio* • Press “measure.” • Select “E-Ratio” measurement and type “Circle or “Area.” • Draw the first measurement at the reference tissue and the second at the lesion of interest. This measurement results in the calculation of the ratio of the E-Indexes of the two areas (reference and lesion). *TIP: These two areas should be approximately at the same depth (side-by-side position) and size.* *Note: The value represents how many times stiffer the lesion is comparing to the reference tissue. If E-Ratio is less than 1, the lesion is softer than the reference tissue.*	
* Not for sale in the United States. Not cleared for use by the United States FDA.	

Strain Elastography Basics (continued)

Table 5-17: Strain Elastography Measure Cine or Mulit-frame measurements

QAnalysis	
1. Acquire a cine loop (10 compressions or 5 sec) 2. Press “QAnalysis” at the cine tab at the touch panel.. 3. Push Run/Stop at the touch panel. 4. Select a frame that the full size of the lesion is visualized. 5. Select to draw either areas or circles at the left bottom of the screen (Image, 1). 6. Draw the ROI first at the reference tissue and then at the lesion (like E-Ratio measurement). *Note: The two graphs represent the value of E-index of each frame. The exact value of E-Index for the selected frame (red line, image, 2) is indicated at the right, top side of the screen (Image, 3).* 7. Press “Ratio” on the touch panel. The graphs represents the E-Ratio value of each frame. *Note: The exact value of E-Ratio for the selected frame (red line, Image, 2) is indicated at the right, top side of the screen (Image, 4).* *TIP: The maximum number of ROIs is up to 8, one for the reference tissue and 7 for lesions.*	 

Shear Wave Elastography

CAUTION

Use Shear Wave Elastography as a complement to other techniques when making a diagnostic decision.

Overview

Shear wave elastography on the LOGIQ P8/P9/P10 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 P8/P9/P10 include;

1. Correctly placing a user-specific region of interest (ROI) over the anatomy of interest.
2. The user activates the shear wave analysis mode where the shear wave generation and tracking occurs.
3. 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)

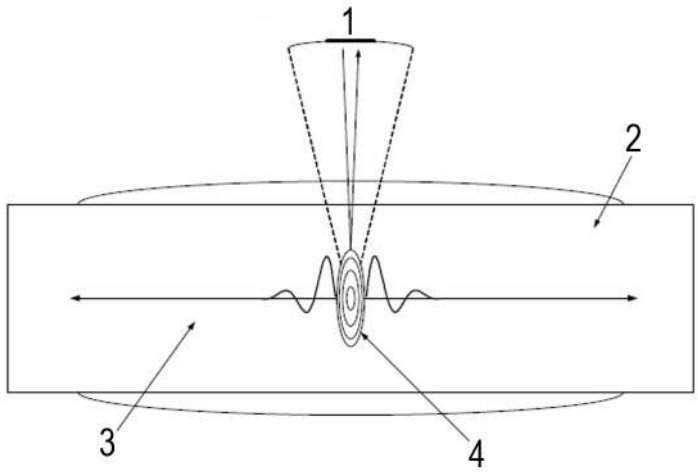


Figure 5-15. Shear wave Probe Characteristics

1. Excitation and imaging transducer
2. Tissue
3. Propagating Wave
4. Focus

Intended Uses

Shear wave elastography Intended Uses are:

- Abdomen
- Small Parts
- Musculoskeletal
- Urology
- Gyn

CAUTION

Shear wave elastography IS NOT intended for use for Obstetrical exams.

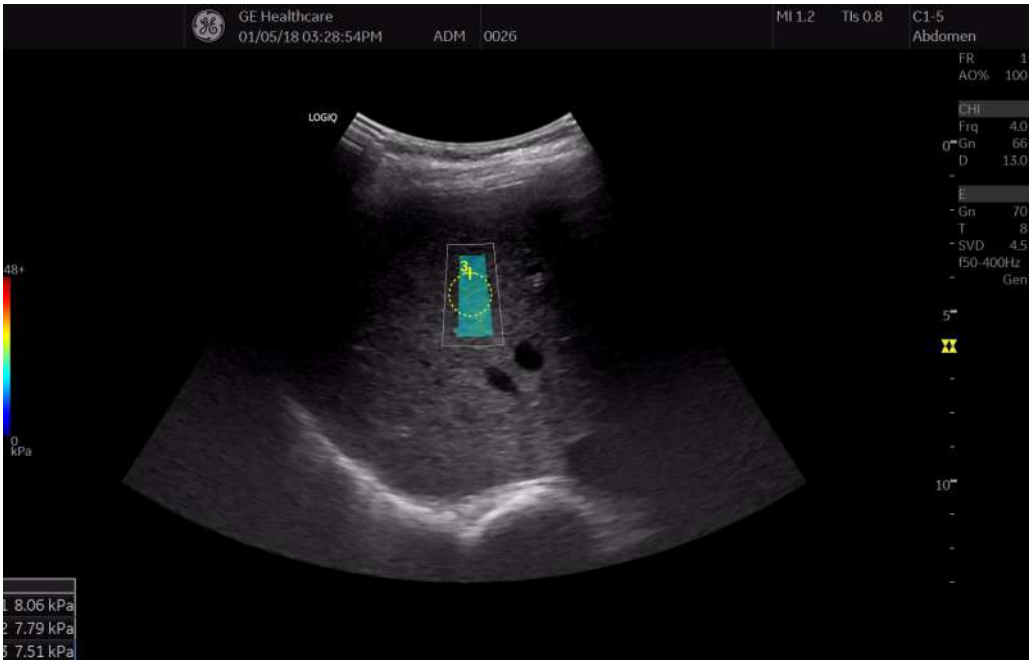


Figure 5-16. Shear Wave Elastography Mode

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 Abdomen, Small Parts, Urology and Gyn)

Imaging Parameters

To configure Shear Wave Elastography settings, select Utility--> Imaging--> ELASTO.

- Acoustic Output (%)
- 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 (SW) Maps plus other ELASTO (E) Maps.
- Quality - Check to enable Quality function on touch panel.
- Quality Map - Select shear wave Quality Maps (SWQ0 or SWQ1)
- Enter ELASTO DualView by Default — Check to select entering shear wave in DualView.

Imaging Parameters (continued)

Shear wave Color Bars:

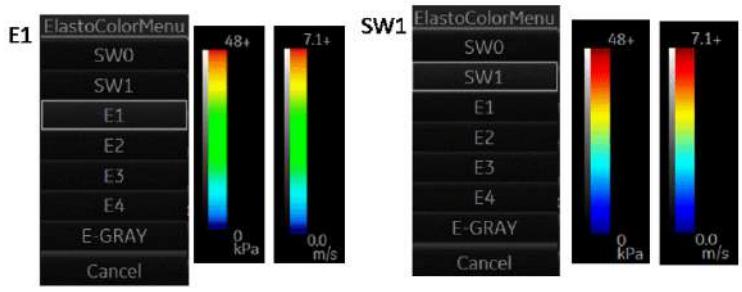


Figure 5-17. Shear wave maps

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 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:

- Auto Shear Measure Fixed Size - Sets to ON to move the shear wave measurement circle with keeping the fixed size.
- Auto Shear Measure Size — Sets the Default Diameter size of the shear wave measurement circle
- 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)
- 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

On the Utility--> Measure--> Advanced--> Small Parts page, specify the Calculation Method (Mean/Median).

- Auto Shear Measure Size - Sets the Default Diameter size of the shear wave measurement circle.
- Auto 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

1. To activate shear wave, press **ELASTO**.
2. To position and size the shear wave ROI, adjust the top Trackball control.
3. To Start or return to Pre-Mode shear wave, touch the right-most Trackball control.
4. To perform measurements, activate the Measure control.

ELASTO -- When you activate ELASTO, the default Elasto Mode appears on the display and Touch Panel. In this example, shear wave was preset as the default Elastography Mode.

Shear Wave Display

Shear wave displays as follows while performing a measurement:

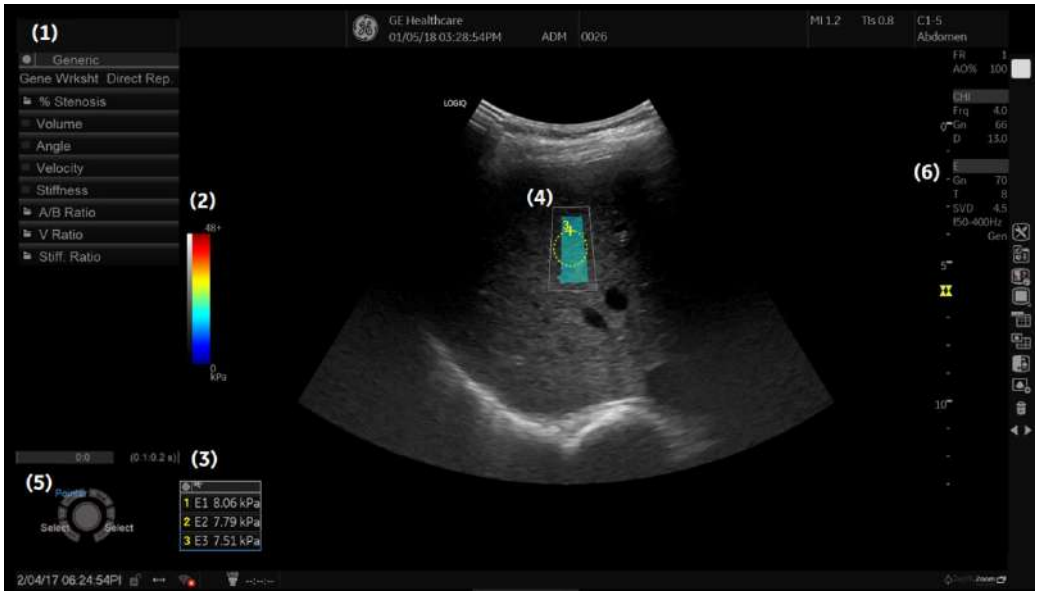


Figure 5-18. Shear wave Display with Measurement

1. Measurement Window
   Always display in Abdomen measurement.
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
   - AO% = Acoustic Output Percentage
   - f50-200Hz = Shear Wave Vibration Frequency -- Displays the normal and image frequency range.
   - Gen = General.
     "Gen" appears when viewing an image where general settings were applied.

Shear Wave Quality Indicator

The Shear Wave Quality Indicator displays the reliabiliy 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.

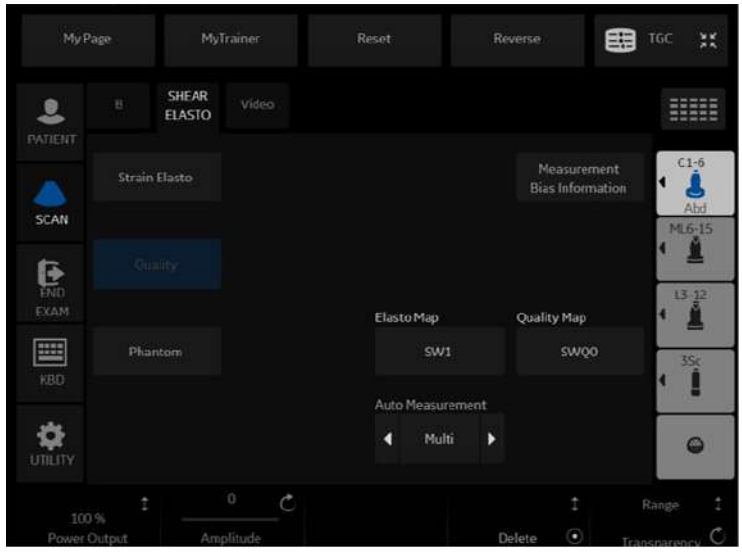


Figure 5-19. Quality Image Button

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.

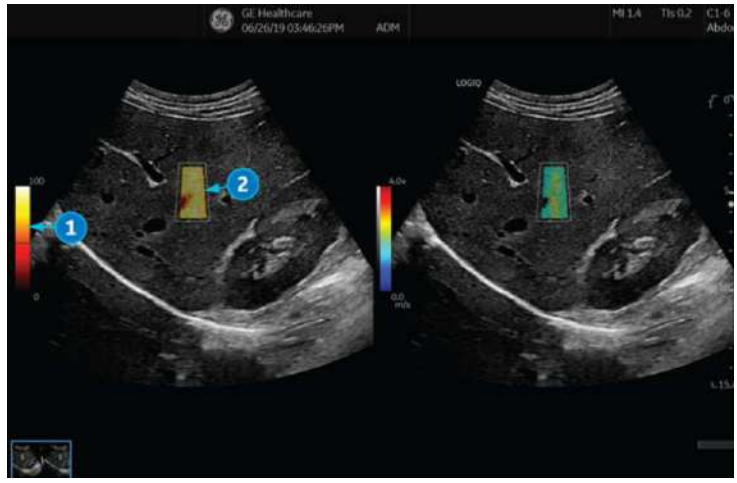


Figure 5-20. Shear Wave Display with Quality Image Enabled

Color Bar for Quality Image

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 qualiy 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 qualiy)
- SWQ1 - Red/orange/yellow/green (low to high quality)

Shear Wave Touch Panel

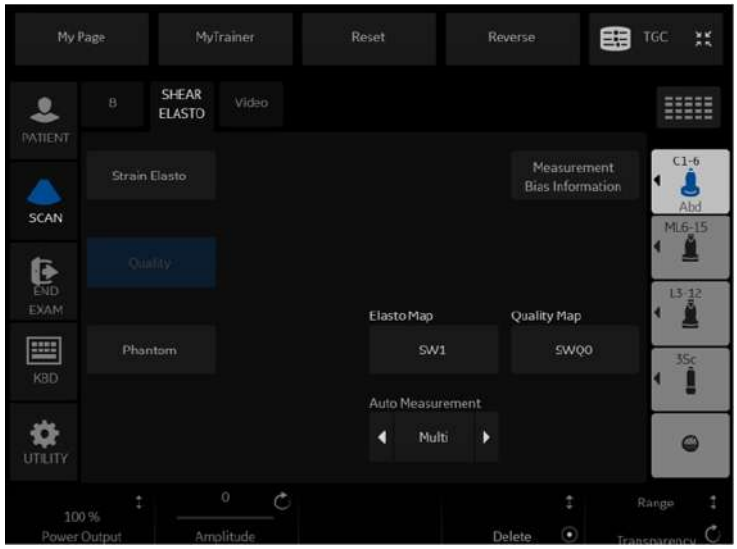


Figure 5-21. Shear wave ELASTO Touch Panel

Table 5-18: Shear Wave Elastography Touch Panel Parameters

Preset Parameter	Description
Strain Elasto	Toggle touch key between Strain and shear wave elastography.
Measurement Bias Information	Press to bring up measurement bias information. See ‘Measurement Bias Information Table’ on *page 5-119* .
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 CIRS website at http://www.cirsinc.com/products/all/74/elasticity-qa-phantoms/?details=specs .
Map	Shear wave Color Map.
Auto Measurement	Only available in Abdomen measurement. Off, Single or Multi Single: When 1 frame of SWE acquisition is completed, the system freezes, enters measure status, and the active measurement circle is placed automatically. Multi: After taking multi frame SWE acquisition, it1s possible to take measurement without scrolling image.
Power Output	The acoustic output of the shear wave.
Range	Min/Max Velocity, or Stiffness displayed.
Transparency	The transparency of the shear wave image overlay.
Delete	You can delete the selected ShearWave measurement.

Table 5-18: Shear Wave Elastography Touch Panel Parameters

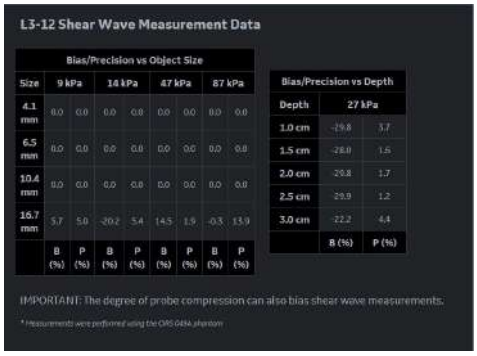
Preset Parameter	Description
Quality	Press the Qualiy button to open the Quality Indicator screen (while in Dual Mode).

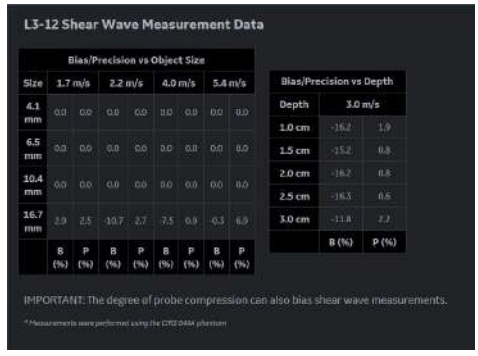
Measurement Bias Information Table

The Measurement Bias Information table displays 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.

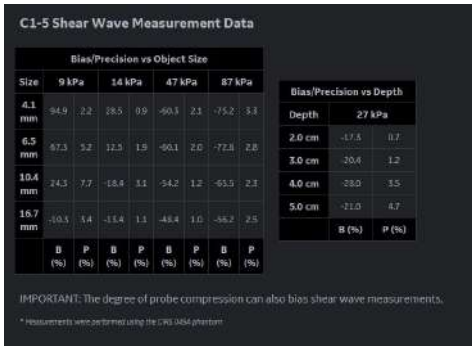
Table 5-19: Measurement Bias Information Tables

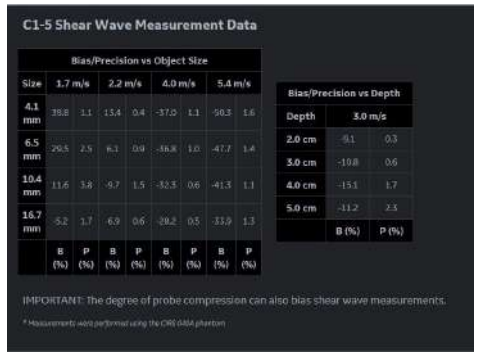
Measurement Bias Information Table for the L3-12-RS Probe (Stiffness on the left and Velocity on the right)





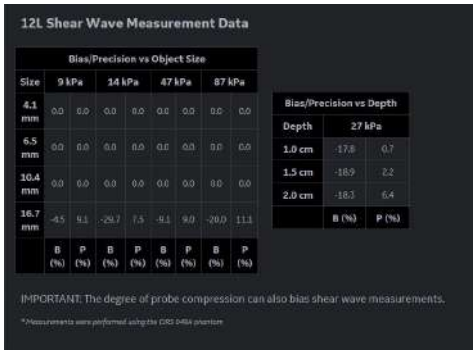
Measurement Bias Information Table for the C1-5-RS Probe (Stiffness on the left and Velocity on the right)





Measurement Bias Information Table for the 12L-RS Probe (Stiffness on the left and Velocity on the right)

Table 5-19: Measurement Bias Information Tables



12L Shear Wave Measurement Data

Bias/Precision vs Object Size

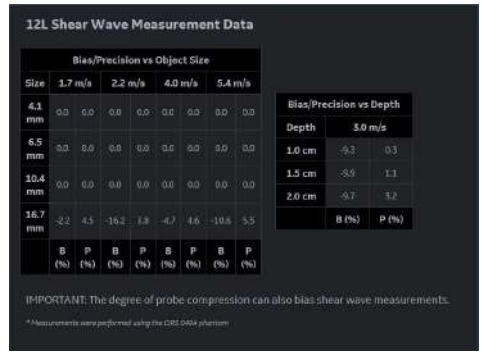
Size	9 kPa		14 kPa		47 kPa		87 kPa	
4.1 mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.5 mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.4 mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.7 mm	-4.5	9.1	-29.7	7.5	-9.1	9.0	-20.0	11.1
	B (%)	P (%)	B (%)	P (%)	B (%)	P (%)	B (%)	P (%)

Bias/Precision vs Depth

Depth	27 kPa	
1.0 cm	-17.8	0.7
1.5 cm	-18.9	2.2
2.0 cm	-18.3	6.4
	B (%)	P (%)

IMPORTANT: The degree of probe compression can also bias shear wave measurements.

* Measurements were performed using the CIRS 049A phantom



12L Shear Wave Measurement Data

Bias/Precision vs Object Size

Size	1.7 m/s		2.2 m/s		4.0 m/s		5.4 m/s	
4.1 mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.5 mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.4 mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16.7 mm	-2.2	4.5	-16.2	1.8	-4.7	4.6	-10.6	5.5
	B (%)	P (%)	B (%)	P (%)	B (%)	P (%)	B (%)	P (%)

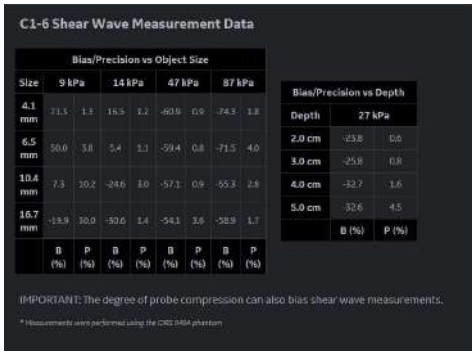
Bias/Precision vs Depth

Depth	3.0 m/s	
1.0 cm	-9.3	0.3
1.5 cm	-9.9	1.1
2.0 cm	-9.7	3.2
	B (%)	P (%)

IMPORTANT: The degree of probe compression can also bias shear wave measurements.

* Measurements were performed using the CIRS 049A phantom

Measurement Bias Information Table for the C1-6-D Probe (Stiffness on the left and Velocity on the right)



C1-6 Shear Wave Measurement Data

Bias/Precision vs Object Size

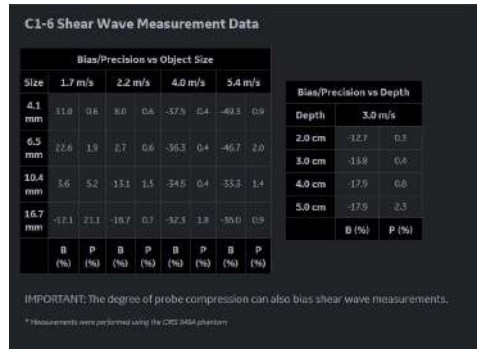
Size	9 kPa		14 kPa		47 kPa		87 kPa	
4.1 mm	71.5	1.3	16.5	1.2	-60.9	0.9	-74.3	1.8
6.5 mm	50.0	3.8	5.4	1.1	-59.4	0.8	-71.5	4.0
10.4 mm	7.3	10.2	-24.6	3.0	-57.1	0.9	-55.3	2.8
16.7 mm	-13.9	30.0	-30.6	1.4	-54.1	3.6	-58.9	1.7
	B (%)	P (%)	B (%)	P (%)	B (%)	P (%)	B (%)	P (%)

Bias/Precision vs Depth

Depth	27 kPa	
2.0 cm	-23.8	0.6
3.0 cm	-25.8	0.8
4.0 cm	-32.7	1.6
5.0 cm	-32.6	4.5
	B (%)	P (%)

IMPORTANT: The degree of probe compression can also bias shear wave measurements.

* Measurements were performed using the CIRS 049A phantom



C1-6 Shear Wave Measurement Data

Bias/Precision vs Object Size

Size	1.7 m/s		2.2 m/s		4.0 m/s		5.4 m/s	
4.1 mm	11.0	0.6	8.0	0.6	-37.5	0.4	-49.3	0.9
6.5 mm	22.6	1.9	2.7	0.6	-36.3	0.4	-46.7	2.0
10.4 mm	3.6	5.2	-13.1	1.5	-34.5	0.4	-33.3	1.4
16.7 mm	-12.1	21.1	-16.7	0.7	-32.5	1.8	-35.0	0.9
	B (%)	P (%)	B (%)	P (%)	B (%)	P (%)	B (%)	P (%)

Bias/Precision vs Depth

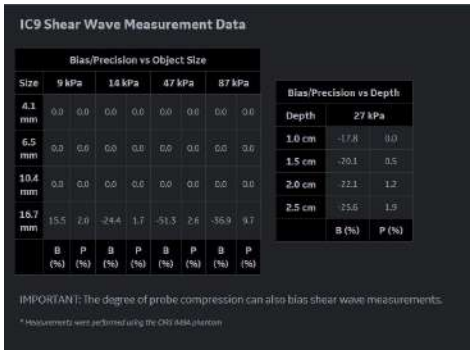
Depth	3.0 m/s	
2.0 cm	-12.7	0.3
3.0 cm	-13.8	0.6
4.0 cm	-17.9	0.8
5.0 cm	-17.9	2.3
	B (%)	P (%)

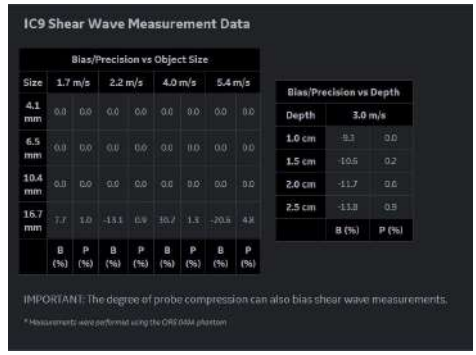
IMPORTANT: The degree of probe compression can also bias shear wave measurements.

* Measurements were performed using the CIRS 049A phantom

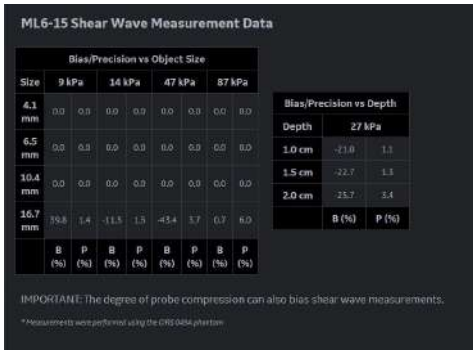
Measurement Bias Information Table for the IC9-RS Probe (Stiffness on the left and Velocity on the right)

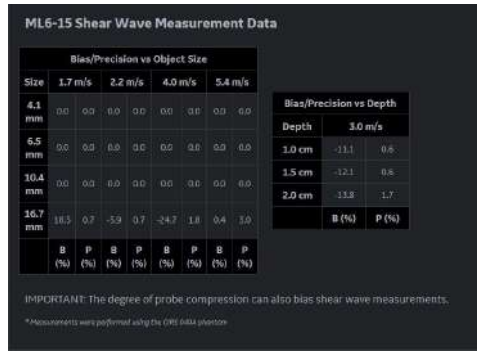
Table 5-19: Measurement Bias Information Tables





Measurement Bias Information Table for the ML6-15 Probe (Stiffness on the left and Velocity on the right)





Speed Ranges and Accuracy are shown at the top of the Bias/ Precision vs Object Size tables.

Using Shear Wave (SWE)

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.

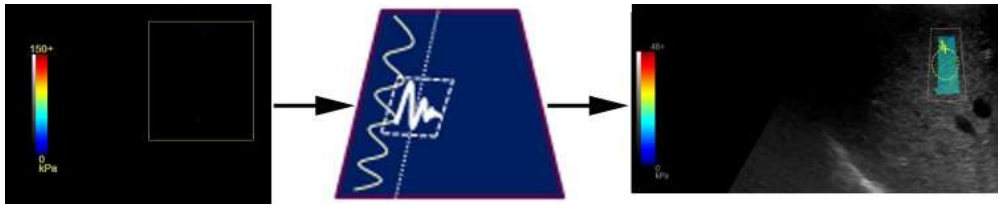
- Shear wave acquisition

  Pressing the “Start" set key initiates SWE acquisition.

- Post-shear wave acquisition (Freeze)

  The system displays the acquired SWE image and background B-mode image. The User can cycle through the acquired frames, perform measurements, and annotate the image.

SWE images can be stored in both raw data and DICOM format.



Pre-Shear wave Mode | Shear wave Acquisition | Post-Shear wave Acquisition

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 measurement 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)

11. 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.

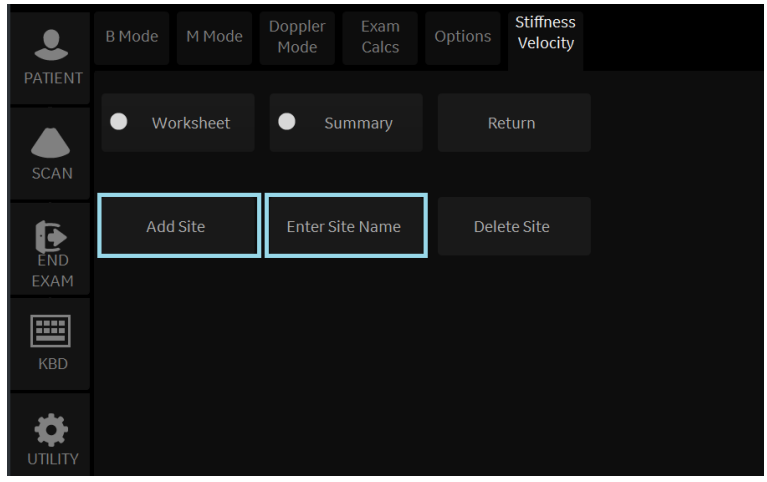


Figure 5-22. Add Additional Shear Wave Site and Enter Site Name

*NOTE: If you no longer need the added site, you can select to delete the site via **Delete Site** on the Touch Panel.*

12. 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.

How to use “Auto”

Only available in Abdominal application.

Single

1. Select Single for ***Auto***.
2. Freeze the image when desired frame is obtained.
3. The system enters the measure status and the active measurement circle is placed automatically.
4. Position and size the ROI manually.
5. Press any of the print button.
   - The measurement result is fixed.
   - Print action is performed with each Print button setting.
   - The system unfreezes automatically.
6. Repeat steps 2 through 5 for the remaining samples.

Multi

1. Select Multi for ***Auto***.
2. After taking multi frame SWE acquisition, the system displays the first frame and starts SWE measurement automatically.
3. Fix the first measurement. The system displays next frame automatically.
4. Continue the measurement for the remaining samples

Shear Wave Measurements

The higher the velocity, the stiffer the tissue.

Types of shear wave measurements

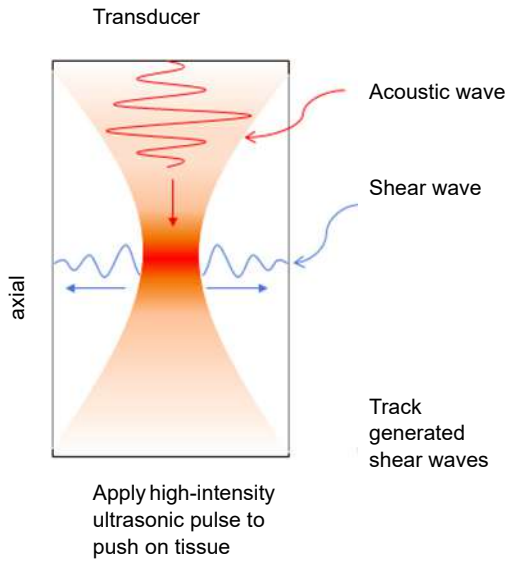
There are two types of measurement units for quantifying stiffness:

- 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.

Types of shear wave measurements (continued)



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 he Musculoskeletal and Prostate Model and is not needed in Abdomen and Breast.

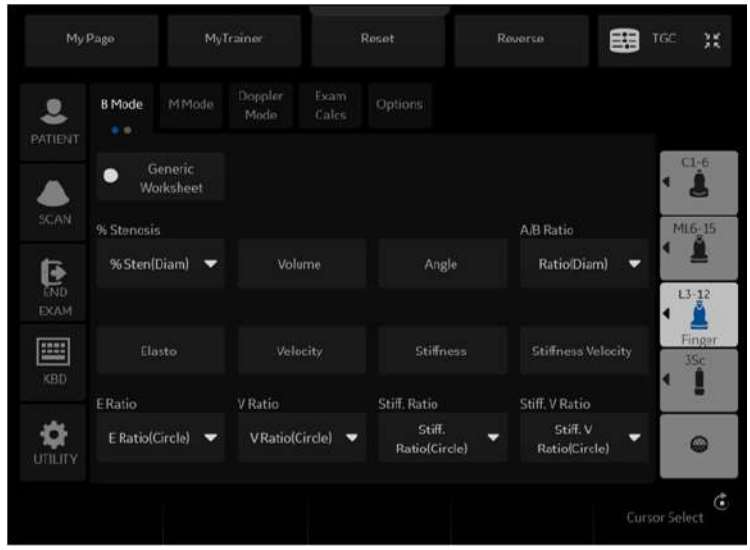


Figure 5-23. Shear wave Measurement Touch Panel (Finger)

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 Model unless you use the Auto Shear Measure Fixed Size 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.

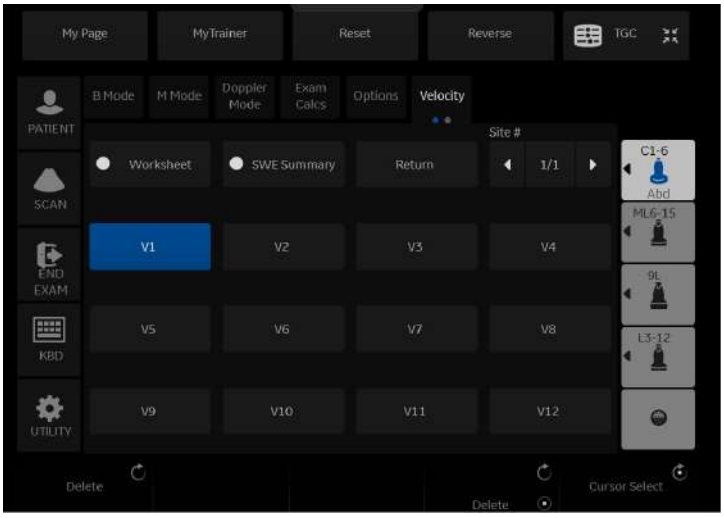


Figure 5-24. Measurement Auto Sequence (Velocity - Abdomen)

Measurement Analysis (continued)

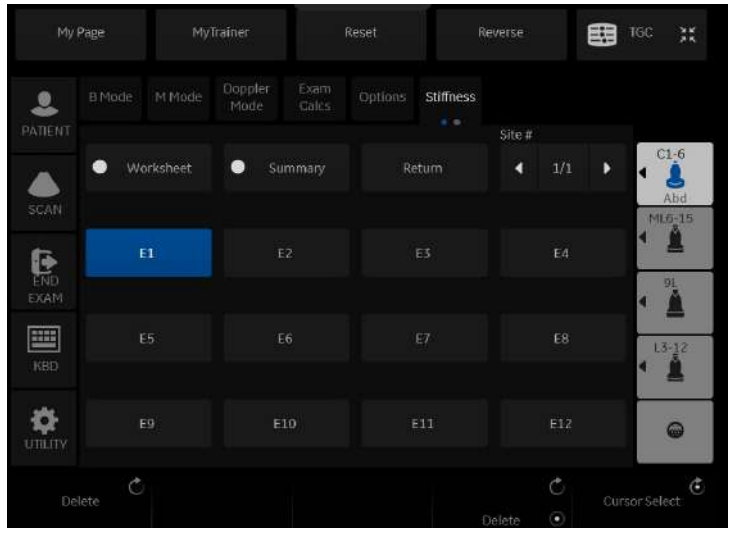
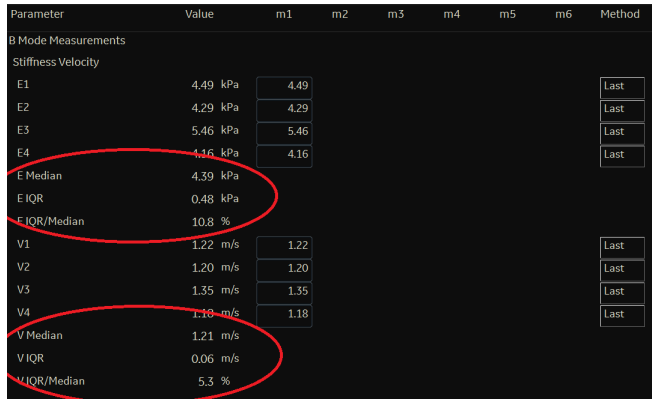


Figure 5-25. Measurement Auto Sequence (Stiffness - Abdomen)

5. Measurements are transferred to the Worksheet.



Parameter	Value	m1	m2	m3	m4	m5	m6	Method
B Mode Measurements								
Stiffness Velocity								
E1	4.49 kPa	4.49						Last
E2	4.29 kPa	4.29						Last
E3	5.46 kPa	5.46						Last
E4	4.16 kPa	4.16						Last
E Median	4.39 kPa							
E IQR	0.48 kPa							
E IQR/Median	10.8 %							
V1	1.22 m/s	1.22						Last
V2	1.20 m/s	1.20						Last
V3	1.35 m/s	1.35						Last
V4	1.18 m/s	1.18						Last
V Median	1.21 m/s							
V IQR	0.06 m/s							
V IQR/Median	5.3 %							

Figure 5-26. Shear wave Worksheet

*NOTE: The measurements' Median and Inter-Quartile Range (IQR) are displayed by default on the display and on the Worksheet (see red circled item in the figure above.) To also display the measurements' mean and standard deviation, go to Utility--> Measure, select **Stiffness** or **Velocity** folder, and under **Available Folders and Measurements** checkmark the **E Mean** and **E Std** selections.*

Measurement Analysis (continued)

HINTS

You can re-calculate the sample in the middle of the auto sequence.

For example;

1. Perform measurement of V1 -> V2 -> V3.
2. Press **Clear** to to deactivate the active measure circle of V4.
3. Select desisred folder you want recalculate on the Touch Panel and perform measurement.
4. Press **Set** to fix the measurement result.
5. Measure V4 is activated automatically.

Measurement Information

Shear wave Measurements and Accuracies:

Table 5-20: 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 L3-12-RS and ±15%, or 0.5 m/s, for the C1-5-RS, C1-6-D, ML6-15-RS, 12L-RS, IC9-RS, 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 L3-12-RS and 30%, or 0.75 kPa, for the C1-5-RS, C1-6-D, ML6-15-RS, 12L-RS, IC9-RS, 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

rho = 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 P8/P9/P10. Absolute values for these measurements may vary among different measurement devices.

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.
- Use a smaller ROI for faster Frame Rates
- 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.

Using 3D

Overview

DO NOT scan any pacemaker patient using the sensor device. The magnetic fields emitted from the device may interfere with the pacemaker operation.

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, sagitta and coronal.

There are two 3D Packages:

Table 5-21: 3D Package Options

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

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 he curved probe (i.e. intercostal liver scan 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 degree.
4. To start acquiring the image, press ***Start*** (left 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*** (right 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

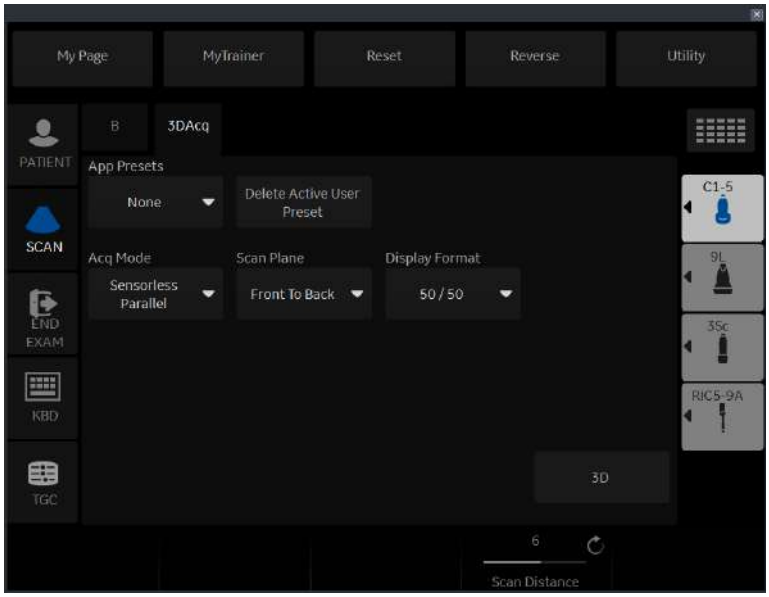


Figure 5-27. 3D Acquisition

Table 5-22: 3D Acquisition Description and Instructions for Use

3D Parameter	Description
App (Application) Presets	Selections: None, OB - Baby Face, Vascular, User 1, User 2, User 3 **None**. No application preset applied. **OB - Baby Face.** After having scanned in this mode, certain rendering parameters are set automatically. The gray surface mode is activated and the texture mode is switched off. The gray surface mode values for opacity and threshold are set automatically according to the datasets histogram. **Vascular**. Available only with Advanced 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.
Delete Active User Preset	Select to delete a user preset (User 1, User 2, or User 3).

Table 5-22: 3D Acquisition Description and Instructions for Use (Continued)

3D Parameter	Description
Acquisition Mode	Selections: Sensorless Parallel, Sensorless Sweep **Sensorless Parallel**. In this mode the probe must be moved during 3D data acquisition without angling it. You should scan the object you want to render in 2-4 seconds. The speed at which you scan should be constant. No sensor is mounted on the probe. • Since the time for rendering 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 rendering (interpolation). Therefore, low frame rate = long render times. **Sensorless Sweep**. In this mode the probe must be moved to a position where you can clearly see a middle cut of the object you want to scan and render. Tilt the probe to about 30 degrees until the object you want to scan disappears. Start the acquisition and tilt the probe over a distance of around 60 degrees until the object disappears again. The entire scan time should be around 2-4 seconds. During the sweep, the probe may not be moved parallel, just tilted. No sensor is mounted on the probe. Before starting an acquisition, take care that the transmitter is positioned correctly during data acquisition and that the transmitter cannot move.
Scan Plane	Selections: Front to Back, Side to Side **Front to Back**. After having scanned in this mode, the rendered dataset is shown in a frontal view. For acquiring a fetal face in sagittal cuts, use this mode. **Side to Side**. After having scanned in this mode, the rendered dataset is shown from a side view. For acquiring a fetal face in coronal cuts, use this mode.
Display Format	**50/50.** Display in Dual Image (2D and 3D). **Only 2D.** Display in Single Image.
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 3D acquisition, the volume of interest's width can be enlarged or reduced. You can adjust the shape 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 60 degrees for a sweep scan.

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.

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.

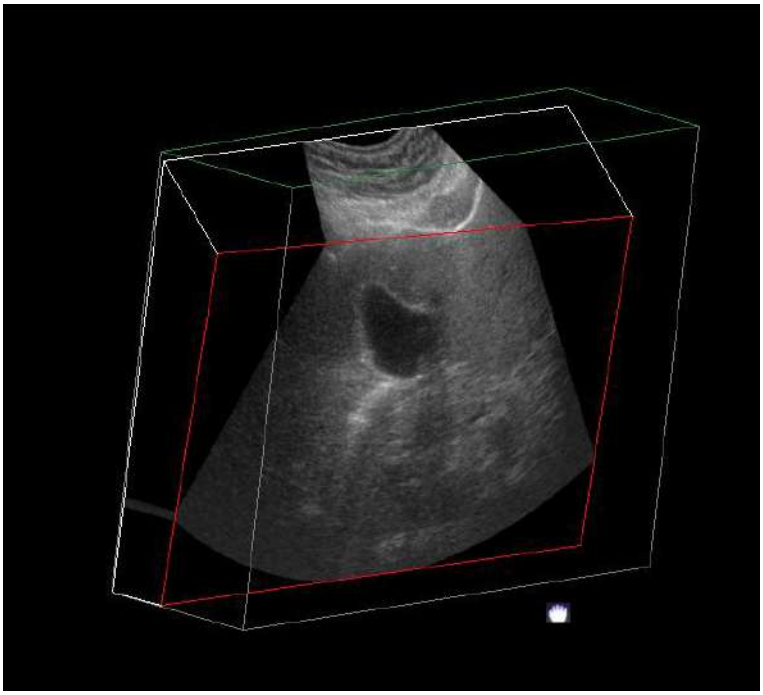


Figure 5-28. Manipulating the 3D Volume of Interest (White Hand)

Moving Through the 3D VOI

You can move through the 3D VOI using the red hand. Press Set when the red pointer finger is positioned on the red box. Move the closed red hand to move through the 3D VOI.

NOTE: Any plane in the volume can be made active (highlighted with red box) by clicking on it.

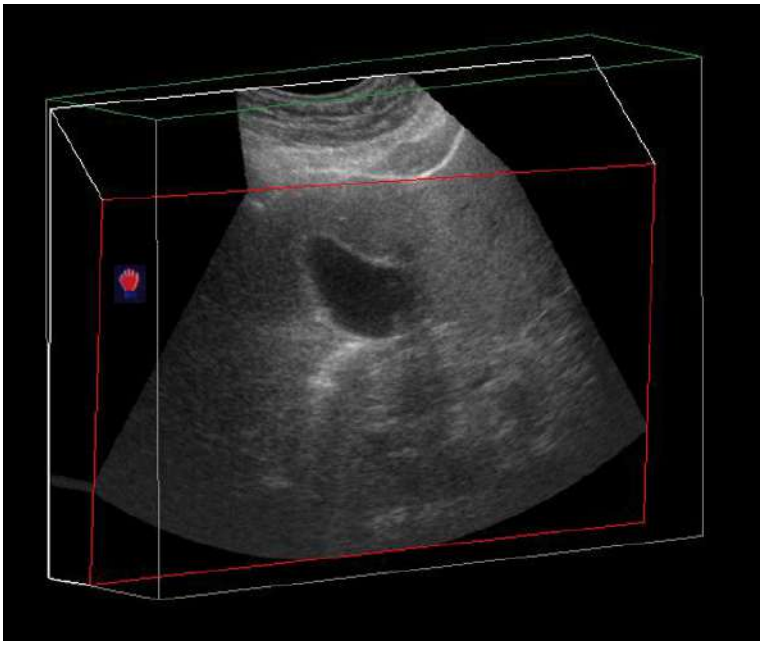


Figure 5-29. Moving through a 3D Volume of Interest (Red Hand)

Viewing Specific Portions of the Anatomy

You can pull back tissue to view specific portions of anatomy using the yellow hand. Press Set when the yellow pointer finger is positioned on the yellow box. Move the closed yellow hand to manipulate the 3D VOI.

NOTE: This actually moves an edge. A yellow hand appears only when the pointer is on an edge of the VOI.

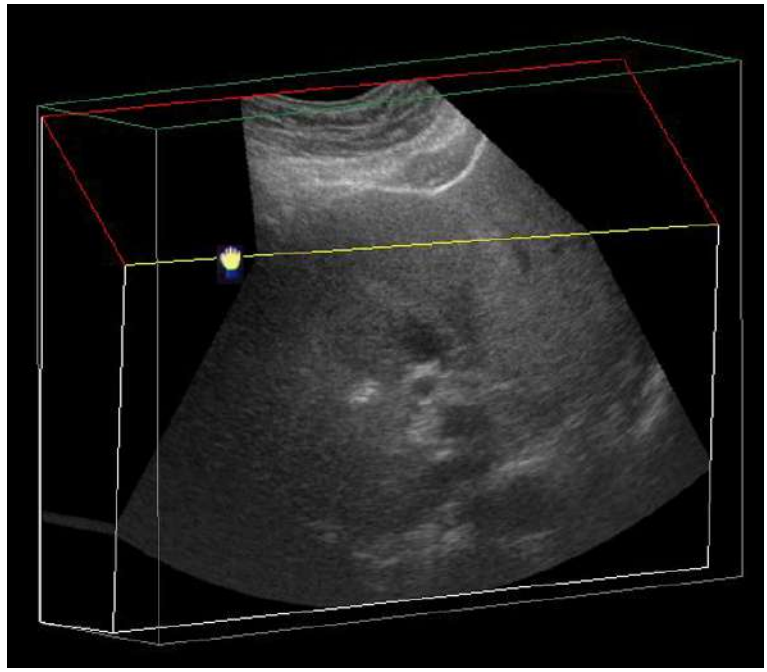


Figure 5-30. Manipulating the Edge of a 3D Volume of Interest (Yellow Hand)

Pulling Back a Corner of the VOI to View Specific Anatomy

You can pull back a corner to view specific portions of anatomy using the green hand. Press Set when the green pointer finger is positioned on the green box. Move the closed green hand to manipulate the 3D VOI.

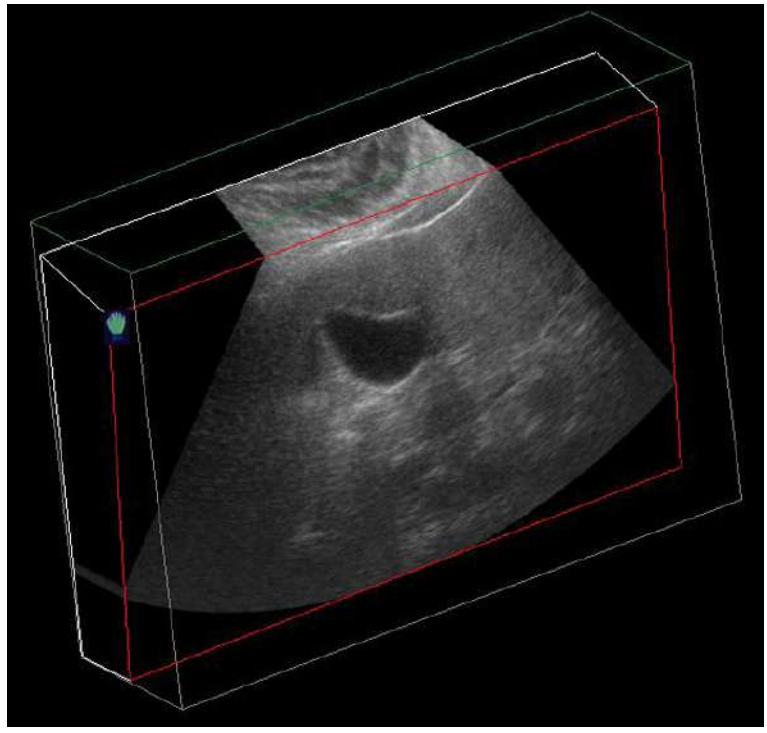


Figure 5-31. Manipulating a Corner of the 3D Volume of Interest (Green Hand)

Easy 3D

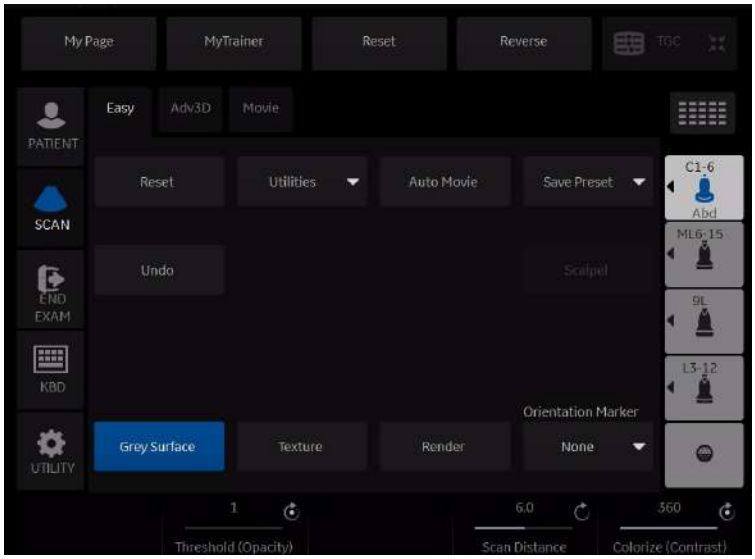


Figure 5-32. Easy 3D

Descriptions and instructions for using Easy 3D follow:

Table 5-23: 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.
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.

Table 5-23: Easy 3D Description and Instructions for Use (Continued)

3D Parameter	Description
Gray Surface	Activates the gray surface rendering mode. It leads to a transparent appearance of the object, generated by displaying only a surrounding shell of structures.
Texture	Activates the texture or photorealistic rendering mode. It creates a photorealistic appearance of the object. The shading depends on the orientation of the surface of the object. If both Texture and Gray Surface mode are switched on, the mixture percentage of both modes can be defined.
Render	Changes between the rendered image view and the view of a volume of interest. The volume of interest shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. The volume of interest can be manipulated as described above.
Orientation Marker	You can now specify/define, then add the following orientation markers while in 3D via the ***Orientation Marker*** key: • TRV Sup to Inf Ant Scan Prb Rt • Ant Scan • Prb Rt • TRV Inf to Sup Ant Scan Prb Rt • Ant Scan • Prb Rt • SAG Lt to Rt Ant Scan Prb Sup • Ant Scan • Prb Sup • SAG Rt to Lft Ant Scan Prb Sup • Ant Scan • Arb Sup • Defined • Superior • Inferior • Left • Right • Anterior • Posterior • Cancel • 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.

Table 5-23: Easy 3D Description and Instructions for Use (Continued)

3D Parameter	Description
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

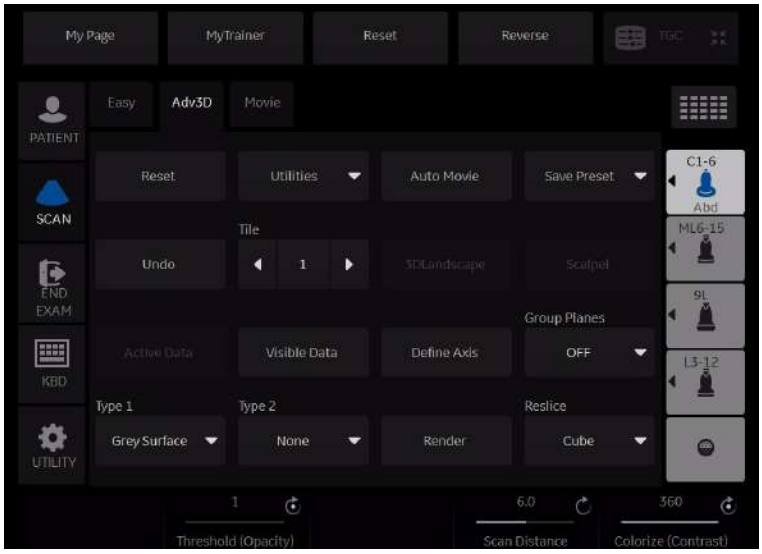


Figure 5-33. Advanced 3D

Descriptions and instructions for using Advanced 3D follow:

Table 5-24: Advanced 3D Description and Instructions for Use

3D Parameter	Description
Reset	Resets the 3D volume of interest back to its original orientation.
Utilities	Use smoothed volume for rending 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.
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.

Table 5-24: Advanced 3D Description and Instructions for Use (Continued)

3D Parameter	Description
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.
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. *NOTE: Inversion Mode is only available for Black-and-White mode.*
Visible Data	After selecting Visible Data, a list of data is displayed, Gray Data or Inversion. Choose the data you want to display. For example, if only Inversion is chosen, the B-Mode image is switched off in the rendered image and only inversion mode is displayed.
Define Axis	For certain display and measurement modes (Angular Plane Mode, Angular Volume Measurement Mode), an axis in the volume of interest is required. To define the axis, set the start point by using the Trackball to position one end of the axis and pressing the right Set key, then positioning the other end of the axis and pressing the right Set key.

Table 5-24: Advanced 3D Description and Instructions for Use (Continued)

3D Parameter	Description
Group Planes	Selections: Off, Main, Parallel, Angular **Off**. A VOI or a rendered image is displayed. The Render button changes between the rendered image view and the view of the VOI. The VOI shows the acquired Ultrasound images transformed into an isotropic rectangular coordinate system. **Main**. Three orthogonal cuts (with colored frames) of the acquired VOI are displayed after pressing Main. The VOI shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. On the left top of the image a complete VOI is displayed. It shows the position of the three orthogonal planes in the VOI. A green point displayed in each plane defines the point of intersection of the three planes. This point can be set to different positions in the planes by double clicking the 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. **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. **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. To move these planes, press and hold down the right Set key while moving the Trackball.
Type 1/2	Defines the rendering modes. Selections: Gray Surface, Texture, Maximum Intensity, Minimum Intensity, Average Intensity, and None. If both Type 1 and Type 2 rendering modes are switched on, the mixture of both modes can be defined. **Gray Surface**. Activates the gray surface rendering mode. It leads to a opaque appearance of the object, generated by displaying only a surrounding shell of anatomical structures. Adjust Threshold and Opacity as well. **Texture**. Activates the texture of photorealistic rendering mode. It creates a photorealistic appearance of the object. The shading depends on the orientation of the surface of the object. Adjust Threshold and Opacity as well. **Maximum Intensity**. Transparent appearance of the object. Generated by displaying the maximum gray values in the VOI. **Minimum Intensity**. The rendered image is generated by displaying the lowest gray values in the VOI that exceed the defined threshold. Dark anatomical structures, like cysts, can be shown in this mode. **Average Intensity**. Transparent appearance of the object. Generated by a summation of the gray values. **None for Type 2**. No second rendering mode is used in addition to the Type 1 rendering mode.
Render	Changes between the rendered image view and the view of a volume of interest. The volume of interest shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. The volume of interest can be manipulated as described above.

Table 5-24: Advanced 3D Description and Instructions for Use (Continued)

3D Parameter	Description
Reslice	Selections: Cube, 2D Plane, and 2D Cubic Plane **Cube**. The VOI shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. This mode allows you to work simultaneously with six cut planes. **Virtual Rescan**. The marked cut planes under Reslice Cube (red border) is displayed without any perspective distortions, e.g., parallel to the screen. This allows you to move through the volume one slice at a time in any direction. **Cubic Plane**. Only one cut plane view is shown in a perspective displayed VOI. The cut plane can be moved freely without any limitations.

Movie 3D

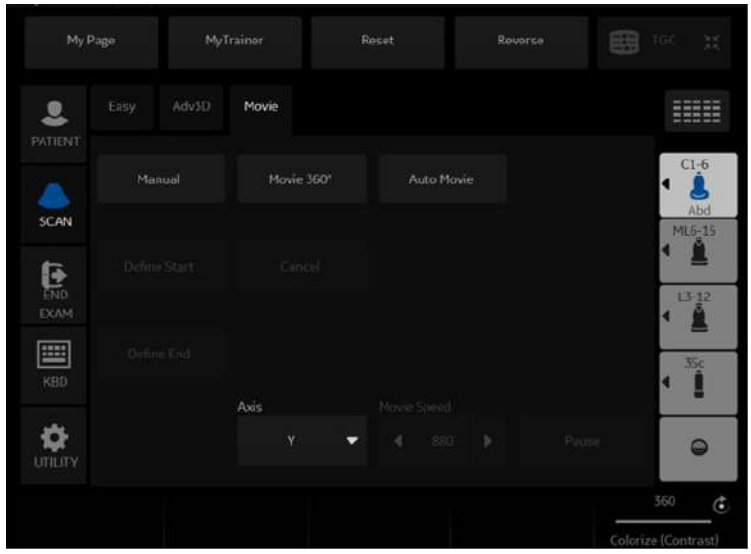


Figure 5-34. Movie 3D

Descriptions and instructions for using Movie 3D follow

Table 5-25: Movie 3D Descriptions and Instructions for Use

3D Parameter	Description
Manual	An animated rotation of the rendered image can be calculated and displayed by this function. Using this function, you first need to define the start and end position of the rotation. To define this, move the VOI to the start position, the press Define Start. Move the VOI to the end position and press Define End.
Movie 360 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.

Chapter 6

Scanning/Display Functions

Describes additional ways in which to adjust the image. In addition, describes ways to get useful information electronically.

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 green.

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).

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:

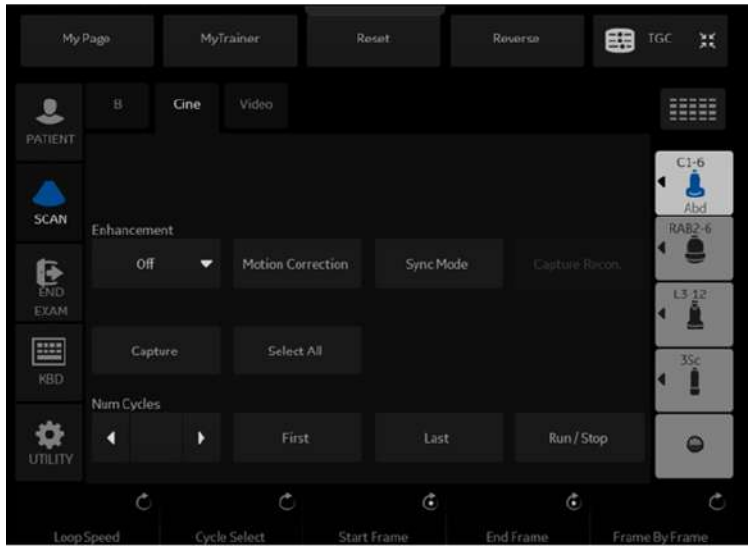


Figure 6-2. Cine Touch Panel

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.

Table 6-1: Cine Touch Panel description

Parameter	Description
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. Refer to 'Print Controls' on page 10-67 .

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: 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.

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 now 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, BFC, Coded Contrast, CF, PDI, and B-Mode without CrossXBeam.

Capture Recon. shows smaller blood flow information than conventional B-Flow image, which 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 ShadeFw/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.

Enhancement (continued)

- 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.

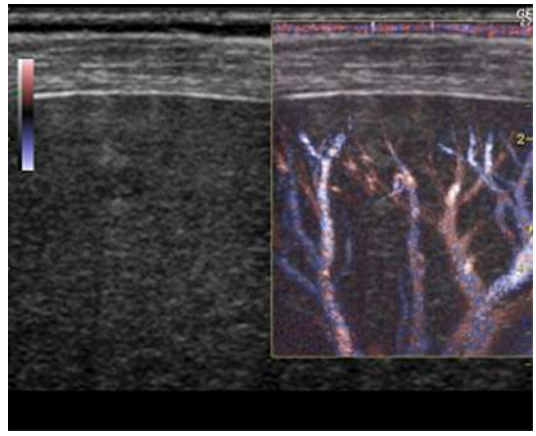


Figure 6-4. Enhancement image example

3. If necessary, save the enhanced image.

NOTE: You can save the still image (JPEG) and cine loop (AVI) 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.

Zooming an Image

Introduction

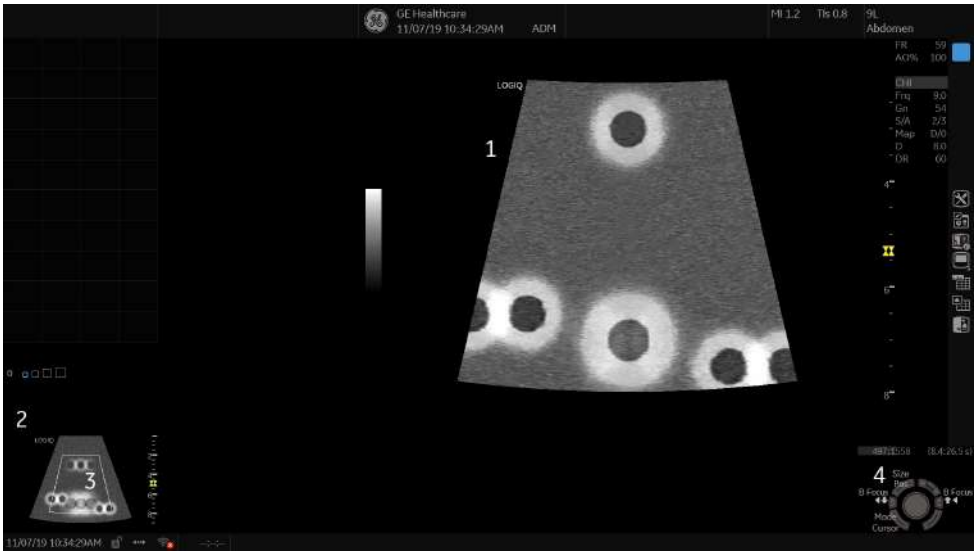


Figure 6-5. Zoom - Example

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.

Two kinds of zoom exist: Pan Zoom and HD Zoom.

- Pan Zoom magnifies the display of the data without making any changes to the ultrasound image data acquired. The entire image is acquired and the ROI can be moved or resized.
- HD Zoom only acquires the image data within the ROI, increasing density of the image in the ROI. HD zoom can only be performed during live scanning.

Pan Zoom

To activate Pan zoom, rotate Zoom knob clockwise.

To deactivate Pan zoom, rotate Zoom knob counterclockwise until entire image is displayed.

HD Zoom

To activate HD zoom, press Zoom knob and rotate it clockwise.

To exit HD zoom, press Zoom knob again.

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.

Split Screen

Overview

LOGIQ P8/P9/P10 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 are into 2 areas, and both panes are live and active)

NOTE: The recalled split screen cannot 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.

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

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

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

Dual Caliper (continued)

NOTE: Only the Original graphic contains the graphic numbering. In this way you can always distinguish between the Original and the Shadow graphic.

NOTE: You can only edit the Original graphic; however, when you do edit the Original graphic, the Shadow graphic is also edited at the same time.

NOTE: If you delete either graphic, both are deleted.

NOTE: When a measurement is selected without Dual B-Mode images or with different probe images, a warning message is displayed on the status bar and the selected measurement is cancelled.

NOTE: If the first point of the Original graphic is out of the Shadow image area, then 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.

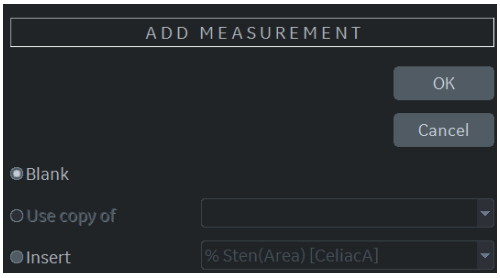


Figure 6-7. Add Measurement

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

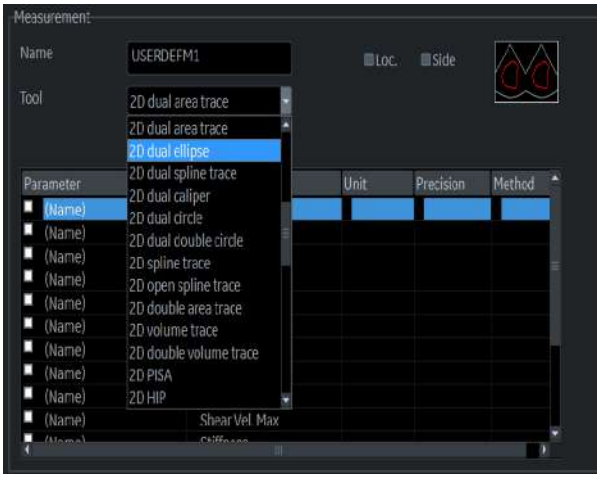


Figure 6-8. Drop-down menu

3. Type the measurement and parameter name as you like.
4. Add the created measurement to the Touch Panel.
5. Display the dual imamge and press **Measure**.

Dual caliper for 2D image (continued)

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.

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.

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.

Text annotations may be inserted anywhere in the image area. It also provides the user with arrow markers to point to parts of the image.

Comments appear on all prints, photos, DVR or CINE loops.

Annotations (text, arrow, and bodymark) are created on separate layers. When viewing annotated images on a different system or when zooming the image, the position of the annotations on the image may be slightly changed.

Adding Comments to an Image

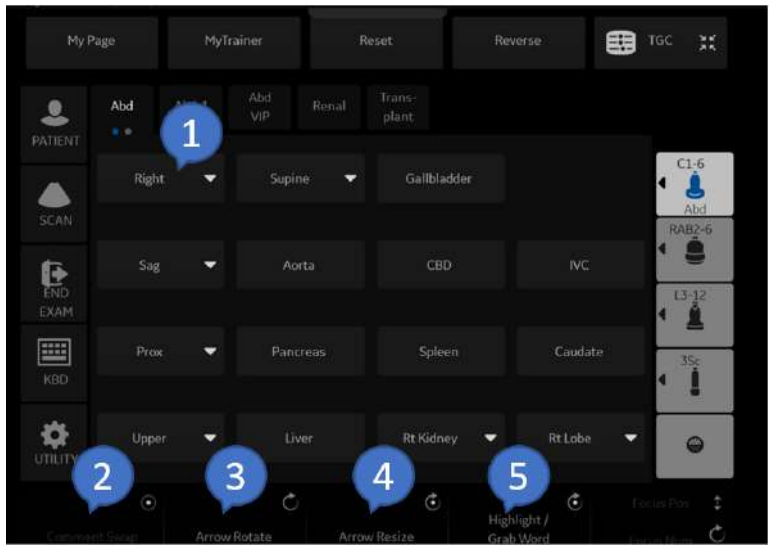


Figure 6-9. Comment Touch Panel

Table 6-3: Control Touch Panel

No.	Function	Description
1.	Small list	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 10-46* for more information.
2.	Comment swap	Comment Swap button in Comment Mode allows the user to do a quick swap of comments from side to side in dual screen. In other words, the comments on the left image are moved to the right image and vice versa.
3.	Arrow Rotate	Rotate the arrow. You can also rotate the arrow by Trackball.
4.	Arrow Size	Adjust the length and thickness of the arrow,
5.	Highlight/Grab word	Press Grab Word to grab latest text group. To increase/decrease the area of the highlighted selection, use HIGHLIGHT rotary.

Adding Comments to an Image (continued)

Figure 6-10. Trackball key

Table 6-4: Comment Trackball key

No.	Function	Description
1.	Comment	Switch to Comment mode.
2.	Arrow	Switch to Arrow mode.
3.	Word Delete	Delete the selected word.
4.	Grab Last	Activate the last selected data for edit.
5.	Set	Erase word associated with comment cursor.

Adding Comments to an Image (continued)

Free text

1. Press **Comment**.
2. Type the desired text using the alhanumeric keyboard.
3. Press ***Enter*** to move to the next line.
4. Move the text cursor to the desired position using Trackball.
5. Press **Set** to fix the placement of the comment. The color returns to yellow or to the user selected color.

NOTE: If selected "Automatically Set Text" in Utility -> Comment -> Comment, the system sets the comment at the cursor position automatically when text entry is complete.

Pre-defined text

1. Press **Comment**.
2. Select a pre-defined text from the comment library on the Touch Panel.
3. Move the text cursor to the desired position using Trackball.
4. Press **Set** to fix the placement of the comment. The color returns to yellow or to the user selected color.

Adding Comments to an Image (continued)

Layered annotations

Annotations can be entered on two different layers (called Text 1 and Text 2). This function enables the user to show/hide different annotations on the same image.

1. Press **F8**.
   "Text 1 (Display and Edit)" displays in the message area.
2. Press **Comment** to enter comments.

Toggle the ***F8*** key to cycle through the three Text 1/Text 2 states asa below:

- Text 1 (Display and Edit)-- Only Text 1 displays.
- Text 2 (Display and Edit) -- Only Text 2 displays.
- Text 1 (Display) and Text 2 (Display and Edit) -- Both displayed; only Text 2 comments editable. 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**.

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.

Cursor position

Pressing the ***F7 (Cursor Home)*** key returns to the user specified position or factory default position.

A new cursor home position is established by placing the cursor in the desired position and pressing ***Shift+Home.***

Adding Comments to an Image (continued)

Arrow Pointers

1. Press **F2 (Arrow)**. The arrow pointer displays.
2. 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.
3. To readjust the length and thickness of the pointer, use the **Arrow Resize** rotary control. The default for the pointer size can be preset.
4. 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).
5. To delete the arrow marks, press the ***Clear*** key while in the arrow pointer mode (The top **Trackball** key is assigned to Arrow).

*NOTE: This action clears the comments only, not the arrows on the screen. To erase all comments as well as arrows, press and hold the **Clear** key.*

NOTE: To prevent the Trackball from changing the arrow angle, select the "Keep arrow angles" preset at Utility -> Comments -> Comments.

Adding Comments to an Image (continued)

Word wrap

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 10-47 for more information.*

The word wrap starts one line below the start of that comment.

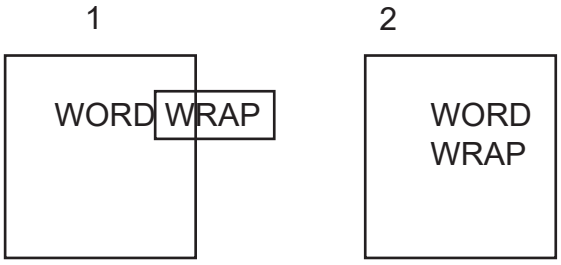


Figure 6-11. Next Line Word Wrap

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.

Adding Comments to an Image (continued)

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.

NOTE: If "Clear Non Active Image Comments" in Utility -> Comment -> Comment is selected, comments from the non-activated images are automatically cleared when entering in dual or quad image screen.

NOTE: Comment Swap button in Comment Mode allows the user to do a quick swap of comments from side to side in dual screen. In other words, the comments on the left image are moved to the right image and vice versa.

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 rotary corresponding to Bodypattern. The bodypattenrss specific to the current application are displayed.
2. Touch the bodypattern to insert. The selected bodypattern with a probe marker is displayed on the scanning screen.
3. Using the trackball, adjust the position of the probe marker.
4. Rotate rotary of Bodypattern to set the probe marker orientation.
5. To move the bodypattern:
   - 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 rotary of Bodypattern 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.

Body Patterns (continued)

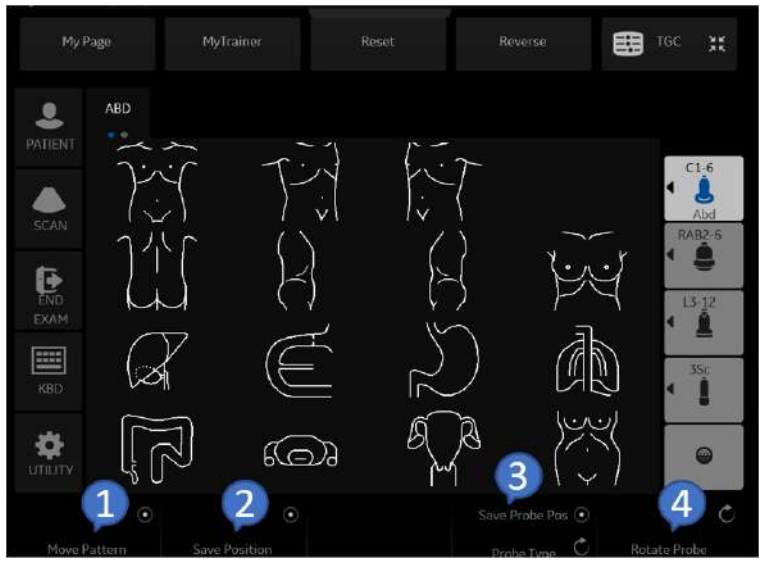


Figure 6-12. Touch Panel displays of Body Pattern - example

Table 6-5: 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 10-46 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. 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.
4.	Rotate Probe	Rotating probe mark position by rotating the **Rotate Probe**control on the Touch Panel.

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 ‘Body Pattern Libraries/Libraries Preset Menu’ on page 10-56.

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.

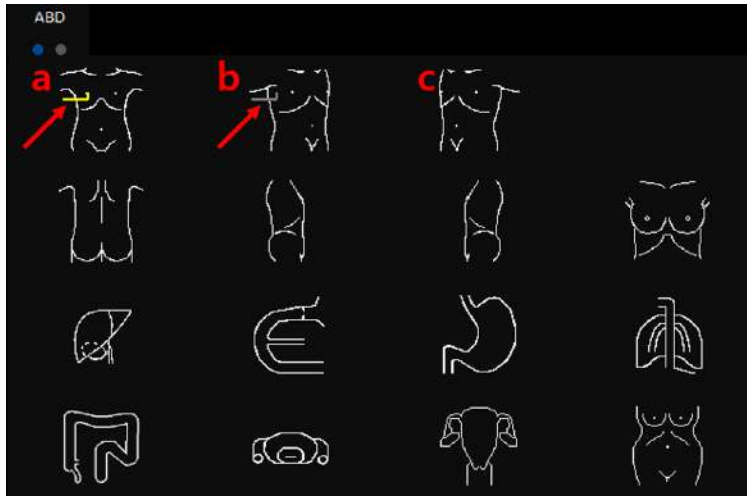


Figure 6-13. Body Pattern Touch Panel

a. 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.

b. 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.

c. 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)

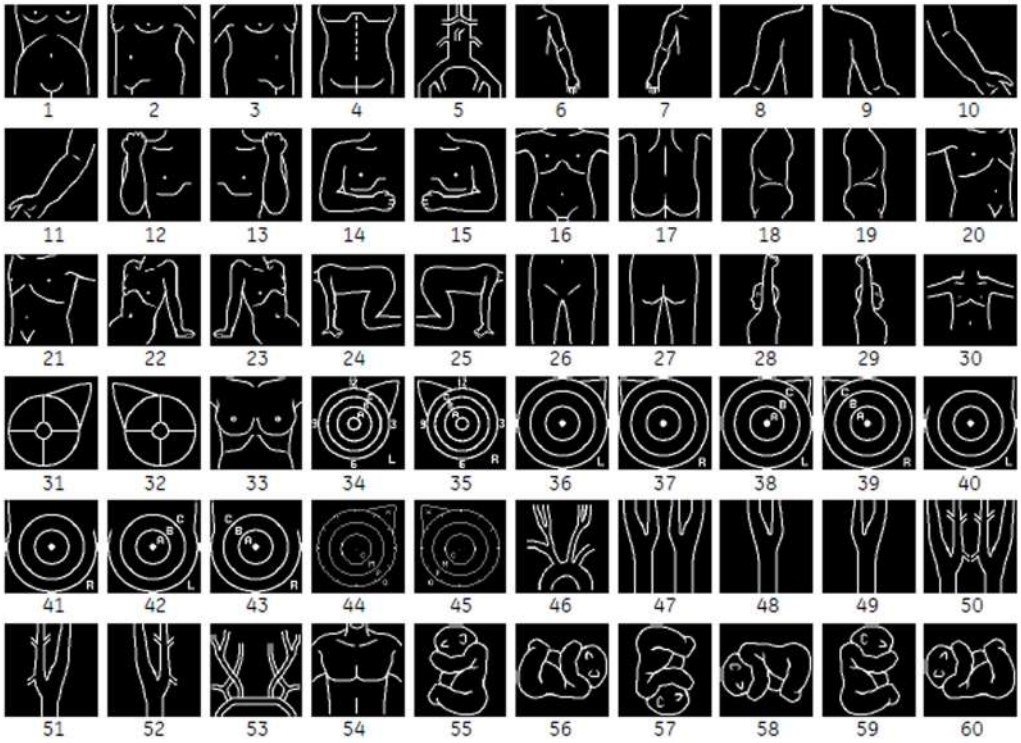


Figure 6-14. Body Patterns Available

1. abdo 1
2. abdo 2
3. abdo 3
4. abdo 4
5. aorta
6. arm 1
7. arm 2
8. arm 3
9. arm 4
10. arm 5
11. arm 6
12. arm 7
13. arm 8
14. arm 9
15. arm 10
16. body 1
17. body 2
18. body 3
19. body 4
20. body 5
21. body 6
22. body 7-Lt
23. body 7-Rt
24. body 8-Lt
25. body 8-Rt
26. body 9
27. body 10
28. body 11-Lt
29. body 11-Rt
30. body 12
31. breast 1
32. breast 2
33. breast 3
34. breast 4-Lt
35. breast 4-Rt
36. breast 5-Lt
37. breast 5-Rt
38. breast 6-Lt
39. breast 6-Rt
40. breast 7-Lt
41. breast 7-Rt
42. breast 8-Lt
43. breast 8-Rt
44. breast 9-Lt
45. breast 9-Rt
46. carotid 1
47. carotid 2
48. carotid 3-Lt
49. carotid 3-Rt
50. carotid 4
51. carotid 4-Lt
52. carotid 4-Rt
53. carotid 5
54. chest 1
55. fetus 1
56. fetus 2
57. fetus 3
58. fetus 4
59. fetus 5
60. fetus 6

Body Patterns (continued)

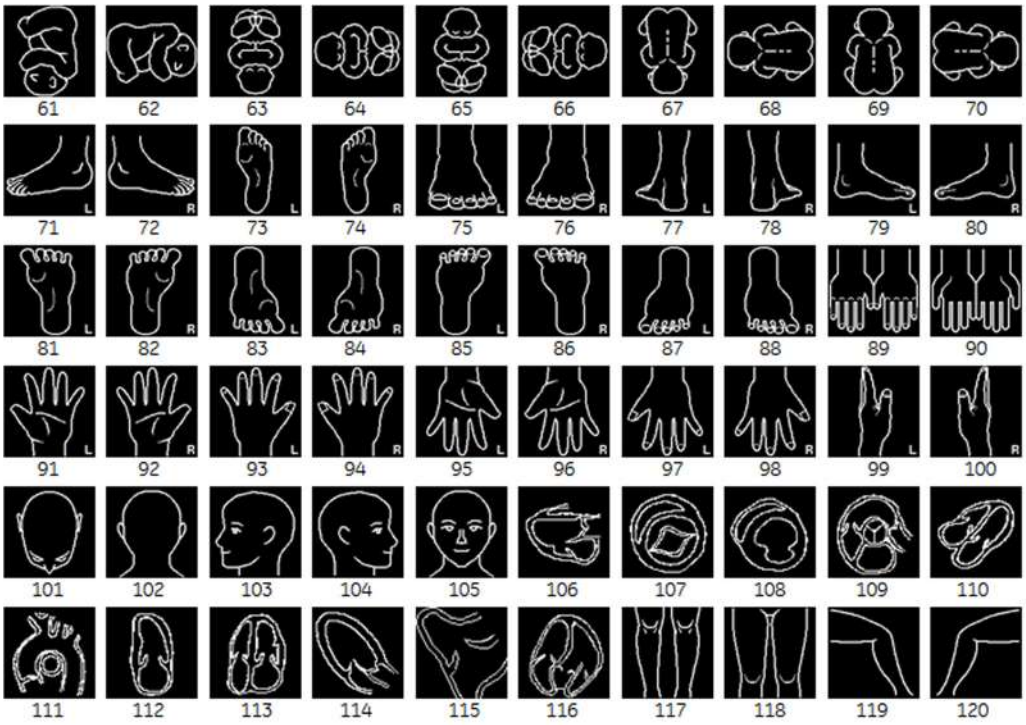


Figure 6-15. Body Patterns Available

61. fetus 7
62. fetus 8
63. fetus 9
64. fetus 10
65. fetus 11
66. fetus 12
67. fetus 13
68. fetus 14
69. fetus 15
70. fetus 16
71. foot 1-Lt
72. foot 1-Rt
73. foot 2-Lt
74. foot 2-Rt
75. foot 3-Lt
76. foot 3-Rt
77. foot 4-Lt
78. foot 4-Rt
79. foot 5-Lt
80. foot 5-Rt
81. foot 6-Lt
82. foot 6-Rt
83. foot 7-Lt
84. foot 7-Rt
85. foot 8-Lt
86. foot 8-Rt
87. foot 9-Lt
88. foot 9-Rt
89. hand 1
90. hand 2
91. hand 3-Lt
92. hand 3-Rt
93. hand 4-Lt
94. hand 4-Rt
95. hand 5-Lt
96. hand 5-Rt
97. hand 6-Lt
98. hand 6-Rt
99. hand 7-Lt
100. hand 7-Rt
101. head 1
102. head 2
103. head 3
104. head 4
105. head 5
106. heart 1
107. heart 2
108. heart 3
109. heart 4
110. heart 5
111. heart 6
112. heart 7
113. heart 8
114. heart 9
115. heart 10
116. heart 11
117. legs 1
118. legs 2
119. legs 3
120. legs 4

Body Patterns (continued)

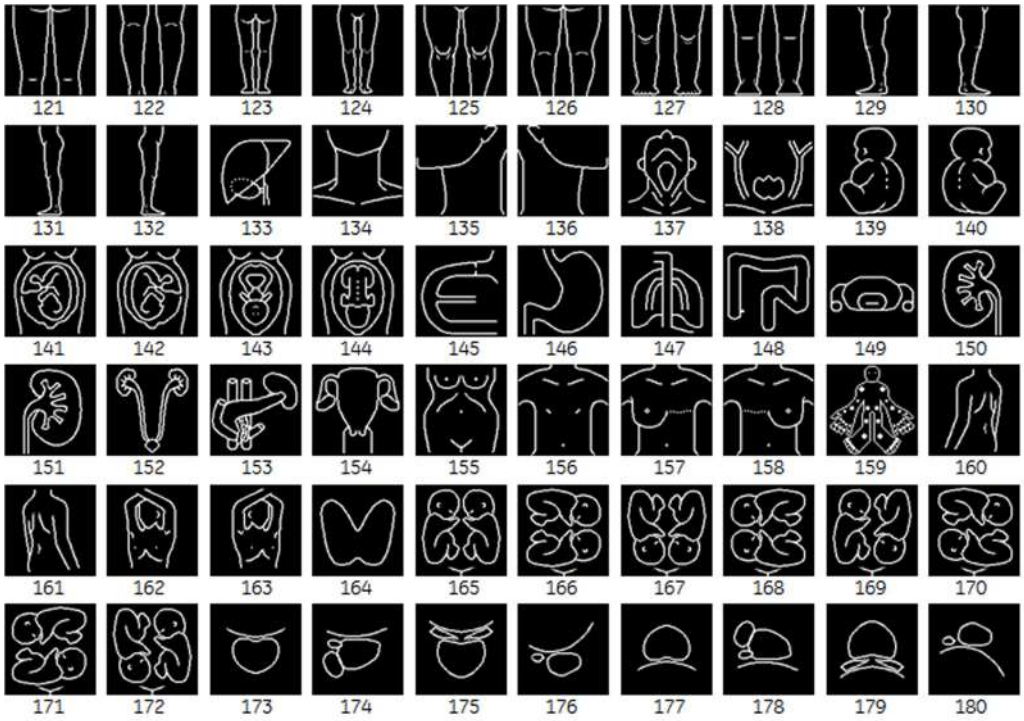


Figure 6-16. Body Patterns Available

121. legs 5
122. legs 6
123. legs 7
124. legs 8
125. legs 9
126. legs 10
127. legs 11
128. legs 12
129. legs 13-a-Lt
130. legs 13-a-Rt
131. legs 13-Lt
132. legs 13-Rt
133. liver
134. neck 1
135. neck 2
136. neck 3
137. neck 4
138. neck 5
139. ob 1
140. ob 2
141. ob 3
142. ob 4
143. ob 5
144. ob 6
145. organ 1
146. organ 2
147. organ 3
148. organ 4
149. organ 5
150. organ 6
151. organ 7
152. organ 8
153. organ 9
154. pelvis 1
155. pelvis 2
156. post-breast-bilateral
157. post-breast-Lt
158. post-breast-Rt
159. rheuma
160. shoulder-back-Lt
161. shoulder-back-Rt
162. shoulder-front-Lr
163. shoulder-front-Rt
164. thyroid
165. twin 1
166. twin 2
167. twin 3
168. twin 4
169. twin 5
170. twin 6
171. twin 7
172. twin 8
173. uro 1
174. uro 2
175. uro 3
176. uro 4
177. uro 5
178. uro 6
179. uro 7
180. uro 8

Body Patterns (continued)

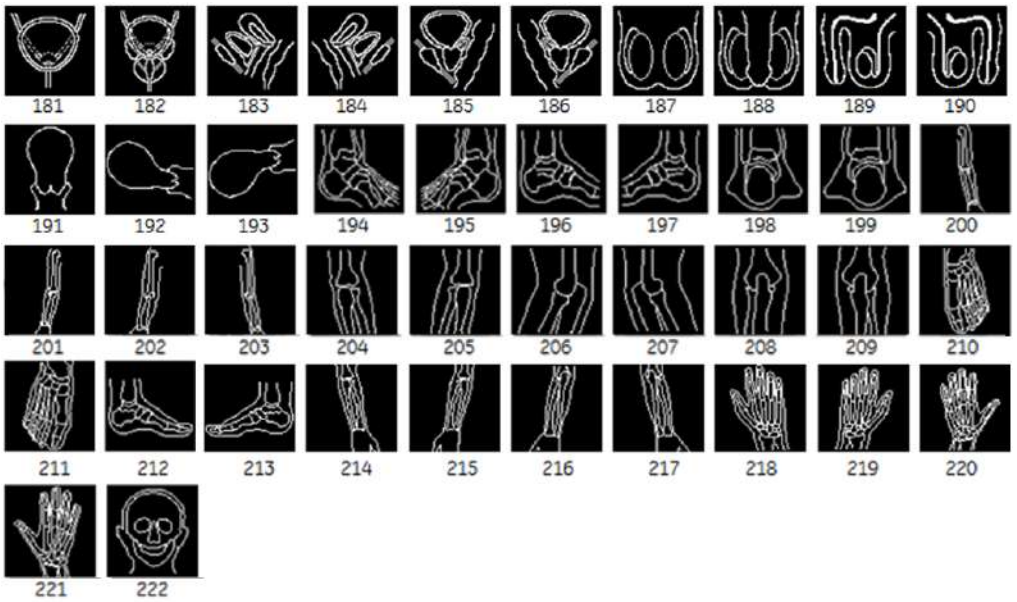


Figure 6-17. Body Patterns Available

181. uro 9 female
182. uro 9 male
183. uro 10 female-Lt
184. uro 10 female-Rt
185. uro 10 male-Lt
186. uro 10 male-Rt
187. uro 11
188. uro 12
189. uro 13-Lt
190. uro 13-Rt
191. uterus 1
192. uterus 2
193. uterus 3
194. ankle-Lt
195. ankle-Rt
196. ankle lat-Lt
197. ankle lat-Rt
198. ankle post-Lt
199. ankle post-Rt
200. arm-Lt
201. arm-Rt
202. arm post-Lt
203. arm post-Rt
204. elbow-Lt
205. elbow-Rt
206. elbow lat-Lt
207. elbow lat-Rt
208. elbow post-Lt
209. elbow post-Rt
210. foot-Lt
211. foot-Rt
212. foot lat-Lt
213. foot lat-Rt
214. forearm-Lt
215. forearm-Rt
216. forearm post-Lt
217. forearm post-Rt
218. hand-Lt
219. hand-Rt
220. hand post-Lt
221. hand post-Rt
222. head

Body Patterns (continued)

Figure 6-18. Body Patterns Available

223. head lat-Lt
224. head lat-Rt
225. head post
226. hip-Lt
227. hip-Rt
228. hip lat-Lt
229. hip lat-Rt
230. hip post-Lt
231. hip post-Rt
232. knee-Lt
233. knee-Rt
234. knee lat-Lt
235. knee lat-Rt
236. knee post-Lt
237. knee post-Rt
238. leg-Lt
239. leg-Rt
240. leg post-Lt
241. leg post-Rt
242. shoulder-Lt
243. shoulder-Rt
244. shoulder lat-Lt
245. shoulder lat-Rt
246. shoulder post-Lt
247. shoulder post-Rt
248. thigh-Lt
249. thigh-Rt
250. thigh post-Lt
251. thigh post-Rt
252. wrist-Lt
253. wrist-Rt
254. wrist post-Lt
255. wrist post-Rt
256. new carotid 2
257. carotid2-Lt
258. carotid2-Rt
259. brain1
260. brain2
261. brain3
262. brain4
263. breastSA-Rt
264. breastSA-Lt
265. lung1
266. organ10
267. organ11

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.

Electronic Documentation

Documentation Distribution

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

https://www.gehealthcare.com/documentation

- Electronic media. You can view user documentation (all languages) on a PC or on the Ultrasound Scanner via the Customer Documentation media, which includes:
  - Basic User Manual (translated)
  - Advanced Reference Manual (English and French)
  - User Guide (translated)
  - Release Notes and Workarounds (translated, optional)
  - Basic Service Manual (English only)

Using Online Help Via F1

Online Help is available via the F1 key. After pressing F1, Help appears. The Help screen is divided into three sections: navigational tools on the top, left portion of the screen (Hide, Back, Forward), help book navigational tools on the left portion of the screen (Contents, Index, Search, Favorites), and the content portion on the right side of the screen where help topics are displayed.

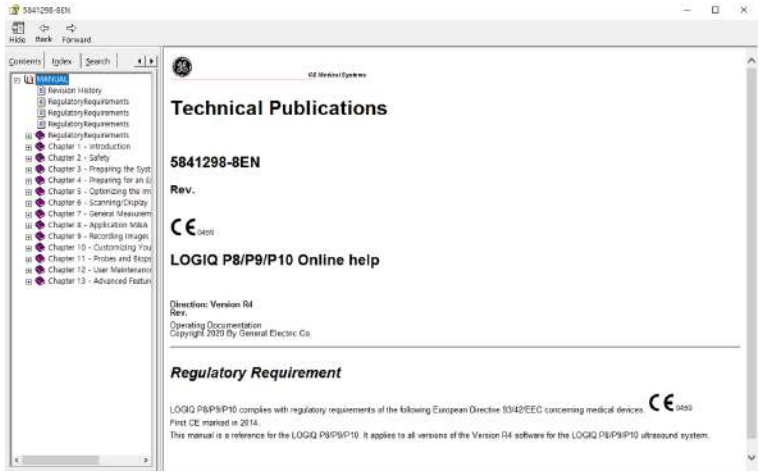


Figure 6-19. Opening Help Screen

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.

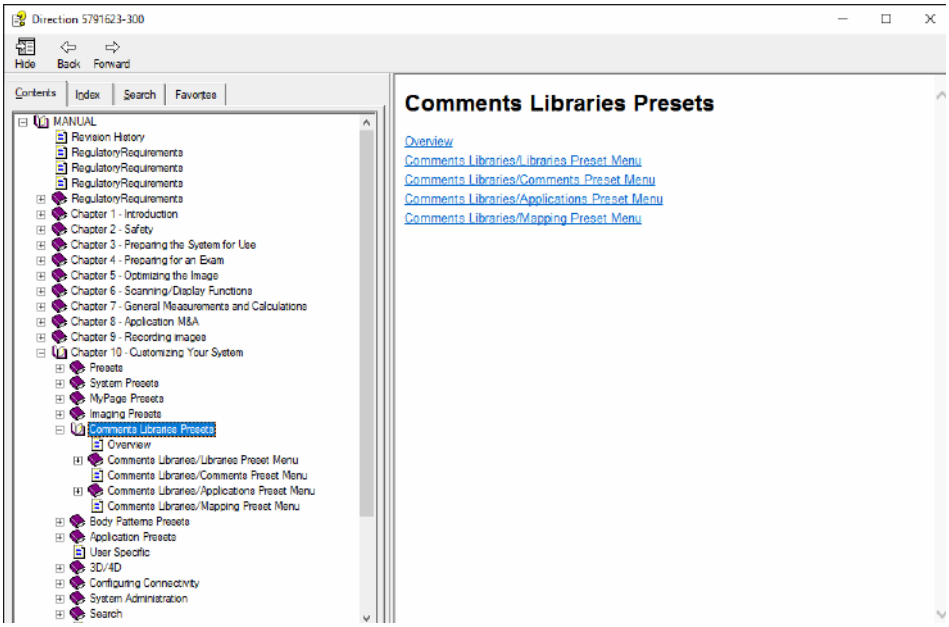


Figure 6-20. Sample Help Topic

The blue, underlined text links you to related topics. Click on the link to move to the new topic.

Links

After you click on a blue, underlined portion of text, the screen updates with this link's content. To go back to the previous screen, press Back. To return to the link, press Forward.

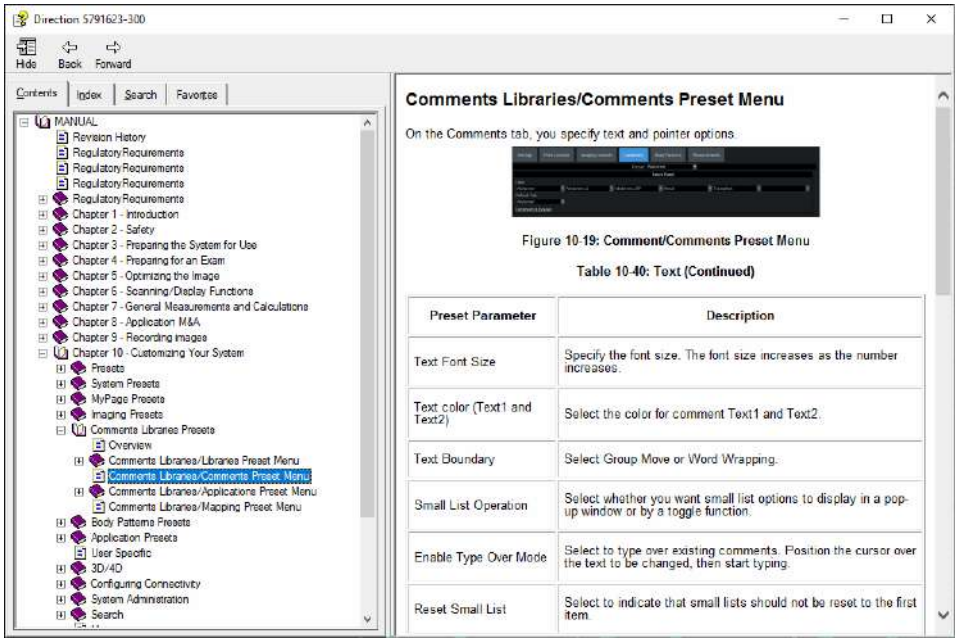


Figure 6-21. Topic Link

Searching for a Topic

To search for a specific topic, click on the Search tab in the left portion of the screen. Type in the topic name in the *Type in the keyword to find:* field. Topics with the word or phrase you typed appear in the *Select Topic to display: area*. Either double click on the topic you want to view or highlight the topic and press the Display button to view this topics.

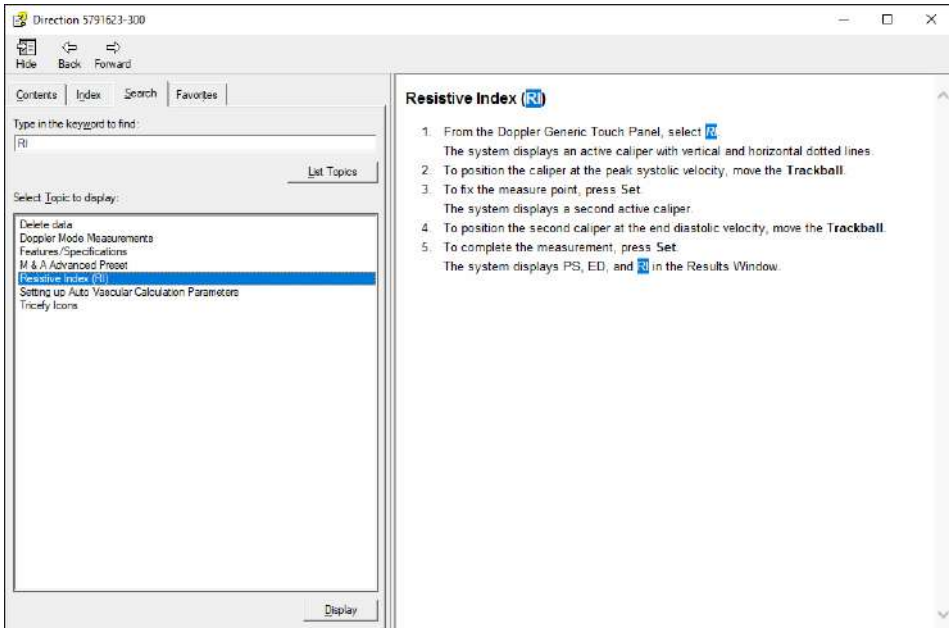


Figure 6-22. Search Results

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.

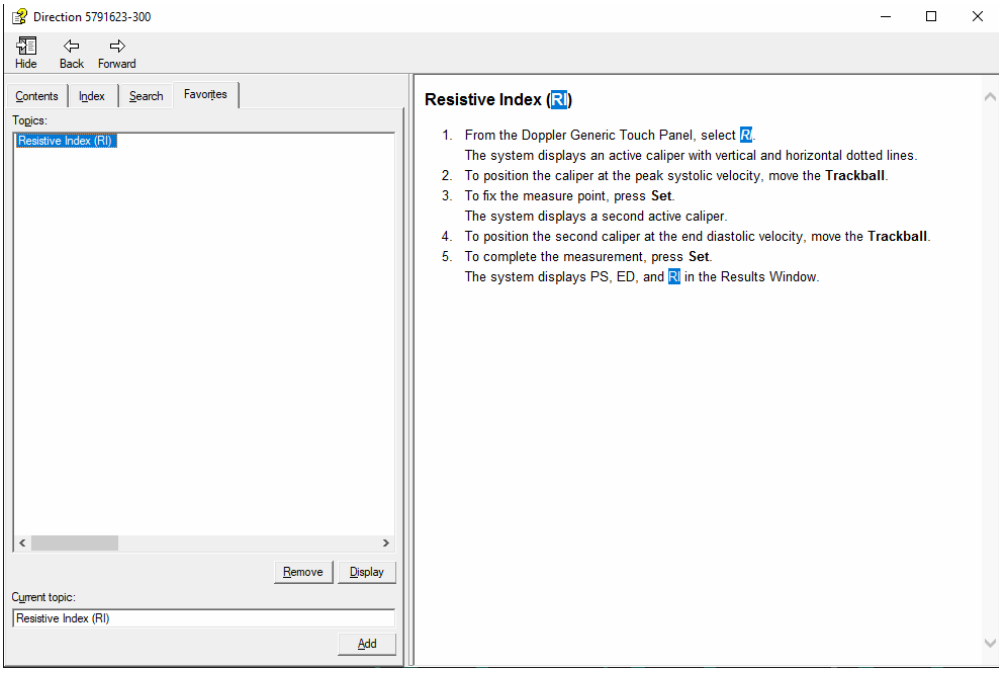


Figure 6-23. Adding Favorites

Using the Index

Or, you can look for topics by using the Index. Press the Index tab, then use the scroll bar to look up a topic.

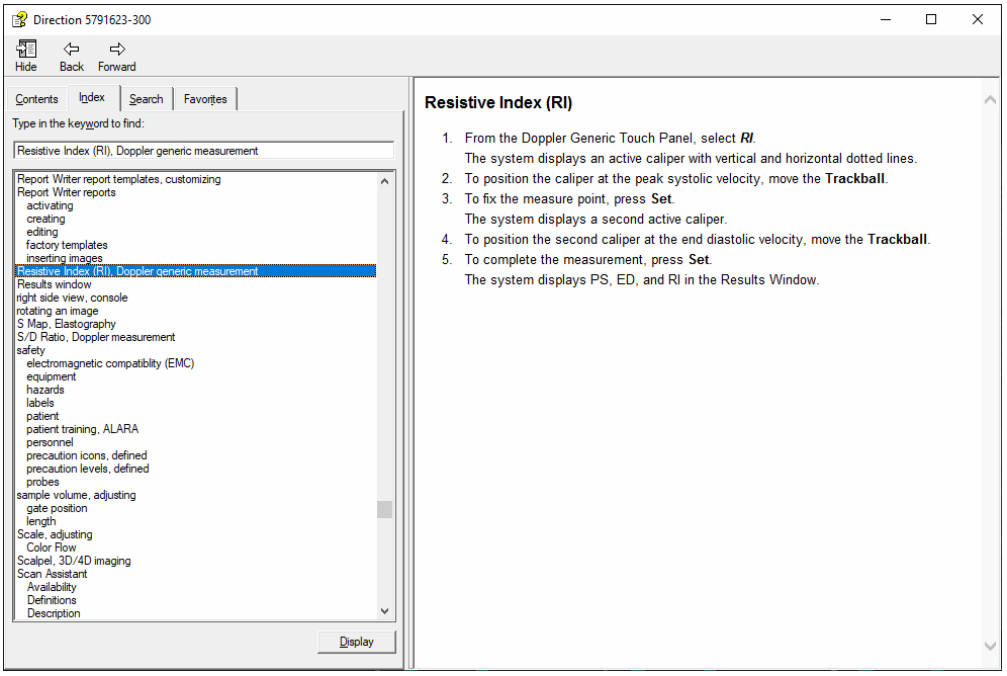


Figure 6-24. Index

Other Help Features

To hide the left side of the screen, press the Hide icon at the upper, left-hand portion of the screen. To view the left side of the screen again, press the Show icon at the upper, left-hand portion of the screen.

To size the Help window, position and hold down the cursor at the corner of the screen while moving the Trackball.

To move the Help window 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 ‘gedocumentation.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 P8/P9/P10 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 P8/P9/P10 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 will begin.
   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.
3. Remove the USB Flash Drive.

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.

Using MyTrainer+

Activate MyTrainer+

Move the cursor to ***MyTrainer+*** icon and press the right or left **Set** key and press the MyTrainer user defined touch button. MyTrainer+ is displayed on the left side of the monitor or in full screen.

Press **Esc** key on the keyboard or ***Exit*** on MyTrainer+ to exit from MyTrainer+.

MyTrainer+ automatically selects contents of active functionality or mode when there is contents of active functionality/mode.

If there is no contents of active functionality/mode, MyTrainer+ displays topics list.

Activate MyTrainer+ (continued)

Figure 6-25. My Trainer+

1. MyTrainer+ icon
2. MyTrainer+
3. MyTrainer user defined touch button

Small layout

Figure 6-26. Small layout

- When displaying contents in Small layout, you can use following keyboard-shortcut.
  - The up arrow (Pg Up) key: Go to the previous page within the current topic.
  - The down arrow (Pg Dn) key: Go to the next page within the current topic.
  - The left arrow (Home) key: Go back to the List of Available topics
- When displaying topics list in Small layout, you can use following keyboard-shortcut.
  - The up arrow (Pg Up) key: Go to the previous topic.
  - The down arrow (Pg Dn) key: Go to the next topic.
  - The right arrow (End) key: Display the content.

Full screen layout

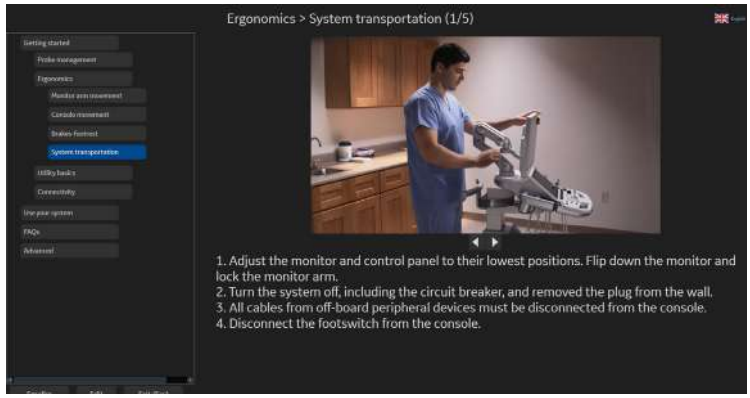


Figure 6-27. Full screen layout

Layout Setting

Select Small layout or Full screen layout.

- Small layout displays MyTrainer+ by side-by-side with a image.
- Full screen layout displays MyTrainer+ in the full screen over scan image.

Select languages

Select MyTrainer+ language.

Supported languages: English, French, Spanish, German, Italian, Brazilian Portuguese, Japanese, Simplified Chinese and Russian.

NOTE: Language setting of MyTrainer+ is independent from Utility language setting. Only for MyTrainer+.

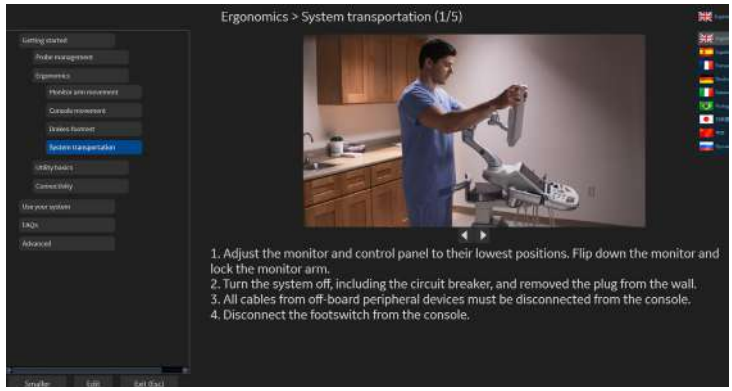


Figure 6-28. Select languages

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.

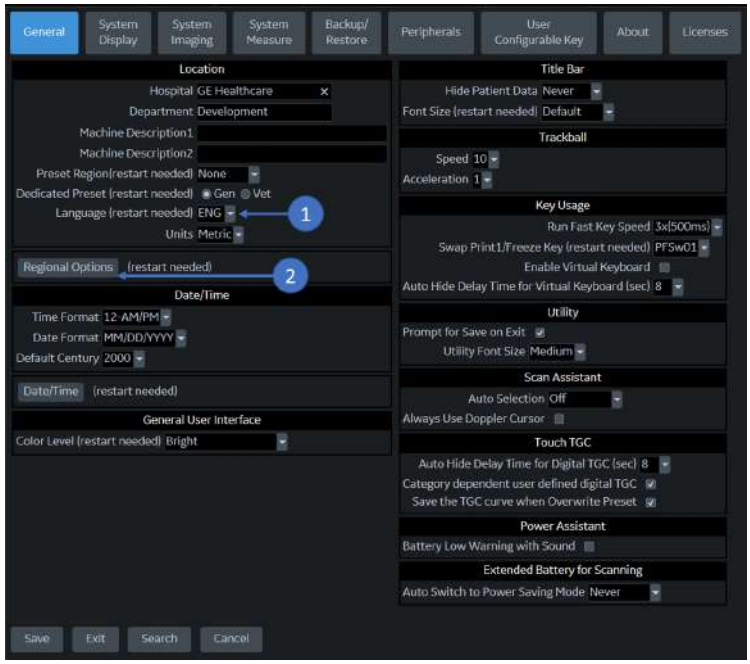


Figure 6-29. Utility System General Screen

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 6-30. Regional Options Dialogue Box

3. Set “Current OS Language” (3) and “Keyboard” (4) to match the system language selected in Step 1.

   Set “Current Format” (5) for date/time preference.

4. After making changes to the Regional Options, select **OK** in the Regional Options dialog box to save the changes and restart the 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 6-30 on page 6-59).

Change the Keyboard Language

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

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/Quatation 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 Ctrl+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 ä
- [Shift] + [“] + [e] to ë
- [Shift] + [“] + [i] to ï
- [Shift] + [“] + [o] to ö

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 user should consider contraindications for the use of a calculation or chart as described in the scientific literature. The diagnosis, decision for further examination, and medical treatment must be performed by qualified personnel following good clinical practice.

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.

Location of Measurement Controls

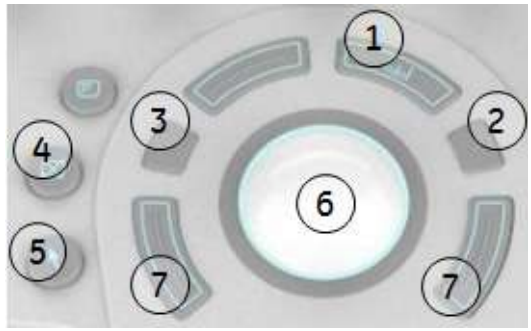


Figure 7-3. Locating Measurement Controls

Table 7-1: Measurement controls

Control	Description
1. Measure	Activates a measurement caliper and the calculation package associated with the currently selected preset.
2. Ellipse	After the first caliper for a distance measurement has been set and the second caliper positioned, **Ellipse** activates the area/ellipse measurement function. During the ellipse adjustment, use the **Trackball** to increase or decrease the size of the ellipse. Select ***Cursor Select*** to adjust the measurement calipers.
3. Ellipse Size	During the ellipse adjustment, Ellipse Size activates to control the ellipes size.
4. 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.
5. Pointer Key	Select to display a pointer on the monitor.
6. Trackball	Moves the measurement calipers, selects the measurement on the Summary Window and controls the ellipse size of the curved lines. Trackball also selects items on the Touch Panel with the Pointer and Set keys.
7. Trackball Keys	The functionality of these keys changes (e.g. 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.

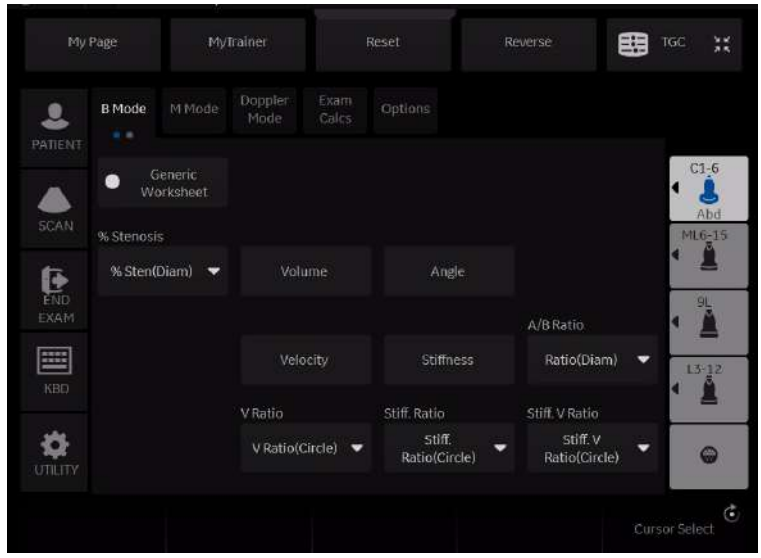


Figure 7-4. B-Mode - Example

Exam Calcs Tab

The Exam Calcs Tab is used for selecting calculations from other study in the selected Exam Category.

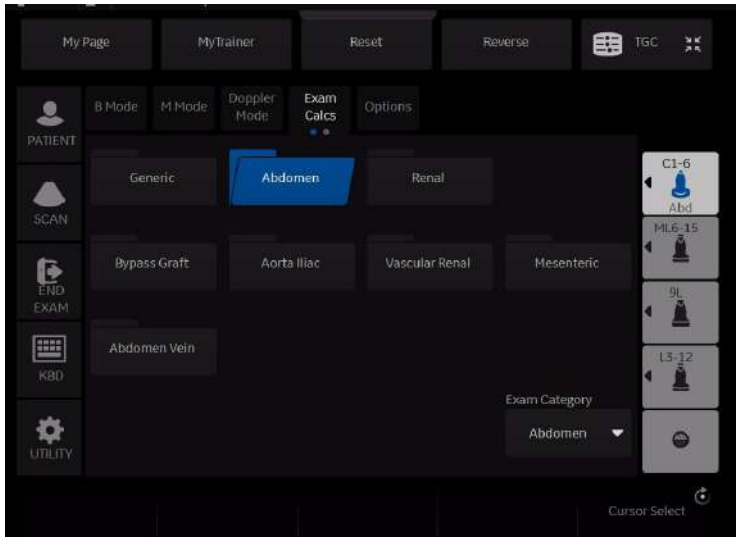


Figure 7-5. Exam Calcs Tab - example

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:

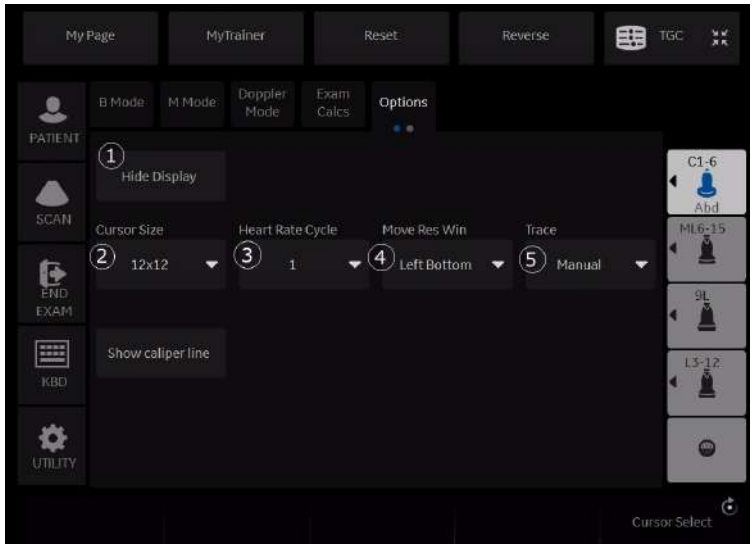


Figure 7-6. Measurement and Display Options - Example

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: • 12 x 12 • 9 x 9
3.	Select ***Heart Rate Cycle*** to hange 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. • 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 five 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 the fixed first 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.

Erasing measurements

The following actions erase measurements from the system's memory:

HINTS

- 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.

General Instructions (continued)

The following are actions you can take while performing measurements.

HINTS

- 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 cusor 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 measurment cursor in Utility -> System -> System Measure.

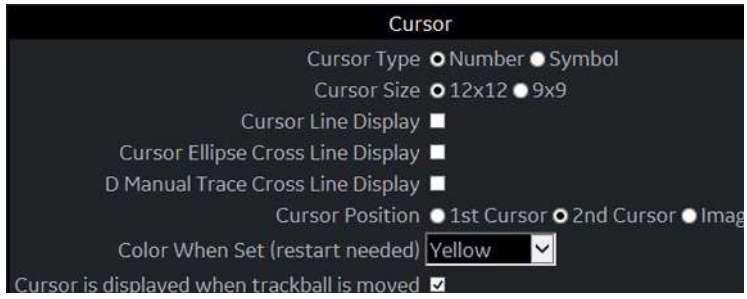


Figure 7-8. System/System Measure Preset Menu

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 popup 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.

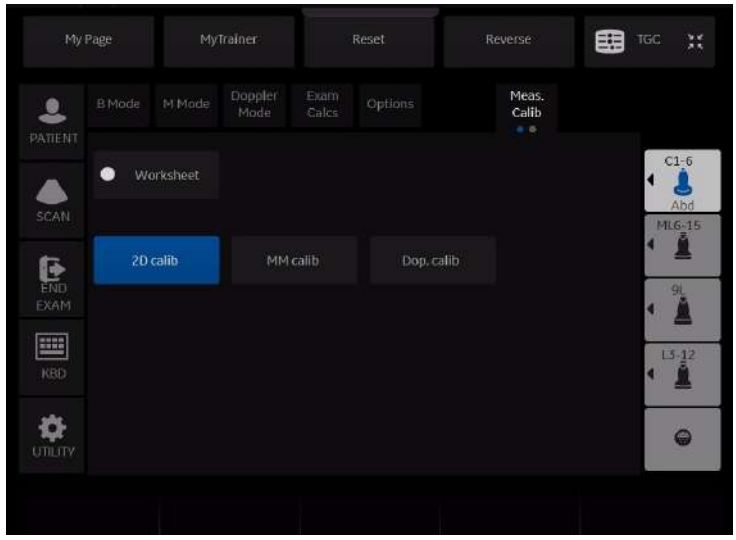


Figure 7-10. Meas. Calib Touch Panel

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.

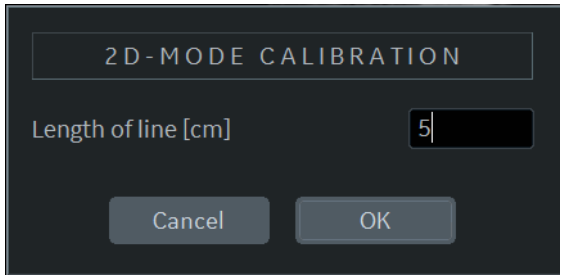


Figure 7-11. 2D-Mode Calibration

Performing Measurements on Saved Images (continued)

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.

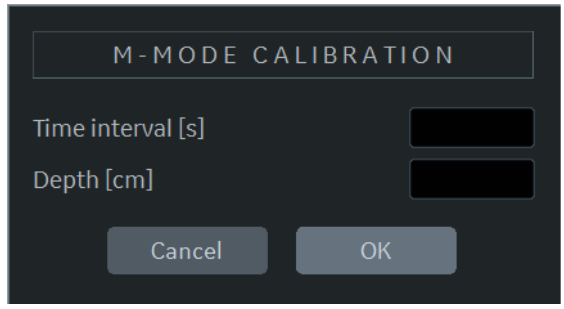


Figure 7-12. M-Mode Calibration

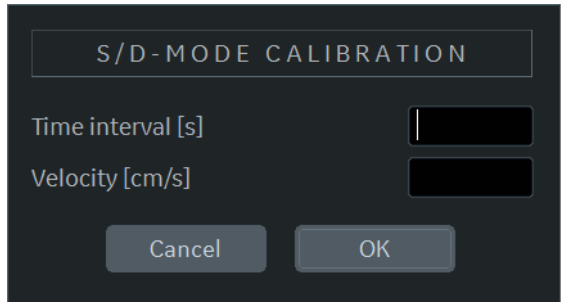


Figure 7-13. Doppler Mode Calibration

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

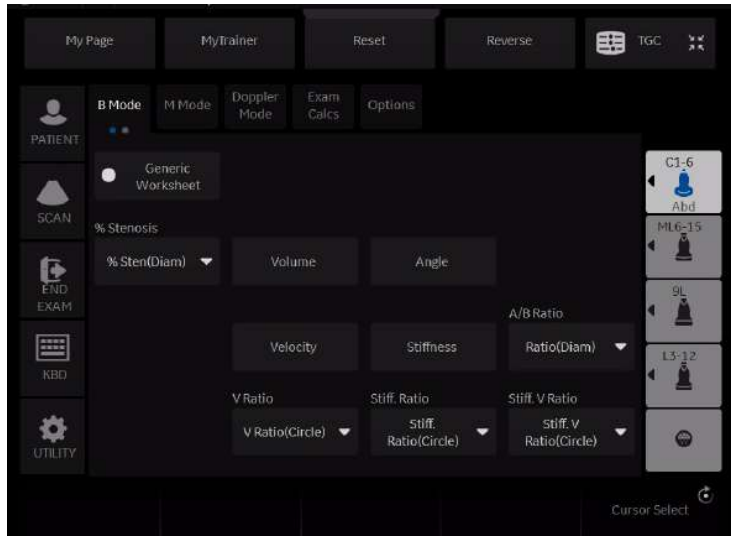


Figure 7-14. B-Mode Generic Study

*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 P8/P9/P10 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 7-46 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 7-46 for more information.*

For details on how to make an ellipse measurement, See ‘Circumference and area (ellipse) measurement’ on *page 7-48 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.

Volume (continued)

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, d1>d2
Volume (spheroidal)	Three distances
Volume (prolate spheroidal)	One ellipse: (d1 major axis, d2 minor axis)
Volume (spheroidal)	One distance d1, and one ellipse (d2 major axis, d3 minor axis)

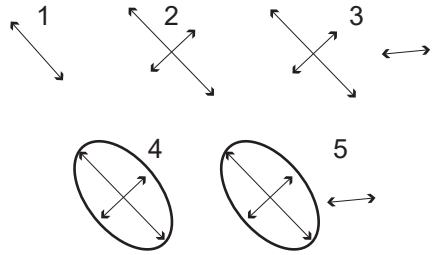


Figure 7-15. Volume Calculation Examples

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.

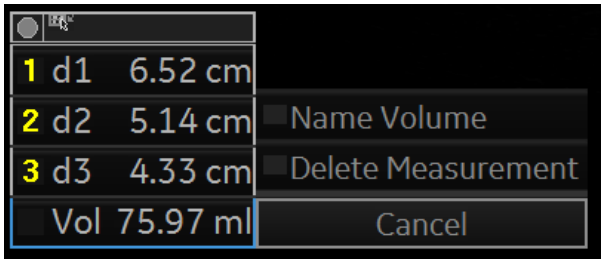


Figure 7-16. Volume Name menu

4. The dialog box displays. Enter a new name or choose the existing name.

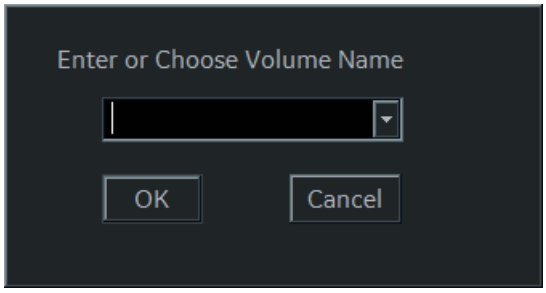


Figure 7-17. Volume Name Dialog box

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 P8/P9/P10 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 7-46 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 7-49 for more information.*

Dual Caliper

If “Dual Caliper on Simultaneous” is checked in Utility --> System --> Sysem Measure menu, dual caliper is automatically enabled when you ener simulaneous view.

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)

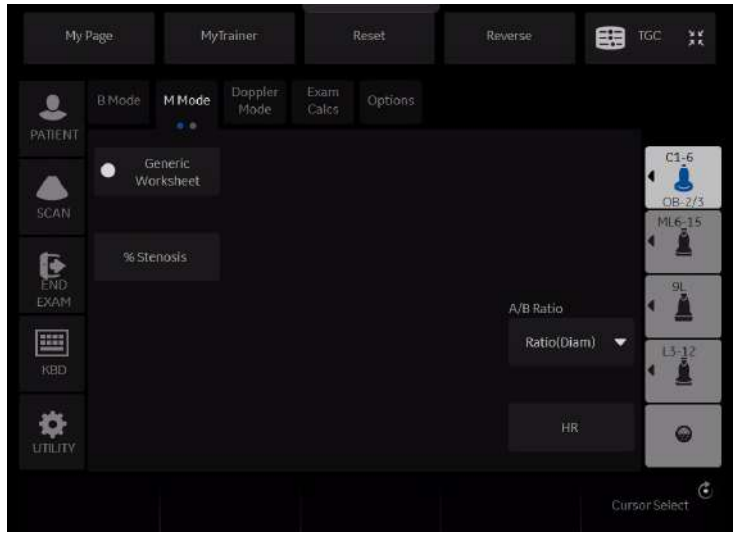


Figure 7-18. M-Mode Generic Study

% Stenosis

See '% Stenosis' on *page 7-24 for more information.*

A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity.

NOTE: The LOGIQ P8/P9/P10 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 7-32 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.

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.

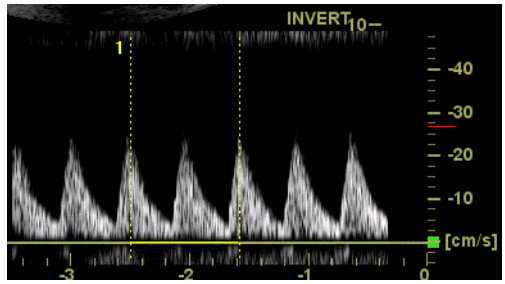


Figure 7-19. Two Heart Beat Reference (example in Doppler mode)

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)

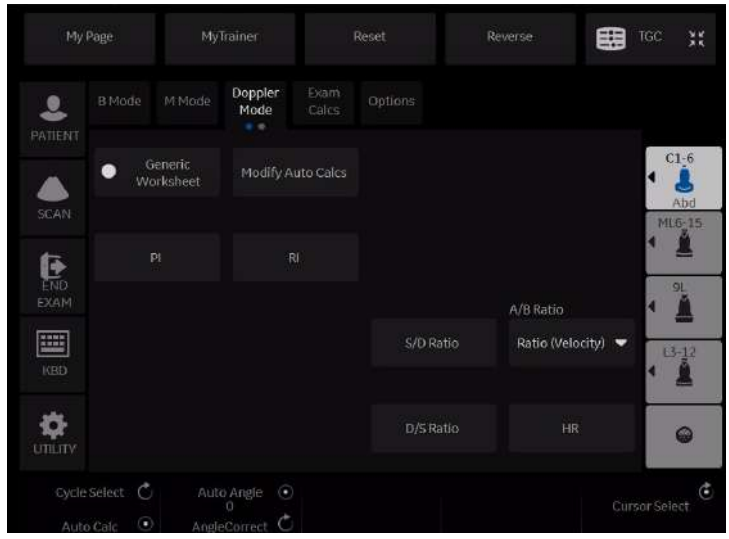


Figure 7-20. Doppler Mode Generic Study

NOTE: The following instructions assume that you do the following:

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the Doppler Mode part of the display.
3. Press **Freeze**.

Control Assignment

Cancel Transfer

NOTE: Only for Vascular, Abdomen, OB and GYN.

After the Auto Vascular calculation results are assigned to a particular vessel, the user can cancel the assignment and assigned parameters are removed from 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 7-36 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 P8/P9/P10 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 7-35 for more information.*

Time

See 'Time' on *page 7-35 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**.*

CAUTION 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 7-94 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.

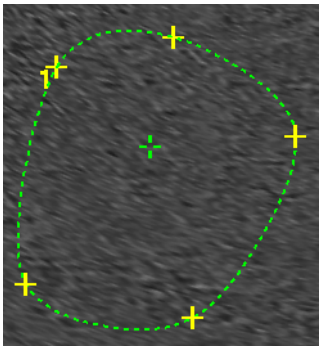


Figure 7-21. Edit spline trace

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

Five 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.

TAMAX and TAMEAN (continued)

Auto Trace

The value measured depends upon the Vol Flow Method preset. The two selections available are: Peak (TAMAX) and Mean (TAMEAN).

To 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.

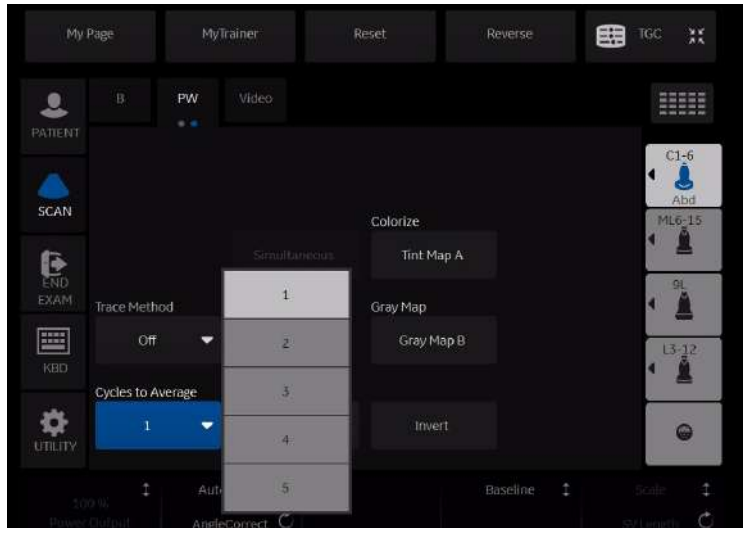


Figure 7-22. PW Touch Panel (Page 2)

Volume Flow - Manual Calc

You perform a manual Volume Flow measurement using the TAMAX plus a Volume Flow coefficient compensation.

1. To perform the Volume Flow measurement using the TAMAX plus a Volume Flow coefficient compensation, in Utility-->Measure-->Advanced, select the following:
   - Trace = Manual
   - Vol Flow Method = TAMAX [you MUST also select a Volume Flow coefficient for use with TAMAX.]
   - Vol Flow Compensation with TAMAX = [select value from 0.5 to 1.0]
2. Set Auto Calcs to Off via Doppler Mode-->Modify Auto Calcs-->Off.
3. Select a folder in Doppler Mode-->select a calculation folder-->select Show All.
4. Select ***Volume Flow***. You'll notice that TAMAX is automatically selected.

NOTE: Ensure that you have placed the caliper in the spectral window when selecting the Volume Flow measurement.

5. Trace the TAMAX. The system prompts you to "Mark the first point on the spectral doppler." Press **Set**.
6. The system prompts you to "Trace the velocity spectrum boundary." Press **Set**.

NOTE: You can back up while tracing the TAMAX by using the Trackball.

7. Trace the vessel diameter. The system prompts you to "Mark first point of vessel diameter for volume flow calculation." Press **Set**.
8. The system prompts you to "Mark last point of vessel diameter for volume flow calculation." Press **Set**.
9. The Volume Flow is calculated in ml/min.

Volume Flow - Auto Calc

You can perform an automatic Volume Flow measurement using TAMEAN or using the TAMAX and a Volume Flow coefficient.

1. To perform the Volume Flow measurement using the TAMEAN, in Utility-->Measure-->Advanced, select the following:
   - Trace = Auto
   - Vol Flow Method = TAMEAN

   OR, to perform the Volume Flow measurement using the TAMAX plus a Volume Flow coefficient compensation, select the following:
   - Trace = Auto
   - Vol Flow Method = TAMAX [if you use TAMAX, you MUST also select a Volume Flow coefficient for use with TAMAX.]
   - Vol Flow Compensation with TAMAX = [select value from 0.5 to 1.0]
2. Set Auto Calcs to Live via Doppler Mode-->Modify Auto Calcs-->Live.
3. Perform the scan.
4. Select ***Volume Flow*** via Doppler Mode-->Modify Auto Calcs-->VOLUME FLOW. The system prompts you through the measurement.
5. Take vessel diameter for volume flow calculation. Set the first cursor.
6. Mark last point of vessel diameter for volume flow calculation. Press **Set**.
7. The calculation automatically completes the Volume Flow measurements as ml/min.

NOTE: If you change the TAMAX coefficient, the Volume Flow is automatically adjusted when in Auto Calcs (but not in Manual Calcs).

Flow Volume (FV)

Flow Volume estimates the volume of blood that flows through a vessel per unit time. It is derived from a vessel's cross-sectional diameter obtained from the B-Mode portion of the image and the mean velocity of flow in the vessel obtained from the Doppler portion of the image. It is measured in milliliters. When the FV measurement is made, FVO is automatically calculated.

To measure flow volume:

1. Select **FV** from Doppler 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.

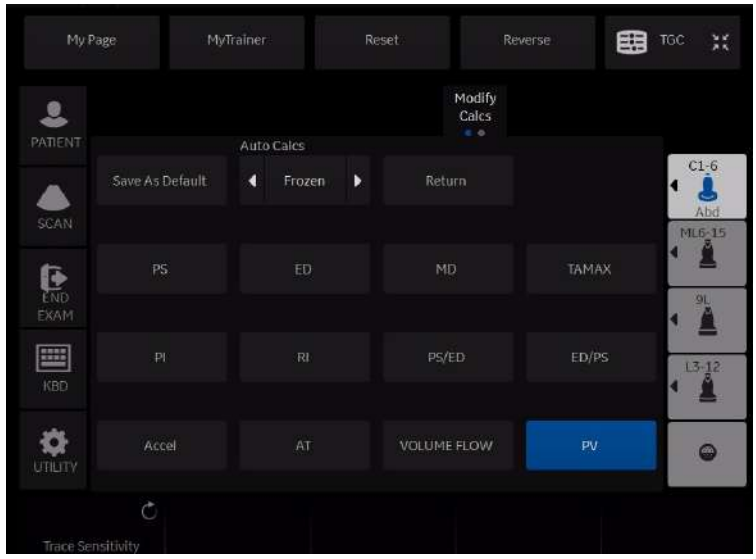


Figure 7-23. Modify Auto Calculation Menu (Page1)

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

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.

Figure 7-24. 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 worksheet.

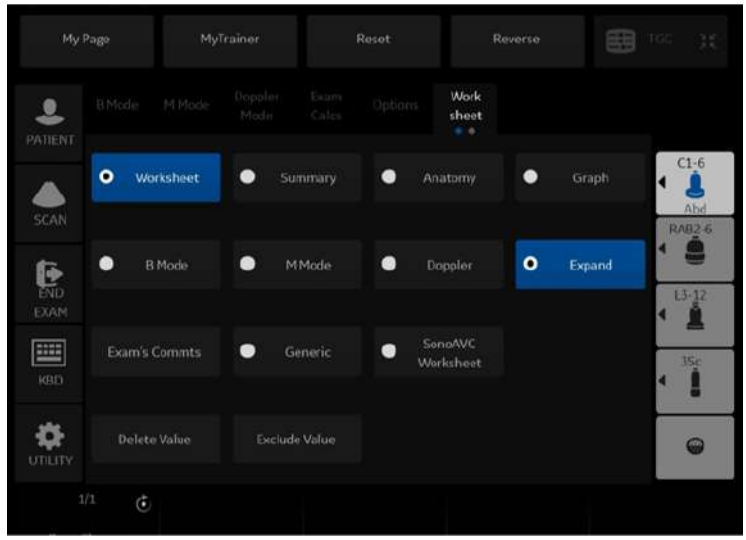


Figure 7-25. Worksheet Display Touch Panel

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

HINTS

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.*

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***.

To edit a worksheet (continued)

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

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

To edit a worksheet (continued)

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***.

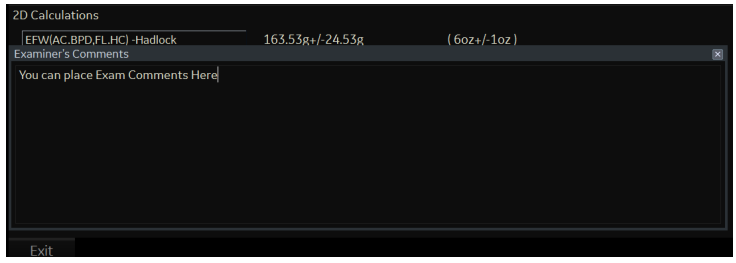


Figure 7-26. Examiner's comments field

Volume measurement value off

1. Select the method type ***Off***. The value field becomes blank.

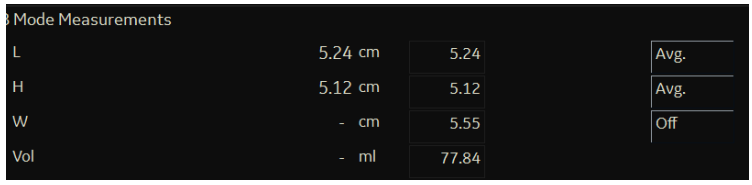


Figure 7-27. Volume Parameter Off

To edit a worksheet (continued)

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 7-28. 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:

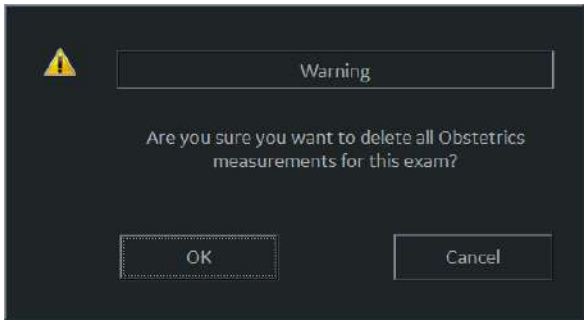


Figure 7-29. Delete All Warning Message

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 7-68* 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.

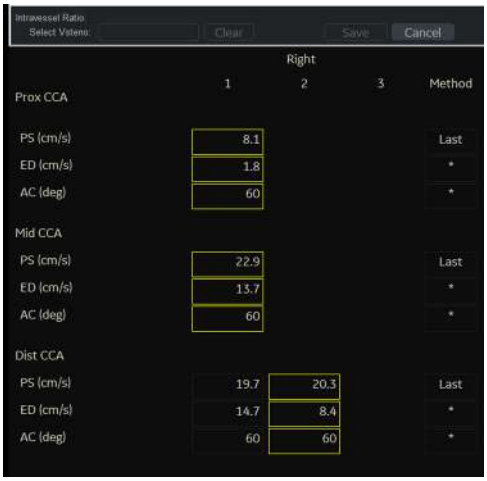


Figure 7-30. Intravessel Pop-up Window

2. Select the first velocity. The value displays in the window.
   The value is displayed in the window.

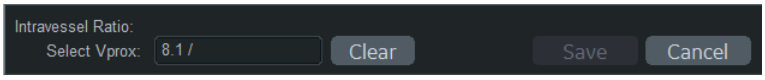


Figure 7-31. Intravessel ratio one

Intravessel ratio (continued)

3. Select the second velocity.

   The second value and Result value display in the window.

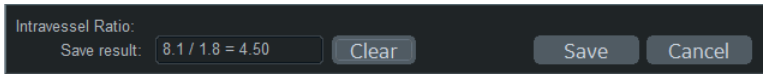


Figure 7-32. Intravessel ratio two

- 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.

Figure 7-33. 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.

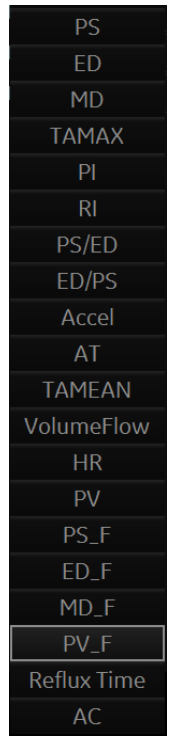


Figure 7-34. Pop-up menu

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.

Anatomical Survey

Overview

The Anatomical Survey page provides a checklist that indicates which anatomy was imaged and its appearance.

Figure 7-35. OB Anatomical Survey

Overview (continued)

Figure 7-36. Abdominal Antomical Survey

Overview (continued)

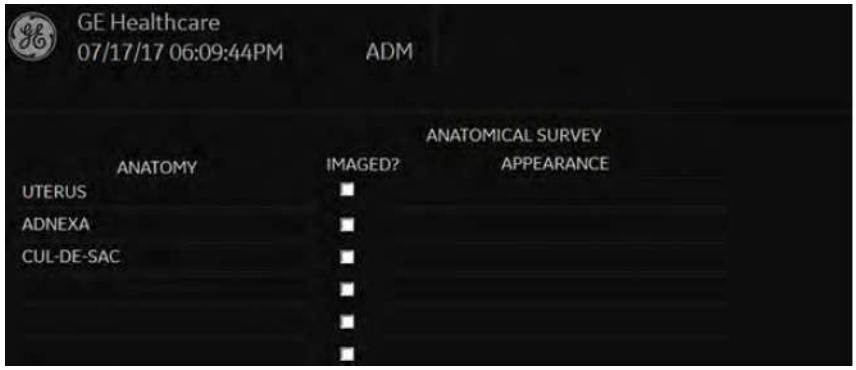


Figure 7-37. GYN Anatomical Survey

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	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

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 P8/P9/P10 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.

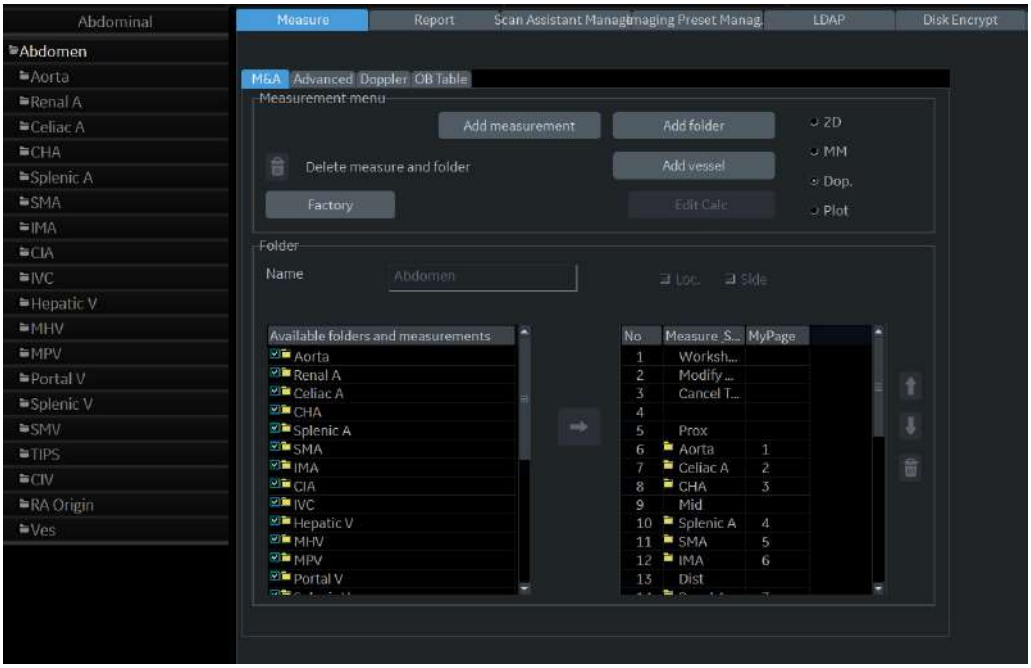


Figure 7-38. Measurement & Analysis screen

1. **Selection menu**: select exam category, study, or measurement folder/measurement.
2. **Measurement menu**: add and delete studies (folders) and measurements; select mode.
3. **Folder or measurement**: define studies and measurements. This section changes between Folder and Measurement, depending on what you select in the Selection menu.

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**.

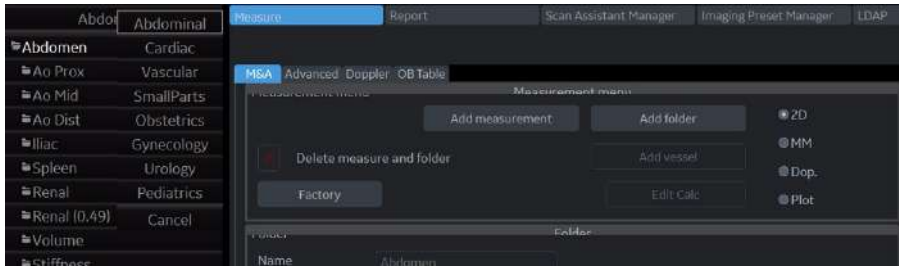


Figure 7-39. Select the exam category

Select the study

1. Move the cursor to the current study in the Selection menu.

Figure 7-40.

2. Press **Set**. All study displays.

Figure 7-41. 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.

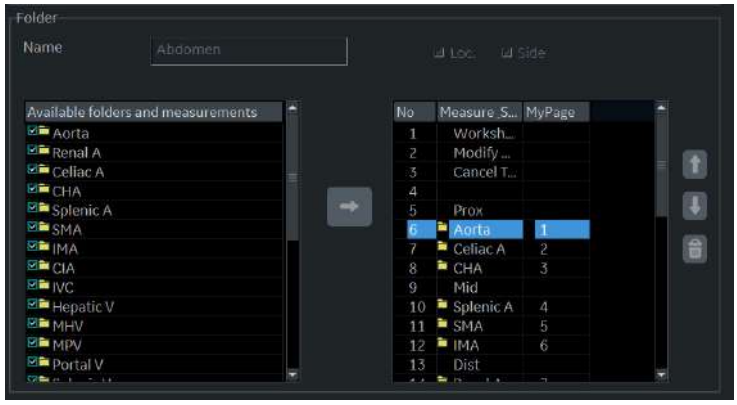


Figure 7-42. Folder - example

   - If you select a measurement, the Measurement section displays information about the selected measurement.

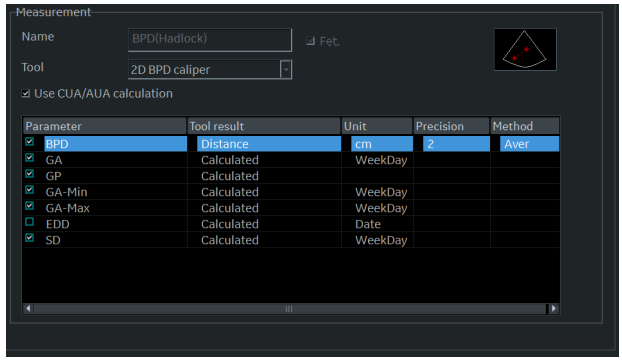


Figure 7-43. Measurement - example

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)

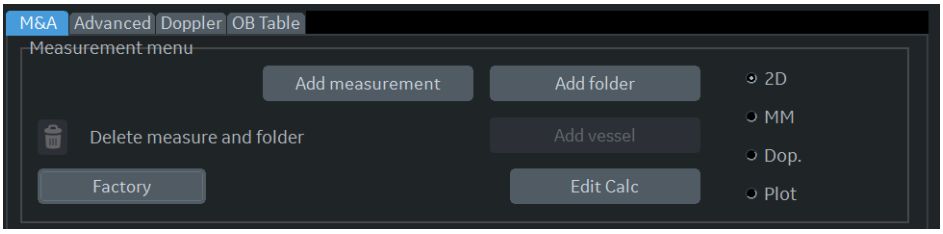


Figure 7-44. Measurement menu

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**.

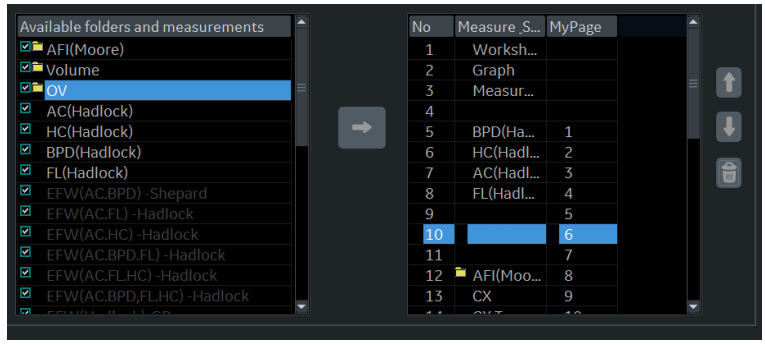


Figure 7-45. Select the position and an item

Display/hide a folder or a measurement in the Touch Panel (continued)

3. Press the arrow between the lists. The item is copied to the Measure & Study list.

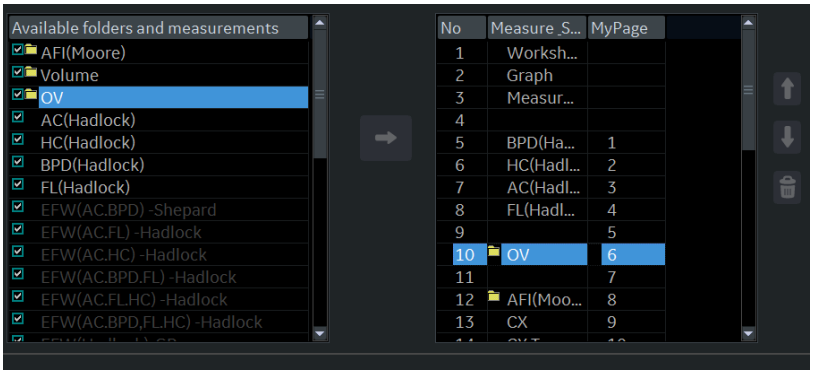


Figure 7-46. Measure & Study list: New item added

The selected item is now displayed in the Touch Panel and the Summary Window.

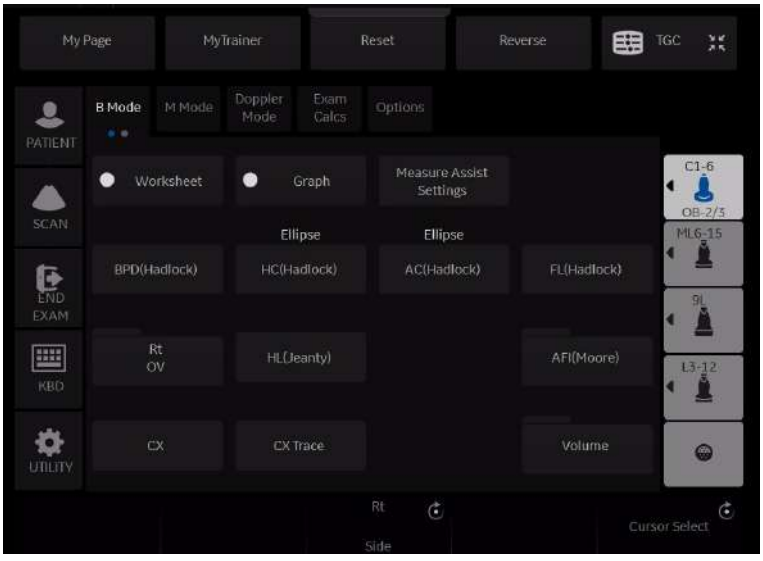


Figure 7-47. Touch Panel for measurement added

Touch Panel positions

Each Touch Panel has 16 positions, five across and five donw. The items in the first row across are numbered 1-4, in the second row 5-8, and so on. Positions 1-4 are system programmed and cannot be edited.

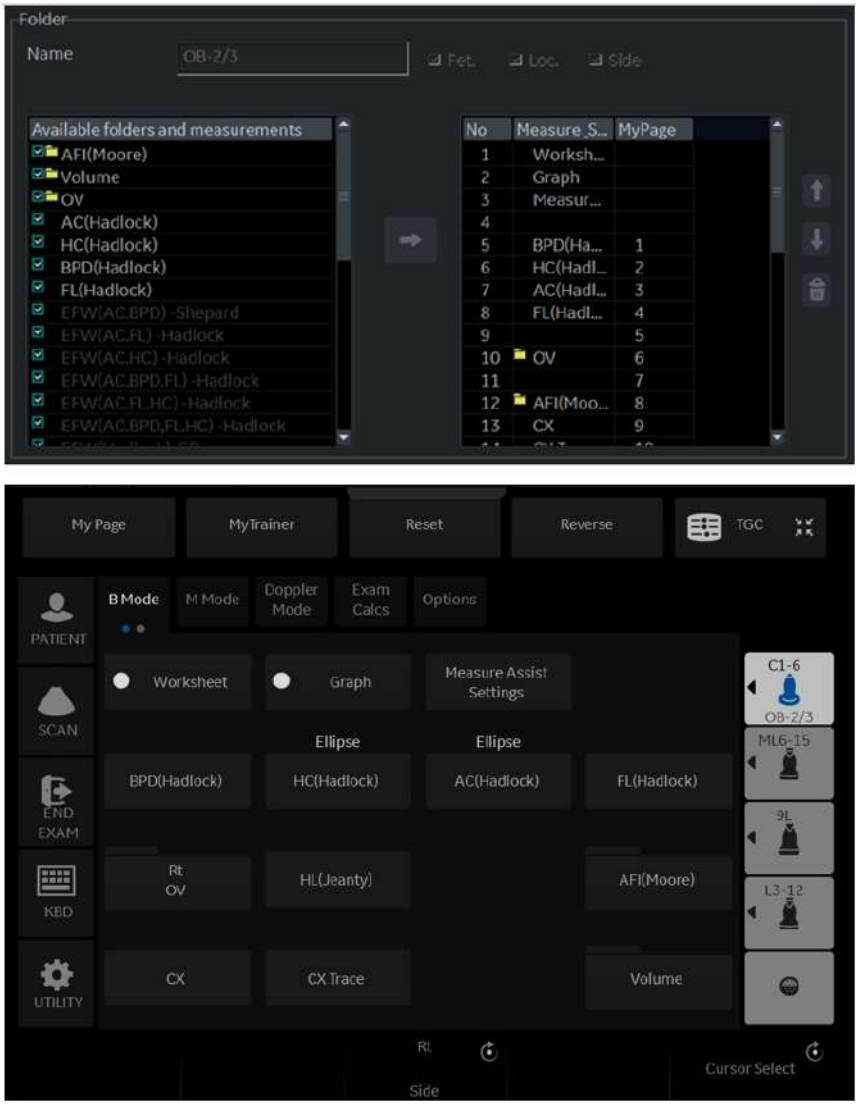


Figure 7-48. Measure & Study display with Touch Panel positions

Move and remove items in the Touch Panel

To move items that are in the Touch Panel, you move them in the Measure & Study list.

1. Highlight an item in the Measure & Study list.
2. Move the cursor to the up or down arrow and press **Set**.

   The item is displayed at the selected position in the Touch Panel.

To remove items from the Touch Panel, you remove them from the Measure & Study list.

1. Move the **Trackball** to highlight the item in the Measure & Study list and press **Set**.
2. Select the X to the right of the list.

   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.

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 Folder section, select Auto sequence.

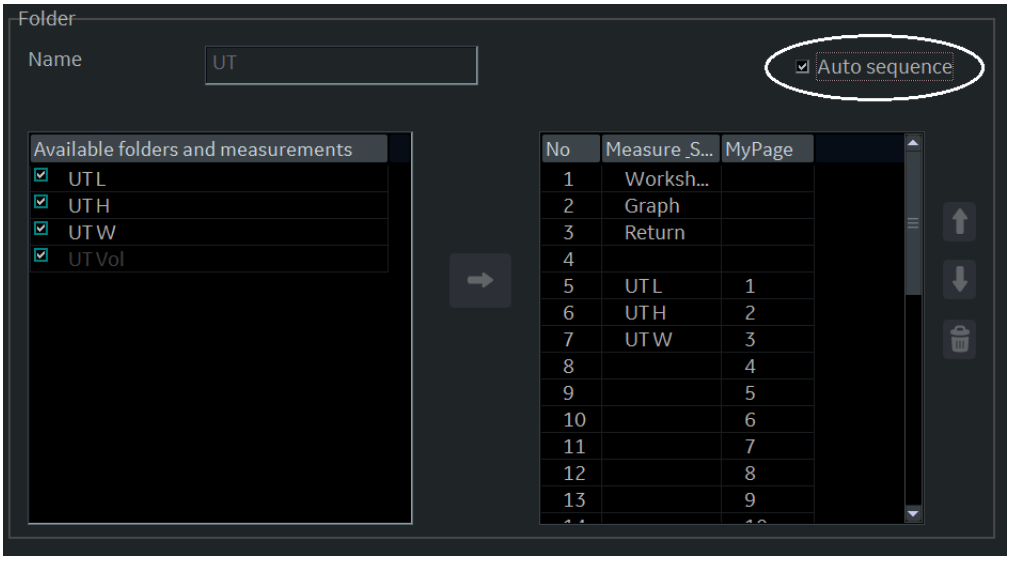


Figure 7-49. Measurement & Analysis screen: Auto sequence

1. Select the measurement folder
2. Put a checkmark to the Auto Sequence box

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.

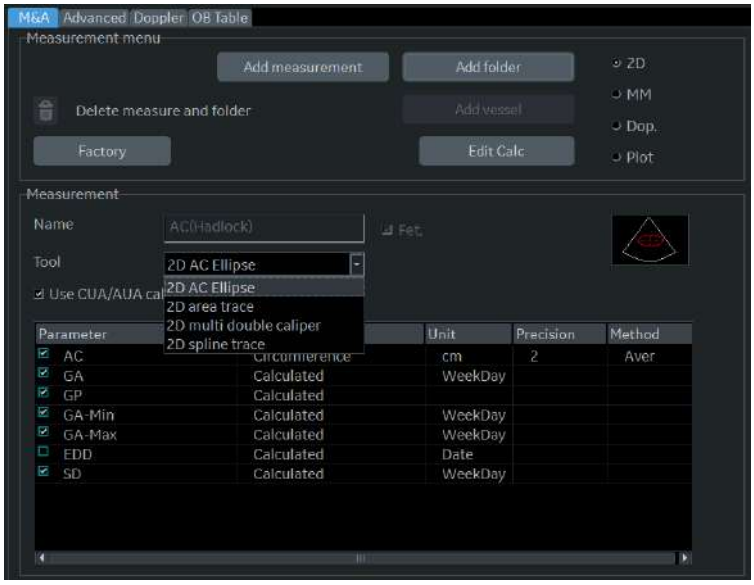


Figure 7-50. Change the tool

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.

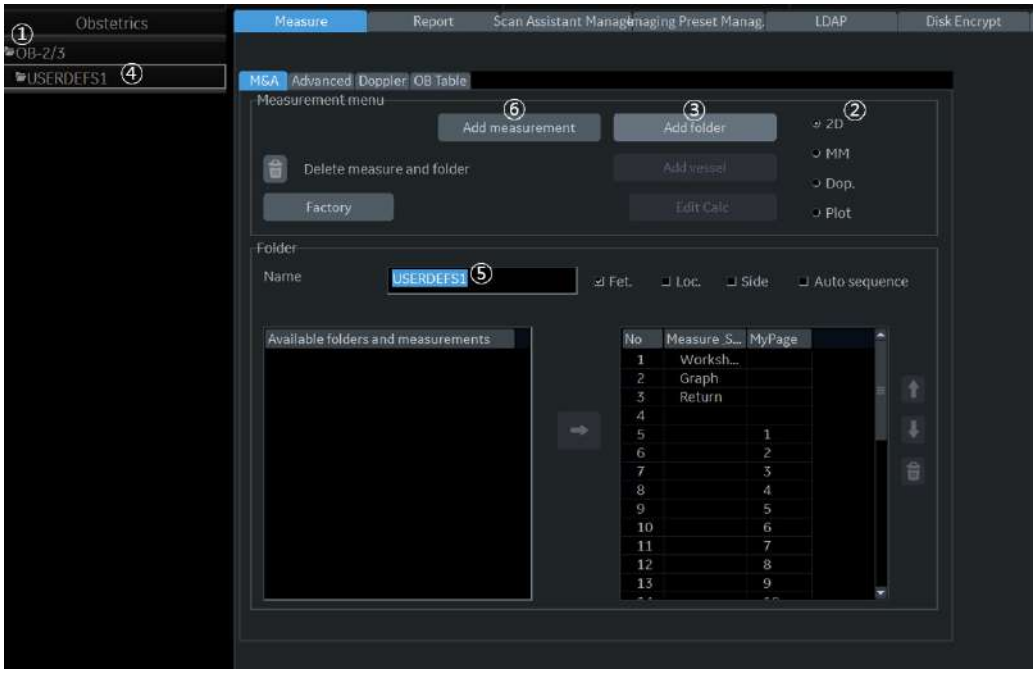


Figure 7-51. Measurement & Analysis: Add folder

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.

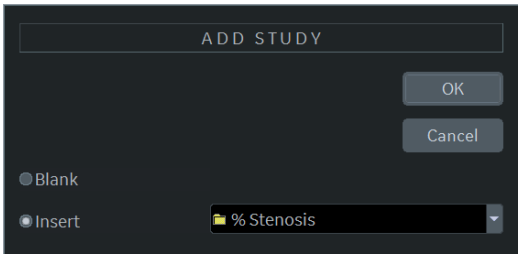


Figure 7-52. Add folder Window

4. Select the user-defined folder in the Selection menu.

NOTE: You cannot change an existing folder name.

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. See ‘Adding measurement parameters’ on *page 7-103*

Changing measurement parameters

Please remember that you are responsible for confirming the correctness and accuracy of the user input formula that is added to your system on your behalf.

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 7-53. 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		

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/s2	x1
	dm/s2	x10
	cm/s2	x100
	mm/s2	x1,000
	inch/s2	x39.37
Area		
	m2 or m^2	x1
	dm2	x100
	cm2 or cm^2	x10,000
	mm2 or mm^2	x1,000,000
	inch2	x1550
Volume		
	m3	x1
	dm3	x1,000
	cm3	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)
	m3/s	x1
	dm3/s	x1,000
	cm3/s	x1,000,000
	l/s	x1,000
	dl/s	x10,000
	cl/s	x100,000
	ml/s	x1,000,000
	m3/min	x60
	dm3/min	x60,000
	cm3/min	x60,000,000
	l/min or L/min	x60,000
	dl/min	x600,000
	cl/min	x6,000,000
	ml/min	x60,000,000
	ml/m2	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
Others		
	mmHg	x1

Formula Unit Conversion (continued)

For example, when a Volume formula is created:

Vol [ml or cm3] = 0.523598*{D1}*{D2}*{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^.

For example, if you want to define the following formula:

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

Formula Unit Conversion (continued)

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:

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.

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.

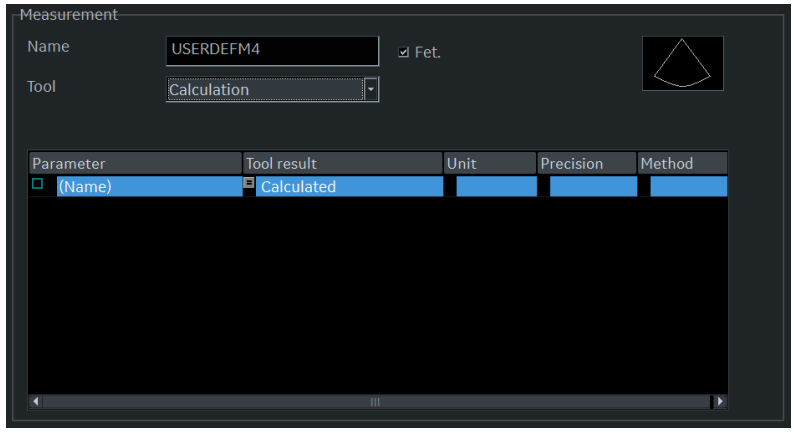


Figure 7-54. Measurement window

4. Type the parameter name.
5. Double click on the = Calculated symbol under Tool Result. The Edit Formula window displays.
6. Select OK.

Editing Calculations (continued)

7. In the Measurement menu section, select *Edit Calc*.

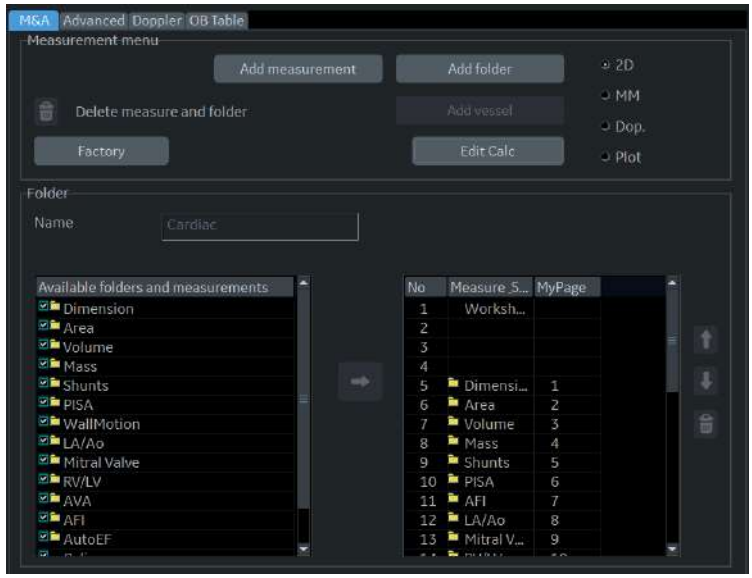


Figure 7-55. Edit Calc

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.

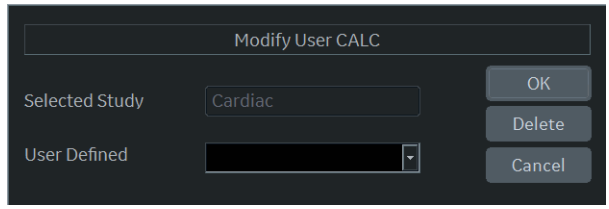


Figure 7-56. Modify User CALC window

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 folder.

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.

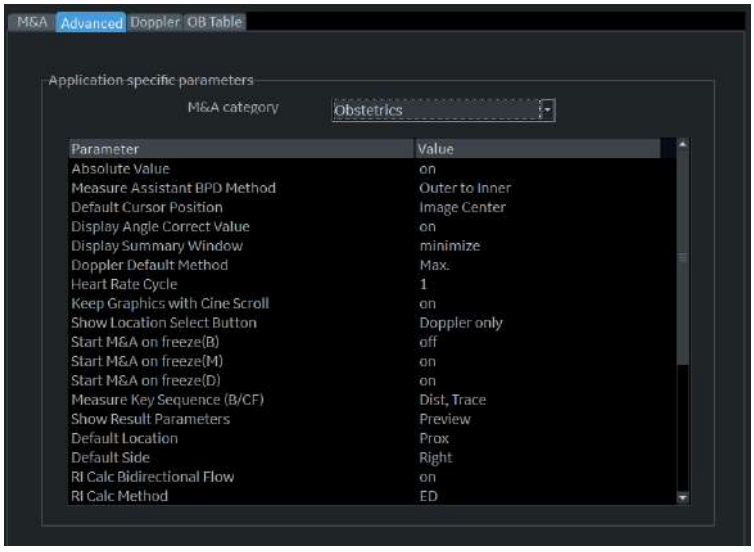


Figure 7-57. M&A Advanced Preset Menu

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 *NOTE: For Cardiac, you can select only "1".*
Keep Graphics with Cine Scroll	If you select "On", the measurement graphics remain while in CINE scroll. The measurement graphic redisplays on the frame where the measurement was taken in B-Mode.
Start M&A on a Freeze (B)	Off: Select measurement manually on Freeze On: Measurement menu appears automatically on Freeze. Caliper: Measurement menu and caliper appear automatically on Freeze.
Start M&A on a Freeze (M)	
Start M&A on a Freeze (D)	
Start M&A on a Freeze (Shear)	Off: Select measurement manually on Freeze. On: Measurement menu appears automatically on Freeze. Auto: If the number of scanned frame is 1, measurement starts automatically on Freeze. Other than that, measurement does not start.
Measure Key Sequence (B/CF)	2 Sequences: Dist, Trace; Dist, Spline 2 Sequences: Dist, Open Trace: Dist, Open Spline 3 Sequences: Dist, Trace, Spline; Dist, Spline, Trace; Dist, Spline, Intensity; Dist, Trace, Intensity; Dist, Trace, Open Trace; Dist, Spline, Open Trace 4 Sequences: Dist, Trace, Spline, Intensity; Dist, Spline, Trace, Intensity; Dist, Spline, Trace, Open Trace; Dist, Trace, Open Trace, Spline
Show Result Parameters	Preview or After Set cursor: Preview: Displays while taking the measurement. After Set Cursor: Displays after completing the measurement.
Default Location	Off, Prox, Mid or Dist
Default Side	Left, Right or Off
RI Calc Bidirectional Flow	On or Off

Table 7-11: M&A Advanced (Continued)

Preset Parameter	Description
RI Calc Method	MD or ED
Auto Shear Measure Size	Sets the Default Diameter size of the shear wave measurement circle.
Auto Shear Measure Fixed Size	On or Off
Shear Calculation Method	Specify Mean or Median • 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
Vol Flow Method	TAMEAN or TAMAX
Vol Flow Compensation with TAMAX	If you select TAMAX as the volume flow method, then you MUST specify the coefficient to use. Select from 0.5 to 1.0.
Worksheet Default Display	Mode/Expand (Abdominal, Small Parts, Obstetrics, Gynecology, Urology and Pediatrics) or Worksheet Summary (Vascular)
Doppler AutoCalc Velocity Unit	Velocity, Hz, Both or Auto
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

Table 7-11: M&A Advanced (Continued)

Preset Parameter	Description
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
AutoEF processing	Off, delay 1s, delay 2s, delay 3s or delay 4s
AutoEF ROI method	Auto ROI or 3 Points
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

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 Cacls.

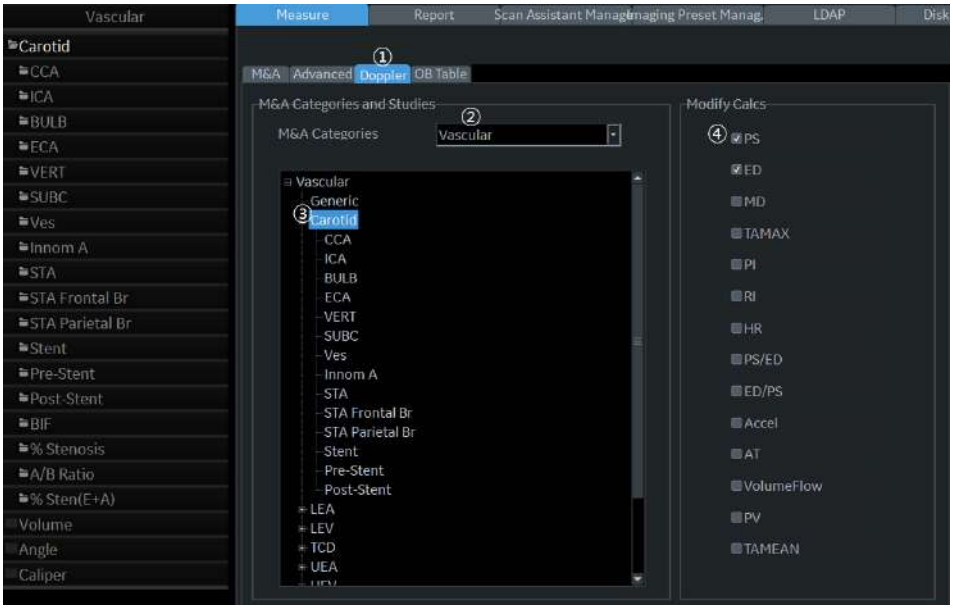


Figure 7-58. M&A Doppler Preset Menu

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.

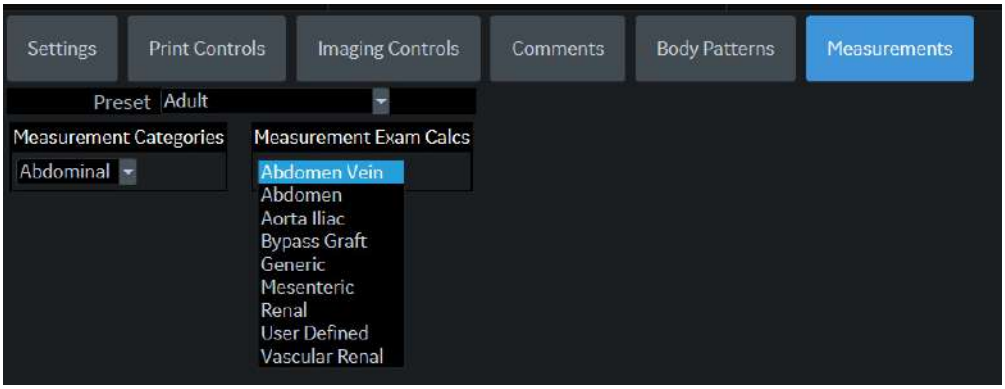


Figure 7-59. Application Measurements Menu

Chapter 8

Application M&A

Describes how to perform application specific measurements and calculations.

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 7-22 for more information.*
- Abdomen
- Renal
- Bypass Graft
- Aorta Iliac
- Vascular Renal
- Mesenteric
- Abdomen Vein

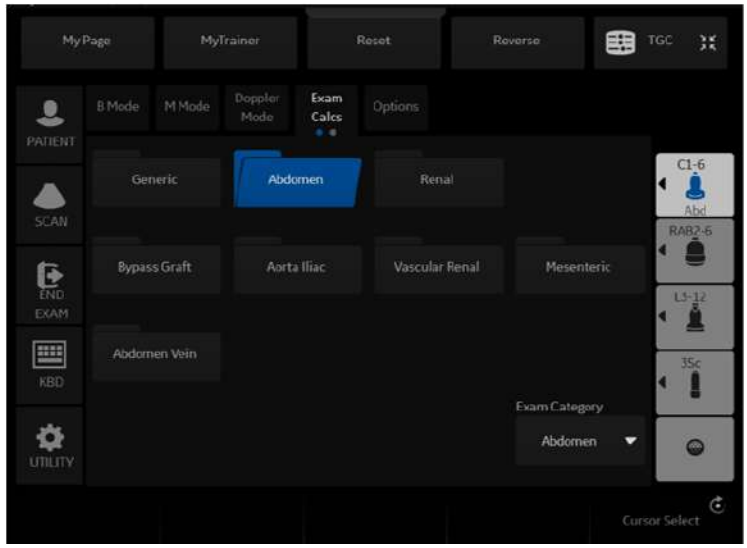


Figure 8-1. Abdomen Exam Category Touch Panel

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 7-22 for more information.*
- Small Parts, which includes the thyroid and scrotal measurement packages.

NOTE: If Small Parts has the Breast package option, the Breast folder displays in the Small Parts Touch Panel.

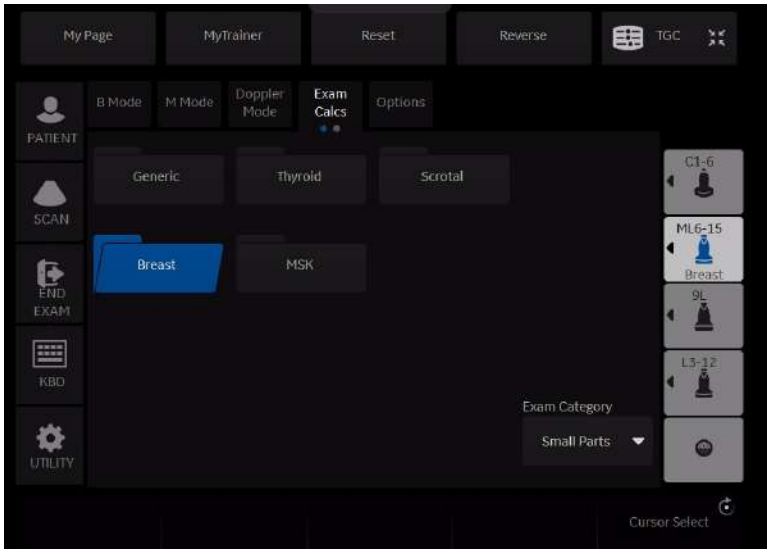


Figure 8-2. Small Parts Exam Category Touch Panel

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.

OB

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 P8/P9/P10 system includes measurements for the following studies: USA, Europe, Tokyo, Osaka and ASUM.

Select OB Type in Utility -> System -> System Measure.

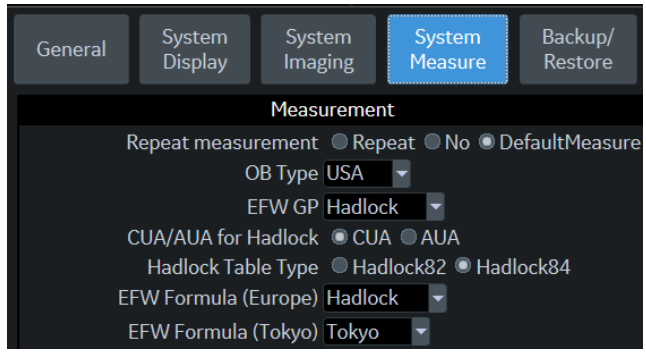


Figure 8-3. OB Type selection

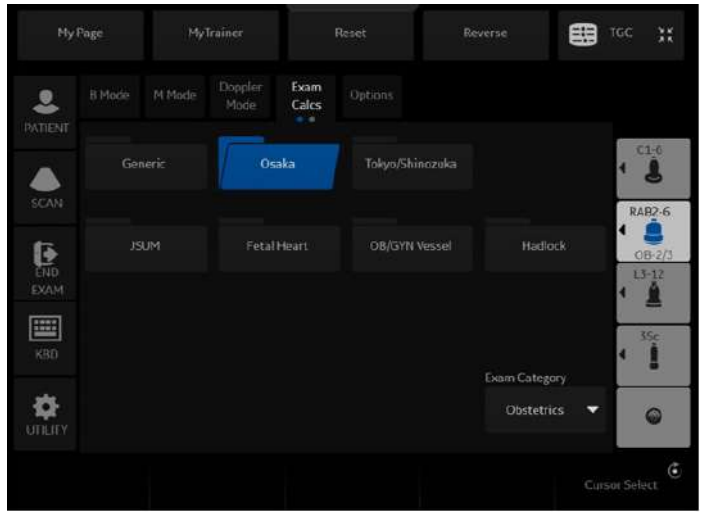


Figure 8-4. OB Type: Tokyo - example

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 Obsterics 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 ***Graph***.

   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.***
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 4-23 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, ener the data. To enter data in a field, move the ***Trackball*** to hightlight 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.
EDD by LMP	Estimated Delivery Date by LMP; the system files in the date after you enter the LMP.
GA by LMP	Gestational Age by LMP; the system files 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; defaulty 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 hightlight 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.

1. 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.
2. To choose the appropriate probe, select the probe icon on the Touch Panel.
3. On the Control Panel, press ***Measure.***

   The default Obstetrics study is displayed on the Touch Panel.

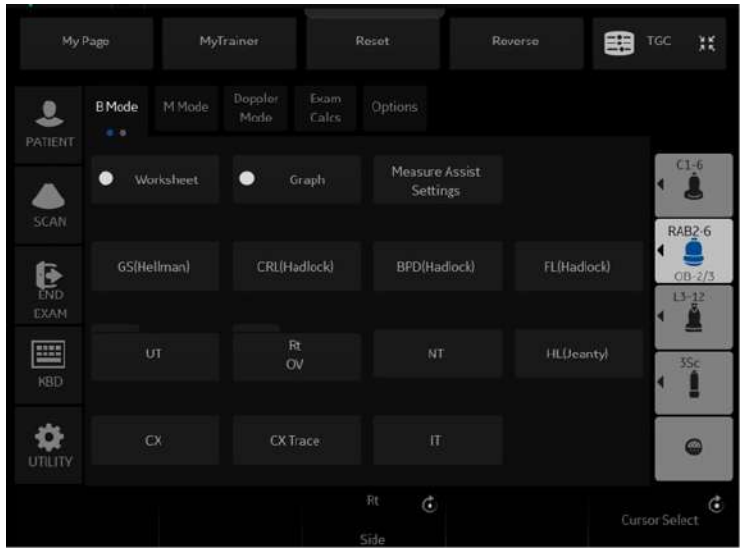


Figure 8-5. OB-General Study

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.

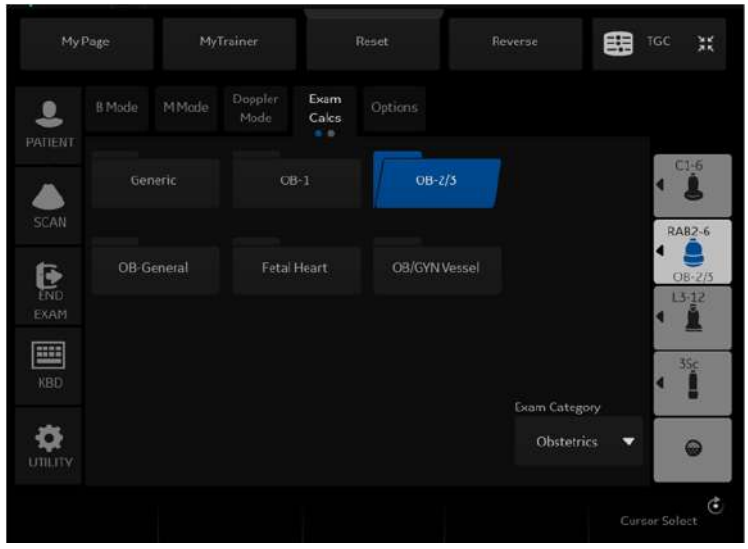


Figure 8-6. OB Study Touch Panel

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, thrid, 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.
- 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. Only if the found measurement is correct according to he guidelines, accept and confirms the result. Then it will be stored 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).

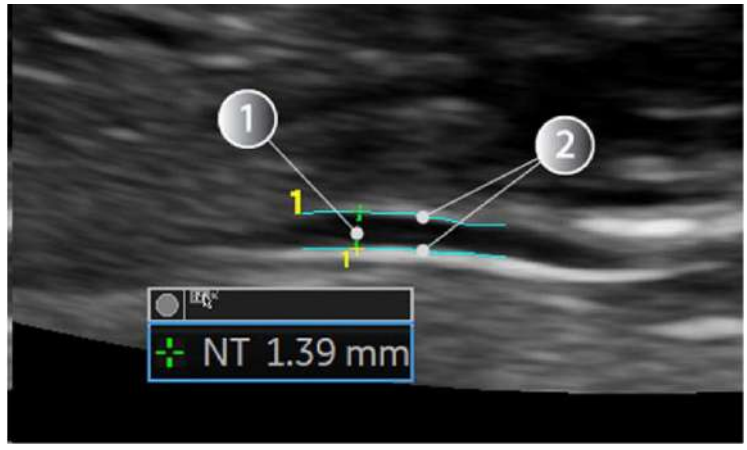


Figure 8-7. SonoNT

SonoNT Measurement Detected NT Border

SonoNT (Nuchal Translucency) (continued)

SonoIT (Intracranial Translucency)

SonoIT is a system supported measurement for Intracranial Translucency. Starting from the routinely used midsagittal view of the fetal face, obtained for assesment of the Nucahl Translucency and nasal bone, the ultrasound system uses a semi-automated mode to measure the anterior-posterior diameter of the fourth ventricle recognizale as intracranial translucency.

The workflow is identical with 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 P8/P9/P10 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.

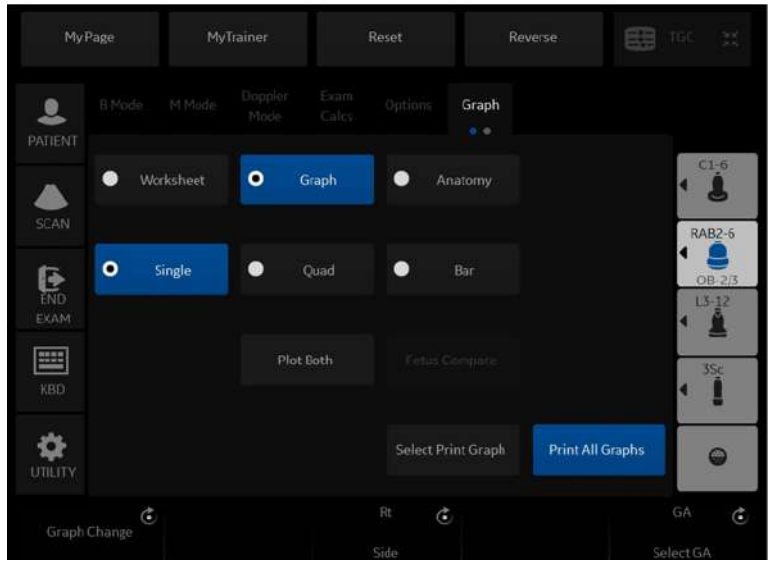


Figure 8-8. OB Graph keys on Touch Panel

Fetal Growth Curve Graph

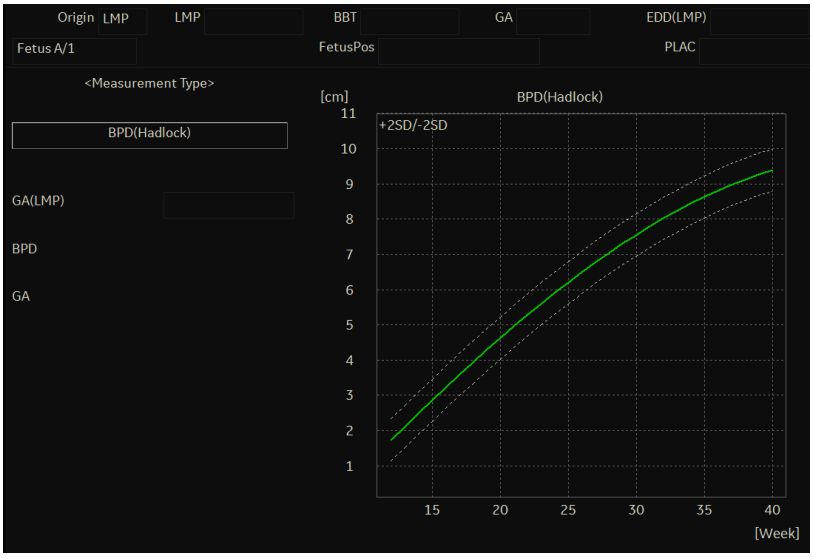


Figure 8-9. Fetal Growth Curve Graph (Single)

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.

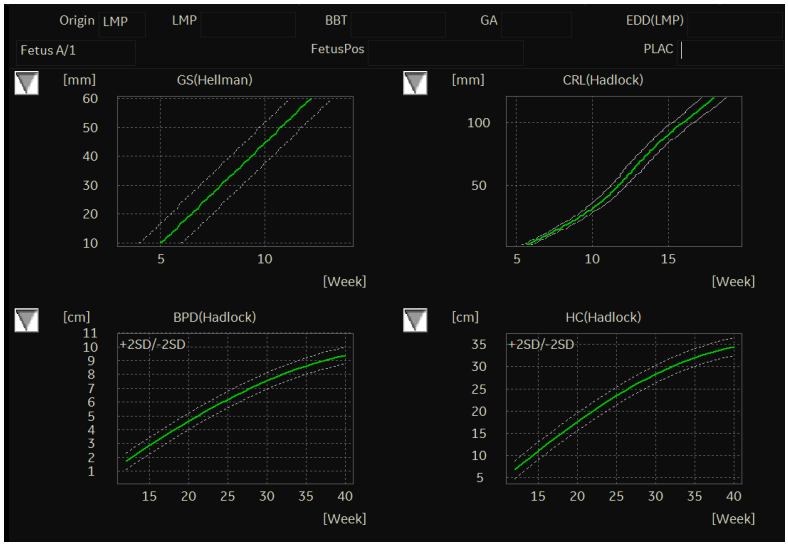


Figure 8-10. Fetal Growth Curve Graph: Quad View

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.

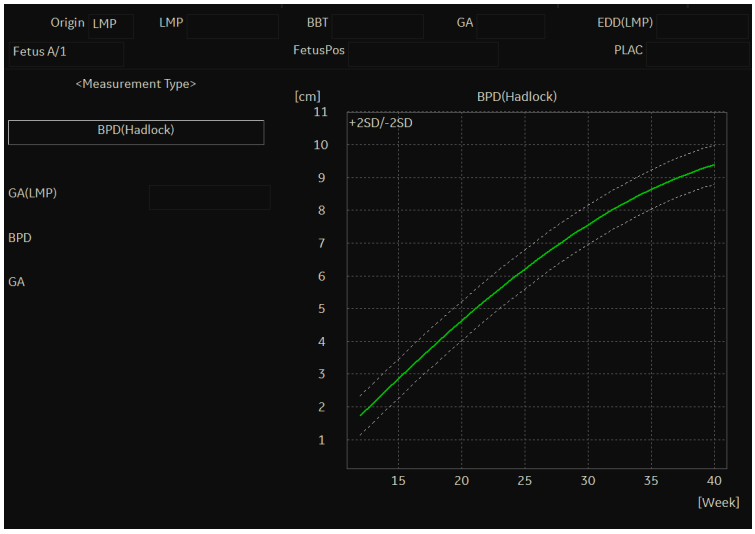


Figure 8-11. Fetal Trending on Fetal Growth Curve Graph

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.

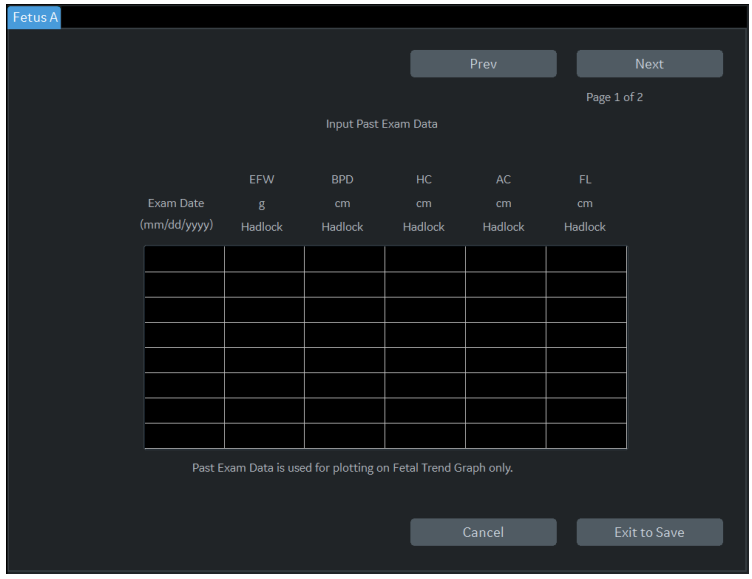


Figure 8-12. Input Past Exam screen, page 1

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***.

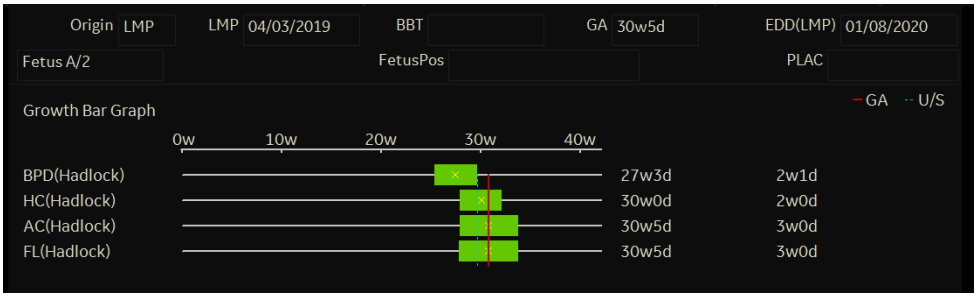


Figure 8-13. Fetal Growth Bar Graph

Fetal Growth Bar Graph (continued)

- 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 P8/P9/P10 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.

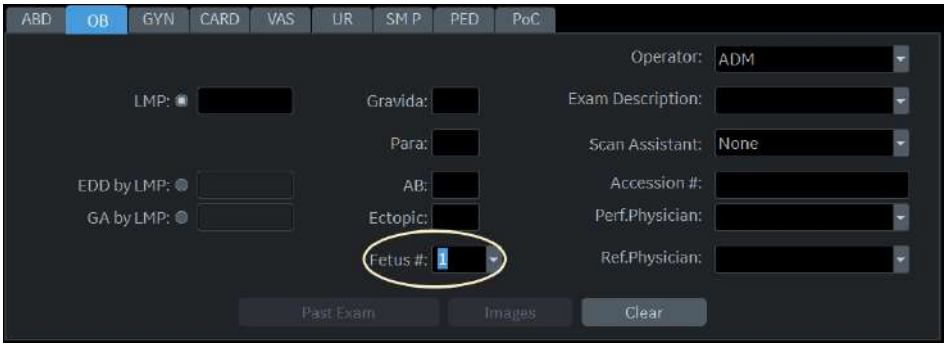


Figure 8-14. Fetus Number

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.

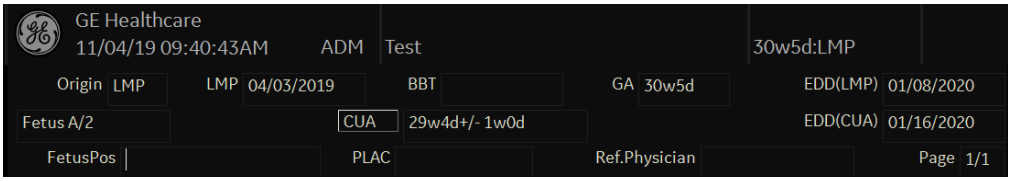


Figure 8-15. Patient Data section of the OB Worksheet

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.

Figure 8-16. Summary Window: Multiple fetus

You can change between fetuses at any time during the exam.

NOTE: After you change to the next fetus, any measurements you make are recorded and reported to that fetus. If you have any active measurement or calculation that is not completed when you change the fetus, the system cancels the measurement or calculation.

To view multiple fetuses data on graphs

You can view multiple gestation data on fetal growth curve graphs. After you have made measurements for each fetus, select ***Graph***.

1. To view the graph for each fetus, do one of the following:
   - Adjust the **Fetus** selection.
   - In the Patient Data section, move the **Trackball** to highlight the FetusNo field. In the list of fetuses, move the **Trackball** to select the fetus you want, and press **Set**.
2. To display data for multiple fetuses on the same graph, select ***Fetus Compare***.

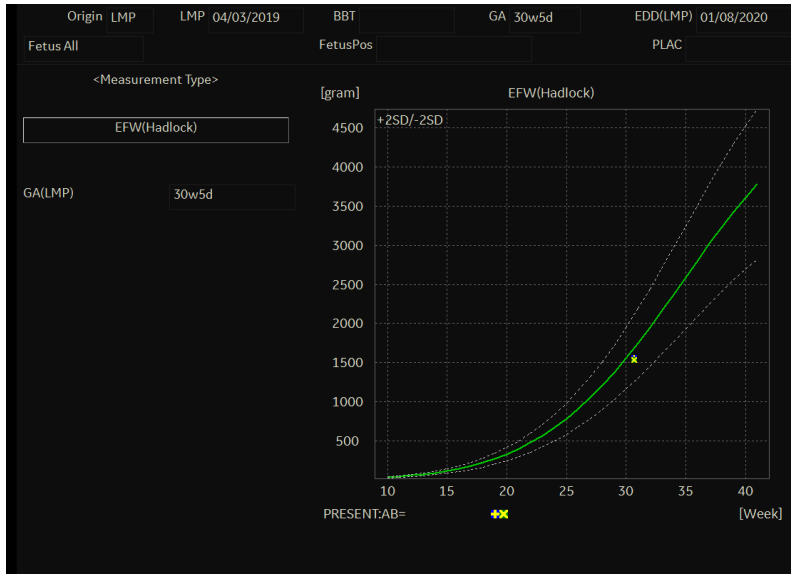


Figure 8-17. Fetal Growth Curve Graph: Fetus Compare

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***.

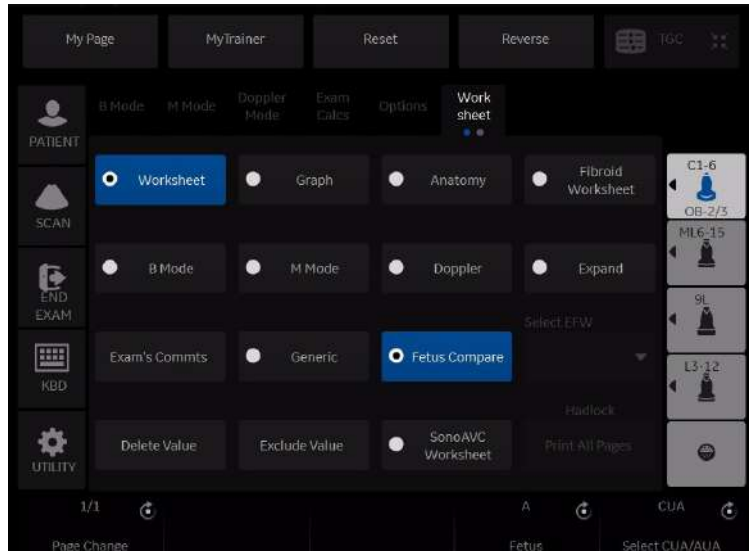


Figure 8-18. OB Worksheet Display Touch Panel

To compare multiple fetus data on a worksheet (continued)

When you select ***Fetus Compare***, the system lists the measurement results for each fetus on the Worksheet.

Origin LMP | LMP 04/03/2019 | BBT | GA 30w5d | EDD(GA) 01/08/2020

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Fetus Compare	A	B		
CUA	29w4d+/- 1w0d	30w0d+/- 1w0d		
EDD(CUA)	01/16/2020	01/13/2020		
EFW	1567 g	1543 g		
BPD(Hadlock)	6.81 cm	7.55 cm		
GA	27w3d	30w2d		
HC(Hadlock)	27.41 cm	27.95 cm		
GA	30w0d	30w4d		
OFD(HC)	9.83 cm	10.17 cm		
AC(Hadlock)	26.66 cm	26.14 cm		
GA	30w5d	30w2d		
FL(Hadlock)	5.89 cm	5.76 cm		
GA	30w5d	30w1d		

Figure 8-19. Worksheet Display with Fetus Compare

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.

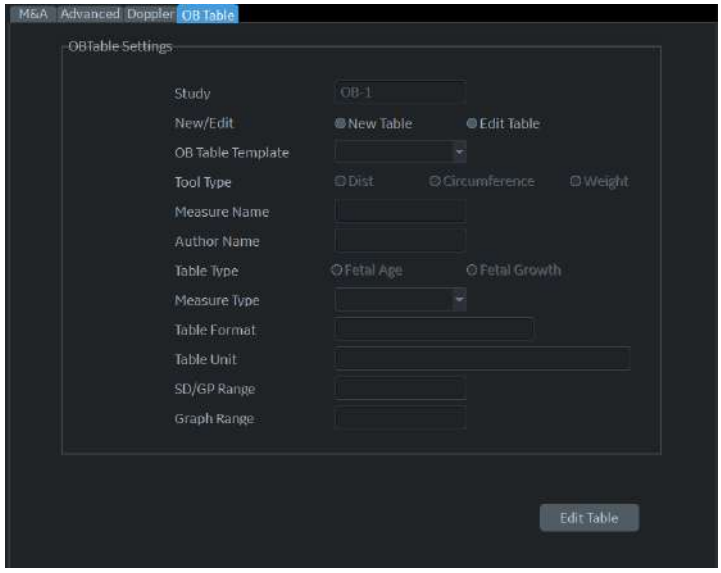


Figure 8-20. OB Table settings

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 8-38*

  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	Day
	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	MEAN	SD
	Table Unit	mm	WeekDay	mm
	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	MEAN	SD
	Table Unit	WeekDay	mm	Day
	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: 10% - 90% Table					
Fetal Age Table	Table Format	MEAS	MIN	MEAN	SD
	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	MEAN	MAX	SD
	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:

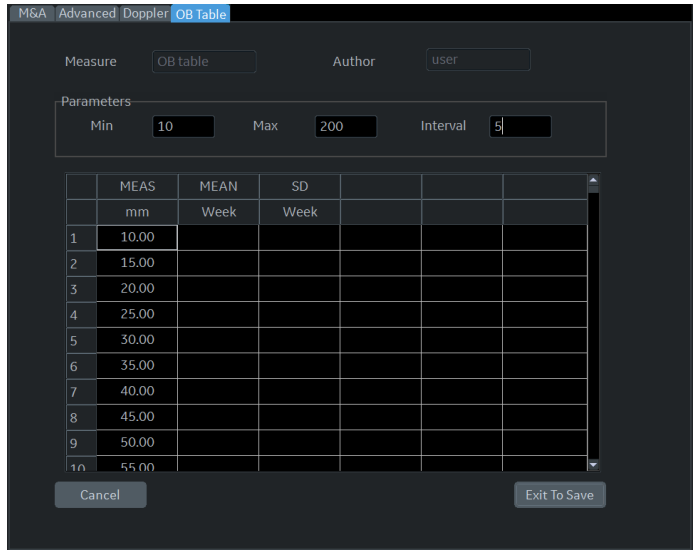


Figure 8-21. OB Table Edit Menu: Fetal Age Table

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:

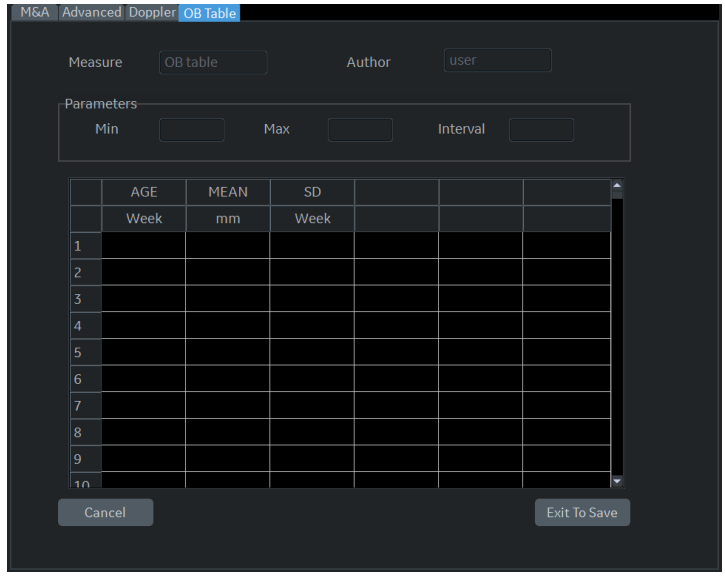


Figure 8-22. OB Table Edit Menu: Fetal Growth Table

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 7-88 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”

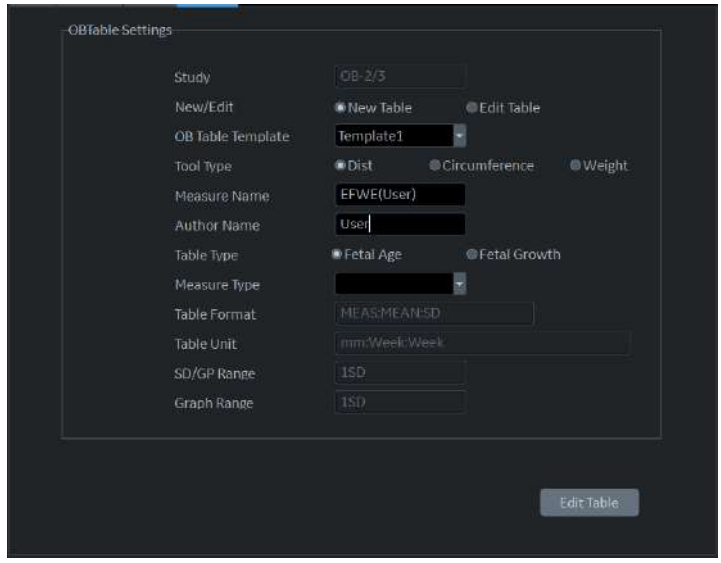


Figure 8-23. OB Table Tab Screen

EFW Table Editor (continued)

3. Edit the table data and press ***Exit To Save***.

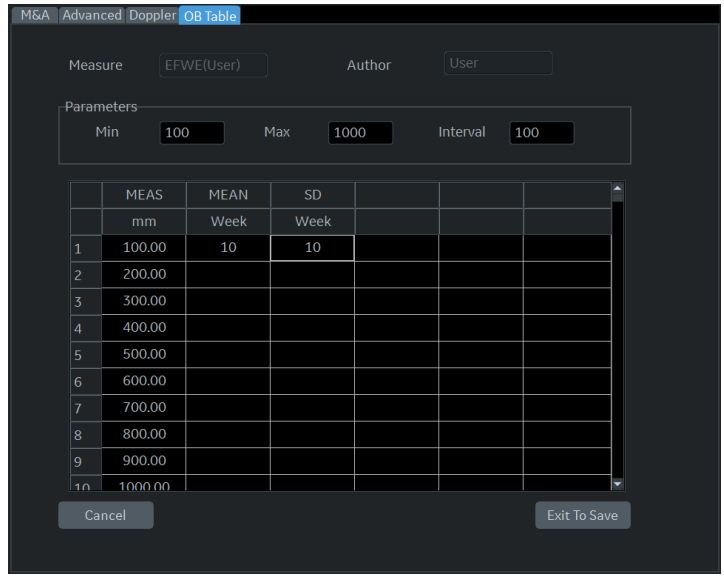


Figure 8-24. OB Table Editor Screen

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***.

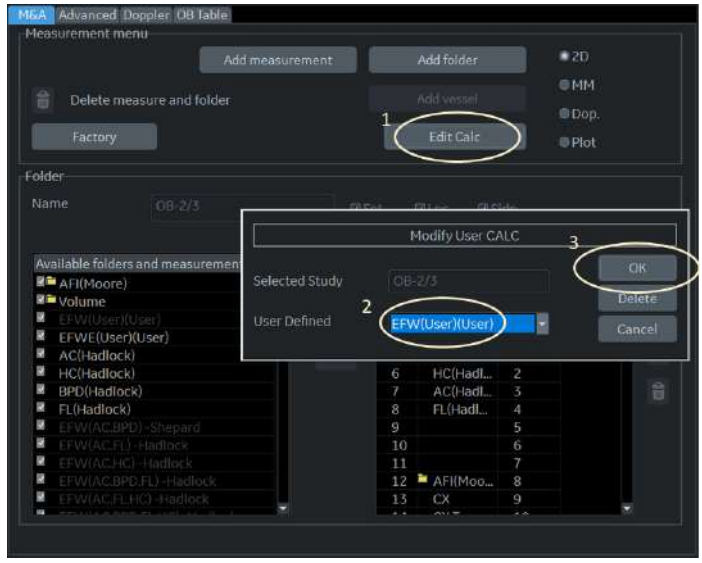


Figure 8-25. Modify User CALC window

EFW Formula Editor (continued)

2. Double click the “Calculated” button for the EFW parameter.

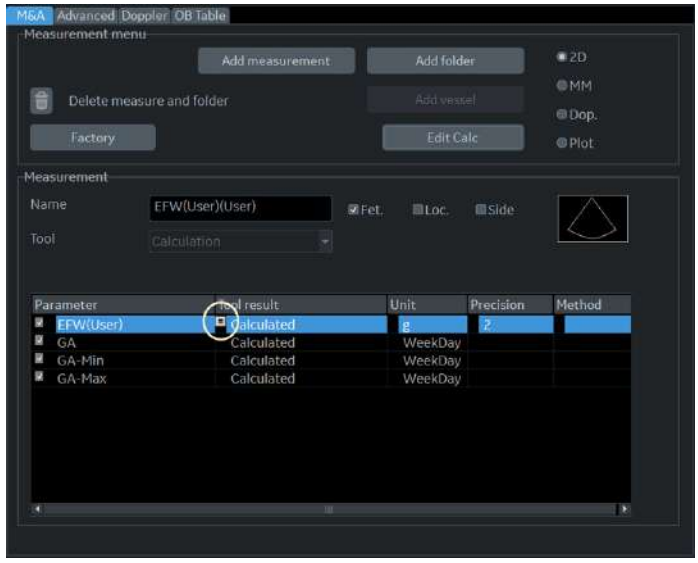


Figure 8-26. M&A Tab Screen

EFW Formula Editor (continued)

3. The EDIT FORMULA window displays. Edit the formula and select ***OK***.

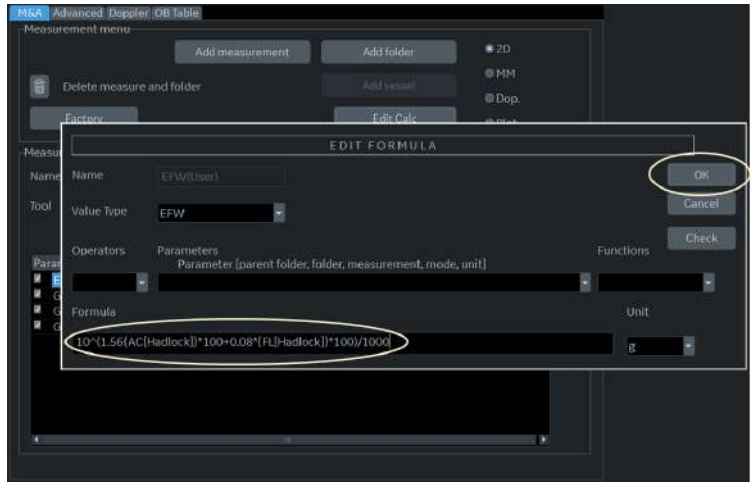


Figure 8-27. EDIT FORMULA window

NOTE: When you edit a formula, be careful of the following points.

- If you want to calculate EFW by centimeter, add " *100 " to the {parameter}.
- If EFW is calculated in grams, add " /1000 " to the formula.

or example,

10^(1.56{AC[Hadlock]}*100+0.08*{FL[Hadlock]}*100)/1000

GYN

Introduction

The Gynecology exam category includes the following three studies:

- Generic. This study is common to all exam categories. See ‘Generic Measurements’ on *page 7-22 for more information.*
- General Gynecology. This study includes uterine, ovarian, ovarian follicle, and endometrium measurements.
- OB/GYN Vessel. This study includes the following vessels: uterine, ovarian, umbilical, middle cerebral artery, aorta, placenta, and descending aorta.

NOTE: The calculation formulas are listed in the Advanced Reference Manual.

B-Mode Measurements

In B-Mode, you make the measurements in the General Gynecology study. These measurements include:

- Uterine length, width, and height
- Ovarian length, width, and height
- Ovarian follicle
- Cervix
- Endometrium thickness
- Fibroid

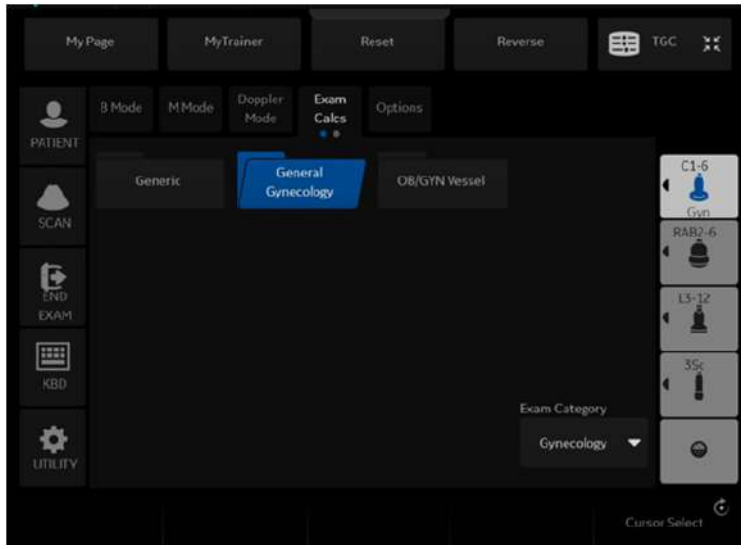


Figure 8-28. General Gynecology study

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.

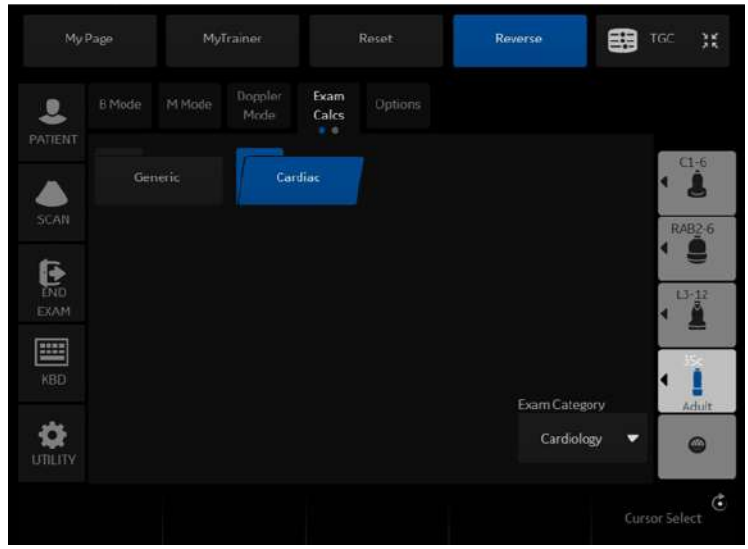


Figure 8-29. Touch Panel - Cardiac Exam Calc

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-22 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 Regurg
Asc	Ascending
ASD	Atrial Septal Defect
AV	Aortic Valve
AV Cusp	Aortic Valve Cusp Separation
AVA	Aortic Valve Area
AV-A	Aortic Valve Area by Continuity Equation
BSA	Body Surface Area
CI	Cardiac Index
CO	Cardiac Output
d	Diastolic
D	Diameter
Dec	Deceleration
DecT	Deceleration Time
Desc	Descending
Dur	Duration
EdV	End Diastolic Volume
EF	Ejection Fraction
EPSS	E-Point-to-Septum Separation

Table 8-10: Cardiology Abbreviations (Continued)

Acronym	Name
EsV	End Systolic Volume
ET	Ejection Time
FS	Fractional Shortening
FV	Flow Volume
FVI	Flow Velocity Integral
HR	Heart Rate
IVRT	IsoVolumetric Relaxation Time
IVS	Interventricular Septum
L	Length
LA	Left Atrium
LAA	Left Atrium Area
LAD	Left Atrium Diameter
LPA	Left Pulmonary Artery
LV	Left Ventricle
LVA	Left Ventricular Area
LVID	Left Ventricle Internal Diameter
LVL	Left Ventricle Length
LVM	Left Ventricular Mass
LVPW	Left Ventricle Posterior Wall
ML	Medial to Lateral
MPA	Main Pulmonary Artery
MR	Mitral Regurgitation
MV	Mitral Valve
MVcf	Mean Velocity Circumferential Fiber Shortening
MVO	Mitral Valve Orifice
OT	Outflow Tract
P	Papillary Muscles
PA	Pulmonary Artery
PAP	Pulmonary Artery Pressure
PDA	Patent Ductus Arterosis

Table 8-10: Cardiology Abbreviations (Continued)

Acronym	Name
PEP	Pre-Ejection Period
PFO	Patent Foramen Ovale
PG	Pressure Gradient
PHT	Pressure Half Time
PI	Pulmonary Insufficiency
PISA	Proximal Isovelocity Surface Area
PR	Pulmonic Regurgitation
PV	Pulmonic Valve
PV-A	Pulmonic Valve Area by Continuity Equation
PVein	Pulmonary Vein
PW	Posterior Wall
Qp	Pulmonic Flow or CO
Qs	Systemic Flow or CO
RA	Right Atrium
RAA	Right Atrium Area
Rad	Radius
RAD	Right Atrium Diameter
RPA	Right Pulmonary Artery
RV	Right Ventricle
RVA	Right Ventricle Area
RVAW	RIght Ventricle Anterior Wall
RVD	Right Ventricle Diameter
RVID	Right Ventricle Internal Diameter
RVL	Right Ventricle LEngth
RVOT	Right Ventricle Outflow Tract
s	Systolic
SI	Stroke Index
ST	Shortening
SV	Stroke Volume
SVI	Stroke Volume Index

Table 8-10: Cardiology Abbreviations (Continued)

Acronym	Name
T	Time
TA	Tricuspid Annulus
TAML	Tricuspid Annulus Medial to Lateral
TR	Tricuspid Regurgitation
TV	Tricuspid Valve
TVA	Tricuspid Valve Area
Vcf	Velocity Circumferential Fiber Shortening
Vel	Velocity
VET	Valve Ejection Time
Vmax	Maximum Velocity
Vmean	Mean Velocity
VSD	Ventricular Septal Defect
VTI	Velocity Time Integral

In this manual, the abbreviation for each measurement is listed in parenthesis after the measurement, as follows:

- Aortic Root Diameter (***Ao Diam***)
- Left Ventricle Posterior Wall Thickness, Diastolic (***LVPWd***)

For example, to measure the Aortic Root Diameter, you select ***Ao Diam*** 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'.

NOTE: The system displays "e" in place of "e'" on the Touch Panel.

3. The system calculates E/e' ratio automatically.

Vascular

Introduction

Vascular measurements offer several different types of measurement studies:

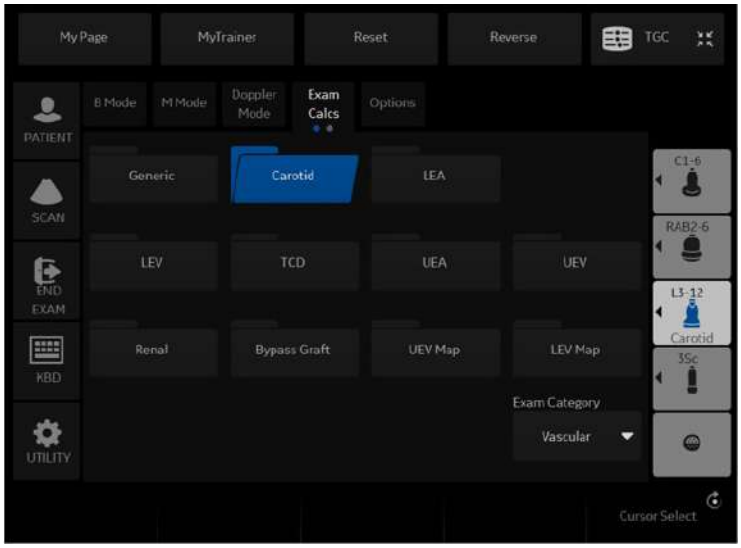


Figure 8-30. Vascular Exam Category Touch Panel

- Generic – Common to all applications. See ‘Generic Measurements’ on *page 7-22 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 7-88 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
Basilar	Basilar Artery
Bas V	Basilic Vein
BasV Antecub	Basilic Vein Antecubital Fossa
BIF IMT	Bifurcation Intima Media Thickness
Brac V	Brachial Vein
CA	Celiac Artery
CCA	Common Carotid Artery

Table 8-11: Vascular Vessel Abbreviations

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
DFA	Deep Femoral Artery
DFV	Deep Femoral Vein
DPA	Dorsalis Pedis Artery
ECA	External Carotid Artery
EIA	External Iliac Artery
EIV	External Iliac Vein
Fr. Branch	Frontal Branchr
FV	Femoral Vein
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
IMA	Inferior Mesenteric Artery
IMT	Intima Media Thickness
IMV	Inferior Mesenteric Vein

Table 8-11: Vascular Vessel Abbreviations

Acronym	Name
Inn	Innominate
Int. Lobular A	InterLobular A
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
SMA	Superior Mesenteric Artery
SMV	Superior Mesenteric Vein
SSV	Small Saphenous Vein
STA	Superficial Temporal Artery
SUBC	Subclavian Artery
SUBC V	Subclavian Vein

Table 8-11: Vascular Vessel Abbreviations

Acronym	Name
SV	Splenic Vein
SV Pop Junc	Small Saphenopopliteal Junction
TCD	Transcranial Doppler
TIPS	Transjugular Intrahepatic Portal Systemic 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 of Distance).

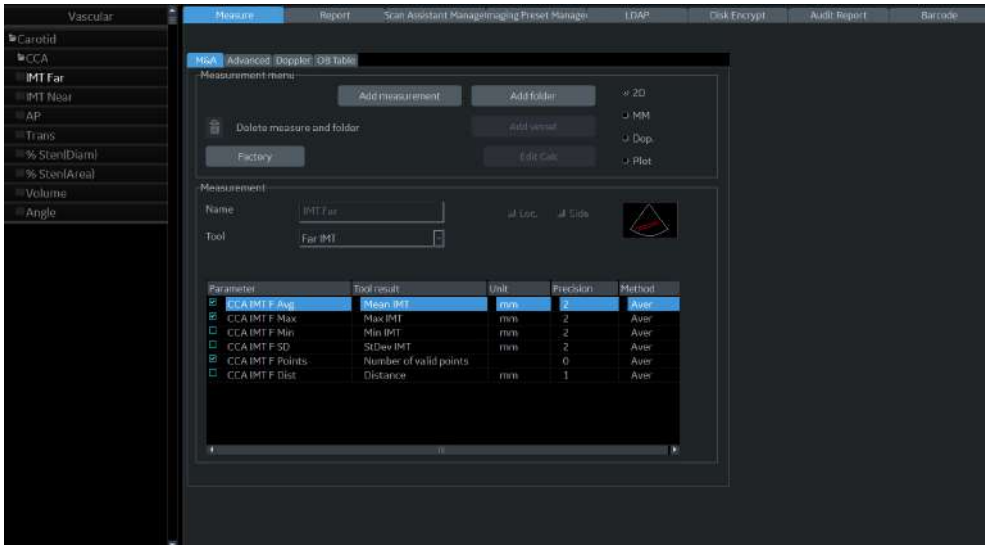


Figure 8-31. Configuring Auto IMT

IMT Measurement - Auto (continued)

In the Vascular Carotid application, the Auto IMT measurement is available.

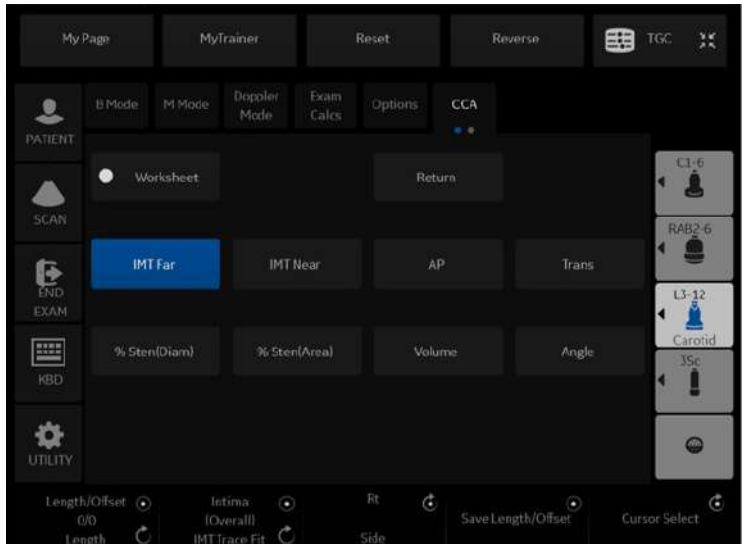


Figure 8-32. Auto IMT Touch Panel

The following controls are available.

Table 8-12: Auto IMT Touch Panel Descripion

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 crsor, then select ***IMT Far.***
3. Use the **Trackball** to set the length.

   Or

   Use the ***Length / Offset*** controlon the Touch Panel to set the length and offset distance. The Offset key controls how far away from he vertical line the measurement starts. Length is the length of he tool itself. If set to zero, you can adjust it anywhere on the image.
4. Press **Set.**

   You can eiher 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 fir (up/down) adjusts the inter luminal line whereas the overall (rotate) adjusts both IMT lines.

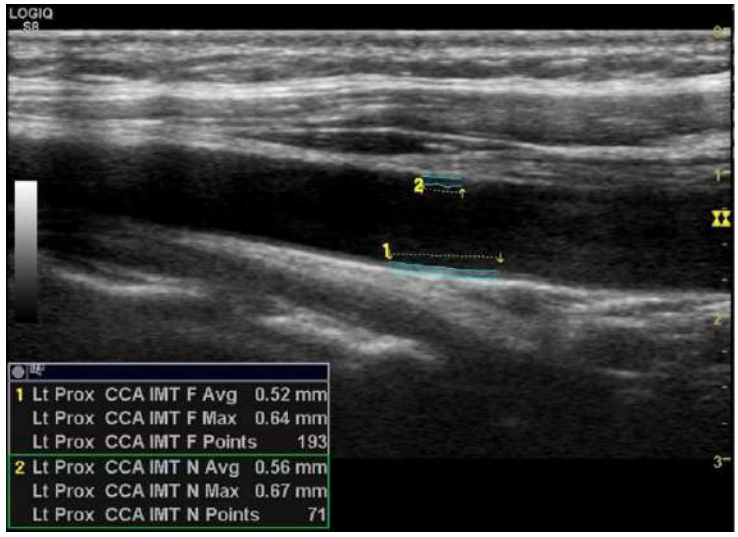


Figure 8-33. Example of Auto IMT Far Measurement

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*** controlon 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 -+-/IMT -+-: 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)

4. Press **Measure**, then select ***IMT1***, ***IMT2*** or ***5mm scale***. An active caliper displays.

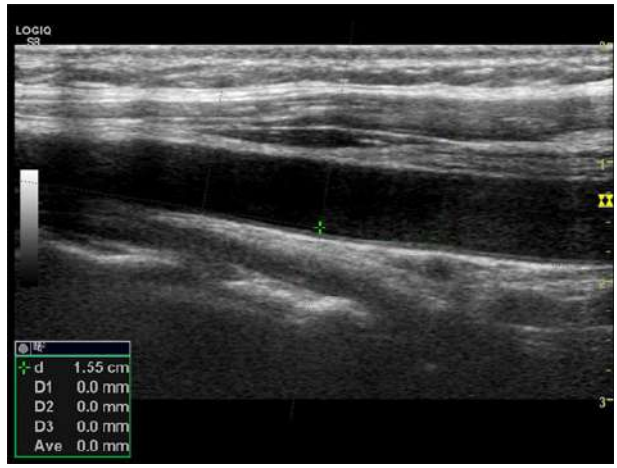


Figure 8-34. IMT caliper (Example)

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 and for the 5mm scale is 5mm.

6. 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.

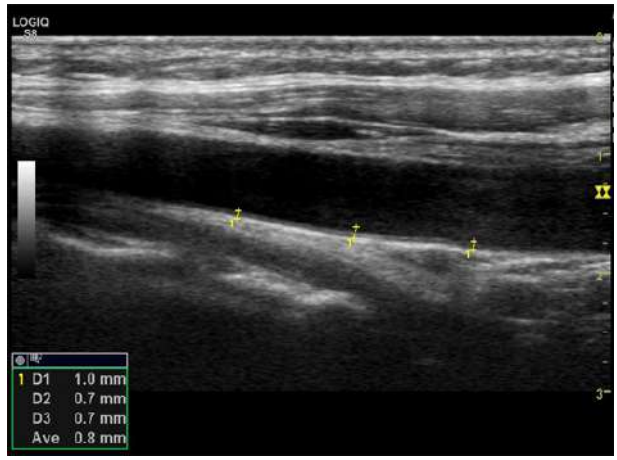


Figure 8-35. IMT Measurement

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.

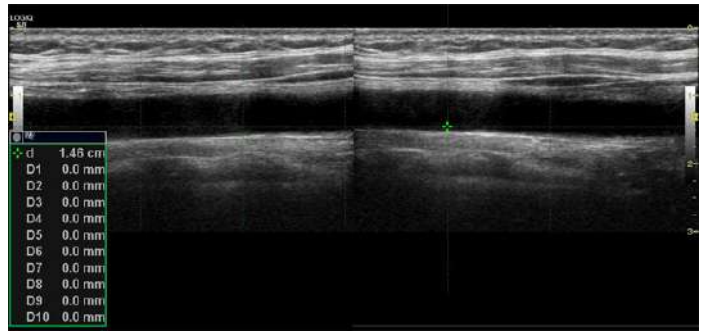


Figure 8-36. Plaque score example

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.

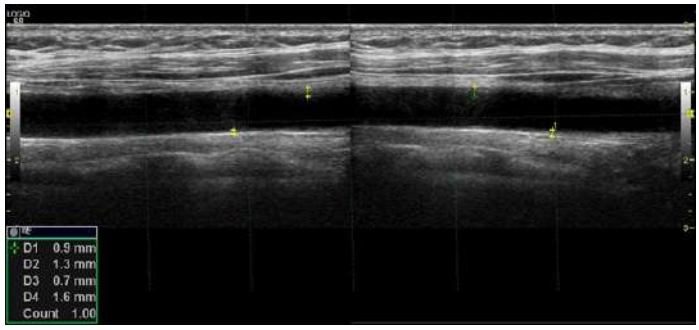


Figure 8-37. Plaque Score Example 2

6. The system displays the measurement result.

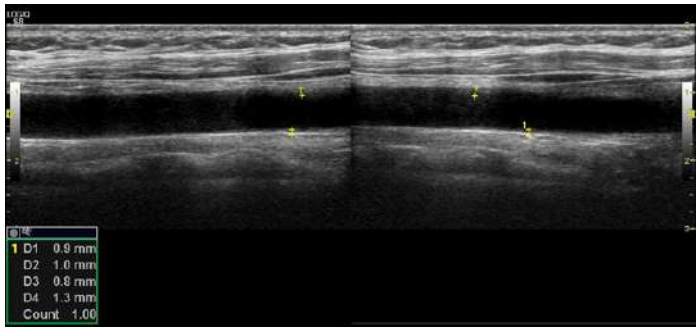


Figure 8-38. Plaque Score Example 3

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 P8/P9/P10 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.

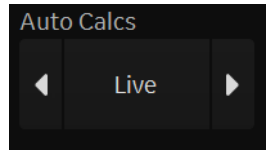


Figure 8-39. Auto Calculation Touch Panel key

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 8-40. 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.

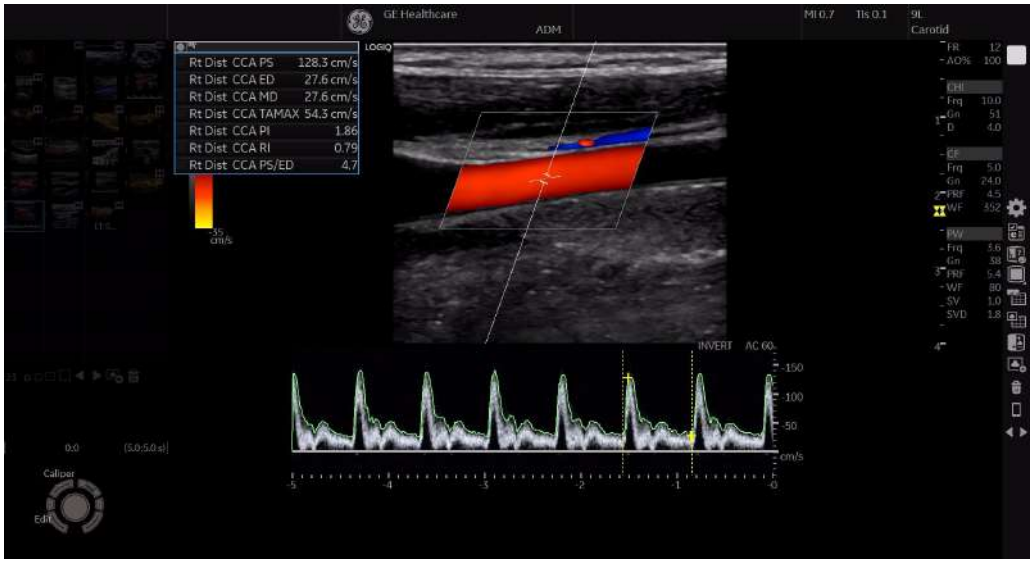


Figure 8-41. Assigned Vessel

*NOTE: When you want to cancel the assignment, you can use the **Cancel Transfer** Touch Panel key. See 'Cancel Transfer' on page 7-38 for more information.*

Auto Vascular Calculation (continued)

During the course of an exam, the cardiac cycle may be indicated between two yellow bars; the peak trace and the mean trace may appear in green; calculation indicators appear on the spectral trace as a caliper identifier (these vary, depending on the selected calculation in the Results Window).

The right-most, most complete cycle is typically chosen to be the selected cardiac cycle. You can select a different cardiac cycle.

To select a different cardiac cycle:

- Move through CINE memory with the Trackball until the desired cardiac cycle is selected by the system.

NOTE: You need several good cycles in front of the new cardiac cycle for this to be successful. Oftentimes, this is problematic near a freeze bar.

- Use the ***Cycle Select*** control to cycle to a different cardiac cycle.

NOTE: You need several good cycles in front of the new cardiac cycle for this to be successful. Oftentimes, this is problematic near a freeze bar.

To move the systole or diastole position:

- Use the ***Cursor Select*** control to move the start systole position or the end diastole position.

Manual Vascular Calculation

You can perform the following calculations manually when Auto Doppler Calculation is not activated.

1. Press **Measure**.

   If necessary, you can select another Exam Calc and then select parameters from Modify Calculation.
2. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
3. Select the desired vessel folder.

   The Measurement menu is displayed.

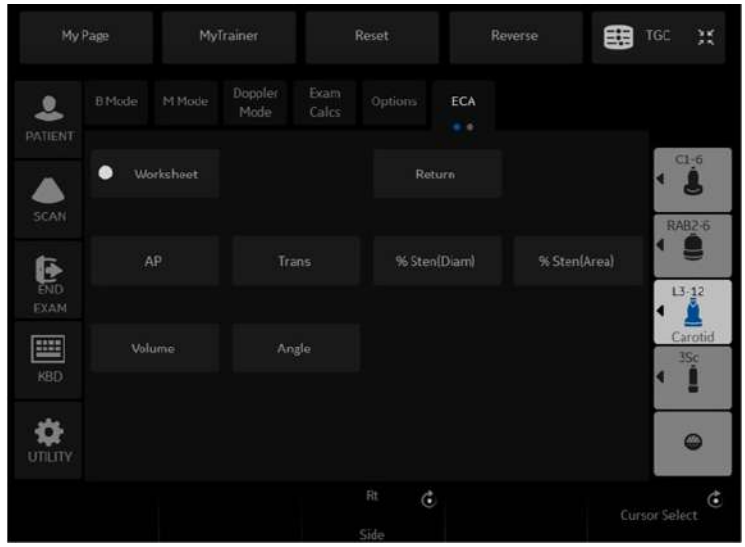


Figure 8-42. Measurement Menu Example

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.

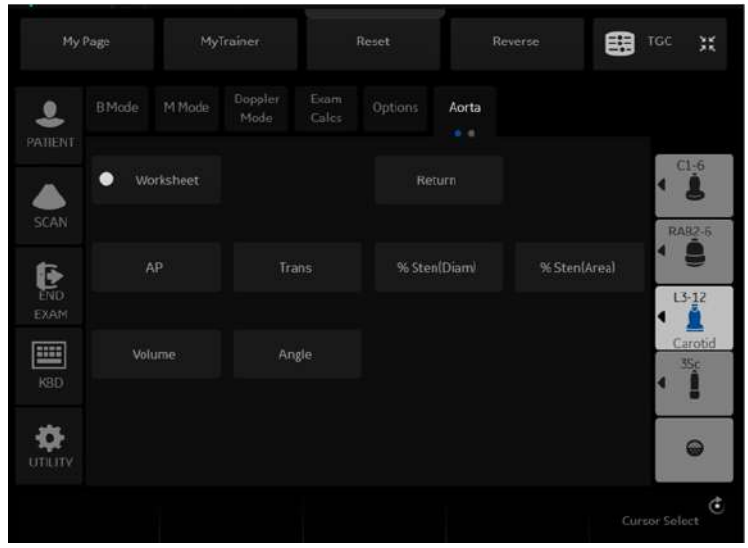


Figure 8-43. Aorta folder - example

2. Select ***Show All***.
   The system displays all possible vessel measurements.

To select vascular measurements (continued)

3. Select the desired measurement.

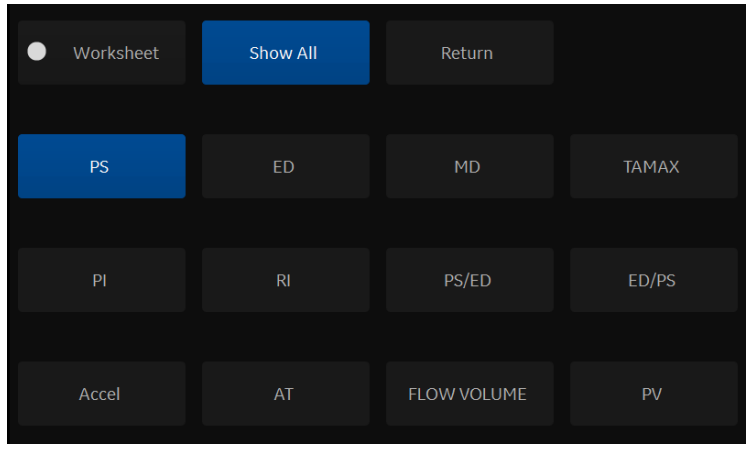


Figure 8-44. Show All measurements

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

Urology

Introduction

Urology measurements offer three different types of measurement studies:

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-22 for more information.*
- Urology
- Pelvic Floor. See ‘Pelvic Floor Measurements’ on *page 8-89 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.

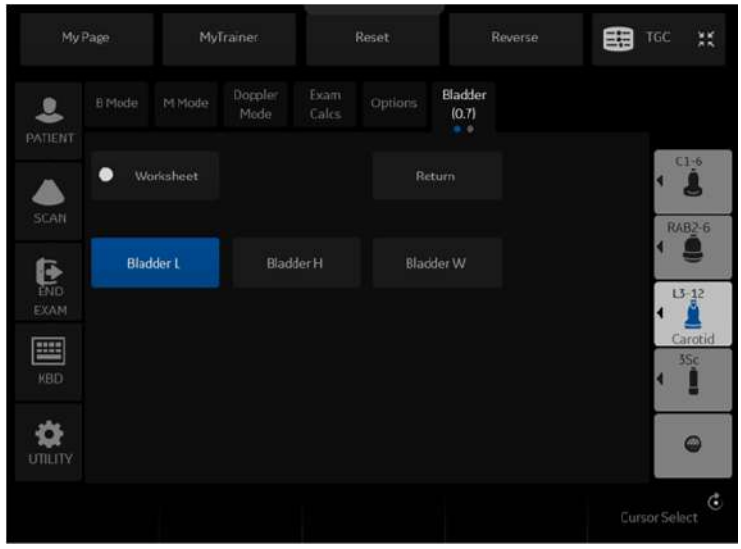


Figure 8-45. Bladder Volume Touch Panel

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.

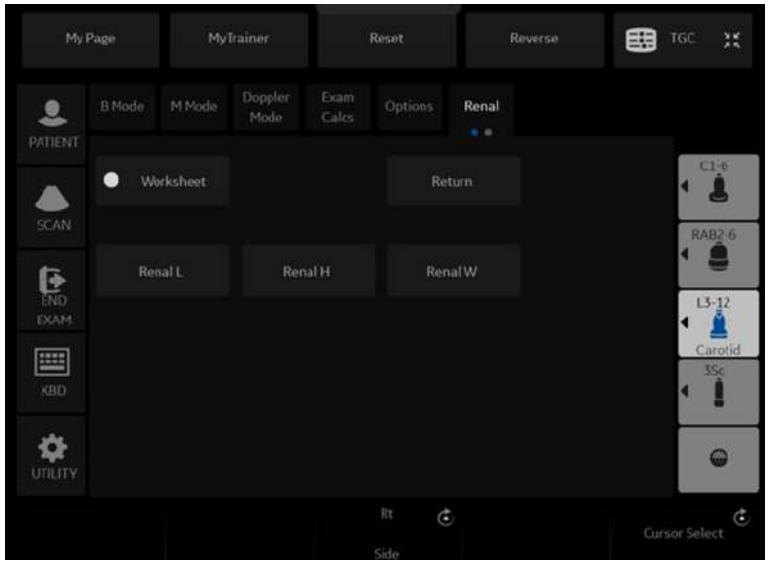


Figure 8-46. Renal Volume Touch Panel

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.

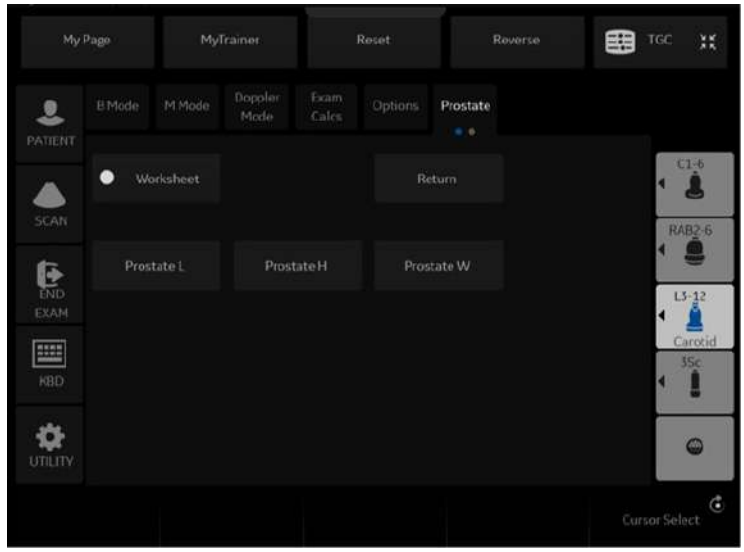


Figure 8-47. Prostate Volume Touch Panel

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).

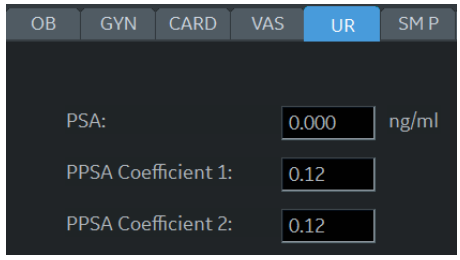


Figure 8-48. Urology Patient Screen

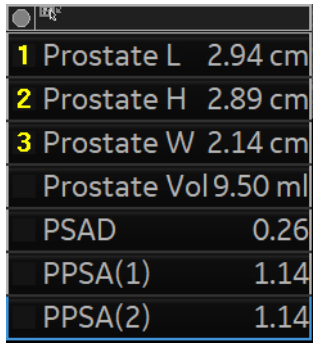


Figure 8-49. Measurement result window

PSAD: Prostatic Specific Antigen (PSA) Density – defined as: PSAD = PSA/Volume

PPSA: Predicted Prostate Specific Antigen – defined as: PPSA = Volume x PPSA Coefficient

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.

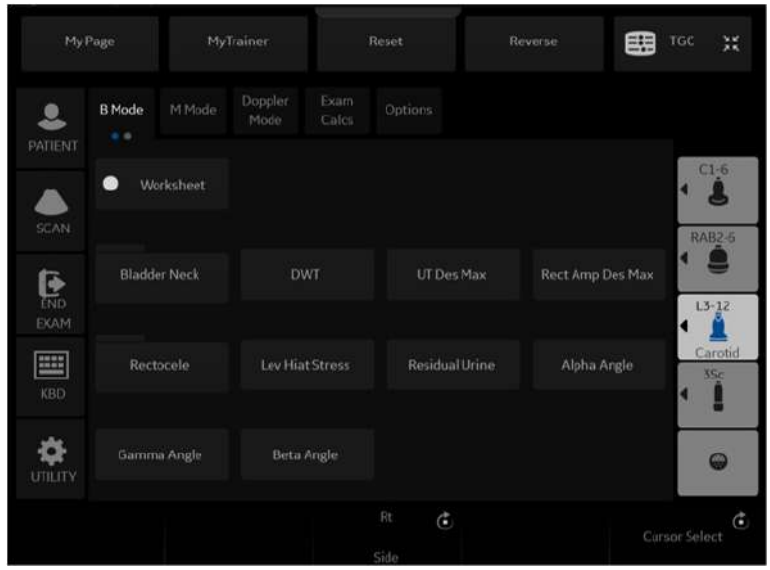


Figure 8-50. Pelvic Floor Study Touch Panel

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.

Pelvic Floor Measurements (continued)

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.

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 = Bladder Neck Rest - Bladder Neck Stress

NOTE: If the Bladder Neck Stress is a negative number, it becomes positive and is added to the bladder neck rest measurement.

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

Pelvic Floor Measurements (continued)

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.

Lev Hiat 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 minus 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 7-22 for more information.*
- Pediatric Hip (PedHip).

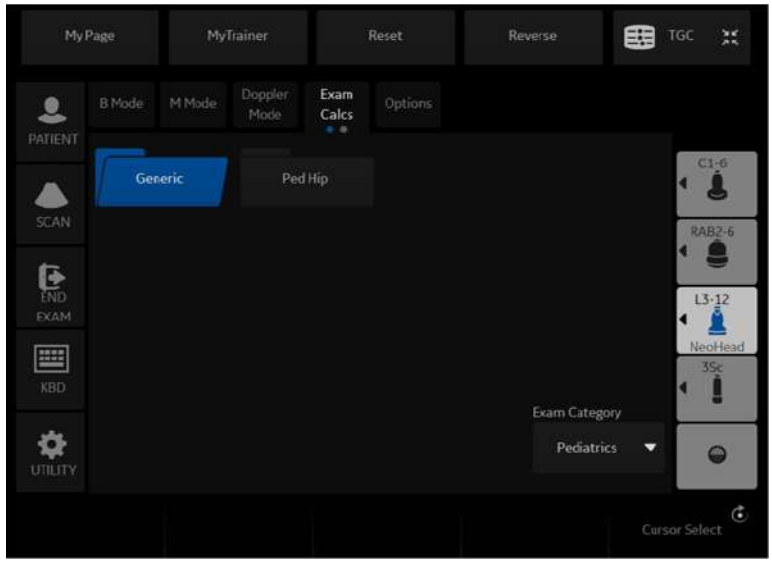


Figure 8-51. Touch Panel - Pediatrics Exam Calcs

Pediatrics Hip

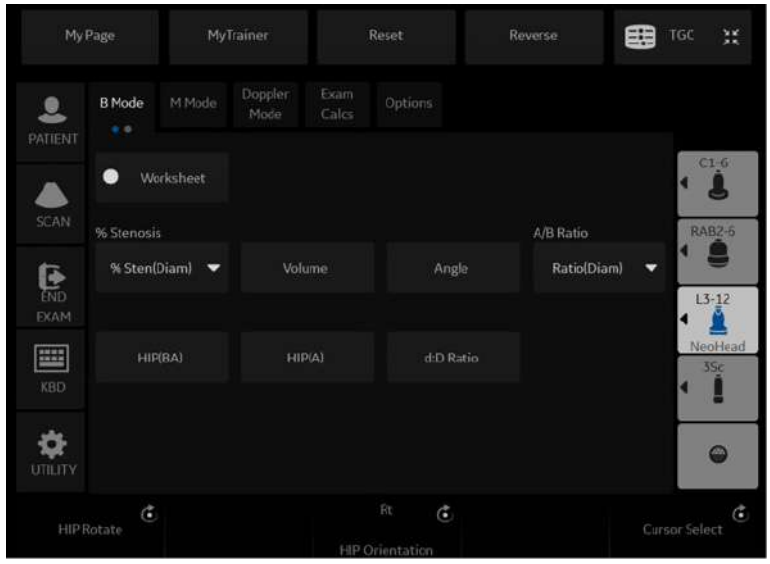


Figure 8-52. B-Mode Measurement Touch Panel – PedHip

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.

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.

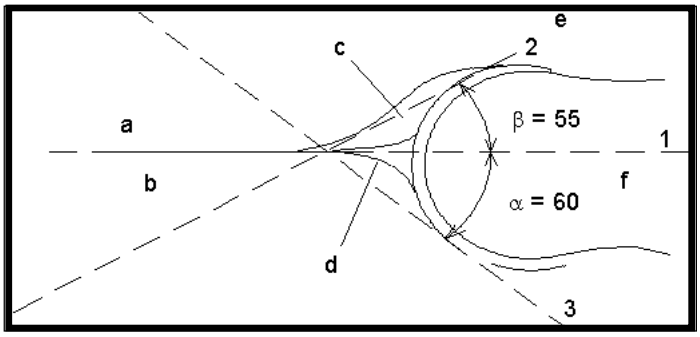


Figure 8-53. Hip Dysplasia

Anatomical Landmarks

a. Ilium
b. Iliac Bone
c. Labrum
d. Bony Roof
e. Cartilaginous acetabular roof
f. Femoral Head

[1]Source: R GRAF, Journal of Pediatric Orthopedics, 4: 735-740(1984)

Hip Dysplasia Measurement (continued)

To make a Hip Dysplasia measurement:

1. 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.
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.

Overview (continued)

During an examination, the operator stores data, images and cineloops for immediate purposes. The LOGIQ P8/P9/P10 includes an integrated patient archiving system for data and image storage.

The LOGIQ P8/P9/P10 enables also storing of data and images to external databases (Network Server, removable media).

Dataflow combines archive, data, DICOM, and onboard records into one coherent workflow. Destination devices are configured and assigned to the print keys. You select the appropriate dataflow (Portable, etc.) according to your requirements. You manage the patient database (local, shared, or via a worklist broker).

- DO NOT use the internal hard drive for long-term image storage. Daily backup is recommended. External storage media is recommended for image archive.

NOTE: *DICOM images are stored to external media storage devices separately from patient data, which also needs to be backed up to a dedicated database-formatted external storage media.*

- If working off-line with a dataflow pointing to a DICOM server, the images stored during the examination may have to be manually resent in the DICOM spooler when reconnecting the unit. Resend all jobs that failed or are on hold.

  In addition, stored images and cineloops can be saved to a removable media in the standard formats JPEG, MPEG, AVI and DICOM.
- You need to set up a 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.

Adding Devices

To add a destination device (printer, worklist server, etc.) to this system, see ‘Device’ on *page 10-89* .

To verify a DICOM device, see ‘Device’ on *page 10-89* .

Adding a Dataflow

To add a new dataflow to this system, see ‘Dataflow’ on *page 10-104* .

Adding Devices to a Print Button

To add devices/dataflows to a print button, see ‘Button’ on *page 10-106* .

Formatting Removable Media

To format removable media, see ‘Formatting removable media’ on *page 10-109* .

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 for detailed settings related storing image/Cine.

The image archive is set by the dataflow selected (See for more information.)

When you want to print/store an image, the P1 is most commonly used for the primary destination and internal hard drive.

NOTE: The recalled split screen cannot be edited.

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 P8/P9/P10 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 P8/P9/P10 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 10-67*), 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

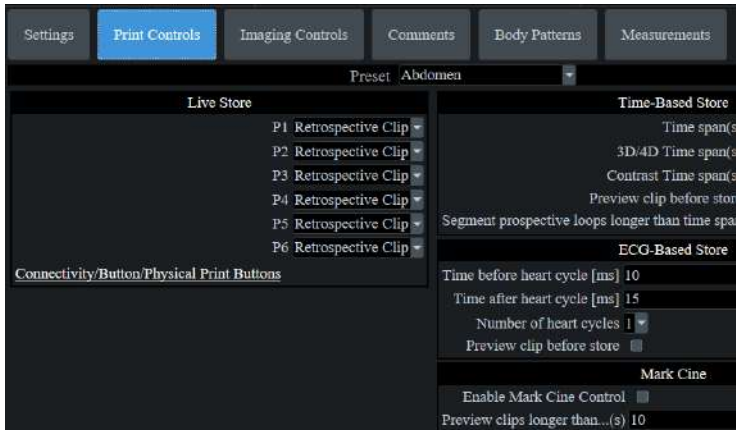


Figure 9-1. Print Control

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 - P6 to “Retrospective Clip” via Utility -> Application -> Print controls.
2. Specify the recording time in Time-Based Store or ECG-Based Store.
3. Press ***Save***.

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 - P6 to “Prospective Clip”.
2. Specify the recording time in Time-Based Store or ECG-Based Store.
3. Press ***Save***.

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.

NOTE: The recalled split screen cannot be edited.

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 *page 9-24* 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	• 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	Refer to 'Send To (Send the image to the DICOM Device)' on *page 13-390* for the detail. 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 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 9-3. 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.

Image History (continued)

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.

a. Name of the disk displayed under the preview window
b. Raw data B-Mode image
c. Raw data Color image
d. Image which does not have raw data (screen capture image)

Image History (continued)

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.

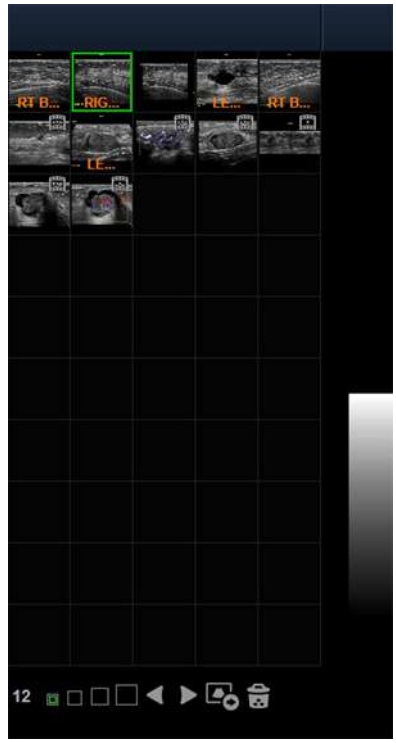


Figure 9-4. Clipboard example

Clipboard icon

Figure 9-5. 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 or Network storage to View on a **Windows PC** in the following standard formats:

- Still images: JPEG, DICOM and RawDICOM (Raw data + DICOM)
- Cineloops: WMV, AVI, DICOM and RawDICOM (Raw data + DICOM)

Images can also be stored as MPEG format as described on ‘MPEGvue’ on *page 9-48* .

SaveAs

To save images to the media:

1. Insert the media into the drive or connect the USB drive to the system.

NOTE: If you have not formatted the media, the media will be formatted when you select Save As.

2. On the scan screen, press the 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 system menu displays.

NOTE: If you save the image as an .avi file, run the CINE Loop before you select SaveAs.

NOTE: You cannot save a 2D cineloop image as a .jpeg file.

5. Select Save As. The Save As menu appears.

SaveAs (continued)

6. Select the media from the Save in Archive pull-down menu.
7. 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.

8. 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.*

9. 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.

10. Compression: Specify Compression.
    - None
    - Rle
    - Jpeg
    - Jpeg2000

NOTE: If you select "WMV" for Save as type, Compression is disabled.

11. 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)

12. Save as type: Select one of the following.
    - RawDICOM: saves the still image or CINE Loop in both GE raw format and DICOM format.
    - DICOM: saves the still image or CINE Loop in pure DICOM format.
    - AVI: Saves the CINE Loop in avi format.

    NOTE: Store "Image Only" is available if you select AVI for Type.

    - JPEG: Saves the still image in jpeg format.
    - JPEG2000: Saves the still image in jpeg2000 format.
    - WMV: Saves in Windows Media Format.

    NOTE: WMV type is only available with CINE loop image.

    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 HDD, select "AllFiles(.*)". All the data names display in the window.
13. Press ***Save***.

    The images are saved directly to the USB drives or Network storage whenever you press Save.

    If you select "For Transfer to CD/DVD", the images are saved to the HDD 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.
14. Repeat this step for as many images/clips you want to save.

SaveAs (continued)

15. 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.

16. If you do not want to save the image to CD/DVD, select “***Delete Files for Transfer***” All images are deleted.

17. 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 AVI 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. 3D images can't be saved with WMV format.

Table 9-2: Save As Formats

	.avi format	.wmv format	MPEGvue in Data Transfer
B, B+CF	Multi frames	Multi frames	Multi frames
B+Dopploer	Single frame	Multi frames	Single frame
B+M	Single frame	Multi frames	Single frame
3D	Multi frames	N/A	Single frame

NOTE: Verify the saved image works correctly on the Windows PC. If the image does not work, please save it again on the LOGIQ P8/P9/P10.

’SaveAs’ Images

You can select the images at one time which you want store by 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.

'SaveAs' Images (continued)

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, then images are transferred when you select 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 P8/P9/P10.

Storing Images with More Resolution

To store images with more resolution than is available with the JPEG selection, select Save As and select AVI as the Save As Type. You can save single images as .avi files.

Table 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.

Backup and Restore

Overview

The backup and restore procedures described in this section are divided into two parts. The first part describes procedures to backup and restore patient data. The second part describes procedures to backup and restore system and user-defined configurations.

The Backup/Restore function enables the user to:

- Copy/Restore the patient archive.
- Copy/Restore the system configuration. The Copy/Restore system configuration feature enables the user to configure several units with identical presets, providing that the units have the same software version.

Depending on the system, you can use either a CD-R, DVD-R, USB Flash Drive, or USB Hard Disk for system backup/restore. For the sake of simplicity, we have used the CD-R in the following examples.

NOTE: The system ONLY supports CD-R / DVD-R and DOES NOT support CD-RW / DVD+R.

Overview (continued)

GE is not responsible for lost data if the suggested backup procedures are not followed and will not aid in the recovery of lost data.

The LOGIQ P8/P9/P10 is not intended to be used as a storage device; backup of the Patient and Image Database is your institution's responsibility. GE is NOT responsible for any lost patient information or for lost images.

The system crash can cause the HDD corruption. The HDD is not considered a permanent storage device. Backup data on a regular basis.

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

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

Overview (continued)

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

Make sure to verify the media after writing of data, such as EZBackup, SaveAs or Export.

Verifying media requires additional time, which varies depending on the amount of data backed up or exported.

Before deleting a patient or image from the patient screen, make sure you have saved the data by EZBackup/Backup or Export and verify that the media transfer of data was successful.

Backup and Restore

To minimize accidental loss of data, perform backup of the patient archives stored on the local hard drive **DAILY** as described in this section. Use a formatted Backup/Restore disk to back up patient archives from the hard drive, using the backup procedure described in this section. Data from the Backup/Restore disk may be restored to the local hard drive using the restore procedure.

NOTE: To perform backup and restore procedures, you must login with administrator privileges.

Backup procedure

Back up patient data AFTER you've archived (via EZBackup) images so that the pointers to the patient's images reflect that the images have been moved to removable media and are no longer on the hard drive.

1. Insert media into the drive or USB device into a USB port.
2. In the patient screen, select the dataflow Local Archive - Int. HD.
3. On the Touch Panel, press ***Utility***.
4. On the Utility Touch Panel, press ***System***.
5. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.

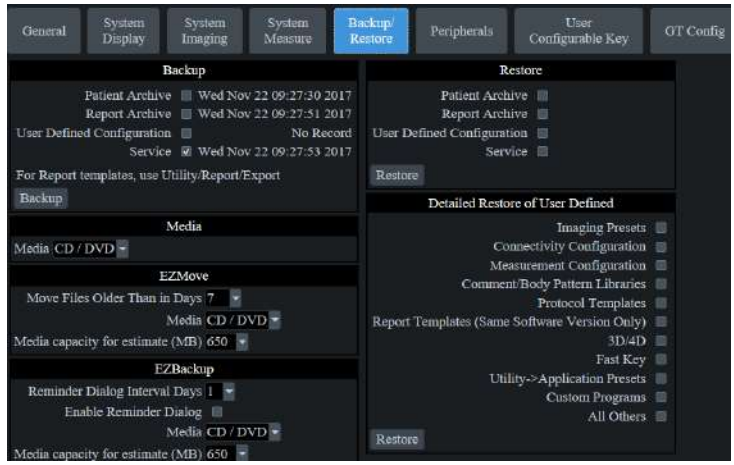


Figure 9-6. System/Backup/Restore Preset Menu

Backup procedure (continued)

6. In the Backup list,
   - Select **Patient Archive** and **Report Archive** to backup the patient records.
   - Select **User Defined Configuration** to copy system settings and user presets.

NOTE: The detailed section of this menu decouples the user defined configuration above. This allows you to selectively restore what you want to restore across multiple machines.

7. Specify where to save data in the media field.
8. Select ***Backup***.

   The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.
9. At the end of the process, the Backup completed message is displayed on the monitor.

   Press **Eject** (F3) for eject media/disconnect USB device.
10. Make sure to physically label the media. An identification of the system should also be noted on the media and a backup log should be kept.

    File the media in a safe place.

Restore procedure

CAUTION

The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct media.

You cannot restore the data between systems with different software versions.

CAUTION

To avoid the risk of overwriting the local patient and report archives, DO NOT check Patient Archive when restoring user-defined configurations.

1. 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 is displayed.

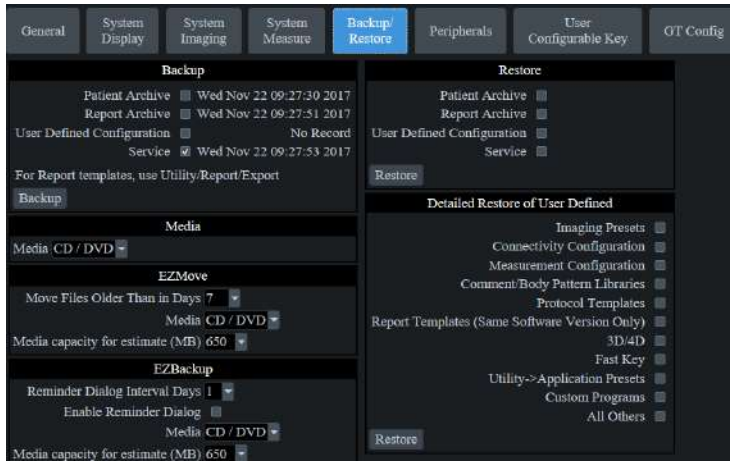


Figure 9-7. System/Backup/Restore Preset Menu

Restore procedure (continued)

4. In the Restore list,
   - Select **Patient Archive** and **Report Archive** to restore the patient archive.
   - Select **User Defined Configuration** to restore all system settings and user presets.

     or

     One or several system configuration items to restore parts of the Detailed Restore of User Defined.
5. In the Media field, select the appropriate Source device.
6. Select ***Restore***.

   The system performs the restore. As it proceeds, status information is displayed on the Backup/Restore screen.
7. The LOGIQ P8/P9/P10 restarts automatically when Restore is done.

Backup and restore strategy: patient data

To minimize accidental loss of data, perform backup of the patient archives stored on the local hard drive **DAILY** as described in this section. Use a formatted Backup/Restore disk to back up patient archives from the hard drive, using the backup procedure described in this section. Data from the Backup/Restore disk may be restored to the local hard drive using the restore procedure.

The restore procedure overwrites the existing database on the local hard drive.

NOTE: To perform backup and restore procedures, you must login with administrator privileges.

Preset synchronization

The procedure for preset synchronization of several scanners is as follow:

1. Make a backup of the user-defined configurations on a removable media from a fully configured LOGIQ P8/P9/P10 system.
2. Restore user-defined configurations from the removable media to another LOGIQ P8/P9/P10 system (you can restore all the user-defined presets or select specific presets to restore via Detailed Restore).

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 HDD 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 and move monthly. It should be an easy strategy to perform and to remember. And follow this same strategy/schedule consistently.

It’s also useful to keep your more recent information on the hard drive since it’s easier to recall that way.

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)

LOGIQ P8/P9/P10 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.

The system crash can cause the HDD corruption. The HDD is not considered a permanent storage device. Backup data on a regular basis. Loss of image data may require a rescan.

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.

DO NOT turn off the power while EZBackup is running. THe data may be lost. It may take several hours for EZBackup to finish, depending on the amount of data being backed up.

The following may give the impression of a lockup, but EZBackup is continuing in the background.

- The progress bar does not move.
- The screen may become white.
- THe hourglass icon keep turning.

EZBackup 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 move.

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.

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 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 P8/P9/P10 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/move 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 for each CD/DVD.

NOTE: *Use Import to restore EZBackup images.*

To Review EZBacked Up/EZMoved Images

You can review backed up media via the Patient Menu, Import, and the DICOM Read dataflow.

If you review an EZMoved 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 ‘DICOM’ on *page 13-372 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: Import/Export has only upward compatibility. For example, you can import data from a R1.x.x system to the current system. But you cannot import data from the current system to a R1.x.x system.

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.

Exporting Data (continued)

5. Select the destination at the Transfer To pull-down menu.
6. Select the patient(s) to export by using the Transfer From search field (the upper field).

   You can use Windows commands to select more than one patient.

   To select a consecutive list of patients, click the cursor on the first name, move the cursor to the last name, then press and hold down the Shift+right Set key to select all the names.

   To select a non-consecutive list of patients, click the cursor at the first name, move the cursor to the next name, then press and hold down the Ctrl+right Set key, move the cursor to the next name, then press and hold down the Ctrl+right Set key again, etc.

   You can also search for patients via the Search key and string.

   Or, use Select All to select all patient.

NOTE: You need to use your best judgment when moving patients' images. If there are lots of images or loops, then only move a few patients at a time.

7. Press ***Transfer***. The progress bar displays during the transfer.
8. 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/or EZ Moved images.

NOTE: You can retrieve from the media to the Local HDD, 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 P8/P9/P10. 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.

CAUTION

DO NOT transfer more than 50 patients at one time.

CAUTION

DO NOT use lossy compression images, such as JPG or MPEG images, for diagnosis.

CAUTION

MPEGvue function is NOT compatible with other LOGIQ series products. Do NOT share the same USB Drive for MPEGvue between LOGIQ P8/P9/P10 and other LOGIQ series products.

NOTE: If you want to label the removable media, format it before use. The system formats the unformatted CD-R/DVD-R automatically when you select MPEGvue on the data transfer screen.

1. Insert the removable media 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.

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.

MPEGvue (continued)

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 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.

MPEGvue (continued)

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 P8/P9/P10.

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)

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 HDD 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)

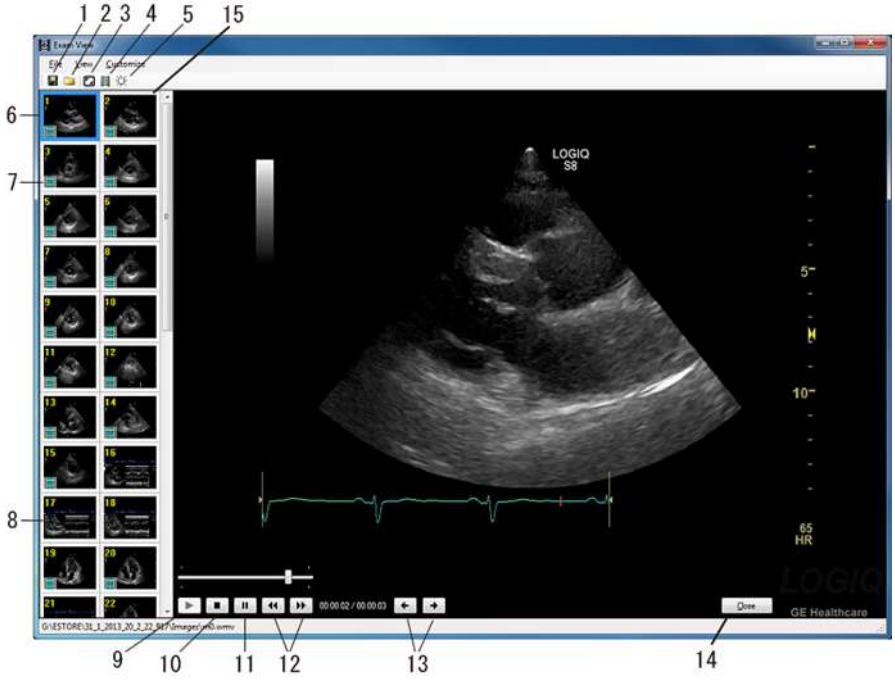


Figure 9-9. MPEGvue screen on the Windows PC

1. Save image as .wmv, .bmp, jpeg, or .WMV
2. Open folder
3. Display full screen
4. Slide Show
5. Brightness/Contrast/Gain
6. Selected image
7. Cineloop
8. Single frame image
9. Play
10. Stop
11. Pause
12. Stop forward/backward
13. Display previous/next image
14. Close
15. Clipboard: select the image to display

MPEGvue (continued)

Slide show

You can change the time interval of Slide show in Customize -> Options.

Figure 9-10. Slide show setting

EZ DICOM CD Viewer

This feature is an option that enables to export a self-contained DICOM viewer to a removable media along with the selected images when transferring images to a DICOM removable media.

NOTE: This viewer is NOT intended to be a diagnostic tool. It is only meant to be used for reference. See further explanation in the "EZ DICOM CD Viewer Quick Start Guide" provided by SST Group Inc.

Details of EZ DICOM CD Viewer

When the LOGIQ P8/P9/P10 system includes the EZ DICOM CD Viewer option, it allows the user to transfer examinations to DICOM removable media together with a DICOM viewer.

Placing the media in any PC automatically starts-up the DICOM viewer to allow users to view images and loops contained in the examinations available on that media. There is no need to perform any installation on the viewing PC station, as the DICOM viewer is self-contained on the inserted media.

NOTE: Minimal requirements for the Viewing PC are Windows 2000 or higher (Windows XP Pro, Windows Vista, or Windows 7 (32 or 64 bit)).

The self-contained DICOM viewer is an off-the-shelf product named EZ DICOM CD Viewer produced by SST Group Inc. (see: www.sstgroup-inc.com).

The self-contained DICOM viewer contains a built-in quick help user manual. Read this manual to learn more about the different functions of the viewer. Translations of the user manual to different languages are available to the user.

The User Interface may be set to a different language using a special **Language** icon in the EZ DICOM CD Viewer.

Configuring the EZ DICOM CD Viewer

The user can configure the system to enable or disable the embedding of the DICOM viewer on the media.

1. Make sure the DICOM Viewer option is installed.
2. Press **Utility/Connectivity** on the Touch panel.
3. Select the **Service** tab and **DICOM Export.**
4. Check the option **Add DICOM Viewer**.

   The DICOM Viewer will be exported when transferring examination to the corresponding DICOM removable media.

Figure 9-11. DICOM Media Properties window

External drives

Intended Use

Removable media can be used for the following purposes:

- Long-term image storage: the final destination of the images, after they are moved out of the system hard disk by using the EZBackup/EZMove (see ‘EZBackup’ on *page 9-36*).
- Backup of patient database and system configuration presets (see ‘System Backup and Restore Preset Menu’ on *page 10-19*)
- 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 9-48*).
- Copy of system configuration presets between to units using the Backup/Restore feature (see ‘Preset synchronization’ on *page 9-35*).
- SaveAs: Save images as JPEG, WMV, AVI, DICOM and RawDICOM for review on a standard Windows computer.

Supported removable media

The following removable media are supported:

- CD-R
- DVD-R
- USB Flash Drive
- USB external hard disk drive

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 (Option)

The DVD drive (Option) is located at the top of the cabinet.

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

You can use the following media for the multi-drive:

- CD-R (maximum writing speed: 48x)
- DVD-R (maximum writing speed: 16x)

DO NOT use or attempt to format CD-RW, DVD+R, DVD+RW or DVD-RW on the LOGIQ P8/P9/P10 DVD Multi-Drive.

Due to the variety of disk types, we cannot guarantee that every media is available.

Recommendation concerning CD and DVD handling

To avoid data loss, never touch the recordable surface of a disk. Handle the disk only by the outer edge. Do not place it face down on a hard surface. Fingerprints or scratches will make the disk unusable. Before usage, verify that the disk surface has no visible scratches. If there are any scratches, do NOT use the disk.

Insert a media

Insert a media with the eject button on the DVD drive.

CAUTION

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.

CAUTION

Make sure that the Disk tray is securely placed in each device during system operation. Mechanical damage may occur if other objects hit the tray.

Eject a media

1. To eject a media, always press ***F3***. **DO NOT** use the eject button on the drive.
2. The Eject device menu is displayed. Select ***CD/DVD Recordable***.
3. When ejecting a media, you are prompted if you wish to finalize the disk. If you do not finalize the disk, you can add files to the media at a later time. However, you may not be able to view the files stored on this disk with a standard PC. Finalizing a media, allows you to view these files using most standard PCs.

   To verify that the data was successfully transferred to the media, Press ***F3***, then select “Finalize” --> “Yes and Verify Files.” If there was a corruption to the media during an operation, the message, “An error occurred on the last disk. Please discard it and start over.” appears. In this case, please redo the operation with new media.

*NOTE: When you press **F3** with a blank media inside the DVD drive, the finalization menu displays. You can select “Yes” or “Yes and Verify Files”, but the system ejects the media without doing anything.*

USB Hard Disk Drive and USB Flash Drive

Cautions and Warnings

DO NOT use the USB Hard Disk Drive for patient storage. The USB HDD is not considered a permanent storage device.

If you connect the USB HDD to a virus-infected computer, the USB HDD may also be infected with a computer virus.

DO NOT plug in TWO Bus-powered USB Drives at the same time.

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.

Disconnect the USB HDD when performing EZMove on the system.

DO NOT use “Select All” when you export the patient data to the USB-HDD.

Cautions and Warnings (continued)

NOTE: Do not insert USB Memory devices (hard drives or flash drives) that contain multiple partitions into the scanner. Use single partitioned USB Drives.

NOTE: Some USB memory device manufacturers allow for executable partitions or ship pre-formatted new USB memory devices with multiple partitions pre-configured. BEFORE inserting any memory device into the scanner, insert it into a PC or MAC to verify that there is only a single partition. If multiple partitions exist, contact the USB manufacturer for the steps in reformatting the memory to a single partition.

USB Ports

Above the Touch Panel

You can use the USB3.0 port for USB Storage (USB Hard Disk Drive and USB Flash Drive).

Figure 9-12. USB port

On the rear panel

You can use the USB2.0 port on the rear panel for:

- Footswitch
- PC Printer with isolation USB
- A5 Printer
- Card reader
- USB Storage (USB-HDD and USB Flash Device)

On the Monitor

You can use the USB2.0 port on the Monitor.

Figure 9-13. USB port on HD Display

Eject a USB Flash Drive/USB HDD

1. To eject a removable media, always press ***F3***. **DO NOT** use the eject button on the drive.
2. The Eject device menu is displayed. Select the relevant media.
3. Select USB Drive from the pull-down menu to disconnect the USB Drive. Disconnect the USB drive after the success dialogue is displayed.

   Remove the USB Drive from the USB port.

NOTE: *If the unsuccessful dialogue is displayed, retry after a while.*

NOTE: *Verify is NOT available on Flash Drives or Hard Disk Drive media.*

MPEGvue (Data Transfer)

To transfer a patient/exam to the USB Flash Drive or USB HDD,

1. Insert the USB Drive into the front USB port.
2. On the 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.

Backup/Restore

To Backup/Restore to/from a USB Flash Drive or USB HDD,

1. Insert the USB Drive into the front USB port.
2. Press Utility--> Backup/Restore. Select the USB Drive as the media.
3. Follow instructions for Backup/Restore. See ‘Backup and Restore’ on *page 9-27 for more information.*
4. When the Backup has been completed, press ***Eject (F3)***.

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 front USB port.
2. Select the image(s) to be saved.
3. Select ***Save As*** menu in the lower, right-hand corner of the screen. Select the USB Drive as the archive media.
4. Specify: Image only or Secondary Capture, type of compression, quality, and image save format (Raw DICOM, DICOM, Jpeg, or WMV).
5. Press ***Save***. When the images have been saved, press ***Eject (F3)***.

NOTE: If you perform the SaveAs function to the USB drive (:\Export) by RawDICOM format and review the data on your PC, the title of the data appears as ":\GEMS_IMG\2006_Oct\08(date)\xxxxx(PatientID)".

Direct SaveAs

You can save the image directly to the USB Drive just by pressing a **Print** key.

NOTE: "Direct SaveAs" doesn't supports WMV type.

1. Insert the USB Drive into the USB port.
2. Select ***Save As*** from the pull-down menu in Utility -> Connectivity -> Service. Press ***Add***.
3. Select ***Save As*** in the list. Rename it in the Name field if needed.
4. Select USB Drive in the Destination field.
5. Verify the service.
6. Press ***Save***.
7. Assign Save As to the appropriate print key in Button tab.
8. Display the image on the monitor and press the print key.

Export/Import

To export/import exams using the USB Flash Drive or USB HDD,

NOTE: Before you export exams to the USB HDD, check "Export to USB HDD: Create DICOMDIR" in Utility -> Connectivity -> Miscellaneous. If you uncheck this parameter, you must import the data to review.

1. Insert the USB Drive into the front USB port.
2. On the Patient menu, select Data Transfer, then Export/Import. Specify USB Drive in the transfer To: pull-down menu. Select the patient/exam you want to transfer. Press ***Transfer***.
3. When Export/Import has completed, press ***F3***.

EZBackup (USB HDD only)

1. Select "USB Drive" on the Utility -> Backup/Restore -> EZBackup/Move -> Media.
2. Follow instructions for EZBackup. See 'EZBackup' on *page 9-36 for more information.*
3. When EZBackup has completed, press ***F3***.

NOTE: "Media capacity for estimate (MB)" in Utility -> System -> Backup/Restore -> EZBackup and EZMove are not effective when the Media is "USB HDD". It only applies to the CD and DVD.

USB Quick Save

USB Quick Save easily sends images to a USB flash drive or Network Storage.

The images are stored either in .jpg or .avi format.

USB Quick Save Setup

In Utility -> Connectivity -> Service, select USB Quick Save. With this selected, the Properties' Destination drop down selections are either USB Key or Network Storage. USB Key is to store images on the USB flash drive whereas Network Storage is to store images on the network storage.

NOTE: For using the USB Quick Save service as Network Storage, the Network Storage service must already be configured.

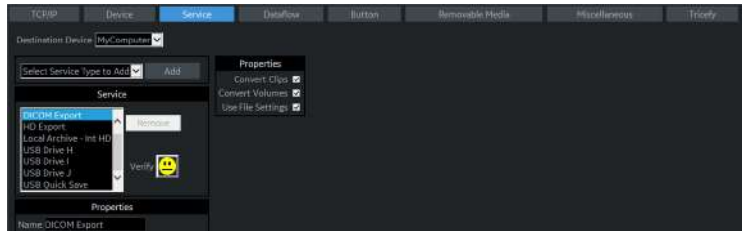


Figure 9-14. Service USB Quick Save

USB Quick Save Setup (continued)

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 as described in Chapter 16.

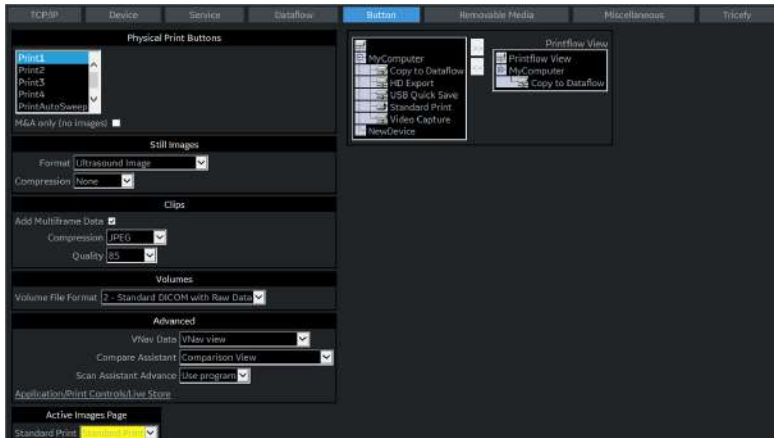


Figure 9-15. Assigning USB Quick Save to Print Keys

Network Storage Service

You can save patient data/images to the PC directly with the following functions, if you select Network Storage Service.

- Save As
- Export/Import
- MPEGvue
- DICOM Read

NOTE: DO NOT share the folder used for Export/Import with other ultrasound systems. It causes loss of data if two or more systems access to the same folder. Please create the unique folder for each system.

NOTE: Before you export patient data/images using Network Storage, check "Export to Network Storage: Create DICOMDIR" in Utility -> Connectivity -> Miscellaneous. If you uncheck this parameter, you must import the data to review.

CAUTION

After MPEGVue to Network Storage, the MPEGVue patient may not be listed in the To list. Make sure to confirm on the destination to storage whether the copy of data succeeded.

Potential risk

- Patient/Image data might not be sent at all with inaccurate network configuration.
- Patient/Image data might be lost by disconnecting the network.
- Patient/Image data might be damaged by unstable network/ data coupling.
- Patient/Image data might be mixed up by network/data coupling.
- Patient/Image data might be sent to wrong destination if network configuration is not inaccurate.
- The system might be attacked by a virus and vulnerable infection.
- Network is not connected by IP address conflict.

LOGIQ P8/P9/P10 Setup

NOTE: Create a Share folder on your PC on the network before continuing with this setup.

1. Select ***Utility -> Connectivity -> Device.***
2. Select ***Add.***
3. Type the computer name in the Name field and Static IP address in the IP Address field.

NOTE: Only use alphanumeric characters for the name.

NOTE: If you change Static IP Address after export, you cannot import patient data/image. In this case, type previous IP address again before import.

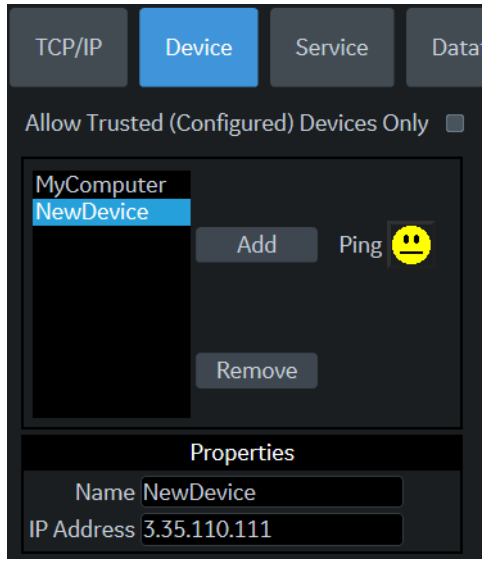


Figure 9-16. Network Storage Service Setup - Device

LOGIQ P8/P9/P10 Setup (continued)

4. Select ***Ping*** to verify the icon changes smiley face appears.
5. Select Service.

   Select the ***Network Service*** from the pull-down menu. Select ***Add.***

   Specify the properties for this service.

   - Name: Enter unique name that identifies this service.

   NOTE: Do not use the same name for any other Service or device.

   - Password: Enter the password used for logging onto the PC.
   - User name: Enter the user name used for logging onto the PC.
   - Shared Dir: Enter the Share name of the folder.

   NOTE: Only use alphameric characters for the Shared Dir.

   - Select ***Save*** and select ***Verify*** to verify the icon changes (smiley face appears).

     It takes a long time to access Network Storage Service by the condition of the network.

Setup on your PC

Check with your network administrator about the LAN connection and setting method of the shared folder.

Other Printing Options

Setting up Digital Peripherals

You set up digital peripherals from the Utility --> System --> Peripherals menu.

Following printers can be connected to the power outlet supplied by the system.

- BW Printer: UP-D898
- Color Printer: HP Universal Printing PCL6

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).

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-D898 printer, select “Portrait” as orientation.
2. Type the printer name in the Name field. This name is used on the Button screen. After you select the printer from the Printer pull-down Properties menu again, it turns white. Press Save.
3. Select Button. Select the appropriate print key (Print1, Print2...) 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.

HP Universal Printing PCL6 Instructions

Follow these steps to set up the paper size of HP Universal Printing PCL6 printer.

1. Press Utility-->System-->Peripherals. Select the HP Universal Printing PCL6 from the pull-down menu under Standard Printer Properties. Click ***Properties***.

Figure 9-17. Properties

2. Select Properties from Printer pull-down menu.

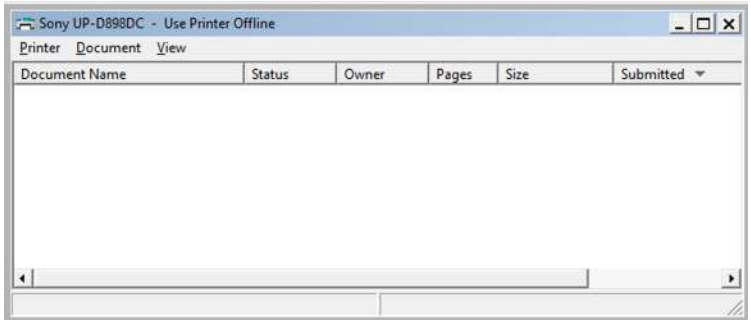


Figure 9-18. Properties

3. Click Printing Preferences at the bottom of Properties Window.

Figure 9-19. Printing Preferences

4. Select Paper Size. Press ***Apply***. Press ***OK***.
5. Press ***Save***, then ***Exit***.

Setting up the Off-Line Paper Printer

You can connect an off-line paper printer via the USB connection (need USB Isolator).

Plug in devices to the USB isolator. Then insert a cable of USB isolator to the USB port located at the rear of the system WHILE the LOGIQ P8/P9/P10 is NOT powered up.

CAUTION

ONLY plug in devices to the USB ports located at the rear of the system WHILE the LOGIQ P8/P9/P10 is NOT powered up. If you plug in a device while the LOGIQ P8/P9/P10 is powered on, your system may become unusable.

CAUTION

DO NOT place an off-line paper printer inside the patient environment. This assures compliance to leakage current.

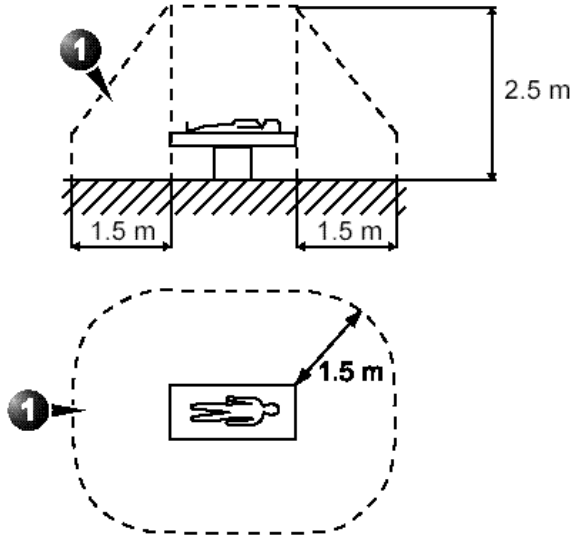


Figure 9-20. Patient Environment

Setting up the off-line paper printer

NOTE: The printer driver is customized for the LOGIQ P8/P9/P10 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 9-21. 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.

Setting up the off-line paper printer (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.

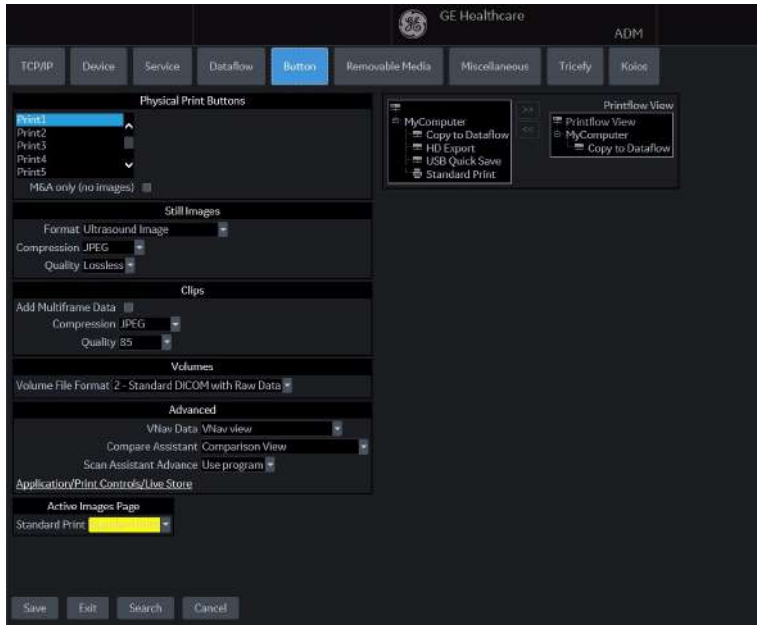


Figure 9-22. Connectivity -> Button Screen

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 Off-Line 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.

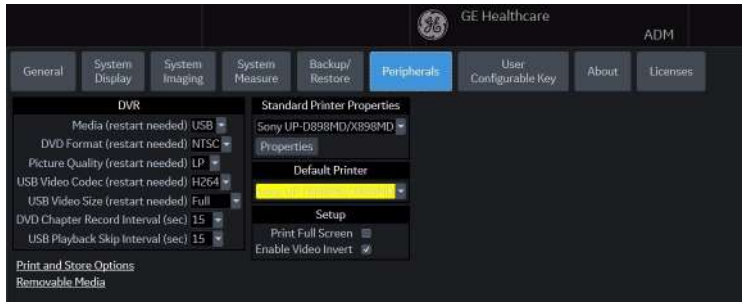


Figure 9-23. Report Printer Setup

3. Press ***Save***.
4. Press Print on the Report screen to print the report.

Chapter 10

Customizing Your System

Describes how to create system, user, and exam presets.

Presets

Overview

Preset Menus provide the following functionality:

- **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.
- **User Specific**. Configure My Desktop. Refer to Chapter 3 “Monitor Display” for more information.
- **3D/4D**. Real-time 4D and Static 3D scanning.
- **Connectivity Setup**. Define connection and communication setup, Tricefy, including exam dataflow information.
- **Measurement and Analysis presets**. Customize exam studies, create measurements, set up manual sequencing, and create OB Tables. Refer to Chapter 7 “General Measurement and Calculations” for more information.
- **Reports Presets**. Allows you to edit the report template, diagnosis codes, and report comments.

Overview (continued)

- **Administration presets**. Perform system administrator activities such as setting up user IDs logon formats and Data Encryption.
- **Scan Assistant**. Create, import/export, and manage Scan Assistant programs.
- **Image Preset Manager**. Activates the Image Preset Manager to create, edit, import, and export user imaging presets.
- **Search**. You can search for a parameter on the Utility pages (Measure, Reports, and Service pages cannot be searched.)
- **Test patterns**. Helps configure system settings.
- **Service**. Activates the Service Browser.
- **Scan Screen**

  Activate the scan screen so that you can adjust the monitor.

  - Room Profile. Change Brightness and Contrast of main display when set to User Defined.
  - Color Profile. Control Color temperature.
  - Gamma

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.
- **Keyboard Lock**. Select to lock the Operator Panel controls in order to clean the system.
- **Brightness/Contrast**. Adjust the monitor brightness/ contrast.

  User-adjustable when Room Profile is set to “User Defined.”
- **Touch Panel Light/Button Light**. Select to adjust the backlighting on the Operator Panel and the Touch Panel.

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/EZMove, Restore, Detailed Restore of User Defined
- **Peripherals** – DVR, Print and Store Options, and Setup configuration
- **User Configurable Key** – BT keys, User Defined keys, Keyboard keys
- **About** – System software, patent, and image information
- **Licenses** – Licenses for software used on the LOGIQ P8/P9/P10.

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.

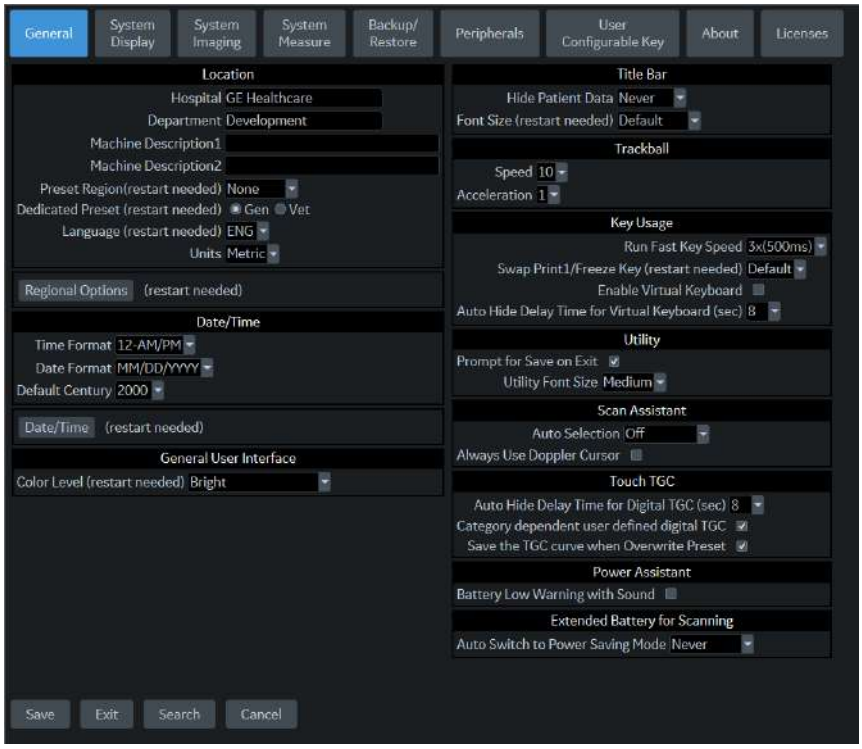


Figure 10-1. System/General Preset Menu

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, LATAM or PoC).
Dedicated Preset (restart needed)	Select the either Vet preset or not Vet preset (Gen)
Language (restart needed)	Select the appropriate language from the drop-down list. Note: If you select Japanese (JPN) or Chinese(CHN), only the warning and status messages and touch panel are displayed in Japanese. You can not type in Japanese or Chinese.
Units	Select metric or US units of measurement.

Table 10-1: Location

Preset Parameter	Description
Regional Options (restart needed)	Select to set up the keyboard.

Table 10-2: Date and Time

Preset Parameter	Description
Time Format	Select the time format: 12 Hr. AM/PM or 24 Hr.
Date Format	Select the date format: dd/mm/yyyy, mm/dd/yyyy, or yyyy/mm/dd.
Default Century	Select the default century for the system to use.
Date/Time (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 System Color according to the condition of the room.

Table 10-4: Title Bar

Preset Parameter	Description
Hide Patient Data	When set to Always, patient information is removed from the scanning screen Title bar and when storing images; or you can set this to remove patient information only when storing the image (On Store); or Never. Note: Upon recall of images with measurements, Dual image, V Nav, the DICOM image is recalled. In this case, there is no patient data burned into the DICOM image. If you DO NOT want this to occur, set this to Never.
Font Size (restart needed)	Select to display patient information in the title bar using a small, medium, or Extra large font size. You need to reboot the system for this change to take effect.

Table 10-5: Trackball

Preset Parameter	Description
Speed	Set how fast you want the Trackball to move while performing actions such as tracing the anatomy. 0=Slow; 20=Very Fast
Acceleration	Set how fast you want to trackball to move across the display. 0, 1, and 2 with 0 being the slowest acceleration.

Table 10-6: Key Usage

Preset Parameter	Description
Run Fast Key speed	Select the maximum value of the key interval when running Fast Key.
Swap Print1/Freeze Key (restart needed)	Swap the control between Print 1 and Freeze key.
Enable Virtual Keyboard	If checked, the Virtual Keyboard appears automatically when selected on the Patient screen.
Auto Hide Delay Time for Virtual Keyboard (sec)	Off, 6, 8, 12, 16.

Table 10-7: Utility

Preset Parameter	Description
Prompt for Save on Exit	If selected, the system prompts you to save data when you select exit without saving.
Utility Font Size	Select the font size you want to use to view the Utility menus: Small, Medium, or Large.

Table 10-8: Scan Assistant

Preset Parameter	Description
Auto Selection	Off, Category, or Description. • **Off**. The Scan Assistant selection on the Patient screen is completely manual. It will say “None” when starting a new patient and you can make a selection manually if desired. • **Category**. Scan Assistant uses the combination of exam category (Abd, OB, etc.) and the currently-selected user to automatically select a Scan Assistant program. It chooses the same program that was used the last time this combination of exam category and user. The user can manually override this auto selection. • **Description**. Scan Assistant uses the combination of the exam description (often auto fills in if the patient was selected from the worklist) and the currently selected user to automatically select a Scan Assistant program. It will choose the same program that was used the last time this combination of exam description and user was selected. The user can manually override this auto selection. If the exam description is blank then it will do the auto selection based on Category as described in the previous paragraph.
Always Use Doppler Cursor	Use the Doppler Cursor when you activate Scan Assistant.

Table 10-9: Smart Start (Start Assistant)

Preset Parameter	Description
Use Smart Start (Start Assistant)	Checked to use Smart Start (Start Assistant) by default.
Edit Mappings	Select to open Smart Start (Start Assistant) Mapping Editor.

Table 10-10: Touch TGC

Preset Parameter	Description
Auto Hide Delay Time for Deigital TGC (sec)	Off, 6, 8, 121, 16.
Categery dependent user defined digital TGC	Check to select.
Save the TGC curve when Oversrite Preset	Check to select.

Table 10-11: Extend Battery for Scanning

Preset Parameter	Description
Auto Switch to Power Saving Mode	Select 10, 30 minutes or 1 hour for automatically switching 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. (Extended battery option is required).

Table 10-12: Extended Battery for Scanning/Power Assistant

Preset Parameter	Description
Battery Low Warning with Sound	If checked, the system plays a beep sound when the battery capacity is low.

System/System Display Preset Menu

The System/System Display screen allows you to specify parameters for Image Display.

Figure 10-2. System/System Display Preset Menu

Table 10-13: Image Display

Preset Parameter	Description
Image Display Area	Select Image Display Area Size: Default, Large, Extra Large
Image size (probe selection required)	Select Default, Medium or Large.

Table 10-14: Side Panel Content

Preset Parameter	Description
Side Clipboard	Display On/Off.
My Desktop	
Measurement Summary	

Table 10-15: Clipboard

Preset Parameter	Description
Review 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 When the windows pointer is moved over the clipboard area, the pointer is undimmed.
Side Clipboard Auto Dimming	

Table 10-16: Configuration Application (requires reboot)

Preset Parameter	Description
Abdomen	Display On/Off in the Model Screen
Obstetrics	
Gynecology	
Cardiology	
Vascular	
Urology	
Pediatrics	
Small Parts	
PoC	

Table 10-17: 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.
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.

Table 10-17: Use Wide Screen for... (Continued)

Preset Parameter	Description
Single Image	On/Off/Auto Auto turns on wide screen if 2D image exceeds width of non wide screen image area.

Table 10-18: 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	Select to take both Stiffness and Velocity measurement.
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
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.
Live/Freeze Indicator	Display On/Off.
Enable DICOM grayscale display mode (GSDF)	Enable On/Off. Adjust Gamma curve on DICOM GSDF.
Room profile	Enable Last used/. Adjust Room Profile.

System/System Imaging Preset Menu

The System/System Imaging screen allows you to specify Biopsy Guides, VNav Brackets, Compare Assistant and Imaging Control.

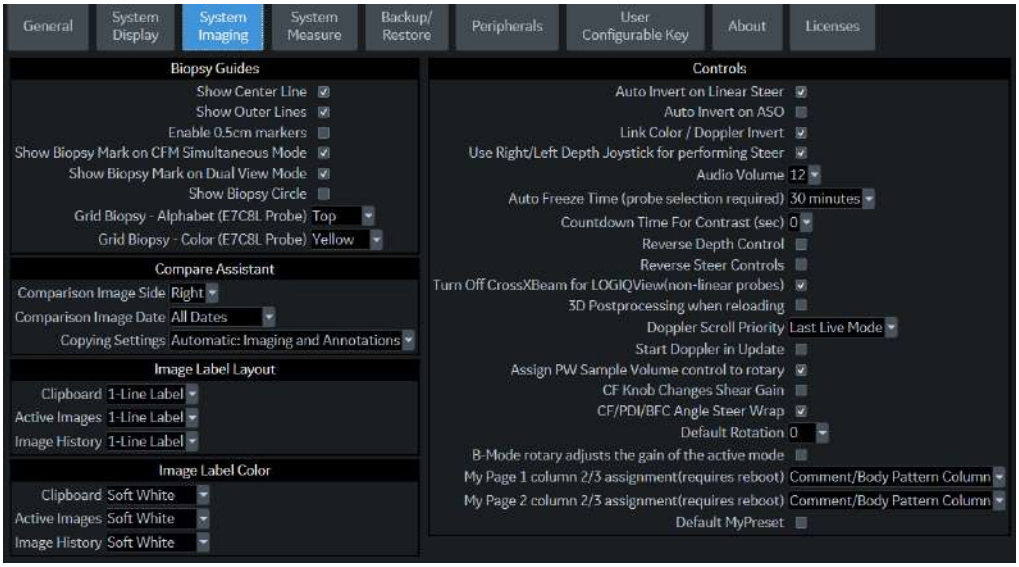


Figure 10-3. System/System Imaging Preset Menu

Table 10-19: 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	Select to display a guide circle control on the monitor and Trackball key during Biopsy.
Grid Biopsy - Alphabet (E7C8L Probe)	Select to choose the position (Top, Bottom or Both) of the alphabet displayed on Grid Biopsy scanning page.
Grid Biopsy - Color (E7C8L Probe)	Select White, Magenta, Green and Yellow for the Biopsy kit lattice.

Table 10-20: Controls

Preset Parameter	Description
Auto Invert on Linear Steer	When selected, for auto calcs, automatically inverts the timeline if needed when using ASO.
Auto Invert on ASO	Automatically inverts the spectrum with ASO.
Link Color/Doppler Invert	When selected, the Doppler timeline scale inverts along with the color ROI.
Use Right/Left Depth Joystick for performing Steer	When selected, Right/Left Depth Joystick activates for performing Steer.
Audio Volume	Adjusts the Doppler audio volume via a drop-down menu (for example, 0=softer; 20=louder).
Auto Freeze Time (probe selection required)	Select 10, 30 or 60 minutes to freeze the image automatically after the time specified of inactivity or Never to never freeze the image automatically.
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 probe)	Deactivates CrossXBeam when you activate LOGIQView.
3D Postprocessing when reloading	When selected, the system re-processes the recalled 3D CINE Loop.
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.
Default Rotation	Select 0 or 180 to default rotation image.
B-Mode rotary adjusts the gain of the active mode	If checked, use B rotary as the active tab mode gain rotary.
MyPage 1 column 2/3 assignment (requires reboot)	Depending on the user's configuration, First page of MyPage has one or two columns of body patterns or comments.
MyPage 2 column 2/3 assignment (requires reboot)	Depending on the user's configuration, Seconde page of MyPage has one or two columns of body patterns or comments.

System/System Measure Preset Menu

The System/System Measure screen allows you to specify measurement parameters such as the type of default OB measurements and calculations. You can also define cursor and Results Window default functionality.

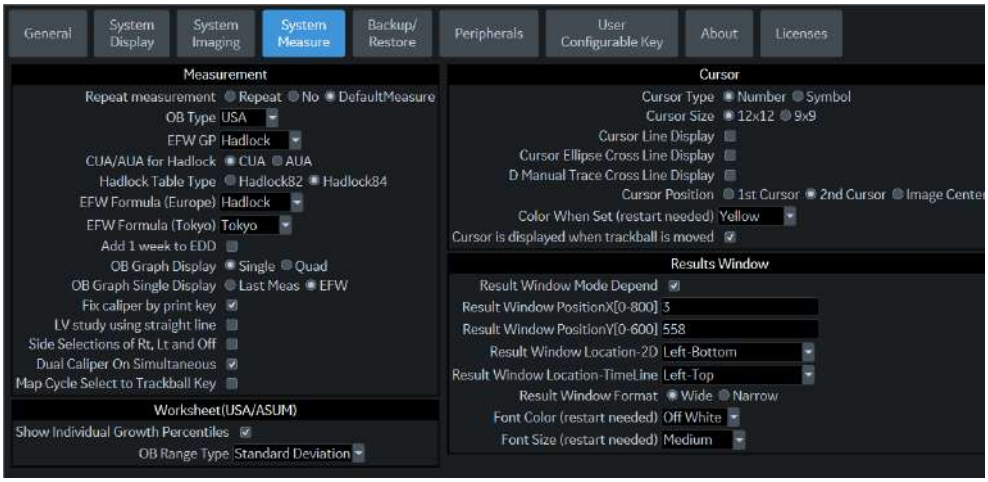


Figure 10-4. System/System Measure Preset Menu

Table 10-21: Measurement

Preset Parameter	Description
Repeat Measurement	Select No, Repeat, DefaultMeas No = After you take a measurement, you have to touch a Touch Panel key or Trackball key to start another measurement. Repeat = After you take a measurement, the system automatically starts the same measurement again. DefaultMeas = 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)
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), Shepard, Merz, Hadlock, German, Rich
EFW Formula (Tokyo)	Select the source used to calculate EFW (Tokyo) (Estimated Fetal Weight)

Table 10-21: Measurement (Continued)

Preset Parameter	Description
Add 1 week to EDD	Select to add additional week to estimated date of delivery
OB Graph Display	Select Single or Quad for displaying OB Graphs.
OB Graph Single Display	Select Last Meas or EFW Single OB Graph displayed by default.
Fix Caliper by Print key	Select to use the Print key like the Set key. *NOTE: If you select this during a generic volume measurement, the print key does not function like the Set key, but instead ends the measurement sequence and initiates the volume calculation based on the number of measurements taken so far.*
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”.
Dual Caliper on Simultaneous	Select to enable Dual Caliper on Simultaneous.
Map Cycle to Select Trackball Key	Map “AutoCalc cycle select” to Left/Right Set key.

Table 10-22: 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 (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.

Table 10-23: Worksheet (USA/ASUM)

Preset Parameter	Description
Show Individual Growth Percentiles	Check to display individual growth percentiles on the Worksheet.

Table 10-23: Worksheet (USA/ASUM)

Preset Parameter	Description
OB Range Type	Selections: Min-Max, Standard Deviation.

Table 10-24: Results Window

Preset Parameter	Description
Result Window Mode Depend	Select this if you want the measurement result window to be repositioned, depending on the mode.
Result Window Position X[0-800]	You can set the coordinates for the measurement result window when you do not have the result window set to be mode dependent. This is the X coordinate (left/right)
Result Window Position Y[0-600]	You can set the coordinates for the measurement result window when you do not have the result window set to be mode dependent. This is the Y coordinate (up/down)
Result Window Location-2D	Select the Result Window location on the Monitor Display: 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

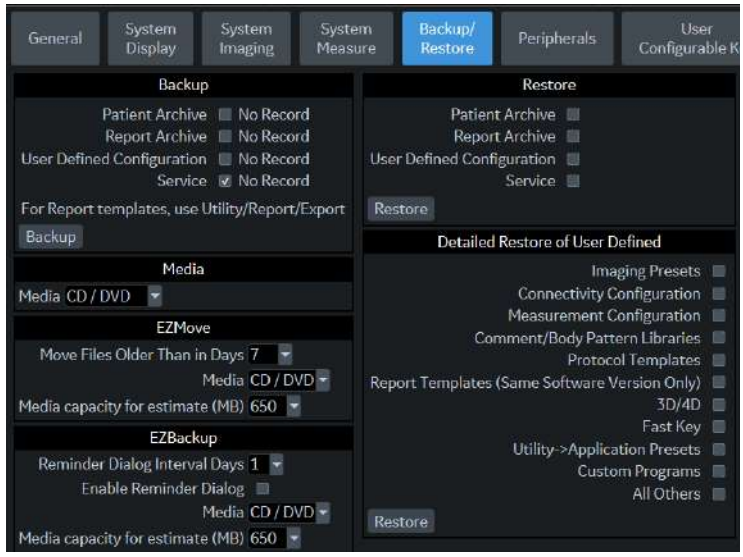


Figure 10-5. System/Backup/Restore Preset Menu

Table 10-25: Backup

Preset Parameter	Description
Patient Archive	Select to back up patient data.
Report Archive	Select to back up report data.
User Defined Configuration	Select to back up the user-defined configuration settings.
Service	Select to back up Service (iLinq and Network) settings.
Backup	Select to begin the backup.

Table 10-26: Media

Preset Parameter	Description
Media	Select media type to use for backup and restore.

System Backup and Restore Preset Menu (continued)

Table 10-27: 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 10-28: Restore

Preset Parameter	Description
Patient Archive	Select to restore patient data.
Report Archive	Select to restore report data.
User Defined Configuration	Select to restore the user-defined configuration settings.
Service	Select to restore service iLinq and Network settings. **CAUTION**: DO NOT restore service presets on to a different LOGIQ P8/P9/P10 system. Only restore service presets to the same system.
Restore	Select to begin the restore process for the selected configuration files.

The detailed section of this menu allows you to restore one area at a time from the user defined configuration. This allows you to selectively restore what you want to restore across multiple machines. Check the box(es) you want to restore, insert the appropriate media, and press Restore.

NOTE: When you restore backup data from the Utility menu, the LOGIQ P8/P9/P10 application usually restarts automatically when the restoring is complete.

System Backup and Restore Preset Menu (continued)

Table 10-29: Detailed Restore

Preset Parameter	Description
Imaging Presets	Select to restore imaging presets.
Connectivity Configuration	Select to restore connectivity configurations.
Measurement Configuration	Select to restore measurement configurations.
Comment/Body Pattern Libraries	Select to restore comment and body pattern configurations.
Protocol Template	Select to restore Protocol Template.
Report Templates (Same software version only)	Select to restore Report templates.
3D/4D	Select to restore 3D.
Fast Key	Select to restore Fast Key.
Utility-->Application Presets	Select to restore Utility--> Application presets.
Custom 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.
Restore	Select to begin the restore process for the selected configuration files.

System/Peripherals Preset Menu

The System/Peripherals screen allows you to specify parameters for the DVR and printers.

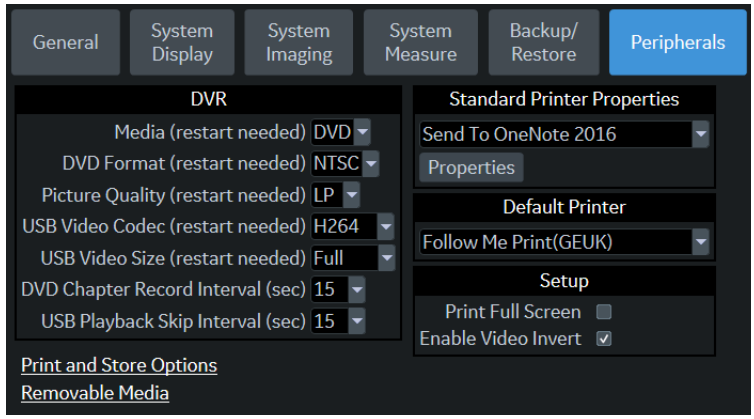


Figure 10-6. System/Peripherals Preset Menu

Table 10-30: DVR

Preset Parameter	Description
Media (restart needed)	Select recording media: Media: DVD or USB storage.
DVD Format (restart needed)	Select DVD video format: NTSC or PAL.
Picture Quality (restart needed)	Select from SP, HQ, SP, or EP.
USB Video Codec (restart needed)	Select from MPEG2 or H264.
USB Video Size (restart needed)	Select from Normal or Full.
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.

System/Peripherals Preset Menu (continued)

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 10-31: Printer Setup

Preset Parameter	Description
Standard Printer Properties: [Printer] and Properties, and Default Printer	Select to add an additional standard printer via the USB serial port and to configure digital printers. This activates the Windows Add Printer wizard. NOTE: Most printer drivers are available via Windows; however, newer printers may require you to load the manufacturer-supplied print driver (must be on CD-ROM). Refer to the Basic Service Manual for more information.
Print Full Screen	Select for the standard printer to print the full screen.
Enable Video Invert	Select for the standard printer to print black on white rather than white on black.

System/User Configurable Key

This feature assigns functionality, that are invoked from the Touch Panel or windows controls, to the keys on the operator panel so that be able to invoke with single action.

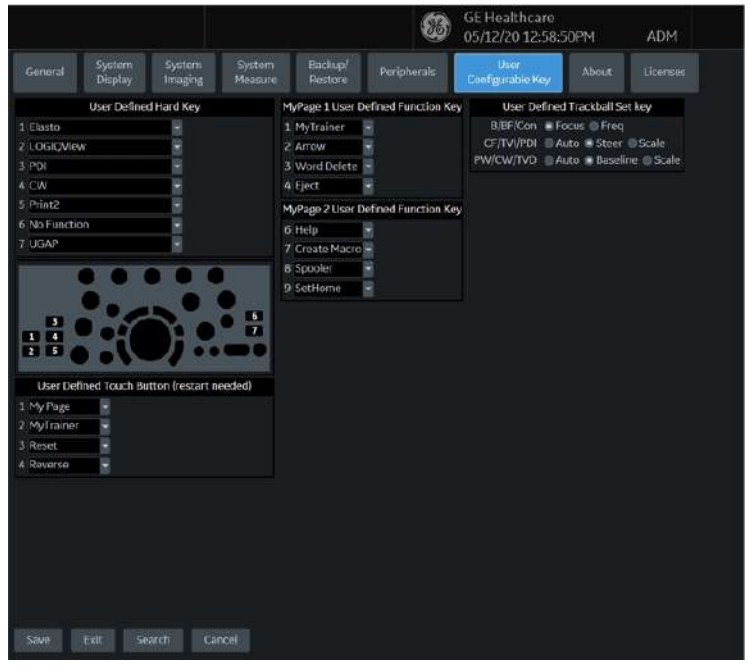


Figure 10-7. User Configurable Key Preset Menu

System/User Configurable Key (continued)

Figure 10-8. Programmable Operator Panel Controls

Table 10-32: User Configurable Keys

Preset Parameter	Description
1-7 User Defined Hard Key	The following functionality is available: Table 10-32 User Defined Hard Key
8 - User Defined Touch Button	The following functionality is available : Table 10-33: User Defined Touch Buttons
9 - User Defined Trackball Set Key	Specify which controls you want to be used on the Trackball: • B/B-Flow/Contrast: Focus or Frequency • CF/TVI/PDI: AUto or Steer or Scale • PW/CW/TVD: Auto or Baseline or Scale

System/User Configurable Key (continued)

To move and replace a BT Feature key cap,

1. Insert the flat blade of a screwdriver into the hole on the upper side of the key cap and lift it up to remove it.

Figure 10-9. Remove the key cap

2. Repeat for each key, to match how you have configured the BT Feature keys.
3. Replace the key caps by positioning it and pushing down on the key cap until it clicks into place.

User Defined Hard keys and User Defined Touch Buttons

User Defined Hard keys and User Defined Touch Buttons can be programmed as one of the following functions:

Table 10-33: User Defined Hard Key

Preset Parameter	Description
No Function	No function.
Elasto	You can arrange the order of BT key on the control panel as you have programmed in the Utility page.
LOGIQView	
3D/4D	
Contrast	
LOGIQApps	
B-flow	
UGAP	Turn on/off UGAP mode
Hepatic Assistant	Turn on/off Hepatic Assistant mode
Reverse	Turn on/off Reverse the image.
MarkCine	Turn on/off Mark Cine.
CHI	Turn on/off CHI mode.
Reset	Reset all the parameters.
My Page	Turn on/off MyPage preset.
CF	Turn on/off CF mode
PDI	Turn on/off PDI mode.
CW	Turn on/off CW mode.
B Steer+	Turn on/off B Steer+
Biopsy Kit	Biopsy Guideline Display/change biopsy guide line.
Biplane	Switch screen layout between Single Plane and Bi Plane.
ECG on/off	Turn on/off ECG.
Print2	Assign Print 2
Print3	Assign Print 3.
Print4	Assign Print 4.
Print5	Assign Print 5.
Print6	Assign Print 6.

Table 10-33: User Defined Hard Key

Preset Parameter	Description
Video	Turn on/off Video tab.
Worksheet	Go to Worksheet page.
MyTrainer	Go to My Trainer Plus page.
Active Image	Go to Active Images Screen.
Auto Dop. Calc	Turn on/off Auto Calcs in Doppler mode.
Auto SoS	Adjust Automated Speed of Sound.
Button Probe Enable/ Disable	Enable/Disable Button Probe
Center Line	Turn on/off center line.
Clear Saved Measurements	Clear all measurements in the selected measurement category. Display the Confirmation dialogue before delete data.
Compare Assistant	Turn on/off Compare Assistant.
Full Timeline	Turn on/off full timeline mode.
HDColor	Turn on/off BFHDC mode.
Image Size	Change Image size.
Report	Go to Report page.
Room Profile	Switch room profile setting.
SaveAs	Go to SaveAs Screen.
TIC Analysis / Qanalysis	Turn on/off TIC Analysis / Qanalysis.
TVI	Turn on/off TVI mode.
Toggle Image Display Area	Toggle current display area and extra large area.
Touch Control	Turn on/off Touch Control mode.
Volume Navigation	Turn on/off VN mode.
Worklist	Go to Worklist page.

Table 10-34: User Defined Touch Buttons

Preset Parameter	Description
No Function	No function.
Reverse	Turn on/off Reverse the image.
MarkCine	Turn on/off Mark Cine.
CHI	Turn on/off CHI mode

Table 10-34: User Defined Touch Buttons

Preset Parameter	Description
Reset	Reset all the parameters.
My Page	Turn on/off MyPage preset.
Biopsy Kit	Biopsy Guideline Display/change biopsy guide line.
ECG on/off	Turn on/off ECG.
Print2	Assign Print 2
Print3	Assign Print 3.
Print4	Assign Print 4.
Print5	Assign Print 5.
Print6	Assign Print 6.
Video	Turn on/off Video tab.
Worklist	Go to Worksheet page.
B-flow	Turn on/off B-flow mode.
MyTrainer	Go to My Trainer Plus page.
Touch Control	Turn on/off Touch Control mode.

System/About Preset Menu

The System/About screen lists information about the system software.

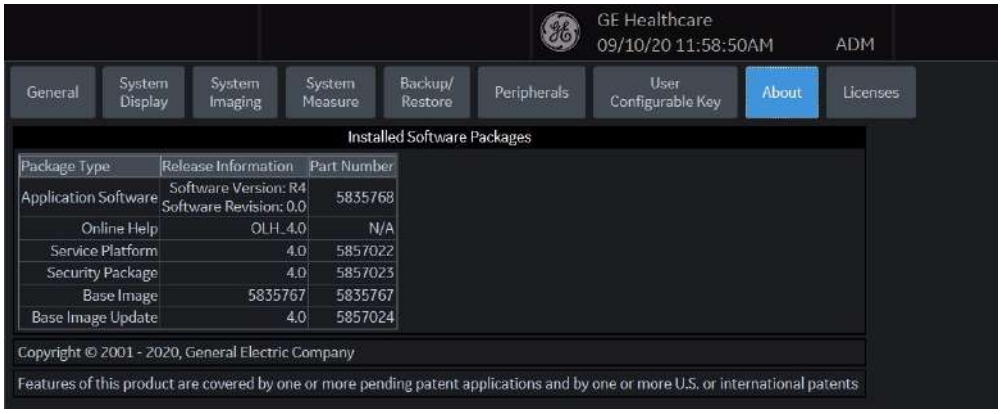


Figure 10-10. System/About Preset Menu

Table 10-35: Software

Preset Parameter	Description
Software Version	The current software version on this system.
System Revision	The current revision of the software version on this system.
Software Part Number	The software part number.
Build View	The software build view.
Build Date	The software build date.

Table 10-36: Patents

Preset Parameter	Description
Patents	Lists system patents.

Table 10-37: System Image

Preset Parameter	Description
Image Part Number	The image part number (ghost part number).
Image Date	The image date (ghost date).

MyPage Presets

Overview

MyPage screens allow you to specify comment, measurement, body pattern, and functions options, to define libraries, and assign comment, measurement, body pattern, and some special functions.

The MyPage allows you to:

- Arrange, Create and Edit MyPage presets on the touch panel
  - measurements on the 1st column touch panel screen
  - comments on the 2nd column touch panel screen
  - body patterns on the 3rd column touch panel screen
  - some special functions on the 4th column touch panel screen

NOTE: The user can be set up to use the body patterns column instead of the comment column. The 2nd and 3rd columns are body pattern lines. Press Utility -> System -> System Imaging -> in Controls -> MyPage column 2/3 assignment (requires reboot) preset, select the "Two Body Pattern Column" and MyPage 1 column 2/3 assignment (requires reboot) preset, select the "Two Body Pattern Column".

Overview (continued)

NOTE: The user can be set up to use the comment column instead of the body pattern column. The 2nd and 3rd columns are comment lines. Press Utility -> System -> System Imaging -> in Controls -> MyPage column 2/3 assignment (requires reboot) preset, select the "Two Comment Column".

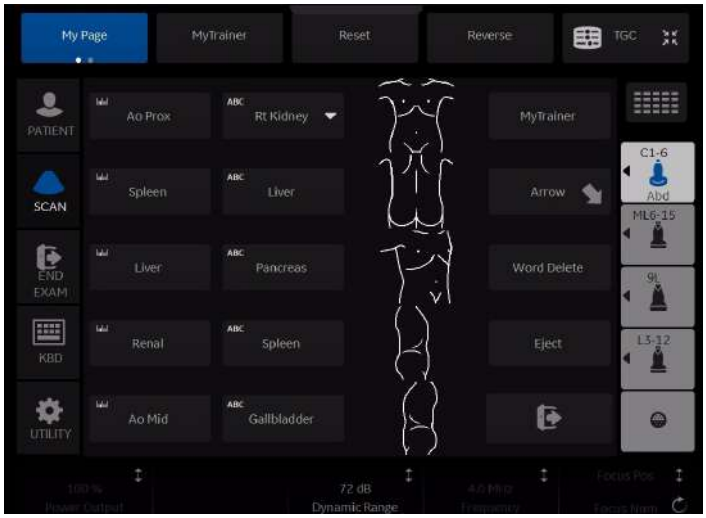


Figure 10-11. MyPage 1 Preset

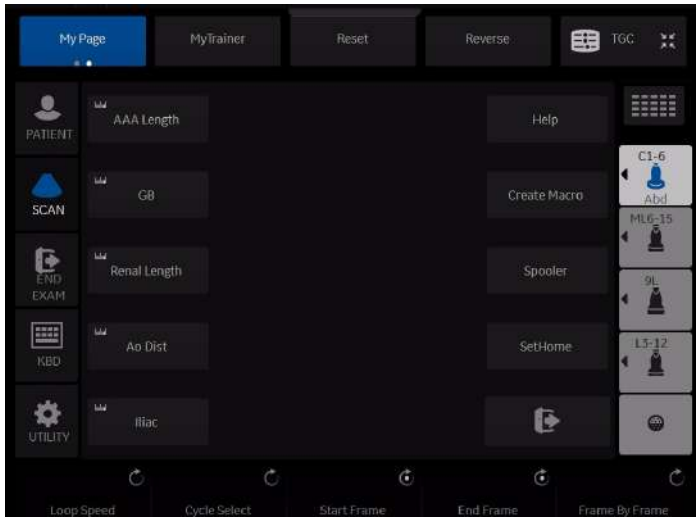


Figure 10-12. MyPage 2 Preset

Measurement column in MyPage Preset

Measurement on the 1st column of MyPage screens allow you to studies and measurements, and assign studies and measurements libraries in the 2D (B-Mode) to applications.The measurement and Studies are listed in the library in the order in which they display on MyPage the touch panel. For each library, you can define MyPage touch panel displays of comments (1st Column), with 5 measurements on each MyPage touch panel.

NOTE: To program on the 1st column of MyPage screens, See 'Measurement and Calculation Setup' on page 7-18 for more information.

Comment column in MyPage Preset

Comment column of MyPage screens allow you to specify comment text and pointer options, to define comment libraries, and assign comment libraries to applications. On comment column of MyPage, you can change and create body pattern libraries. A comment library is a list of body patterns that are associated with a specific application. The comments are listed in the library in the order in which they display on MyPage the touch panel. For each library, you can define MyPage touch panel displays of comments column, with 5 comments or 10 comments each on MyPage touch panel.

NOTE: To program comment column of MyPage screens,See 'Comments Libraries Presets' on page 10-43 for more information.

Body pattern column in MyPage Preset

Body pattern column of MyPage screens allow you to specify body pattern text, to define body pattern libraries, and assign body pattern libraries to applications. On body pattern column of MyPage, 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 MyPage the touch panel. For each library, you can define MyPage touch panel displays of body patterns Column, with 5 body patterns or 10 body patterns on each MyPage touch panel.

NOTE: To program body pattern column of MyPage screens, See 'Body Patterns Presets' on page 10-56 for more information.

Function column in MyPage Preset

Function on the 4th column of MyPage screens allow you to specify some function.On Function on the 4th column of MyPage, you can change function. The functions are listed in the order in which they display on MyPage the touch panel. For each functions, you can define MyPage touch panel displays of function (4th Column), with 4 functions on each MyPage touch panel.

Some special function Keys in MyPage can be programmed as one of the following functions:

Table 10-38:

Function	Description
Help	Access Online help / user manual.
Arrow	Annotation arrow.
Biopsy Kit	Biopsy Guideline Display/change biop
Create Macro	Creates a Macro.
ECG on/off	Turn on/off ECG.
Eject	Eject media.
Spooler	Activates DICOM Job Spooler screen.
Create a Fast Key	Creates a Fast Key.
Play a Fast Key	Plays a Fast Key.
Home	Move annotation cursor to home position
Set Home	Set current annotation cursor position as the new home position
Text1/Text2	Switch between user text annotation overlays
Grab Last	Activate the last selected data for edit.
Word Delete	Erase word associated with comment cursor.
MyTrainer	Active the MyTariner

NOTE: To program on the 4th column of MyPage screens, Go to Utility -> System -> User Configurable Key -> MyPage 1 User Defined Function Key and MyPage 2 User Defined Function Key

Imaging Presets

Overview

Imaging screens allow you to specify parameters for the following:

- B-Mode (B)
- Color Flow Mode (CF)
- Power Doppler Imaging (PDI)
- Elastography (ELASTO)
- UGAP
- M-Mode (M)
- Anatomical M-Mode (AMM)
- Pulse Wave Mode (PW)
- Continuous Wave Mode (CW)
- Harmonics (HAR)
- B-Flow (BF)
- B-Flow Color (BFC)
- B-Flow HD Color (BFHDC)
- Contrast Reference (Ref)
- Contrast (CON)
- Tissue Velocity Imaging (TVI)
- Tissue Velocity Doppler (TVD)
- Auto Sweep
- General

Overview (continued)

Figure 10-13. Imaging - Example

1. Model/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.

Figure 10-14. Example: B-Mode Preset

3. In the row across the top of the screen, select the mode.

   The system displays two sets of parameters and settings. The left column lists all settings for the exam (for example, Abdomen). The right column lists settings that apply only to the exam and probe combination.
4. In the Preset list, select the exam.
5. In the Probe list, select the probe.
6. To change a parameter, do one of the following:
   - Select the value from a list
   - Select one value from a choice of two or more buttons
   - Select or clear a check box
7. After changing the parameters, to save the changes, select the ***Save*** button.

NOTE: When you Save changes to imaging parameters, the system saves changes to all modes, not just the mode currently displayed.

NOTE: If you have problems with imaging, you can return parameters back to the original settings. Select the exam, probe, and mode, and then select Reload Factory Defaults. The system returns the selected parameters to the original settings.

For information about the specific parameters, refer to Chapter 5 Optimizing the Image.

General

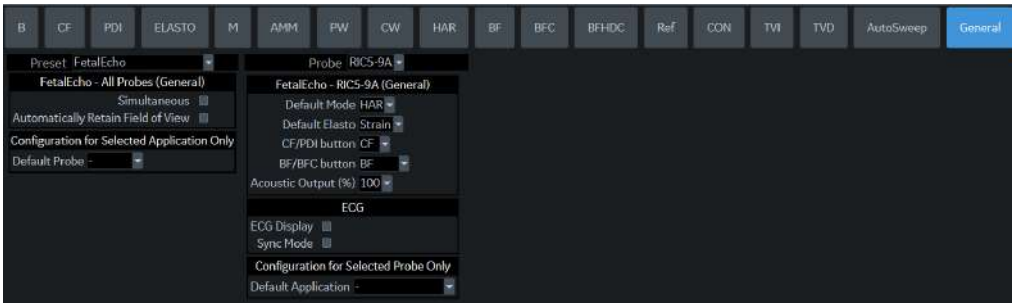


Figure 10-15. General Presets

Default probe per application

The Default Probe per Application Configuration feature enables to specify a default probe for a particular application. Each time an application is activated, the default probe for that application is also activated if connected to the system.

1. To specify a default probe per application, select Utility --> Imaging --> General.
2. Select the default probe from the Configuration for Selected Application only pull-down menu.

Settings

- All Probes (General)
  - 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 Model Touch Panel.
- Configuration for Selected Application only

  Select Probe which you want configure.

Default mode and application per probe

The Default Application per Probe Configuration feature enables to specify a default application for a particular probe. Each time that probe is loaded, the default application is activated.

1. To specify a default application per probe, select Utility --> Imaging --> General.
2. Select the default application from the Configuration for Selected Probe only pull-down menu.

Settings

- Assign the following options per application and probe.
  - Default Mode: B-Mode or Harmonic
  - Default Elasto: Shear or Strain
  - CF/PDI Button: CF or PDI
  - BF/BFC Button: HAR or BF or BFC or BFHDC
  - Acoustic Output (%)
  - Enable B Steer+
  - Show Center Maker
  - Show Center line
- ECG
  - ECG Display
  - Sync Mode
- Configuration for Selected Probe only

  Select the application which you want configure.

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

Probe Button

Button probe allows user to assign functions as they wish and use the system without touching touch panel or front panels. (Only applicable with special probes, for example. L4-12t)

The following menu allows you to customize the buttons on the probe for different controls.

NOTE: When the system is in PoC mode, the menu in "General" tab is only effective. The General Tab allows the user to configure the 4 Button controls.

HINTS

Holding a button for few seconds displays button probe helper.

To customize probe buttons, select one of the selections available in the Imaging menu. (The following menu is only available from the Imaging menu with the L4-12t probe selected.)

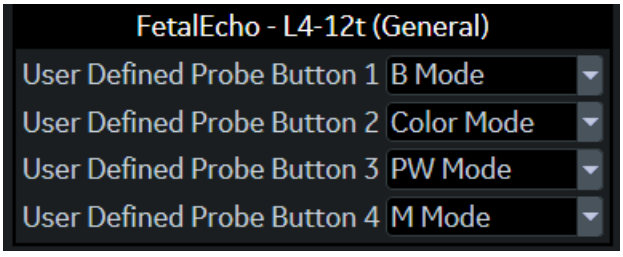


Figure 10-16. Assigning different functions to the probe buttons

Probe Button (continued)

CAUTION

Button ‘1’ may not be usable with out of plane needle guides.

HINTS

Holding a button for few seconds shows button probe helper.

Figure 10-17. Button Probe Helper

HINTS

Holding two buttons (for example, button 1 and 2 / button 3 and 4) for a few seconds disables the probe button function. You can activate the probe button again by holding down two buttons. The system also shows the current probe button status on the status bar.

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 16 comments on each Touch Panel.

For each library, you can define one or two column display of comments (MyPage), with 5 comments or 10 comments on each My Page Touch Panel.

NOTE: The user can be set up to use the body patterns column instead of the comment column. The 2nd and 3rd columns are body pattern lines. Press Utility -> System -> System Imaging -> in Controls -> MyPage 1 column 2/3 assignment (requires reboot) preset and MyPage 2 column 2/3 assignment (requires reboot) preset, select the "Two Body Pattern Column".

Comments Libraries/Libraries Preset Menu (continued)

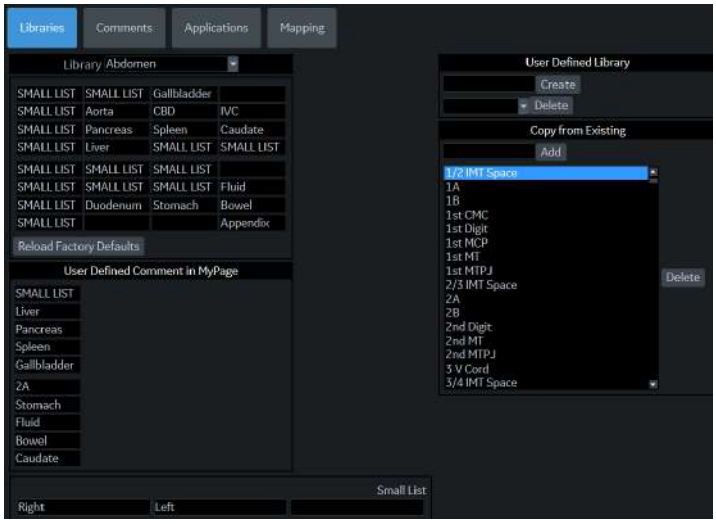


Figure 10-18. Comment Libraries Preset Menu

Table 10-39: Libraries

Preset Parameter	Description
Library	The name of the comment library.
Paging	The first (or second) Touch Panel page of comments for the selected library.
Small List	Fields where you define a small list.
Reload Factory Defaults	Select to reload factory defaults.
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

1. 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.
2. To change or add an comment, select the comment or blank location and press **Set**, then do one of the following:
   - Type the comment.
   - Select the comment in the *Copy from Existing* list, and press **Set**.
3. To save the changes, select the ***Save*** button.

Creating a new comments library

1. In the *User Defined Library* field, type a name for the library, then select ***Create***.

   The system creates a new library.
2. Enter comments as described in step 2 above.
3. To save the changes, select the ***Save*** button.

Deleting a user defined library

1. Select the library name which you want to delete from the pull-down menu.
2. Press ***Delete***.
3. Press ***Save*** to save the changes.

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 Comment tab allows you to specify how it is displayed.

Comments Libraries/Comments Preset Menu

On the Comments tab, you specify text and pointer options.

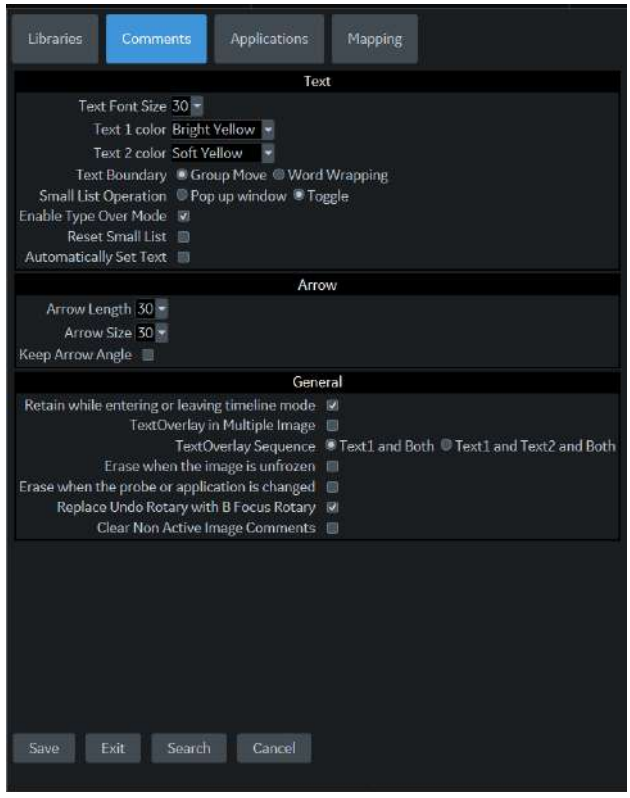


Figure 10-19. Comment/Comments Preset Menu

Table 10-40: Text

Preset Parameter	Description
Text Font Size	Specify the font size. The font size increases as the number increases.
Text color (Text1 and Text2)	Select the color for comment Text1 and Text2.
Text Boundary	Select Group Move or Word Wrapping.
Small List Operation	Select whether you want small list options to display in a pop-up window or by a toggle function.
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	If selected, the system sets the comment at the cursor position automatically when text entry is complete.

Table 10-41: 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 10-42: General

Preset Parameter	Description
Retain while entering or leaving timeline mode	If selected, the system keeps the comment(s) on the monitor display when you enter or leave timeline mode.
TextOverlay in Multiple Image	When selected, and you select the F8 key to hide or show comments, if you are in multiple image, the system hides the text in both images. When cleared, the system only hides the text for the active image.
TextOverlay sequence	You can specify to display Text1, Text2, or both. This allows you to have some comments that do not change during the exam while allowing you to change other comments. Toggle the F8 key to cycle through the 3 Text1/ Text12 states.
Erase When the image is unfrozen	Deletes comments when you unfreeze the image. If you check this parameter, Text2 automatically erase when you unfreeze the image.
Erase When the probe or application is changed	Deletes annotations when you change the application or probe.
Replace Undo Rotary with B Focus Rotary	If selected, the Focal Zone Number and Position can be adjusted using the Annotation Touch Panel. The Undo Rotary control changes to B Focus Rotary.
Clear Non Active Image Comments	If selected, comments from the non-activated images are automatically cleared when entering dual or quad image screen.

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.

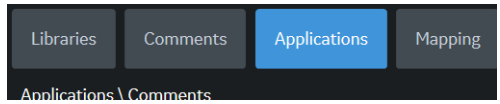


Figure 10-20. Applications/Comments Link

The Applications/Comments screen can be accessed through either the Comments Libraries or Applications Touch Panel key.

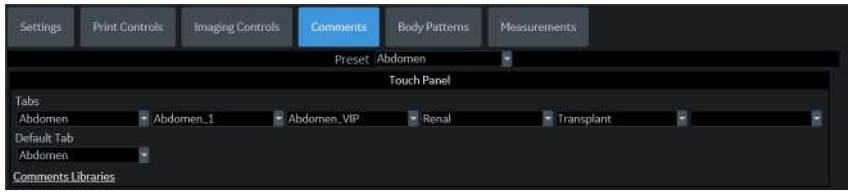


Figure 10-21. Applications/Comments Preset Menu

Specifying which libraries belong to an application

1. On the Comments tab, in the Preset field, select the application.
2. In the Library Group Tabs fields, select the libraries for this application. 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 10-43: 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).

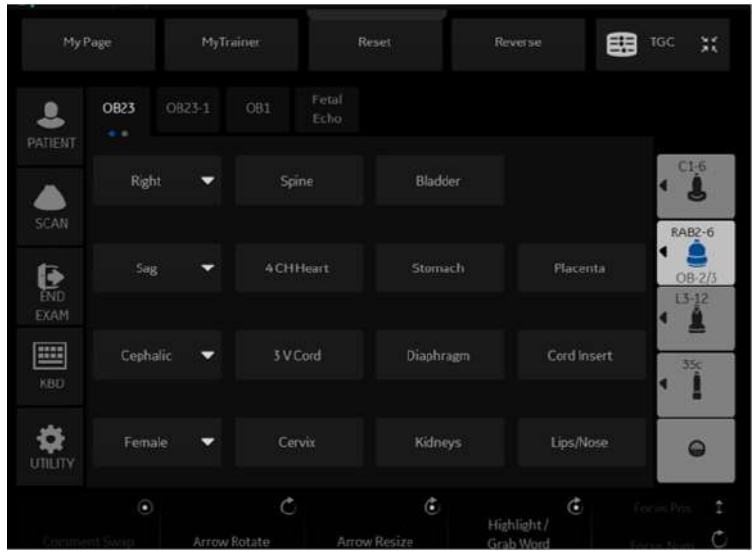


Figure 10-22. OB 2/3 Comments Touch Panel

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.

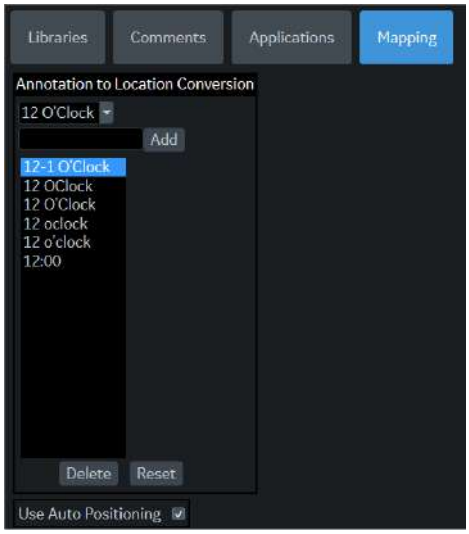


Figure 10-23. Comment/Mapping Preset Menu

Table 10-44: Mapping preset

Preset Parameter	Description
Annotation to Location Conversion	Add/Delete/Reset the use-defined mapping annotation for the qualifier for Breast. • **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”.
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 and press Add.
7. Press Save and Exit.
8. Scan the patient.

Comments Libraries/Mapping Preset Menu (continued)

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.

NOTE: The system assigns “-” to position qualifier if the value is not found in the annotation or body pattern information associated with the image.

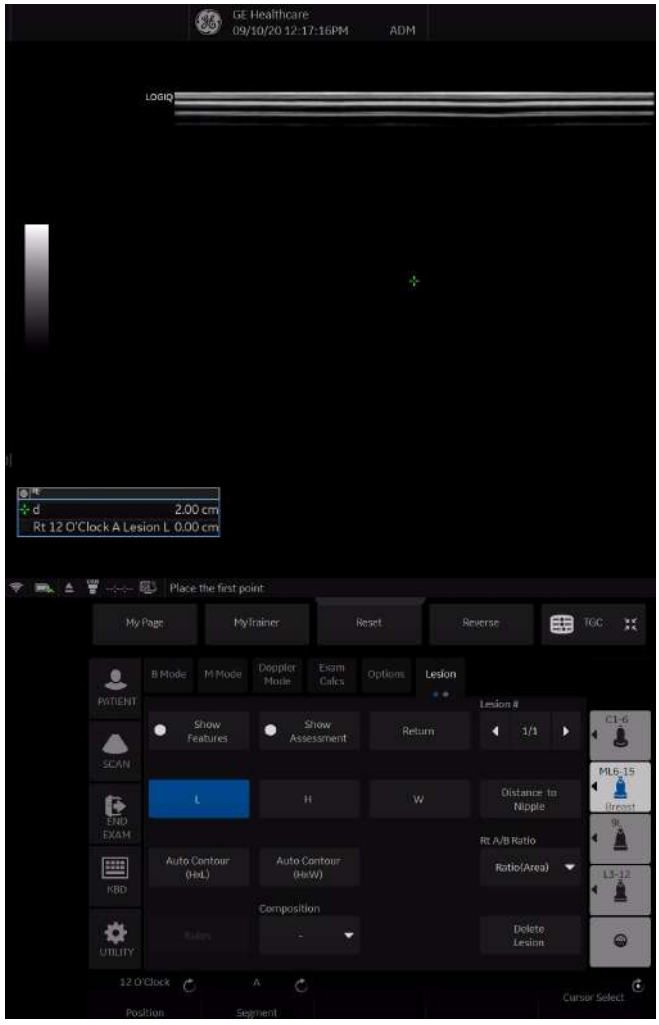


Figure 10-24. Annotation Example

Comments Libraries/Mapping Preset Menu (continued)

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.

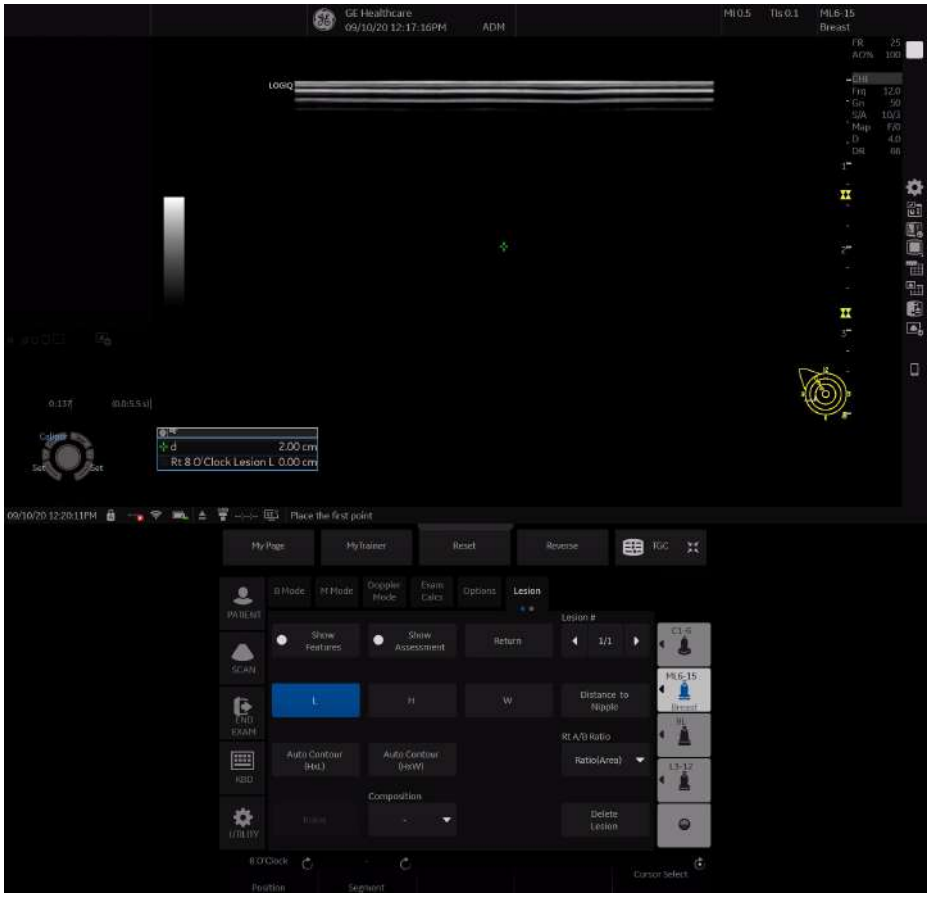


Figure 10-25. Body Pattern Example

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 16 body patterns on each Touch Panel.

For each library, you can define one or two column displays of body patterns (MyPage), with 5 comments or 10 comments on each MyPage Touch Panel.

NOTE: The user can be set up to use the comment column instead of the body pattern column. The 2nd and 3rd columns are comment lines. Press Utility -> System -> System Imaging -> in Controls -> MyPage 1 column 2/3 assignment (requires reboot) preset and MyPage 2 column 2/3 assignment (requires reboot) preset, select the "Two Comment Column".

Body Pattern Libraries/Libraries Preset Menu (continued)

Figure 10-26. Body Patterns Libraries Preset Menu

Table 10-45: Body Patterns Libraries

Preset Parameter	Description
Library	The name of the body pattern application library.
Reload Factory Defaults	Select to reload factory defaults.
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

On the Body Patterns tab, you specify body pattern options.

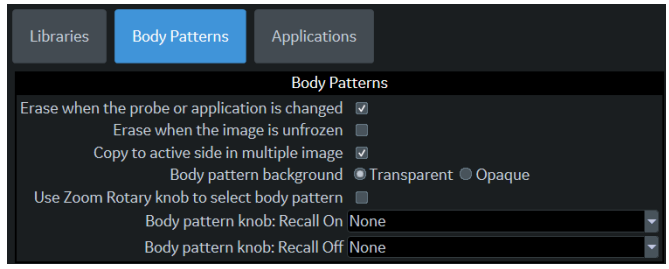


Figure 10-27. Body Patterns General Preset Menu

After you change body pattern options, select Save to save the changes.

Table 10-46: 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 Libraries/Applications Preset Menu

The Body Patterns Library/Applications tab is a link to the Applications preset menu. The Body Patterns Applications tab allows you to select body pattern application libraries. You also specify which is the default library that displays when you use body patterns.

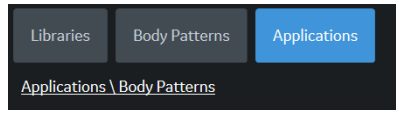


Figure 10-28. Applications/Body Patterns Link

The Applications/Body Patterns screen can be accessed through either the Body Pattern Libraries or Applications Touch Panel keys.

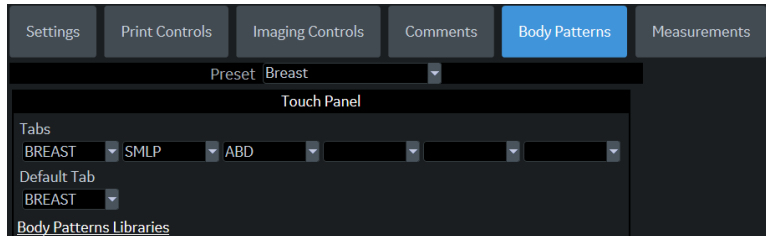


Figure 10-29. Body Patterns Applications Preset Menu

Table 10-47: 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 Body Patterns tab, in the Preset field, select the body pattern.
2. In the Library Group Tabs fields, select the application libraries for Body Patterns. 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.

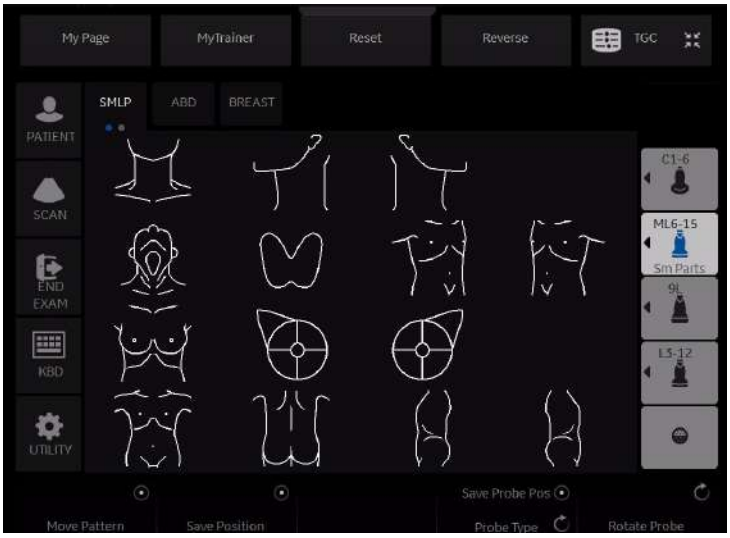


Figure 10-30. Body Patterns Small Parts Touch Panel

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

Figure 10-31. Application Settings Preset Menu

Table 10-48: 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 10-49: Image Control and Display

Preset Parameter	Description
Show kHz scale	When selected, displays the kHz scale on the left side of the Doppler spectrum.

Table 10-49: Image Control and Display

Preset Parameter	Description
Show Doppler Rate	When selected, displays the Doppler rate (mm/s) below the Doppler spectrum.
Anatomical Angle Correction	Select to keep the angle constant with regard to the anatomy.
Join Dual Image for Linear	Select to place linear probe dual images directly next to each other.
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.
Map AutoSweep Key	The following functions are able to be assigned to the right Set key: None, Preview, Acquire.
Horizontal Display for Biplane	Select to display Biplane images of BE9CS-D probe horizontally.

Table 10-50: Auto Zoom Linear Probe Images at Shallow Depth

Preset Parameter	Description
Single Screen	Automatically zoom linear probe images at a shallow depth on a single screen.
Dual Screen and DualView	Automatically zoom linear probe images at a shallow depth on the dual and DualView screen.
Virtual Convex	Automatically zoom linear probes at a shallow depth when you activate Virtual Convex.

Table 10-51: 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 10-52: 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 10-53: Comments

Preset Parameter	Description
Active function at Freeze	Select None, Body Pattern, or Comments. If Body Pattern or Comment is selected, the Body Pattern or Comment is activated automatically when freezing the system.

Table 10-54: 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 10-55: 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 10-56: ECG

Preset Parameter	Description
Show ECG Tab	Check to display the ECG Tab on the Touch Panel.

Table 10-57: 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	Off, Small, Medium, Large Select Off (No elasto quality graph is displayed in the image) or Small, Medium or Large for display size of Quality Graph.

Table 10-58: Shear

Preset Parameter	Description
Show Quality Bar	Check to display Quality Bar.

Table 10-59: AutoSweep

Preset Parameter	Description
Show AutoSweep Tab	If selected, display the AutoSweep Tab on the Touch Panel.

Table 10-60: Video

Preset Parameter	Description
Show Video Tab	Check to display a Video tab on the Touch Panel.

Table 10-61: Label Area

Preset Parameter	Description
Show Label	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 50 characters.

Print Controls

You have to set parameters with each application.

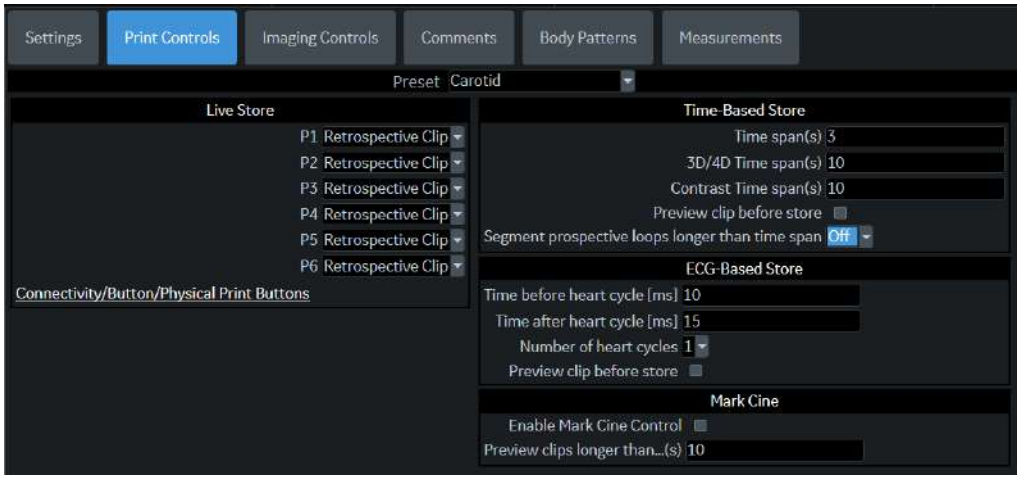


Figure 10-32. Print Control

Table 10-62: Preset

Preset Parameter	Description
Preset	Select Application from pull-down menu. You can set Time span for each application.

Table 10-63: Live Store

Preset Parameter	Description
P1, P2, P3, P4, P5, P6	Select the behavior of Print key during live scan from Prospective Clip, Retrospective Clip, Single image only or None for each print key. None: Store a still image when you press P-key during Freeze. 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. Single image only: Store a still image during live scan each time you press P-Key.

Table 10-64: Time-Based Store

Preset Parameter	Description
Time span [s]	Select the number of seconds of CINE Loop storage. The default is 3 seconds.
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.

Table 10-64: Time-Based Store (Continued)

Preset Parameter	Description
Preview loop before store	When selected, allows you to review cine loops before storage.
Segment prospective loops longer than time span	When selected, the system divides cine automatically which take a longer time than Time span you have programmed. Specify length of Clip (15, 30, or 45 seconds, Off, or Max).

Table 10-65: ECG-Based Store

Preset Parameter	Description
Time before heart cycle [ms]	Sets the storage time span before R-wave of the first heart cycle.
Time after heart cycle [ms]	Sets the storage time span after R-wave of the last heart cycle.
Number of heart cycles	Select the number of heart cycles to store. (Must be de-selected for single frame.)
Preview loop before store	When selected, allows you to review cine loops before storage.

Table 10-66: 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).

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.

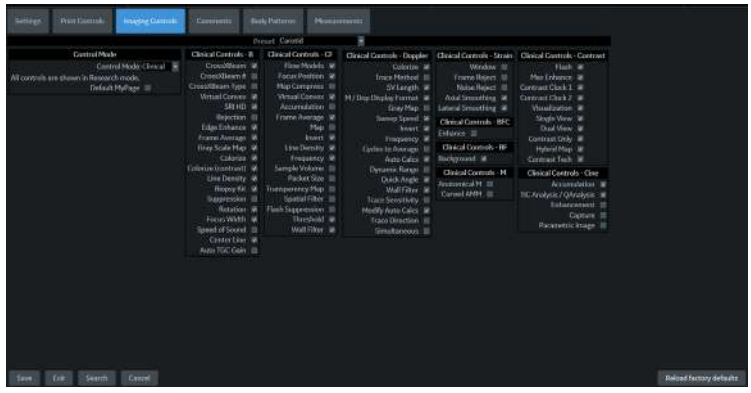


Figure 10-33. Imaging Controls

Imaging Controls (continued)

Clinical vs. Research Touch Panel Example

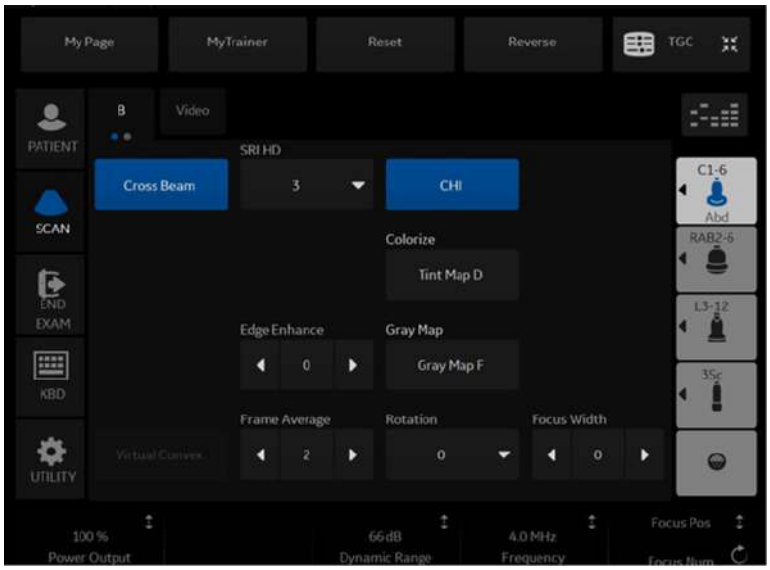


Figure 10-34. Clinical Control Mode - example

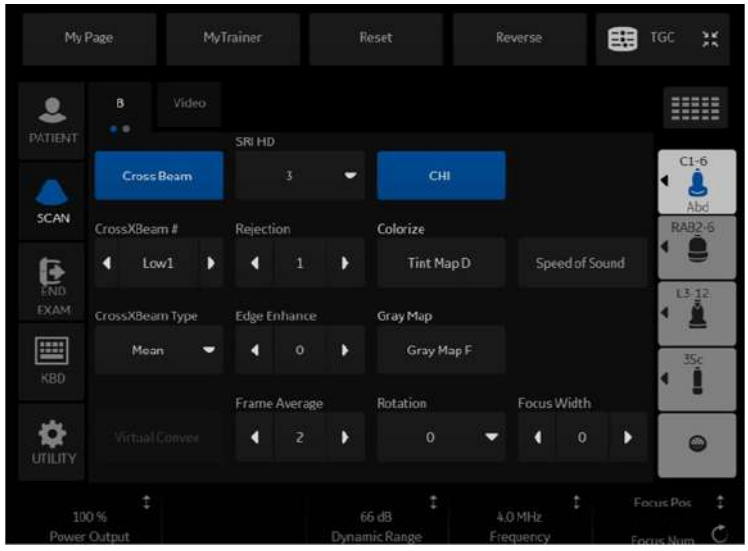


Figure 10-35. Research Control Mode - example

Comments and Body Patterns

Comments and Body Patterns were described earlier in this chapter.

Measurements

You can set the exam category measurement and calculation package you want to appear when you select the exam category Preset.

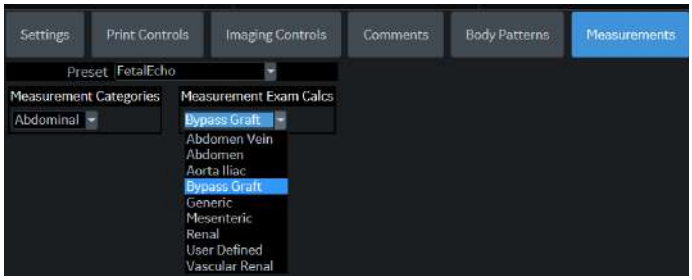


Figure 10-36. Application Measurements Menu

User Specific

Refer to Chapter 3 “Monitor Display” for detail.

3D/4D

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.

4D Presets (continued)

Figure 10-37. Display Preset Parameter

Table 10-67: 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 he desired Gain

Table 10-68: 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 10-69: 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

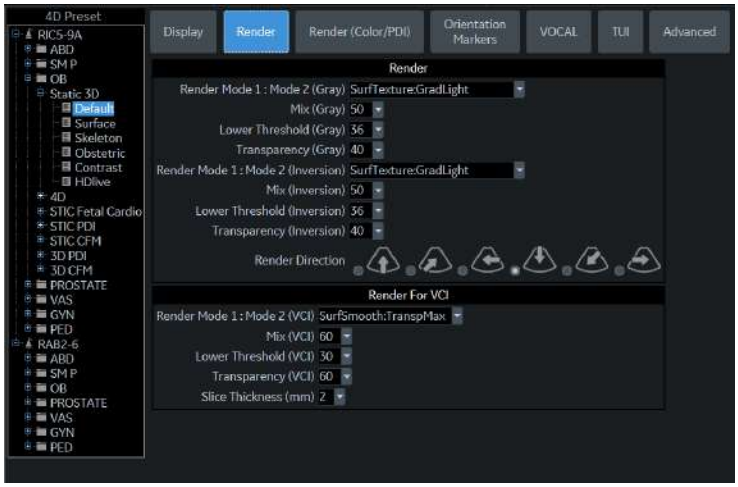


Figure 10-38. Render tab

Table 10-70: 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 Fetoscopic. Surface Smooth, Light, Gradient Light, Transp Max, Transp X-Ray, Transp Min (Render 2), or FetoSmooth.
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 transparence 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, 3-20.

Color / PDI Render tab

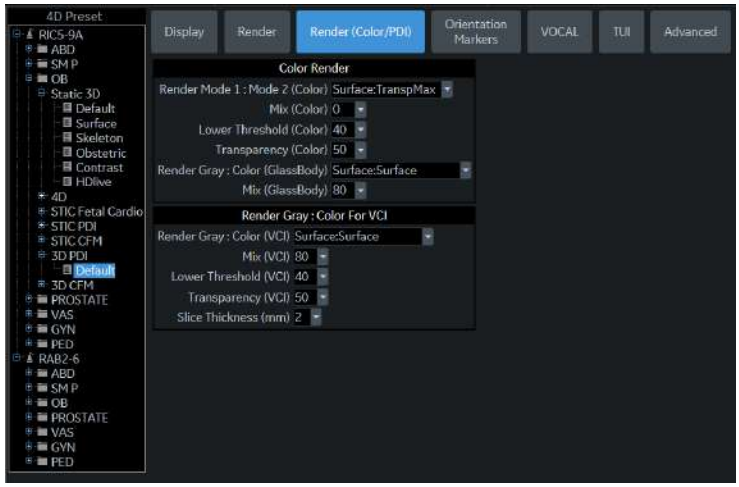


Figure 10-39. Color / PDI tab

Table 10-71: Color / PDI Render

Preset Parameter	Description
Render Mode 1 : 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 (GlassBody)	Determine the render mode, selected from Render Mode 1 and Render Mode 2.
Mix (GlassBody)	Set the percentage of Render Mode 1 to be mixed with Render Mode 2.

Orientation Markers tab

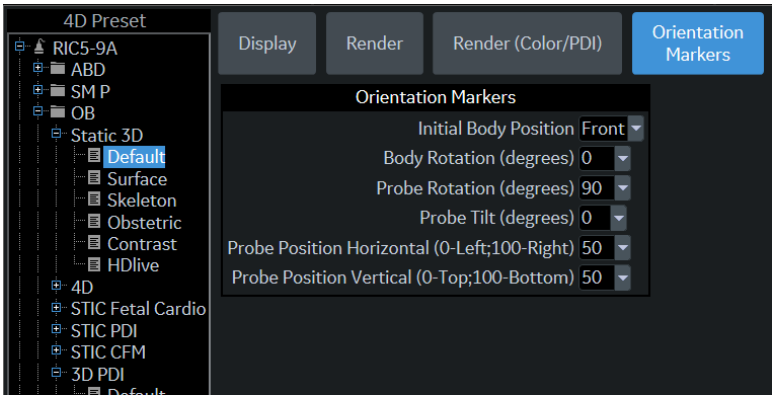


Figure 10-40. Orientation Markers tab

Table 10-72: Orientation Markers

Preset Parameter	Description
Initial Body Position	Set Head, Feet, Front, or Back
Body Rotation (degrees)	Set 0, 45, 90, 135, 180, 225, 270, or 315.
Probe Rotation (degrees)	Set 0, 45, 90, 135, or 180.
Probe Tilt (degrees)	Set 0, 45, 90, 135, or 180.
Probe Position Horizontal (0-Left;100-Right)	Set 0-100.
Probe Position Vertical (0-Top;100-Bottom)	Set 0-100.

VOCAL tab

Figure 10-41. Vocal tab

Table 10-73: 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

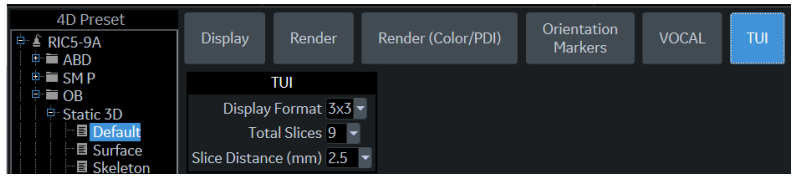


Figure 10-42. TUI tab

Table 10-74: 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 0.5-10 (0.1 step increments).

Advanced tab

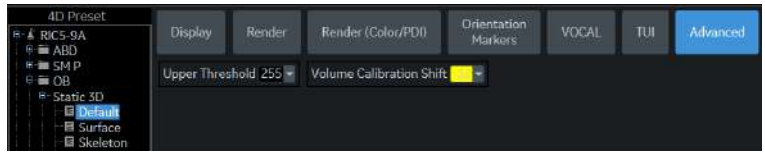


Figure 10-43. Advanced tab

Table 10-75: 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.

About Wireless LAN and DICOM, see Chapter 13.

Connectivity Functions

To set up your institution's connectivity, you must login with administrator privileges.

1. **TCPIP**: allows you to configure the Internet Protocol.
2. **Device**. allows you to set up devices.
3. **Service**: allows you to configure a service (for example, DICOM services such as printers, worklist, and other services such as 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.
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**. Koios is a Breast and Thyroid Lesion Analysis Option. Koios is intergrated with the LOGIQ P8/P9/P10 via DICOM. Koios is configured similar to a DICOM Service. The user can accept/reject analysis results.

Configure these screens from left to right, starting with the TCPIP tab first.

NOTE: The ultrasound system is pre-configured for many services, with default settings selected. You can change these services and settings as needed.

CAUTION

You must restart the LOGIQ P8/P9/P10 (shutdown) after making any changes to connectivity settings in the Utility menus. This includes any changes on the TCPIP or dataflow setup screens.

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 10-44. TCP/IP Screen

The Wired Network Configuration shows what the LOGIQ P8/P9/P10 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.

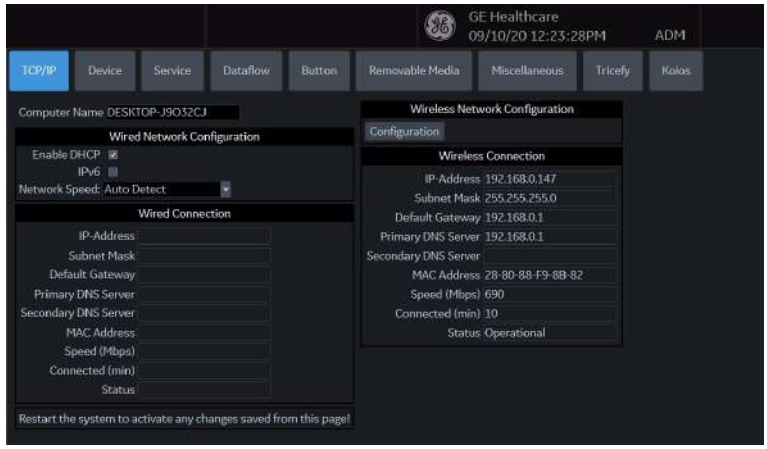


Figure 10-45. DHCP Network Connectivity Menu

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 10-46. 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.
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 P8/P9/P10 IP address MUST BE unique.

TCP/IP Preset Menus

Table 10-76: Computer Name

Preset Parameter	Description
Computer Name	Type the unique name for the Ultrasound system (no spaces in name).

Table 10-77: 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.
IP-Address	Enter 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	Enter the subnet mask address. NOTE: The Subnet Mask is an IP address filter that eliminates communication/messages from network devices of no interest to your system.
Default Gateway	Enter 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.)
Network Speed	Select the network speed (Auto Detect, 10Mbps/Half/Full Duplex, or 100 Mbps/Half/Full Duplex, and 1000Mbps/Auto-negotiate).

Table 10-78: 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).
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 10-78: Wired Connection

Preset Parameter	Description
Status	Current network status. • 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 10-79: Wireless Network

Preset Parameter	Description
Configuration	Press to view or change the Wireless Networking settings. See Chapter 13 for more information.
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.
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. • 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

To add a new device,

1. Press ***Add***.
2. Type the device name in the Name field.
3. Type the device's IP address in the IP Address field.

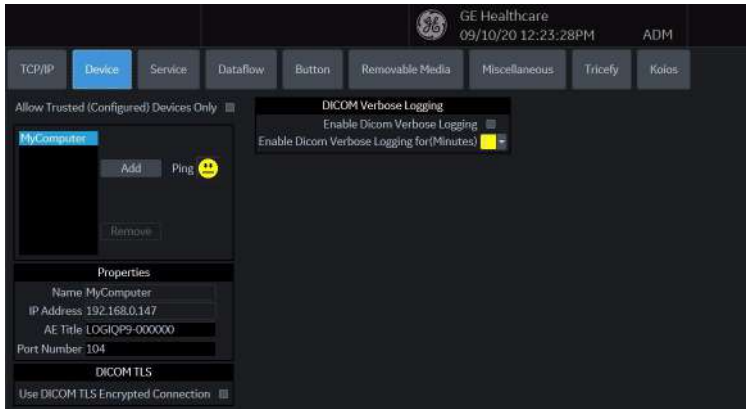


Figure 10-47. Connectivity Device Preset Menu

Table 10-80: Device

Preset Parameter	Description
Add/Remove	Press Add to add a new device; press Remove to delete a device.
Ping	Press Ping to confirm that a device is connected.
Properties: Name	Type the name of the device.
Properties: IP Address	Type the device's IP address. The following IP address cannot be used for device's address, these are reserved for internal use by the system: 192.168.221.1/192.168.221.2
Properties: AE Title	AE Title of the LOGIQ P8/P9/P10. NOTE: Only available for MyComputer.
Properties: Port Number	IP Port Number Used for DICOM, set by default to 104. NOTE: Only available for MyComputer.
DICOM TLS: Use DICOM TLS Encrypted Connection	Check to use DICOM TLS Encrypted Connection
DICOM Verbose Logging: Enable Dicom Verbose Logging	Check to be enable Dicom Verbose Logging
DICOM Verbose Logging: Enable Dicom Verbose Logging for (Minutes)	Coose duration for Dicom Verbose Logging

Device (continued)

To ping a device,

1. Select the device.
2. Press ***Ping***. If the smiley face smiles, then the connection has been confirmed. If the smiley face frowns, then the connection has not been made. Check the device name and IP address.

Service

For each Device that you added to the system, you need to set up the service(s) that device supports (you must be an administrator to update these screens).

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 Parameters** - lists properties for the service currently selected in the Services section. The name and parameters in this section change, depending on what service is currently selected. In the above figure, this section shows DICOM Print parameters.

Adding a service to a destination device

1. Select the service from the pull-down menu. Press ***Add***.
2. Specify the properties for this service. Press ***Save***.
3. Verify the service.

Removing a service

1. Select the service. Press ***Remove***.
2. Press ***Save***.

Changing parameters for a service

There are certain parameters that may need to be set up for each service:

Table 10-81: Service Parameters: Common Service Parameters

Preset Parameter	Description
Name	Free text: give a descriptive name to the device.
AE Title	The Application Entity Title for the service.
Port Number	The port number of the service.
Maximum Retries	Max # – the maximum number of times to try establishing a connection to the service.
Retry Interval (sec)	Specify how often (in seconds) the system should try to establish a connection to the service.
Timeout	The amount of time after which the system will stop trying to establish a connection to the service.

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 10-82: 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 10-83: Video Capture

Preset Parameter	Description
Type	Specify Color, BW, or DVD Record/Pause.

Save As

Table 10-84: Save As

Preset Parameter	Description
Destination	Specify destination device, Hard Drive, USB Flash Drive.

USB Quick Save

USB Quick Save provides the ability to easily send images to a USB memory stick or Network Storage. See ‘USB Quick Save’ on page 15-47 for more information.

E-mail to MMS

NOTE: You can attach up to 10 images to an e-mail.

To use the E-mail service, the SMTP (Simple Mail Transfer Protocol) settings and user account are needed from your E-mail service provider.

- SMTP server name (Outgoing Messages) e.g., smtp.gmail.com
- SMTP authentication (Outgoing Messages) e.g., SSL
- SMTP port (Outgoing Messages) e.g., 465

NOTE: The LOGIQ P8/P9/P10 only supports the E-mail Send service; receiving E-mail is not supported. To receive E-mails, the same E-mail account needs to be installed on an Office-PC.

NOTE: Some E-mail servers allow less secure applications to access your account. If your account cannot gain access to the E-mail server from the LOGIQ P8/P9/P10, please contact the server administrator and configure access to your account to allow a less secure application. In case of Google gmail, please refer to the Accounts Help at https://support.google.com/accounts/answer/6010255?hl=en.

Setting up the Email to MMS

1. Enter IP Address and Name of SMTP server to add an Email connection device in Device Tab.
2. Press Verify icon and Press Add button if the ping test is executed successfully.
3. Move to Service Tab, select “Email to MMS” in Service menu and Press “Add” button.
4. Enter your Account name or Email Address in the Identity group. As an option, you can enter a different reply to address and a signature text.
5. To verify E-mail configuration, click on Verify icon. The test message will be sent to the entered E-mail address followed by a message box.
6. To save your configuration, select the Save button.

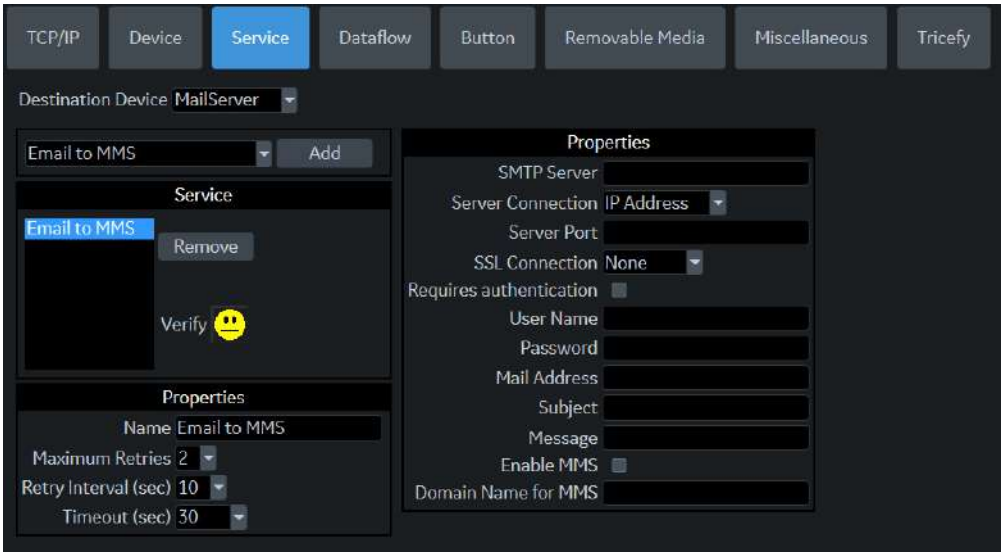


Figure 10-48. Email to MMS

Table 10-85: Network Storage Service

Preset Parameter	Description
SMTP Server	Free text: give a descriptive name to the email server.
Server Connection	Options: • IP Address: Try connecting via IP address. • Server Name: Try connecting via SMTP server name. Select server connection method to access mail server.
Server Port	The port number of the email server.

Table 10-85: Network Storage Service (Continued)

Preset Parameter	Description
Connection security	Options: • None • SSLTTLS • STARTTLS If your SMTP server requires SSL or STAR connection, select the proper option.
Authentication method	Enter user account and password for SMTP authentication. If your server doesn't require User authentication, uncheck the box and do not enter anything. Leave the User Name and Password fields blank.
User Name	Email Account User Name.
Password	Email Account Password.
Email Address	Enter To (receiver) Email Address for sending test message (Mandatory). Note: It will be used for From (sender) Email Address.
Subject	Free text: give a subject to test E-mail.
Message	Free text: give a body text message to test email.
Enable MMS	Enable MMS with E-mail service.
Domain Name for MMS	Domain Server Name for the 3rd party provider to MMS message.

MMS Configuration

The MMS phone number is mapped into the recipient E-mail address of the MMS service provider.

NOTE: The LOGIQ P8/P9/P10 does not support MMS service. The LOGIQ P8/P9/P10 only supports patient phone number combined with MMS domain name when sending an email ("Phone number@DomainName").

NOTE: To use the MMS function, you need to contract with a 3rd party provider that offers E-mail to MMS service (e.g. SMSglobal). Contact a service provider!

1. If it is desired to also use MMS, select "Enable MMS" in the Email Service Properties.
2. Enter 3rd party Domain Name.

NOTE: Captured images will be sent to your E-mail account with "Phone number@DomainName".

3. Store your configuration by selecting"Save" button.

Send Email

The user can send selected images from the Active Image page via "Send To".

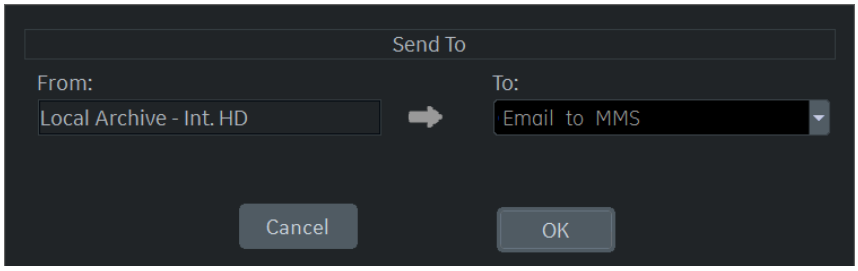


Figure 10-49. Batch Send to E-mail

E-mails contain JPEGs for still image and WMV for Cine loops.

NOTE: Exam send function is not supported for E-mail to MMS. You can only send selected images from the Active Image screen.

How to enter Patient's E-mail address and Phone number in the Patient screen

To show and allow entering the patient's E-mail address, enable the "Use Email to MMS" option on the Connectivity -> Miscellaneous screen.

How to enter Patient's E-mail address and Phone number in the Patient screen (continued)

1. Press the “Details” button on the Patient screen. The Patient’s E-mail address and Phone number controls appear.
2. Enter patient information and Comment. The content of the Comments will be used for the body text of the email. The subject of the E-mail will be automatically generated using the Patient Name and Exam Date information.
3. Select Register to save the patient’s email configuration.

Setting up a Printer

Use Standard Print for digital peripherals. These are printers with either a USB interface or Ethernet interface (Sony UP-D25MD, for example).

On the Utility --> Connectivity --> Button page, select the Print key in the upper, left-hand corner of the display. In the middle portion of the page, under Available Input/Outputs, select the printer you want to configure. Next, press the two right arrows (>>) in the upper, right-hand corner of the page to move this printer into the Printflow View.

You can also configure the Standard Print button that appears on the Active Images screen.

Example: For instance a 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.

Dataflow

CAUTION DO NOT rename the factory default dataflow.

A dataflow is a set of pre-configured services. When you select a dataflow, the ultrasound system automatically works according to the services associated with the dataflow. The Dataflow tab allows you to select and review information about dataflows. You can also create, change, and remove dataflows.

Set up dataflows for the services.

NOTE: You must be logged on as Administrator to use the Dataflow tab.

NOTE: Services added to the Dataflow View will receive images immediately if Direct Store is checked; or at the end of the exam if Direct Store is not checked.

Figure 10-50. Dataflow Preset Menu

Table 10-86: Dataflow

Preset Parameter	Description
Name	Select the dataflow from the list.
Direct Store	Select to store data directly to archive (no buffer storage).
Hidden	Select so that this dataflow does not appear as a Dataflow on the Patient menu.
Default Dataflow	Select to use this dataflow as the default dataflow when you start the system.

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 pages. 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.

Button (continued)

Table 10-87: Print Button

Parameter	Description
Physical Print Buttons • Print 1-6 • PrintScreenAutoSweep • PrintScreen	
M&A only (no images)	Configures the system to send a DICOM structured report only; no image is generated or sent.
Still Images	• Format: Ultrasound Image, Secondary Capture (Image, Video, Screen) • Compression: None, Rle, Jpeg, Jpeg2000 • Quality: Lossless, 99, 98, 97, ... 50 (Displays when JPEG/JPEG2000 is the selected Compression)
Clips/Volume	• Clips: Add Multiframe Data: Checkbox • Compression: None, Rle, Jpeg, Jpeg2000 • Quality: Lossless, 99, 98, 97, ... 50 • Volume File Format*: 1-Standard DICOM (Default), 2-Standard DICOM with Raw Data; 3-Enhanced DICOM, 2&3 (2 files) *Easy3D replace format 3 with format 2
Note: The default Compression for Clips/Volumes is JPEG85. It is strongly recommended to keep the Compression set to JPEG85.	
Advanced	• 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.
- Verify that the media is finalized or unfinalized.
- Verify that the media is formatted or unformatted.
- Format removable media (rewritable CD/DVD)

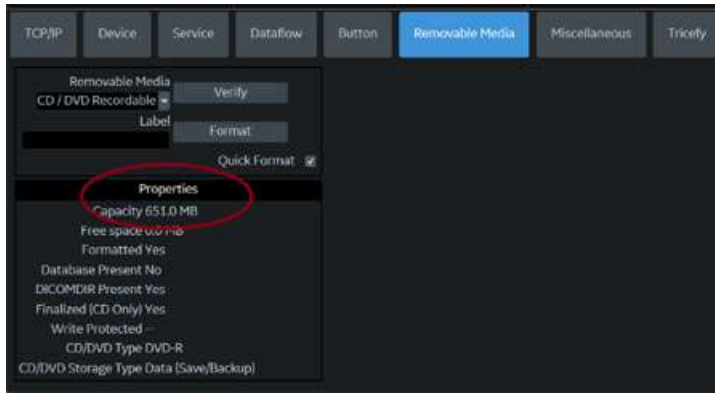


Figure 10-51. Removable Media Preset Menu

Table 10-88: Tools

Preset Parameter	Description
Removable Media	Select the removable media to format or verify.
Label	Type a label for a new removable media (free text).
Verify	• Select to verify DICOM directory on removable DICOM disk. • Verify the free space of the media. • Verify that the media is finalized or unfinalized. • Verify that the media is formatted or unformatted.
Format	Select to format removable media.
Quick Format	To format the media quickly, check this box. If you uncheck this box, the media is formatted with a full format. New media should always be formatted with a full format.

The bottom of the screen lists properties of the selected media.

Formatting removable media

1. Select the removable media from the Media list.
2. Type a name for the removable media in the Label field.

NOTE: Do not use the following characters for labelling:

\ / : ; . , * < > | + = [ ] &

3. Select ***Format***. Confirm **OK** or **Cancel**.
4. An information window confirms when the format has been completed. Select **OK** to exit.

Verifying removable media

1. Select the removable media from the Media list.
2. Select ***Verify***.

Miscellaneous

The Miscellaneous tab allows you to configure tools related to patient management and print and store options. You can specify default system functionality, such as whether patient ID is required when you archive data, or if you want the system to automatically search the archive for a patient when you enter patient data.

Table 10-89: 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.
Show BBT	Show BBT field on the OB patient screen to input the basal body temperature.
Double Click on Patient List to Start	Select Review or New Exam to display each time you double click on the patient name in the patient list on the Patient menu.
Detail Mode	Select to display Detail Mode, rather than Exam View, when you select the patient name in the patient list on the Patient menu. You can also type comments while in Detail Mode.
Export to USB HDD: Create DICOMDIR	Create DICOMDIR is a DICOM file format which contains how the directory and DICOM files structured for diagnostic portable media behave. It is important for portability between the LOGIQ P8/P9/P10 to PACS. If you want to save exams to the USB Hard drive and look at it on the PACS, the DICOMDIR is a must.
Export to Network storage: Create DICOMDIR	
Automatic Disable Patient Data	Select to automatically disable patient data. If selected, locks the patient name, date of birth and gender (like Patient ID). The Factory Default for this preset is unchecked.

Table 10-89: Patient/Exam Menu Options (Continued)

Preset Parameter	Description
Remember Cursor Position on the Transfer Screen	To set a default cursor location on the Data Transfer screen: 1. Select the “Remember cursor position in the Transfer screen” preset and press Save. 2. On the Data Transfer screen, move the cursor to the desired field. 3. Exit out of the Data Transfer screen. When returning to the Data Transfer screen, the cursor location is in the position your selected.
Quick New Patient Entry	Select to store new patient automatically by pressing the Patient key.
User Email to MMS	To show and allow entering the patient¡¯s E-mail address in the patient information.
User Simple MPEGVue	Select to transfer the captured images to PC format (JPEG, WMV).
Use Pet Name	To show and allow entering the pet¡¯s name in the patient information.

Table 10-90: 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.

Table 10-91: Print and Store Options

Preset Parameter	Description
P[1-6] Key Sound	Select None, Click, Chimes, Ding, Ding-Dong, or Whoosh.
Store Dual as Dicom Only	Select to always store dual images as a DICOM (secondary capture) store, rather than Raw DICOM.
Dual When Color Support is Mixed	Dataflow Mixed is not available. While transferring dual images to the PACS, send black and white images as gray; send color images as color. Set up 2 services (one gray and one color), set up 2 dataflows, and set up 2 buttons. Each button needs to be tied to a different service. Select if you want to keep the user preset for Color Photometric Interpretation while in Dual mode.
Enable Smart Capture Area	Check box to select.
Store 2D Loop with Timeline Data	Check box to select.
Patient List Print-Font Size	Select font size.

Table 10-91: Print and Store Options

Preset Parameter	Description
Add Titlebar Information to Multiframe Loops	Adds a title bar information to the multiframe loops.
Add Scan Parameter Information to Multiframe Loops	Adds scan parameter information to the multiframe loops.
Image Order Scheme	Select to Direct Store images in Acquisition Order, Scan Assistant Order, or Off. • **Off**. The clipboard on the Ultrasound system shows the image in the order it was acquired. Therefore, re-stored images appear where you'd expect. However, on the PACS system, images appear in arrival order or in image number order. • **Acquisition Order**. From the Ultrasound system perspective, the same as "Off." But on the PACS system (if based on image number order), images are displayed consistently with the way they are stored on the Ultrasound system. • **Scan Assistant Order**. You can define the storage order (reading order) via Scan Assistant Creator. Therefore, based on the order defined in Scan Assistant, images are re-ordered and displayed in this manner both on the Clipboard and on the PACS system.
Send Images via Wireless	When connected to the network via Wireless LAN and this box is checked, then 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.
Allow press and hold print key to replace an image	When an image is recalled and the user stores it locally on the system using press and hold the Print key, the currently recalled image is deleted from the exam and the newly stored image is saved. Or when you store the image without annotations, type the annotation and press and hold the Print key, the system replaces previously stored image with the new image.

Table 10-92: 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 10-93: LOGIQ Apps

Function	Description
Unpair Bluetooth Devices	Un-paired from all trusted Bluetooth devices.

Examination list window column configuration

You can create new columns, remove columns, and select the information to display in a column.

1. Move the **Trackball** to highlight a column.
2. Press **Set.**
3. Use the arrows (<< or >>) to reposition column headings.

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. The Wireless LAN Option is required.

As soon as the Tricefy option is enabled, relevant Tricefy items are displayed.

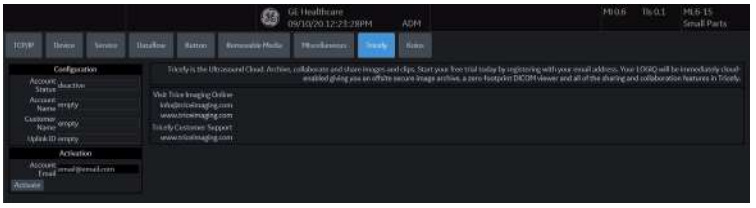


Figure 10-52. Tricefy Preset Menu

Table 10-94: Configuration

Preset Parameter	Description
Account Status	[TBD]
Account Name	Name for the account.
Customer Name	Customer's name.
Uplink ID	Uplink ID.

Table 10-95: Activation

Preset Parameter	Description
Account Email	Account email
Activate	Press to activate the Tricefy option.

Barcode

Overview

The Barcode Scanner supports 1D and 2D encoding symbologies. The protocols supported are shown as below:

Table 10-96: Protocols supported by Barcode Scanner

Category	Protocol
1D	Code 128, Code 93, Interleaved 2 of 5
2D	PDF417, Data Matrix

Barcode Scanner

Select Barcode Scanner in the drop-down list.

NOTE: Reboot is required after the device is selected or changed.

Input Mode

Off

Enter the Patient ID using the keyboard.

Patient ID

Scan the Barcode as the Patient ID or enter the Patient ID using the keyboard instead of the barcode.

Complexation

Scan the Barcode to input the Patient demographics or enter the Patient demographics using the keyboard instead of the barcode.

To enter the Patient demographics using 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, Birth Month, Birthday

   NOTE: The length of BirthYear equals to 4, BirthMonth equals to 2 and BirthDay equals to 2, and they 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 the information of any item, configure the Start and End position as "0".

For example, if the scanned barcode is "000001LastNameFirstName191990101F", the configuration and results display as the following:

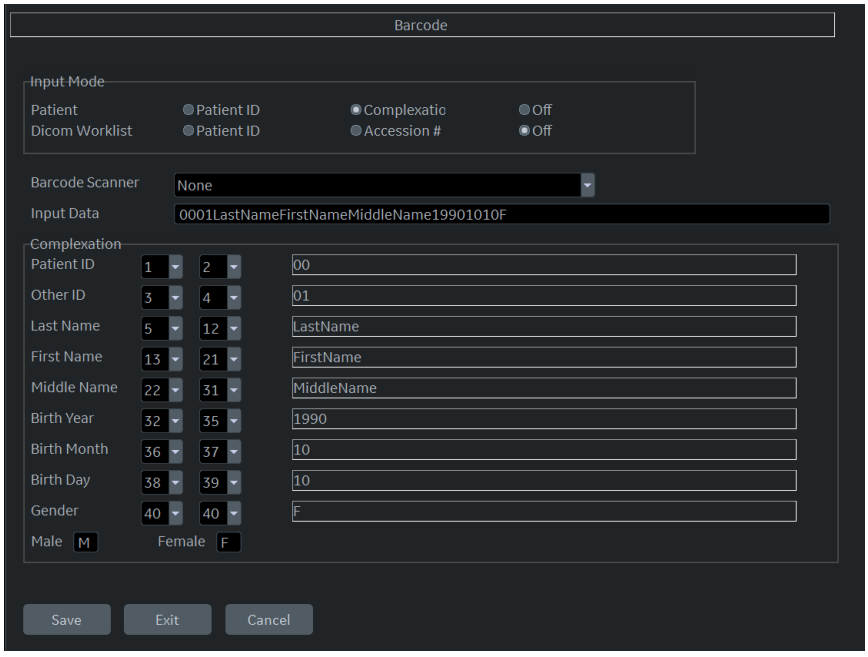


Figure 10-53. Barcode Configuration Page Example

Cloud Reporting

Instead of storing and processing patient data on a local device, the user can store and access the patient data on a remote server which is outsourced to another company. The user can edit and print the report on the remote server. The patient data can be stored on the outsourced server though DICOM. Contact the Cloud Reporting vendor for DICOM service properties, such as IP Address, AE Title, Port number and URL address for Q-Path E.

There is currently one vendor for Cloud Reporting:

- Q-Path by Telexy

To review and edit the stored patient data on Cloud Reporting:

1. Press Utility -> Connectivity -> Miscellaneous -> Cloud Reporting.
2. Check the box for “Enable Cloud Reporting”.
3. Select destination as “Q-Path E”.
4. Select one protocol type. There are two options: http://, https://.
    - Q-Path Application URL is required to access Q-Path server. Contact the Telexy vendor for the URL

Cloud Reporting (continued)

5. Enter Username and Password.
   - Q-Path Application URL is required to access Q-Path server. Contact the Telexy vendor for the URL

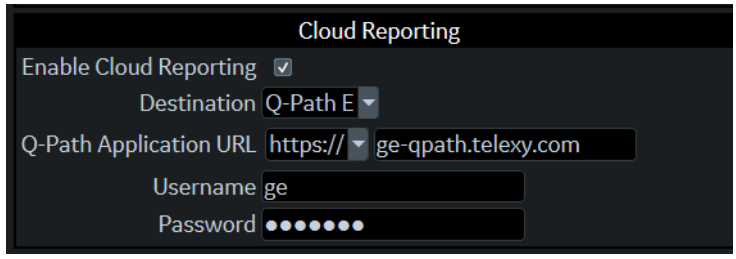


Figure 10-54. Input User information

6. Press Utility key on the touch panel and then select System. Go to User Configuration Key to assign Cloud Reporting button to User Defined Hard Key.
   - The Cloud Reporting button displays on User Defined Key If the Enable Cloud Reporting option is checked.

Cloud Reporting (continued)

7. Assign the Cloud Reporting button on User Defined Hard Key or MyPage User Defined Function Key.
8. Press Patient key on the touch panel and open the patient you sent to the Q-Path.

NOTE: To view the patient in the Web browser, you need to send the exam to the DICOM server of Q-Path. See 'DICOM Image Storage' on page 16-140 in Basic User Manual for more information.

9. Press the button you assigned to enter the website to edit the current patient exam.
10. The system opens the webpage for cloud Reporting of the selected destination.
    - If Q-Path server requires authentication or the login information is wrong, you may need input correct Username and Password.

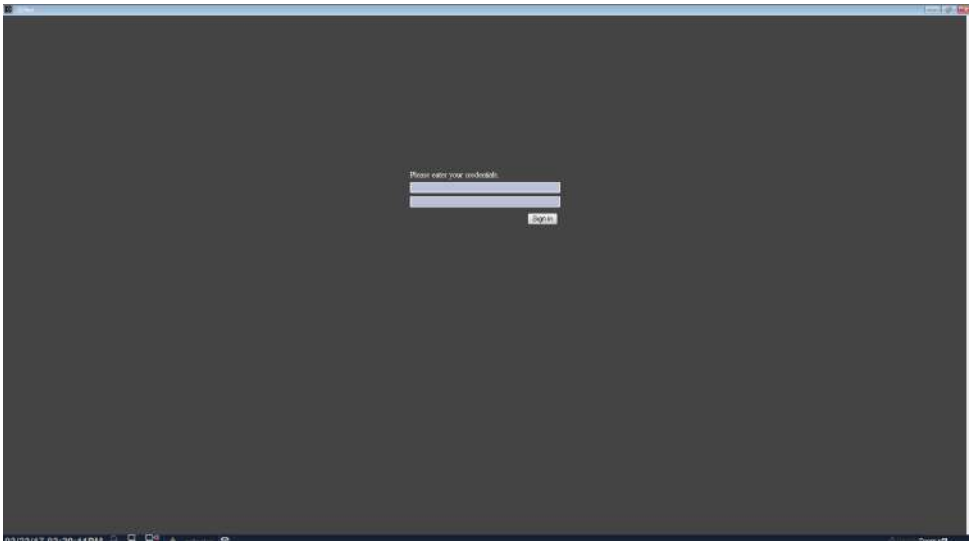


Figure 10-55. Example - Q-Path E WebPage - Login

Cloud Reporting (continued)

- You can review and edit the patient data on the Webpage via custom browser.

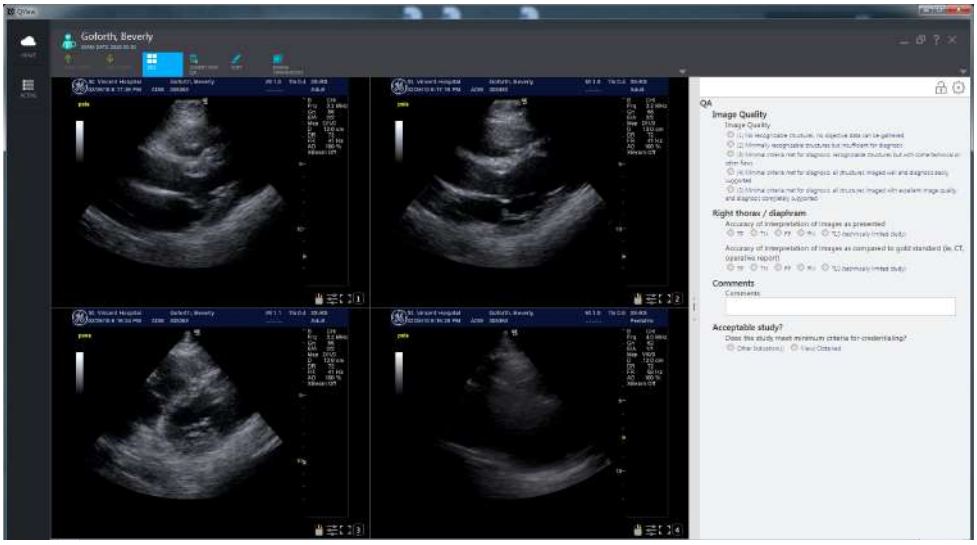


Figure 10-56. Example - Q-Path E Webpage

NOTE: *Refer to the instruction from "Help" or "?" on the webpage or consult the DICOM server vendor about how to manage the patient data on the webpage.*

Table 10-97: Cloud Reporting

Preset Parameter	Description
Enable Cloud Reporting	Select to enable Cloud Reporting. The Cloud Reporting button appears in Patient screen. Press the Cloud Reporting button to enter the website to edit and print the report.
Destination	Select the destination of Cloud Reporting.

Koios DS Configuration (Available on region regulatory clearance)

Koios DS is a Breast and Thyroid Lesion Analysis Option. Koios is integrated with the LOGIQ P8/P9/P10 via DICOM. Koios is configured similar to a DICOM Service. The user can accept/ reject analysis results.

To activate Koios,

1. Access the Utiliy --> Connectivity --> Koios Configuration page.

NOTE: The Koios 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 Server.
3. Select the ***Activate*** button.

Figure 10-57. Activate Koios

4. You will receive notification upon successfully connecting to the Koios Server (The activation was successful. Your system is connected to Koios). 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 Server via the Utiliy --> Connectivity --> Device page.

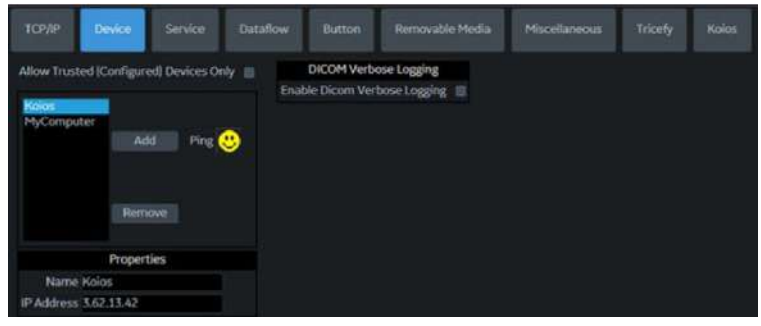


Figure 10-58. Ping the Koios Server

Koios DS Configuration (Available on region regulatory clearance) (continued)

6. Confirm that the Koios Assessment service is running by pinging the Koios Assessment service via the Utility --> Connectivit --> Service page.

Figure 10-59. Ping the Koios Assessment Service

Deactivate Koios DS

1. Access the Utility--> Connectivity--> Koios Configuration page.
2. Select ***Deactivate***.

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 P8/P9/P10.

NOTE: Only the System Administrator can access the pages.

Administrator Tasks

Here are the tasks typically performed by the LOGIQ P8/P9/P10 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
- 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 P8/P9/P10 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.

HINTS

Ensure the ADM password is known **BEFORE** rebooting the system.

Figure 10-60. 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.

HINTS

Admin has full access rights.

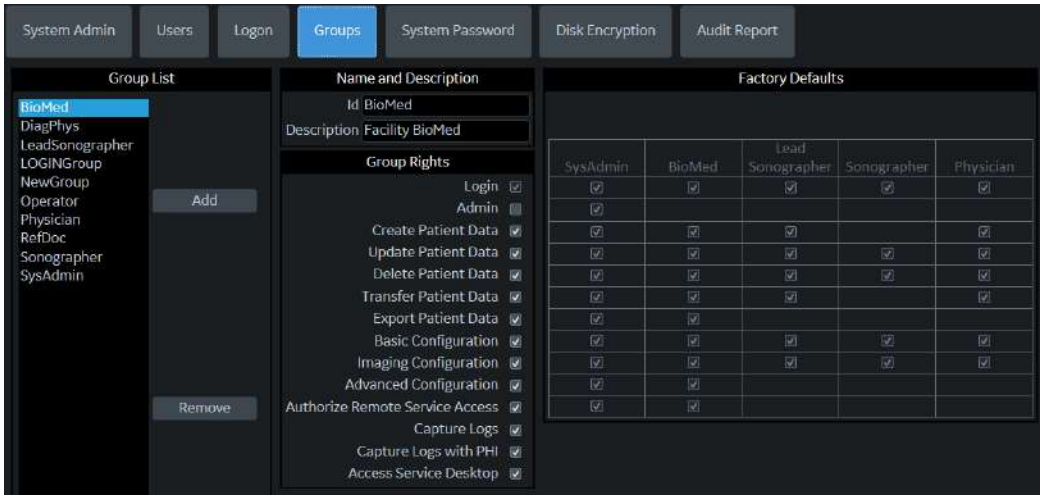


Figure 10-61. Groups Page

Adding users

You define Group access rights via the Utility-> Admin-> Users page.

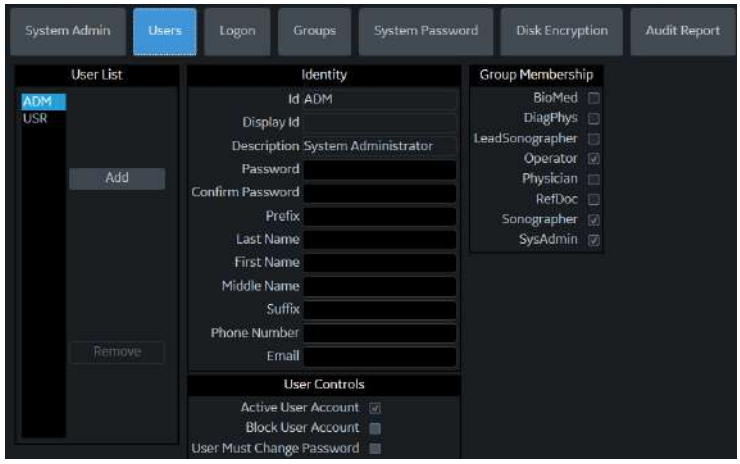


Figure 10-62. Page to Add Users

Creating a user

1. Press ***Add***.
2. Type the user ID.

HINTS

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.

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.

NOTE: *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 P8/P9/P10.

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 Amin 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.

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”

User Accounts and Password Policies Frequently Asked Questions (continued)

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.

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.

User Accounts and Password Policies Frequently Asked Questions (continued)

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)).

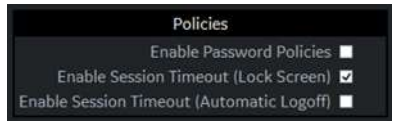


Figure 10-63. Enable Lock Screen

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.

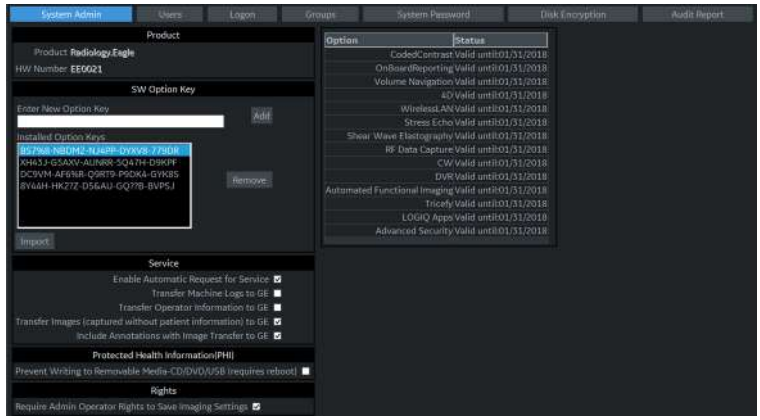


Figure 10-64. Administrative System Admin Preset Menu

Table 10-98: Product

Preset Parameter	Description
Product	The name of the product.
HW Number	The hardware number of the product.

Table 10-99: Software Option Key

Preset Parameter	Description
Enter New Option Key	Type the key for the option you wish to add and press Add. *Note: The Option Key may contain alphanumeric characters (2-9, A-H, J-N, P-Z) and special characters ("?", "%" and "&").*
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 10-100: Service

Preset Parameter	Description
Enable 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	Usage Analysis: Allows transfer of monitoring errors and status logs to GE back office for data analytics.
Transfer Operator Information to GE	Usage Analysis: Allows transfer of operator information to GE back office for usage analytics.
Transfer Images (captured without patient information) to GE	Usage Analysis: 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 RSVP Agent, then Remote Connectivity is no longer available on the LOGIQ P8/P9/P10. This also means that Remote Service can no longer connect to the LOGIQ P8/P9/P10 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 RSVP” icon control located at the bottom of the Monitor Display.

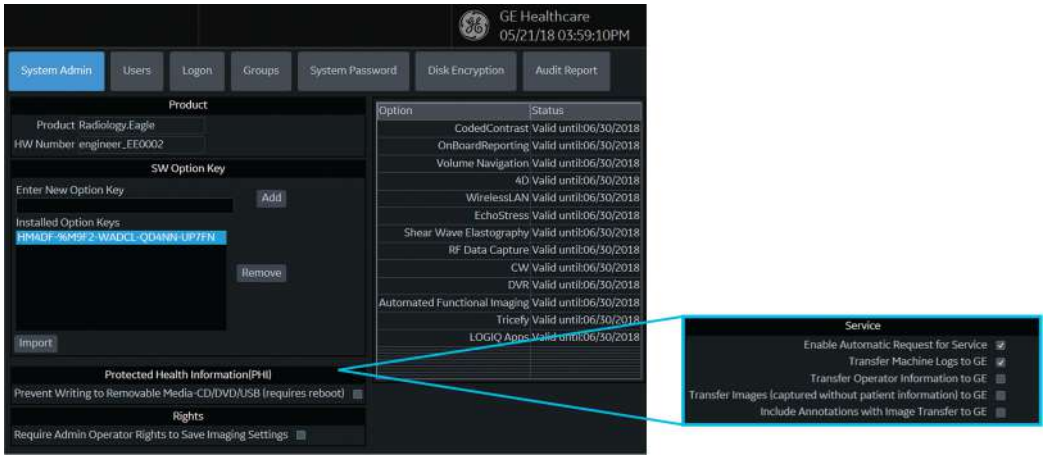


Figure 10-65. Remote Connectivity Deactivated; Service Fields Removed

Table 10-101: 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 10-102: 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 P8/P9/P10. **Please remember to enable this feature to reload software or to install the eIFU USB Media.**

Table 10-103: 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 10-104: 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 10-66. Users Preset Menu

Table 10-105: 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.

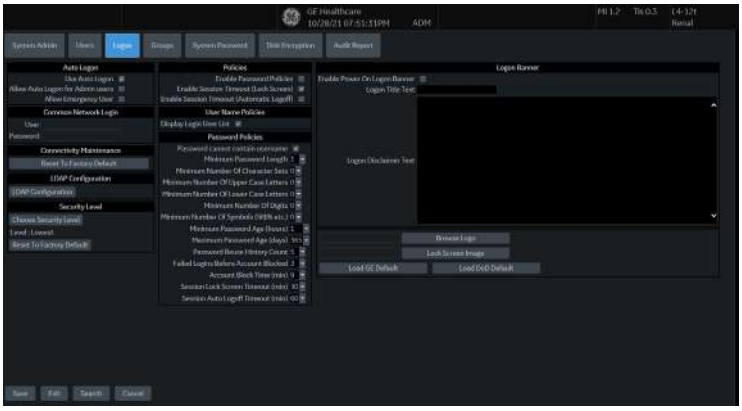


Figure 10-67. Administrative Logon Preset Menu

Table 10-106: Logon

Preset Parameter	Description

Auto Logon	Specifies logon procedures:
	• Use Auto Logon
	  • 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.
	Note: Auto LOGON only works when password policies are disabled and if there is no password assigned to the user.
	• 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	Specifies the user ID and password used to access the network. • 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 10-106: Logon (Continued)

Preset Parameter	Description
Security Baseline	**Choose Security Baseline**. Select a baseline set of security policies for password and session management. For example: **Lowest (default)**: Autologon available. No password complexity rules. **Medium**: Autologon unavailable. Passwords must meet the following criteria: • 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. **High**: Autologon unavailable. Passwords must meet the following criteria: • 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. **Highest**: Autologon unavailable. Passwords must meet the following criteria: • 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. **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.

Table 10-107: 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)	2-step logout: 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.

Table 10-108: User Name Policies

Preset Parameter	Description
Display Login User List	Check this box to display a list of Users.

Table 10-109: 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 polilcy 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.
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.
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.
Session Auto Logoff Timeout (min)	Password policy for the time, in minutes, before the system will automatically log a user off the system.

LDAP Configuration

To enable LDAP authentication, check the “Enable LDAP authentication” box at the top of the LDAP Configuration page.

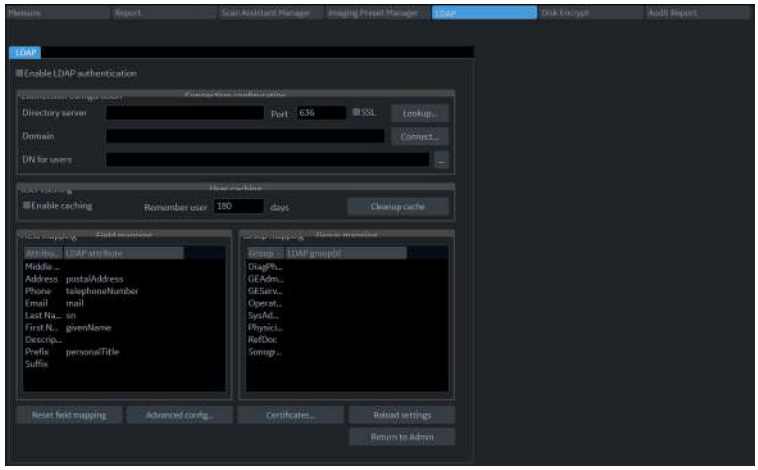


Figure 10-68. LDAP Configuration

Table 10-110: 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 10-110: 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.

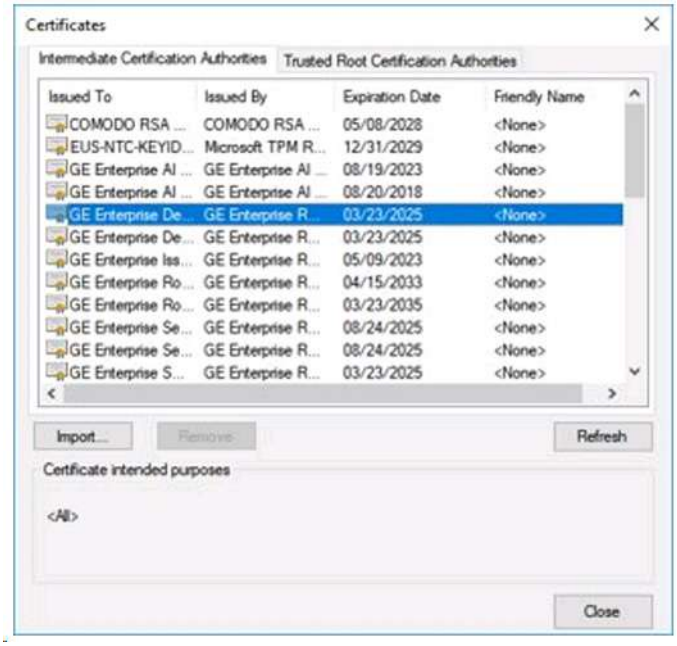


Figure 10-69. Certificate manager

Select the appropriate Certification Authority, then press "Import" to import Certificates or press "Remove" to remove Certificates.

Figure 10-70. Certificate Import Dialog

Advanced LDAP Configuration

Advanced LDAP Configuration Settings can be set on the Advanced LDAP Configuration menu.

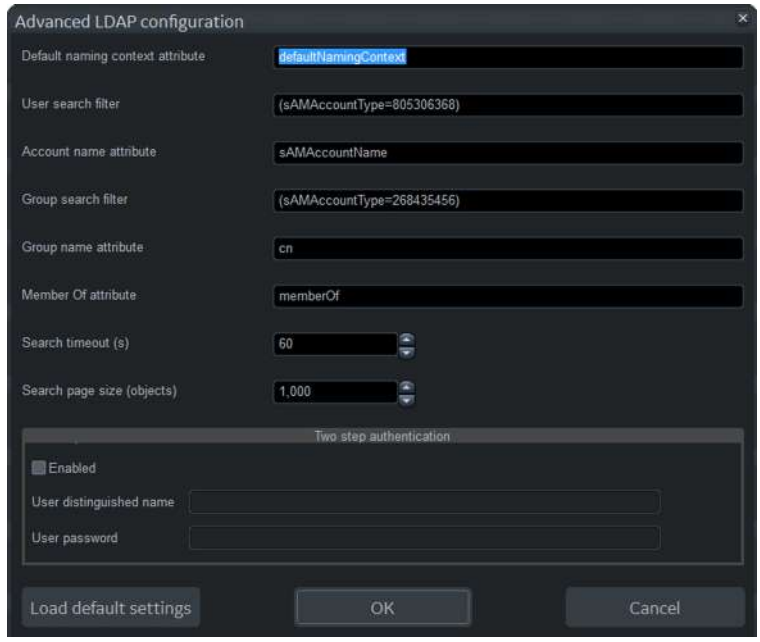


Figure 10-71. Advanced LDAP Configuration

Table 10-111: 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 10-111: 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.

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 P8/P9/P10 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

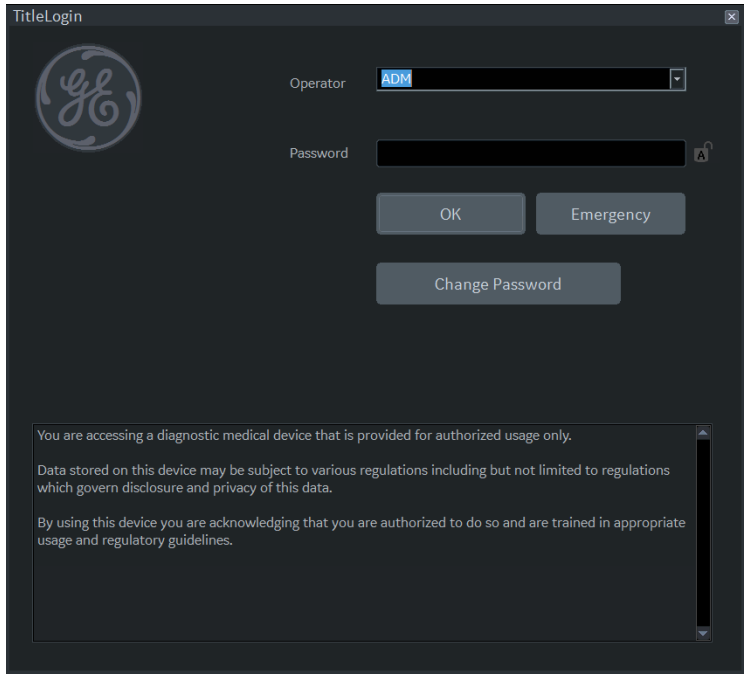
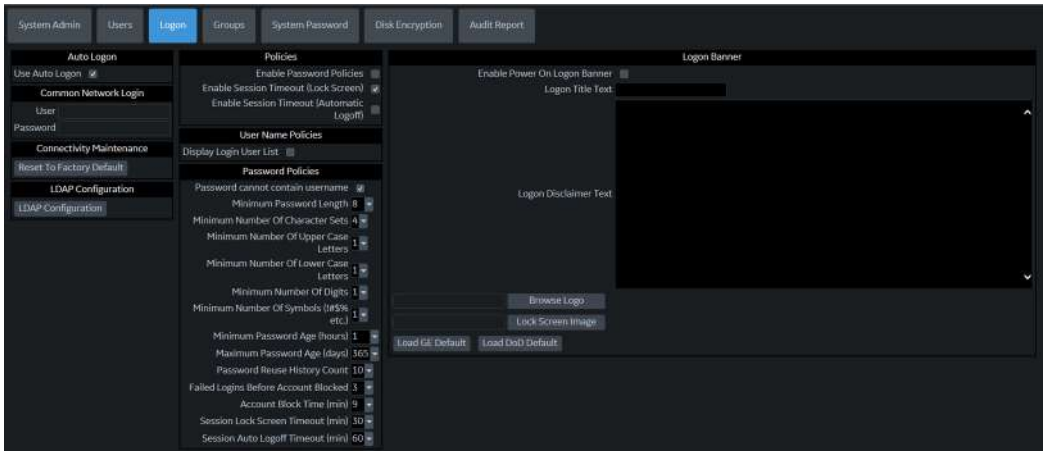


Figure 10-72. GE Default Login Window

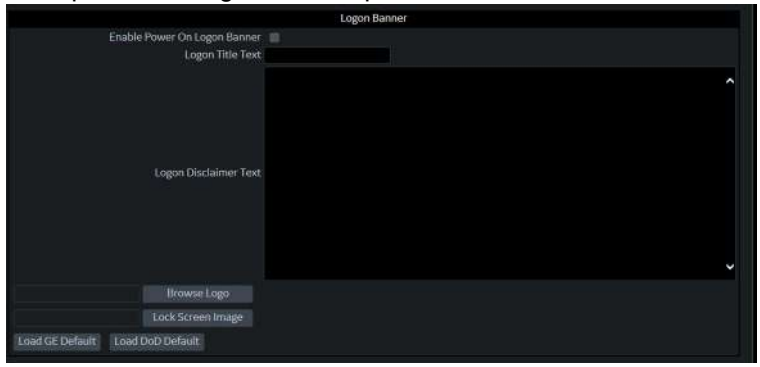
Updating the Logon Banner Page (continued)

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.

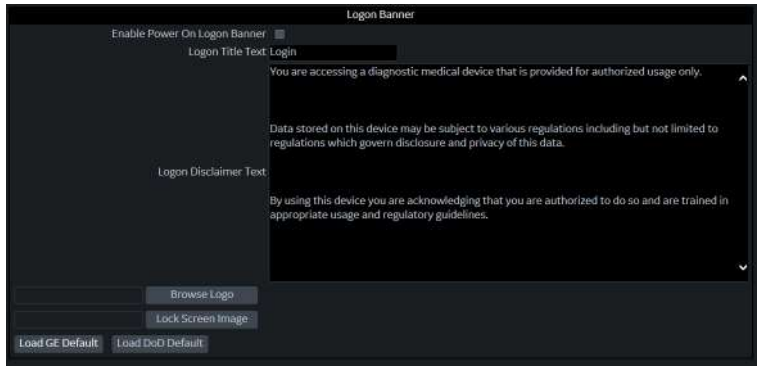


Figure 10-73. Default GE Logon Banner

To set the DoD Default as the Login window, press Load DoD Default. Then press OK-> Save.

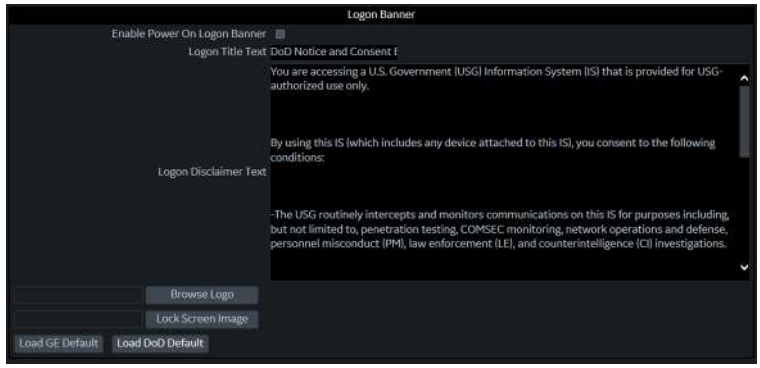


Figure 10-74. Department of Defense Logon Banner

Enabling the Power On Logon Banner

To ensure the Power On Logon Banner displays and requires user confirmation to complete booting the system,

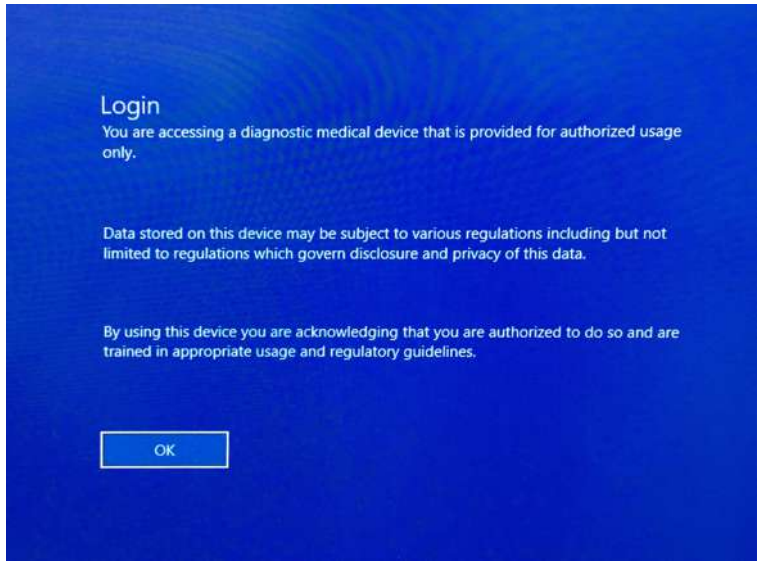


Figure 10-75. Power On Logon Banner

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 P8/P9/P10 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 P8/P9/P10.

   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 P8/P9/P10.
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.

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 10-76. Groups Configuration

Table 10-112: 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
Physician	Login, Create/Update/Delete/Transfer/Export Patient Data, Basic/Imaging Configuration, Authorize Remote Service Access, and Capture Logs

Table 10-112: Group List (Continued)

Preset Parameter	Description
Emergency User	Login, Create/Transfer Patient Data. Only access to the Utility System and Search Tabs.

Table 10-113: Name and Description

Preset Parameter	Description
Id	The Id, from the Group List.
Description	A description of the Group List Id.

Table 10-114: Group Rights

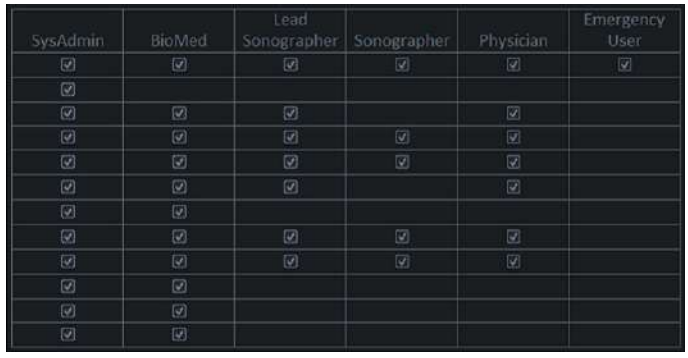
Preset Parameter	Description
Rights assigned to each Group, by default	
Login	Allows users in this group to logon to the system.
Admin	Allows users in this group to have an system administrator's rights. Can add/ remove users and enable/disable encryption, etc.
Delete Patient Data	Allows users in this group to delete patient and exam data.
Export Patient Data	Allows users to export patient and exam data to media.
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.
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.

Table 10-114: Group Rights (Continued)

Preset Parameter	Description
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.

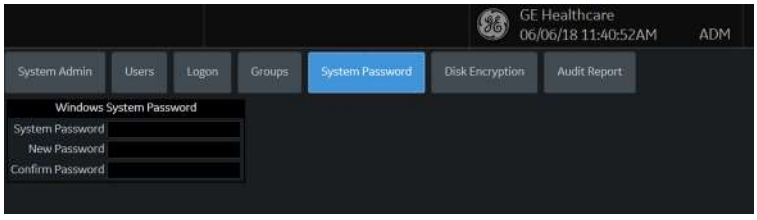
System Password

The System Password is the Windows Password used by the LOGIQ P8/P9/P10 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.

Make sure the system power cable is plugged into external power. **DO NOT** attempt to perform the initial encryption function on battery power.

The security of the system, with respect to user encryption at rest, relies on the user's protection of the recovery key(s) and encryption passwords. If an adversary obtains an encrypted system or its hard-disk together with the recovery key(s) or encryption password, the encryption at rest will have no effect and give no protection of the data.

The selected encryption password and the recovery key(s) must be stored and managed in a safe and secure manner. It is the responsibility of the owner of the system to take care of these keys. If the keys are lost, the patient data stored on the system will be lost. There is no way for GE Healthcare to recover the data if the keys and password are lost.

For those using manual unlock with a recovery key(s) stored on USB rather than a password to regularly unlock the system. It is recommended to remove the USB when the system is not used.

Disk Encryption (continued)

If you've selected "Encryption ON. Key is stored on USB / password is entered manually" encryption, 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.

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.

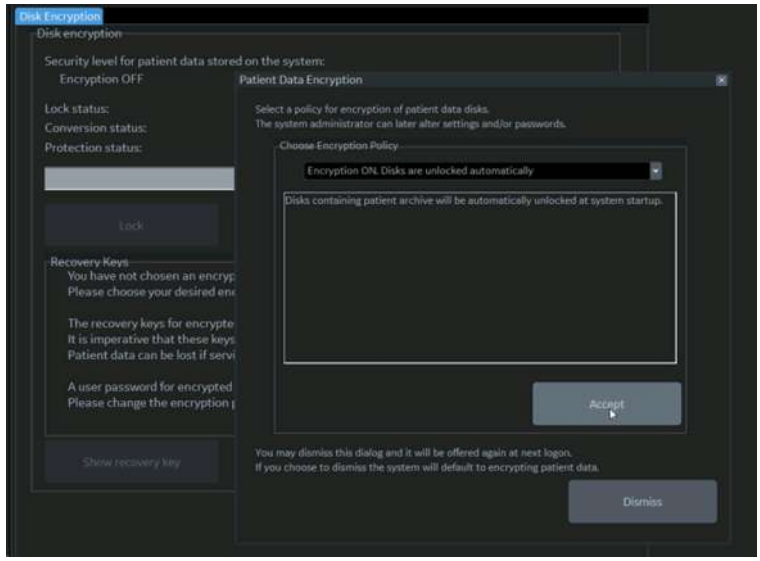


Figure 10-77. Initialize System Encryption

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

Table 10-115: 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. 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.

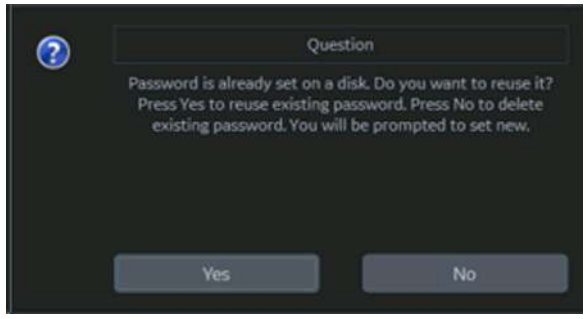
NOTE: If you choose to dismiss this dialog, you will be reminded to continue configuring encryption at each logon.

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: *If you receive this question, reply "No": "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 can now update the encryption password, then press OK.

Disk Encryption (continued)

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

CAUTION

Make sure to keep the password, recovery key, and any backup of these in a secure place, not accessible for any unintended audience.

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

a. 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**.

b. 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.

c. 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 AES (Advanced Encryption Standard) 256 bits supported. https://technet.microsoft.com/en-us/library/cc731549(v=ws.10).aspx

Q The system was accidentally turned off or lost power during the disk encryption process.
A The system will resume encryption automatically when restarted.

Q The USB recovery key was accidentally formatted. How do I access the system?
A If a password was created or the recovery key written down, enter this in the pop up window. Then go to Utility>Admin>Disc Encryption Select **Change recovery key**. Be sure to print and save the new recovery key and store the USB in a secure location.

Q Is it possible to stop encrypting the data?
A Yes, via Utility>Admin>Disk encryption, choose Encryption, and select the “Encryption Off” from the pull-down menu. The process to unencrypt may take up to 15 minutes.

Disk Encryption Frequently Asked Questions (continued)

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 the proper user rights and/or 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, and only if you have selected manual unlock.

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 Only if “Disks unlocked manually” has been selected as the Encryption Policy. In this case the recovery key or password must be entered each time the system is turned on. If a USB with Recovery key is connected 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 If manual unlocking is used, the system cannot be operated without the password or recovery key.

Audit Report and System Log Server Configuration

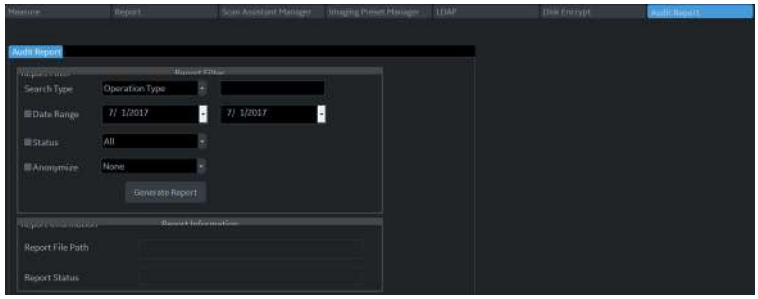


Figure 10-78. Audit Report

Table 10-116: 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)

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 P8/P9/P10 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 sytsem's data in the customer's data center -- It's like a DICOM connection page, but connects logs to a central location.

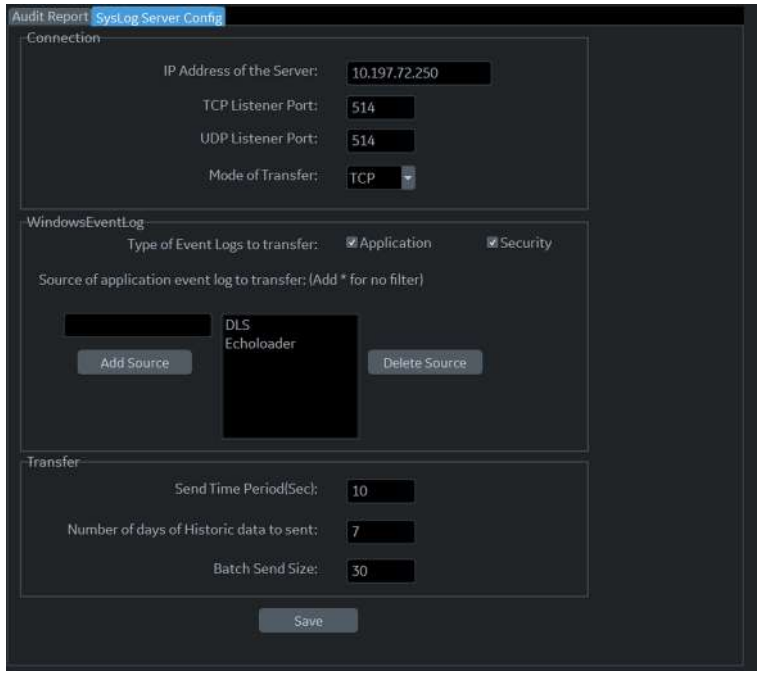


Figure 10-79. System Log Server Configuration

Table 10-117: Audit Report

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 10-117: Audit Report (Continued)

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	• Application Logs • Security Logs
Source of application event log to transfer: (Add * for no filter)	• 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?
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.

Vulnerability Scan Mode (Option)

Please refer to the Advanced Security Option in Chapter 13.

Search

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'.

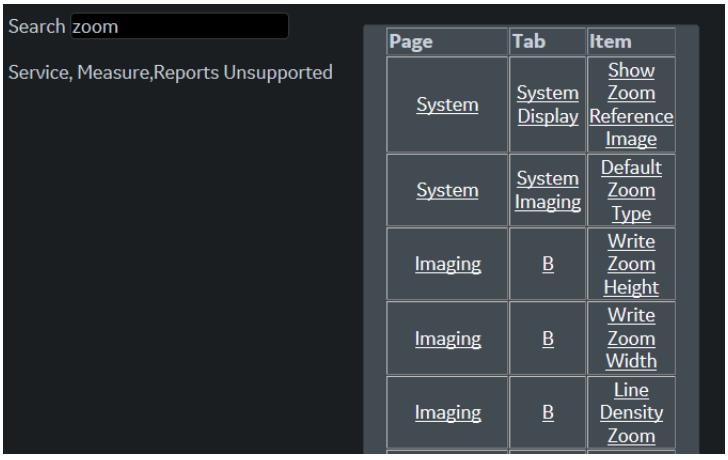


Figure 10-80. Search Example

3. A list of possible matches appears to the right. Select the correct match.

NOTE: You cannot perform a search on the Measure, Reports or Service utility pages.

Measure

Please refer to Chapter 7, General Measurements and Calculations for more information on setting up Measurement and Analysis Presets.

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 P8/P9/P10 systems
  - Export User Presets
  - Import User Presets

Creating a User-Defined Application Preset

To create a User-Defined Application Preset,

1. From the Touch Panel, select the active probe icon. The Model Touch Panel appears:

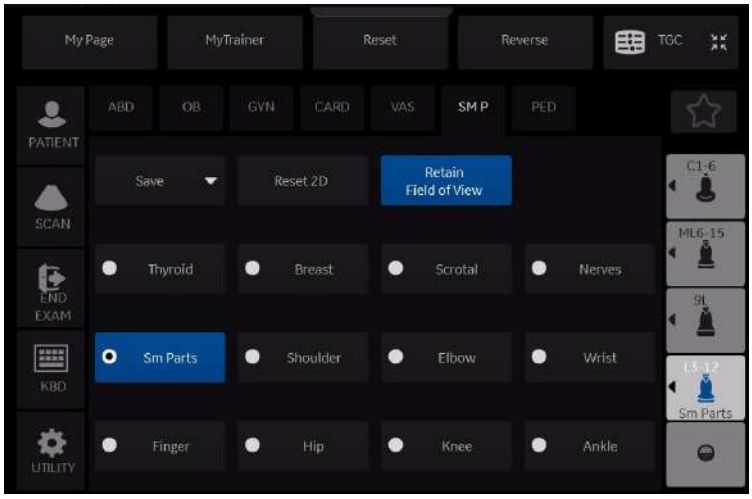


Figure 10-81. Model Touch Panel

2. Select the ***Model*** and ***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.

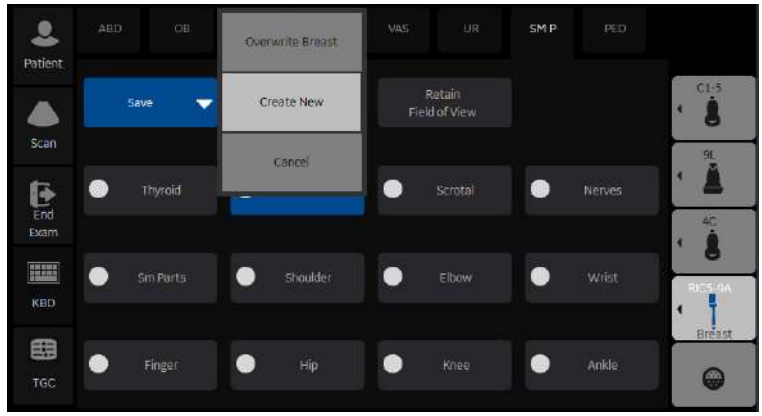


Figure 10-82. Create New User Pop-up Menu

Creating a User-Defined Application Preset (continued)

4. Select ***Create New***. The Create New Application menu appears.

   Type the name of the new application. Select ***Create*** OR press ***Cancel*** if you do not wish to proceed.

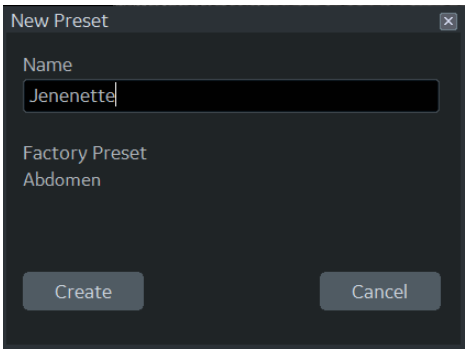


Figure 10-83. Create New Preset

NOTE: The new user application is based upon the current exam model 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.

Creating a User-Defined Application Preset (continued)

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 (Jeannette) + [Thyroid], the name of the application upon which it was based.

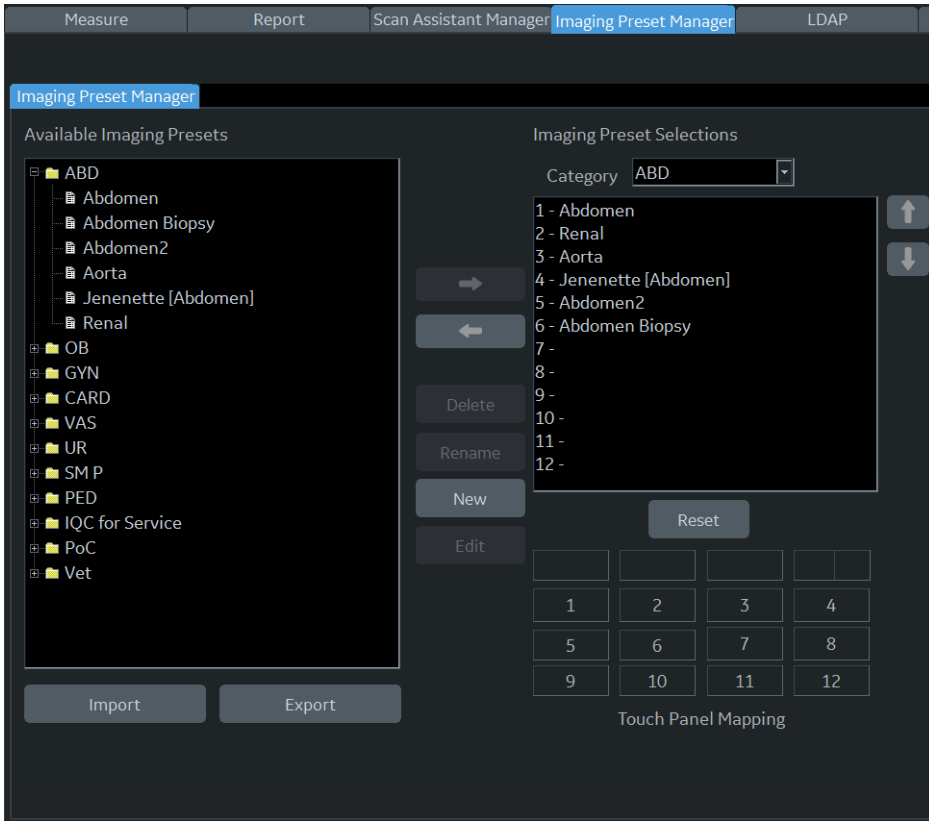


Figure 10-84. Imaging Preset Manager

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 active probe icon 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 ***Model***.
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.

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.

NOTE: In the example above, the new user preset (Jeannette [Thyroid]) appears directly below Thyroid on the Touch Panel in the #5 position).

Each control on the Touch Panel aligns with the numbers below. The Touch Panel has 12 controls that can be controlled by the user. In the example below, "1-Thyroid" would appear where the number "1" is on the Touch Panel Mapping grid. "2-Breast" would appear where the number "2" is on the Touch Panel Mapping grid. And so on. These applications can be positioned by you.

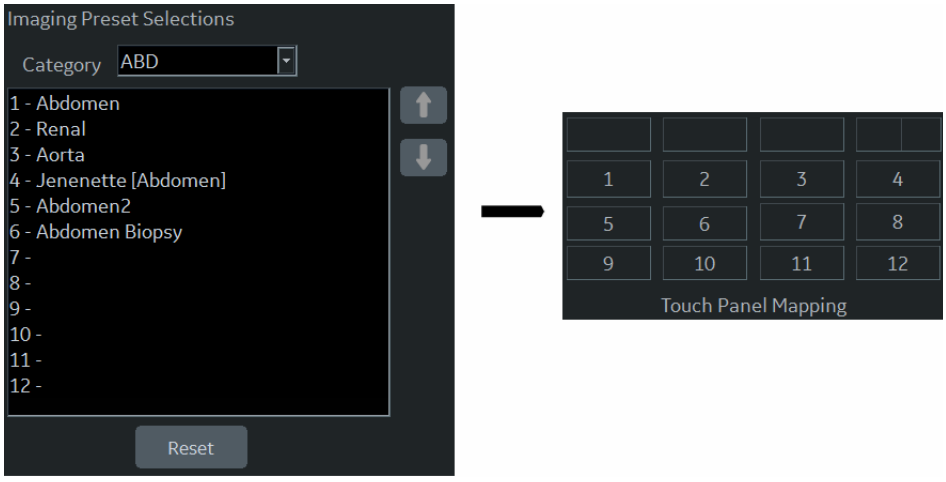


Figure 10-85. Mapping Touch Panel keys

Arranging Presets on the Touch Panel (continued)

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 Imaging Preset you want to move from the Imaging Preset Selection Column.
2. Use the up/down arrow on the right side of the screen to move the preset to a position, next to the new map number

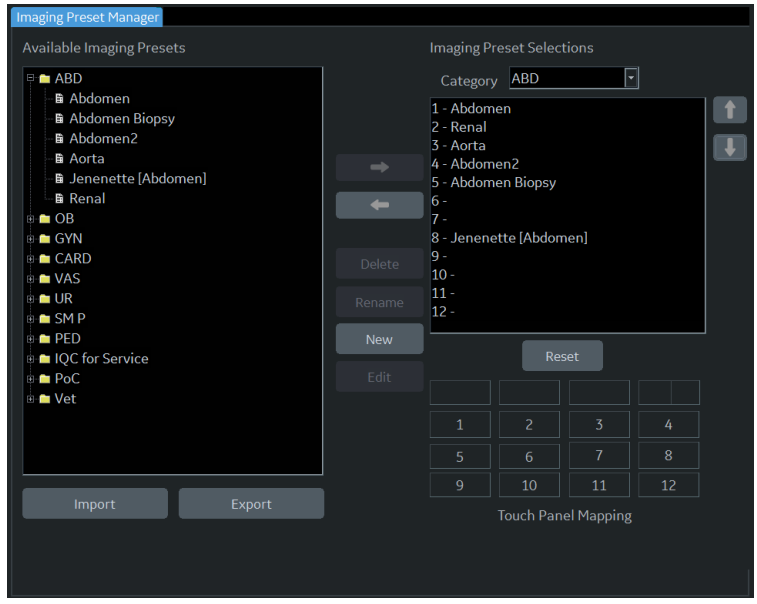


Figure 10-86. Adjusting the position of the Preset

Arranging Presets on the Touch Panel (continued)

In the example below, the “Jeannette [Thyroid]) preset has been moved to the 9th position on the Touch Panel grid.

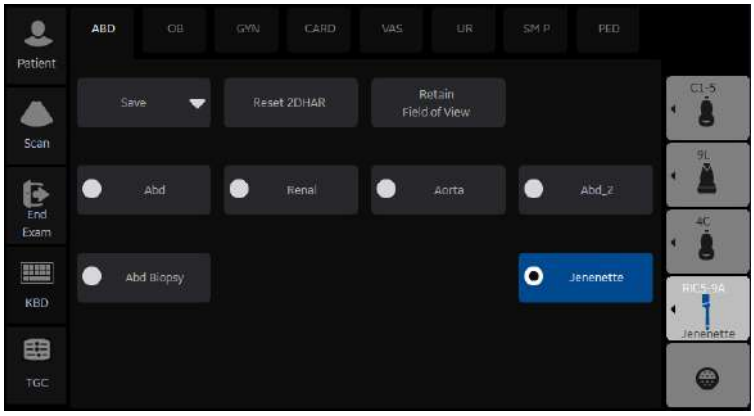


Figure 10-87. Repositioned User Preset

Sharing User Presets between LOGIQ P8/P9/P10 Systems

You can share the user presets you have created between LOGIQ P8/P9/P10 systems by exporting/importing the preset(s) you want to share.

To move a user preset from one LOGIQ P8/P9/P10 to another LOGIQ P8/P9/P10 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.

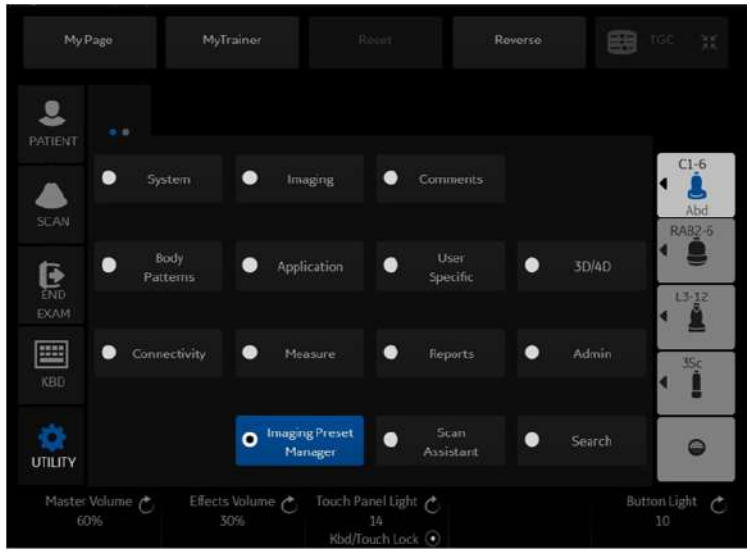


Figure 10-88. Imaging Preset Manager Location on the Utility Touch Panel

2. Insert the media.

Exporting User Presets (continued)

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

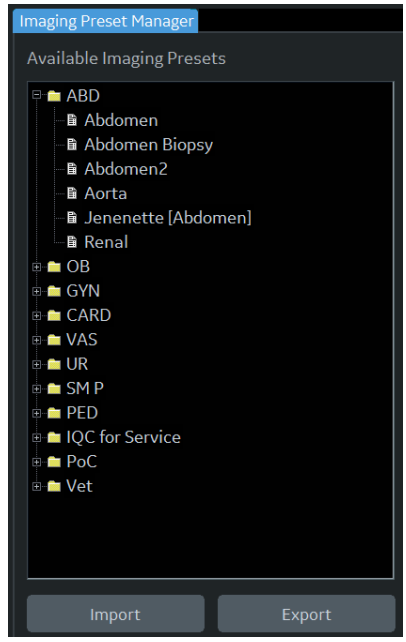


Figure 10-89. Exporting a User Preset

Exporting User Presets (continued)

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

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

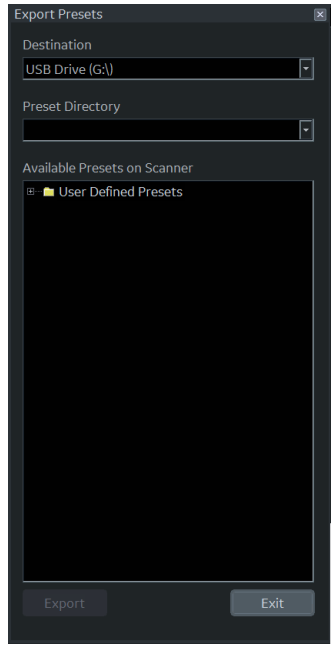


Figure 10-90. Export Presets

5. Select the User Defined Presets under Available presets on Scanner and press Export.
6. Upon a successful Export, an informational message will pop-up indicating that “1 preset successfully exported.” Press Ok. Then press Exit to close the Export Presets pop-up menu.
7. Press F3 to Eject the media. Take the media to the other LOGIQ P8/P9/P10 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 P8/P9/P10, 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.

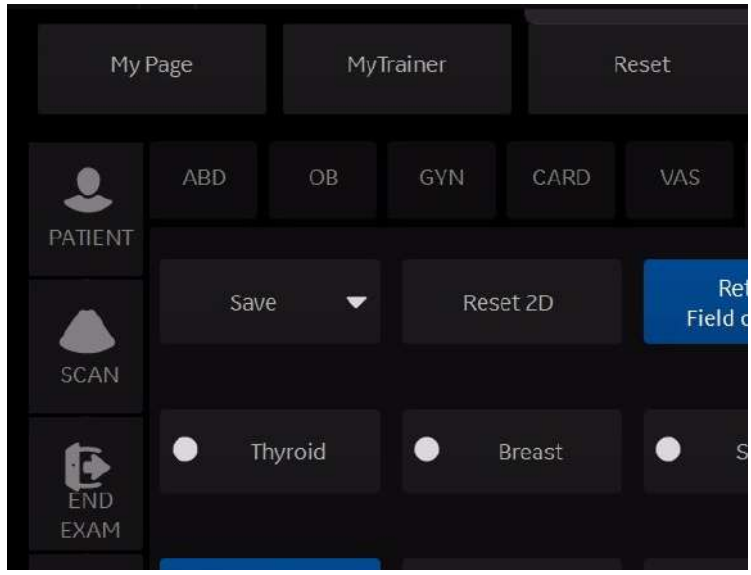


Figure 10-91. Model Touch Panel

Table 10-118: 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

MyPreset

Overview

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

The MyPreset allows you to:

- Arrange and edit presets on the Touch Panel

Activating MyPreset

1. From the Touch Panel, select the active probe icon.
   The star icon appears at the top left of the touch panel:

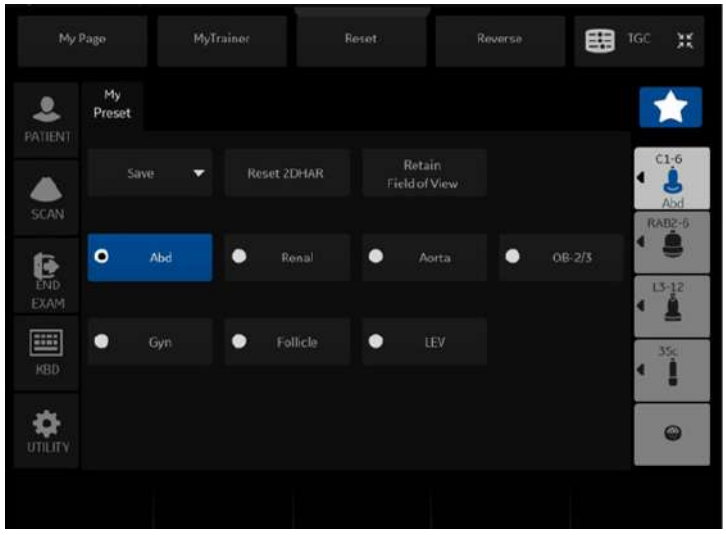


Figure 10-92. MyPreset button on touch panel

2. Select the MyPreset button(star icon). Display the MyPreset page on touch panel.

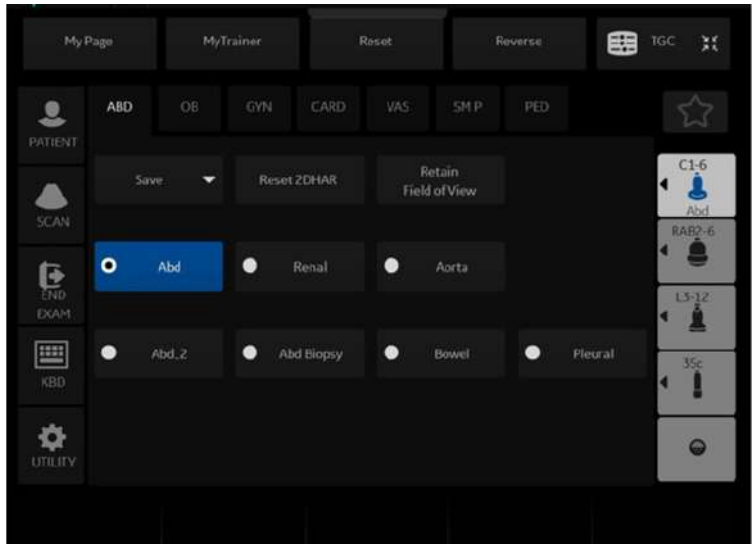


Figure 10-93. MyPreset page

Arranging MyPreset

On this screen, you specify where you want the new user (and existing) presets to appear on the exam's Touch Panel screen according to probe.

For information about the specific MyPreset manager in utility, refer to "Imaging Preset manager"

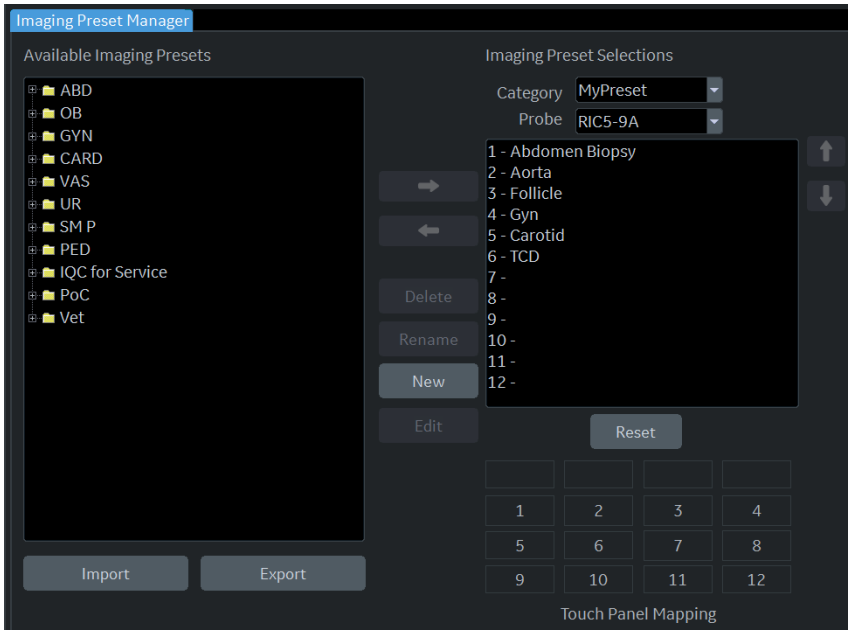


Figure 10-94. MyPreset mapping touch panel keys

Service

Press Service to activate the Service browser interface.

Scan Screen

For more information, see the Wide Monitor section of Chapter 3.

Test Patterns

Overview

There are different test patterns available: Gray Bars, Color Bars, Resolution, Text, Angularity, Brightness Calibration, White, Gray, Red, Green, Blue and Pixel test patterns.

Pixel Test Patterns

Pixel patterns should appear to be a uniform color rectangle on the Blue/Yellow (B/Y and Y/B), Cyan/Red (C/R and R/C), Green/Magenta (G/M and M/G) and Black/White (K/W and W/K). If an area of the screen appears to have a dark or light grouping of pixels, first clean the screen to ensure that gel or dust is not causing an optical defect. If a pixel is defective, contact your Service Representative.

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

Cable handling

Take the following precautions with probe cables:

- Keep free from wheels
- Do not bend the cable acutely
- Avoid crossing cables between probes.

Probe Orientation

Each probe is provided with an orientation marking. This mark is used to identify the end of the probe corresponding to the side of the image having the orientation mark on the display.

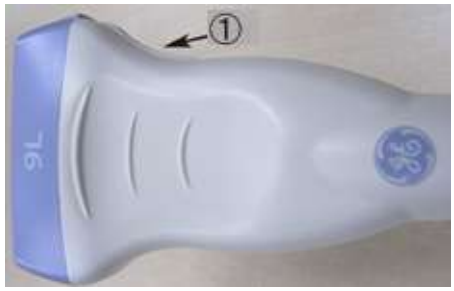


Figure 11-1. Orientation Marking on Probe (Example)

1. Notch

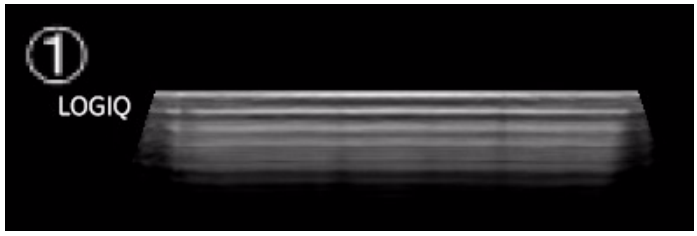


Figure 11-2. Probe orientation marker on the display

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,” “MD symbol” and “XDclear^{TM}” which only appears on applicable probes.

Figure 11-3. Probe Label (Example)

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

Supported probes

The LOGIQ P8/P9/P10 supports the following types of probes:

- Sector Phased Array
- Linear Array
- Convex Array
- Micro convex Array
- Matrix Array
- Split Crystal
- Volume probe (4D)
  - Convex Array
  - Micro Convex Array
  - Linear Array

NOTE: Not all probes described in this document may be available or cleared for sale in all markets.

Probe Naming Conventions

Table 11-1: Probe Naming Convention

Type	Application	Frequency	Connector Type
C=Convex L=Linear M=Matrix S=Sector R=Real time 4D	AB=Abdominal IC=Intracavitary NA=Neonatal SP=Small Parts	“1-5”	RS D=DLP

Composition (for E7C8L-RS only)

1. Probe body, including:
   - Probe body
   - Cable
   - Connector
2. Probe Care Card
3. Carrying Case

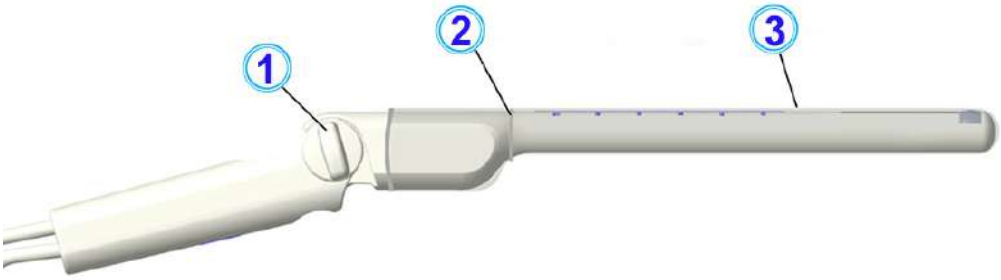


Figure 11-4. E7C8L-RS Illustration

1. Knob
2. Twist lock
3. Sterile/Sanitary Outer Sheath

Probe Description

Table 11-2: Probe Description

Probe	Illustration	Application	Feature
C1-5-RS		Abdomen (incl. Pleural), Vascular (No transcranial), OB/GYN, Urology	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Contrast, Elastography, Shearwave Elastography, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
8C-RS		Pediatrics, Neonatal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, B Steer+
E8C-RS		OB/GYN, Urology, Transvaginal, Transrectal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy
E8CS-RS		OB/GYN (Transvaginal), Urology (Transrectal)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam,LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Elastography, Biopsy
IC9-RS		OB/GYN, Urology, (Transvaginal, Transrectal)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam,LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Elastography, Shearwave Elastography, Biopsy, Contrast, Max Angle

Table 11-2: Probe Description (Continued)

Probe	Illustration	Application	Feature
BE9CS-RS		Urology (Transrectal)	B, CHI, CF, PDI, B-Flow, B-Flow Color, M, Anatomical M, PW, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Elastography, Contrast Biopsy
ML6-15- RS		Small Parts, Vascular (No transcranial), Pediatric, Neonatal, Musculoskeletal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Shearwave Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
L3-12-RS		Abdomen (incl. Pleural), Vascular (No transcranial), Small Parts, Pediatric, Neonatal, Breast, Musculoskeletal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+, Shear Wave Elastography
L4-12t-RS		Abdomen (incl. Pleural), Small Parts, Vascular (No transcranial), Pediatric, Neonatal, Musculoskeletal, Breast	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
12L-RS		Small Parts, Vascular (No transcranial), Pediatric, Neonatal, Musculoskeletal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Shearwave Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
L6-12-RS		Abdomen (incl. Pleural), Vascular (No transcranial), Small Parts, Pediatric, Neonatal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced3D, Biopsy, B Steer+

Table 11-2: Probe Description (Continued)

Probe	Illustration	Application	Feature
9L-RS		Abdomen (incl. Pleural), Small Parts, Vascular (No transcranial), Pediatric	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
L10-22-RS (LP10/LP9 only)		Small Parts, Musculoskeletal, Neonatal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Virtual Convex,CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D
L8-18i-RS		Small Parts, Vascular (No transcranial), Neonatal, Pediatrics, Intraoperative (Not for China) Musculoskeletal, Peripheral Vascular	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D
3Sc-RS		Cardiac, Abdomen (incl. Pleural), Transcranial	B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ASO, CTO, Stress Echo, SRI-HD, Advanced 3D, Biopsy, Contrast, PDI
6S-RS		Cardiac, Pediatrics, Neonatal	B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced3D

Table 11-2: Probe Description (Continued)

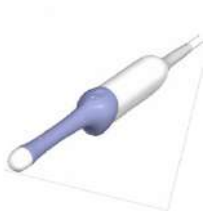
Probe	Illustration	Application	Feature
12S-RS		Pediatrics, Neonatal	B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced3D
RAB2-6- RS		Abdomen, OB/GYN, Urology	B, CHI, CF, PDI, M, PW, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, 3D/4D real-time imaging, Biopsy, Advanced 3D, B Steer+
RIC5-9A-RS		OB/GYN (Transvaginal), Urology (Transrectal)	B, CHI, CF, PDI, M, PW, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced3D, 3D/4D, Biopsy, Max Angle
P8D		Cardiac, Vascular (No transcranial)	CW, ASO
P6D		Cardiac, Vascular (No transcranial)	CW, ASO
P2D		Cardiac, Vascular (No transcranial)	CW, ASO
L3-9i-RS (LP10/LP9 only)		Small Parts, Vascular, Musculoskeletal, Intraoperatives (Not for China)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Virtual Convex,CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D

Table 11-2: Probe Description (Continued)

Probe	Illustration	Application	Feature
6Tc-RS		Cardiac (Transesophageal)	B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D Note: 6Tc-RS probe requires special handling. Refer to the TEE Probe User Manual enclosed with 6Tc-RS probe.
C1-6-D (LP10/LP9 only)		Abdomen (incl. Pleural), OB, Gynecology, Vascular (No transcranial), Urology	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Contrast, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Elastography, Shearwave Elastography, Biopsy, B Steer+, UGAP
C2-7-D		Abdomen (incl. Pleural)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Contrast, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, B Steer+
C3-10-D (LP10 only)		Abdomen (incl. Pleural), Neonatal, Pediatric, Vascular (No transcranial)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, B Steer+

Table 11-2: Probe Description (Continued)

Probe	Illustration	Application	Feature
10C-D		Neonatal, Pediatric, Vascular, (No transcranial)	B, CHI, CF, PDI, M, PW, B-FLow, B-Flow Color, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, B Steer+
M5Sc-RS (LP10 only)		Cardiac, Transcranial, Abdomen (incl. Pleural)	B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Contrast, Virtual Convex, LOGIQView, ATO/ASO, CTO, Stress Echo, SRI-HD, Advanced 3D, Biopsy
E7C8L-RS (-C: Convex Transducer & -L: Linear Transducer)		Urology (Transrectal)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Contrast, B Steer+(only E7C8L-L),Max Angle(only E7C8L-C), Biopsy, Virtual Convex (only E7C8L-L)

BE9CS-RS Probe Changing Scan Method

Changing scan methods between two micro-convex. Press the switch on the BE9CS-RS probe.

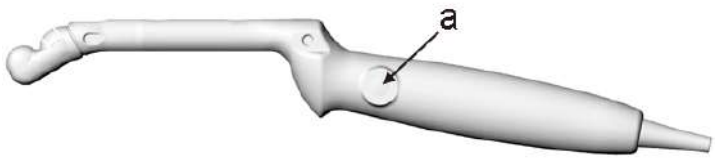


Figure 11-5. Switching button

a. Switching button

Figure 11-6. Scan plane orientation

E7C8L-RS Operation

WARNING

Inspect probe for damage or cracks prior to each use. A damaged probe may cause an electrically hazardous condition when coupled to the human body. DO NOT use any probe with damaged lens to scan a patient.

Further more, a damaged probe will not produce a desirable image.

Inspecting before each use or the operation

1. Make a visual inspection of the probe before each use for damage or degradation to the housing, strain relief, lens and seal.
2. Check all surfaces of the probe, especially the patient contact area, to ensure that there are no rough or sharp edges that could damage the sheath or patient tissue.

Tilting the grip

Figure 11-7. Grip adjustment

1. Loosen the screw by turning the knob on the probe body counterclockwise.
2. Set the grip to the desired angle and securely tighten the screw by turning the knob clockwise.

CAUTION

If there is an attempt to tilt the grip or change the grip angle after the sterile sheath is placed on the probe, the sterile sheath may break if it gets caught in the grip. To avoid this, be sure to tilt the grip before putting on the sterile sheath.

E7C8L-RS Operation (continued)

System Preparation

Connect the two E7C8L-RS probe connectors to the Ultrasound system's probe ports (refer to LOGIQ P8/P9/P10 User Guide). Before inserting the connector into the probe port, inspect the probe connector pin. If the pin is bent, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative.

NOTE: Sterile/sanitary sheaths are to be used on the probe during its actual use with patients. Wearing gloves protects the patient and operator.

Patient Preparation for Transrectal Imaging

1. Prepare the patient. An enema is recommended one hour before the exam.
2. Transaxial imaging is best performed with the patient in the supine position.

Change Scan Method

Change scan methods between convex and linear as follows:

- Select probe from touch panel that corresponds to the probe port used.

The split-screen 2D mode display format may be useful as well. See the User Guide of LOGIQ P8/P9/P10.

E7C8L-RS Operation (continued)

Patient Scan

1. Scan the patient. The probe handle orientation mark indicates the image scan plane.
2. If necessary, when the probe is in position, attach it to the mechanical stepping device.

   Steps for attaching probe to stepper:

   a. Place the probe into clamp.

   b. Tighten the probe clamp.

   c. Attach the needle placement guide.

   d. Align the probe to the needle placement guide.

Ensure that the arrow at the bottom center of the Needle Placement Guide accurately aligns to the center line marked on the probe shaft.

Failure to do so will cause the needle placement not to match the ultrasound display.

3. If a needle placement is to be performed, display the needle placement grid on the image screen.

Before needle insertion, scan the patient to determine the correct puncture depth and site.

Only the sterile/sanitary sheath, rubber band or twist lock and finger cot with rubber band are on the E7C8L-RS probe during the pre-needle placement scanning.

Patient Scan (continued)

4. When the examination is over:
   a. Carefully remove the probe.
   b. Remove the twist lock. Remove and discard the sheath.
   c. Thoroughly clean and disinfect the probe and equipment. Return the probe to its box.

Figure 11-8. Scan Plane Orientation Transaxial View

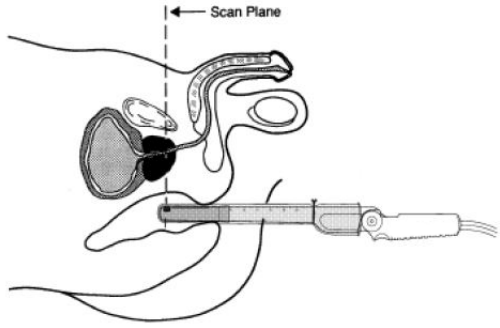


Figure 11-9. Transrectal Image Orientation Axial View

Probe Safety

Probe handling and infection control

This information is intended to increase user awareness of the risks of disease transmission associated with using this equipment and provide guidance in making decisions directly affecting the safety of the patient as well as the equipment user.

Diagnostic ultrasound systems utilize ultrasound energy that must be coupled to the patient by direct physical contact. Depending on the type of examination, this contact occurs with a variety of tissues ranging from intact skin in a routine exam to recirculating blood in a surgical procedure. The level of risk of infection varies greatly with the type of contact.

One of the most effective ways to prevent transmission between patients is with single use or disposable devices. However, ultrasound transducers are complex and expensive devices that must be reused between patients. It is very important, therefore, to minimize the risk of disease transmission by using barriers and through proper processing between patients.

CAUTION

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.

CAUTION

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.

Using protective sheaths

Probe sheaths are disposable and must not be reused.

Protective barriers may be required to minimize disease transmission. Probe sheaths are available for use with all clinical situations where infection is a concern.

Always use a legally marketed, sterile probe sheaths for intra-cavitary and intra-operative procedures.

For neurological intra-operative procedures, use of a legally marketed, sterile, pyrogen free probe sheath is REQUIRED.

Devices containing latex may cause severe allergic reaction in latex sensitive individuals. Refer to FDA's March 29, 1991 Medical Alert on latex products.

DO NOT use an expired probe sheath. Before using probe sheaths, verify whether the term of validity has expired.

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.

Using protective sheaths (continued)

Handling precautions

WARNING

Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. DO NOT use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

WARNING

Ultrasound transducers can easily be damaged by improper handling and by contact with certain chemicals. Failure to follow these precautions can result in serious injury and equipment damage.

- Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector and the adapter into any liquid.
- Avoid mechanical shock or impact to the transducer and do not apply excessive bending or pulling force to the cable.
- Transducer damage can result from contact with inappropriate coupling or cleaning agents:
  - Do not soak or saturate transducers with solutions containing alcohol, bleach, ammonium chloride compounds or hydrogen peroxide
  - Avoid contact with solutions or coupling gels containing mineral oil or lanolin
  - Avoid temperatures above 60°C.

CAUTION

Probes for transvaginal and transrectal applications require special handling. Transvaginal/transrectal examinations and probe insertions should be performed only by personnel with adequate training.

Transesophageal probe safety

Never use excessive force when manipulating the transesophageal probe. The detailed operator manual enclosed with the transesophageal probe must be read carefully.

Transesophageal probes require special handling. Refer to the user documentation enclosed with these probes.

TEE probes should always be used with an appropriate Bite Guard in place.

Mechanical hazards

A defective probe or excessive force can cause patient injury or probe damage:

- Observe depth markings and do not apply excessive force when inserting or manipulating intercavitary probes.
- Inspect probes for sharp edges or rough surfaces that could injure sensitive tissue.
- DO NOT apply excessive force to the probe connector when inserting into the probe port.

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.
- **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.

6Tc-RS Probe Thermal Safety

Maintaining a safe thermal environment for the patient has been a design priority at GE. In order to avoid damage to body tissues, for long term exposures, tissue contact probe tip temperatures should be less than 42-43 degrees C. The ultrasound scanner incorporates an elaborate thermal safety system which informs the physician of the operating temperature of the probe, and prevents the operative temperature from exceeding given limits. Whenever the 6Tc-RS Probe is plugged into the system and selected, the probe tip temperature is displayed on the system monitor.

If the temperature sensor is not working properly when you plug the probe into the system, the probe will not be accepted and scanning will not be possible.

The lower limits of the temperature observation of the system is 29 degrees C.

NOTE: The system displays “29” on the title bar even if the temperature of the probe tip becomes less than 29 degrees C.

High temperature protection levels

The temperature is always displayed on the system monitor. The system has two levels of upper thermal limit: the first high limit is set at 41.0 degrees C, and the second high limit is set at 42.7 degrees C. If the temperature of the probe tip reaches 41.0 degrees C, the temperature display turns red, the system enters freeze mode, and a warning appears on the monitor, asking the user if he/she wishes to continue scanning up to a higher temperature limit. If the response is OK, the scanner will resume scanning. If he/she selects Cancel, or no response is given, the system will remain in Freeze mode. If the temperature reaches 42.7 degrees C, the system will freeze unconditionally. The user will not be allowed to start scanning until the temperature has decreased 0.5 degrees C below the limit where the system entered Freeze mode. To restart scanning, the user must press the Freeze button.

NOTE: If you receive a system error message while scanning with the 6Tc-RS TEE probe, discontinue scanning with this probe immediately -- the temperature exceeds normal operating conditions. Remove the probe from patient contact until the system no longer reports the overheating message. If the system continues to report an overheating message, contact Service. Refer to the TEE Probe User Manual for more information.

Endocavitary probe safety

If the sterilization solution comes out of the endocavitary probe, please follow the cautions below.

WARNING

Sterile/sanitary sheaths are to be used on the probe during its actual use with patients. Wearing gloves protects the patient and operator.

CAUTION

Sterilant Exposure to Patient (e.g., Cidex)-Contact with a sterilant to the patient's skin or mucous membrane may cause an inflammation. If this happens, refer to the sterilant's instruction manual. Sterilant Exposure from Probe Handle/ Connector to Patient (e.g., Cidex)-DO NOT allow the sterilant 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 sterilant comes into contact with the patient, refer to the sterilant's instruction manual. Endocavitary Probe Point of Contact-Refer to the sterilant's instruction manual.

Special Reprocessing Instructions for E7C8L-RS

To properly disinfect the E7C8L-RS probe, the probe handle can be disassembled and reassembled so that the entire probe and handle can be immersed in the germicide solution. Allow the germicide to remain in contact with the fully immersed probe, for high level disinfection, according to the germicide manufacturer's recommended time. To remove all germicide residue, final rinsing should be done following the germicide manufacturer's instructions. Remove excess water by shaking and allow to air dry.

Disassemble the probe handles

1. Turn the probe knob counterclockwise until the pin can be removed, refer to Figure 11-10.

Figure 11-10. Remove the knob

Disassemble the probe handles (continued)

2. Grasp the probe and slide the left piece (the one with GE Logo) towards the arrow direction to separate the two handle pieces, refer to Figure 11-11.

NOTE: The indicated direction of the arrows on the handles are only for disassemble process; to reassemble the handles, follow the opposite direction.

Figure 11-11. Separate the two handle pieces

Special Reprocessing Instructions for E7C8L-RS (continued)

Reassemble the probe handles

1. Align the probe with the right handle piece (the one without GE logo), refer to Figure 11-12.

NOTE: *Ensure the probe cables are well positioned to allow the mating piece to be slided in.*

Figure 11-12. Reassemble the probe right handle

2. Place the left handle piece on the right handle piece and slide to lock, refer to Figure 11-13.

Figure 11-13. Reassemble the probe left handle

Reassemble the probe handles (continued)

3. Insert the knob and tighten it clockwise till it is well locked, refer to Figure 11-14.

Figure 11-14. Reassemble the probe lock

Special Reprocessing Instructions for E7C8L-RS (continued)

Instruction for reprocessing the probe

1. Disassemble the probe handles, refer to ‘Disassemble the probe handles’ on *page 11-25*.
2. Dispense and RTU cleaning wipe from the wipe canister and wipe the entire probe, handle piece and locking nut. Wrap a wipe around a soft nylon bristle brush to clean the positioning teeth on the handle and probe body.
3. Use a round, soft bristle brush wrapped in a cleaning wipe to clean the through hole on the probe and handle.
4. Ensure the probe remains exposed the cleaning solution for at least the minimum contact time listed on the enzymatic cleaner label.
5. Rinse under running water for at least 2 minutes or until no visible cleaner residue has been removed.
6. Visually inspect the device in a well-lit area to ensure all surfaces are free from residual cleaning solution. Repeat Step 5 if visible cleaning solution is observed.
7. Thoroughly dry the probe using a clean lint-free soft and dry cloth or wipe. Do not use abrasive paper products.
8. Visually inspect the probe for any remaining soil and, if necessary repeat Steps 2 through 5 until probe is visibly clean.
9. Put on a clean set of gloves.
10. Prepare a basin with High-level disinfectant per manufacturer’s disinfectant instructions.
11. Immerse probe, handle and knob in the disinfectant. Ensure the probe is submerged past the cable strain reliefs and ensure no air bubbles are trapped. Ensure the probe remains in the disinfectant for at least the minimum contact time listed in manufacturer’s disinfectant instructions for use.
12. Thoroughly rinse the probe, handle and knob using running water for at least 2 minutes.
13. Reassemble the probe handles, refer to ‘Reassemble the probe handles’ on *page 11-27*.

Care and Maintenance

Planned maintenance

CAUTION

Improper handling can lead to early probe failure and electric shock hazards.

DO follow the specific cleaning and disinfection procedures provided in this chapter and the germicide manufacturers instructions.

Failure to do so will void probe warranty.

The following maintenance schedule is suggested for the system and probes to ensure optimum operation and safety.

It is recommended to keep a maintenance log and note all probe malfunctions, along with a picture of any probe malfunction.

Table 11-3: Planned Maintenance Program

Do the Following	Before Each Use	After Each Use	As Necessary
Inspect the Probes	X	X	X
Clean the Probes		X	X
Disinfect Probes		X	

Care and Handling

The following recommentions help to reduce preventable probe damage.

Failure to follow these precautions can result in serious injury and/or equipment damage.

NOTE: Sporadically, silicone grease can leak in small amounts from 3D/4D probes' cable bushing. This leakage is not a failure or harmful to the human body, Silicone grease does not contain any hazardous substances and is only used to seal the cable bushing. In case of a leakage wipe the grease with a cloth.

Table 11-4: 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 failulre.
Ensure that connected probes are placed in the probe holder yoke when not in use. Be sure to utilize the endocavity 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 P8/P9/P10. 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: • 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.
Disconnect probes from the system prior to cleaning or disinfecting the probe.	DO NOT let probe cables dangle loosely from the LOGIQ P8/P9/P10 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 immerese the connector or adapter into any liquid.
Always use bite guards withTransesophageal (TEE) probes.	DO NOT apply excessive bending or pulling force to the probe cable.

Table 11-4: Probe Care Recommendations (Continued)

Do:	Don’t Do:
Clean and disinfect all probes following the procedures contained in this manual, Probe User Manual and Probe Care Carad..	DO NOT kink, tightly coil, or apply excessive force on the probe cable or TEE endoscope shaft. Insulation failure may result.

Inspecting probes

CAUTION

If any damage is found, DO NOT use the probe until it has been inspected and released for further use by a GE service representative.

Before first use

- Inspect the probe
- Clean the probe
- Disinfect the probe

Before each use

1. Inspect the probe's lens, cable, casing, and connector for cracks, cuts, tears, and other signs of physical damage.
2. Test the functionality of the probe.

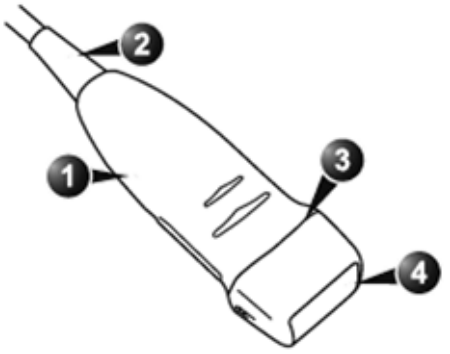


Figure 11-15. Probe parts

1. Housing
2. Strain relief
3. Seal
4. Lens

After each use

1. Inspect the probe's lens, cable, casing, and connector for cracks, cuts, tears, and other signs of physical damage.
2. Look for any damage that would allow liquid to enter the probe.

Probe Reprocessing

Probe processing

To prevent transmission of disease, adequate cleaning and disinfection are necessary before first use, between patient use, and every time the probe is stored or transported in a nonclean container like shipping case.

All probes must be thoroughly cleaned prior to disinfection.

The required level of disinfection is based on the type of tissue the probe will contact during use. These recommendations suit the Spaulding classification for intended use, and federal guidelines from FDA and CDC for proper processing of reusable medical instruments.

Table 11-5: Care Methods by type of tissue

Type of tissue	Care Method
Intact skin only	Cleaning followed by Intermediate-Level Disinfection (ILD) (wipe or spray)
Mucosal or Non-intact skin	Mucosal or Non-intact skin Cleaning followed by High-Level Disinfection (HLD) (soaking or wipe or use of a trophon EPR or trophon2)

NOTE: According to FDA Guidance and CDC Guideline, ILD have HBV, HIV, and tuberculocidal claims. HLD refer to FDA-cleared high-level disinfectants.

NOTE: There are no adequate means to disinfect a probe that has been contaminated by prions, such as Creutzfeldt Jacob's disease. In this case, the contaminated probe MUST BE discarded in accordance with local biologic waste hazard procedures.

The following picture indicates the appropriate care method of the different portions of the probe.

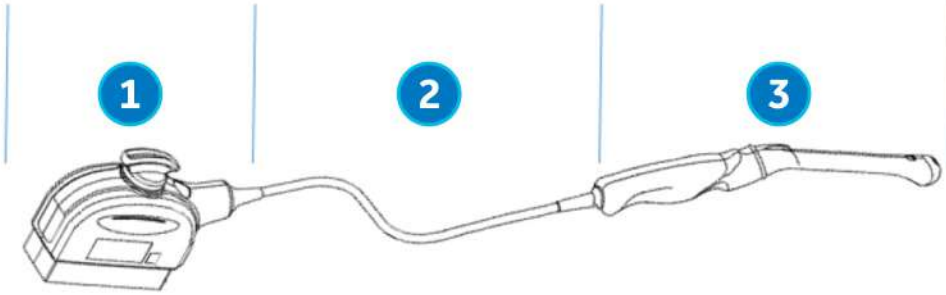


Figure 11-16. Inspect the Lens, Cable, and Probe House After Each Use

1. Cleaning only portion
2. Processed using cleaning/ disinfectant wipes
3. Cleaning followed by appropriate level of disinfection

The processing instructions provided in this document have been validated per ISO 17664: 2021 to properly prepare GE HealthCare Ultrasound probes for re-use, with the chemicals mentioned in Table 11-8 *on page 11-52*. 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 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 11-8 *on page 11-52*.

To download the latest revision of the probes processing manual, visit the Customer Documentation Portal and type reference 5661328 in the search bar.

The Probe Care Card is supplied with every probe and may also be downloaded from:

Table 11-6: Documentation Website

Customer Documentation Portal Website
https://www.gehealthcare.com/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. See the GE probe website in Table 11-7.
- Probes that contact mucosal or non-intact skin require cleaning followed by High-Level Disinfection either soaking or use of a trophon® EPR and trophon2.
- Probes that contact intact skin require cleaning followed by Intermediate-Level Disinfection (wipe or spray).

Table 11-7: Probe Website

Ultrasound Probe Website
https://www.gehealthcare.com/transducers

Probe Pre-Treatment at the Point of Use (Required for All Probes)

CAUTION

DO NOT use abrasive paper products when cleaning or wiping a GE Ultrasound probe. The use of abrasive wipes can damage the soft lens (acoustic window). To extend the life of the probe lens, pat dry only.

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.
2. Wipe the cable with one of the wipes listed in the 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.

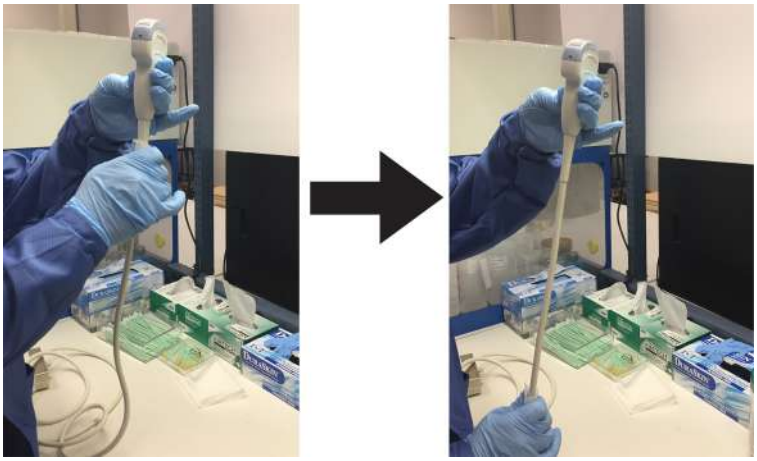


Figure 11-17. Cleaning the Probe Cable

NOTE: Use of wipes listed on 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.

Probe Manual Cleaning Instructions

Thorough cleaning is a mandatory first step to allow adequate subsequent disinfection or sterilization. **Choose the most convenient method, either the wipe or enzymatic soak.**

WARNING

DO NOT clean the probe in an automated washer-disinfector, due to the possible damage of the connector/console interface.

Use necessary precautions (e.g., gloves, face screen and gown), as directed by your facility.

Cleaning with Wipes

1. Hold the probe by the handle near the cable strain relief. **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 acoustic lens (i.e. from cleanest to dirtiest area). Gently wipe the probe's acoustic lens.

NOTE: ***Pay special attention to acoustic lens, edges, and crevices, removing all gel, product, and body fluids.***

4. Turn the probe and continue wiping until the entire surface of the probe has been wiped. As the wipe becomes visibly soiled, discard the wipe into clinical trash and dispense fresh wipes as needed.
5. As needed for additional focused cleaning to crevices, wrap a clean wipe around a soft nylon bristle brush or other suitable instrument to access crevices, such as biopsy notches.
6. Visually inspect the probe for any remaining soil and, if necessary, repeat steps 3 through 5 until the probe is visibly clean.
7. Thorough dry the probe using a clean, low-/non-linting, soft cloth or wipe. Pat dry acoustic lens.

NOTE: *Clean the probe holder of the ultrasound system before returning the probe back to the system. (Refer to the probe holder cleaning instruction in ultrasound system user manual for details).*

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 the user manual.
2. Prepare the cleaning solution in accordance with the detergent manufacturer's instructions.
3. Immerse the probe in the prepared cleaning solution up to the immersion line and ensure no air bubbles are trapped on the surface.

CAUTION

DO NOT submerge probe beyond the immersion line shown in the Ultrasound console's user manual.

NOTE: *For IC5-9-D, E8C and E8C-RS, see Figure 11-23 on page 11-47 for special immersion instructions.*

NOTE: *Over-exposing ultrasound probes to cleaning solution may damage the ultrasound probe.*

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 11-18. Cleaning the probe using a brush

CAUTION

Do not use the brush on the probe lens.

Cleaning with Enzymatic Detergent (continued)

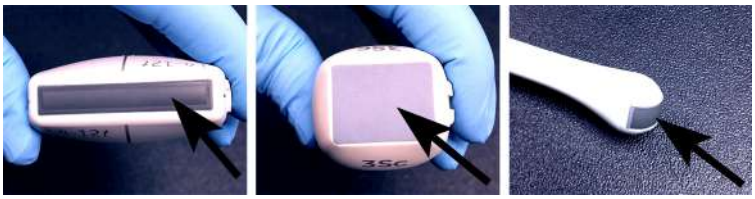


Figure 11-19. Probe Lens Examples

5. Continue brushing the probe for not less than the minimum contact time listed on the detergent manufacturer's label.
6. Visually inspect the probe for soil. Repeat Steps 3 through 5 until all visible soil has been removed from the surface of the probe.
7. Rinse the probe under running warm potable water (30 - 40°C) for not less than 2 minutes. Scrub the surface of the probe with a clean, soft, nylon bristle brush from the base of the cable strain relief to the distal tip.

CAUTION

DO NOT use the brush on the probe lens.

NOTE: Discard solutions and rinse waters in accordance with local regulations.

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.

CAUTION

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.

NOTE: Clean the probe holder of the ultrasound system before returning the probe back to the system. (Refer to the probe holder cleaning instruction in ultrasound system user manual for details).

Cable and Connector Manual Cleaning

The connector can be cleaned with a wipe dampened with alcohol. Use caution when cleaning the connector, wring wipe to remove excess of liquid before wiping the connector. Prevent introduction of foreign objects in the system connector assembly. Do not apply excessive force on any component of the system connector

WARNING

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 (Refer to red circles in picture below). DO NOT clean the probe in an automated washer-disinfector.

Figure 11-20. Connector/console interface surface and label

The cable should be processed using cleaning/disinfectant wipes. If the cable has been in contact with risk factors, such as blood and/or mucous, cleaning should be followed by disinfection.

1. Dispense a cleaning/disinfectant wipe from the wipe canister

2. Wipe the cable with a cleaning/disinfectant wipe from the handle strain relief to the connector strain relief. As the wipe becomes visibly soiled, discard the wipe into clinical trash and dispense fresh wipes as needed

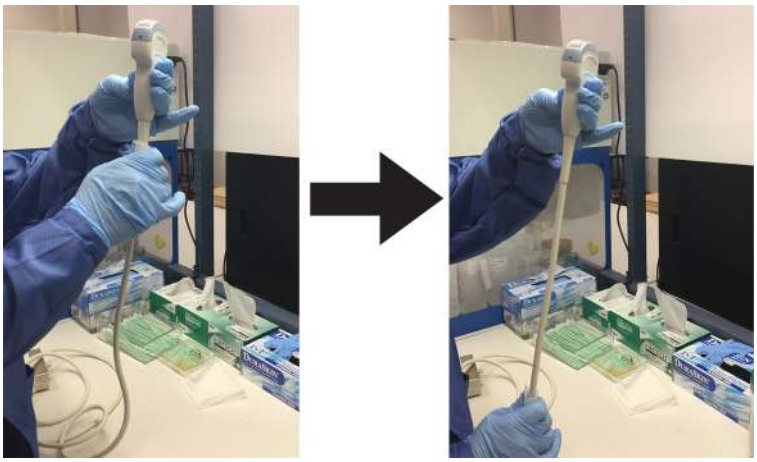


Figure 11-21. Cleaning the Probe Cable

NOTE: Some detergents and disinfectants might cause discoloration to the probe's cable.

3. Visually inspect the cable for any remaining soil and, if necessary, repeat cleaning until the cable is visibly clean

   If disinfection is needed, dispense a new cleaning/ disinfectant wipe and continue wiping the cable. Use as many wipes as needed, to ensure all surfaces remain wet for the minimum required contact time mentioned in Table 11-8 *on page 11-52* Discard the wipes into clinical trash.

4. Saturate a soft, low-/non-linting cloth with Critical Water (remove excess water, wipe should be damp but not dripping) and thoroughly wipe all surfaces of the cable to remove chemical residues. Discard the cloth into clinical trash.

NOTE: Critical Water is water that is treated (usually by a multistep treatment process that could include a carbon bed, softening, DI, and RO or distillation) to ensure that the microorganisms and the inorganic and organic material are removed from the water to an appropriate level (Refer to AAMI TIR34/ST108). Use of this type of water will reduce the recontamination of probes during processing.

5. Let the cable air dry until visibly dry

Probe Intermediate-Level Disinfection (ILD)

For Intermediate-Level Disinfection of intact skin contacting probes, choose either the spray or wipe method.

NOTE: Probes that contact only intact skin may be disinfected in this manner. All probes that contact non-intact skin or mucous membranes (e.g., endocavitary, Transesophageal) require High-Level Disinfection.

CAUTION

After each use, inspect the lens, cable, and housing of the probe. Look for any damage that would allow liquid to enter the probe.

DANGER

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.

Probe ILD - Disinfectant Spray or Wipe

NOTE: Disinfectant exists either in pre-impregnated wipe or in spray. The spray should be sprayed onto a low-/non-linting cloth and then used in same way as a pre-impregnated wipe. In steps 1 to 4 of this section, "wipe" will then stand for a pre-impregnated wipe as well as for a low-/non-linting cloth saturated with disinfectant.

Do not spray disinfectant onto the probe directly.

Use necessary precautions (e.g. gloves, face screen and gown), as directed by your facility.

1. Dispense a new wipe.
2. Holding the probe near the strain relief, wipe the acoustic lens and handle areas. Slightly rotate the probe after each wiping pass and continue wiping until all areas of the probe and handle have been wetted. Wring the wipe above recessed areas and ridges for dripping liquid directly onto the less accessible surfaces.
3. Using fresh wipes, repeat step 2 as many times as needed to ensure all surfaces remain wet for the minimum required contact time listed in Table 11-8 *on page 11-52*

Probe ILD - Disinfectant Spray or Wipe (continued)

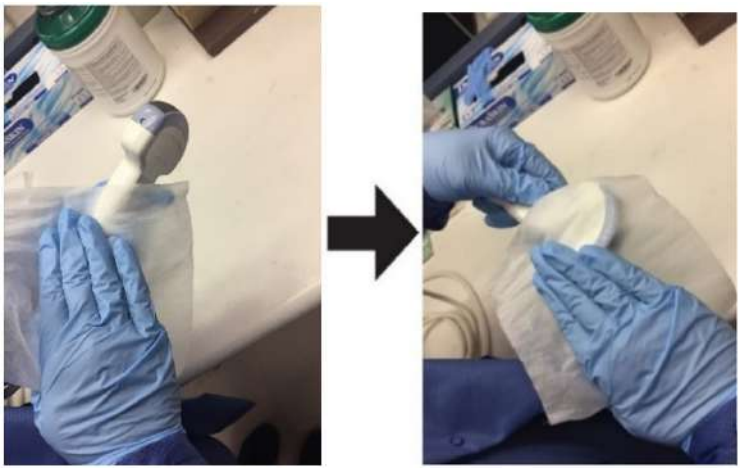


Figure 11-22. Disinfecting the Probe with slight rotation

4. Saturate a soft, low-/non-linting wipe with Critical Water (remove excess water, wipe should be damp but not dripping) and thoroughly wipe all surfaces of the probe to remove chemical residue. Discard the wipe into clinical trash.

NOTE: Critical Water is water that is treated (usually by a multistep treatment process that could include a carbon bed, softening, DI, and RO or distillation) to ensure that the microorganisms and the inorganic and organic material are removed from the water to an appropriate level (Refer to AAMI TIR34/ST108). Use of this type of water will reduce the recontamination of probes during processing.

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 acoustic 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. Refer to the Probe Transportation and Storage section for additional information.

NOTE: Ensure that probe holder of the ultrasound system has been disinfected before returning the probe back to the system (refer to the probe holder disinfection instruction in ultrasound system user manual for details).

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 disinfectant wipes (only for some probes), a disinfectant soaking method or an automated system such as trophon EPR and trophon2.

WARNING

DO NOT disinfect the probe in an automated washer-disinfector, due to the possible damage of the connector/console interface.

DANGER

If the probe is damaged, remove it from patient use. Clean and disinfect the probe before contacting your GE HealthCare Service Representative for inspection and repair/replacement.

CAUTION

After each use, inspect the acoustic lens, cable, and housing of the probe. Look for any damage that would allow liquid to enter the probe.

NOTE: Handles of semi-critical probes that are not submerged during High-Level Disinfection require at minimum Intermediate-Level Disinfection to avoid cross contamination.

NOTE: All probes must be thoroughly cleaned and dried prior to High-Level Disinfection.

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 the Ultrasound console's user manual.

CAUTION

Ensure no liquid comes into contact with the probe connector pins or labels.

2. Immerse probe in the disinfectant up to the immersion line 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.

   For IC5-9-D, E8C, and E8C-RS probes with serial numbers listed below or greater, refer to Figure 11-23 for the soaking level:

   - IC5-9-D: 780333WX1 or greater (example 780334WX1, 780335WX1)
   - E8C: 783101WX9 or greater (example: 783102WX9, 783103WX9)
   - E8C-RS: 782439WX4 or greater (example 782440WX4, 782441WX4)

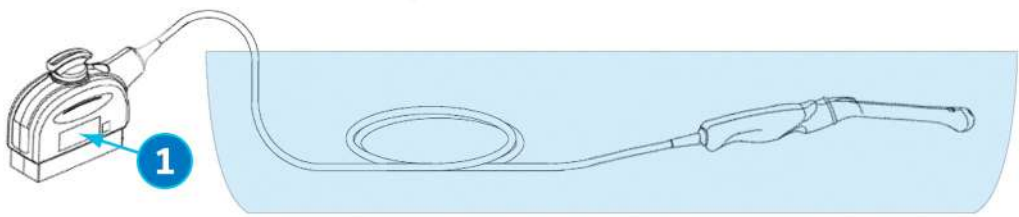


Figure 11-23. Probe Immersion Level for IC5-9-D, E8C, and E8C-RS

1. Serial number location

The prefix number, i.e. 780333 for 780333WX1, indicates serial number sequence.

NOTE: *Over-exposing ultrasound probes to high-level disinfectants may damage the ultrasound probe. NEVER exceed the disinfectant manufacture's maximum exposure time.*

Probe HLD – Soak (continued)

CAUTION

Ensure that the probe is suspended. The probe face should not be resting against the tank/basin surface and should be in full contact with the liquid. Carefully place the probe in the basin, taking care not to damage the transducer lens.

Figure 11-24. 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.

NOTE: *Critical Water is water that is treated (usually by a multistep treatment process that could include a carbon bed, softening, DI, and RO or distillation) to ensure that the microorganisms and the inorganic and organic material are removed from the water to an appropriate level (Refer to AAMI TIR34/ST108). Use of this type of water will reduce the recontamination of probes during processing.*

WARNING

Failure to properly rinse probes with water following disinfection may cause skin irritation.

NOTE: *Discard solutions and rinse waters in accordance with local regulations*

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.

CAUTION

USE non-abrasive cloth or wipe, such as Kimwipes¢, Delicate Task Wipers or equivalent. DO NOT use a twisting motion when wiping the probe. To extend the life of the probe acoustic lens, pat dry only.

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.

NOTE: Ensure that probe holder of the ultrasound system has been disinfected before returning the probe back to the system (refer to the probe holder disinfection instruction in ultrasound system user manual for details).

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 and trophon2

When performing High-Level Disinfection of GE HealthCare ultrasound probes with the trophon EPR and 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. This automated disinfection replaces the manual HLD, but manual cleaning still needs to be performed prior to automated HLD. Refer to manual cleaning instructions mentioned in this document.
2. Follow the trophon instructions for probe placement and operation of the trophon system. Incorrect positioning of the probe may lead to probe/cable damage and High-Level Disinfection not being achieved.

CAUTION

Damage to the cable may occur if improperly hung. 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 EPR system, or with the Integrated Probe Positioner (IPP) of trophon2 system.

3. Once the trophon High-Level Disinfection cycle is complete, use necessary precautions (e.g. gloves), as directed by your facility and promptly remove the probe from the trophon machine. DO NOT store the probe in the trophon chamber.
4. Hold the probe's handle near the strain relief cable. DO NOT suspend or hold the probe by the cable, as this may damage the probe.

Probe HLD - trophon EPR and trophon2 (continued)

5. Wipe the probe from the acoustic lens to strain relief with a clean, low-/non-linting, soft cloth or wipe to remove any possible residual hydrogen peroxide from the probe surface.

USE non-abrasive cloth or wipe, such as Kimwipes™, Delicate Task Wipers or equivalent. DO NOT use a twisting motion when wiping the probe. To extend the life of the probe acoustic lens, pat dry only.

6. If the probe is not immediately reused, store the probe in a manner that will protect and keep the probe from being recontaminated. Refer to the Probe Transportation and Storage section for additional information.

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 11-8: Chemicals used for Efficacy Validation

Product Type	Trade Name	Manufacturer	Minimum Contact Time	Active Ingredient	Validated for Probe
Cleaning (Wipe)	Oxivir® Tb	Diversey	N/A	Hydrogen Peroxide	12L-RS, 12S-RS, 3Sc-RS, 6S-RS, 8C-RS, 9L-RS, C1-5-RS, C1-6-D, C3-10-D, L3-12-RS, L6-12-RS, M5Sc-RS, ML6-15-RS, RAB2-6-RS, BE9CS-RS, C2-7-D, L3-9i-RS, L8-18i-RS, RIC5-9A-RS, E8C-RS, E8Cs-RS, IC9-RS, L4-12t-RS
Enzymatic Detergent (Soak)	Enzol® (Cidezyme®)	Advanced Sterilization Products® (J&J)	1-Minute Soak	Proteolytic Enzymes	12L-RS, 12S-RS, 3Sc-RS, 6S-RS, 8C-RS, 9L-RS, C1-5-RS, C1-6-D, C3-10-D, L3-12-RS, L6-12-RS, M5Sc-RS, ML6-15-RS, RAB2-6-RS, 6Tc-RS, BE9CS-RS, E7C8L-RS, L8-18i-RS, RIC5-9A-RS, 10C-D(Only MetriZyme™)), E8C-RS, E8Cs-RS, IC9-RS, L4-12t-RS, L3-9i-RS, C2-7-D, P8D(Only Enzol® and MetriZyme™)
	MetriZyme™	Metrex™			
	Prolystica® 2X Concentrate Presoak & Cleaner	Steris			

Table 11-8: Chemicals used for Efficacy Validation

Product Type	Trade Name	Manufacturer	Minimum Contact Time	Active Ingredient	Validated for Probe
Intermediate -level Disinfectant (wipe)	Oxivir® Tb	Diversey	10-Minute Exposure	Hydrogen Peroxide	12L-RS, 12S-RS, 3Sc-RS, 6S-RS, 8C-RS, 9L-RS, C1-5-RS, C1-6-D, C3-10-D, L3-12-RS, L6-12-RS, M5Sc-RS, ML6-15-RS, RAB2-6-RS, L3-9i-RS, RIC5-9A-RS, L4-12t-RS, L3-9i-RS, C2-7-D
High-level Disinfectant (Soak)	Cidex® OPA	Advanced Sterilization Products (J&J)	10-Minute Soak	Ortho-phthala ldehyde	6Tc-RS, BE9CS-RS, C2-7-D, E7C8L-RS , L8-18i-RS, 10C-D(Only Cidex® OPA), E8C-RS, E8Cs-RS, IC9-RS, L3-9i-RS, C2-7-D, P8D(Only Cidex® OPA)
	McKessen OPA/28	McKesson			

A full list of chemicals tested for compatibility is available at the GE Probe website:

Table 11-9: Probe Website

Ultrasound Probe Website
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

Probe sheaths are disposable and must not be reused.

CAUTION

Protective barriers may be required to minimize disease transmission, but their use does not replace cleaning and disinfection. Probe sheaths are available for use with all clinical situations where infection is a concern. Use of legally marketed, sterile probe sheaths is recommended for intra-cavitary, intra-operative, and biopsy 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 11-25. 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.
5. After usage, discard the sheath into clinical trash.

Cleaning and disinfecting probes

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.

Use only germicides that are listed in 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.

You MUST disconnect the probe from the LOGIQ P8/P9/P10 prior to cleaning/disinfecting the probe. Failure to do so could damage the system.

Avoid cross-contamination, follow all infection control policies established by your office, department or hospital as they apply to personnel and equipment.

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.

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.

Cleaning and disinfecting probes (continued)

CAUTION

Probes for neuro surgical intra-operative use must NOT be sterilized with liquid chemical sterilants because of the possibility of neuro toxic residues remaining on the probe. Neurological procedures must be done with the use of legally marketed, sterile, pyrogen free probe sheaths.

Biological Hazard

CREUTZFIELD-JACOB DISEASE

Neurological use on patients with this disease must be avoided. If a probe becomes contaminated, there is no adequate disinfecting means.

Probe Cleaning Process

To clean the probe:

NOTE: Do not immerse the probe into any liquid beyond the level specified for that probe (See 'Immersion Level' on page 11-63 for more information.). Never immerse the transducer connector into any liquid.

- 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.

1. Inspect the probe's lens, cable, casing, and connector for cracks, cuts, tears, and other signs of physical damage.
2. Disconnect the probe from the ultrasound console and remove all coupling gel from the probe by wiping with a soft cloth and rinsing with flowing water.

NOTE: DO NOT wipe the probe with a dry cloth.

3. Soak the probe head in water. Scrub the probe as needed using a soft sponge, gauze, or cloth to remove all visible residue from the probe surface.
4. Rinse the probe with enough clean potable water.
5. Air dry or dry with a soft cloth.
6. After cleaning, inspect the probe's lens, cable, casing and connector. Look for any damage that would allow liquid to enter the probe. Also, inspect the probe functionality by live scan. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE service representative.

Choosing a Disinfectant

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.

WARNING

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.

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.

HINTS

A validated, high-level disinfection process, combined with the use of a sterile gel and a probe cover/sheath is an accepted method of infection control for Ultrasound probes. Adequate records or a log book detailing the time, date, disinfection method, and verification of disinfectant effectiveness or test results is recommended. For more information about establishing an evidence based disinfection protocol for your practice, refer to the FDA, CDC, HICPAC, APIC, or the Joint Commission websites.

Disinfecting probes

In order to provide users with options in choosing a germicide, GE routinely reviews new medical germicides for compatibility with the materials used in the transducer housing, cable and lens. Although a necessary step in protecting patients and employees from disease transmission, liquid chemical

Refer to the Probe Care Card enclosed in the probe case or to the following web site for the latest list of compatible cleaning solutions and disinfectants.

- https://www.gehealthcare.com/transducers

Table 11-10: Description of Pictogram on Probe Care Cards

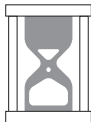
Pictogram	Description
	“ATTENTION” - Consult accompanying documents” is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.
	“CAUTION” - Dangerous voltage (the lightning flash with arrowhead) is used to indicate electric shock hazards.
	Biohazard - Patient/user infection due to contaminated equipment. Usage • Cleaning and care instructions • Sheath and glove guidelines
	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 immerse the probe into any liquid beyond the level specified for that probe. Refer to the user manual of the ultrasound system.
	Since there is a possibility of having negative effects on the probe, observe the specified immersing time by the germicide manufacturer strictly. Do not immerse the probe in liquid chemical germicides more than the time prescribed in the care card.

Table 11-10: Description of Pictogram on Probe Care Cards (Continued)

Pictogram	Description
	“Consult accompany document” - Refer to the ultrasound system user manual for important probe care and cleaning instruction.
	Symbol indicates useful information
	This is to illustrate compatible ultrasound coupling gels
	This is to illustrate compatible cleaners or disinfectants available in spray format (to be used according to instruction from the manufacturers of these products).
	This is to illustrate compatible cleaners or disinfectants available in wipes format (to be used according to instruction from the manufacturers of these products)
	This is to illustrate compatible cleaners or disinfectants available in powder (to be used according to instruction from the manufacturers of these products).
	This is to illustrate compatible cleaners or disinfectants available in liquid format (to be used according to instruction from the manufacturers of these products).
	This is to illustrate compatible automated reprocessors (to be used according to instruction from the manufacturers of these products).

Disinfecting probes (continued)

Use additional precautions (e.g. gloves and gown) when decontaminating an infected probe.

NOTE: About the recommended disinfectant, review the probe care card that is packed with each probe.

Low-level disinfection

1. After cleaning, the probe and cable may be wiped with a tissue sprayed with a recommended disinfectant.

NOTE: In order for liquid chemical germicides to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described earlier before attempting disinfection.

2. After disinfecting, inspect the probe's lens, cable, casing and connector. Look for any damage that would allow liquid to enter the probe. Also, inspect the probe functionality by live scan. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE service representative.

NOTE: See ‘Probe Cleaning’ on page 12-35 for more information.

Disinfecting probes (continued)

High-level disinfection

High-level Disinfection destroys vegetative bacteria; lipid & non-lipid viruses, fungi and, depending highly on time of contact, is effective on bacterial spores.

1. Prepare the high-level disinfectants solutions according to the manufacturer's instructions. Be sure to follow all precautions for storage, use and disposal.

NOTE: In order for liquid chemical germicides to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described earlier before attempting disinfection.

2. Place the cleaned and dried probe in contact with the germicide for the time specified by the germicide manufacturer. High-level disinfection is recommended for surface probes and is required for endocavitary and intraoperative probes (follow the germicide manufacturer's recommended time).

NOTE: DO NOT soak probes in liquid chemical germicide for longer than is stated by the germicide instructions for use. Extended soaking may cause probe damage and early failure of the enclosure, resulting in possible electric shock hazard.

3. Rinse the part of the probe which was in contact with the germicide according to the germicide manufacturer's instructions. Flush all visible germicide residue from the probe and allow to air dry.

NOTE: Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector into any liquid.

4. After disinfecting, inspect the probe's lens, cable, casing and connector. Look for any damage that would allow liquid to enter the probe. Also, inspect the probe functionality by live scan. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE service representative.

Immersion Level

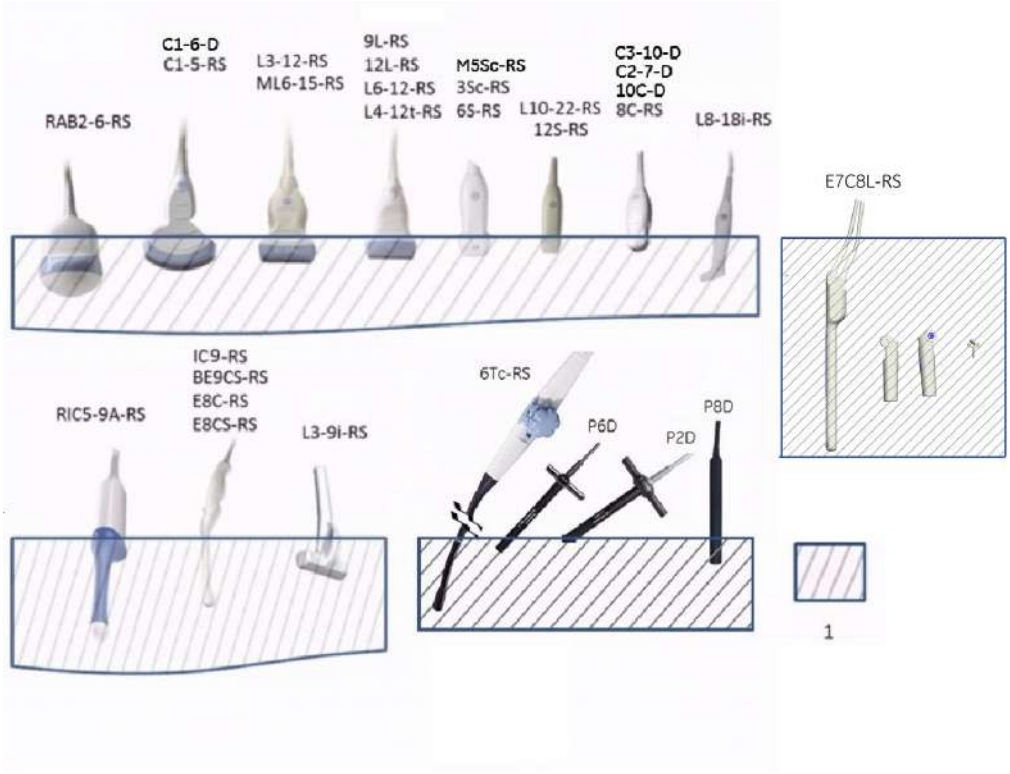


Figure 11-26. Probe Immersion Level, 1=Fluid Level

Coupling gels

WARNING

Do not use unrecommended gels (lubricants). They may damage the probe and void the warranty.

About the recommended gel, review the probe care card that is packed with each probe.

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 apply gel to the eyes. If there is gel contact to the eye, flush eye thoroughly with water.

Precautions

Coupling gels should not contain the following ingredients as they are known to cause probe damage:

- Methanol, ethanol, isopropanol, or any other alcohol-based product
- Mineral oil
- Iodine
- Lotions
- Lanolin
- Aloe Vera
- Olive Oil
- Methyl or Ethyl Parabens (para hydroxybenzoic acid)
- Dimethylsilicone
- Polyether glycol based
- Petroleum

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.

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 guidezones are intended to assist the user in determining optimal probe placement and approximate the needle path. However, actual needle movement is likely to deviate from the guideline. Always monitor the relative positions of the biopsy needle and the subject mass during the procedure.

WARNING

NEVER reuse the TR5° disposable biopsy guide attachment and Disposable sterile Ultra-Pro II Needle guide kits.

CAUTION

The use of biopsy devices and accessories that have not been evaluated for use with this equipment may not be compatible and could result in injury.

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.

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.

Ensure that the needle (especially the needle tip) is always visible in the ultrasound image during the whole biopsy procedure.

Ensure the correct position and optimal fit every time before using a biopsy guide.

Freehand Biopsy

When performing a freehand biopsy, i.e. without a biopsy guide, it is the user’s responsibility to use appropriate equipment.

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.

NOTE: Discard solutions and rinse waters in accordance with local regulations

CAUTION

Do not clean any portion of the attachment with methanol, ethanol, isopropanol, or any other alcohol base detergent. Such substances can cause irreparable damage to the attachment.

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.

NOTE: Critical Water is water that is treated (usually by a multistep treatment process that could include a carbon bed, softening, DI, and RO or distillation) to ensure that the microorganisms and the inorganic and organic material are removed from the water to an appropriate level. (Refer to AAMI TIR34/ST108).

5. Repeat Step 4 two additional times, for a total of 3 (three) rinses using fresh volumes of water for each rinse.

NOTE: Discard solutions and rinse waters in accordance with local regulations

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. Visually inspect the biopsy to ensure all surfaces are dry. Repeat drying steps if any moisture is visible.

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 11-11: Autoclave parameters

Parameter	Cycle Type 1	Cycle Type 2
Sterilizer	Pre-vacuum	Pre-vacuum
Preconditioning Pulses	3	3
Temperature (Minimum)	132 degrees C	134 degrees C
Exposure Time (Minimum)	4 Minutes	3 Minutes
Drying Time (Minimum)	15 Minutes	15 Minutes
Package Configuration	Tyvek Pouch (14 x 25 cm)	Tyvek Pouch (14 x 25 cm)

Perform a biopsy

Displaying the Guidezone

Activate the Biopsy Kit by selecting it from the B-Mode Touch Panel.

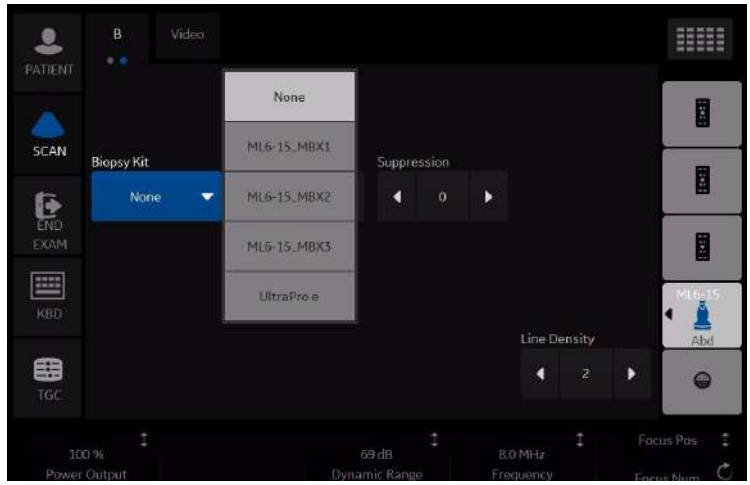


Figure 11-27. B-Mode Touch Panel menu

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 P8/P9/P10 depending on the probe. Select the desired biopsy kit.

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)

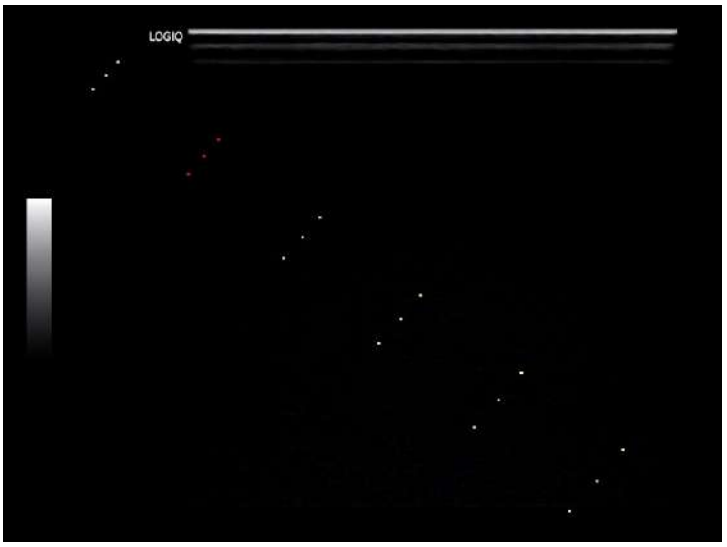


Figure 11-28. Biopsy Guidezone display (example)

The biopsy guidezone represents a path of the needle. The dots which make up the guidezones is the depth readout where:

- Yellow represent 1 cm increments.
- Red represents 5 cm increments.

The display should be carefully monitored during a biopsy for any needle deviation from the center line or guidezone.

NOTE: Biopsy Guide Lines do not appear on Recalled Images and PACS when the Print Button is set to DICOM or Secondary Capture.

Displaying the Guidezone (continued)

The Biopsy Guidezone adjusts along with image adjustments, such as image inversion/rotations, zoom and depth changes.

NOTE: To set up biopsy guidezones, refer to Table 16-9 for more details.

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.

DANGER

Failure to match the guidezone displayed to the guide may cause the needle to track a path outside the zone.

It is extremely important that when using the adjustable angle biopsy guides, the angle displayed on the screen matches the angle set on the guide, otherwise the needle will not follow the displayed guidezone which could result in repeated biopsies or patient injury.

Preparing the Biopsy Guide Attachment

Convex, Sector and Linear probes have optional biopsy guide attachments for each probe. The guide consists of a 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.

WARNING DO NOT attempt to use the biopsy bracket and needle guide until the manufacturer's instructions, provided with the biopsy bracket and needle guide in the kit, have been read and thoroughly understood.

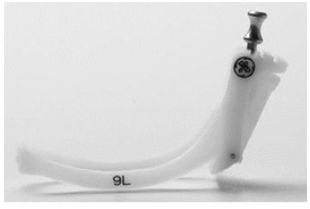
Probe	Attachment	Attachment with Probe
C1-5-RS Multi-angle		
9L-RS Multi-angle		
ML6-15-RS Multi-angle		

Table 11-12: Biopsy Guide Attachments

Probe	Attachment	Attachment with Probe
3Sc-RS Multi-angle		
12L-RS Multi-angle		
12L-RS Infinite-angle		
12L-RS Transverse Bracket		

Table 11-12: Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
RAB2-6-RS Multi-angle		
E8C-RS with reusable		
E8C-RS with TR5 (PROTEK)		
E8C-RS with TR5 (CIVCO)		
L6-12-RS Multi-angle		
RIC5-9A-RS with reusable		

Table 11-12: Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
RIC5-9A-RS (CIVCO)		
BE9CS-RS with reusable		
BE9CS-RS (PROTEK)		
BE9CS-RS (CIVCO)		
BE9CS-RS (CIVCO)		
E8CS-RS with reusable		
E8CS-RS with TR5 (PROTEK)		

Table 11-12: Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
E8CS-RS with TR5 (CIVCO)		
L4-12t-RS Multi-angle		
L4-12t-RS Infinite-angle		
L4-12t-RS Transverse Bracket		
L3-12-RS Multiangle		

Table 11-12: Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
IC9-RS with reusable		
IC9-RS Disposable		
C1-6-D Multi-angle		
C2-7-D Stainless reusable		
C2-7-D Multi-angle		
M5Sc-RS Multi-angle		

Table 11-12: Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
E7C8L-RS Multi-angle		 Refer to ‘ERB7/ERB Biopsy Attachment User Instruction’ on *page 13-537*
E7C8L-RS Fixed-angle	 Multi-Purpose Workstation Stepper	 Refer to ‘Grid Biopsy Accessories for E7C8L-RS’ on *page 13-537*
	 Classic Stepper	 Refer to ‘Grid Biopsy Accessories for E7C8L-RS’ on *page 13-537*
	 EX^{3TM} Stepper	 Refer to ‘Grid Biopsy Accessories for E7C8L-RS’ on *page 13-537*

Table 11-12: Biopsy Guide Attachments (Continued)

Multi Angle Biopsy Guide Assembly

WARNING

DO NOT attempt to use the biopsy bracket and needle guide until the manufacturer's instructions, provided with the biopsy bracket and needle guide in the kit, have been read and thoroughly understood.

1. Scan the patient and identify the target for biopsy. Move the probe to locate the target to the center of the image. Enable the system biopsy guidezone and try guidezone angles MBX1 to MBX3 to decide the best angle setting for needle path.

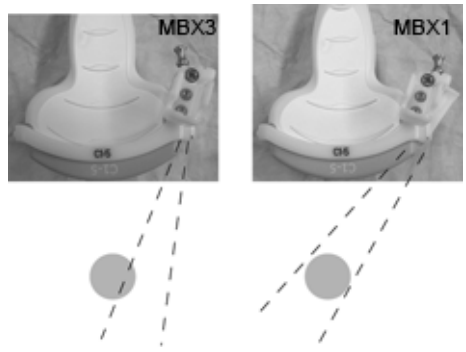


Figure 11-29. Example

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).

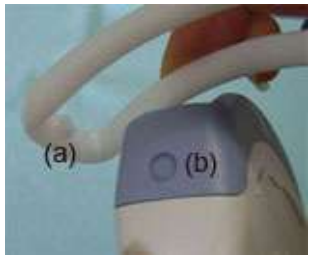


Figure 11-31. Probe/Bracket Alignment

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.

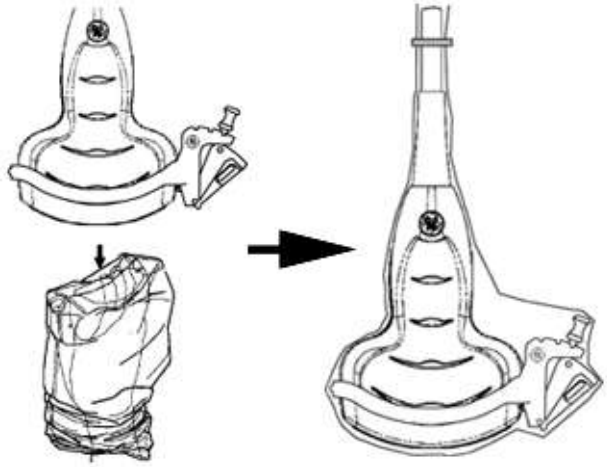


Figure 11-33. Applying Sanitary Sheath

6. Snap the needle guide onto the biopsy guide bracket.

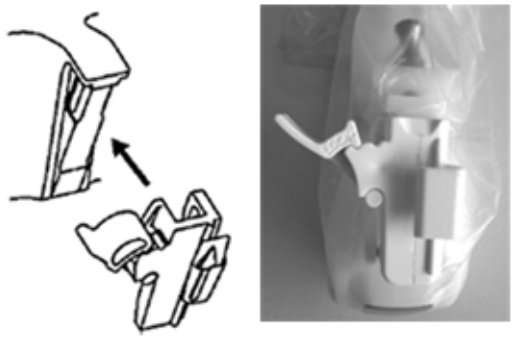


Figure 11-34. Snap the needle guide

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.

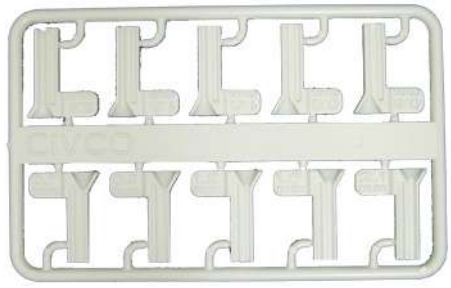


Figure 11-36. Needle Barrel

9. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

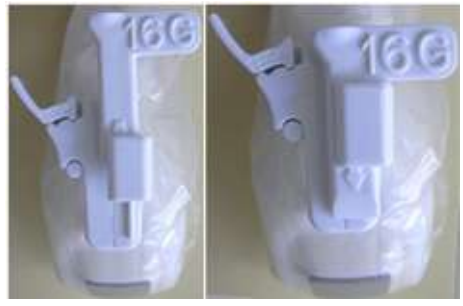


Figure 11-37. Needle Barrel Installation

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.

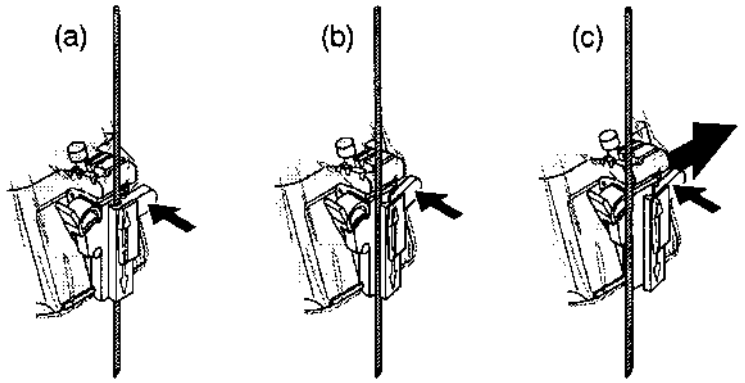


Figure 11-39. Release the needle from assembly

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.

4D Biopsy Guide Assembly - Representative Example

1. Place the needle guide onto the probe.
2. Push the needle guide until the bracket (b) catches in the support on the housing of the probe (a).

Figure 11-40. Support on the housing

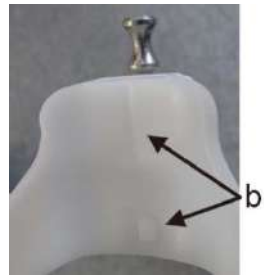


Figure 11-41. Biopsy Needle Guide

3. Fix the needle guide by locking the frame on the opposite side.

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.

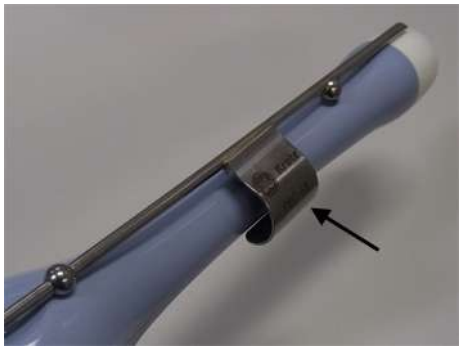


Figure 11-42. Installation (without probe sheath)

NOTE: Material: Stainless Steel

NOTE: Needle guide sterilization with autoclave possible.

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.

Endocavitary Probe Biopsy Guide Assembly - Representative Example

WARNING

DO NOT use the needle with the catheter (soft tube). There is a possibility of breaking the catheter in the body.

CAUTION

Patient injury or repeated biopsies may result. The needle placement will not be as intended if the needle guide is not properly seated and secure.

CAUTION

Before inserting the needle, scan the patient to determine the correct puncture depth and site. Only the sterile/sanitary sheath and rubber band are on the probe during the pre-needle placement scanning.

Preparation

To prepare the endocavitary probe for use:

1. Remove the probe from the box and carefully examine it for any damage.
2. If the biopsy guide is to be attached, use the filling removal tool to clean out the attachment area on the probe head.

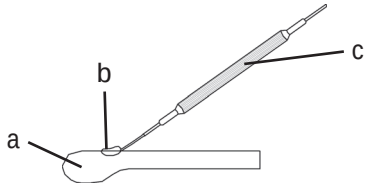


Figure 11-43. Attachment Filling Removal

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.

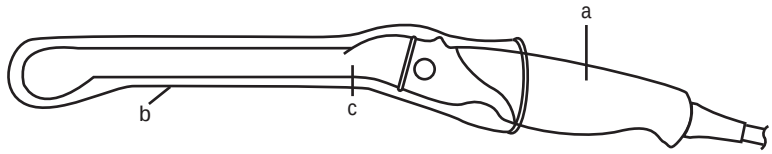


Figure 11-44. Endocavitary Probe with Sheath

a. Probe Handle
b. Sanitary Sheath
c. Probe Body

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.

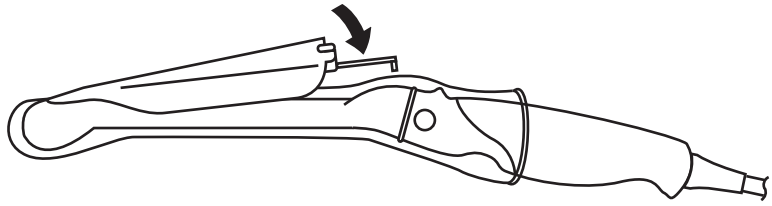


Figure 11-45. Disposable Biopsy Guide 5 degree Angle

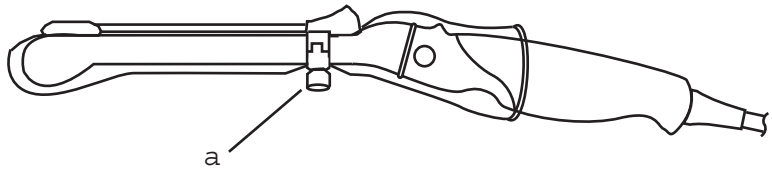


Figure 11-46. Reusable Biopsy Guide

a. Fix with a screw

NOTE: *For the E8C-RS,E8CS-RS and IC9-RS probe, use the TR5 guidelines for the plastic (disposable-only) biopsy guides; use the RU guidelines with the stainless steel reusable biopsy guides.*

2. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.
3. Ensure the guide is properly seated and secure by pushing forward on the needle insertion end of the guide until the attachment node is firmly in place in it's hole.

Biopsy Guideline Display

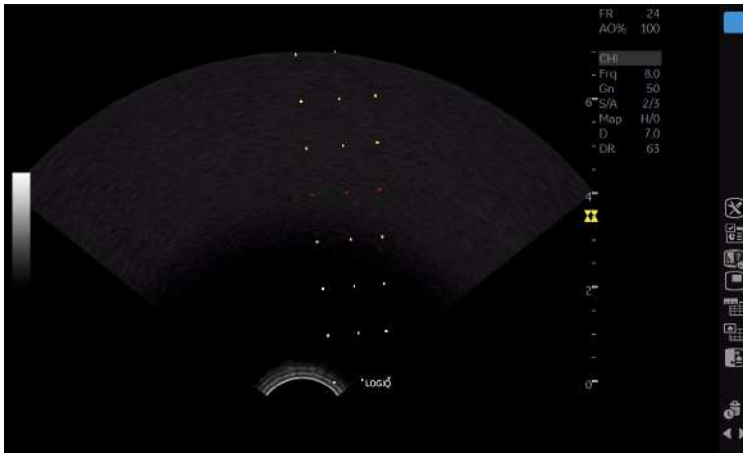


Figure 11-47. Endocavitary Probe Biopsy Guideline - Reusable

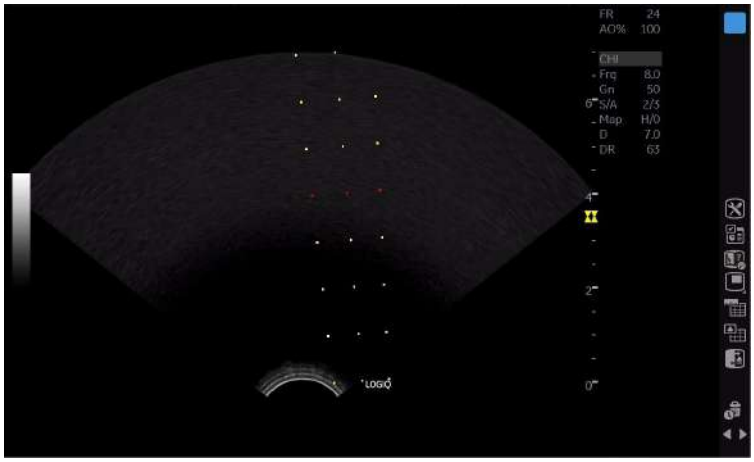


Figure 11-48. Endocavitary Probe Biopsy Guideline - TR5

BE9CS-RS Biopsy Guide Preparation

NOTE: The following graphics do not have a sheath pictured but a sheath must be installed before attaching the biopsy guide.

NOTE: Recommended Needle Length: greater or equal than 220 mm.

NOTE: Recommended Needle Gauge: 16 G or thinner needle

Reusable type

1. Ensure that the fixing screw is loose.

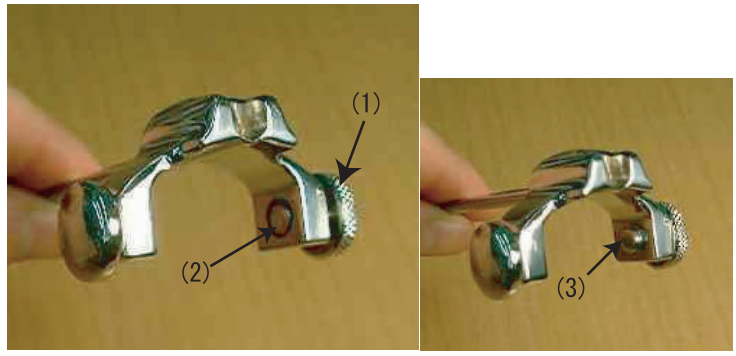


Figure 11-49. BE9CS-RS Biopsy Guide Screws

1. Fixing screw
2. Loosened fixing screw (ensure that the screw end is not sticking out). Left side is a spring (not a screw).
3. Tightened fixing screw (the screw end is sticking out)

Reusable type (continued)

2. Align the tip of the biopsy guide to the edge on the probe shaft.

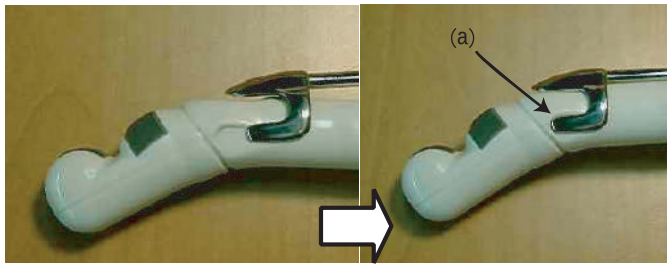


Figure 11-50. Biopsy Guide Alignment

a. Align with edge of probe

3. Push the guide down to the probe and snap the guide in place.
4. The biopsy guide should mate with the dent of the shaft on the handle side.
5. The fixing screws of the biopsy guide must be securely tightened.

NOTE: Take care not to tear the sheath when tightening the screw.

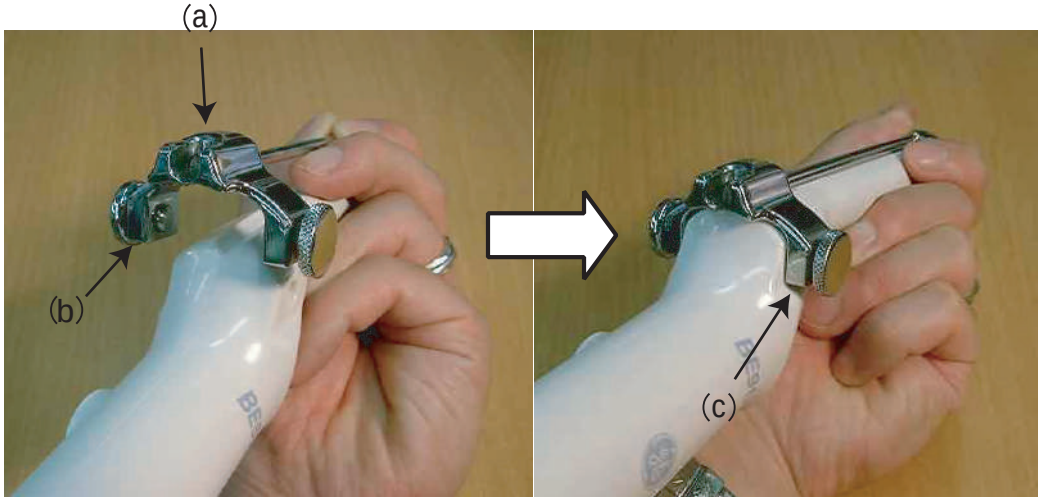


Figure 11-51. Biopsy Guide Setting 3

6. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.

Disposable type

1. Align the tip of the biopsy guide to the edge on the probe shaft.

Figure 11-52. Align the biopsy guide

2. Push the guide down to the probe and snap the guide in place.

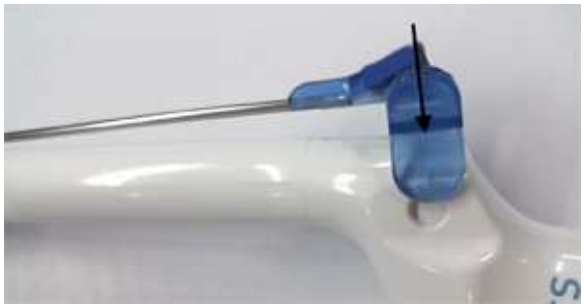


Figure 11-53. Push down the biopsy guide

Figure 11-54. BE9CS-RS with disposable biopsy guide

Biopsy Guideline display

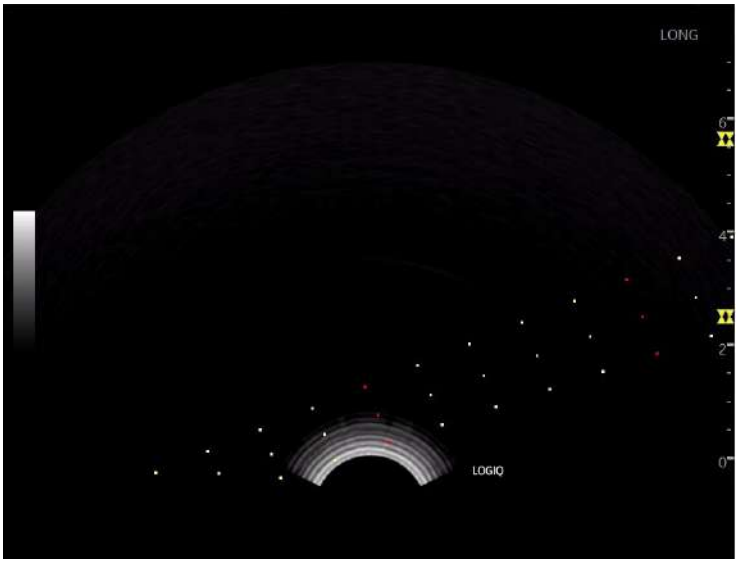


Figure 11-55. BE9CS-RS Biopsy Guide Line - Longitudinal

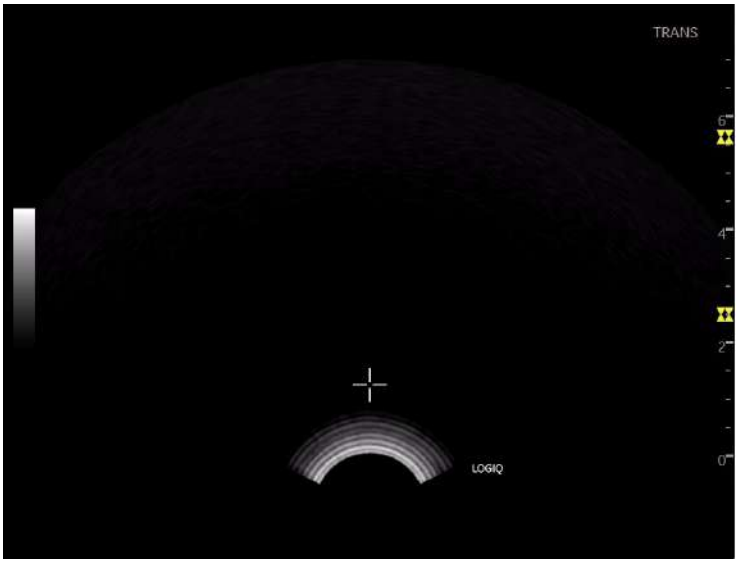


Figure 11-56. BE9CS-RS Biopsy Guide Line - Transverse

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.

CAUTION Ensure that all guide parts are seated properly prior to performing a biopsy.

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.

The biopsy bracket can be cleaned and disinfected in a recommended disinfecting agent and reused.

CAUTION

When the biopsy needle guide kit is opened, all parts must be discarded after the procedure whether they have been used or not.

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 11-75 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.

CAUTION

For surgery/intra-operative procedures, a sterile environment is required. Therefore, both the operator and probe 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.

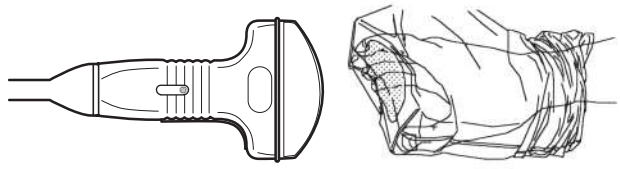


Figure 11-57. Applying Sterile Sheath

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

Dimensions and Weight • Height: 1,345mm (Minimum), 1,595mm (Max.) • Height (with HD Display): 1,390mm (Minimum), 1,640mm (Max.) • Width : 545mm (23.8 inch monitor), 565mm (23.8 inch HD Display), 430mm (Operator Panel) • Depth: Max 740mm • Weight: 67 kg (148 lb.) (69 kg with HD Display (152 lb.)) Console Design • 4 active probe ports • 1 non imaging, CW pencil probe port (Option) • Integrated SSD • Integrated DVD-RW Multi Drive (Option) • On-board storage of BW thermal printer • Integrated speakers • Locking mechanism that provides rolling lock and caster swivel lock • Integrated cable management • Front handle • Rear handle (Option) • Gel holder • Easily removable air filters Electrical Power • Voltage:100V - 240V AC • Frequency: 50/60 Hz • Power: Consumption maximum of 500 VA with peripherals • Power cord: Type SJT, SJE, SJO or SJTO, 14AWG, 3-Conductor, VW-1, 125 V or 250 V, 10 A, max 3.0 m long; One end with Hospital Grade Type, NEMA 5-15P or 6-15P. Other end with appliance coupler.	Operator Panel • Operating keyboard adjustable in two dimensions of Height and Rotation • Backlit alphanumeric keyboard (Option) • Ergonomic hard key layout • Interactive back-lighting • Integrated recording keys for remote control of up to 6 peripheral or DICOM devices • Gel warmer (Option) Touch panel • Wide 10.4 in High Resolution, Color, Touch, LCD screen • Interactive dynamic software menu • Brightness adjustment • User-configurable layout • Probe light LCD Monitor • 23.8inch bezel-less LCD LED backlight monitor • 23.8inch HD Display (option) • LCD translation (independent of console): 500 mm horizontal (end to end), 150 mm vertical (end to end), 90° Swivel • Fold-down and lock mechanism for transportation • Brightness & contrast adjustment • Resolution: 1920 x 1080 • Horizontal/Vertical viewing angle of +/- 178°

Table 12-2: System Overview

Applications
- Abdominal
- Obstetrical
- Gynecological
- Breast
- Small Parts
- Vascular
- Transcranial
- Transrectal
- Transvaginal
- Pediatric and Neonatal
- Musculoskeletal
- Urological
- Cardiac
- Intraoperative (Not for China)
- Peripheral vascular
- Transesophageal (Not for China)

Scanning Methods
- Electronic Sector
- Electronic Convex
- Electronic Linear
- Mechanical Volume Sweep

Operating Modes
- B-Mode
- M-Mode
- Color Flow Mode (CFM)
- M-Color Flow Mode
- Power Doppler Imaging (PDI)
- PW Doppler Mode
- CW Doppler Mode (Option)
- Volume Mode (Easy 3D, Advanced 3D, 4D, STIC, Omiview, HDLive)
- Anatomical-M Mode
- Curved Anatomical M-Mode
- B-Flow/B-Flow Color (Option)
- Extended Field of View (LOGIQView, Option)
- TVI Mode (Option)
- Coded Contrast Imaging (LP9 Only, Option)
- B-Steer + (Option)
- Coded Harmonic Imaging
- M-Color Flow mode
- Offline scanning mode (Power Assistant Option)
- Strain Elastography (Option)
- Shear Wave Elastography (Option)
- UGAP (Option)

Display Modes
- Simultaneous Capability
  - B or CrossXBeam / PW
  - B or CrossXBeam / CFM or PDI
  - B / M
  - B or CrossXBeam + CFM or PDI / PW (Real-time Triplex Mode)
  - B / CW (option)
- Selectable Alternating Modes
  - B or CrossXBeam / PW
  - B or CrossXBeam + CFM(PDI) / PW
  - B / CW (option)
- Colorized Image
  - B mode
  - M mode
  - Doppler mode
- Time line Display
  - Independent Dual B or CrossXBeam || PW Display
  - CW Display
  - 2 Display Formats (Top / Bottom, Side / Side selectable Format)
  - Selectable Size Formats (Full format, Switchable after freeze, Vert 1/3 B, Vert 1/2 B, Vert 2/3 B, Horiz 1/2 B, Horiz 1/4 B)
  - 2 Timeline Methods (Scrolling, Moving Bar)
- Virtual Convex
- Multi-image (split/quad screen)
- Live and/or frozen
  - B or CrossXBeam + B or CrossXBeam || CFM or PDI
  - PW/M
- Zoom: Write/Read
- Simultaneous Bi-plane for Urology application
  - BE9CS-RS

Transducer Types
- Sector Phased Array
- Linear Array
- Convex Array
- Micro convex Array
- Matrix Array
- Single CW (Pencil) Probes
- Volume probe (4D)

Table 12-2: System Overview (Continued)

Standard Features
- Advanced user interface with high resolution 10.4 inch wide touch screen
- Automatic Optimization
- CrossXBeam
- Speckle Reduction Imaging (SRI-HD)
- Fine Angle Steer
- Coded Harmonic Imaging
- Virtual Convex
- Patient information database
- Image Archive on integrated CD/DVD and hard disk drive
- Real-time automatic Doppler calcs
- OB Calcs
- Fetal Trending
- Multi gestational Calcs
- Hip Dysplasia Calcs
- Gynecological Calcs
- Vascular Calcs
- Urological Calcs
- Renal Calcs
- Cardiac Calcs
- inSite ExC Capability
- On-board electronic documentation
- Raw Data Analysis
- MPEGVue
- Key Macro
- Network Storage
- Quick Save
- Quick Patient Entry
- Email2MMS
- Easy 3D

Options
- Auto EF
- Cardiac Strain
- Auto IMT
- B-Flow/B-Flow Color
- Breast Measure Assistant
- B Steer+
- Coded Contrast Imaging (CEUS, HRes)
- Compare Assistant
- CW Doppler
- DICOM 3.0 connectivity
- Digital Video Recording Software (Software DVR)
- Digital Video Recording Software (Software DVR Basic)
- Elastography Quantification
- LOGIQView
- OB Measure Assistant
- Offline scanning
- Power Assistant
- Standard Battery
- Extended Battery
- Quantitative Flow Analysis
- Real-Time 4D
- Automated Volume Calculation (VOCAL II)
- Tomographic Ultrasound Imaging
- Volume Contrast Imaging (VCI) Static
- OmniView
- STIC
- HDLive
- Report Writer
- Scan Assistant
- Shear Wave Elastography
- Strain Elastography
- Stress Echo
- Thyroid Productivity Package
- Breast Productivity Package
- Tissue Velocity Imaging (TVI)
- LOGIQApps
- Bluetooth
- Wireless LAN
- Gel warmer
- DVDCabinet: High/Low Drive
- Koios Breast Lesion Decision Support
- Koios Thyroid Lesion Decision Support
- Hepatic Assistant
- SonoAVC
- UGAP
- SonoNT/IT
- Ethernet protection cable (Not for China)
- Barcode reader (Not for China)

Peripheral Options
- Integrated options for
  - Digital B/W thermal printer
  - Digital color thermal printer
- Digital A6 color thermal printer
- External USB Printer connection
- HDMI output (Video & Audio) available for compatible device
- S-Video output available for compatible device
- Composite Video output available for compatible device
- Wireless LAN
- Printing using Bluetooth connectivity (Inkjet printer option)
- Printer installation kit
- Footswitch with programmable functionality
- Isolation Transformer
- Isolated USB connector
- EMI filter (PWR supply noise filter)
- Drawer
- Small Probe Holder (Probe Holder Adapter for Small Probe)
- Probe cable hanger
- ECG + AHA/IEC Cables
- Power Assistant
- Extended battery life
- Battery Pack (for Power Assistant/Extended battery life)

Table 12-3: System Parameters

Controls Available on Freeze or Recall
• 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; TGC, Colorized B and M; Frame Average [Loops only]; Dynamic Range)
• Anatomical M-Mode
• Max Read Zoom to 20x
• Base Line Shift
• Sweep Speed
• PW-Mode (Gray Map; Post Gain; Baseline Shift; Sweep Speed; Invert Spectral Waveform; Compression; Rejection, Colorized Spectrum; Display Format; Doppler Audio; Angle Correct; Quick Angle Correct, Auto Angle Correct)
• 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, dual, quad sectional or rendered)
 	
Controls Available While “Live”
• Write zoom
• B/M-Mode (Gain; TGC; Dynamic Range; Acoustic Output; Transmission Focus Position; Transmission Focus Number; Line Density 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; Packet Size; Frame Rate Control; CFM Spatial Filter; CFM Frame Averaging; CFM Line Resolution; Frequency/Velocity Baseline Shift)
	Scanning Parameters
	• Displayed Imaging Depth: 0 - 48 cm
	• Minimum Depth of Field: 0 - 1 cm (Zoom) (probe dependent)
	• Maximum Depth of Field: 0 - 48 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°
	
	Image Storage
	• On-board database of patient information from past exams
	• Storage Formats:
	  • DICOM - compressed/ uncompressed, single/ multiframe, with/ without Raw Data
	  • Export JPEG,JPEG2000, WMV MPEG 4 and AVI formats
	• Storage Devices:
	  • USB Flash Device: 64MB to 4GB (for exporting individual images/clips)
	  • CD-R storage: 700MB
	  • DVD storage: -R (4.7GB)
	  • Hard Drive Image Storage: ~350GB
	• Compare old images with current exam
	• Reload of archived data sets
	
	CINE Memory/Image Memory
	• 776 MB 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

B-Mode
- Depth and Distance
- Circumference and Area (Ellipse/Trace)
- Volume (Ellipsoid)
- Angle between 2 Lines
- % Stenosis (Area or Diameter)

M-Mode
- M Depth and Distance
- Time
- Slope
- Heart Rate

Doppler Measurements/Calculations
- Velocity
- Time
- A/B Ratio (Velocities/Frequency Ratio)
- PS (Peak Systole)
- ED (End Diastole)
- PS/ED (PS/ED Ratio)
- ED/PS (ED/PS Ratio)
- AT (Acceleration Time)
- Accel (Acceleration)
- TAMAX (Time Averaged Maximum Velocity)
- Volume Flow [TAMEAN and Vessel Area]
- Heart Rate
- PI (Pulsatility Index)
- RI (Resistivity Index)

Vascular Measurements/Calculations
- Carotid, Vertebral, Subclavian Measurements, Auto IMT
- Summary Reports

Small Part Measurement Analysis
- Koios DS Breast Lesion Decision Support
- Koios DS Thyroid Lesion Decision Support

Obstetrics Measurements/Calculations
- Gestational Age Calculation
- EFW Calculation
- Calculations and Ratios
- Measurements/Calculations
- Fetal Graphical Trending
- Growth Percentiles
- Multi-Gestational Calculation
- Fetal Qualitative Description (Anatomical Survey)
- Fetal Environmental Description (Biophysical profile)
- Programmable OB Tables
- Over 20 selectable OB Calcs
- Expanded Worksheets

Gynecology Measurements/Calculations
- Right/Left Ovary Length, Width, Height
- Uterus Length, Width, Height
- Cervix Length, Trace
- Ovarian Volume
- ENDO (Endometrial thickness)
- Ovarian/Uterine RI
- Summary Report

Urology Calculation
- Bladder, Prostate, Renal, Generic Volume Measurements
- Post-Void Bladder Volume

Cardiology Measurements/Calculations
- Cardiology Measurements and Calculations
- Summary Worksheet
- Summary Report

Table 12-5: Probes

• C1-5-RS [Applications: Abdomen(incl. Pleural), Vascular(No transcranial), OB/GYN, Urology] • C2-7-D [Applications: Abdomen(incl. Pleural)] • 8C-RS [Applications: Pediatrics, Neonatal] • 10C-D [Applications: Neonatal, Pediatric, Vascular(No transcranial)] • E8C-RS [Applications: OB/GYN, Urology, Transvaginal, Transrectal] • E8CS-RS [Applications: OB/GYN(Transvaginal), Urology(Transrectal)] • IC9-RS [Applications: OB/GYN, Urology(Transvaginal, Transrectal)] • BE9CS-RS [Applications: Urology(Transrectal)] • ML6-15-RS [Applications: Small Parts, Vascular(No transcranial), Pediatric, Neonatal, Musculoskeletal] • L3-12-RS [Applications: Abdomen(incl. Pleural), Vascular(No transcranial), Small Parts, Pediatric, Neonatal, Breast] • L4-12t-RS [Applications: Abdomen(incl. Pleural), Small Parts, Vascular(No transcranial), Pediatric, Neonatal, Musculoskeletal, Breast] • 12L-RS [Applications: Small Parts, Vascular(No transcranial), Pediatric, Neonatal, Musculoskeletal] • L6-12-RS [Applications: Abdomen(incl. Pleural), Vascular(No transcranial), Small Parts, Pediatric, Neonatal] • 9L-RS [Applications: Abdomen(incl. Pleural), Small Parts, Vascular(No transcranial), Pediatric]	• L8-18i-RS [Applications: Small Parts, Vascular(No transcranial), Peripheral Vascular, Neonatal, Pediatrics, Intraoperative(Not for China), Musculoskeletal] • 3Sc-RS [Applications: Cardiac, Abdomen(incl. Pleural), Transcranial] • 6S-RS [Applications: Cardiac, Pediatrics, Neonatal] • 12S-RS [Applications: Pediatrics, Neonatal] • RAB2-6-RS [Applications: Abdomen, OB/GYN, Urology] • RIC5-9A-RS [Applications: OB/GYN(Transvaginal), Urology(Transrectal)] • P8D [Applications: Cardiac, Vascular(No transcranial)] • P6D [Applications: Cardiac, Vascular(No transcranial)] • P2D [Applications: Cardiac, Vascular(No transcranial)] • L3-9i-RS* [Applications: Small Parts, Vascular, Musculoskeletal, Intraoperative(Not for China)] • L10-22-RS* [Applications: Small Parts, Musculoskeletal, Neonatal] • 6Tc-RS [Applications: Cardiac(Transesophageal)] • C1-6-D* [Applications: Abdomen(incl. Pleural), OB, Gynecology, Vascular(No transcranial), Urology] • C3-10-D** [Applications: Abdomen(incl. Pleural), Neonatal, Pediatric, Vascular(No transcranial)] • M5Sc-RS** [Applications: Cardiac, Transcranial, Abdomen(incl. Pleural)] • E7C8L-RS (-C: Convex Transducer & -L: Linear Transducer) [Applications: Urology (Transrectal)]

*LOGIQ P10/P9 only

**LOGIQ P10 only

Table 12-6: Biopsy Guides

• Single-Angle, disposable with a reusable bracket • Multi-Angle, disposable with a reusable bracket	• Single-Angle, disposable with a disposable bracket

Table 12-7: Inputs and Outputs Signal

• USB 2.0 x 5 ports, USB 3.0 x 2 ports • HDMI connector	• Ethernet 1000/100/10BaseT • Audio Line Out (1.5mm pin jack)

Table 12-8: Physiological Input Panel (Option)

• Physiological Input
  • ECG 2 lead
  • Dual R-Trigger
  • Pre-settable ECG R Delay Time
  • Pre-settable ECG Position
  • Adjustable ECG Gain Control
	• Automatic Heart Rate Display

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 12-9: System Measurements and Accuracies

Measurement	Units	Useful Range	Accuracy	Limitations or Conditions
Depth	mm	Full Screen	±max (5% or 1 mm)	
Angle	degree	Full Screen	±max (10% or 1deg)	
Distance:				
Axial	mm	Full Screen	±max (5% or 1 mm)	
Lateral	mm	Full Screen	±max (5% or 2 mm)	Linear Probes
Lateral	mm	Full Screen	±max (5% or 4 mm)	Convex Probes
Lateral	mm	Full Screen	±max (5% or 4 mm)	Sector Probes
Circumference:				
Trace	mm	Full Screen	±max (10% or 1 mm)	
Ellipse	mm	Full Screen	±max (5% or 1 mm)	
Area:				
Trace	mm^2	Full Screen	±max (5% or 1 $mm^{2)}$	
Ellipse	mm^2	Full Screen	±max (5% or 1 $mm^{2)}$	
3D Volume Accuracy	cm^3	Full Screen	±max (10% or 1.0 $cm^{3)}$	
Time	s	Timeline Display	±max (5% or 10 ms)	M mode, PWD mode, CWD mode, TVD mode
Slope	mm/s	Timeline Display	±max (5% or 1 mm/s)	M-Mode
Doppler SV Position	mm	Full Screen	±2 mm	PWD mode, TVD mode
Velocity	cm/s	Timeline Display	±max (10% or 1cm/s)	PWD mode, CWD mode, TVD mode

Table 12-9: System Measurements and Accuracies

Measurement	Units	Useful Range	Accuracy	Limitations or Conditions
Doppler Angle Correction	cm/s	From 0-60° From 60-80°	±max (5% or 1deg) ±12%	PWD mode, CWD mode, TVD mode

Clinical Calculation Accuracy

Estimate the overall inaccuracy of a combined measurement and calculation by including the stated inaccuracy from the basic measurement accuracy statements.

Diagnostic errors may result from the inappropriate use of clinical calculations. Review the referenced source of the stated formula or method to become familiar with the intended uses and possible limitations of the calculation.

Calculation formulas and databases are provided as a tool to assist the user, but should not be considered an undisputed database, in making a clinical diagnosis. The user is encouraged to research the literature and judge the equipment capabilities on an ongoing basis in order to assess its utility as a clinical tool.

Privacy and Security

Introduction

Privacy & Security considerations, capabilities and configuration of the LOGIQ P8/P9/P10 Ultrasound System are described in the LOGIQ P8/P9/P10 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 P8/P9/P10 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 P8/P9/P10 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 P8/P9/P10 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 P8/P9/P10 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 P8/P9/P10 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 P8/P9/P10 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 Embedded Standard 7 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 P8/P9/P10 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's Windows Embedded Standard 10 will provide security against malware, especially for a system used in a professinoal, 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 P8/P9/P10 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.

NOTE: How to contac GE : For privacy and security concerns regarding GE HealthCare products: http://www.gehealthcare.com/security

NOTE: Cybersecurity Bill of Material (CBOM) is listed in the software / Utility > System > About page.

Copyrighted Material

Viewing Copyrighted Third Party Software License Information

The LOGIQ P8/P9/P10 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.

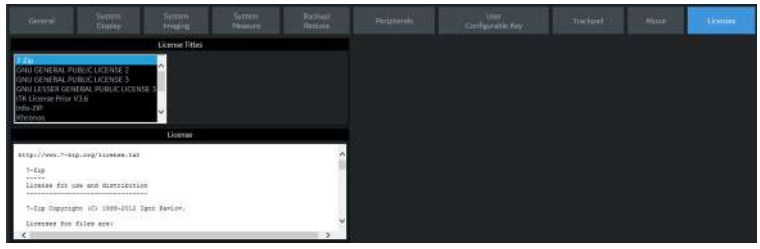


Figure 12-1. Third Party Software License Information

- The selected software license appears in the License window. Use the Set+Trackball to scroll through the license.

System Care and Maintenance

Overview

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 (2012). 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 P8/P9/P10 system and probes is identified in this table:

Table 12-10: Expected Service Life

Equipment / Accessory	Expected Service Life
LOGIQ P8/P9/P10 system	The expected service life for the LOGIQ P8/P9/P10 is at least seven (7) years from the manufacturing date under the provision of regular maintenance by authorized service personnel.
LOGIQ P8/P9/P10 Probes	The expected service life for the LOGIQ P8/P9/P10 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 P8/P9/P10 Instructions for Use.

Maintenance Schedule

Follow this Maintenance Schedule to maintain optimum system function and patient care:

Table 12-11: Maintenance Schedule

Monthly	Weekly	Daily	After Each Patient
Inspect the following on a monthly basis: • 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. • Trackball movement. If the trackball is dusty, please clean it. See 'Trackball' on *page 12-30 for more information.*	Clean the following on a weekly basis: • System Cabinet • Monitor • LCD panel and the Touch Panel • Operator Controls Panel • Probe holder If the probe holder is dusty, please clean it. See 'Probe holder' on *page 12-31 for more information.* • Gel warmer If the gel warmer is dusty, please clean it. See 'Gel warmer' on *page 12-32 for more information.* • Air Filters (weekly, or as needed) If the air filter is dusty, please clean it. See 'Cleaning the air filter' on *page 12-33 for more information.* • Footswitch • B/W Printer • CD/DVD-R Multi Drive	Clean and Disinfect the following areas where Cross Contamination can occur: • Monitor • LCD panel and the Touch Panel • Operator Controls Panel • Front and Rear Handles	Clean and Disinfect the following after each patient: • 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.

NOTE: Frequency of the cleaning and disinfection is depended on environment. Failure to perform required maintenance may result in unnecessary service calls.

DANGER

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

These cleaners/disinfectants can be used anywhere on the console (Operator Panel, Monitor, Probe Holders, etc.), except for the probes. **See 'Probe Cleaning' on *page 12-35 for more 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.

NOTE: Refer to 'Cleaning and disinfecting probes' on page 11-55 for probe cleaning and disinfection information

Appropriate cleaners/disinfectants for the console that have been validated for compatibility are shown below:

Table 12-12: List of approved cleaning and disinfection agents

Components		Probe holder	User interface *	Touch Panel	Monitor display	Housing	Probes	Air Filter	Peripherals (e.g. Printers ...)
When to clean		See 'Maintenance Schedule' on *page 12-20 for more information.*							
Cleaning/disinfection Agent	OXIVIR TB WIPES**	X	X	X	-	X	**See 'Cleaning and disinfecting probes' on *page 11-55 for more information.***	Clean with a vacuum cleaner from the outside	Clean according to the instructions fof the peripheral manufacturer
	Acryl-Des Wipes**	X	X	X	X	X			
	Alcohol (Isopropyl) 70%**	X	X	X	X	X			
	CAVIWIPES 1**	X	X	X	X	X			
	Cleanisept Wipes**	X	X	X	X	X			
	Clinell Clorox Wipes**	X	X	X	X	X			
	Clinell Universal Sanitizing Wipes**	X	X	X	X	X			
	Clorox Healthcare ™ Bleach Germicidal Wipes**	X	X	X	X	X			
	Distel**	X	X	X	X	X			

Table 12-13: List of approved cleaning and disinfection agents

Components		Probe holder	User interface *	Touch Panel	Monitor display	Hou-sing	Probes	Air Filter	Peri-pherals (e.g. Printers ...)
When to clean		See 'Maintenance Schedule' on *page 12-20 for more information.*							
Cleaning/disinfection Agent	Mikrobac® Tissues**	X	X	X	X	X	**See 'Cleaning and disinfecting probes' on *page 11-55 for more information.***	Clean with a vacuum cleaner from the outside	Clean according to the instructions fof the peripheral manufacturer
	Mikrozid® Sensitive Wipes**	X	X	X	X	X			
	PDI Easy Screen Cleaning®**	X	X	X	X	X			
	Protex Ultra Disinfectant Wipes**	X	X	X	X	X			
	Sani-Cloth® Bleach**	X	X	X	X	X			
	Sani-Cloth® HB**	X	X	X	X	X			
	Sani-Cloth® Plus**	X	X	X	X	X			
	Sani-Cloth® Prime**	X	X	X	X	X			
	Septiwipes**	X	X	X	X	X			
	Sodium Hypochlorite 5.25% (Bleach) Diluted 10:1	X	X	X	X	X			
	Sono Ultrasound Wipes**	X	X	X	X	X			
	Super Sani-Cloth®**	X	X	X	X	X			
	Trophon Companion Cleaning Wipes**	X	X	X	X	X			

Cleaning and Disinfecting the system (continued)

X : can be used on the component of the ultrasound console

- : do not use on component of the ultrasound console

** : Wipes can be used directly on console

NOTE: ** Effective cleaning for parts with narrow gaps and holes (e.g. Keyboard, trackball...) is not possible. For more information, visit to http://cleaning.gehealthcare.com/.*

All cleaners and disinfectants **NOT** on this list are **unapproved** by GE. Failure to follow guidelines could result in damage to the device.

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.

To avoid liquids entering the product, **DO NOT** spray any liquid directly onto the surfaces. **ALWAYS** use a cloth or wipe.

Avoid using ALCOHOL (ISOPROPANOL) 70% inside the trackball. ALCOHOL (ISOPROPANOL) 70% may also compromise the durability of the paint used on the console controls.

Oxivir TB Wipes may compromise the durability of the paintused on the console handles and controls.

Cleaning the system

Prior to cleaning any parts of the system:

The system includes the System enclosure, Monitor, LCD panel, Touch Panel, Operator Control Panel and Probe Holders. For Probes processing, **See 'Probe Cleaning' on *page 12-35 for more information.***

Always clean visible soil from surfaces first before disinfecting the system.

Follow the cleaning/disinfecting frequency suggested in 'Maintenance Schedule' on *page 12-20*.

To clean the system,

1. Turn off the system power. If possible, disconnect the power cord.
2. 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 system.*

NOTE: *Refer to See 'Cleaning and Disinfecting the system' on page 12-21 for a list of acceptable solutions to be used on the Console.*

NOTE: Use a gentle wiping action to clean any surface on the console.

HINTS

A scrubbing action with the wipe may be necessary to remove stubborn soil from the surfaces. However be careful with this action over cervices 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 system

For disinfectants to be effective, the surface must first be clean. Refer to ‘Cleaning the system’ on *page 12-25*.

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 12-20*.

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 non-linting 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 cervices 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.

System Cabinet

To clean and disinfect the system cabinet:

1. Moisten a soft, non-linting folded cloth with a mild, general purpose, non-abrasive soap and water solution.

NOTE: For disinfection processing, refer to 'Disinfecting the system' on page 12-26

NOTE: The cloth should be damp, not dripping wet.

2. Wipe down the top, front, back, and both sides of the system cabinet.
3. Wipe off excess cleaning agents.

NOTE: Do not spray any liquid directly into the unit.

Monitor

To clean and disinfect the Monitor:

1. Moisten a soft, non-linting cloth folded cloth with a mild, general purpose, non-abrasive soap and water solution.

NOTE: For disinfection processing, refer to 'Disinfecting the system' on page 12-26

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 or methanol), abrasive cleaners, or other strong solvents, as these may cause damage.

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.

LCD Monitor and Touch Panel

To clean and disinfect the LCD panel and the Touch Panel:

1. The surface can be cleaned with a non-linting cloth and soft cloth, such as cloths for cleaning glasses.

NOTE: For disinfection processing, refer to ‘Disinfecting the system’ on page 12-26

2. If necessary, stubborn stains can be removed by moistening part of a cloth with water to enhance its cleaning power.

NOTE: Never use thinner, benzene, alcohol (ethanol or methanol), abrasive cleaners, or other strong solvents, as these may cause damage.

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 Control Panel

To clean and disinfect the operator control panel:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.

NOTE: For disinfection processing, refer to 'Disinfecting the system' on page 12-26

2. Wipe down operator control panel.
3. Use a cotton swab to clean around keys or controls. Use a toothpick to remove solids from between keys and controls.
4. Wipe off excess cleaning agents.

NOTE: When cleaning the operator control panel, make sure not to spill or spray any liquid on the controls, into the system cabinet, or in the probe connection receptacle.

NOTE: In case of SARS, use bleach, alcohol, or Cidex in a normal diluted form for cleaning/disinfecting the operator panel.

NOTE: DO NOT use T-spray or Sani Wipes on the control panel.

CAUTION Before cleaning the control panel, make sure the key cap is firmly in place.

NOTE: The cloth should be damp, not dripping wet.

Footswitch

To clean and disinfect the footswitch:

1. Disconnect the footswitch from the system.

NOTE: For disinfection processing, refer to 'Disinfecting the system' on page 12-26

2. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
3. Wipe the external surfaces of the unit then dry with a soft, clean, cloth.
4. Wipe off excess cleaning agents.

Trackball

To clean and disinfect the Trackball:

1. Power off the system.
2. Rotate the retainer counterclockwise until it can be removed from the keyboard.

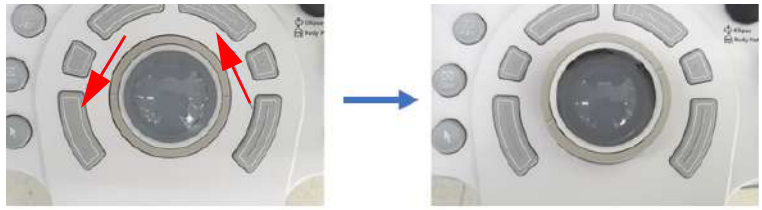


Figure 12-2. Remove the retainer

3. Separate the trackball and the retainer. Wipe off any oil or dust from the trackball, retainer and the trackball housing using a cleaner or cotton swab.

NOTE: *For disinfection processing, refer to ‘Disinfecting the system’ on page 12-26*

4. Wipe off excess cleaning agents.
5. Assemble the trackball and retainer, then put it into the housing and rotate it clockwise until its notches are set in position.

CAUTION

When cleaning, make sure not to spill or spray any liquid into the trackball housing (keyboard or system).

Probe holder

To clean and disinfect the Probe holder:

1. Remove the holder.

Figure 12-3. Remove the holder

2. Wash the holder with mild soap in lukewarm water. Scrub it using a soft sponge, gauze, or cloth to remove all visible residue from the surface. Prolonged soaking or scrubbing with a soft bristle brush (such as a toothbrush) may be necessary if material has dried onto the surface.
3. Rinse the holder with enough water.

NOTE: *For disinfection processing, refer to ‘Disinfecting the system’ on page 12-26*

4. Dry with a soft cloth and put it back.

Gel warmer

To clean and disinfect the Gel warmer:

NOTE: Gel Warmer is expected to be cleaned when dust or other debris cumulates.

1. Remove the screw-on lid of the bottom.

Figure 12-4. Gel warmer cap

2. Wipe inside of the gel warmer with soft cloth.
3. Wash the cap with mild soap in lukewarm water. Rinse the cap with enough water.

NOTE: For disinfection processing, refer to 'Disinfecting the system' on page 12-26

4. Dry with a soft cloth and put it back.

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 weekly, but the requirements will vary due to your system use.

CAUTION

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

To clean the air filter:

1. Pull the front cover of cabinet with hand and pull out the air filter.

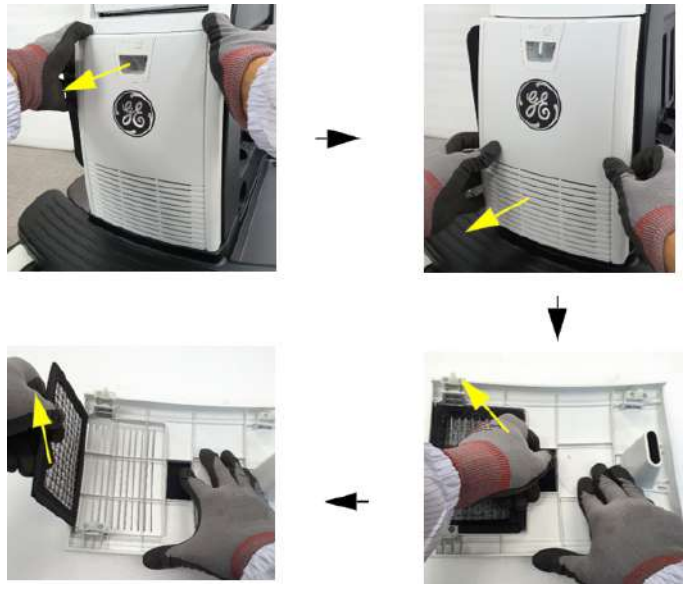


Figure 12-5. Air filter location

Cleaning (continued)

2. Pull out the filter

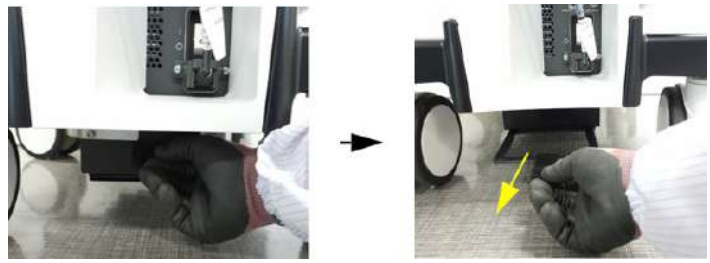


Figure 12-6. Air filter location

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 and the front cover.

Probe Cleaning

Refer to the Probes Chapter, for probe cleaning and disinfecting instructions.

NOTE: The image of the system that is shown in this section could look different from the real system.

CAUTION

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. Overspray can damage the TGC controls.

Figure 12-7. DO NOT Spray a Probe While in its Holder

Probe Cleaning (continued)

If you use a spray cleaner, spray AWAY from the Ultrasound system.

Figure 12-8. Spray Probes AWAY from the Ultrasound System

If you are cleaning/disinfecting probes while they are on the Ultrasound system, use a wipe cleaner/disinfectant instead.

Figure 12-9. Using a Wipe to Clean/Disinfect a Probe

Prevention of static electricity interference

Interference from static electricity can damage electronic components in the system. The following measures help to reduce the likelihood of electrostatic discharge:

- Wipe the alphanumeric keyboard and monitor with lint-free tissue or a soft cloth dampened with anti-static spray on a monthly basis.
- Spray carpets with anti-static spray because constant walking on carpets in or near the scanning room may be a source of static electricity.

Disposal

Table 12-14: WEEE symbol

	Rear of the system Probe connector

Disposal of Old Electrical & Electronic Equipment (applicable in the European Union and other European countries with separate collection systems). This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Battery Replacement and Disposal

Battery replacement every two years is recommended. Contact a local Service Representative for the replacement of the battery.

Power Assistant uses a Lithium Ion battery. Used battery will require to discard as chemical waste. Please contact your local authority for the directions

NOTE: WHEN REMOVING A DEFECTIVE BATTERY, ENSURE THAT IT IS DISPOSED OF IN ACCORDANCE WITH LOCAL REGULATIONS. ALTERNATIVELY, FORWARD IT TO GE MEDICAL SYSTEMS FOR PROPER DISPOSAL.

Troubleshooting

Refer to the LOGIQ P8/P9/P10 Service Manual if other messages appear on the monitor display.

Table 12-15: Error message and workaround

	The system has detected the lower air filter requires cleaning. Please clean the lower filter. 1. Shutdown the system. 2. Clean the air filter according to ‘Cleaning the air filter’ on *page 12-33* .
	System temperature is too high. System will shut down. 1. Shutdown the system. 2. Clean the air filter according to ‘Cleaning the air filter’ on *page 12-33* .
	System voltage fault. System will shut down. 1. Select ***OK*** and reboot the system. 2. If the same message appears after reboot, shut down the system and turn off the breaker. Then turn on the system according to ‘Power On’ on page 3-31.
	System Error. Please reboot the system. 1. Select ***OK*** and reboot the system. 2. If the same message appears after reboot, shut down the system and turn off the breaker. Then turn on the system according to ‘Power On’ on page 3-31.

Image Quality Check

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. Map the IQC to the location you want it to appear on the Touch Panel.
4. Map the IQC to the location you want it to appear on the Touch Panel.
5. Select Model. Then select IQC.

Quality Assurance

Introduction

A good Quality Assurance Evaluation program consists of periodic systematic actions that provide the user with adequate confidence that their diagnostic ultrasound system will produce consistently high quality images and quantitative information.

Therefore, it is in the best interests of every ultrasound user to routinely monitor equipment performance.

The frequency of Quality Assurance evaluations should be based on user's specific needs and clinical practice.

Periodic monitoring is essential in order to detect the performance changes that occur through normal aging of system components. Routine equipment evaluations may also reduce the duration of exams, number of repeat exams, and maintenance time required.

For details on system and peripheral routine preventive maintenance instructions, See ‘System Care and Maintenance’ on *page 12-19 for more information.*

Typical Tests to Perform

Quality assurance measurements provide results relating to system performance. Typically these are:

- Axial Measurement Accuracy
- Lateral Measurement Accuracy
- Axial and Lateral Resolution
- Penetration
- Functional & Contrast Resolution
- Gray Scale Photography.

With these tests, a performance baseline can be set at installation with the phantom in your department. Future test results can be compared to the baseline in order to maintain a record of system performance trends.

Frequency of tests

Quality assurance tests are used to determine whether a scanner is providing the same level of performance from day to day.

The frequency of testing varies with the amount of system usage and modes to be tested. It is recommended that the user perform quality assurance tests at least every three months or every 400 patient studies. Tests should also be performed when a question about system performance exists.

A mobile system may require more frequent tests.

Image quality should also be tested immediately after the following events:

- Service calls
- System upgrades/modifications
- Dropped probe, power surge, etc.

Phantoms

Quality Assurance Evaluations 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.

Doppler phantoms are currently expensive and complicated to deal with on the user level. If a problem with any Doppler parameters or measurement is suspected, contact a local service representative for evaluation.

The RMI 403GS phantom is shown in the illustration below as a representative example of a phantom.

Phantoms (continued)

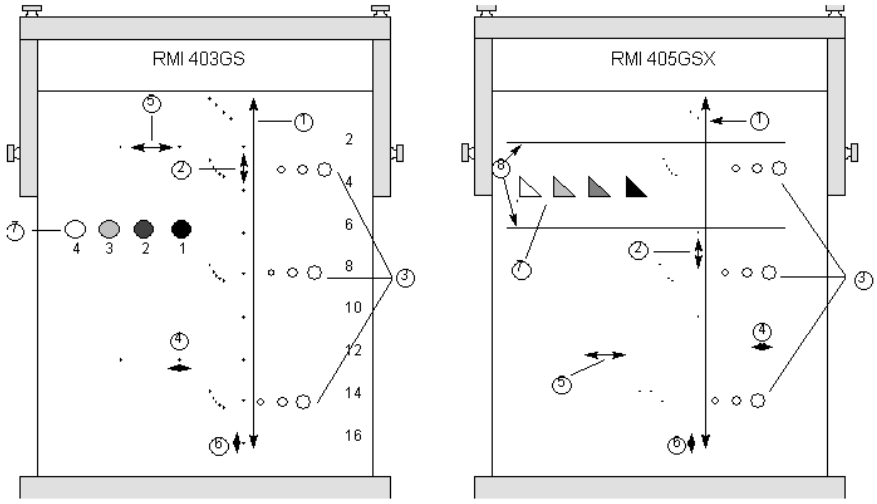


Figure 12-10. Representative Phantom Example

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 12-10 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 12-10 for more information.

Benefit

The purpose is the same as vertical measurements. Precisely-spaced horizontal pin targets are scanned and results compared to the known distance in the phantom.

Method

Lateral distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths of fields of view can be tested.

Procedure

To measure lateral distance:

1. Scan a test phantom with precisely-spaced horizontal pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets from side to side.
2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.
3. Scan the horizontal pins in zoom or at different depth/scale factors.
4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.
5. Document the measurements for reference and future comparison.

Contact a Service Engineer if horizontal measurements differ by more than 3mm or 3% of that depth, whichever is greater.

Axial resolution

Descprition

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 12-10 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 12-10 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 12-10 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 12-10 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 12-10 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 12-10 for more information.

Benefit

When photographic controls and film processors are properly adjusted, weak echoes, as well as strong echoes, are accurately recorded on film.

Procedure

1. Adjust the camera according to the manufacturer's instructions until the hard copy and video display are equal.
2. Scan the phantom and it's echogenic contrast targets.
3. Make a hard copy photograph of the display and compare it to the image on the video monitor for contrast and weak echo display.
4. Document all results for future reference and comparison.

Contact a Service Engineer if camera cannot duplicate what is on the image monitor.

NOTE: Optimization of brightness/contrast controls on the display monitor is imperative in order to make sure that the hardcopy and monitor look alike.

The display monitor is adjusted first. The hardcopy camera or printer is adjusted to match the display monitor.

Setting up a Record Keeping System

Preparation

The following is needed:

- Quality Assurance binder.
- Hard copy or electronic file of images.
- Quality Assurance Checklists.
- Display the following information while testing quality assurance:
  - Acoustic Output
  - Gain
  - Depth
  - Probe
  - Dynamic Range
  - Set up new patient to be the name of the test.
- Annotate the following:
  - Any control where its value is **NOT** displayed.
  - Significant phantom information.

Record Keeping

Complete the following:

1. Fill out the Ultrasound Quality Assurance Checklist for each probe, as scheduled.
2. Make a hard copy or archive the image.
3. Compare images to baseline images and acceptable values.
4. Evaluate trends over previous test periods.
5. File hard copy or electronic file of images and checklist in Quality Assurance binder.

Ultrasound Quality Assurance Checklist

Table 12-16: 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 12-17: (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						

Assistance

Supplies/Accessories

CAUTION

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

CAUTION

Use only GE approved internal equipment when replacing an internal peripheral.

The user or the operator should never install/replace the internal peripheral. Service representatives authorized by GEHC will install/replace the internal peripheral.

Not all features 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 2million/5million number part numbers, these are service replacement part numbers that may be either new or refurbished. 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 12-18: Peripherals and Accessories

Accessory
Sony B/W Printer Model UP-D898
Sony Color Printer Model UP-D25MD
DVR
UVC
Digital expert

ECG Accessories

Table 12-19: ECG Accessories

Accessory
ECG module
ECG cable - AHA type
ECG cable - IEC type

Console

Table 12-20: Console Accessories

Accessory
Footswitch
Endocavity Probe Holder
Optional Probe Holder
Side Tray
Low cabinet
High cabinet
Side cabinet
Greek Keyboard
Russian Keyboard
English keyboard
French keyboard
German keyboard
Norwegian/Danish Keyboard
Swedish Keyboard
Power Cord - US
Power Cord - Argentina
Power Cord - Italy
Power Cord - UK-Ireland
Power Cord - Switzerland
Power Cord - Denmark
Power Cord - Israel
Power Cord - Japan
Power Cord - China
Power Cord - Australia
Power Cord - India
Power Cord - Taiwan
Power Cord - South Africa
Power Cord - Brazil

Probes

Table 12-21: Probes and Accessories

Probe	Biopsy Guide
C1-5-RS	Multi Angle, Disposable with a Reusable Bracket
E8C-RS	Single Angle, Disposable with a Plastic Bracket or Reusable with a Stainless Steel Bracket
L8-18i-RS	Not Available
9L-RS	Multi Angle, Disposable with a Reusable Bracket
P8D	Not Available
12L-RS	Multi Angle, Disposable with a Reusable Bracket Infinite-angle (in plane biopsy kit), Disposable with a Reusable Bracket Transverse Bracket (off plane biopsy kit), Disposable with a Reusable Bracket
ML6-15-RS	Multi Angle, Disposable with a Reusable Bracket
3Sc-RS	Multi Angle, Disposable with a Reusable Bracket
RAB2-6-RS	Single Angle, Disposable with a Reusable Bracket, Single angle reusable
8C-RS	Not Available
6S-RS	Not Available
L6-12-RS	Multi Angle, Disposable with a Reusable Bracket
RIC5-9A-RS	Single Angle, Disposable with a Plastic Bracket or Reusable with a Stainless Steel Bracket
BE9CS-RS	Single Angle, Disposable with a Plastic Bracket or Reusable with a Stainless Steel Bracket
E8CS-RS	Single Angle, Disposable with a Plastic Bracket or Reusable with a Stainless Steel Bracket
L4-12t-RS	Multi Angle, Disposable with a Reusable Bracket Infinite-angle (in plane biopsy kit), Disposable with a Reusable Bracket Transverse Bracket (off plane biopsy kit), Disposable with a Reusable Bracket
L10-22-RS	Not Available
L3-9i-RS	Not Available
12S-RS	Not Available
P6D	Not Available
L3-12-RS	Multi Angle Bracket

Table 12-21: Probes and Accessories (Continued)

Probe		Biopsy Guide
6Tc-RS		Not Available
P2D		Not Available
IC9-RS		Reusable, Disposable Bracket
C1-6-D		Multi-Angle, Disposable wih a Reusable Bracket
C2-7-D		Multi-Angle, Disposable with a Reusable Bracket Multi-Angle, Reusable with a Stainless Steel Bracket
C3-10-D		Not Available
10C-D		Not Available
M5Sc-RS		Multi-Angle, Disposable with a Reusable Bracket
E7C8L-RS	• Multi-Purpose Workstation Stepper • Classic Stepper • EX3™ Stepper	Fixed-angle(GRID), Disposable with a Reusable Bracket (GRID: Disposable)
	ERB7 BIOPSY ATTACHMENT kit	Multi-Angle, Reusable

Options

Table 12-22: Options

Accessory
LOGIQView
Contrast Enhanced Ultrasound*
Scan Assistant
DICOM 3.0 connectivity
Report Writer
Real time 4D
4D with VCI
VOCAL II (Volume Calculation)
Tomographic Ultrasound Imaging
Continuous Wave (CW)
Tissue Velocity Imaging (TVI)
Elastography
Elastography Quantification (Not available in the USA)
Advanced 3D
B-Flow
Auto IMT
Flow Quantification
Stress Echo
B Steer+
ECG
SW DVR
Footswitch
Auto EF
Advanced 3D
Volume Contrast Imaging (VCI)
STIC
Omniview
HD Live
Wireless Lan (WLAN)

Table 12-22: Options (Continued)

Accessory
Digital Video Recording Software (Software DVR)
Digital Video Recording Software (Software DVR Basic)
LOGIQ Apps
Bluetooth
Compare Assistant
Breast Productivity Package
Thyroid Productivity Package
OB Measure Assistant
Breast Measure Assistant
Video Scan Converter
Automated Function Imaging
Shear Wave Elastography
Koios Breast Lesion Decision Support
Koios Thyroid Lesion Decision Support
Ultrasound Guided Attenuation Parameter (UGAP)
SonoAVC
SonoNT/IT
Ethernet protection cable (Not for China)
Barcode reader (Not for China)
*The LOGIQ P8/P9/P10 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.

Chapter 13

Advanced Features

This chapter consists of information about System Options.

List of Advanced Features

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NOTE: The following features are an option. If these options are not installed, the button/key are disabled or not displayed.

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  - 'LOGIQView' on *page 13-4*
  - 'B Steer+ (Option)' on *page 13-7*
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B-Mode Option

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.

LOGIQView (continued)

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*** (Left 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 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.

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 10% or 4mm of the distance you measured for all linear probes.*

LOGIQView (continued)

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+ (Option)

Description

B Steer+ allows you to obtain better biopsy (needle) imaging without slanting the B Mode image. B Steer+ is operable in B mode, Color Flow mode, PDI mode or GT mode. B Steer+ is available with all linear probes and following convex probes: C1-5-RS, 8C-RS, RAB2-6-RS, C1-6-D, C2-7-D, C3-10-D and 10C-D.

Benefits

B Steer+ provides better biopsy visualization compared to normal B Mode image. B Steer+ allows you to adjust beam angle and needle gain to achieve best biopsy image without changing B mode image.

Activating

To acivate B Steer+ in B mode, press left or right key. To activate B Steer+ in B mode or Color flow mode or PDI mode or GT mode, press user-difined hard key after assigning the key to B Steer+ in Utility -> System -> User Configurable Key -> User Defined hard key.

NOTE: Activating B Steer+ may decrease frame rate.

NOTE: B Steer+ user-defined key activates B Steer+ even when "Enable B Steer+" preset is off

Using B Steer+

To optimize biopsy image using B Steer+ functionality, adjust B Steer+ beam direction, angle and needle gain.

Adjust B Steer+ beam direction and angle to make biopsy and beam angle as perpendicular as possible. B Steer+ beam direction and angle are selectable using the direction and angle buttons on the touch panel (supporting 20, 30, 40 and 50 degree for linear probes, 10, 20, 30, 40 degree for following four convex probes: C1-5-RS, 8C-RS, RAB2-6-RS, C1-6-D, C2-7-D, C3-10-D and 10C-D)

Adjust Needle Gain and find best brightness for biopsy. Needle Gain is adjustable using the Needle Gain rotary (range from 0 to 100).

Turn on B Steer+ Dynamic FOV preset option that helps you to achieve better biopsy visualization when your biopsy and beam angle are not perpendicular enough. B Steer+ Dynamic FOV is selectable in Utility -> Imaging -> B Tab.

NOTE: Turning on B Steer+ Dynamic FOV preset option may decrease frame rate.

B Steer+ (Option) (continued)

Select Needle Thickness preset option to make biopsy visualized thin or thick. B Steer+ Needle Thickness is selectable in Utility -> Imaging -> B Tab.

B Steer+ values (including enable/disable, beam direction, angle and Needle Gain) are returned to factory default values or user preset values when you change: Probe, Exam Category, Exam Calcs or New Patient.

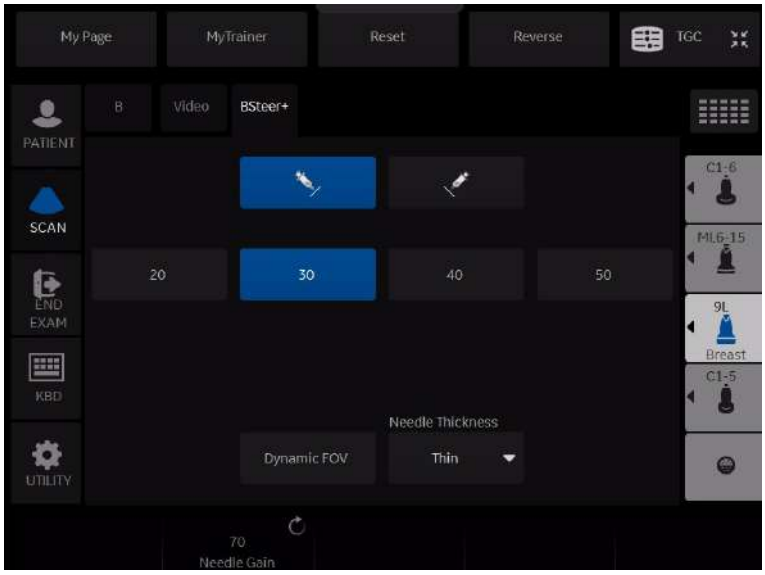


Figure 13-1. B Steer+ Tab in Touch Panel

Preset

B Steer+ Enable/Disable - preset via Utility -> Imaging -> General.

B Steer+ Beam Direction - preset via Utility -> Imaging -> B Tab.

B Steer+ Beam Angle - preset via Utility -> Imaging -> B Tab.

B Steer+ Needle Gain - preset via Utility -> Imaging -> B Tab.

B Steer+ Dynamic FOV - preset via Utility -> Imaging -> B Tab.

B Steer+ Needle Thickness - preset via Utility -> Imaging -> B Tab.

B Steer+ (Option) (continued)

Bioeffects

Activating B Steer+ may change the TI and/or MI. Observe the output display for possible effects.

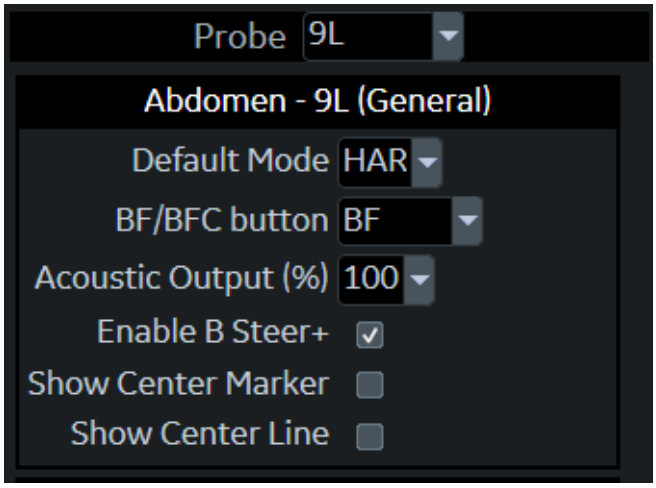


Figure 13-2. Enable B Steer+

Figure 13-3. B Steer+ Preset+

Biplane (BE9CS-RS probe)

Description BE9CS-RS probe can scan and display both the longitudinal and the transverse planes simultaneously.

NOTE: When displaying single plane, pressing the button on the probe toggles scan plane between the longitudinal and the transverse. When scanning biplanes, pressing the button exits biplane and displays only the longitudinal scan plane.

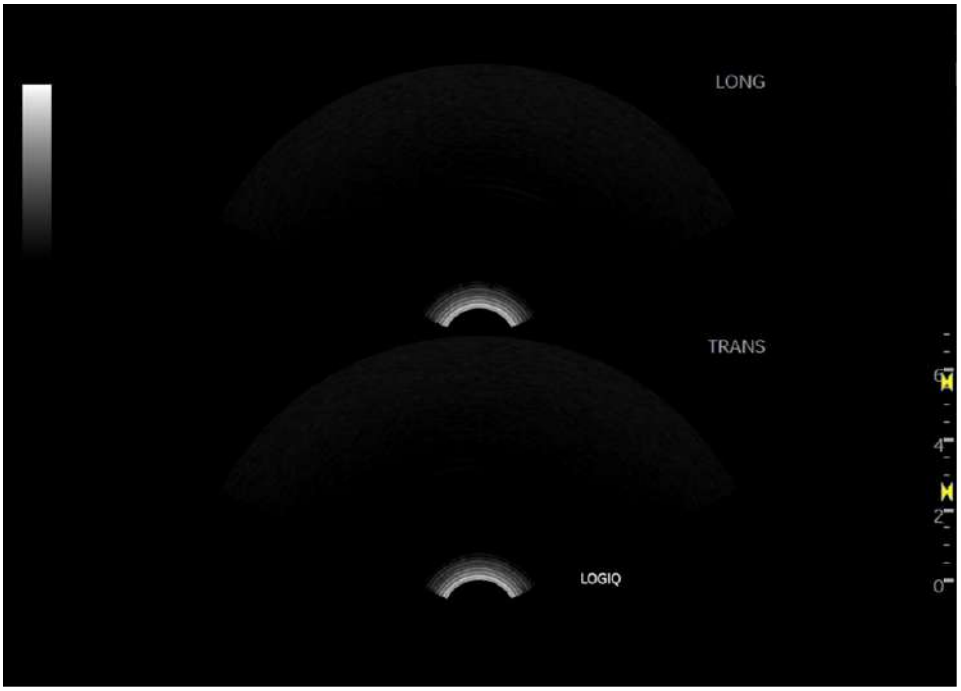


Figure 13-4. Biplane Image Display (Example)

Biplane (BE9CS-RS probe) (continued)

Values On/Off.

To activate Biplane, select Biplane on the 2nd Touch Panel page of B, CF and PDI.

NOTE: Only the longitudinal plane can scan CF and PDI during Biplane.

Preset User Configurable key can activate/deactivate Biplane. Assign "Biplane" to the key in Utility -> System -> User Configurable Key.

BE9CS-RS can start Biplane scan as default. Check "Start with Biplane" in Utility -> Imaging -> B.

Biplane can display two planes side by side. Check "Horizontal Display for Biplane" in Utility -> Application -> Settings -> Image Control & Display.

BE9CS-RS Probe Changing Scan Method

Changing scan methods between two micro-convex. Press the switch on the BE9CS-RS probe.

Figure 13-5. Switching button

a. Switching button

Figure 13-6. Scan plane orientation

a. Longitudinal scan plane
b. Transverse scan plane

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.

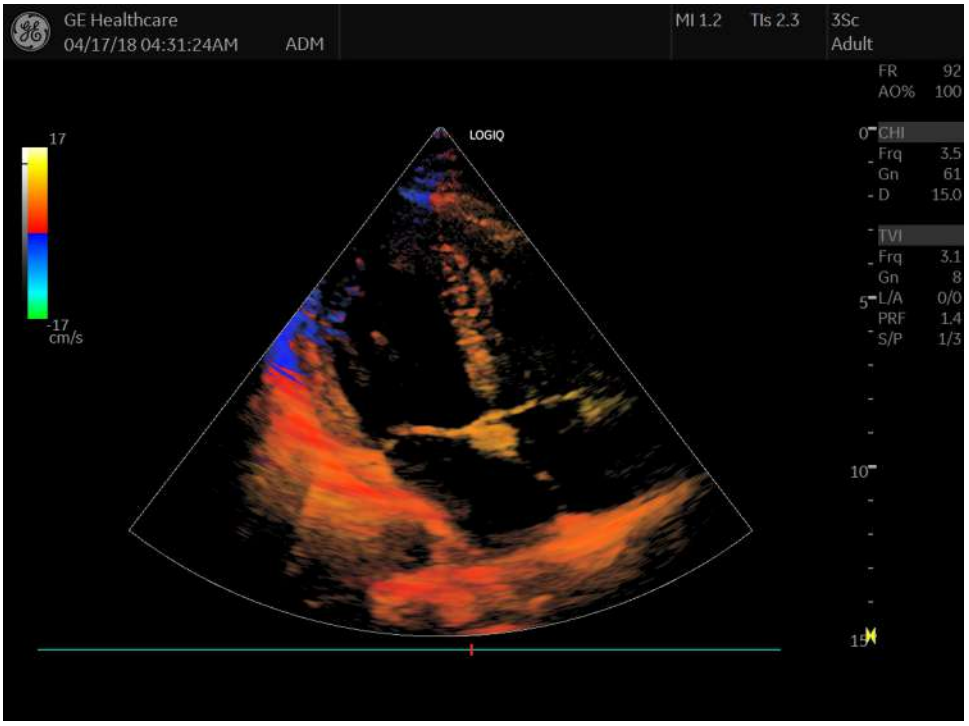


Figure 13-7. Tissue Velocity Imaging Display

Activating TVI

1. Select the desired probe.
2. While in B-Mode, press the **TVI** key. The TVI image and the Touch Panel display.

   While in TVI, press **M** to activate TVM.

   While in TVI, press **PW** to activate TVD.
3. Use the trackball (assigned function: Pos) to position the ROI frame over the area to be examined.
4. Use the trackball (assigned function: Size) to adjust the dimension of the ROI.

Optimizing TVI

The use of preset gives optimum performance with minimum adjustment. If necessary, the following controls can be adjusted to further optimize the TVI display:

- To reduce quantification noise (variance), the Nyquist limit should be as low as possible, without creating aliasing. To reduce the Nyquist limit: Reduce the Scale value.

NOTE: The Scale value also affects the frame rate. There is a trade off between the frame rate and quantification noise.

- TVI provides velocity information only in the beam direction. The apical view typically provides the best window since the beams are then approximately aligned to the longitudinal direction of the myocardium (except near the apex). To obtain radial or circumferential tissue velocities, a parasternal view must be used. However, from this window the beam cannot be aligned to the muscle for all the parts of the ventricle.

NOTE: PW will be optimized for Tissue Velocities when activated from inside TVI.

*NOTE: You can preset the value on the Utility -> Imaging -> TVI or TVD mode and press **Save**.*

TVI

You can preset all parameters in Utility -> Imaging ->TVI.

The TVI parameters function the same as those described in the Color Flow specific section. The only differences would be that it pertains to tissue velocity rather than the color flow image. In the table below any TVI parameter or parameter specifics are noted.

About optimizing other parameters, see ‘Optimizing Color Flow’ on *page 5-44* for details.

Table 13-1: 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.
Line Density	0 or 1. Optimizes B-Mode frame rate or spatial resolution for the best possible image.
Map	Values: TV1 and TV2.
Threshold	High values display more color. Low values limit the color to lower tissue echo (Opposite of Threshold in Color Flow Mode).
Spatial Filter	Values 0, 1 and 2.
TVI Gain	Control color transparency. High values display more color; low values display more tissue. This parameter is assigned to the Color Gain control.

TVM Parameters

About optimizing other parameters, see ‘Optimizing M-Mode’ on *page 5-38 for more information*.

Axial Filter

Description	Smooths out the color, makes it look less pixely.
Adjusting	Press left or right arrow key to select the value.
Values	0, 1 or 2.
Benefits	Smooths the image.

TVD Parameters

About optimizing other parameters, see ‘Optimizing Spectral Doppler’ on *page 5-64* for details.

Contrast Imaging

Overview

Appropriate training

Only physicians or echo technicians who have received appropriate training can use the Contrast applications.

Misdiagnosis based on image artifacts

Misdiagnosis in ultrasound contrast images may be caused by several artifacts, most importantly:

Motion artifacts: gives rise to signals independently of contrast presence. This may be caused by patient movement; including respiration, or by probe movement influenced by the operator.

Regional drop outs: caused by unintentional destruction of the contrast agent, too low concentration of contrast agent, poor acoustic penetration due to rib/lung shadows or system failing to detect the contrast agent due to erroneous settings induced by the operator.

Tissue harmonics: gives contrast-like signals independently of the presence of contrast agent.

Cardiac rhythm disturbances during perfusion studies using gas ultrasound contrast agents have been observed in the diagnostic range of Mechanical Index (MI) values. See the specific package insert for the contrast agent being used for details.

Overview (continued)

CAUTION Read and follow contrast agent instructions provided by the manufacturer.

NOTE: The LOGIQ P8/P9/P10 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.

Contrast Imaging Overview

Benefits	Injected contrast agents re-emit incident acoustic energy at a harmonic frequency much more efficiently than the surrounding tissue. Blood containing the contrast agent stands out brightly against a dark background of normal tissue.
Clinical Use	Possible clinical uses are to detect and characterize tumors of the liver, kidney, and pancreas and to enhance flow signals in the determination of stenosis or thrombus.
Affect on other controls	The default acoustic output adjusts for contrast imaging and the Power Output key provides more subtle gradations for use while in contrast imaging. When you exit Contrast Imaging, the system returns the acoustic output to its original setting. When you reactivate Contrast Imaging, the system enters the default Contrast Mode. Most system controls are available (Depth, Zoom, Colorize, etc.). However, some controls are not available (Anatomical M Mode, 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.
Feature Availability	Multi Image and LOGIQView are not available.

Mode

Reference Mode

Reference (Ref) Mode is to image the anatomical reference, not the contrast enhancement.

Contrast Mode

There are several contrast imaging techniques. Note that the appropriate imaging technique may vary by agent and application. In other words, the imaging technique is not dedicated for the agent and vice versa.

Parameters

You can be preset almost controls in the Utility --> Imaging --> CON or Ref Tab.

Contrast Tech.

Description Select the active contrast acquisition mode. “HRes”, “AM”, and “CHA”

Table 13-2: Available Contrast Techniques

Label	Description	Clinical Use
HRes	The main purpose of HRes mode is to image the harmonic signal from the contrast agent. This mode transmits two consecutive pulses with inverted polarity as a contrast transmit group. The received signals are summed to cancel the fundamental (i.e. linear) responses and then the non-linear harmonic responses are extracted.	Harmonic - perfusion, tumor flow characteristics
Coded Harmonic Angio (CHA)	The main purpose of CHA mode is to image the non-linear signal from the contrast agent with strong tissue suppression. This mode transmits four consecutive pulses with alternate polarity (i.e. two pairs of Phase Inversion) as a contrast transmit group.	Vascular, early phase imaging
Amplitude Modulation (AM)	The main purpose of AM mode is to image the non-linear signal from the contrast agent. This mode transmits two or more consecutive pulses with the different amplitude as a contrast transmit group. The received signals are summed with the different coefficients to cancel the linear responses and then the non-linear responses are extracted.	Tumor detection and characterization

NOTE: The available options for the Contrast Tech. is depend on the supported contrast acquisition mode for the active probe.

Parameters (continued)

Single View/Dual View

Description

Single View displays the active Contrast image only.

Dual View displays the active Contrast image and the reference image simultaneously.

Visualization

Description

Define the display technique.

Values

- **Contrast**. Displays the contrast-enhanced image.
- **Tissue**. Displays the tissue image.
- **Hybrid Contrast**. Displays the contrast-enhanced image and the tissue image using Hybrid Map.

Visualization/Map Indication

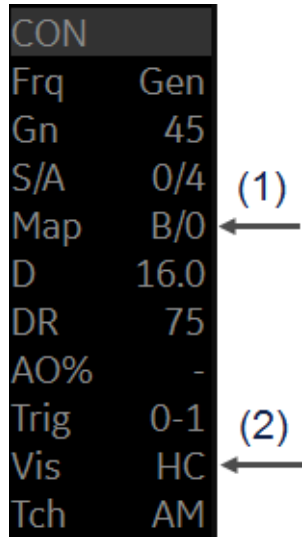


Figure 13-8. Imaging parameter

1. Gray/Colorize Map for current visualization.
2. Visualization: C=Contrast, T=Tissue, HC=Hybrid Contrast

Parameters (continued)

Hybrid Map

Description Select the hybrid map for the Hybrid Contrast visualization in the Dual/Hybrid Display.

Gray Map

Description You can select a map for the contrast image and reference tissue image independently.

Adjusting Press ***Gray Map*** and select the map in each tab.

Contrast Color

Description Select the color map for the Contrast mode image.

Adjusting Press ***Colorize*** and select the map.

Contrast only

Description Only transmit and receive the acoustic power signal for the contrast-enhanced image.

Adjusting Press ***Contrast Only***.

Parameters (continued)

Frequency

Description Select frequency type for each contrast technique.

Adjusting Frequency can be preset in the Utility -> Imaging -> CON.

- Frequency (AM): Res, Gen, Pen
- Frequency (HRes): Gen

Sonazoid

Description If you use Sonazoid for Contrast agent, you have to check Sonazoid in Utility -> Imaging -> CON.

Target MI

Description Target MI Control provides the automated adjustment of the acoustic output to keep the specified target MI value to reduce the unexpected results on the contrast exam.

Target MI control can be preset in the Utility -> Imaging -> CON and Ref.

NOTE: The value of Target MI for Reference Image is adjustable on Ref tab, only when Ref-Only mode.

Accumulation

Description Accumulation enhances the flow in an image.

If Accumulation is turned off, then Frame Averaging is used; if Accumulation value is set, then Accumulation is used.

Availability Available in Contrast, Color Flow, PDI, and B-Flow.

Benefit Accumulation detects the maximum signal and holds it for the level specified.

Parameters (continued)

Max (Maximum) Enhance

Description Sets the acoustic output to its maximum setting (100%)

Values On/Off. When you deactivate Max Enhance, the acoustic output is returned to its previous setting. Max Enhance is deactivated by the system when you turn it off, change probes, or change the contrast technique.

Benefits This control provides quick transition to High MI imaging. This allows the user a quick one-button push to destroy the agent. Useful when the user is interested in the bubble wash-in characteristics of the anatomy being scanned.

Trigger

Description The Contrast Trigger scans images at set intervals, delaying imaging according to the time delay that you specify.

Adjusting On/Off. Press **Trigger** assigned rotary.

Time Delay

Description The Contrast Trigger scans images at set intervals, delaying imaging according to the time delay that you specify.

Adjusting Press **Trigger** to activate **Time Delay** (select the interval of the interval timer triggered acquisition). Move the rotary up/down to select the index.

Set the default seconds of Time Delay in Utility -> Imaging -> Con.

Parameters (continued)

Flash

Description

This feature provides a way to expose the higher acoustic power for a specified time duration by pressing a control once.

Adjusting

Press ***Flash***.

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.

Parameters (continued)

Contrast Clock (Timer)

Description

You can use the Contrast Clock by activating it at the time of injection and deactivating it at the end of the exam.

Two timers can be displayed on the bottom-left corner in image area and info area for several injection.

NOTE: You can also configure the system to perform a countdown for the contrast injection with the Utility -> System -> System Imaging -> Countdown Time for Contrast preset.

Adjusting

- Press ***Contrast Clock 1*** to start/stop the T1 timer.
- Press ***Contrast Clock 2*** to start/stop the T2 timer.

Display

There are two areas on the screen where the Contrast Clock displays: on the image and on the lower, left-hand portion of the display. The timer on the image freezes when you freeze the image (the timer updates when you unfreeze the image). However, the timer located on the lower, left-hand portion of the display continues to display over a freeze, probe change, mode change, multi image, and zoom.

The timer also appears on CINE Loops and archived images.

Benefits

The Contrast Clock measures the time since injection.

You can save the data of contrast clock to an external file by using Export Traces of TIC.

1. Press **Freeze**. Scroll with the Trackball to show Cine tab.
2. 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.

Relationship with other controls

- L + R Simultaneous Display (L: Tissue, R: Active Visualization)
  - Accumulation/Cine Capture
    - Applied on the right side image only.
    - You cannot compare On and Off image using L + R.
  - SRI-HD
    - Applied on both side image.
  - Frame Average
    - Applied on both side image.
- TIC
  - Measured on active visualization, except “Hybrid Contrast”.
  - “Hybrid Contrast” is disabled and measured on “Contrast” visualization.
- Easy 3D
  - Build volume data from active visualization, except “Hybrid Contrast”.
  - Hybrid map is disabled and forces “Contrast” visualization.
- Advanced 3D
  - 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.
- 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.

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.

UPGAP is available on the C1-6-D probe in the Abdomen (ABD) application.

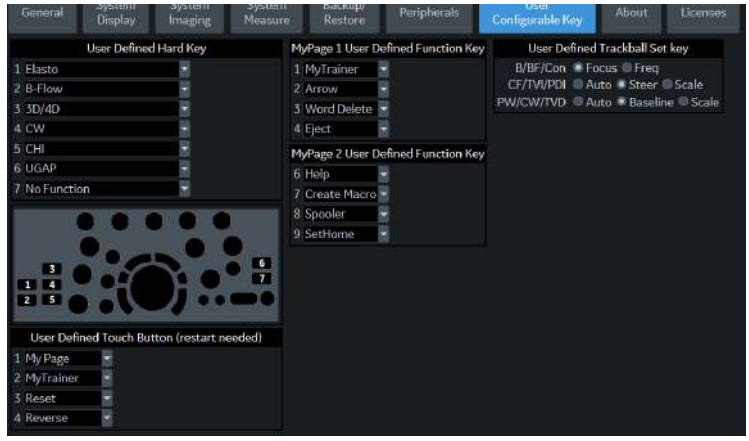


Figure 13-9. Set UGAP as any User-defined Hard Key

Activation

To activate UGAP, select the C1-6-D probe Abdominal application, then press User Defined Hard Key you selected.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 13-10. 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.

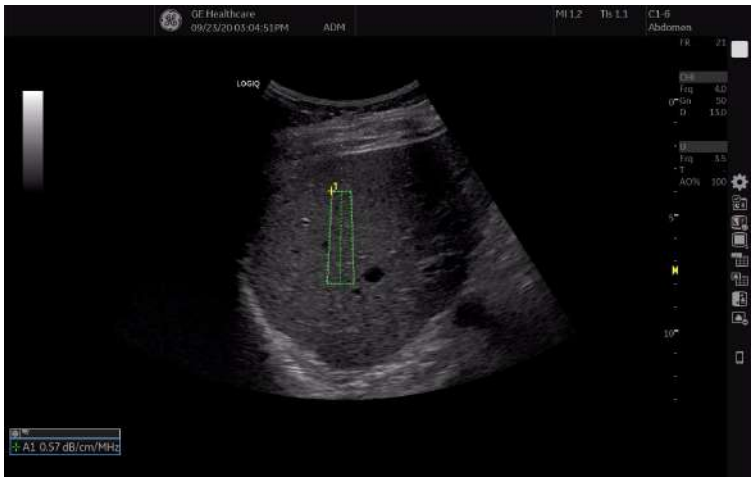


Figure 13-11. UGAP Study

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.

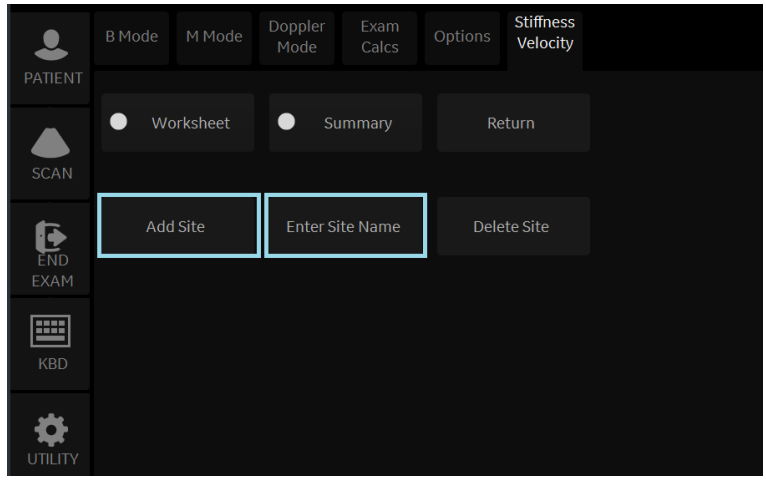
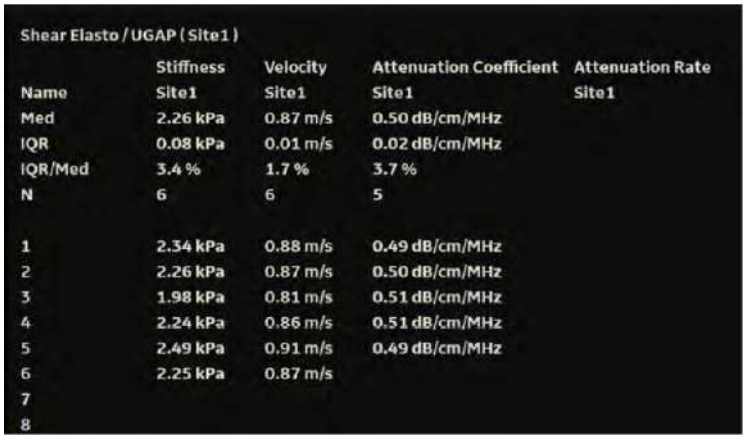


Figure 13-12. Add Additional Shear Wave Site and Enter Site Name

*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)

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 13-13. UGAP Summary Worksheet

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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 13-14. 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 and Color Dual. There are two 2D color maps: Attenuation Map and Quality Map. Attenuation Map provides the distribution of attenuation values. Quality Map provides the position where attenuation can be measured with high accuracy.

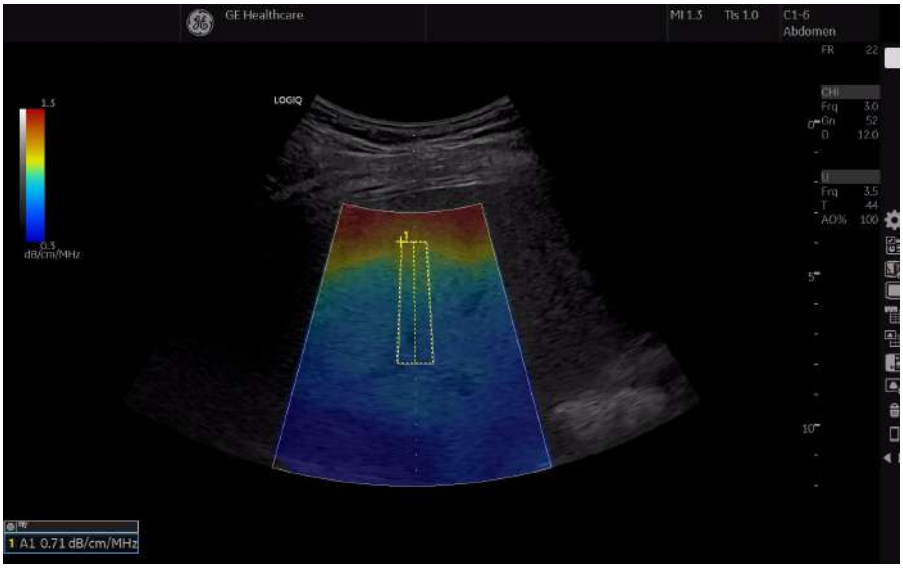


Figure 13-15. Attenuation Map

Figure 13-16. Quality Map

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 myocardial contrast agent concentration rates.

The basic TIC process works as follows:

1. Scan the patient after injecting the contrast agent.
2. Watch the agent flow through the anatomy of interest.
3. When the desired contrast effect has been visualized, freeze the image and select a range of images for analysis.
4. Position an ROI (region of interest) on one of those images where the contrast effect is visible.
5. The system then calculates the mean pixel intensity within that ROI for all frames in the user designated loop and plots the resulting data as a function of time.

You can also choose to fit this data to one of several mathematical functions. The fundamental idea is that the contrast effect flowing through the organ of interest can be modeled mathematically, and details of the wash in and washout of the agent can be gleaned by analyzing the numerical parameters of the mathematical model.

Activating TIC

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*** ont 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

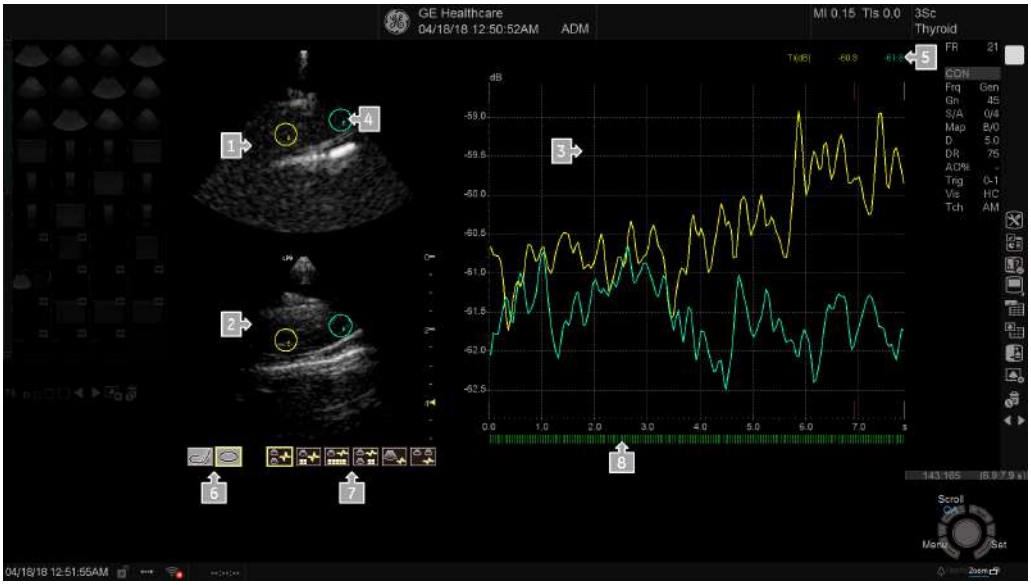


Figure 13-17. TIC Analysis Screen - Graph with dual image layout (example)

1. Contrast cineloop window
2. B-Mode cineloop window
3. Analysis window
4. Sample area
5. Time and velocity at cursor position
6. Sample area tools
7. Layout icons
8. Frame marker

Table 13-3: Cineloop windows

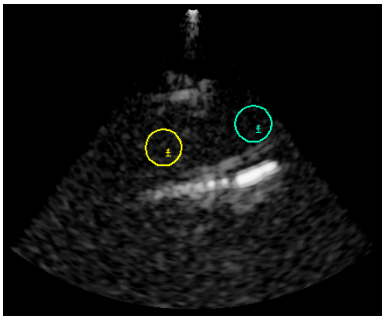
Graphic	Description
	Displays Contrast image data Sample area: Indicates sampling position of the intensity trace. The sample area is color-coded: the first sample area is yellow, the second blue...etc.

Table 13-3: Cineloop windows (Continued)

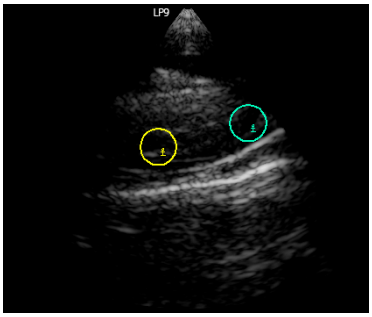
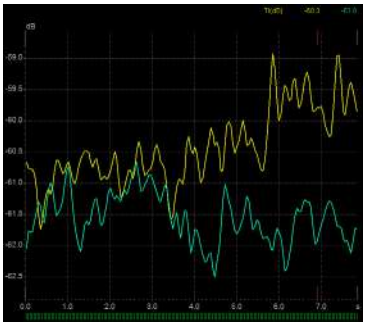
Graphic	Description
	Displays B-mode data Sample area: Indicates sampling position of the intensity trace. The sample area is color-coded: the first sample area is yellow, the second blue...etc. NOTE: B-mode image is not displayed when cine clip stored in contrast only mode.
 	System menu on Sample Area This menu is displayed by pressing the left Set key when the cursor is placed over a sample area in one of the Cineloop windows. Note: The system menu is dependent on mode. • Set As Default ROI Size: Displays on elliptical ROI. • Delete Anchor (On ROI setting as anchor point only) • Label Sample Area: sets a descriptive name to the sample area. The label is useful for identification of the sample area when exporting data. • Copy Sample Area • Copy & Move • Copy & Move (Same Depth) • Move (Same Depth) • Set Curve Fit Start Frame: Displays only while curve fitting • Set Curve Fit End Frame: Displays only while curve fitting • Cancel: exits the System menu. System menu on Image when copy sample area is selected. • Paste Sample Area
	Displays time-intensity curve. • Y axis: Intensity scale (logarithmic) (db) or linear acoustic units (AU). • X axis: Time(s) or Dt(s), elapsed time from previous frame. • ECG (where available -- not shown): 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 13-3: Cineloop windows (Continued)

Graphic	Description
	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. • 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). • Line Style: selects between solid line only or solid line with square markers at each data point. • 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 • ECG Triggering • Cancel: exits the System menu.

Table 13-4: Analysis windows

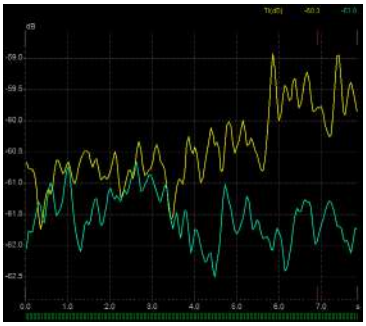
Graphic	Description
	Displays time-intensity curve. • Y axis: Intensity scale (logarithmic) (db) or linear acoustic units (AU). • X axis: Time(s) or Dt(s), elapsed time from previous frame. • ECG (where available -- not shown): displays ECG trace (where available). • Frame Marker: the current frame marker 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 13-5: Layout icon

Graphic	Description
	You can select layout from following. • Graph with Dual Image Layout • Small Data Layout • Large Data Layout • Everything Layout • Single Image Layout • Dual Image Layout

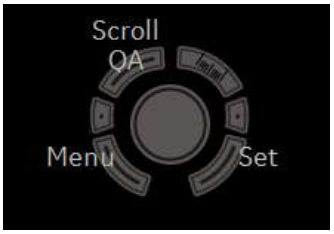
Table 13-5: Layout icon (Continued)

Graphic	Description
	Indicates an analysis graph.
	Indicates an image One icon means Contrast image. Two icons mean Contrast and B-Mode.
	Indicates parameters. 10 dots means that all parameters display. 4 dots means that only displays high level parameters.

Table 13-6: Sample area drawing tool

Graphic	Description
	Creates a sample are based on freehand drawing.
	Creates a sample area with a pre-defined circular/elliptic shape.

Table 13-7: Trackball Assignment

Graphic	Description
	Press the top Trackball key to toggle the trackball assignment between QA and Scroll. • QA Pointing tool in TIC mode. • Scroll When the cineloop is stopped, enables scrolling through the cineloop. • Menu Press left Set key to display System Menu. • Set

TIC Touch Panel

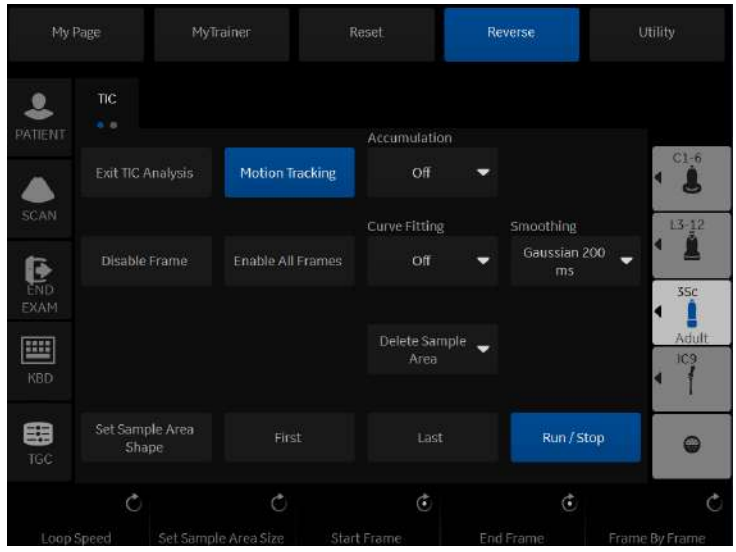


Figure 13-18. TIC Touch Panel

Table 13-8: 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.
First	Move to the first frame of cineloop.
Last	Move to the last frame of cineloop.

Table 13-8: TIC Touch Panel Description (Continued)

Parameter	Description
Run/Stop	Start/Stop the cineloop review.
Loop Speed	Adjust the cine loop playback speed.
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 he 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**
4. The cursor is changed to a sample area (white circle). A preview of the trace is displayed in the Analysis window. .
5. Press **Set** to anchor the sample area.
6. In this frame, the sample area is marked with an anchor. If the cineloop has more than on 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 ourline of the desired ROI by moving the caliper with the **Trackball**.
4. Press **Set** to anchor the sample area.
5. 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 past 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.

Manual tracking of the sample area (dynamic anchored sample area) (continued)

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 he 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 he 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/Enabling the frame (continued)

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 corressponding frames in the other heart cycle.

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.

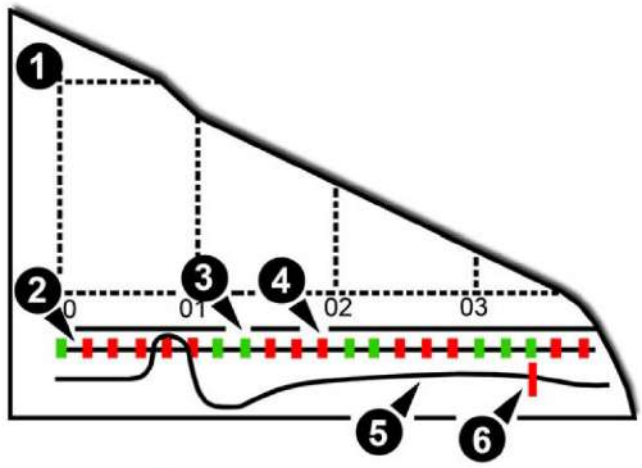


Figure 13-10. Frame markers

Figure 13-19. Frame markers

1. Analysis Window
2. Frame markers axis
3. Enable frame (Green)
4. Disabled frame (Red)
5. ECG (where available)
6. Crrent frame

Manipulating the Sample Area

Up to eight ROIs can be saved on the reference image, with the corresponding eight races plotted simulatneously 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 differend frames of he 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.

Manipulating the Sample Area (continued)

Labeling a Sample Area

The sample area label is used to idenify 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 sysem 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.

- ***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: The Horizontal Scale menu displays for Phase Inversion.

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).

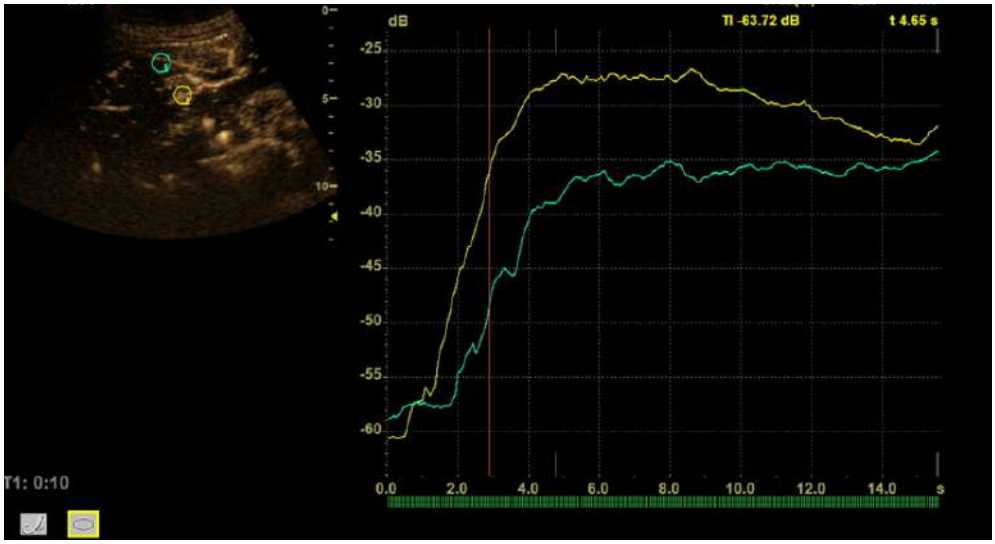


Figure 13-20. Gradient

Trace Measurement (continued)

Max Gradient

Max Gradient is displayed when Small Data Layout and Everything Layout is selected while Curve fitting is off.

Displays the time and gradient that becomes the maximum gradient between the cine start and end frame.

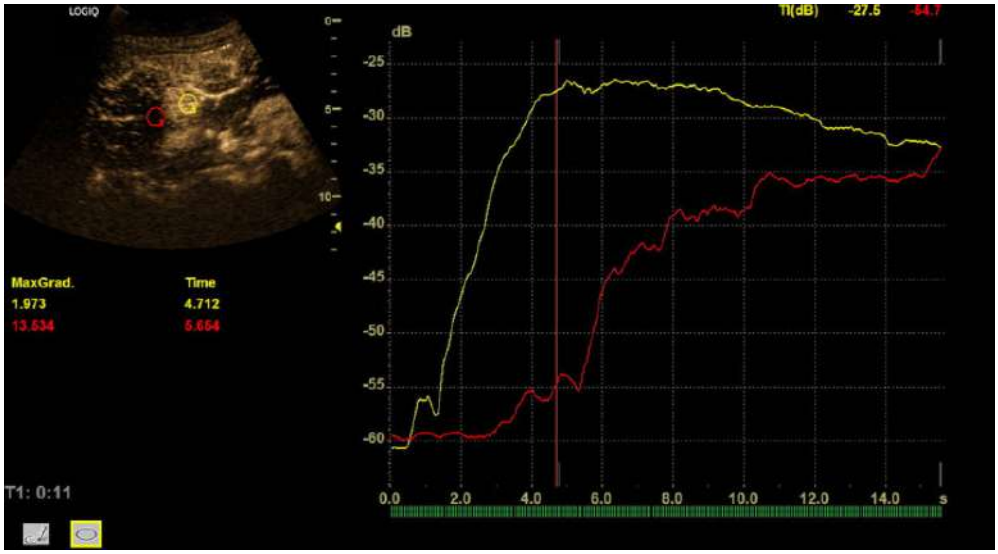


Figure 13-21. Max Gradient

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(db)/dt or d(AU)/dt in case of the intensity gradient.

     - Gradient values for the current frame are displayed in the upper right corner of the graph.
   - Gradient Derivative: Two graphs plot TIC and TIC gradient derivative.

     - The Y-axis units is d2(dB)/dt2 or d2(AU)/dts in case of the intensity gradient derivative.

     - Gradient derivative values for the current frame are displayed in the upper right corner of the graph.
   - All: Three graphs plot TIC, TIC gradient and TIC gradient derivative.

Curve Fit

1. Select ***Curve Fiting*** on the Touch Panel.
2. The Curve Fit selection list displays.

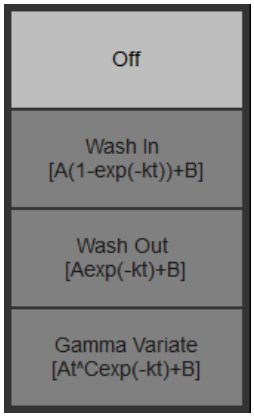


Figure 13-22. Curve Fit Selection List

- ***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. Expotential wash-in is described by the function:

  Y(t) = A(1-exp(-kt))+B, where:

  - A (dB or AU) is the intensity from the contrast agent.
  - B (dB or AU) is the intensity at time t=0 (defined as the time of the left marker). This corresponds to the tissue (baseline) signal if no contrast is present at the selected starting point.

NOTE: *A + B = contrast + tissue = plateau level.*

  - k (1/s) is a time constant.

Curve Fit (continued)

- ***Wash-out***—Used to find and estimate a local wash-out rate. Expotential wash-out is described by the function:

  Y(t) = Aexp(-kt)+B, where :

  - A (dB or AU) is the intensity from the contrast agent.
  - B (dB or AU) is the intensity from the tissue = baseline signal.

  NOTE: A + B is the initial intensity level.

  - k (1/s) is a time constant.

- ***Gamma variate***

  $Y(t) = At^{c}\exp(-kt)+B$

Parameters of Gamma curve fitting

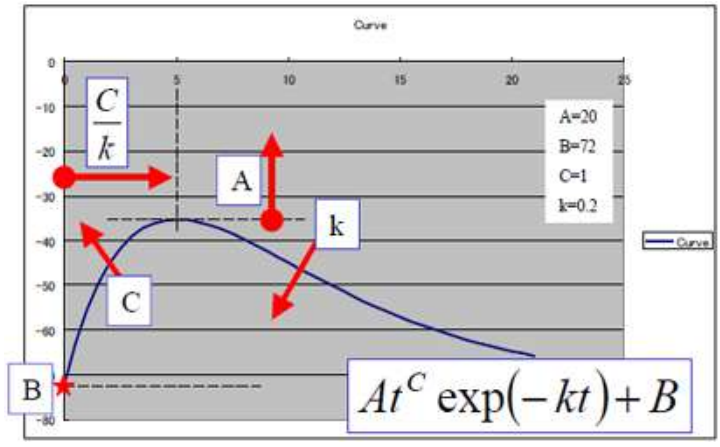


Figure 13-23. Gamma Curve

- 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. Select the start frame as with Cine or move the cursor to the desired position on the graph and press the right **Set** key.
3. Move the arrow pointer on the ROI (hand cursor appears) and press the left **Set** key. The system menu appears.
4. Select ***Set curve fit start frame*** from the menu.
5. Select the End Frame as with Cine or move the cursor to the desired position on the graph and select the right **Set** key.
6. Move the arrow pointer on the ROI (hand cursor appears) and select the unmarked key (the left **Set** key). The system menu appears.
7. Select ***Set curve fit end frame*** from the menu. The ROI colored line displays.
8. Repeat the above procedures as necessary.

   The system retains the start/end frame per ROI while TIC is active. Once the TIC menu is closed, the settings are lost.

Display/Hide Calculation Values

1. Place the cursor on the analysis graph and press left **Set** key. Select ***Curve Fitting Parameters*** from the pull-down menu. The Curve Fitting Parameters dialog appears.
2. The Curve Fitting Parameters dialog appears.

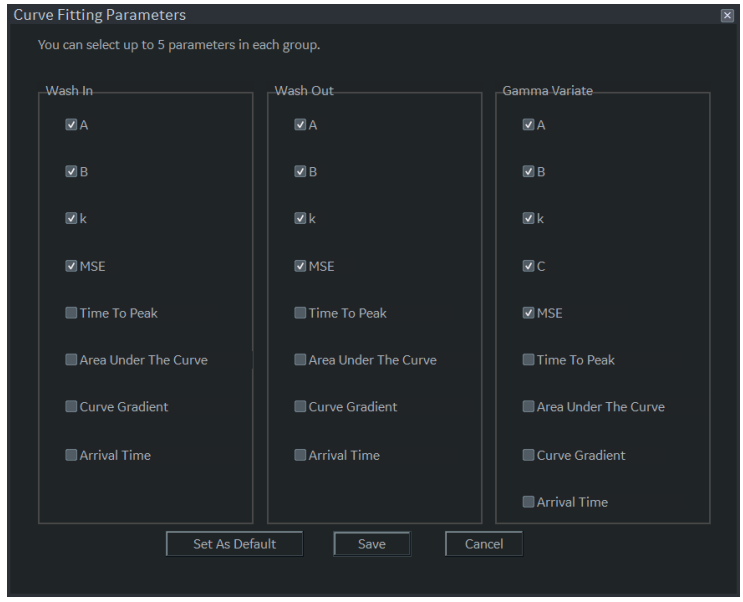


Figure 13-24. Curve Fitting Parameters Dialog

3. Select a maximum of 5 parameters to display for each curve fitting.
   - Save as default: saves as a system preset.
   - Save: saves as temporary.
   - Cancel

NOTE: *If you select more than 5 parameters and select "Save" or "Save as default," you will be prompted to select only 4 parameters.*

4. The selected parameter displays below the image with the curve fitting active. Press the display button to display all parameters; or press the hide button to hide all parameters.

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 capture 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 P8/P9/P10 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.

Quantitative Analysis (QAnalysis)

Overview

Quantitative Analysis is available for the following CINE loops obtained in the following modes: Tissue Velocity Imaging, Color Flow Mode, Power Doppler Mode and Elastography. 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 P8/P9/P10 extracts various statistics from the image data within each ROI. 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 ROI area.
- Area (mm2): The size of ROI
- Max Ratio/Time of Max Ratio: Maximum Ratio of Color (Power) Doppler pixels in each ROI, and which frame that occurs in.
- Min Ratio/Time of Min Ratio: Minimum Ratio of Color (Power) Doppler pixels in each ROI, and which frame that occurs in.

Quantification supports two different statistical display formats: Short Form and Long Form.

Statistics (continued)

- Short Form: Ratio and Area.

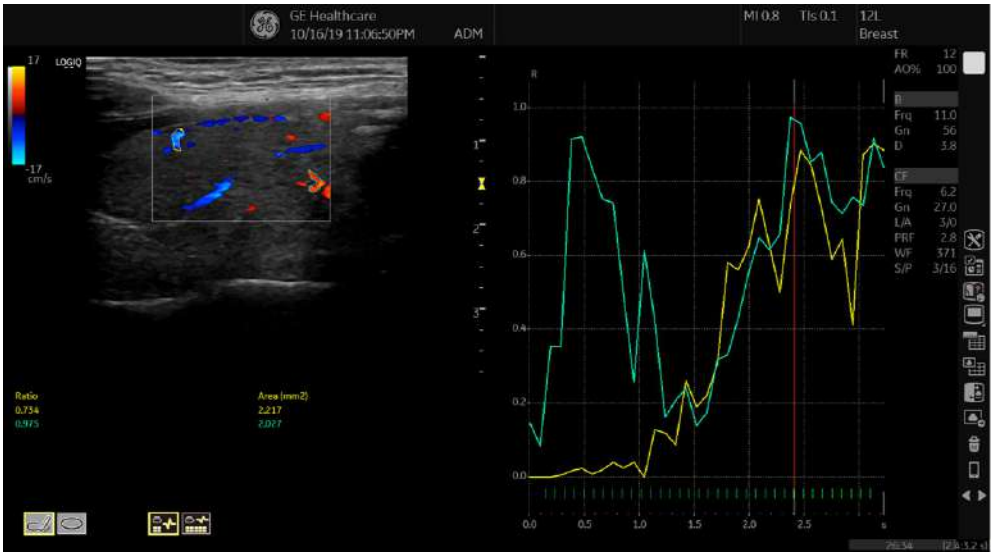


Figure 13-25. Color Flow Mode Short Form - Example

- Long Form: Ratio, Area, Max Ratio/Time of Max Ratio, Min Ratio/Time of Min Ratio

Figure 13-26. Color Flow Mode Long Form - Example

QAnalysis - Tissue Velocity Imaging

Multiple Time -Motion trace display from selected points in the myocardium.

QAnalysis Screen Description

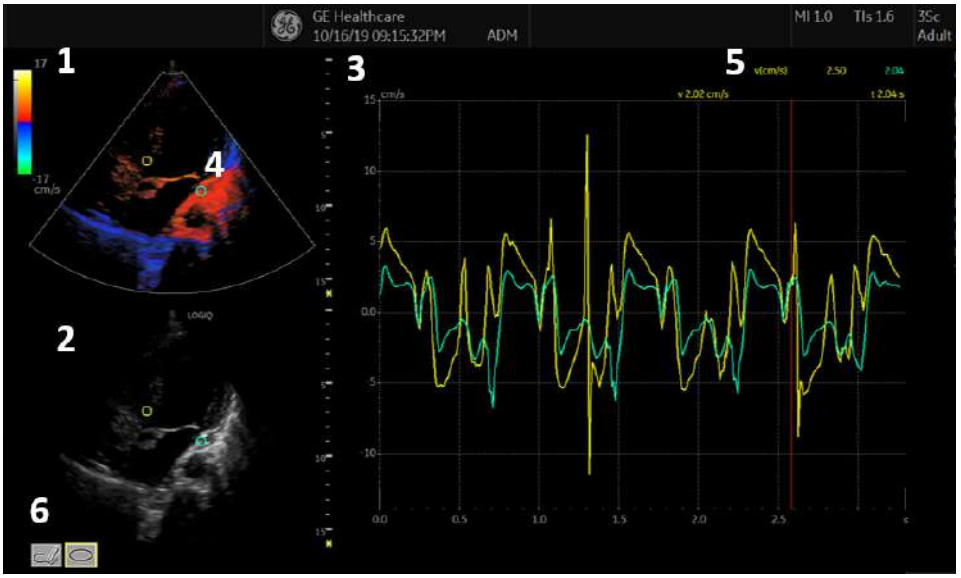


Figure 13-27. Q-Analysis Screen

Table 13-9: QAnalysis Screen Description

1.	TVI Cineloop Window Sample Area: Indicates sampling position of the velocity. The sample area is color-coded: the first sample area is yellow, the second green, etc.
2.	B Cineloop Window Sample Area: Indicates sampling position of the velocity. The sample area is color-coded: the first sample area is yellow, the second green, etc.
3.	Analysis Window. • Y axis: Velocity scale (cm/s) • X axis: Time(s) • 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. • 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.

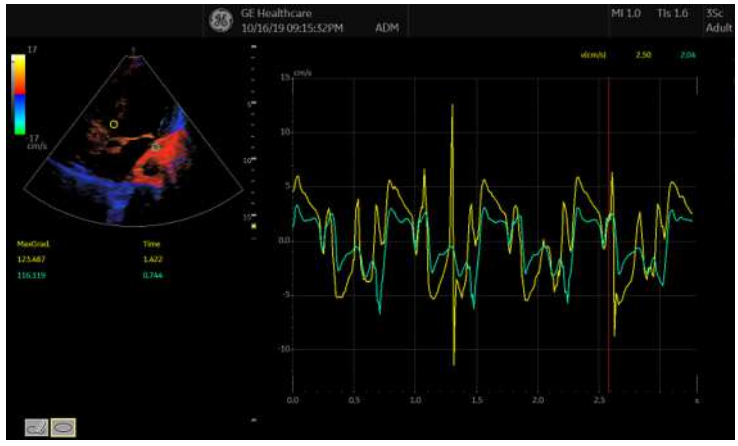


Figure 13-28. Max Gradient

Elastography Quantification

Use Quantification Analysis in Elastography to determine the Elastography index of a single ROI, and the ratio between multiple ROIs.

NOTE: Elastography Quantification IS NOT available in the United States.

Q-Analysis. Plot each elasticity index and their ratio on the timeline axis. Use the first ROI as a reference point [in yellow] for calculating the ratio between multiple ROIs. A maximum of 8 ROI and 7 ratio curves are available. Automatic disables (skips) low quality frames. ECG and Quality graph are displayed on the same time line.

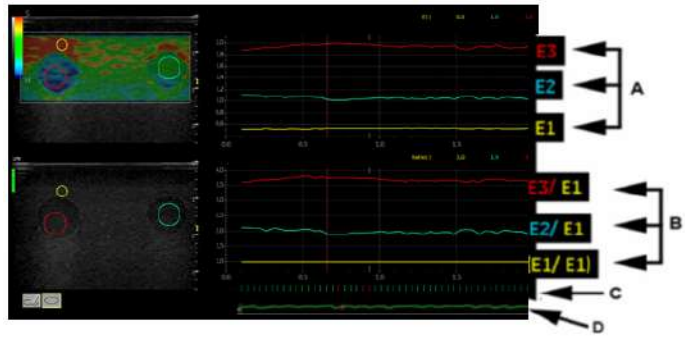


Figure 13-29. Q-Analysis

a. E Index - graph
b. E Ratio - graph
c. Skip frames is shown as a red bar
d. Quality

Plot Control

Ratio

Select ***Ratio*** allows the user to toggle between Elastography data and Ratio plot display.

The LOGIQ P8/P9/P10 plots the ratio of the original ROI and the first ROI (ROI 1). The two plots are displayed together one on top of the other in the plot area.

Ratio formula: Ratio = ROI 1 / ROI n (n: 2-8)

Ratio for ROI 1 is 1.0 for all frames. When ROI 1 is removed, then Ratio is not calculated for ROI n (n: 2-8).

Ratio Plot Values

- Ratio
- Diff: The LOGIQ P8/P9/P10 displays the second derivative as a function of time below the traditional plot.

  Diff formula: Ratio Diff = ROI 1- ROI n (n: 2-8),
- All: The LOGIQ P8/P9/P10 plots the three plots in the plot area of the screen.
- Off

Additional Notes for Elastography Quantification

When the desired elastography image has been visualized, press Freeze; then select a range of CINE loops for analysis. The Q Analysis button appears on the CINE Touch Panel. Press Q Analysis to enter analysis mode. Set the ROI on the image for the E graph to appear. For ratio calculation, set the first ROI and then set the second and more ROI; then press “Ratio” or select “System Menu => Ratio Plot => Ratio”. Adjust the ROI size by using the “body pattern and ellipse” controls.

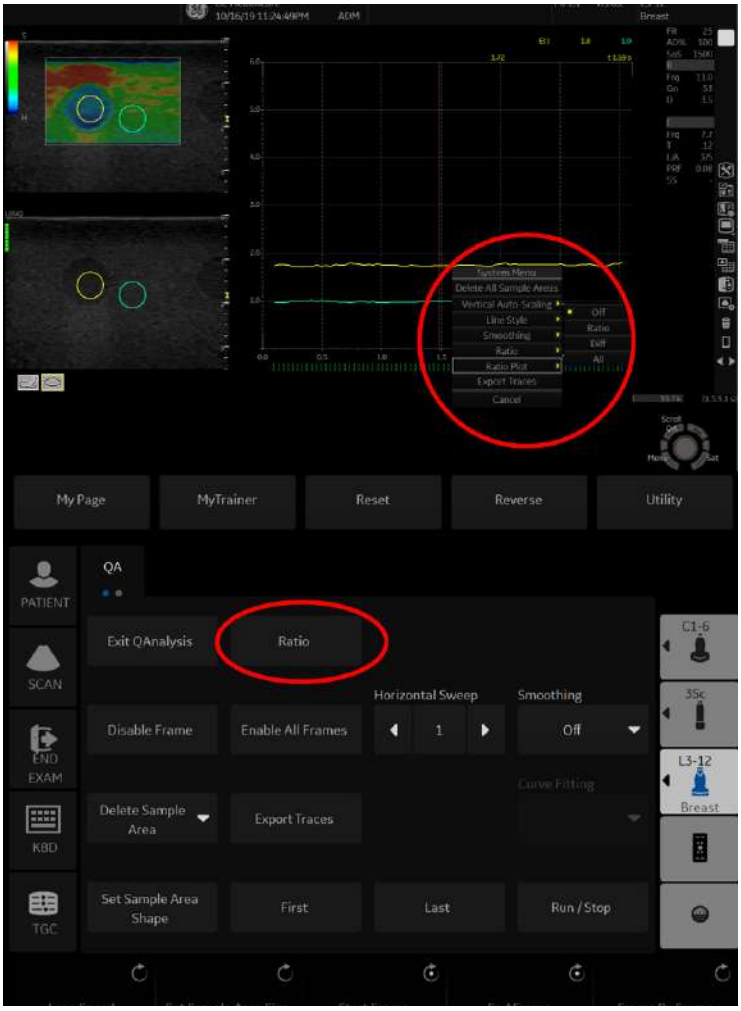


Figure 13-30. Q-Analysis

Additional Notes for Elastography Quantification (continued)

HINTS

Highlights:

- Raw data capability. User can do some further calculations (modifying ROI position/size, adding another ROI, and recalculating the ratio or difference between them) for recalled images at a later time.
- The result of just one ROI (elasticity index) becomes the effective index. This quantifies the color distribution in the area of interest. By setting two ROI, the ratio is automatically calculated.

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 P8/P9/P10 factory default map (which corresponds to hard), then progresses to green and then to red (which corresponds to soft). The posterior displacement of elastography patterns also may cause the B-Mode cyst to consist primarily of blue with the green to red being posterior to the B-Mode cyst. You need to be aware of the three-layer pattern of a cyst in elastography. Utilizing elastography quantification and setting the ROI in the blue portion of the three-layer pattern on the cyst and then setting the ROI in the “normal” tissue may cause you to misinterpret the elastography quantification ratio as the cyst to be hard as compared to the “normal” tissue.

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.

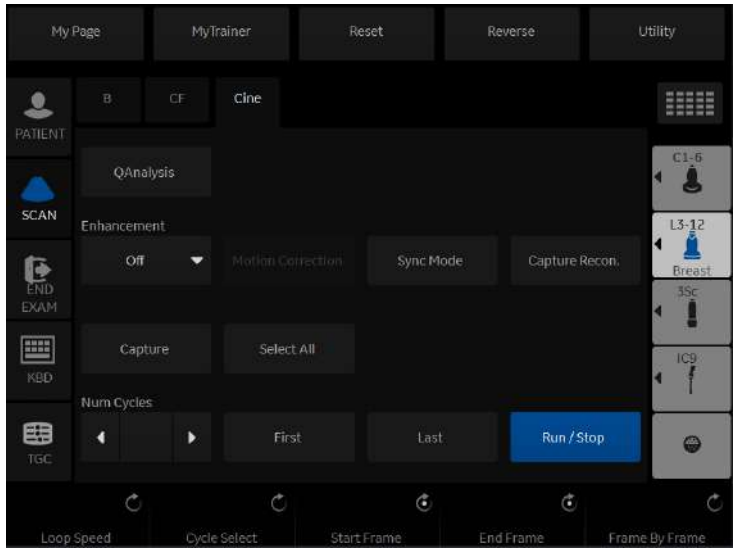


Figure 13-31. Cine Touch Panel

3. Select ***QAnalysis***. The QAnalysis screen and Touch Panel displays. To toggle the trackball function between QA and Scroll, press the top **Trackball** key.

Activating QAnalysis (continued)

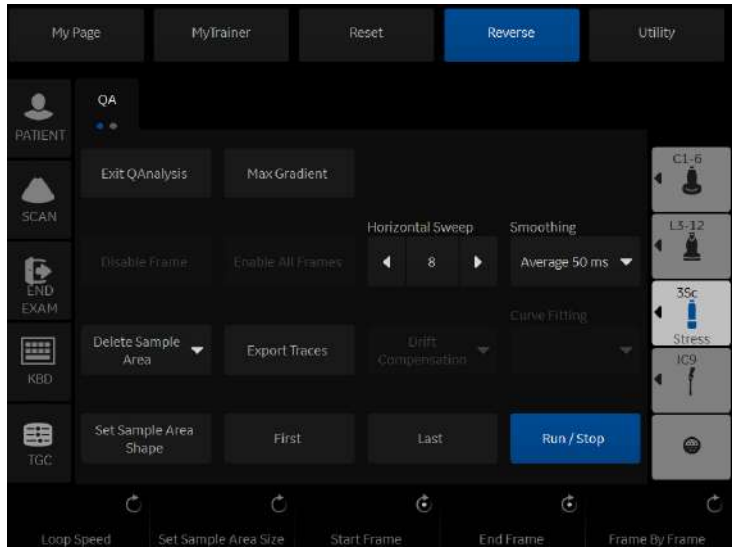


Figure 13-32. TVI QAnalysis Touch Panel, Page 1

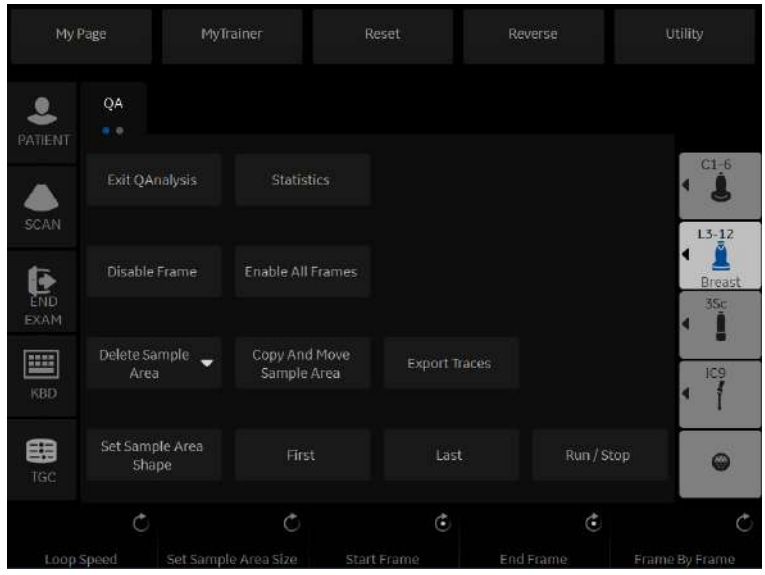


Figure 13-33. Color Flow and PDI Mode QAnalysis Touch Panel

Activating QAnalysis (continued)

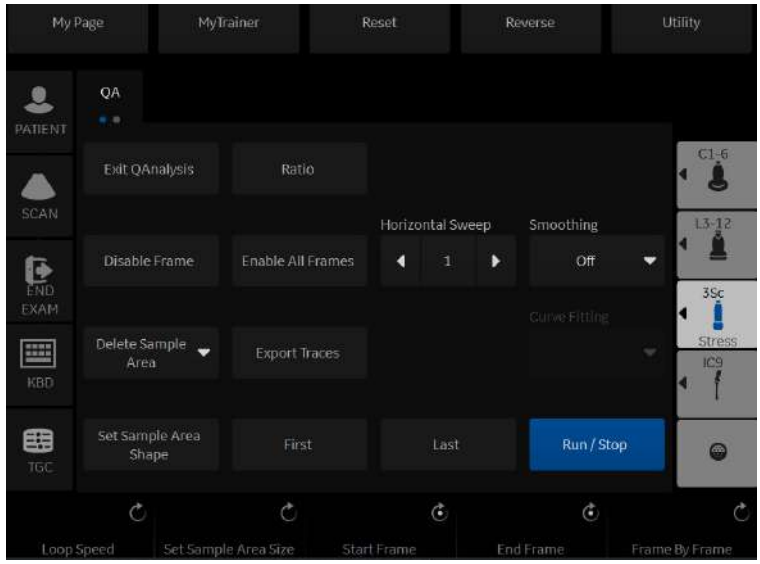


Figure 13-34. Elastography QAnalysis Touch Panel

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 cineloop.

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 ROI button (shape icon on the monitor display).
3. Move the cursor to one of the Cineloop 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 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. 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.

Generating a Trace (continued)

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 thought 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 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.

Setting the default sample area shape

1. Select ***Set sample area shape***. The Information Box displays.

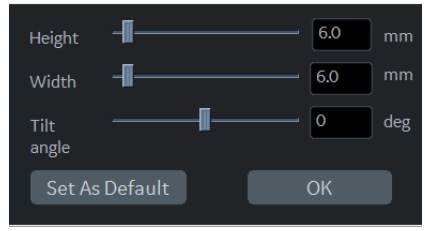


Figure 13-35. Sample Area Information Box

2. Select Height, Width and Tilt angle.
3. Select ***Set as default***. The current ROI size is set as the default for subsequent Ellipse ROIs.

Sample Area Shapes

There are two different methods for determining the shapes of the sample area.

Ellipse ROI

1. Select the ellipse icon (shape icon on the monitor display).
2. When the trackball positions the image display cursor over the reference image(s), an elliptical ROI is automatically generated and displays on the reference image(s).
3. The average 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 ROI, and its trace plot automatically updates as the user repositions it on the reference image. Old traces are erased.
5. When scanning with an elliptical ROI, press **Set** to fix the ROI position and freeze its corresponding trace on the plot. A new active ROI is generated whose position is manipulated by the trackball and whose velocity curve traces will be plotted as before, while the previous ROI and trace remain fixed at the points they were saved at.

NOTE: Elliptical ROIs can be positioned in any manner that keeps their center within the image boundaries. In the case that part of the ROI is outside the image boundary, only data from within the image boundary is used for calculating the mean velocity value.

NOTE: You can change the size of the Ellipse ROI by adjusting the Ellipse control.

Sample Area Shapes (continued)

Freehand ROI

1. Select Freehand icon (pencil icon on the monitor display).

   Use the **Trackball** to position the caliper on the reference image at the start point. Press **Set** to fix the start point.
2. While holding down the **Set** key, trace the outline of the desired ROI by moving the caliper with the **Trackball**.

Reshaping a Sample Area

To reshape the sample area:

1. Position the cursor on the ROI to reshape and press the left **Set** key.
2. The ROI system menu displays. Select ***Set sample area shape***.

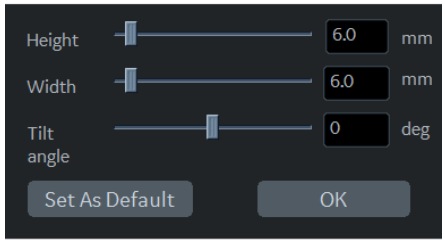


Figure 13-36. Sample Area Information Box

3. Adjust Height, Width and Tilt angle.
4. Press ***OK***. The selected ROI size changes.

Labeling a Sample Area

The sample area label is used to identify data associated with the sample area when exporting.

1. Position the cursor on the ROI to label and press the left **Set** key.
2. The ROI system menu displays. Select ***Label sample area***. The Label Dialog box displays.

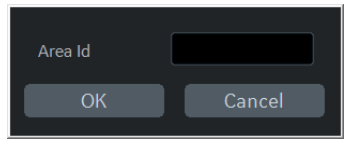


Figure 13-37. Label Dialog Box

3. Enter a name for the sample area.
4. Select ***OK***.

Copy, move, and paste a Sample Area

To copy and paste the 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.

Deleting a Sample Area

Sample ROIs and their corresponding traces can be deleted using ***Delete Sample Area***.

1. Select ***Delete Sample Area***; a pull-down menu displays.

Figure 13-38. Delete Sample Area pull-down menu

2. Select ***Current sample*** to delete the currently active ROI.

   Select ***Delete all*** to delete all currently set ROIs and all of their traces.

NOTE: The corresponding traces for the deleted ROIs are erased from the plot.

NOTE: Deleting an ROI causes the ROIs to be deleted from all frames in the analysis loop.

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 ROI is saved, to account for changing input dynamic range.
- ***On***—The system automatically rescale the vertical axis of the trace graph every time the currently selected (active) ROI is moved.
- ***Off***—Disable any automatic scaling of the vertical axis. There is user-defined system defaults on the system preset page for the fixed vertical scale to be used for the plot.

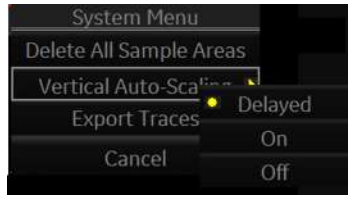


Figure 13-39. Vertical Autoscale Pop-up menu

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.

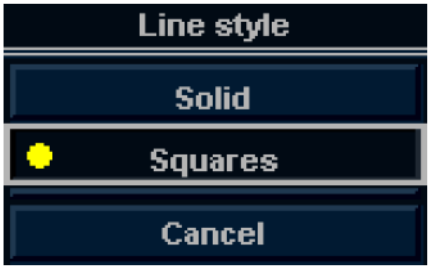


Figure 13-40. Line Style Pop-up menu

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***.

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 cineloop display.

Disabling the frame from the frame marker

To disable One Frame:

1. Use the **Trackball** to move the cursor to the frame maker to disable.
2. Press **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 maker 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/Enabling the frame (continued)

Disabling Frames - Auto

When the user enters Elasto Quantification, the useless frames are disabled automatically. The LOGIQ P8/P9/P10 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.

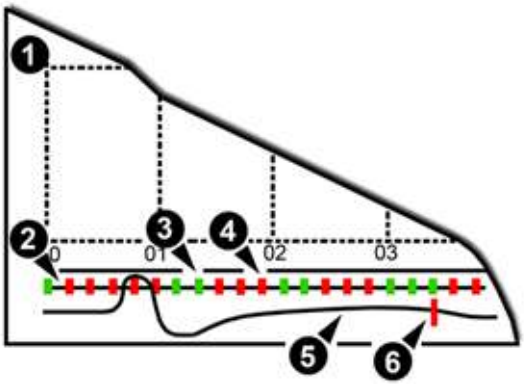


Figure 13-41. Frame Makers

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. The following window displays.

Figure 13-42. Export Trace Window

- Location : Select Location which to save.
- Filename : Enter the filename. (Only Text)

3. Select ***OK*** to save the data and return to the QAnalysis screen.
   - All displayed ROI traces are saved in the exported file.

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.

Real-time 4D

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 13-10: 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.

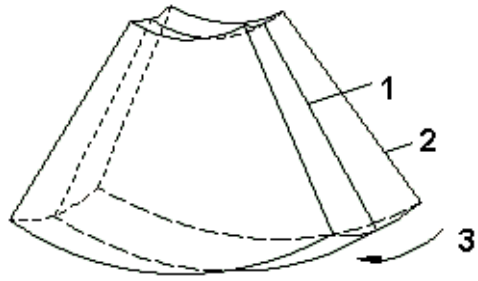


Figure 13-43. Volume Sweep

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.

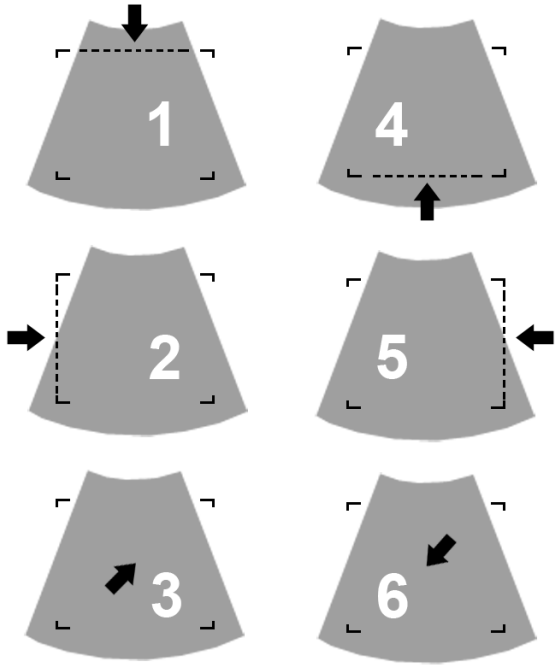


Figure 13-44. Render View Directions

1. Up/Down
2. Left/Right
3. Front/Back
4. Down/Up
5. Right/Left
6. Back/Front

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).

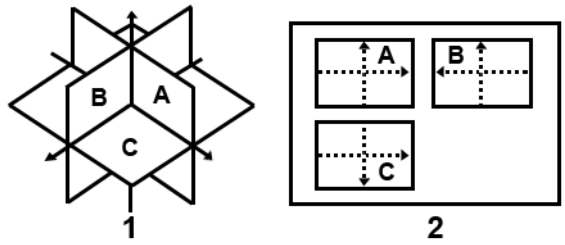


Figure 13-45. Illustration of Sectional Planes

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.

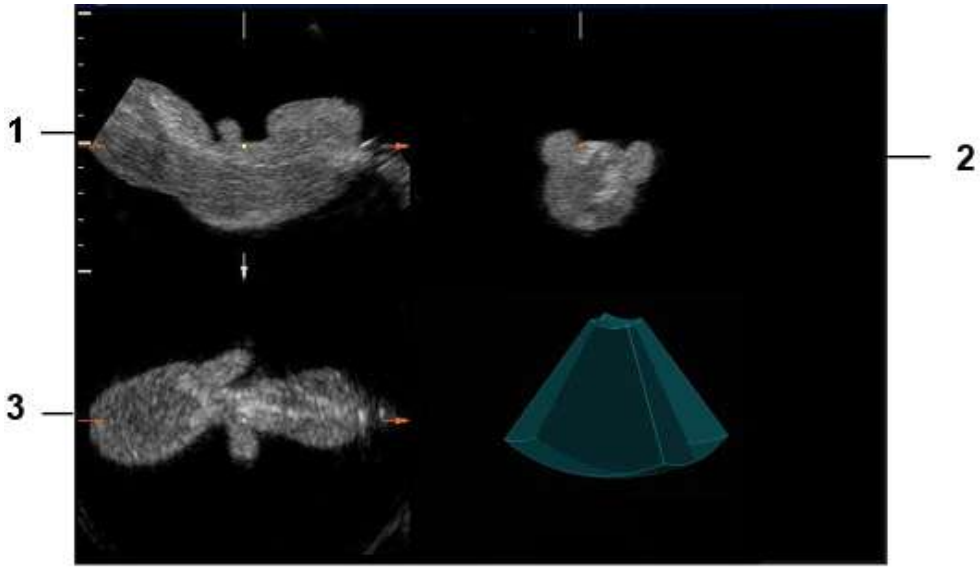


Figure 13-46. Monitor Display of Reference Images in Sectional View

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)

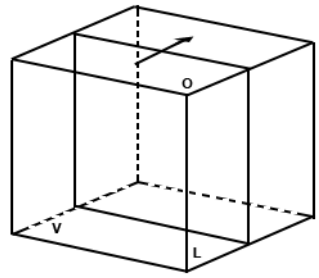


Figure 13-47. Reference Image A

For Reference image A, the transducer plane migrates from the FRONT to the REAR through the volume body.

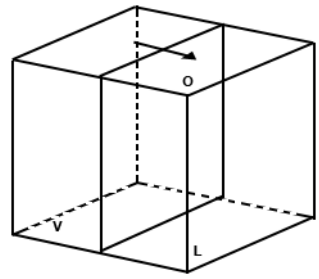


Figure 13-48. Reference Image B

For Reference image B, the transducer plane migrates from the LEFT to the RIGHT through the volume body.

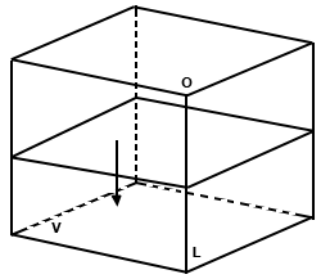


Figure 13-49. Reference Image C

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

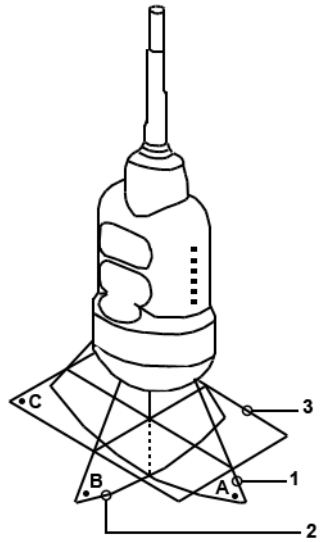


Figure 13-50. Abdominal Probe Orientation

1. Image Plane A
2. image Plane B
3. Image Plane C

Reference Images (continued)

Examples of Probe Orientation with Reference Planes

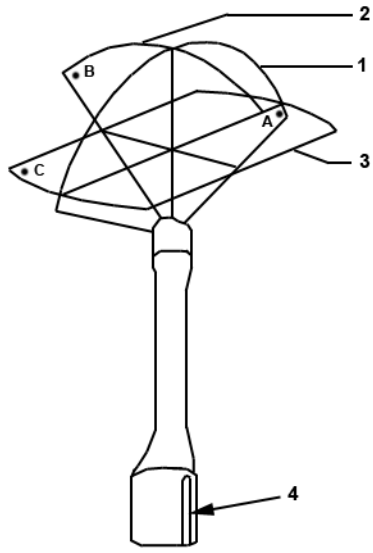


Figure 13-51. Endocavity Probe Orientation

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 13-52. Control Panel Buttons

1. 3D/4D key, used to activate/deactivate 3D/4D.
2. CF Key, CF-Mode key is used to rotate about the X axis.
3. PW Key, PW-Mode key is used to rotate about the X axis.
4. M Key, M-Mode key is used to rotate about the X axis.
5. Ellipse key, used as a transverse translation through the image.
6. Top Trackball 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**.

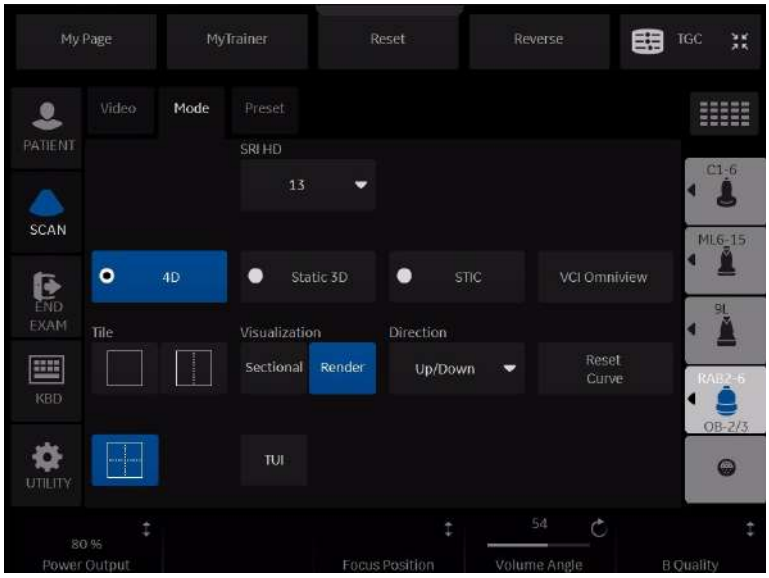


Figure 13-53. First Touch Panel displayed when entering 3D/4D mode

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 13-11: Common 4D Touch Panel Controls

Preset Parameter	Description
SRI-HD	Allows you to apply SRI-HD (High Detection Speckle Reduction Imaging) to the selected reference image.
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-Static, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image.
Focus Position	Adjusts the focal position.

Table 13-11: Common 4D Touch Panel Controls (Continued)

Preset Parameter	Description
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.

Real-Time 4D/Static 3D Presets

1. When you enter 3D/4D mode, press the Preset tab.

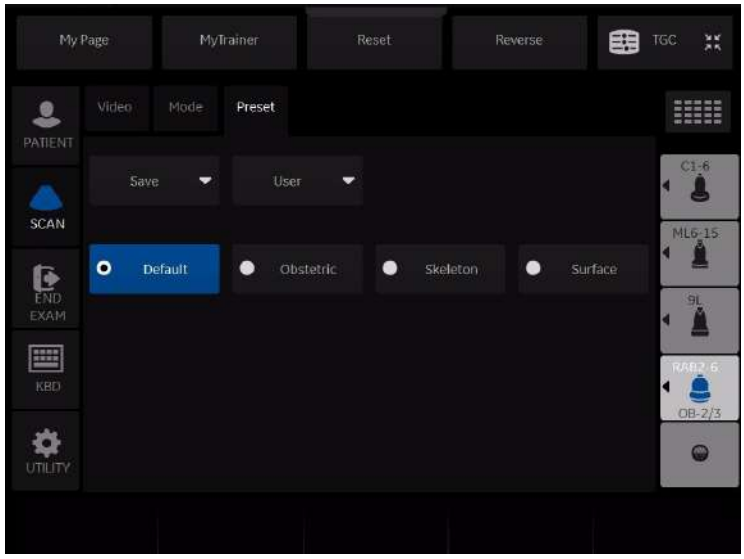


Figure 13-54. 4D Preset

2. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

Table 13-12: 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. Abdomen, Obstetric, Gyn, Surface, Skeleton, Default, Peri. Vasc., Small Part, Contrast
User	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.

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 DICOM

Anatomical Markers in 4D

Anatomical markers are available in 4D.

To add an anatomical marker in 4D,

- Rotate the Body Pattern/Ellipse key. A person pattern overlays the 4th quadrant on the display.

To change the person pattern,

- Press the Touch Panel key. From left to right, select either Transrectal, Neonatal Head, Face (down), or Face (up).

To rotate the person pattern,

- Rotate the Body Rotation Touch Panel key (0, 45, 90, 135, 180, 225, 270, or 315 degrees).

To tilt the probe,

- Rotate the Probe Tilt Touch Panel key (0, 45, 90).

To align the marker with the probe's orientation marker.

- Rotate the Body Pattern/Ellipse key.

To position the marker on the anatomy,

- Move the Trackball to position the marker at the appropriate anatomy.

The display is also annotated, for example:

- Cr = Cranial
- Ca = Caudal
- A = Anterior
- P = Posterior
- L = Left
- R = Right

To exit Anatomical Markers:

- Press the **Set** key.

Performing a 4D Scan

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 three 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.

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.

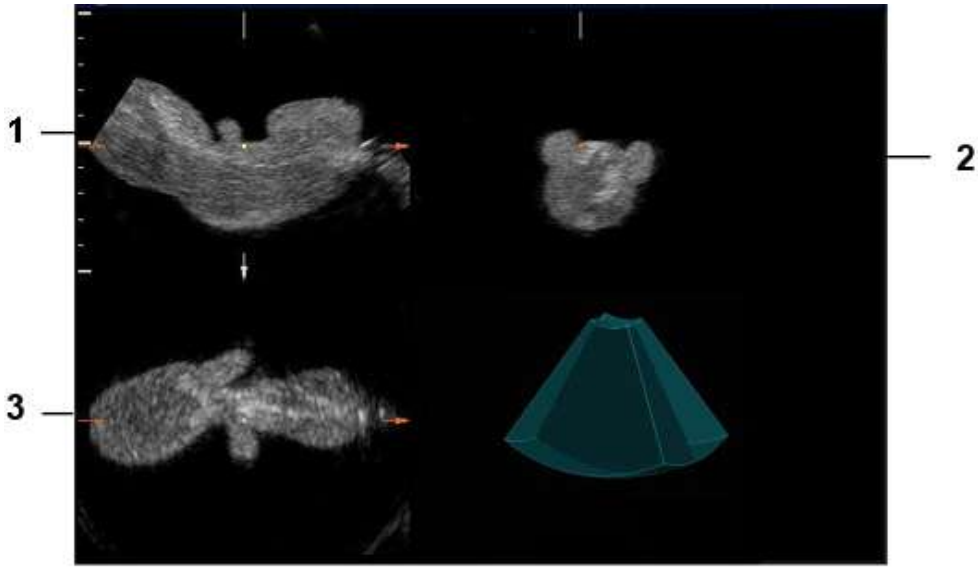


Figure 13-55. Monitor Display in Sectional View

1. Sectional Image A
2. Sectional Image B
3. Sectional Image C

Visualizations (continued)

Render View

The LOGIQ P8/P9/P10 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.

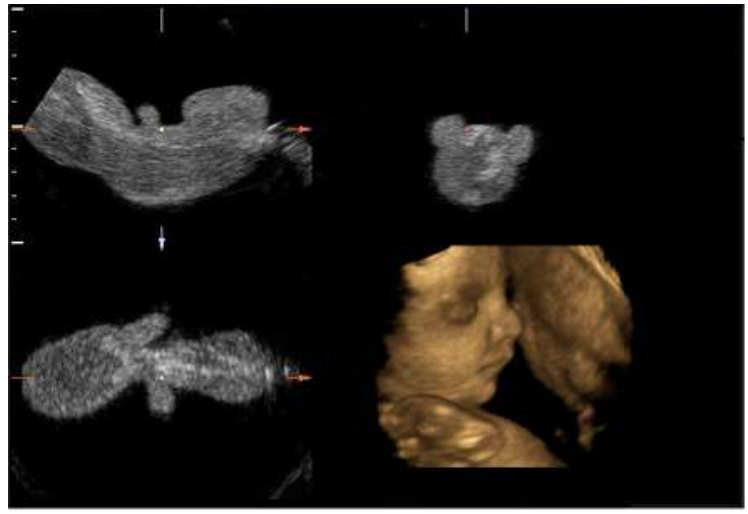


Figure 13-56. Quad Tile Render View

Visualizations (continued)

Orientation Help

When you view a 4D image on the display monitor, it's sometimes difficult to recognize he orientation. To help, the system displays a three-dimensional drawing to illustrate the orientation. This drawing displays ONLY in sectional view.

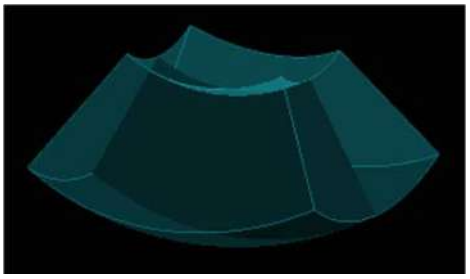


Figure 13-57. Orientation Help Graphic

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 appropriae 4D-compatible probe, leaving the probes in their respective holders. Follow he 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. Wen you enter pre-mode, an ROI graphic may appear on the monitor display that defines the initial ROI (Region of Interest) of the volume.

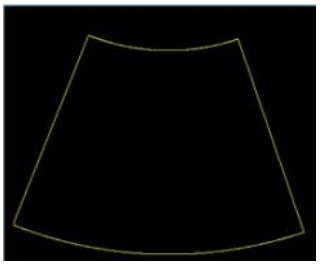


Figure 13-58. ROI Graphic

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 ***M*** control. To rotate the VOI in a circular motion, use the ***CF*** 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.

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 change the position of the focal zone, adjust the depth of the VOI.
- You cannot change the number of focal zones.

Acquiring a 4D Volume of Interest (VOI) (continued)

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.

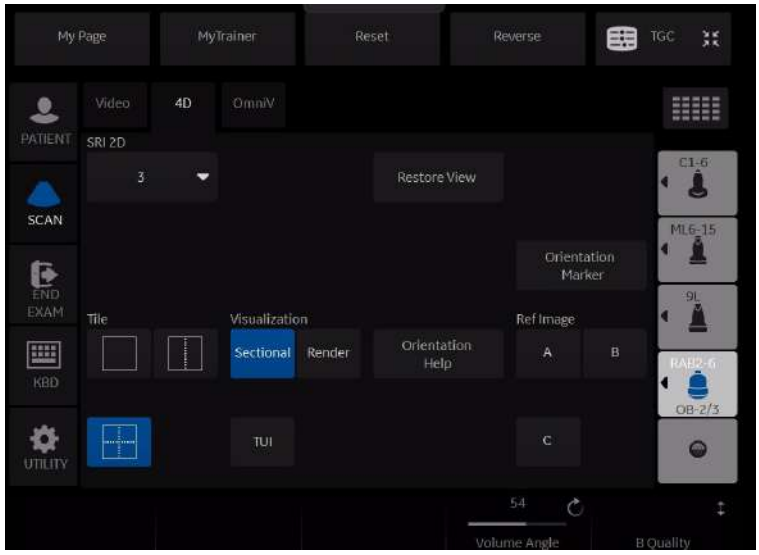


Figure 13-59. 4D Data Acquisition Sectional View

Table 13-13: 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.

Table 13-13: 4D Data Acquisition Parameters (Continued)

4D Parameter	Description
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.

Render VOI Acquisition (continued)

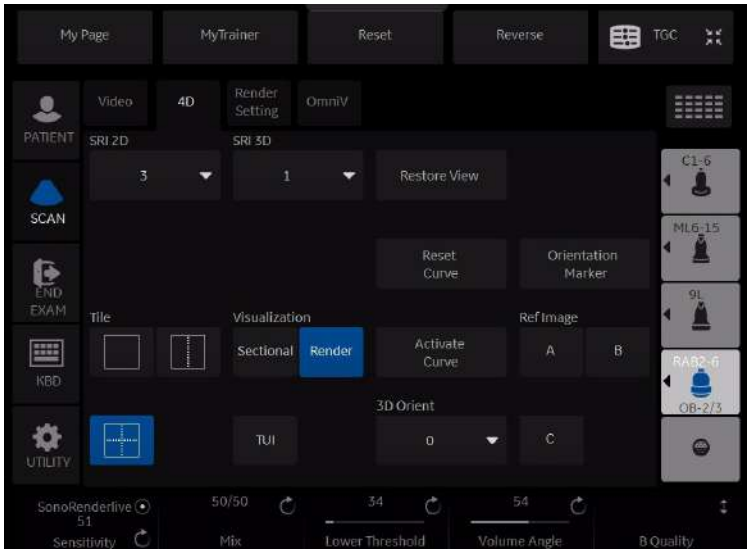


Figure 13-60. 4D Tab (Data Acquisition) Render View

Table 13-14: 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.

Table 13-14: 4D Data Acquisition Parameters - Render Mode (Continued)

4D Parameter	Description
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.

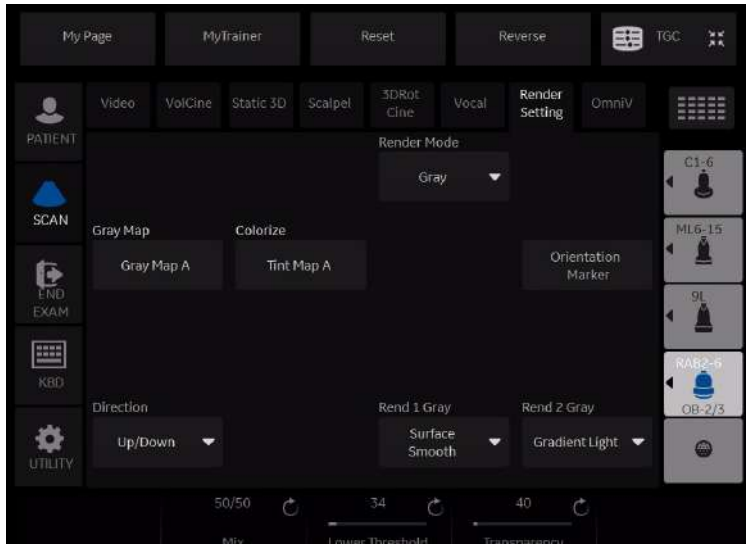


Figure 13-61. Render Setting Tab (4D Data Acquisition)

Table 13-15: 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).

Table 13-15: 4D (Data Acquisition) Render Parameters (Continued)

4D Parameter	Description
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.
Render 2	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. **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 hollo4w 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.
Edit Light	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.
Transparency	Selections: 20 to 250. Sets the transparency of the image. The higher the number, the more transparent the gray scale information.

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 X axis, turn the **CF** left/right.

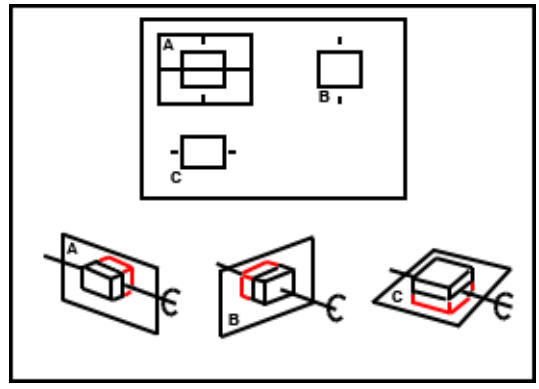


Figure 13-62. Rotate about X Axis with CF Control

Manipulating the Volume of Interest (VOI) (continued)

To rotate the VOI around the Y axis, turn the **PW** left/right.

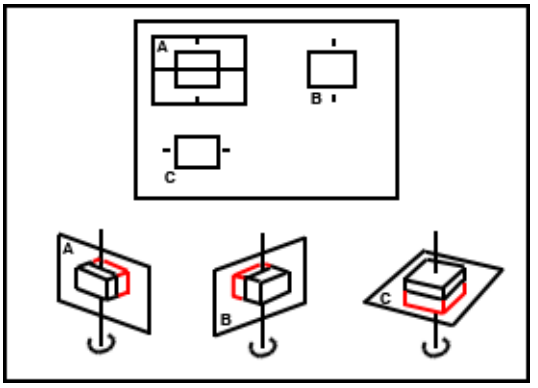


Figure 13-63. Rotate about Y Axis with PW Control

Rotating the 4D Image in a Circular Motion

To rotate the VOI around the Z axis, turn the **M** left/right.

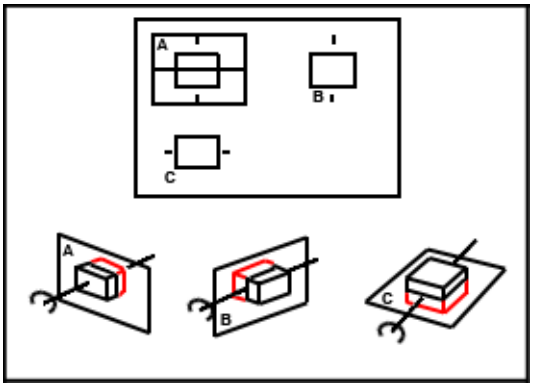


Figure 13-64. Rotate about Z Axis with M Control

*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 13-105 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.

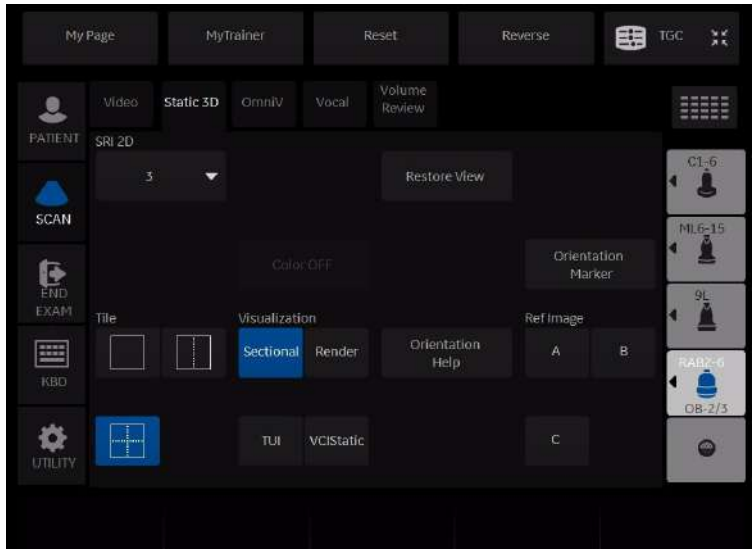


Figure 13-65. 4D (After Acquisition) Touch Panel - Sectional View

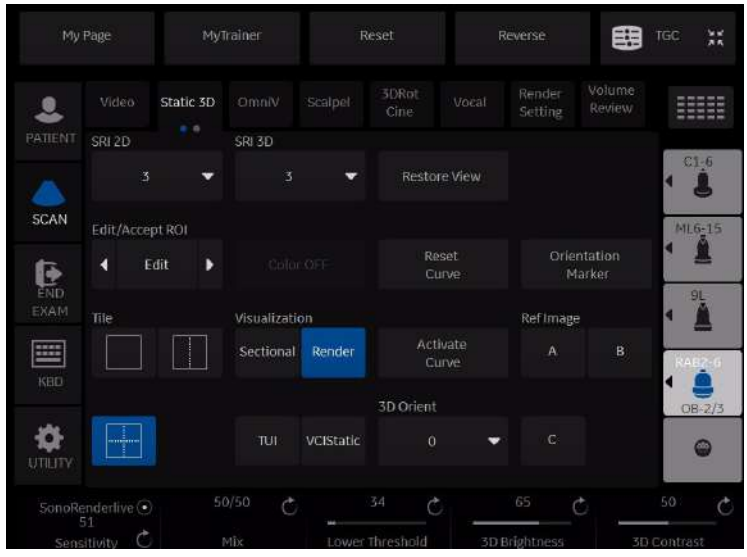


Figure 13-66. 4D (After Acquisition) Touch Panel - Render View

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.

Static 3D Sectional View

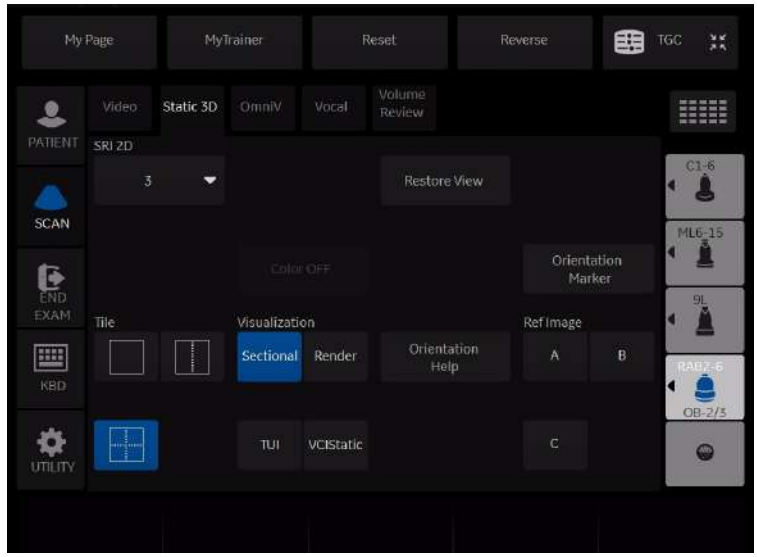


Figure 13-67. 3D (After Acquisition) Touch Panel - Sectional View

Table 13-16: 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

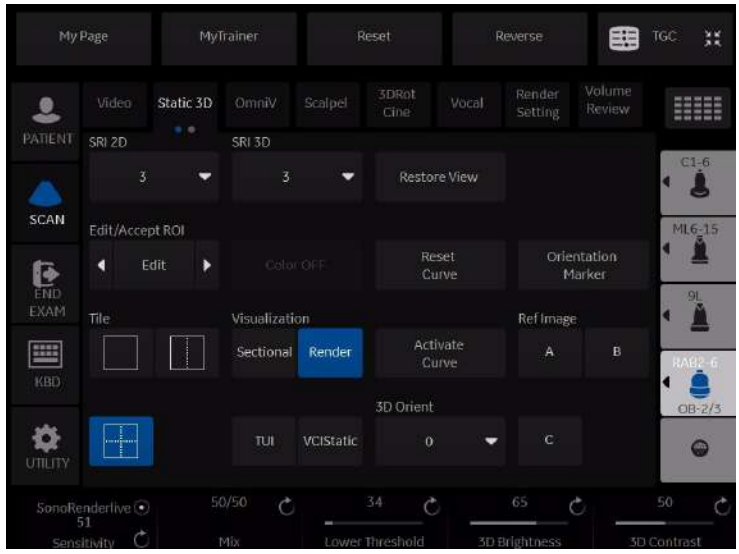


Figure 13-68. 3D (After Acquisition) Touch Panel - Render View

Table 13-17: 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.

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.

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.

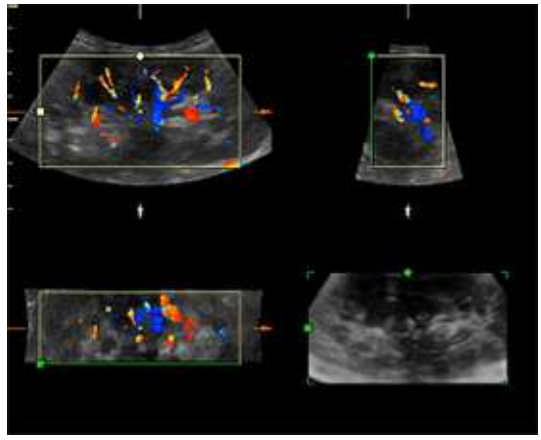


Figure 13-69. 3D Color - Gray

- **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.

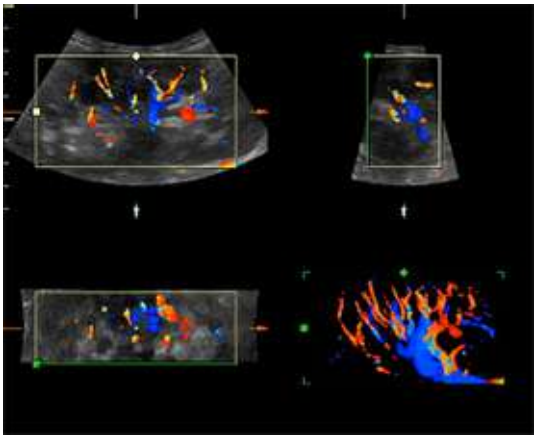


Figure 13-70. 3D Color - Color

- **Glass Body**. Displays both Color-Flow and B-Mode.

  Select the rendering method ([Rend Gray] or [Rend Color]) and the mixing ratio.

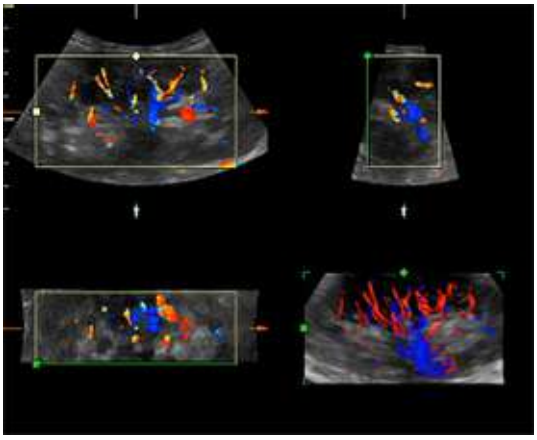


Figure 13-71. 3D Color - Glass Body

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.

Scalpel

Scalpel allows you to edit/cut sections of a 3D image. Scalpel is available only on a rendered image.

1. Press ***Scalpel***.
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***.

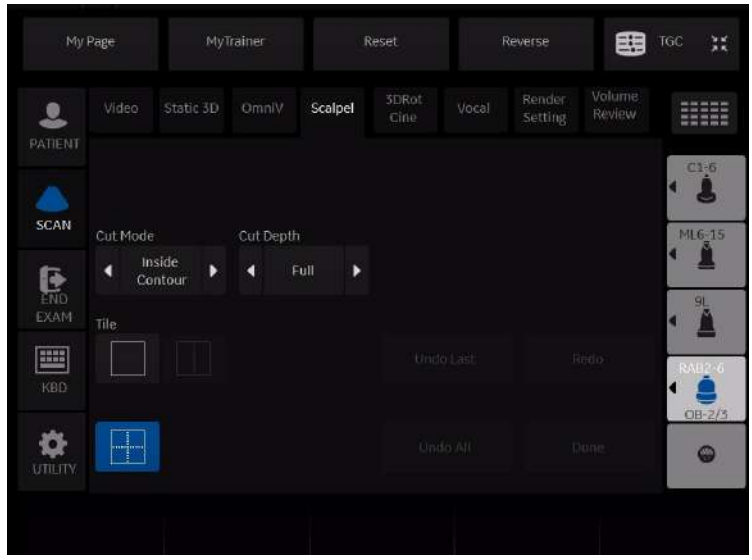


Figure 13-72. Scalpel

Table 13-18: 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.

Table 13-18: Scalpel Parameters (Continued)

Preset Parameter	Description
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.

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.

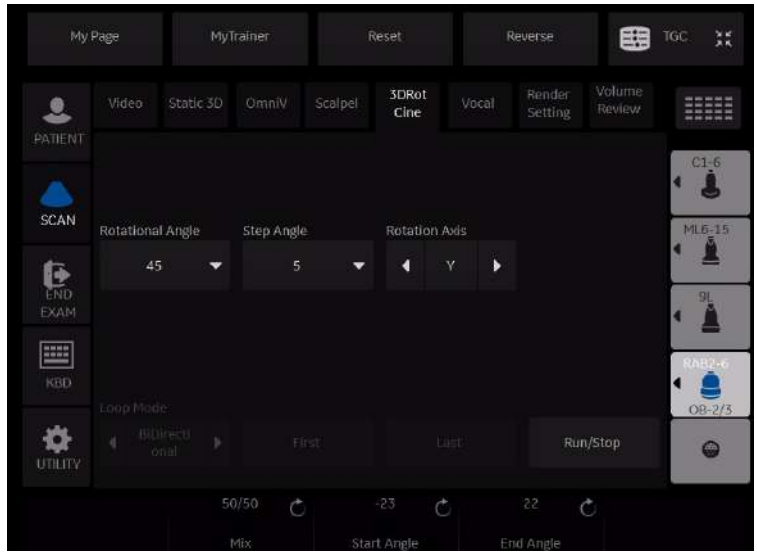


Figure 13-73. 3D Rotation Cine

Table 13-19: 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.

Table 13-19: 3D Rotation Cine Parameters (Continued)

Preset Parameter	Description
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 X 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: 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.

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.

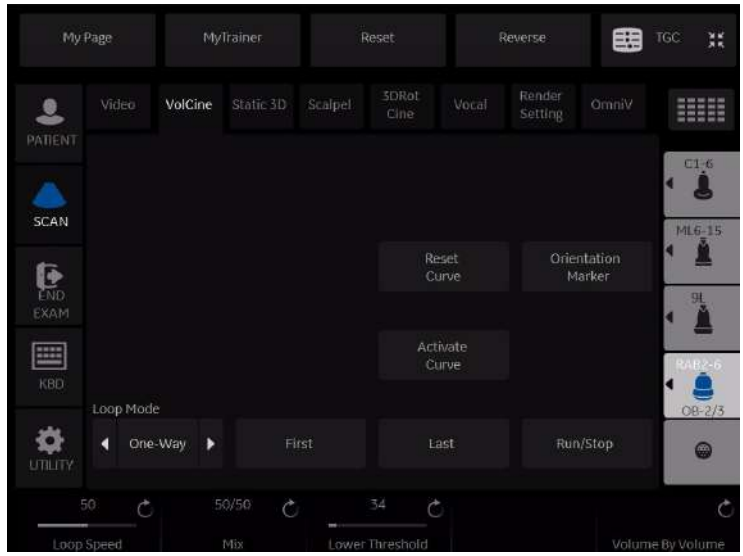


Figure 13-74. 4D Volume Cine

Table 13-20: 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.

Volume CINE (continued)

1. 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.
2. To re-start real-time 4D acquisition, press **Freeze**.

VCI Static

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.

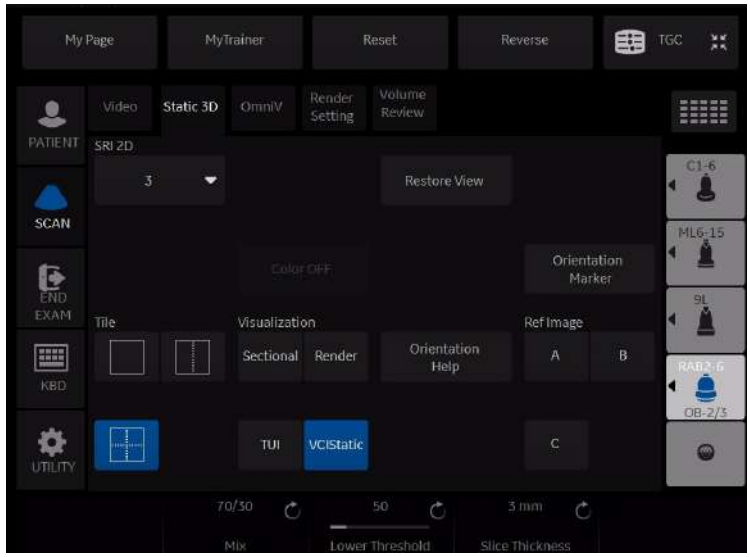


Figure 13-75. 3D (After Acquisition) Touch Panel VCI Static

Table 13-21: VCI Static View

Preset Parameter	Description
Slice Thickness	Select the slice thickness

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)

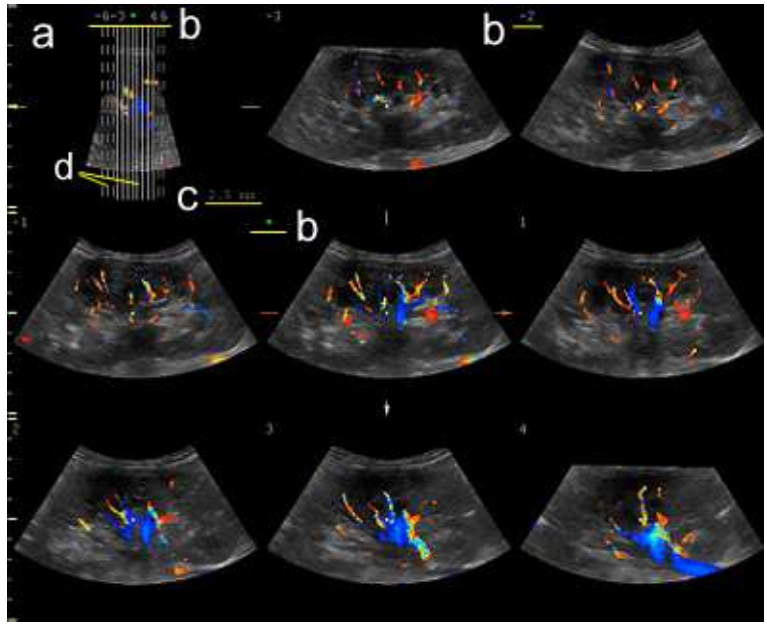


Figure 13-76. TUI 3x3 Example

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.

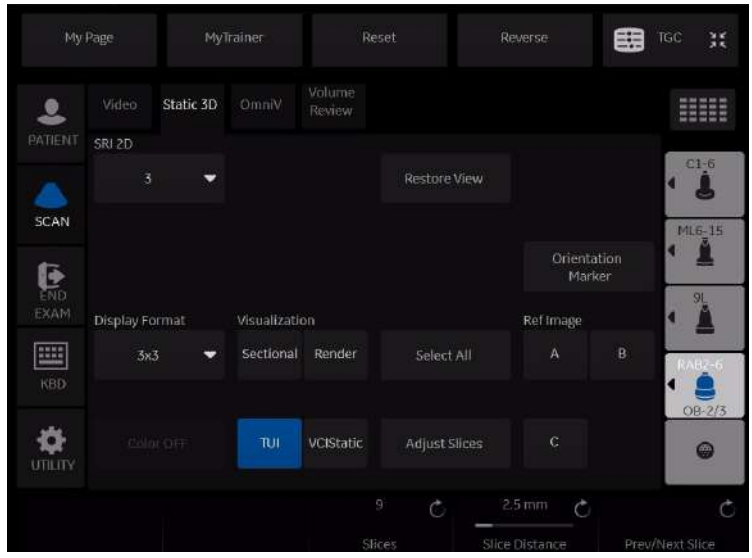


Figure 13-77. TUI Touch Panel

- 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.
- For Orientation Marker, please refer to ‘Easy 3D’ on *page 5-143* .
- 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**.

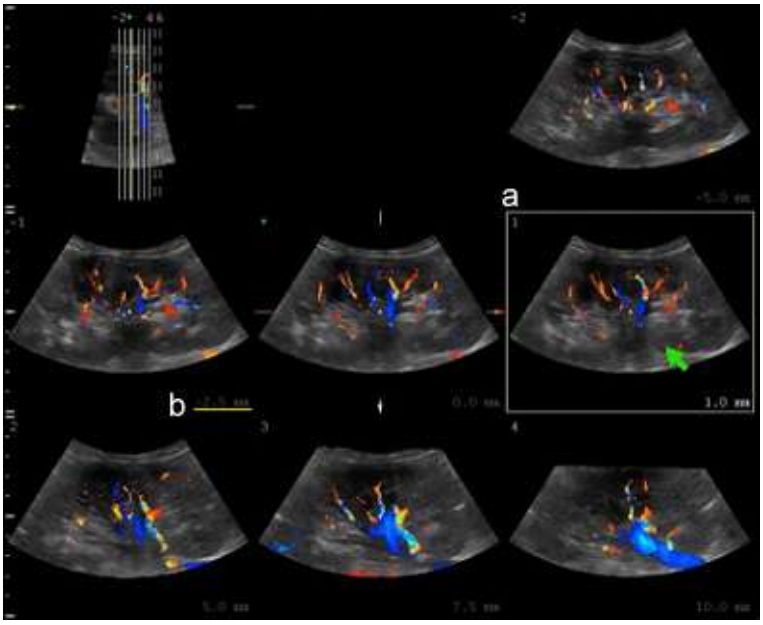


Figure 13-78. Adjust Slice screen (example)

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.

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 (continued)

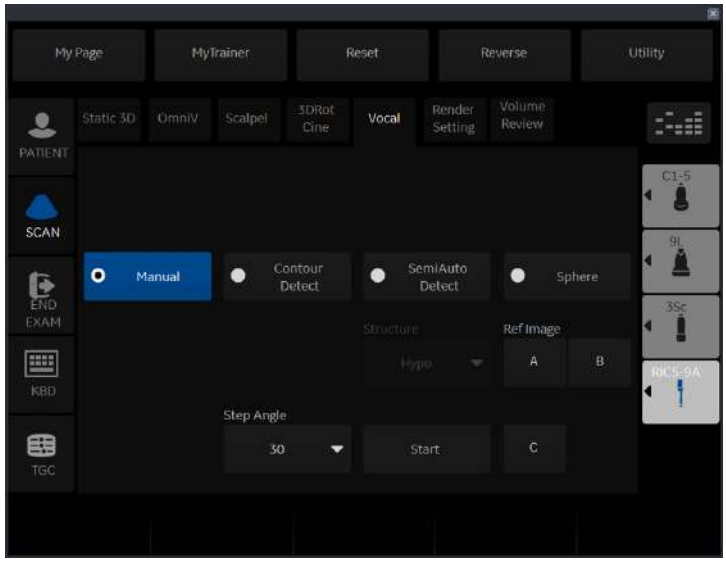


Figure 13-79. VOCAL Setup

Table 13-22: 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.
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.

VOCAL (continued)

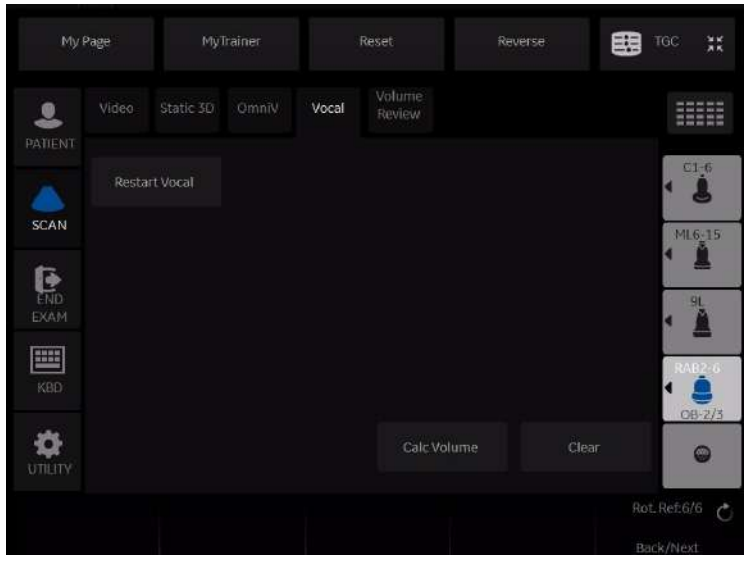


Figure 13-80. VOCAL Calculate Volume Touch Panel

Table 13-23: 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.

VOCAL (continued)

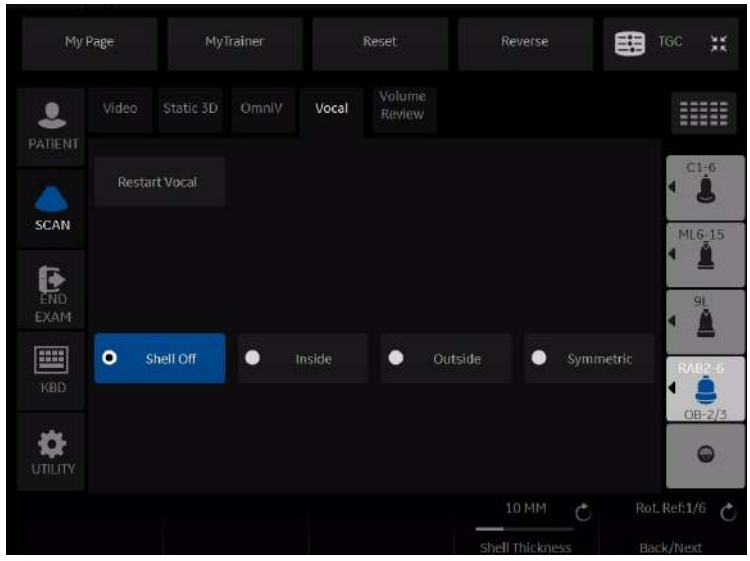


Figure 13-81. VOCAL Edit Touch Panel

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 13-24: 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.

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 staright line but a “free” trace for optimal adaptation to the render object.

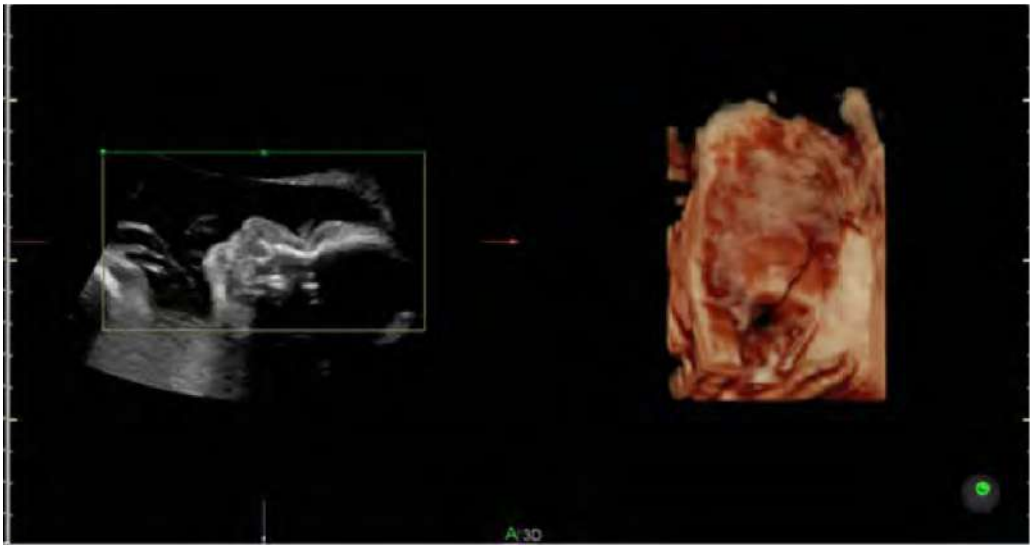


Figure 13-82. Screen Display Off

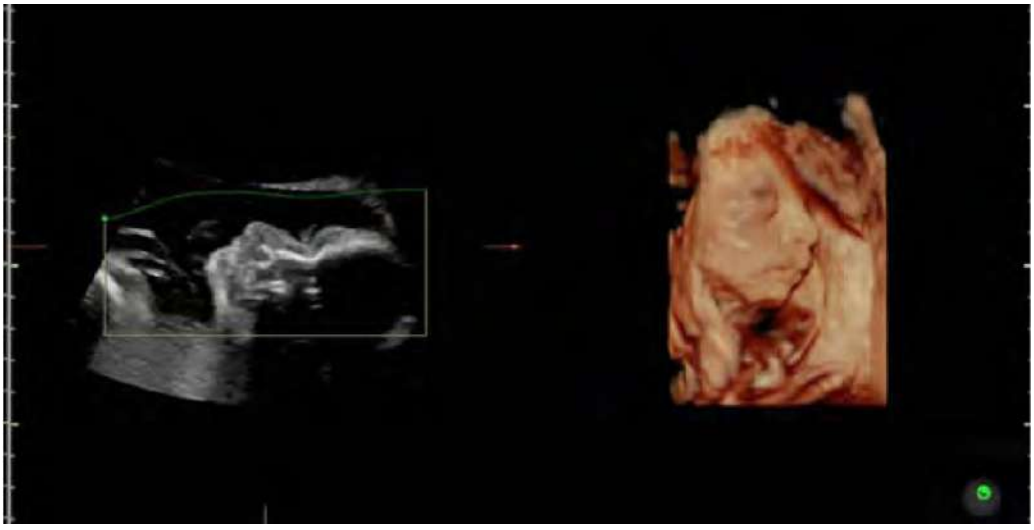


Figure 13-83. Screen Display On

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.

SonoAVC™

Overview

SonoAVC helps detect low echogenic objects (eg. cysts) in an organ (eg. Kidney) and analyzes their shape and volume. From the calculated volume of the object, an average diameter is calculated. All calculated objects are listed according to size. The calculation results are displayed in the top left corner, with the object numbers color-coded to denote the object on the image. If the mouse cursor hovers over a specific item on the list, the respective object in the image is highlighted (and vice versa). The color of the object is bound to its position on the list.

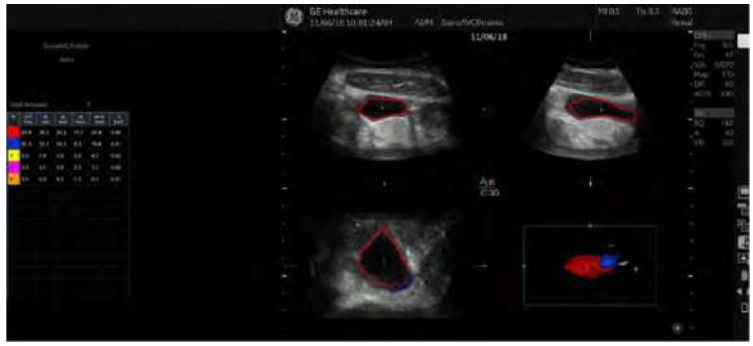


Figure 13-84. SonoAVC Display Screen

- d(V): Diameter, calculated as if the object were a perfect sphere
- dx: Length of x-axis of the best fitting ellipsoid
- dy: Length of y-axis of the best fitting ellipsoid
- dz: Length of z-axis of the best fitting ellipsoid
- mean d: Average value of the x-axis, y-axis and z-axis
- V: Volume of the object

Overview (continued)

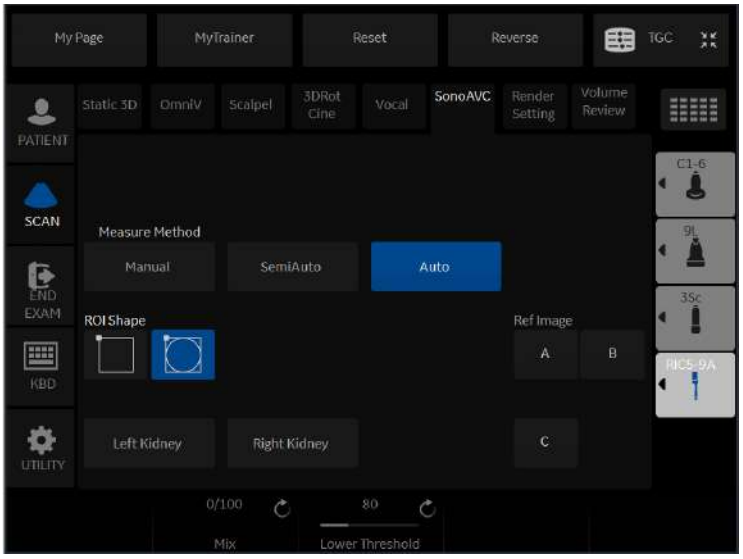


Figure 13-85. SonoAVC Menu

Table 13-25: Menu

Parameter	Description
Measure Method	• Manual: Each object has to be selected and measured manually • SemiAuto: Each object is selected manually with the system cursor but traced / measured automatically • Auto: Objects are detected automatically (Default)
ROI Shape	• Rounded: The box has the shape of a rectangle • Angular: The box has an elliptic shape with rounded corners (Default)
Ref Image	Select the reference image to which all image dependent functions like parallel shifts, rotations, etc. are applied.
Start SonoAVC	With Abd application: • Left Kidney • Right Kidney With Gyn application: • Left Ovary • Right Ovary

SonoAVC Main Menu

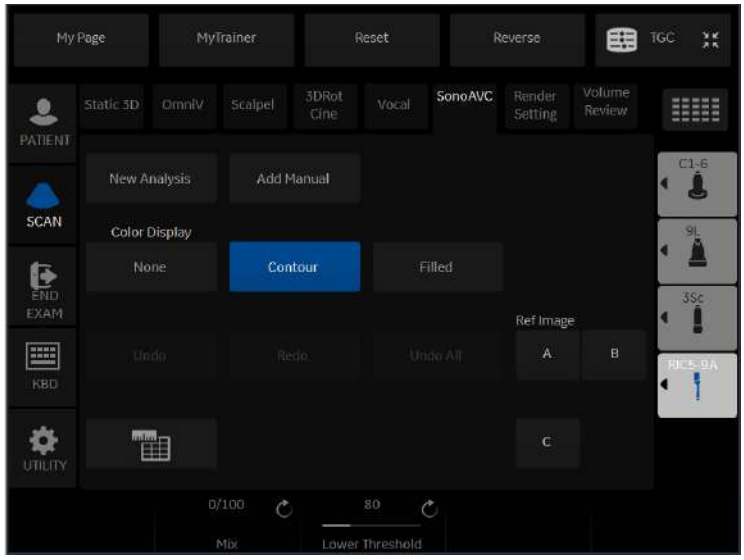


Figure 13-86. SonoAVC main Menu

Figure 13-87. SonoAVC Trackball Menu

SonoAVC Main Menu (continued)

Table 13-26:

Parameter	Description
New Analysis	Starts a new analysis.
Add Manual	Only available when auto or semi-auto is selected. Objects not automatically detected can be added manually, or wrongly detected objects can be removed.
Save	Add the result to database.
Worksheet	Open the worksheet.
Cut/Merge	• Undo All: Undo all edits • Redo: Redo the last edit • Undo: Undo the last edit
Display	• None: No visible segmentation • Contour: Segmentation are shown with a contour-line • Filled: Segmentation are filled with color
Ref Image	Select the reference image to which all image dependent functions like parallel shifts, rotations, etc. are applied.
Add/Rem.	Add detected objects manually.
Cut	Cut detected objects.
Merge	Combine detected objects.

Using SonoAVC

Manual

1. Acquire 3D volume or reload previously acquired volume.
2. Select ***SonoAVC*** tab.
3. Switch sect. plane A to full size if not present.
4. Adjust the sect. plane A with x, y, z rotation, parallel shift and zoom to achieve the correct measuring plane.
5. Select ***SonoAVC***.
6. Select ***Manual*** and adjust the ROI shape, if desired.
7. Start the measurement by selecting either Left Ovary or Right Ovary.
8. The green measurement cross appears in the middle of the image.
9. Perform measurements:
   a. Position the start-point of the long diameter with the Trackball and press **Set**.
   b. Position end-point of the long diameter with the Trackball and press **Set**.
   c. Position the start-point of the short diameter with the Trackball and press **Set**.
   d. Position end-point of the short diameter with the Trackball and press **Set**.
   e. To start the next measurement, move the Trackball and repeat step 9.
10. Select Save to save the measurements to the current exam.

Using SonoAVC (continued)

Semi Auto

1. Acquire 3D volume or reload previously acquired volume.
2. Select ***SonoAVC.***
3. Select ***SemiAuto*** and adjust the ROI shape, if desired.
4. Start the measurement by selecting either Left Ovary or Right Ovary.
5. Measure all desired objects on the current plane:
   a. Position the system cursor over the object to be measured and press **Add/Rem**.
   b. Click the cursor by pressing **Set** on the object.
      The selected trace with corresponding color and number is displayed.
   c. Position the system cursor over the next object to be measured.
   d. If the measurement is not finished, repeat step 5.
6. Select ***Save*** to save the measurements to the current exam.

Auto

1. Acquire 3D volume or reload previously acquired volume.
2. Select ***SonoAVC***.
3. Select ***Auto*** and adjust the ROI shape, if desired.
4. Start the measurement by selecting either Left Ovary or Right Ovary.
   The rendered objects and the result list are displayed on the screen.
5. Select ***Save*** to save the measurements to the current exam.

Using SonoAVC (continued)

Add Manual

1. Press ***Add Manual*** button.
2. The measurement cross appears in the middle of the sect. plane A.
3. Perform measurements:
   a. Position the start-point of the long diameter with the Trackball and press **Set**.
   b. Position end-point of the long diameter with the Trackball and press **Set**.
   c. Position the start-point of the short diameter with the Trackball and press **Set**.
   d. Position end-point of the short diameter with the Trackball and press **Set**.

      The second measurement displays.
   e. To start the next measurement move the Trackball and repeat step 3.

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.

Possible Acquisition Modes: (Sectional Planes Visualization only)

- 4D Real Time
- 3D Static
- STIC

Workflow

1. Press **3D/4D**.
2. Select ***VCI 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 endopoints of each segment by press **Set**.

OmniView Main Menu

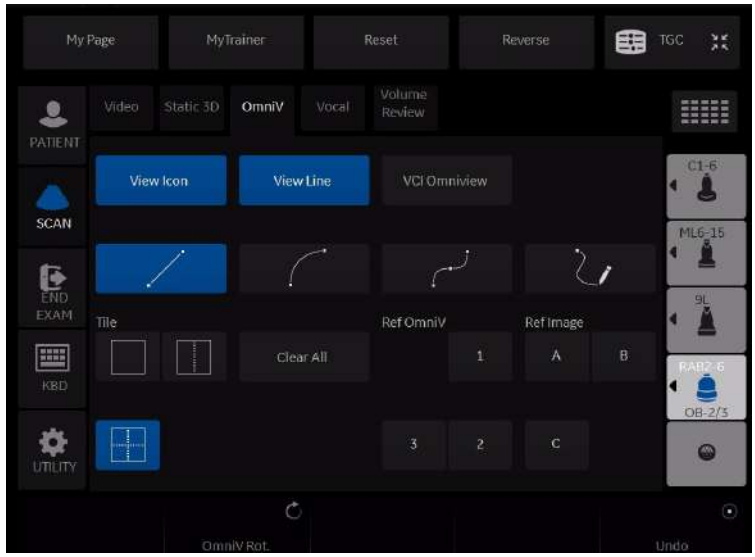


Figure 13-88. OmniView Menu

Table 13-27: 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 (Singul, 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.

OmniView Control

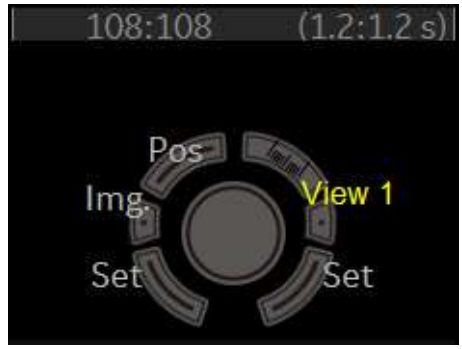


Figure 13-89. OmniView Control

Table 13-28: OmniView Parameters on Line Edit Mode: New

Parameter	Description
Undo	Restart the line.
Pre mode	Go back to Pre-mode.

VCI OmniView

With help of OmniView sectional planes derived from an entered trace can be visualized and so special coronal planes are possible. The trace can be entered in the Vol. Pre image or if a volume data set is present on image A, B or C. The trace can be a straight line, a curved line or any freeform trace. Together with the VCI function images with less speckle pattern and a highly improved tissue contrast can be archived.

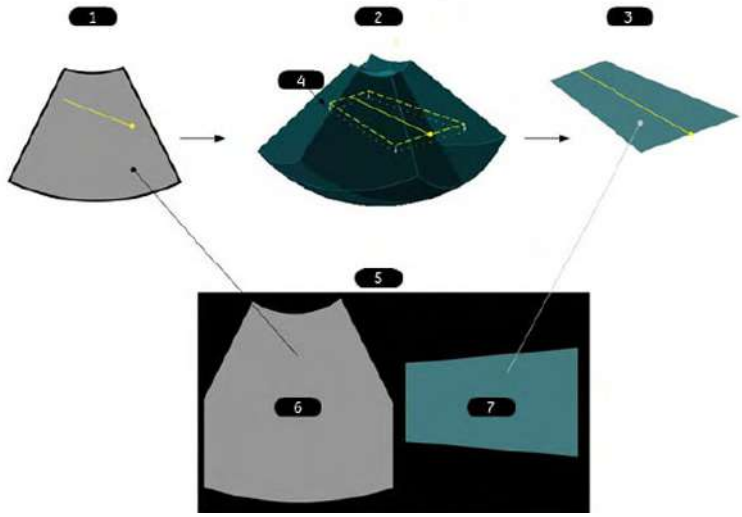


Figure 13-90. VCI OmniView

1. OmniView pre mode:
   Entered OmniView line in center position of Vol. sweep
2. Acquired Volume block:
   dashed line: plane position orthogonal to the center image dotted line: VCI (slice) thickness
3. Calculated result:
   OmniView image including VCI rendering if on
4. Render direction
5. Screen display
6. Ref. Image
7. OmniView image

STIC (Spatio-Temporal Image Correlation)

NOTE: STIC is an option.

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 STICpre 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 use in OB application.

NOTE: Supported probe: RAB2-6-D and RIC5-9-RS.

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.

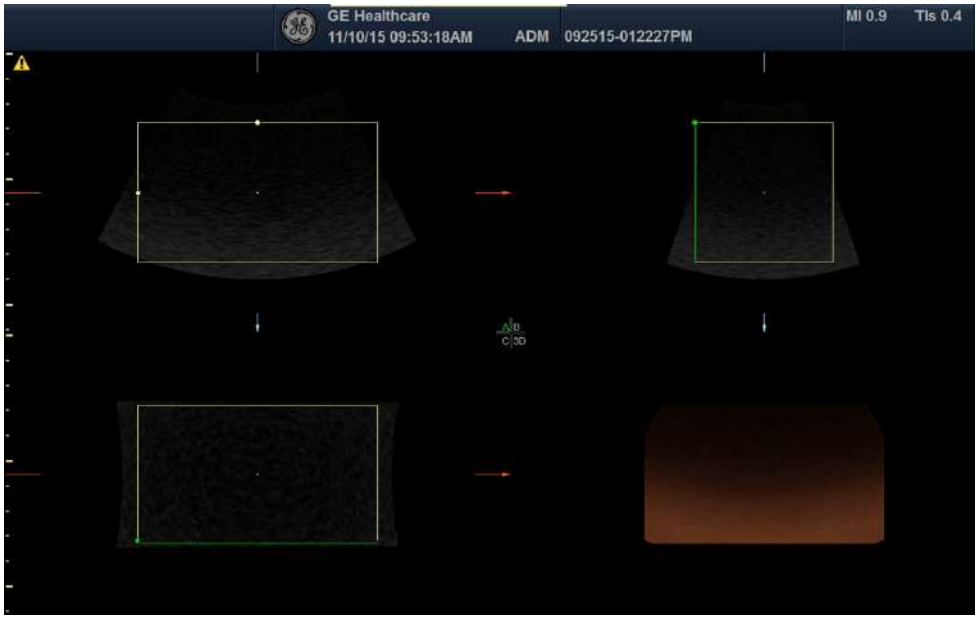


Figure 13-91. Screen Layout

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 13-29: 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.

HDLive

NOTE: HDlive is an option

NOTE: The virtual light source of HDlive mode can be positioned by keeping the small center trackball button pressed while moving the trackball.

NOTE: HDlive rendering is just available if Static 3D is active.

NOTE: The Render Mode for HDLive is available when HDLive is activated.

Render Parameter

HDlive Texture Activates HDlive Texture.

HDlive Smooth Activates HDlive Smooth.

HDLive Activation

1. Press 3D/4D.
2. Select [Static3D] button and then HDLive preset
3. Select Render in Visualization.
4. Start Static3D acquisition.

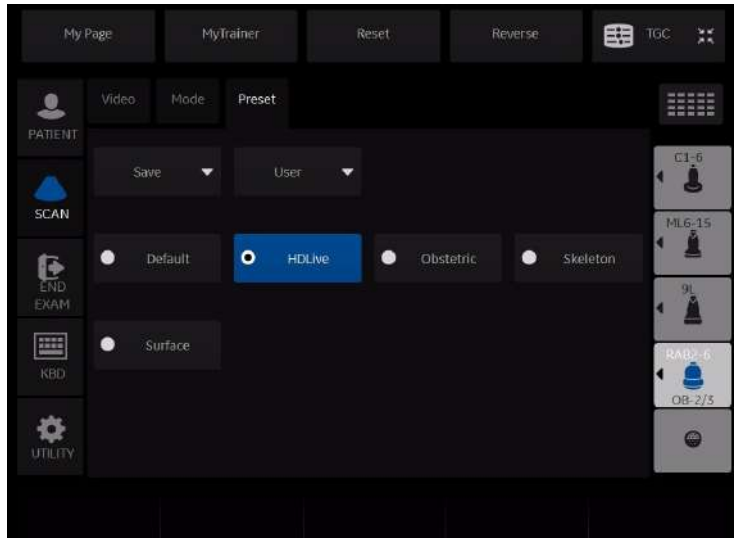


Figure 13-92. HDLive Preset

Light Control

1. Select Light with Top-Left setkey
2. Move the cursor with trackball the direction of light

Figure 13-93. HDLive Light Control

Figure 13-94. HDLive Light Control

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 P8/P9/P10 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 now 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), B-Flow (supports depth, frequency, focal zones, and sensitivity), and B-Flow Color (supports ROI Size, ROI Position, frequency, and scale)

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 PW, CW, M-Mode, 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 "Compare" checkbox of the DICOM Image folder and press Compare in 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.

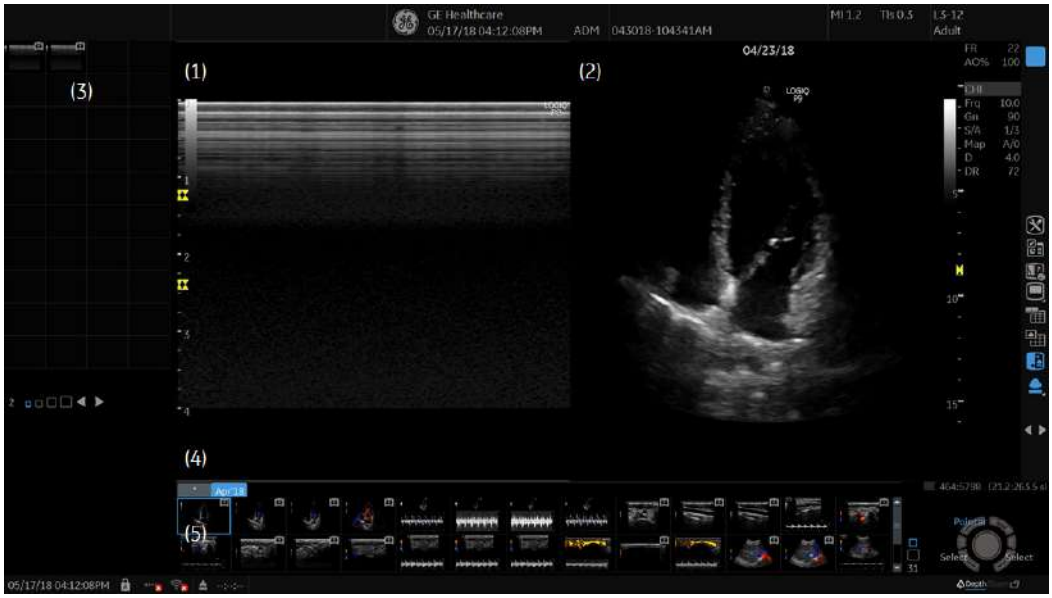


Figure 13-95. Compare Assistant Screen (example)

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.

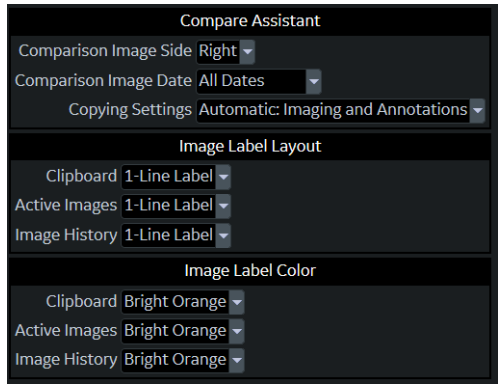


Figure 13-96. Setting Up Compare Assistant Parameters

Table 13-30: Compare Assistant Parameters

Parameter	Settings
Comparison Image Side	• Left • Right (Default)
Comparison Image Date	• 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 13-30: Compare Assistant Parameters

Parameter	Settings
Copying Settings	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). **Automatic Settings** are copied from the Comparison Image to the current image as soon as the comparison image is loaded. • **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 **Manual Settings** are copied from the Comparison Image to the current image when you manually select the control. • **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 **Off**: No parameters copied.
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.	
Image Label Layout: Clipboard Active Images Image History	• No Label • 1-Line Label (Default) • 2-Line Label
Image Label Color: Clipboard Active Images Image History	• 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 13-31: Compare Assistant Controls

Control	Description
	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 13-32: 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.

Table 13-33: Compare Assistant icon and Copy Setting icon

	Compare Assistant On. Copy to Right.		Compare Assistant On. Copy to Left.
	Off		Off

Table 13-33: Compare Assistant icon and Copy Setting icon

	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 13-97. 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.

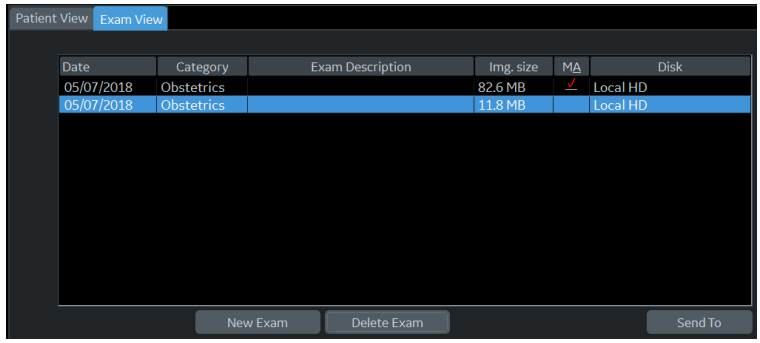


Figure 13-98. Patient Exam View

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 13-99. 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 Model, change active exam, change patient, or recall an image from the active clipboard.

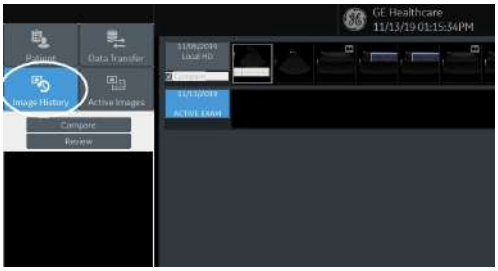
Compare Assistant Quick Card

LOGIQ Techniques: Compare Assistant

Table 13-34: Getting Started

1. Import Previous images onto system by using a USB, DVD or by Query retrieve directly from PACS.
2. Select patient from Patient View by double clicking over name.
3. Start a new exam.
4. Select Image History to view previous studies.

Note: Compare Assistant is also accessible from Active Image Screen by using icon adjacent to clipboard. At anytime, select Compare Assistant icon to get in or out of Compare Assistant.



LOGIQ Techniques: Compare Assistant (continued)

Table 13-35: Comparing Studies

1. From Image History Screen, select image from exam to compare and then select the Compare Key.

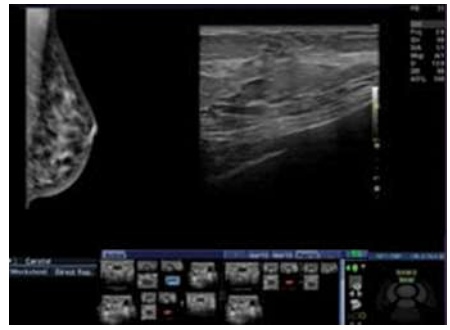
OR

2. Select the Compare Assistant icon to the right of the clipboard to start Compare Assistant from main screen.

Note: In image history screen . Select checkboxes adjacent to previous exams to be compared. These exams will show up as tabs within compare assistant shown by date of study. Up to 3 exams may be chosen to compare.

Table 13-36: Clinical Use

1. Follow-up Routine Exams and known pathology.
2. View prior exams side-by-side with a real-time ultrasound image so you can quickly identify the area of interest.



LOGIQ Techniques: Compare Assistant (continued)

Table 13-37: Compare Assistant Screen

1. In Dual screen, the left side is the active image and the right side is the prior image.
2. Comparison image date will be seen at top of comparison image.

Note: Active Image side can be changed by default.

Smart Start (Start Assistant)

Introduction

Smart Start (Start Assistant) saves exam setting Mappings automatically when the first image is acquired during an exam. Saved Smart Start Exam Mappings are automatically recalled when a Worklist item is loaded, keying off the Worklist Exam Description.

Smart Start 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

NOTE: 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. An Exam Description or Scan Assistant program entry must be present for Smart Start to save the Mapping.

Saved Smart Start Exam Mappings can also be added, edited or deleted with the Smart Start Mapping Editor - See

NOTE: The “Use Smart Start” box on the Utility-> System-> General page is checked by default.

Smart Start (Start Assistant) Mapping Editor

The Smart Start (Start Assistant) Mapping Editor can be accessed from the Utility-> System-> General screen by selecting “Edit mappings” under the Smart Start section.

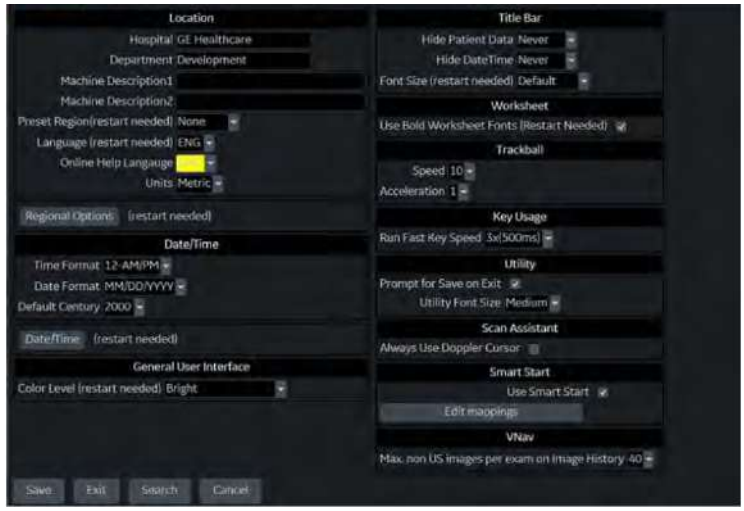


Figure 13-100. Smart Start (Start Assistant) on Utility-> System-> General Page

On the Smart Start Mapping Editor screen you can Add, Edit or Remove a Smart Start map.

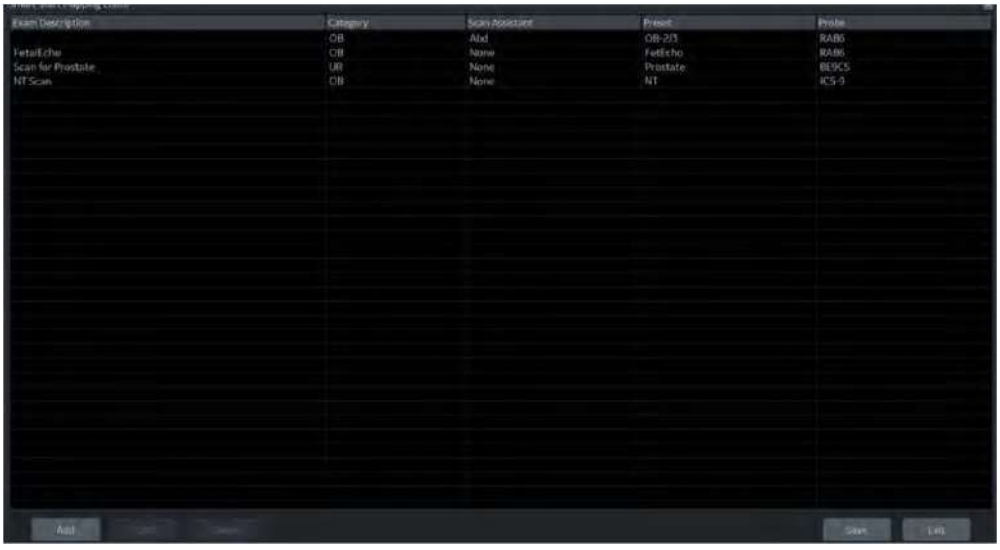


Figure 13-101. Smart Start (Start Assistant) Mapping Editor

Add a Smart Start (Start Assistant) Mapping

Select **Add** to add a new mapping.

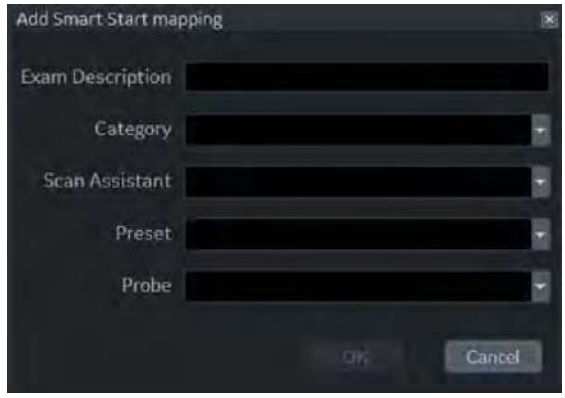


Figure 13-102. Add Smart Start (Start Assistant) Mapping

Edit a Smart Start (Start Assistant) Mapping

Highlight an existing mapping and select **Edit**or double-click the item to edit a mapping.

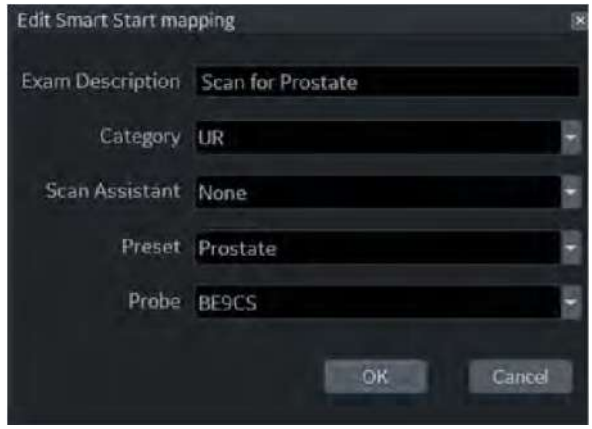


Figure 13-103. Edit Smart Start (Start Assistant) Mapping

Delete a Smart Start (Start Assistant) Mapping

Highlight one or more existing mappings and select **Delete** to delete.

Save and Exit Smart Start (Start Assistant) Mapping Editor

Before exiting Smart Start (Start Assistant) Mapping Editor, select **Save** to save any changes you have made.

Select **Exit** to exit Smart Start 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.

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 P8/P9/P10.
- **Export**. Used to move Programs from one LOGIQ P8/P9/P10 system to another LOGIQ P8/P9/P10.
- **Scan Assistant Creator**. Used to create Scan Assistant Programs.

Scan Assistant Description

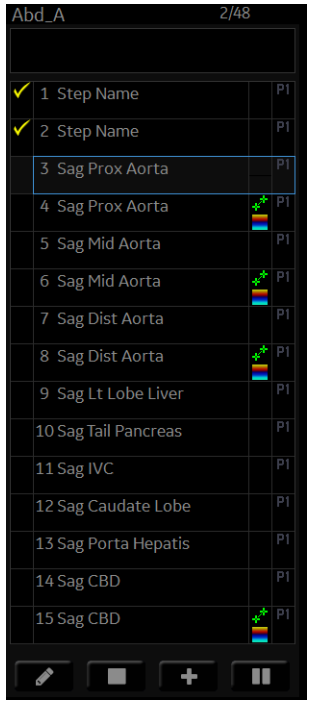


Figure 13-104. Scan Assistant Display Description

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 P8/P9/P10 program.
   a. Insert the media with the saved Program from the Scan Assistant Creator or exported program from another LOGIQ P8/P9/P10.

NOTE: *If you insert the media with exported program from another LOGIQ S8 and LOGIQ E9, the following dialog displays before Import Programs. Select Default for LOGIQ P9/P7 or LOGIQ S8 or LOGIQ E9.*

Figure 13-105. LOGIQ S8 and LOGIQ E9

NOTE: *If you insert the media with exported program from LOGIQ E9, the following dialog displays before Import Programs. Click OK.*

Figure 13-106. LOGIQ E9 only

Setting up Scan Assistant (continued)

b. Press Utility -> Scan Assistant.

c. Select Import from the Scan Assistant Manager page.

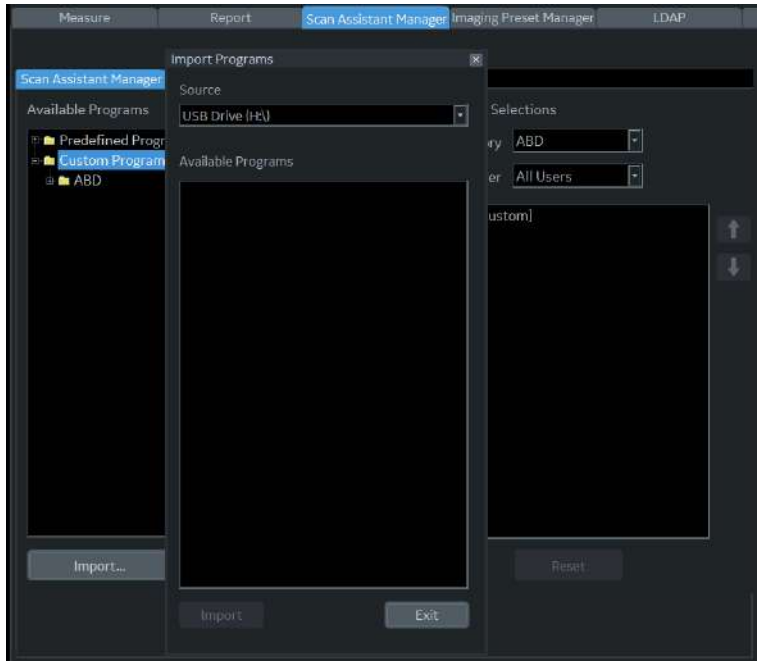


Figure 13-107. Import Programs

Setting up Scan Assistant (continued)

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.

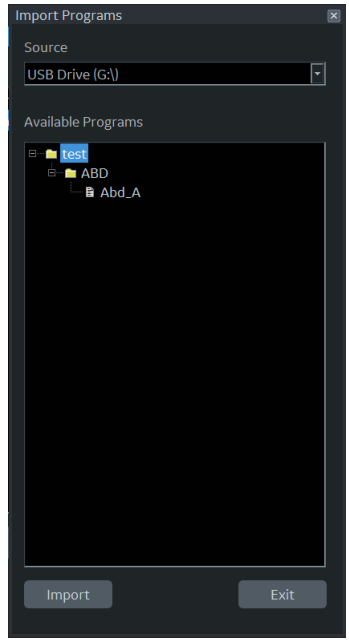


Figure 13-108. Import Programs

Setting up Scan Assistant (continued)

f. Select Import. The Program(s) you selected are stored to the LOGIQ P8/P9/P10. You can add it to the exam category and user.

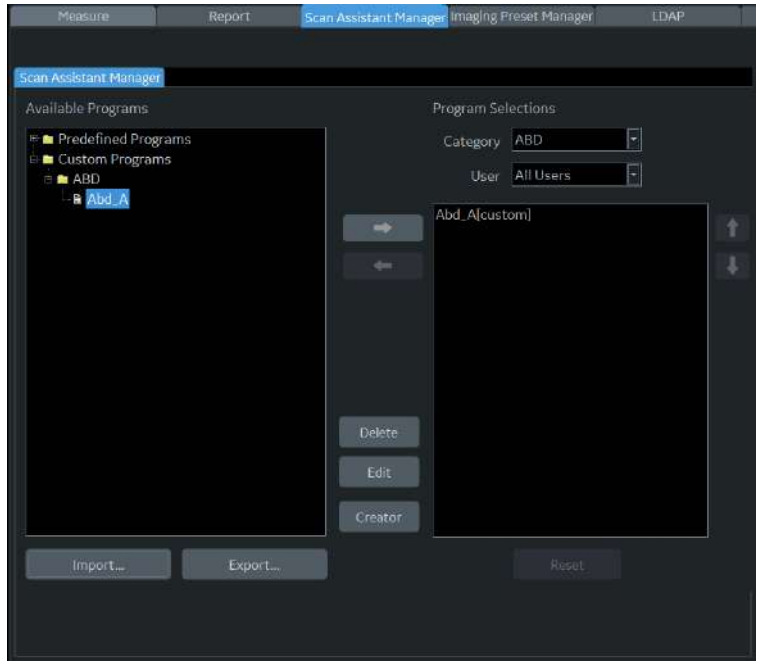


Figure 13-109. Add Program

Setting up Scan Assistant (continued)

2. Assign the imported Program to the exam category and user. Under Program Selections on the right-hand side of the Scan Assistant Manager page, specify the Exam Category and User for this Program. You can select All Users, or a specific user. If you specify All Users, all users will have the ability to use this Program while in the specified exam category, unless the user has his/her own list defined.
3. Select the imported Program from Available Programs -> Custom Programs on the left-hand side of the page. Then press the right arrow button to move the imported Program to the exam category and user selected above.

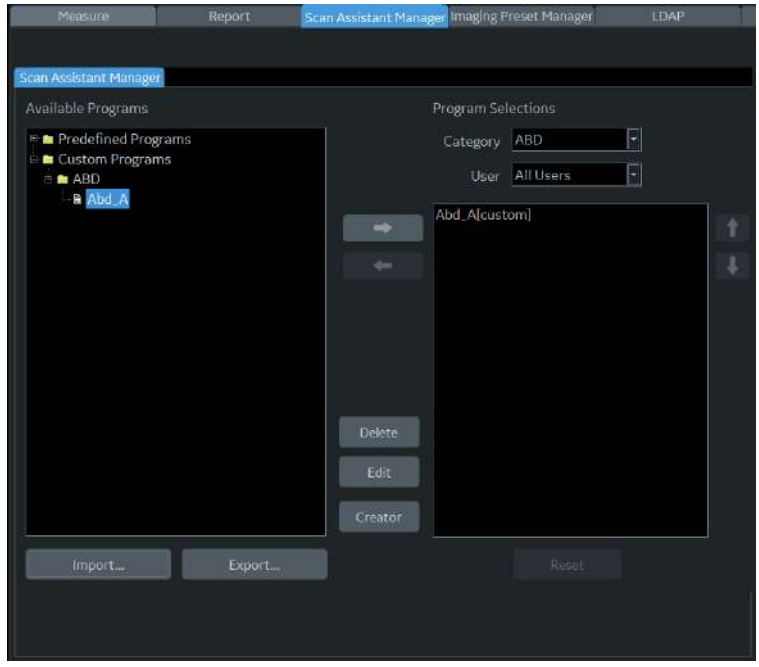


Figure 13-110. Add Program

Setting up Scan Assistant (continued)

4. If you want the system to automatically select the last-used Program based on the Exam Description or Exam Category, you can preset the system to do so. Go to Utility -> System -> General -> Scan Assistant -> Auto Selection -> and select Description or Category.

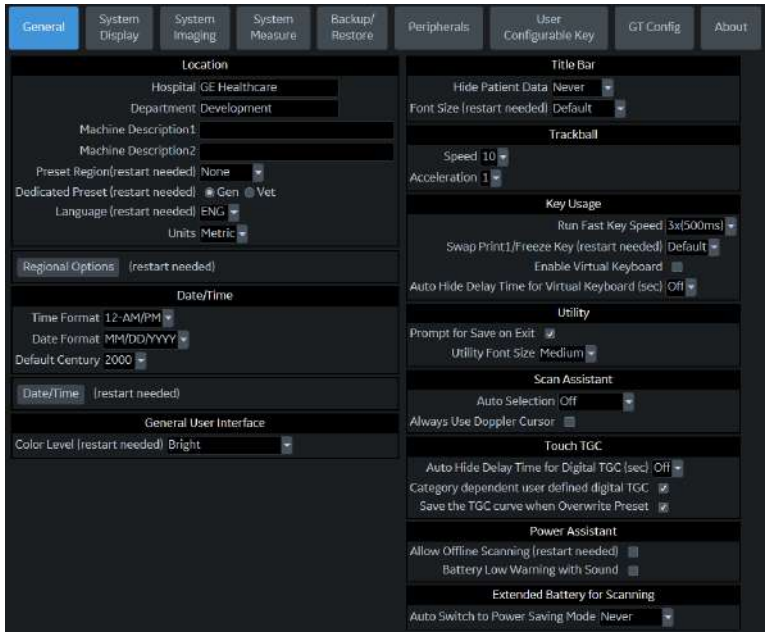


Figure 13-111. Scan Assistant Auto Selection

5. 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.

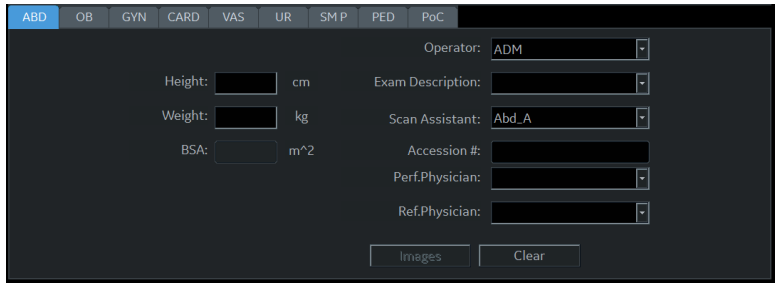


Figure 13-112. Patient Scan Assistant Program

Setting up Scan Assistant (continued)

You can access the Scan Assistant Creator to edit the exam's program from the imaging display via the Creator Icon located at the bottom, 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.

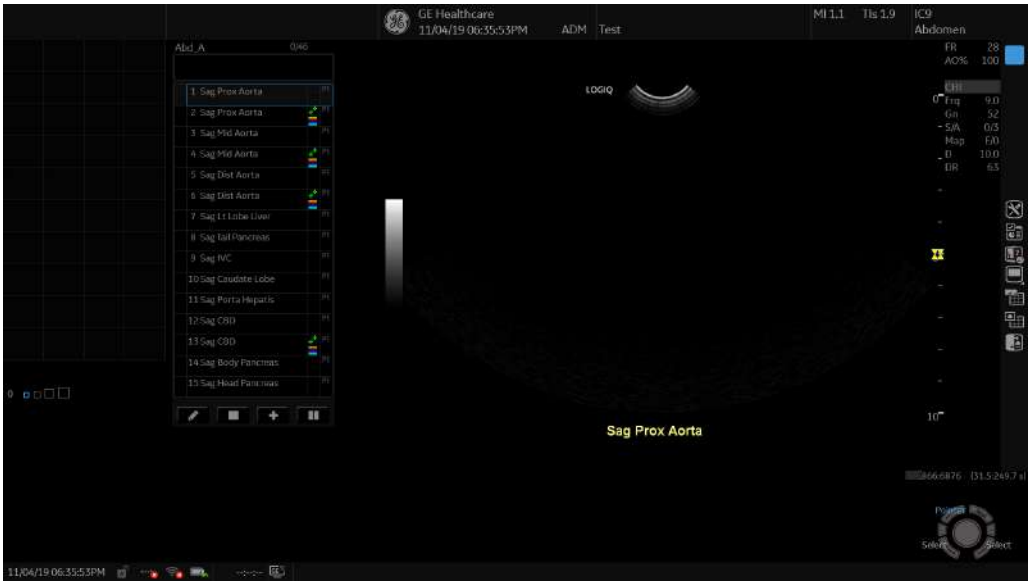


Figure 13-113. Scan Assistant Display

Using Scan Assistant (continued)

1. Follow the steps indicated in the Program: image/measure the appropriate anatomy.
2. Perform the indicated trigger to move to the next step in the Program.

NOTE: The footswitch can be used with Scan Assistant. You can map Pause/Resume, Previous Step, and Next Step to the footswitch.

3. To pause or unpause Scan Assistant, press the pause button on the display 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.

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.

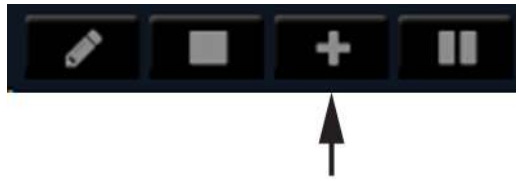


Figure 13-114. Insert Steps

The Insert Steps Pop-Up Menu appears.

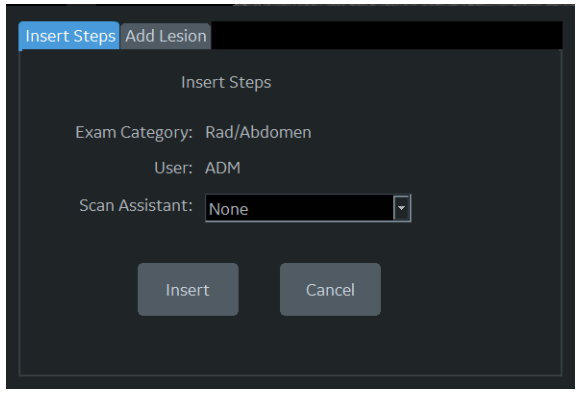


Figure 13-115. Insert Steps Pop-up menu

2. Select the steps to be inserted via the pull-down Scan Assistant menu.

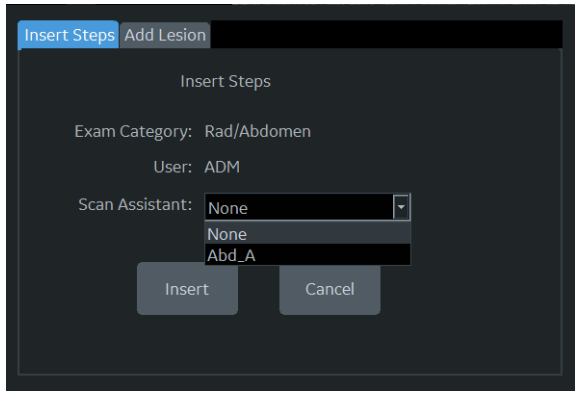


Figure 13-116. Select from pull-down menu

Inserting a step (continued)

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.

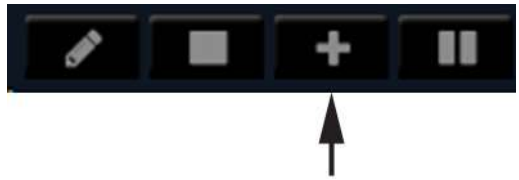


Figure 13-117. Insert Steps

2. Select the "Add Lesion" tab.

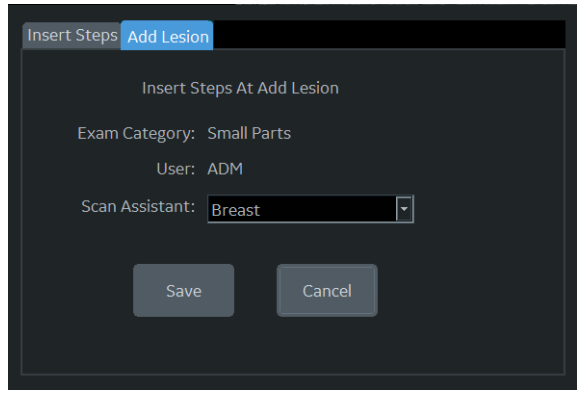


Figure 13-118. Select from pull-down menu

Breast Measurement Auto Insert Steps (continued)

3. In the Scan Assistant field, select the steps to be inserted when the user presses the Add Lesion Touch Key shown below.

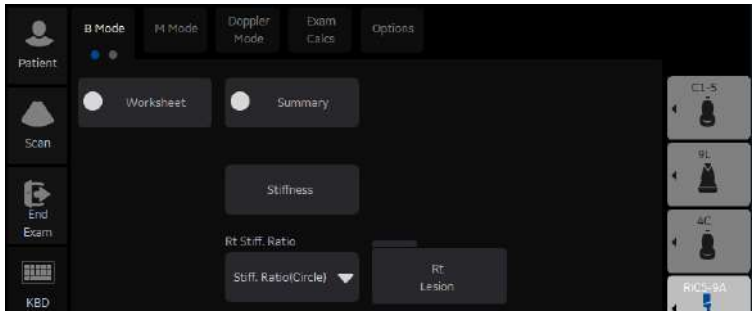


Figure 13-119. Add Lesion key

Exporting Scan Assistant Programs

Exporting Scan Assistant Programs allows them to be imported to another LOGIQ P8/P9/P10 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.

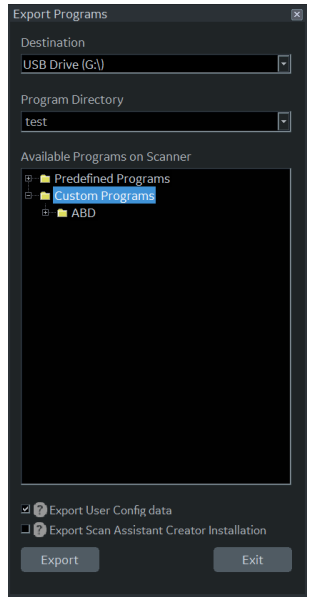


Figure 13-120. Export Programs

7. Select Export. The Program(s) you selected are stored to the media. You can now import it to a new LOGIQ P8/P9/P10.

Scan Assistant Creator

Activating the Scan Assistant Creator

To activate the Scan Assistant Creator on the LOGIQ P8/P9/P10, press the Creator key in Utility -> Scan Assistant Manager.

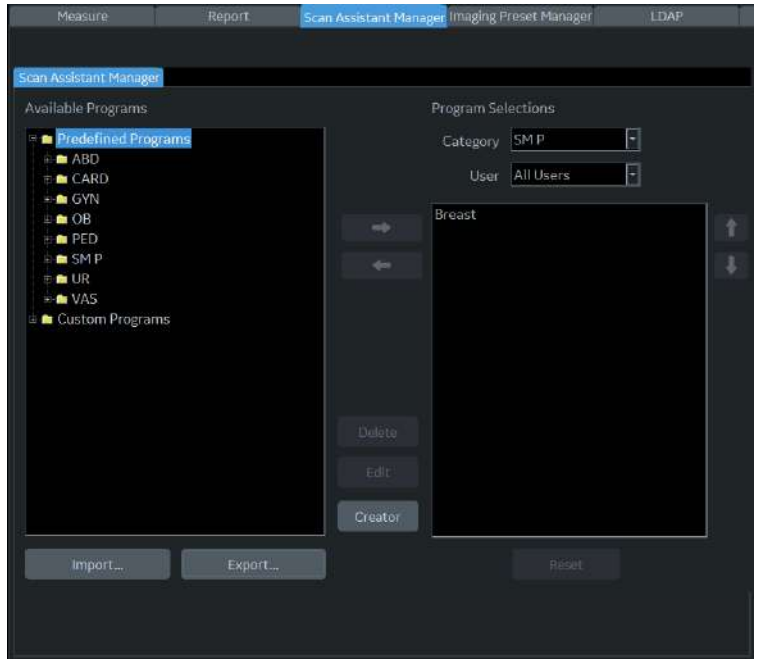


Figure 13-121. Scan Assistant Manager

Overview

The Scan Assistant Creator is used to build customized Programs that can be imported onto the LOGIQ P8/P9/P10. These Programs automate many of the steps normally performed manually by the user, thereby reducing the number of user actions and the amount of time to perform an exam.

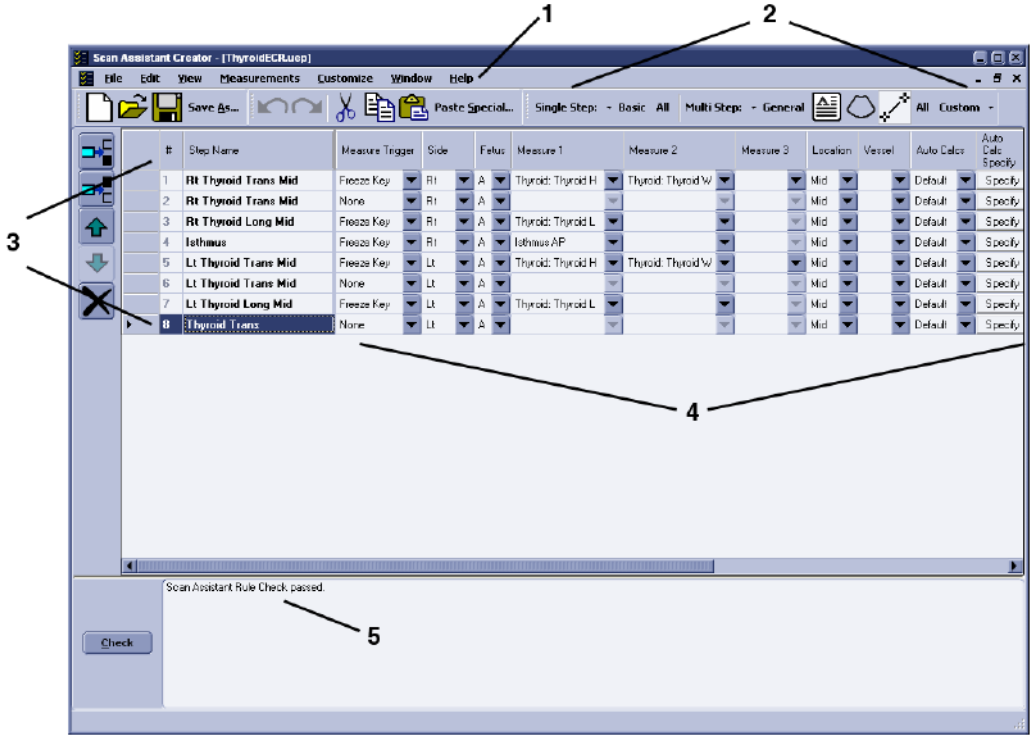


Figure 13-122. Tool Layout Overview

1. Menu
2. Toolbars
3. Steps
4. Step Attributes
5. Rule Checking

Overview (continued)

The Scan Assistant Creator tool can be used both on the scanner and as an off scanner tool. Where there are differences in behavior, this user's guide uses the term 'on scanner' to indicate when the tool is running on the scanner and 'off scanner' to indicate when the tool is running off the scanner.

File Handling

When using Scan 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.

Off-Scanner Directory Structure

The Scan Assistant Creator organizes the Programs in a directory structure that allows easy importing into the LOGIQ P8/P9/P10. 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.

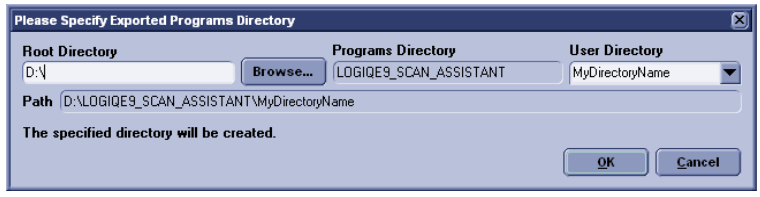


Figure 13-123. Directory Structure

Off-Scanner Directory Structure (continued)

The Directory Structure dialog can be accessed via the File menu.

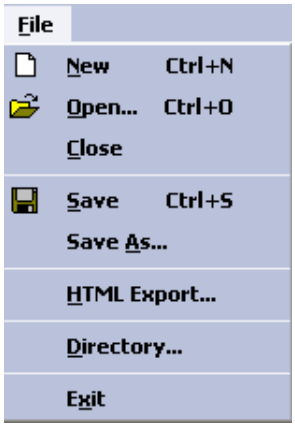


Figure 13-124. File Menu

Figure 13-125. File Toolbar

File Extensions

Factory defined Programs have an .ep (exam Program) extension while user-defined Programs have an .uep (user exam Program) extension. Both factory and user-defined Programs can be read into the Scan 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.

Upon installation of the Scan Assistant Creator, files with a .ep or .uep extension are automatically associated with the Scan Assistant Creator.

Exporting Programs from LOGIQ P8/P9/P10

Factory or user-defined Programs on the LOGIQ P8/P9/P10 are easily exported for editing with the Scan Assistant Creator.

On the LOGIQ P8/P9/P10:

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 P8/P9/P10

Programs created with the Scan Assistant Creator are easily imported to the LOGIQ P8/P9/P10.

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).

Example of Directory structure:

LOGIQ_SCAN_ASSISTANT

MyUserNameDirectory

ABD

CARD

GYN

OB

PED

SMP

UR

VAS

On the LOGIQ P8/P9/P10:

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.

Creating New Programs

A new Program is created by selecting File -> New, by clicking on the New document icon in the Toolbar, or by using the keyboard shortcut Ctrl+N.

1. Before creating a New Program, select ***Single Step*** or ***Multi Step*** in the Toolbar.

Figure 13-126. File Toolbar

2. Proceed to add/update your settings for the Step: Step Name, Instructions, etc.
3. Once finished, highlight the finished Step.

Creating New Programs (continued)

4. Select **Edit** -> **Copy**

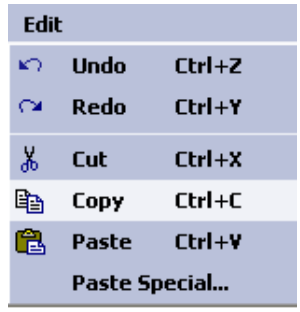


Figure 13-127. Edit -> Copy

5. In the Toolbar along the left, select **Insert Step Before Selected** or **Insert Step After Selected**.

Figure 13-128. Insert Step

6. Highlight the copied step and proceed to edit accordingly.
7. Proceed to follow the same procedure to add more steps to your Program.

Creating New Programs (continued)

8. When you are done, select **Check** to verify your Steps.

Figure 13-129. Rule Check and results area

9. 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.

Opening New 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.

Opening Existing Programs

An existing Program is opened by selecting File -> Open, by clicking on the File -> Open icon in the Toolbar, or by using the shortcut Ctrl+O. Finding the Program file (.ep or .uep) and opening the file automatically opens the file in the Scan Assistant Creator. Multiple Programs can be opened at the same time.

Saving Programs

Programs are saved via the Save or Save As functions available on the File Menu and the File Toolbar. Save is also available via the Ctrl+S keyboard shortcut. "Save" saves the Program using its current name and file location. "Save As" allows the name and file locations to be edited.

When Saving a Program, the Scan Assistant Creator provides an opportunity to run a rule check on the Program before saving it as shown in the following figure. **Yes** runs the rule check, **No** bypasses the rule check and **Cancel** cancels the Save request. See ‘Rule Checking’ on *page 13-252* for more details on Rule Checking Programs.

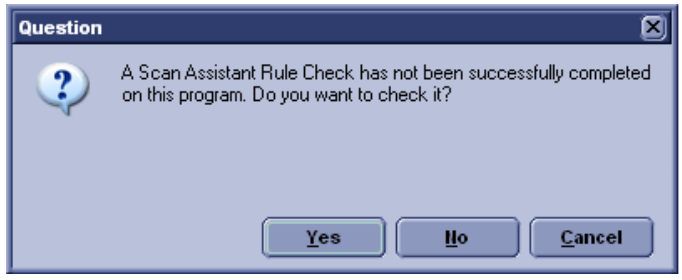


Figure 13-130. Program Rule Check Reminder

NOTE: The name of a Program is appended with an asterisk (*) when the Program has been changed, but those changes have not yet been saved

A Program can be closed without saving it using the Close selection on the File Menu or by using the "X" in the upper right corner of the Program window.

Sharing Programs

If you want to share a program with someone else, the file can simply be sent via e-mail as an attachment or copied onto a media. If the person receiving the program has the Scan Assistant Creator tool installed, he can simply open the file and then use “Save As” to save it to an appropriate directory. See Section 3.1. If the person receiving the program does not have the Scan Assistant Creator tool installed, he can still load the program onto a scanner by creating the following directory structure on a media device, copying the file to one of the category directories and then importing the protocol onto the scanner.

Top Level Directory on media: LOGIQ_SCAN_ASSISTANTUser Program Directory: Any user nameCategory Directories: Abd, Card, Gyn, OB, Ped, SMP, UR, Vas

If you want to share an entire portfolio of programs with some 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.

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. The view of choice is selected from the View Selection Menu or the View Toolbar Menu.

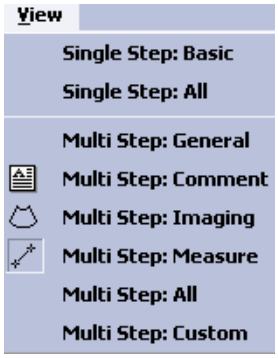


Figure 13-131. View Selection Menu

Figure 13-132. View Toolbar Menu

Single Step Views

There are two Single Step views: Basic and All. The Basic view shows the most common attributes of the selected step. The All view shows all of the attributes of a given step.

For both views, the step names are shown on the left with the active step highlighted. The step attributes appear on the right and are separated into four groupings:

General attributes at the top

Imaging and Comment attributes on the left

Measure attributes on the right.

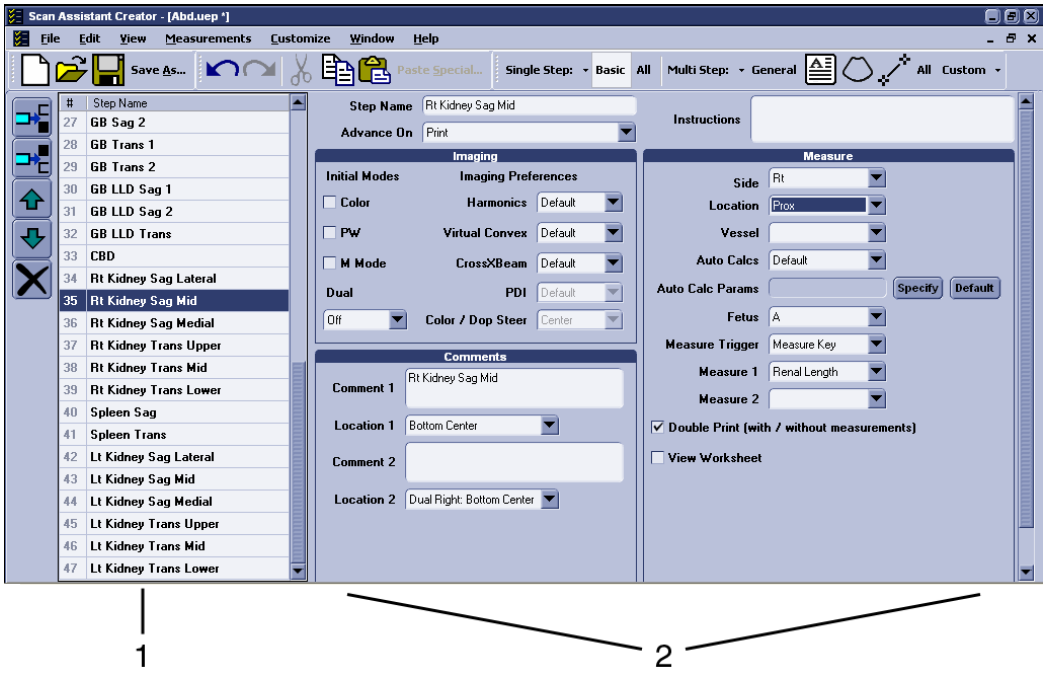


Figure 13-133. Basic Single Step View

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.

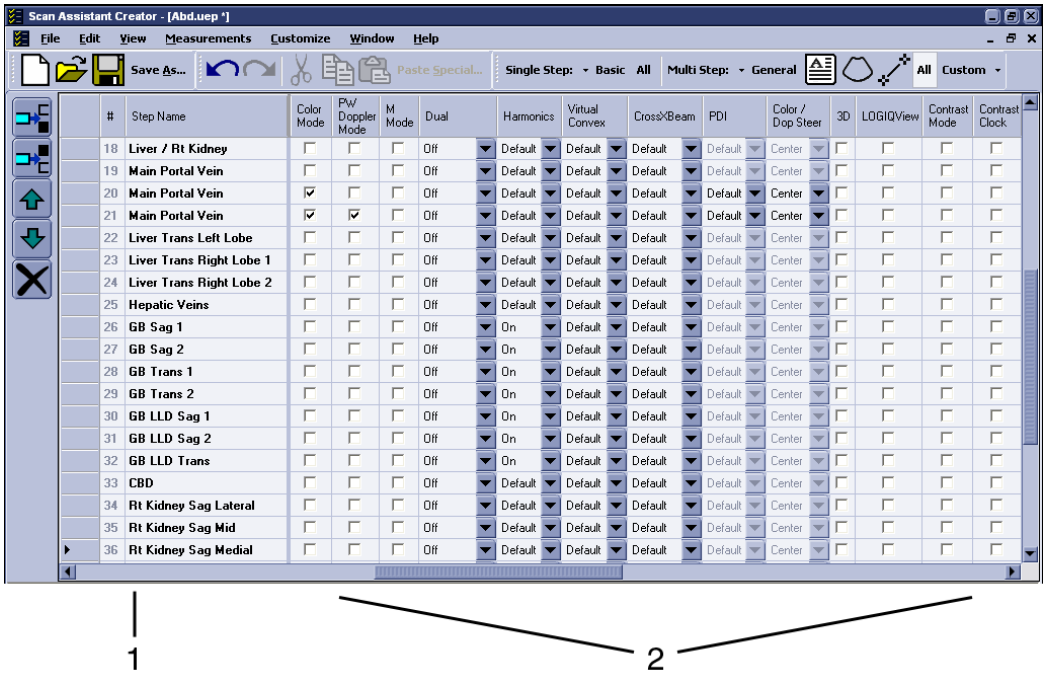


Figure 13-134. Multi Step Scan View

1. Steps
2. Step Attributes

Customizing Multi Step Views

The contents of the Multi Step views is configurable via the Customize Menu or the small downward pointing arrow next to the word "Custom" on the View Toolbar Menu. In either case the Customize Multi Step Views dialog appears. 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.

See ‘HTML Export’ on *page 13-254* for details on the HTML Export Multi Step view.

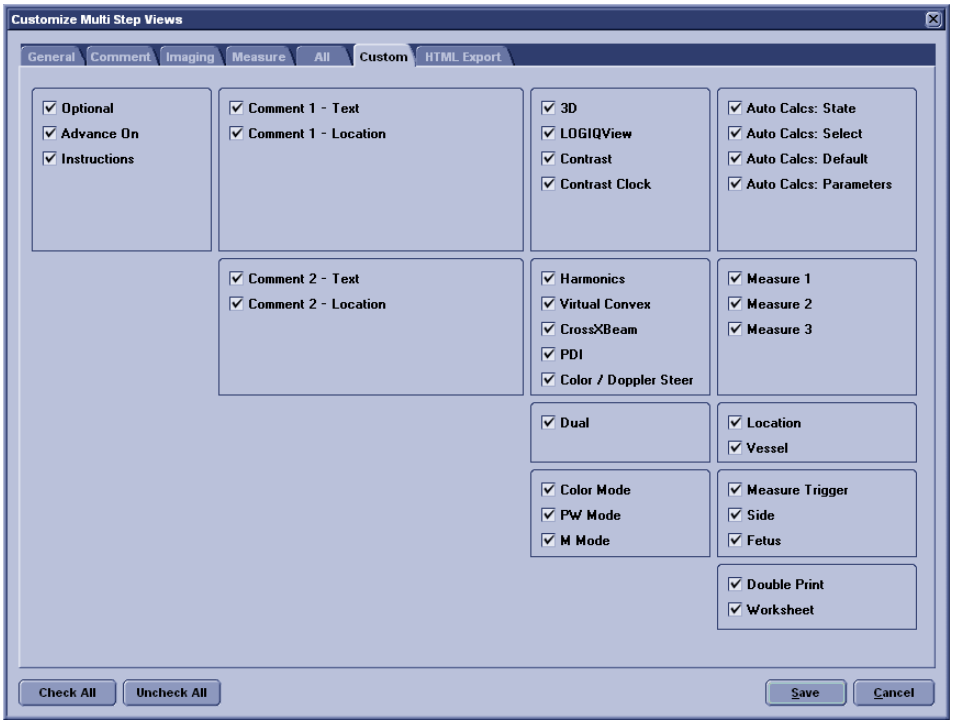


Figure 13-135. Customize Multi Step Views Dialog

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 of how each one is interpreted by the Scan Assistant feature.

General Attributes

Table 13-38: General Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Step Number	Numeric	Number of the step that appears in the Scan Assistant Navigation menu	1	Previous plus one
Step Name	Any	Name of the step that appears in the Scan Assistant Navigation menu	Step Name	Same as previous step
Advance On	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	Same as previous step
	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	[Any Text]	User notes displayed in the Scan Assistant Navigation menu when the step is active	Blank	Same as previous step

Table 13-38: General Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Optional	Optional (checked)	An optional step is given a check mark during Program execution even if no image is acquired	Mandatory	Same as previous step
	Mandatory (unchecked)	A mandatory step is given a check mark only if an image is acquired for the step		

Comment Attributes

Table 13-39: Comment Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Comment 1, Comment 2	[Any Text]	User annotation associated with the step. When editing in a Multi Step View, use Alt+Enter to create a new line.	Same as Step Name attribute	Same as Step Name attribute
Location 1, Location 2	Top Left	Annotation is placed in the top left corner of the image area	Location 1: Bottom Center	Same as previous step
	Middle Left	Annotation is placed in the middle left side of the image area		
	Bottom Left	Annotation is placed in the bottom left corner of the image area	Location 2: Dual Right: Bottom Center	
	Top Center	Annotation is placed in the top center of the image area		
	Bottom Center	Annotation is placed in the bottom center of the image area		
	Top Right	Annotation is placed in the top right corner of the image area		
	Mid Right	Annotation is placed in the middle right side of the image area		
	Bottom Right	Annotation is placed in the bottom right corner of the image area		

Table 13-39: Comment Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
	Dual Left: Bottom Center	Annotation is placed on the bottom center of the left image in dual screen		
	Dual Left: Top Left	Annotation is placed on the top left of the left image in dual screen		
	Dual Right: Bottom Center	Annotation is placed on the bottom center of the right image in dual screen		
	Dual Right: Top Left	Annotation is placed on the top left of the right image in dual screen		

Imaging Mode Attributes

The probe and application associated with a program is not configurable. Instead, the scanner remembers the last probe and application used for a given Scan Assistant program and automatically selects them the next time the program is started.

Table 13-40: Imaging Mode Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Color Mode	On (checked)	Color Doppler is on	Off	Same as previous step
	Off (unchecked)	Color Doppler is off		
PW Doppler Mode	On (checked)	PW Doppler is on. If PW Doppler is not on and the new activated step indicates that Doppler should be on, the Mode Cursor is displayed or, if the Mode Cursor is already displayed, then PW Doppler is turned on.	Off	Same as previous step
	Off (unchecked)	PW Doppler is off		
M Mode	On (checked)	M-Mode is on	Off	Same as previous step
	Off (unchecked)	M-mode is off		
Dual	Off	Dual screen not in use	Off	Same as previous step
	Left Active	Dual screen is active and the left image is the active image.		
	Right Active	Dual screen is active and the right image is the active image.		
	DualView (simul)	DualView is active (both left and right images are live)		

Table 13-40: Imaging Mode Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
3D	On (checked)	3D on	Off	Same as previous step
	Off (unchecked)	3D off		
LOGIQView	On (checked)	LOGIQView on	Off	Same as previous step
	Off (unchecked)	LOGIQView off		
Contrast Mode	On (checked)	Contrast mode on	Off	Same as previous step
	Off (unchecked)	Contrast mode off		
Contrast Clock	On (checked)	Contrast Clock on	Off	Same as previous step
	Off (unchecked)	Contrast Clock off		
B-Flow	On (checked)	B-Flow on	Off	Same as previous step
	Off (unchecked)	B-Flow off		
B-Flow Color	On (checked)	BFC on	Off	Same as previous step
	Off (unchecked)	BFC off		
Elastography	On (checked)	Elastography on	Off	Same as previous step
	Off (unchecked)	Elastography off		

Imaging Preference Attributes

Imaging Preferences work slightly different than other attributes. For example, if an abdomen Program has 20 steps and all steps have the Harmonics attribute set to Default, then Scan 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, e.g.), harmonics will be turned on (or remain on if it was previously on). If harmonics is then manually turned off in step 10 then Scan 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 13-41: Imaging Preference Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Harmonics	Off	Harmonics off	Default	Same as previous step
	On	Harmonics on		
	Default	Harmonics not specified. Scan Assistant does not set Harmonics on or off.		
Virtual Convex	Off	Virtual Convex off	Default	Same as previous step
	On	Virtual Convex on		
	Default	Virtual Convex not specified. Scan Assistant does not set Virtual Convex on or off.		
CrossXBeam	Off	CrossXBeam off	Default	Same as previous step
	On	CrossXBeam on		
	Default	CrossXBeam not specified. Scan Assistant does not set CrossXBeam on or off.		
PDI	Off	PDI off	Default	Same as previous step
	On	PDI on		

Table 13-41: Imaging Preference Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
	Default	PDI not specified. Scan Assistant does not set PDI on or off.		
Color/Doppler Steer	Left	Color/Doppler steered to the left	Center	Same as previous step
	Center	Color/Doppler not steered		
	Right	Color/Doppler steered to the right		
Flow Model	Default	Flow Model not specified. Scan Assistant does not set Flow Model	Default	Default
	Aorta, Renal, Penetration, Slow Flow, Med Flow, Fast Flow	Specified Flow Model is selected		
Depth	Default	Depth not specified. Scan Assistant does not set Depth	Default	Default
	2.0 to 36.0	Specified or the nearest available Depth is selected		
Color Scale	Default	Color Scale not specified. Scan Assistant does not set Color Scale	Default	Default
	1 to 200	Specified or the nearest available Color Scale is selected		
Doppler Scale	Default	Doppler Scale not specified. Scan Assistant does not set Doppler Scale	Default	Default
	1 to 200	Specified or the nearest available Doppler Scale is selected	Default	Default

Table 13-41: Imaging Preference Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
SV	Default	PW Sample Volume Size not specified. Scan Assistant does not set PW Sample Volume Size	Default	Default
	1 to 16	Specified or the nearest available PW Sample Volume Size is selected		
Baseline (PW Doppler and Color Flow)	Default	Baseline not specified. Scan Assistant does not set PW Sample Volume Size.	Default	Default
	100	Specified or the nearest available Baseline is selected.		
B-Flow Sensitivity	Default	B-Flow Sensitivity not specified. Scan Assistant does not set B-Flow Sensitivity.	Default	Default
	1.0 to 50	Specified or the nearest available B-Flow Sensitivity is selected.		
B-Flow Color Scale	Default	BFC Scale not specified. Scan Assistant does not set BFC Scale.	Default	Default
	0.20 to 1.500	Specified or the nearest available BFC Scale is selected.		

Table 13-41: Imaging Preference Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Color Baseline	Default	Color Baseline not specified. Scan Assistant does not set Color Baseline.	Default	Default
	0 to 100	Specified or the nearest available Color Baseline is selected.		
Doppler Baseline	Default	Doppler Baseline not specified. Scan Assistant does not set Doppler Baseline.	Default	Default
	5 to 95	Specified or the nearest available Doppler Baseline is selected.		

Measurement Attributes

Table 13-42: Measure Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Measure Trigger	Measure Key	Initiate "Measure 1" attribute when the Measure key is manually selected.	None	None
	Freeze Key	Initiate "Measure 1" attribute when the image is frozen.		
	Image Store	Initiate "Measure 1" attribute when the Measure key is manually selected or the image is stored. This is used to store / print an image and then measure on it and then store it again. Therefore, the Advance On Print attribute is ignored on the first store / print when the Measure Trigger attribute is set to Image Store.		
	None	Measurements are not triggered by Scan Assistant. The "Measure 1" attribute is ignored.		
Side	Rt	The side measurement qualifier is set to Right side of the body	Rt	Derived from Step Name attribute if possible. Otherwise, same as previous step
	Lt	The side measurement qualifier is set to Right side of the body		
	None	The side measurement qualifier is not used (neither Right nor Left)		
Fetus	A	The fetus measurement qualifier is set to Fetus A	A	Same as previous step
	B	The fetus measurement qualifier is set to Fetus B		
	C	The fetus measurement qualifier is set to Fetus C		
	D	The fetus measurement qualifier is set to Fetus D		

Table 13-42: Measure Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Location	Prox	The location measurement qualifier is set to Proximal	Prox	Same as previous step
	Mid	The location measurement qualifier is set to Middle		
	Dist	The location measurement qualifier is set to Distal		
	None	The location measurement qualifier is not used		
Measure 1	Various 2D or M-mode measurements	Specifies the first 2D or M-mode measurement to be initiated. The point at which the measurement is initiated is based upon the Measure Trigger attribute. See Section 6 for more information.	Blank	Blank
Measure 2	Various 2D or M-mode measurements	Specifies the second 2D or M-mode measurement to be initiated after the measurement associated with the Measure 1 attribute is completed. See Section 6 for more information	Blank	Blank
Measure 3	Various 2D or M-mode measurements	Specifies the second 2D or M-mode measurement to be initiated after the measurement associated with the Measure 2 attribute is completed. See Section 6 for more information.	Blank	Blank
Vessel	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). See Section 6 for more information.	Blank	Blank
Auto Calcs	Default	Auto Calcs state not specified. Scan Assistant does not set Auto Calcs state.	Default	Same as previous step
	Off	Auto Calcs state set to Off		
	Frozen	Auto Calcs state set to Frozen		
	Live	Auto Calcs state set to Live		

Table 13-42: Measure Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Auto Calc Params	Various Auto Calc parameters	Specifies the auto calc parameters to be used.	Default	Same as previous step
	Default	Auto Calc parameters are not specified. Scan Assistant does not set the Auto Calc parameters.		
Auto Calc Specify	[Not Applicable]	Button used to enable the Auto Calcs Parameter Selection dialog so that the Auto Calc Params attribute can be set	[Not Applicable]	[Not Applicable]
Auto Calc Default	[Not Applicable]	Button used to set the Auto Calcs Params attribute to Default.	[Not Applicable]	[Not Applicable]
Double Print	On (checked)	If an Image Store / Print (P1 key, e.g.) is performed on an image with measurements, the image is stored / printed two times, once with the measurements and once without.	Off	Same as previous step
	Off (unchecked)	No special Store / Print behavior.		
Double Print	On (checked)	If an Image Store / Print (P1 key, e.g.) is performed on an image with color, the image is stored / printed two times, once with color and once without. If double print on color and double print on measurements are both configured to be on, the image is stored / printed two times, once with the measurements and once without.		
	Off (unchecked)	No special Store / Print behavior.		
View Worksheet	On (checked)	The worksheet is turned on	Off	Off
	Off (unchecked)	The worksheet is not turned on		

Measurements

Because there are many measurements available on the LOGIQ P8/P9/P10 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.

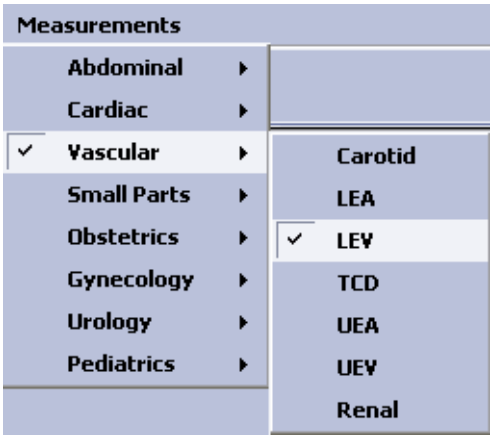


Figure 13-136. Measurements Menu

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 P8/P9/P10.

On the LOGIQ P8/P9/P10, 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.

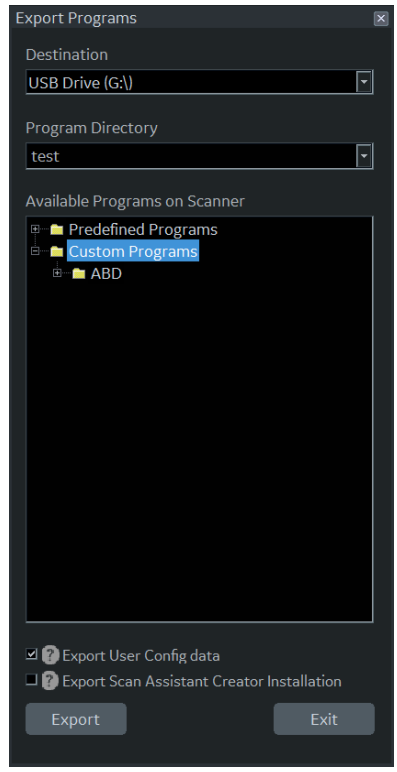


Figure 13-137. Program Export Menu on LOGIQ P8/P9/P10

Navigating Programs

In addition to moving the windows pointer and selecting an item, there are several keyboard controls that navigate a Program.

Table 13-43: 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.

Editing Programs

When editing Programs, changes can be made at both the step level and the step attribute level. Steps can be added, inserted, moved, deleted, copied and pasted. Step attributes can be modified for a given step or across multiple steps.

Editing Steps

The step toolbar allows steps to be inserted, moved up and down, and deleted. For steps to be moved, one or more consecutive steps must be selected. Some of the controls have shortcuts (Control Key + another key).

When the last step in a Program is selected, the Enter key automatically appends a new step to the end of the Program and selects the new step. When the Enter key is pressed on any other step, the next step is activated. The up and down arrows can also be used to move between steps.

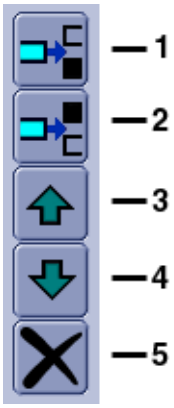


Figure 13-138. Step Toolbar

1. Insert Step above selected step (Ctrl+I)
2. Insert Step below selected step
3. Move selected step(s) up (Ctrl+Up Arrow)
4. Move selected step(s) down (Ctrl+Down Arrow)
5. Delete selected step(s)

Editing Steps (continued)

The Edit Menu and Edit toolbar provides access to the Cut, Copy, Paste and Paste Special features. The Undo and Redo actions also appear on Edit Menu and Edit Toolbar.

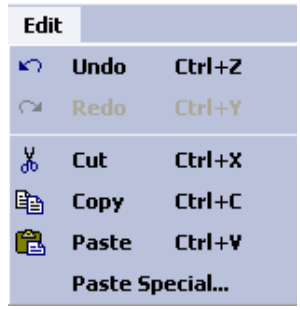


Figure 13-139. Edit Menu

Figure 13-140. Edit Toolbar

When selecting multiple steps for Cutting or Copying, the Shift + Left Mouse and Ctrl + Left Mouse key combinations can be used. Multiple steps are also selected by holding the Left Mouse key and dragging across the steps of interest. When pasting steps they are added after the currently selected step.

The Paste Special control allows copied steps to be pasted with some modification. For example, the steps associated with the Right Kidney can be Copied and Pasted so that they are converted into Left Kidney steps during the paste. The Paste Special dialog is shown in the figure below . Simply select the desired Conversion and choose the "Paste" key.

Editing Steps (continued)

- Step Name (Text)
- Comment 1 (Text)
- Comment 2 (Text)
- Side (Measurement qualifier)
- Location (Measurement qualifier)
- Fetus (Measurement qualifier)

Figure 13-141. Paste Special Dialog

Editing Steps (continued)

The Define Conversions key is used to define the text that is converted. An example is shown in the figure below. If an exact case match is found, it is used for the conversion. If there is a match, but with different case, it is used only if there is not an exact case match.

There are 3 user-defined conversions that can be edited and named. These user-defined conversions can also be used to perform a find and replace capability.

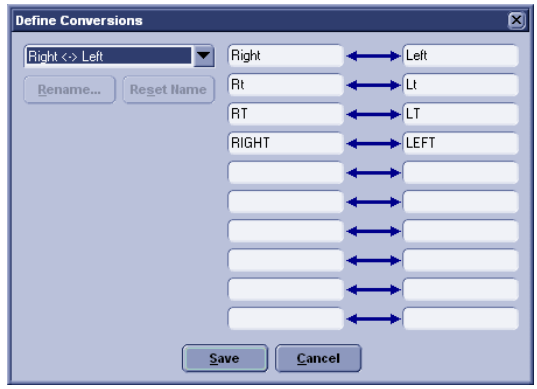


Figure 13-142. Define Conversions Dialog

Editing Step Attributes

To edit a step attribute simply select the step attribute and edit it, such as picking from a drop down menu, checking or unchecking a box or typing in text. 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 13-44: 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 Multiple Programs

Multiple Programs can be opened at the same time. 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.

Figure 13-143. Window Menu

With multiple Programs open, steps copied from one Program can be put inserted into another Program via the paste or paste special features.

Undo/Redo

The Undo feature allows the previous action to be undone. For example, pressing undo 6 times will undo the last 6 changes. Redo cancels the Undo of an action. For example, pressing undo 6 times will undo the last 6 changes and then pressing Undo 2 times will cause only the last 4 actions to be undone.

Editing the Current Program on the Scanner

If you are currently using a Scan Assistant program and choose to edit that program while using it, the program will be reloaded when scanning is restarted. If the number of steps is changed, the checkmarks that were in place before editing are cleared. If the number of steps in the program has not changed, the checkmarks that were in place before editing are maintained.

The current program can be restarted at any time by selecting the Stop button on the Scan Assistant navigation window and selecting restart.

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 P8/P9/P10. 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.

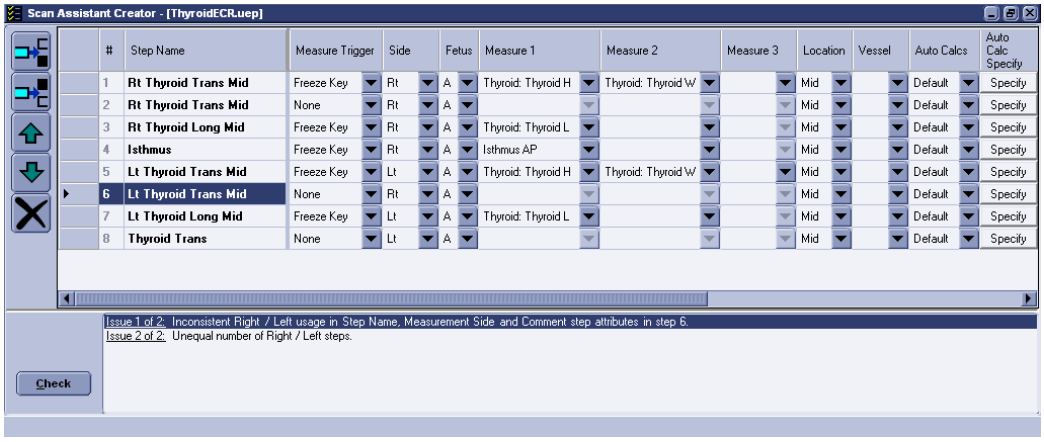


Figure 13-144. Rule Check Button and Rule Check Results

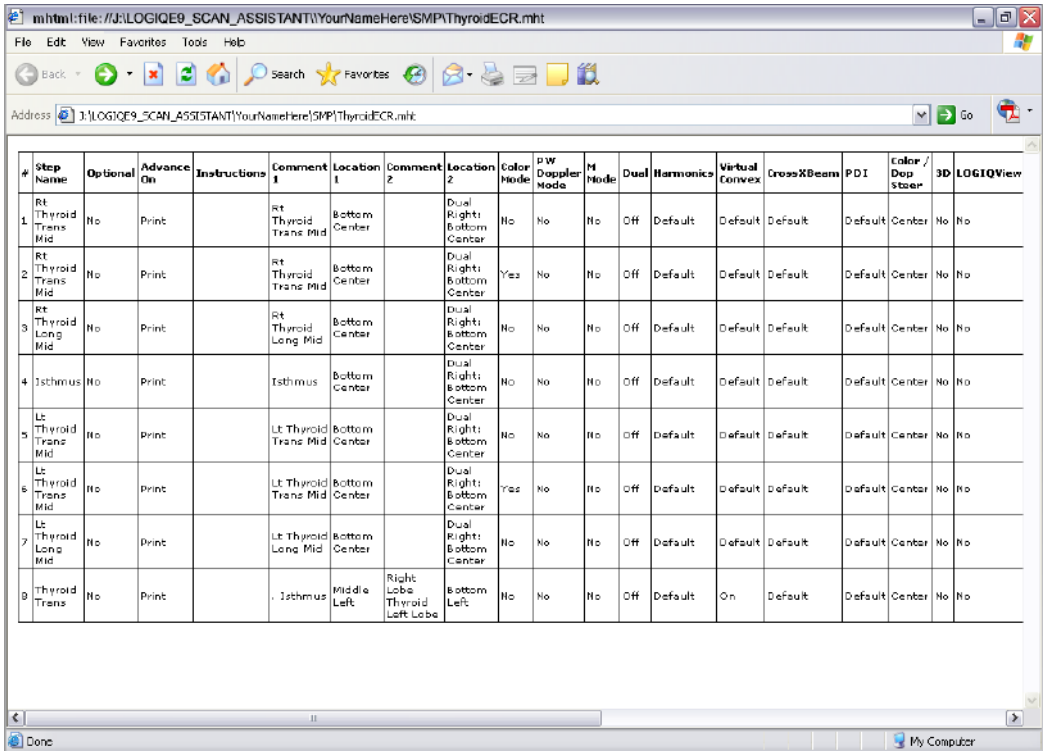
Rule Check Results

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.

Documenting Programs

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.


mhtml:file://J:\LOGIQE9_SCAN_ASSISTANT\YourNameHere\SMP\ThyroidECR.mht

File Edit View Favorites Tools Help

Back Search Favorites

Address J:\LOGIQE9_SCAN_ASSISTANT\YourNameHere\SMP\ThyroidECR.mht Go

#	Step Name	Optional	Advance On	Instructions	Comment 1	Location 1	Comment 2	Location 2	Color Mode	PW Doppler Mode	M Mode	Dual	Harmonics	Virtual Convex	CrossXBeam	PDI	Color / Dop 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

Done My Computer

Figure 13-145. HTML Export

The step attributes shown in the HTML Export are configurable via the Views selection on the Customize Menu.

Customization

The Customize Menu is shown below. The Views selection allows the contents of the Multi Step views and HTML Export to be configured as described in ‘Customizing Multi Step Views’ on *page 13-228* .

Figure 13-146. 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.

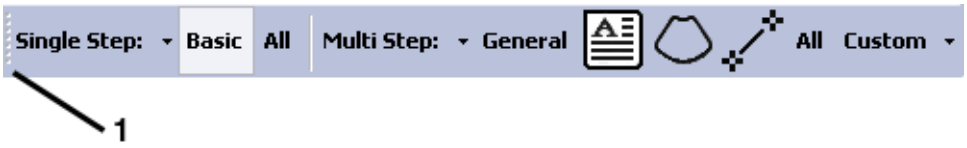


Figure 13-147. Gripper used for Toolbar placement

1. Toolbar Gripper

Help

Help is available via the About Menu or the F1 key.

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***.

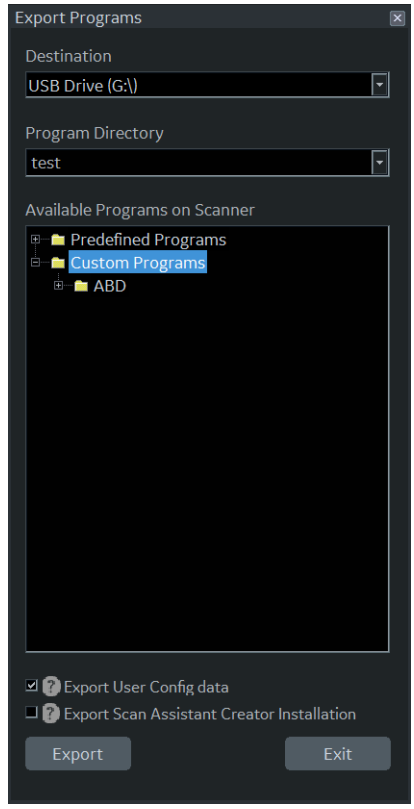


Figure 13-148. Export Scan Assistant Creator Installation

Installation (Install from a zip file)

Create a directory called Scan Assistant Creator on your PC's hard drive under \Program Files\GE\. It should look something like this:

Drive Letter:\Program Files\GE\Scan Assistant Creator.

Unzip the contents of the zip file into the Scan Assistant Creator directory. After unzipping, go to the directory and double-click on the setup.exe file. Follow the steps in the setup wizard to complete installation.

To export the Scan Assistant Creator tool from the scanner for off scanner use, go to the Utility->Scan Assistant page on the LOGIQ P8/P9/P10 scanner. Select the Export button. On the Export dialog, select the media to be exported to, select the 'Scan Assistant Creator Tool' check box and then choose Export. The files needed to install the tool off the scanner are copied to the media. Insert the media in the computer where you want to install the off scanner version and use the setup.exe file to initiate the installation.

System Requirements

Scan Assistant Creator requires the Windows XP Professional Service Pack 2 or Windows Vista Business operating system. It also requires .NET Framework 2.0 Service Pack 1. If the computer does not have this installed, the installation utility will direct you to a link where it can be downloaded.

OB Measure Assistant

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 B-Mode measurement Touch Panel to set OB Measure Assistant parameters.
2. Press ***Return*** to return the measurement mode.
3. Press the measurement (BPD, HC, AC, FL or HL). The trace is auto generated on the display.
4. 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.

OB Measure Assistant Touch Panel

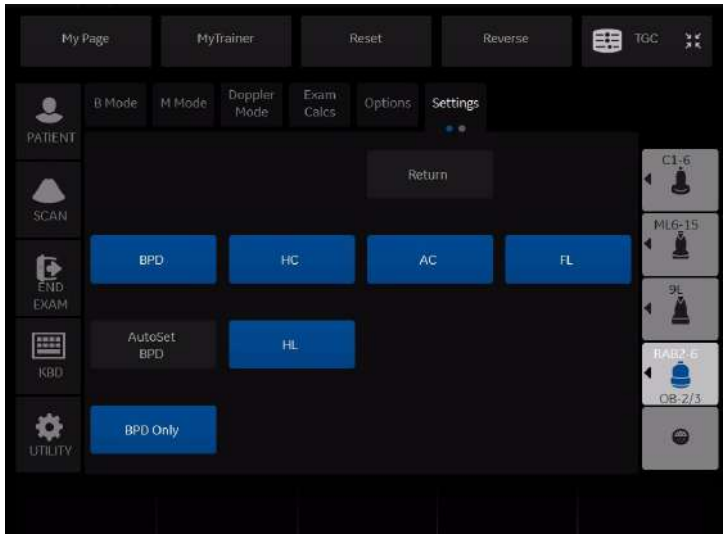


Figure 13-149. OB Measure Assistant Touch Panel

Table 13-45: 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, FL and HL. 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

Breast Options

There are two options related to Breast:

- Breast Measure Assistant — this contains the auto contour feature and auto Height and Length. It also has measurements related to Breast (distance to nipple, ratio)
- Breast Productivity Package — this includes lesion measurement folders, show features, summary, etc.

This section covers both the Breast Productivity Package (Breast Lesion) and Breast Measure Assistant (Auto Contour) features.

NOTE: The Productivity Package is only activated when Breast Measure Assistant is available.

Breast Productivity Package (Lesion M&A)

Breast Lesion M&A allows you to document up to 30 breast lesions for each breast. Lesion Height/Width/Length, Distance to Nipple, and A/B Ratio are available. Distance to Nipple allows you to enter the value. This is not a calculated measurement.

BI-RADS lesion classification can be notated via Show Features and Show Assessment.

The 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.

From the Small Parts Model, select the Breast Application. Next, select the Right/Left Lesion (Select Rt Side/Lt Side below the Touch Panel). The following Touch Panel appears:

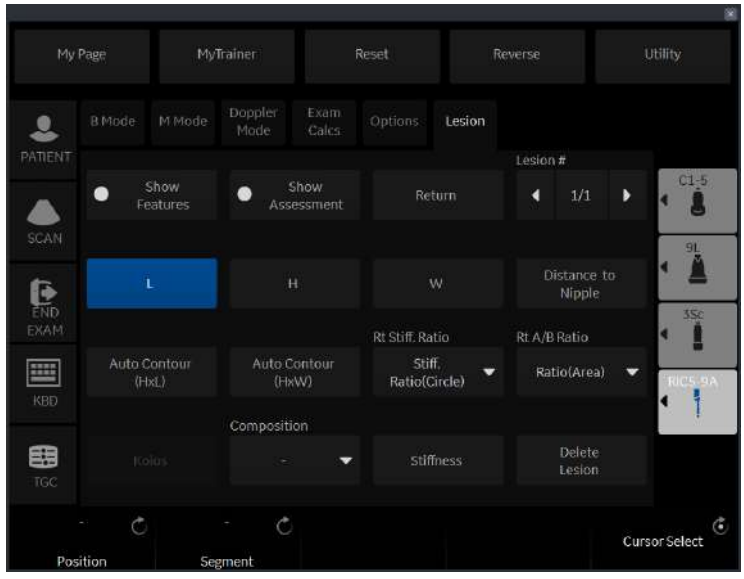


Figure 13-150. Default Breast Lesion M&A Touch Panel

Table 13-46: Breast Lesion M&A Touch Panel

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).

Table 13-46: Breast Lesion M&A Touch Panel (Continued)

Preset Parameter	Description
Show Features	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature. If a Feature has an asterisk next to it (*), then you can select multiple notations -- select all that apply and then select 'Done.' These features are displayed on the Below is a list of each Feature with its possible notations: • Shape: Oval, Round, Irregular, None (-) • Orientation: Parallel, Not Parallel, None (-) • Margin: Circumscribed, Indistinct, Angular, Microlobulated, Spiculated, None (-) • Boundary: Abrupt Interface, Echogenic Halo, None (-) • Echo Pattern: Anechoic, Hyperechoic, Complex, Hypoechoic, Isoechoic, None (-) • Posterior Features: No posterior features, Enhancement, Shadowing, Combined Pattern, None (-) • Surrounding Tissue*: Duct changes, Cooper's ligament changes, Edema, Architectural distortion, Skin thickening, Skin retraction/irregularity, None (-) • Calcifications*: Macrocalcifications, Microcalcifications out of mass, Microcalcifications in mass, None (-) • Special Cases*: Clustered microcysts, Complicated cysts, Mass in or on skin, Foreign body, Lymph nodes-intramammary, Lymph nodes-axillary, None (-) • Vascularity: Not Present or not assessed, Present in Lesion, Adjacent to Lesion, Diffuse in surrounding tissue, None (-)
Show Assessment	Specify the BI-RADS Assessment: None (-), 0, 1, 2, 3, 4a, 4b, 4c, 5, 6. A comment field is available directly below the BI-RADS Assessment.
Koios Assessment	Specify the Koios 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.
Auto Contour (HxL)	Press to activate the Auto Contour feature, using the height and length.
Auto Contour (HxW)	Press to activate the Auto Contour feature, using the height and width.
Rt or Lt A/B Ratio	Right or Left Lesion A/B Ratio, measured by Area or Diameter.
Composition	Specify the composition of the lesion: None (-), Solid, Systolic, or Complex.
Delete Lesion	Press to delete this lesion.

Worksheet and Summary Worksheets

Worksheets and Summary Worksheets are provided for all documented Breast Lesions.

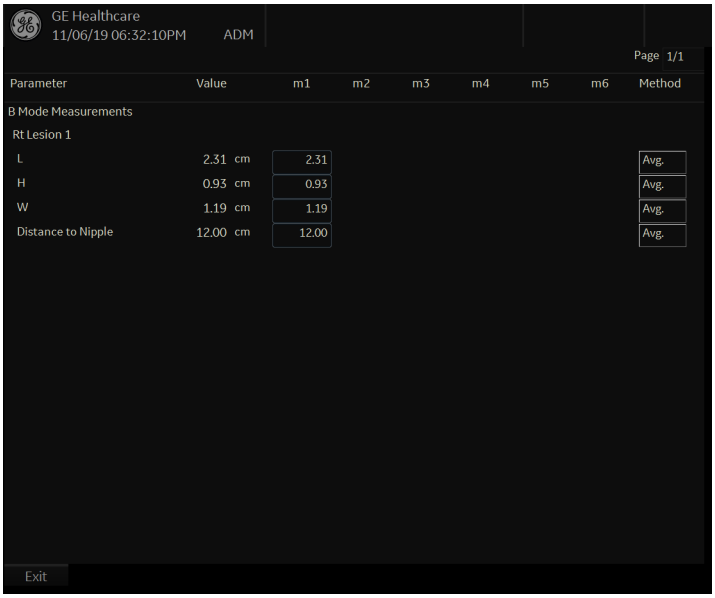


Figure 13-151. Breast Lesion Worksheet

Worksheet and Summary Worksheets (continued)

To move to the next page, select the Page Change control beneath the Touch Panel.

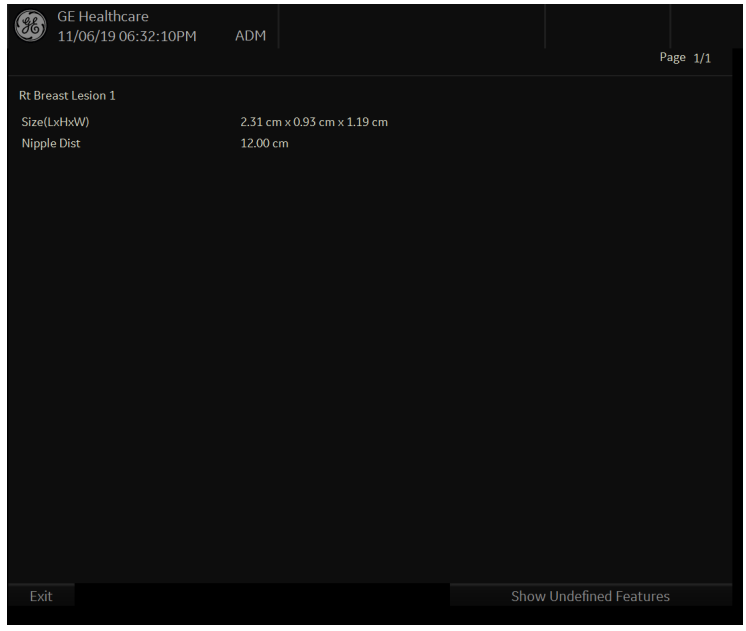


Figure 13-152. Breast Lesion Summary

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.

The system can store up to 30 breast lesions. The system tracks these by numbering the lesions consecutively.

To automatically detect the breast lesion on the display,

1. Press **Measure**.
2. Select the side of breast (Left or Right) using Side selection rotary below the Touch Panel.
3. Press ***Rt Lesion*** (or Lt Lesion) folder.
4. Press ***Auto Contour (HxW)*** on the Touch Panel.
5. 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.

6. Press **Set** on the Trackball. A trace appears around the lesion.
7. Size the trace via the Trackball.
8. Press **Set**. The contour around the breast lesion is generated.

NOTE: Multiple breast lesion traces may be generated by the system.

9. Inspect the generated contour for accuracy. If edits are necessary, execute steps 8-10 to edit the contour prior to accepting the measurement. Otherwise, skip to step 11.
10. To cycle through the generated contours, use the Select Contours rotary on the Touch Panel.

Breast Measure Assistant (Auto Contour) (continued)

11. To edit the selected contour, move the Trackball to appropriately size the edit region and then press **Set** on the Trackball.
12. 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.

13. After you have completed any required edits, to accept the measurement press Done on Trackball or press Print.

Breast Assistant, Powered by Koios DS (Available on region regulatory clearance)

Breast Assistant, Powered by Koios DS is a Breast Lesion Analysis Option. Breast Assistant, Powered by Koios DS is integrated with the General Topic or Product Name via DICOM. Koios DS is configured similar to a DICOM Service. The user can accept/reject analysis results.

To perform Breast lesion analysis using Breast Assistant, Powered by Koios DS:

1. In B-Mofe in the Breast Application, select the Breast Productivity Package Lesion # then press **Koios DS**via the Touch Panel.

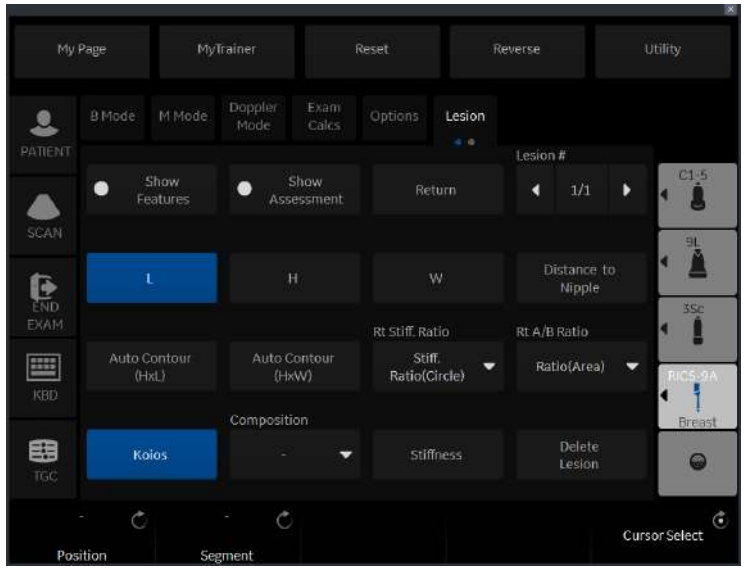


Figure 13-153. B-Mode Touch Panel in Breast Application

Breast Assistant, Powered by Koios DS (Available on region regulatory clearance) (continued)

2. Press Dual Image, image the breast lesion, then press Freeze.
3. Measure the breast lesion (Length, Width, Heigh) over 2 scan planes; or measure the lesion using Auto Contour.
4. Using the Trackball control, press **Analyze.**
5. Koios DS analyzes the lesion (a pop-up appears, “Analyzing”).

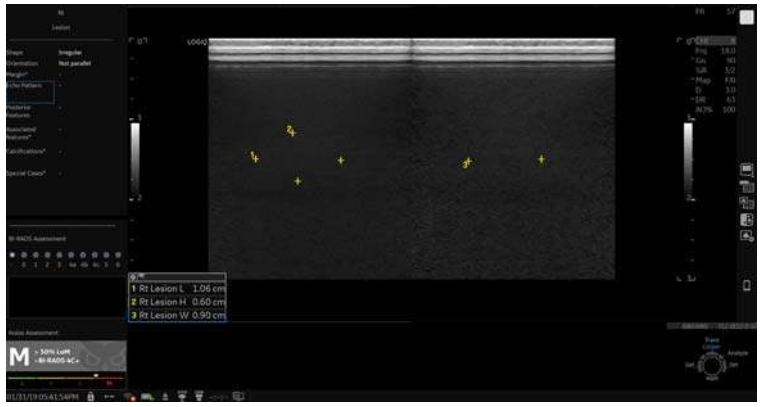


Figure 13-154. Koios DS Analysis

6. Accept the analysis and Koios DS returns a BI-RADS Assessment. This assessment is also transferred to the exam’s Summary Report.

To deactivate Koios DS:

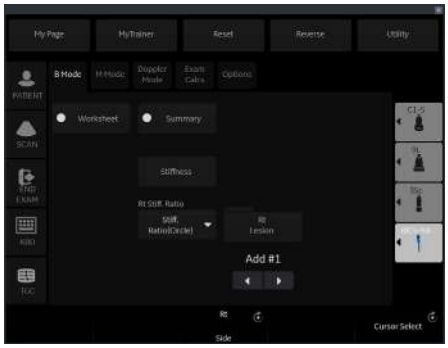
1. Access Utiliy --> Connectivity --> Koios DS Configuration page.
2. Press Deactivate.

Breast Options Quick Card

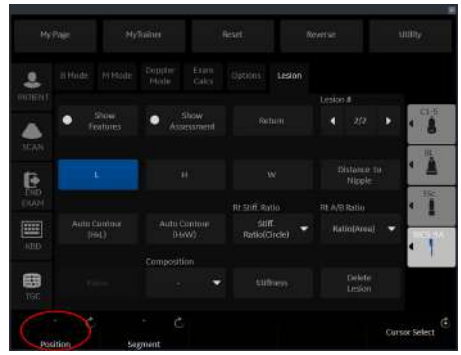
LOGIQ Techniques: Breast Productivity Package

Table 13-47: Getting Started

1. Select measure to activate Breast productivity package.
2. Select side of scan. Use Rotary knob to change between Right and Left side at the bottom of the Touch Panel (TP).



3. Select position and segment using rotary knobs on the left lower region of the touch panel.



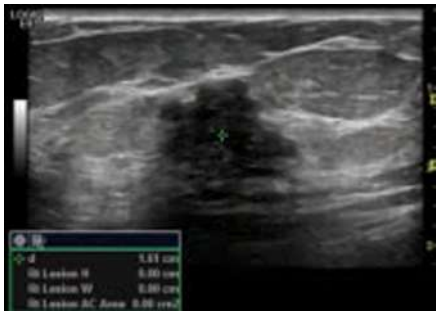
LOGIQ Techniques: Breast Productivity Package (continued)

Table 13-48: Measuring Lesions

1. Select lesion folder on TP. Width and Height will become available.
2. To measure manually, use calipers and Set Keys located on either side of the Trackball.

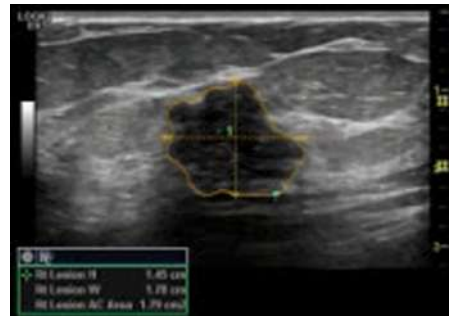
Note: Length is available to be added to TP. This may be confi gured in the utilities page.

3. For Auto Measurements, select Auto-contour on TP. (Two Choices Auto Contour (HxL) or Auto-contour (HxW).
4. Once Auto-contour is selected, identify the middle of lesion with cursor. Select Set Key.



5. Next, identify borders of lesion using Trackball to change size of circle so it encompasses the entire lesion. Select Set Key.

6. System will then segment lesion and generate measurements.



Note: System generates 4 different contour selections. Use Rotary Knob at bottom of TP to change between auto-contour selections.

LOGIQ Techniques: Breast Productivity Package (continued)

Table 13-49: Characterize Lesion

1. Characterize the features of each lesion by selecting the Show Features Button. Select Feature by using Trackball and Arrow Key.
2. Select show assessment if applicable. Add comments and BI-Rad™ assessment.
3. At the end of the exam, select worksheet to view measurements. Select summary to view features and measurements.

Note: More than one Characteristic may be selected for each lesion. The Features and Characteristics that have an asterisk allow user to select more than one Feature within those selections.

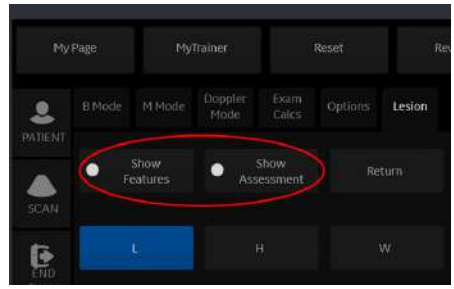
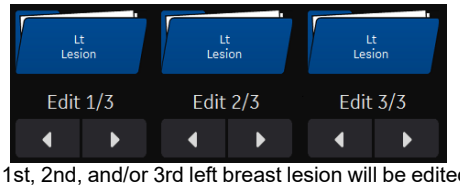


Table 13-50: Adding/Editing

Enter multiple measurements by selecting the Lesion folder. When adding a new Lesion, Add #2, 3, 4, etc. For example, after measuring fi rst Lesion select Return on TP. Then select Lesion folder. This will add an additional Lesion to be measured.

When editing, folder will appear open and Edit will be shown.



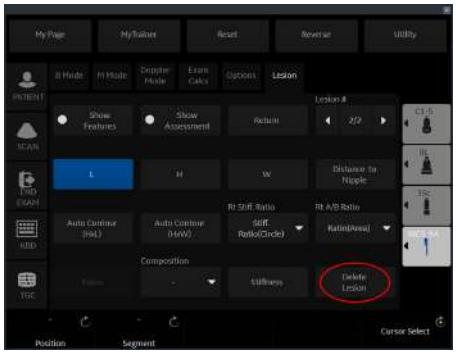
A 1st, 2nd, and/or 3rd left breast lesion will be edited or added. (If the Lesion folder is selected to add a Lesion, but no measurements are completed, the Lesion is not added.)

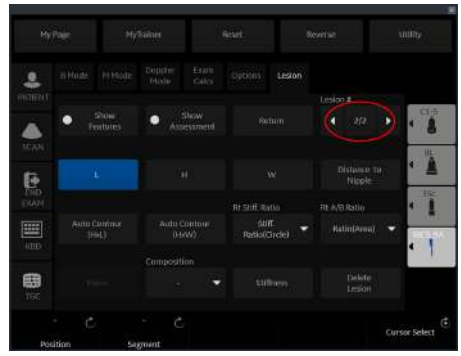
This Selection control indicates which lesion is being assessed.

LOGIQ Techniques: Breast Productivity Package (continued)

Table 13-51: Deleting

Select Delete Button on Touch Panel (TP) to delete current lesion that you are measuring.





Note: To access a different Lesion to Edit or delete, select the # of the Lesion in the upper Right hand corner of the TP while in the measurement package.

Thyroid Productivity Package

The Thyroid Productivity Package is only available when the Thyroid Productivity Option is activated.

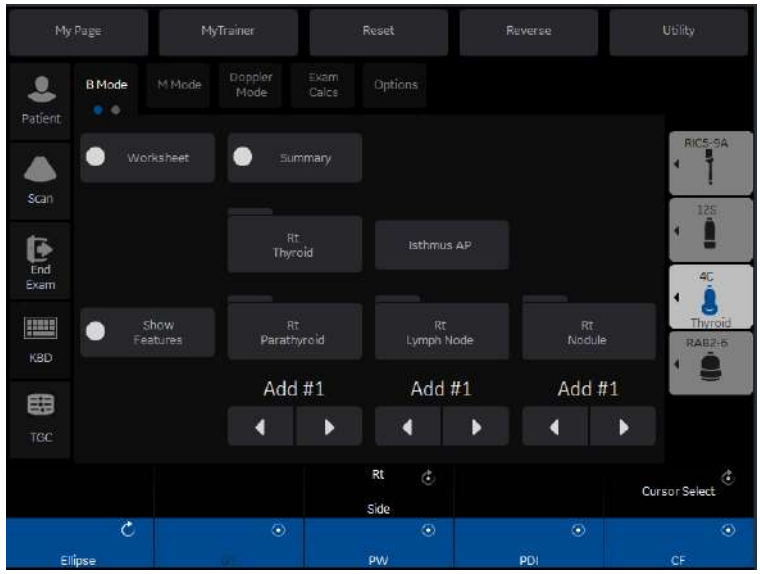


Figure 13-155. Thyroid/Parathyroid/Lymph Node Touch Panel

Table 13-52: Thyroid/Parathyroid/Lymph Node Touch Panel

Preset Parameter	Description
Side	Specify the side: **Right, Left, Isthmus**.
Worksheet/Summary	Select to view the Worksheet/Summary Worksheet.
Add#1, Add#2, etc.	Cycles through the available lesions, or adds a new lesion/node/nodule, etc.
Rt/Lt Thyroid Rt/Lt Parathyroid Rt/Lt Lymph Node Rt/Lt Nodule	When measuring the Left/Right Thyroid/Parathyroid/Lymph Node/Nodule, these folders highlight on the 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.

Table 13-52: Thyroid/Parathyroid/Lymph Node Touch Panel (Continued)

Preset Parameter	Description
Isthmus Lymph Node Isthmus Nodule	When measuring the Isthmus Lymph Node/Nodule, these folders highlight on the Touch Panel. Length, Height, and Width are available for all isthmus measurements. The Cortical Thickness measurement is available for the Lymph Node. Show Features is available all isthmus measurements.

Show Features - Overall Thyroid	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature and on the Summary Worksheet.
	Below is a list of each Feature with its possible notations by measurement type:
	• Overall Thyroid (Top Level Touch Panel)
	  • Resected: Totally, Partially, None (-)
	  • Appearance: Within normal limits, Abnormal, Symmetric, Asymmetric R>L, Asymmetric L>R, None (-)
	  • Comment

Table 13-52: Thyroid/Parathyroid/Lymph Node Touch Panel (Continued)

Preset Parameter	Description

Show Features - Lt/Rt Thyroid / Parathyroid / Lymph Node / Nodule	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature and on the Summary Worksheet.
	Below is a list of each Feature with its possible notations by measurement type:
	• Lt/Rt Thyroid
	  • Resected: Totally, Partially, None (-)
	  • Echogenicity: Homogeneous; Coarse; Heterogeneous; Hashimoto, Classic; Hashimoto, Probable; None (-)
	  • Vascularity: Normal, Increased, Decreased, None (-)
	  • Size: Normal, Enlarged, Small, None (-)
	  • Comment
	  • Isthmus Comment
	• Lt/Rt Parathyroid -- Upper/Lower Gland
	  • Visibility: Visualized, Not Visualized, None (-)
	  • Comment
	• Lt/Rt Lymph Node
	  • Appearance: Within normal limits, Suspicious, Pathologic, None (-)
	  • Composition: Cystic, Complex, Solid, None (-)
	  • Vascularity: Normal, Increased hilar, Increased non-hilar, None (-)
	  • Comment
	• Lt/Rt Nodule
	  • Shape: Round, Oval, Irregular, Lobulated, None (-)
	  • Margin: Well Defined, Well Defined with halo, Well Defined with partial halo, Well Defined with complete halo, Poorly defined, Irregular, None (-)
	  • Composition: Solid, Cystic, Mixed, Complex, Heterogeneous, None (-)
	  • Vascularity: Normal, Increased, Decreased, Central Vasc (Avascular, Hypovascular, Isovascular, Hypervascular, Severely Hypervascular), None (-)
	  • Calcification: No Calcification, Coarse central, Coarse rim, Punctate scattered, Punctate clumped, Colloid, Mixed, None(-)
	  • Comment
	  • Koios Assessment

Table 13-52: Thyroid/Parathyroid/Lymph Node Touch Panel (Continued)

Preset Parameter	Description

Show Features - Isthmus	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature. Below is a list of each Feature with its possible notations by measurement type:
	• Isthmus Lymph Node
	  • Appearance: Within normal limits, Pathologic, None (-)
	  • Composition: Cystic, Complex, Solid, None (-)
	  • Vascularity: Normal, Increased, None (-)
	  • Comment
	• Isthmus Nodule
	  • Shape: Round, Oval, Irregular, Lobulated, None (-)
	  • Margin: Well Defined, Well Defined with halo, Well Defined with partial halo, Poorly defined, Irregular, None (-)
	  • Composition: Solid, Cystic, Mixed, Complex, Heterogeneous, None (-)
	  • Vascularity: Normal, Increased, Central Vasc (Avascular, Hypovascular, Isovascular, Hypervascular, Severely Hypervascular), None (-)
	  • Calcification: Coarse central, Coarse rim, Punctuate scattered, Punctuate clumped, Colloid, Mixed, None (-)
	  • Comment
	  • Koios Assessment

Return	Press to return to the previous Touch Panel.
H	Height
W	Width
L	Length
Isthmus AP	Used to measure the Isthmus height distance.
Cortical Thickness	Cortical thickness of the lymph node.
Delete	Press to delete this anatomy.

Worksheet and Summary Worksheets

Worksheets and Summary Worksheets are provided for all documented Thyroid anatomies.

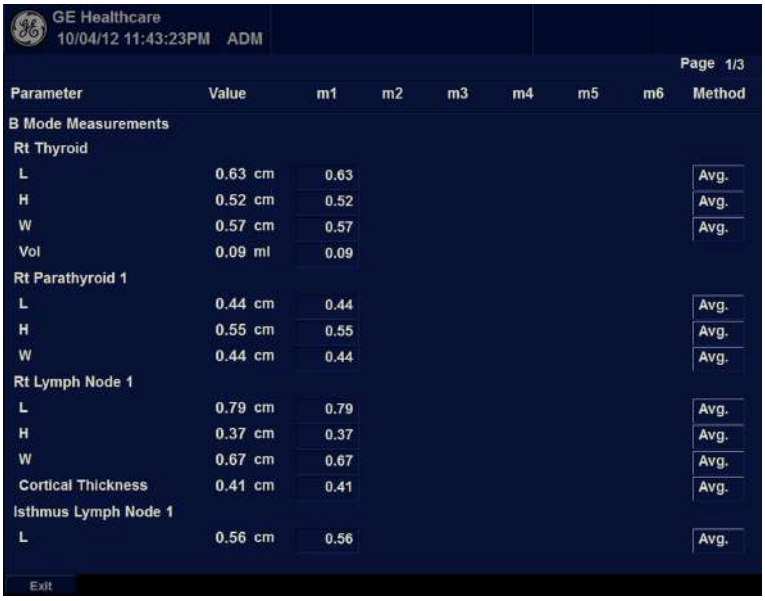


Figure 13-156. Thyroid Worksheet

To move to the next page, select the Page Change control beneath the Touch Panel.

Worksheet and Summary Worksheets (continued)

Figure 13-157. Thyroid Summary Report

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 Productivity Package Quick Card

LOGIQ Techniques: Thyroid Productivity Package

Table 13-53: Getting Started

1. Select measure to activate Thyroid productivity package.
2. Select side of scan. Use Rotary Knob to change between Right, Left, and Isthmus at the bottom of the Touch Panel (TP).
3. Choose folder specific to the area of interest (Isthmus is an option as well as RT and LT Thyroid, Parathyroid, Lymph node or nodule).

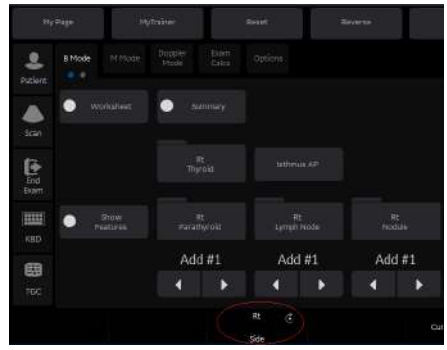
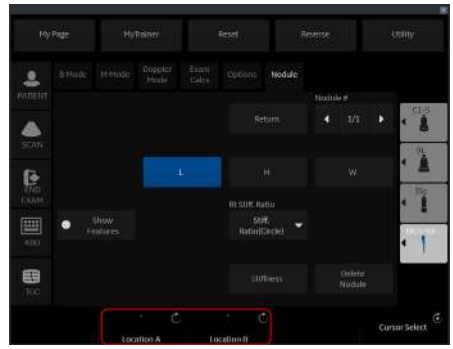


Table 13-54: Measuring

1. Once Folder is selected, L, H, and W measurements will become available. Use Trackball and Set Keys on either side of the Trackball to measure.
2. After measuring Area of Interest, select Location A and Location B. Toggle rotary knobs up or down between selections, then choose desired locations.
3. Store image after measurements are completed. These measurements will then transfer to Worksheet/Summary Page.



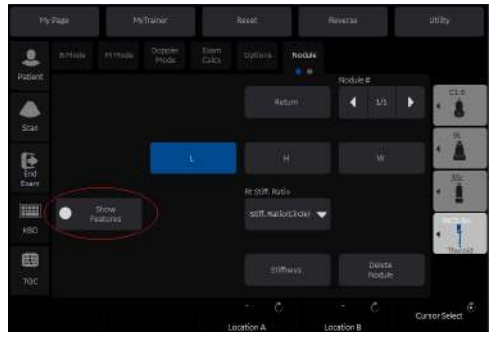
Note: At any time, select Return on TP to return to previous page, or select measure again to exit the productivity package.

LOGIQ Techniques: Thyroid Productivity Package (continued)

Table 13-55: Characterize Thyroid, Parathyroid, Lymph Node or Nodule

1. Select the show features button on the Touch Panel to describe the characteristics of the Thyroid, Parathyroid, Lymph node or nodule which is being measured.
2. Place arrow over selection and choose from items in Drop Box.
3. Add additional comments as needed in Comments Box.
4. At the end of the exam, select Worksheet to view measurements and Summary to view Features and Measurements.
5. Select Exit to get back to Measurements Package.

Note: More than one Characteristic may be selected. Features/Characteristics that have an asterisk allow user to select more than one Feature within those selections.



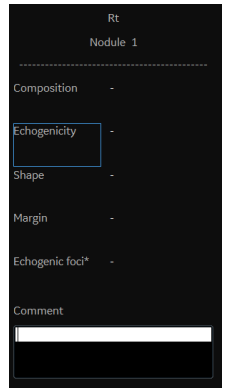
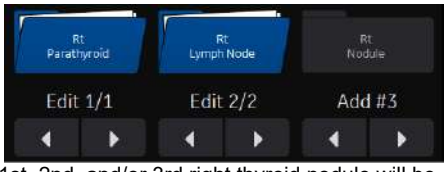


Table 13-56: Adding/Editing

Enter multiple measurements by selecting the Nodule, Lymph node or Parathyroid folder. When adding a new nodule, add #2, 3, 4, etc. For example, after measuring first nodule, select Return on Touch Panel. Then select nodule folder. This will add an additional nodule to be measured.

When editing, folder will appear open and Edit will be shown.



A 1st, 2nd, and/or 3rd right thyroid nodule will be edited or added. (If the nodule folder is selected to add a nodule, but no measurements are completed, the nodule is not added.)

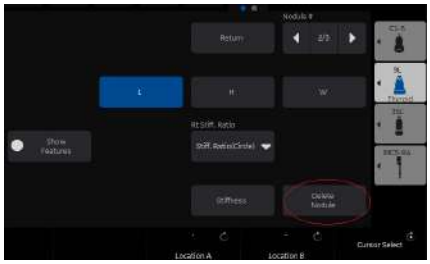
This selection control indicates what action the Nodule folder above it is going to take when pushed.

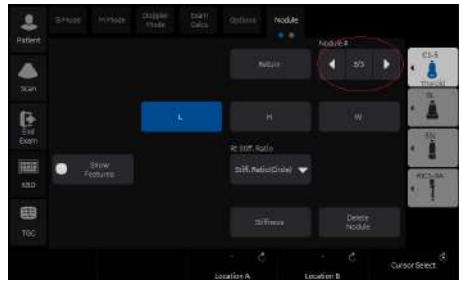
Note: Up to 30 Rt/Lt thyroid lymph nodes/nodules can be added or edited.

LOGIQ Techniques: Thyroid Productivity Package (continued)

Table 13-57: Deleting

Select Delete Button on Touch Panel to delete current nodule that you are measuring.





Note: To access a different nodule, Parathyroid or Lymph node to edit or delete, select the # of the nodule in the upper right hand corner of the TP while in the measurement package.

Thyroid Assistant, Powered by Koios DS (Available on region regulatory clearance)

Thyroid Assistant, Powered by Koios DS is a Thyroid Nodule Analysis Option. Koios DS is integrated with the LOGIQ P8/P9/P10 via DICOM. Koios DS is configured similar to a DICOM Service. The user can accept/reject analysis results.

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.

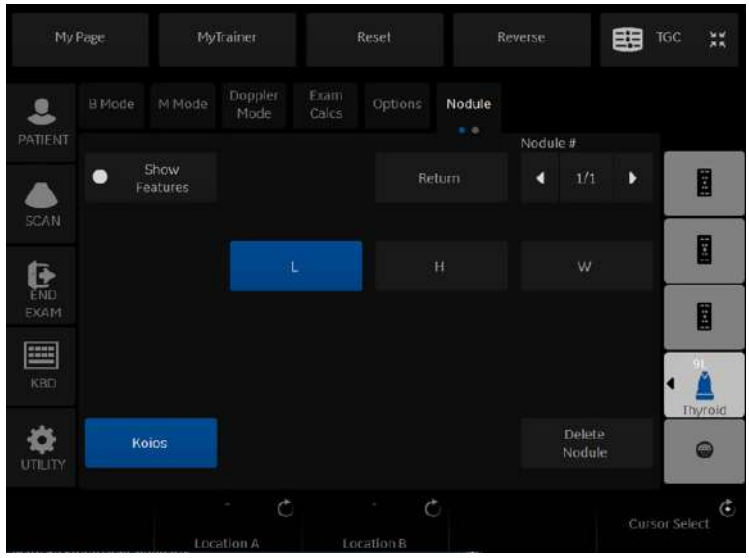


Figure 13-158. B-Mode Touch Panel in Thyroid Application

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 (Available on region regulatory clearance) (continued)

Figure 13-159. 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 rejected, the results are not stored as part of the exam.

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 13-294 for more information.*).

NOTE: The AutoEF tool is intended for adult cardiology and is not intended to be used in pediatrics cardiology.

Acquisition

NOTE: AutoEF is only available on 3Sc-RS, 6S-RS, 12S-RS, 6Tc-RS and M5Sc-RS.

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 P8/P9/P10 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.

Figure 13-160. View Selection Menu

3. Select the name of the current view: 4-ch or 2-ch. A ROI is defined and tracked through the entire heart cycle as detailed below.

Defining the endocardial border (EB)

When selecting a view to analyze, the system automatically displays a frame where the endocardial border is usually clearly visible. The system automatically displays the ROI for tracking on the screen and the tissue tracking starts. When the tracking is completed and displayed, you can either accept the results or recalculate/redraw the endocardial border (EB).

Selecting “Recalc”

When selecting Recalc, you have the option to correct the EB manually or to revert to the semi-automatic 3 Point EB definition mode. (To revert to semi-automatic mode, press Auto ROI.) If you adjust any point in the EB and wait a few seconds, the system automatically starts reprocessing.

You can also choose another frame to redefine the EB. To choose another frame, turn off the YOYO function, and adjust the Left/Right marker.

It is also possible to define an EB in semi-automatic 3 Point mode.

Defining Endocardial Border (EB) in semi-automatic 3 Point mode

To define the endocardial border, place three points at the endocardial border; two annular points at the base and one at the apex. Follow the indications displayed on the screen when placing the three points.

After placing the third point on the Apex, an endocardial border will automatically be traced (Figure 13-161 *on page 13-289*).

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 13-162 *on page 13-290*). 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.

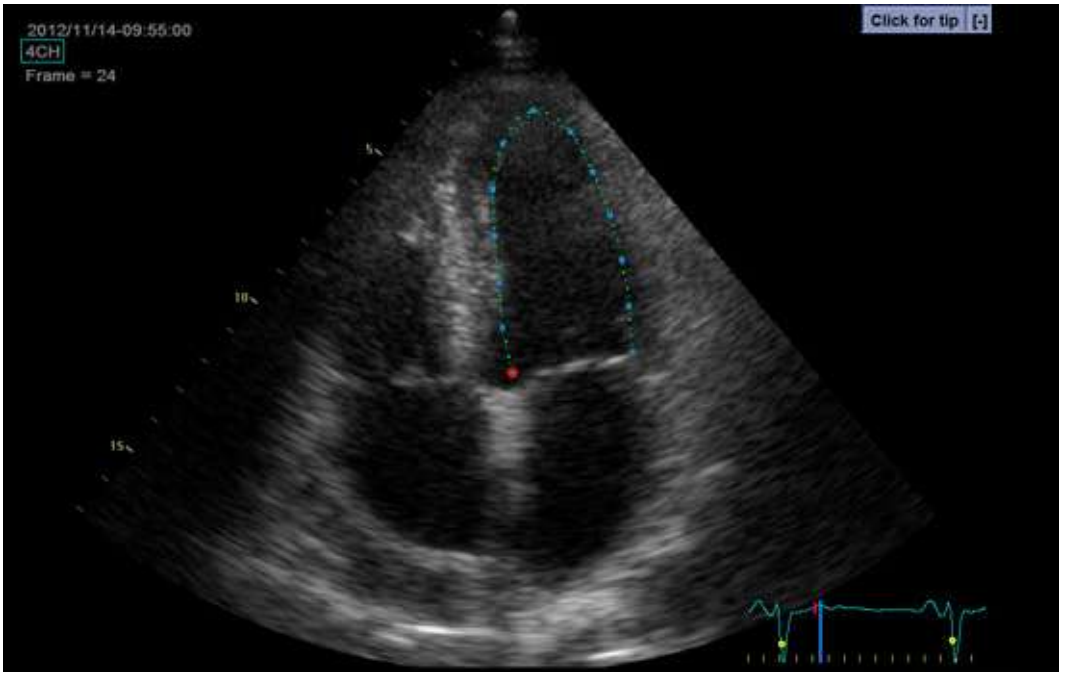


Figure 13-161. Defining a ROI

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.

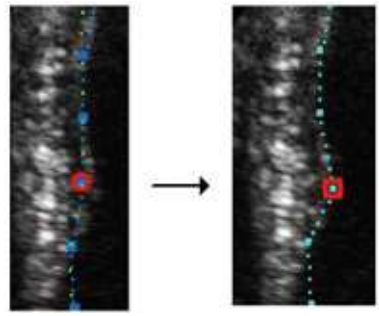


Figure 13-162. Selected anchor point on the inner border trace

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 13-163 *on page 13-292*).

NOTE: The bi-plane results (BiP) will only appear on screen (Figure 13-163) 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)

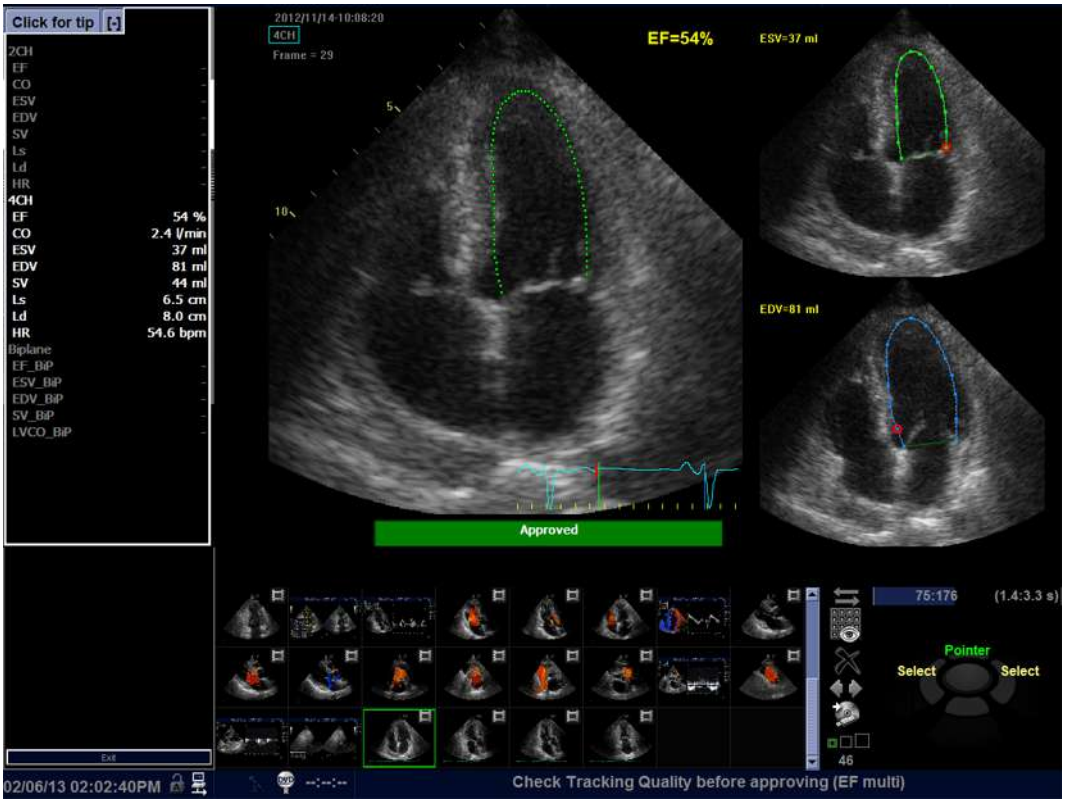


Figure 13-163. AutoEF Result Multi Screen

EF results screen (continued)

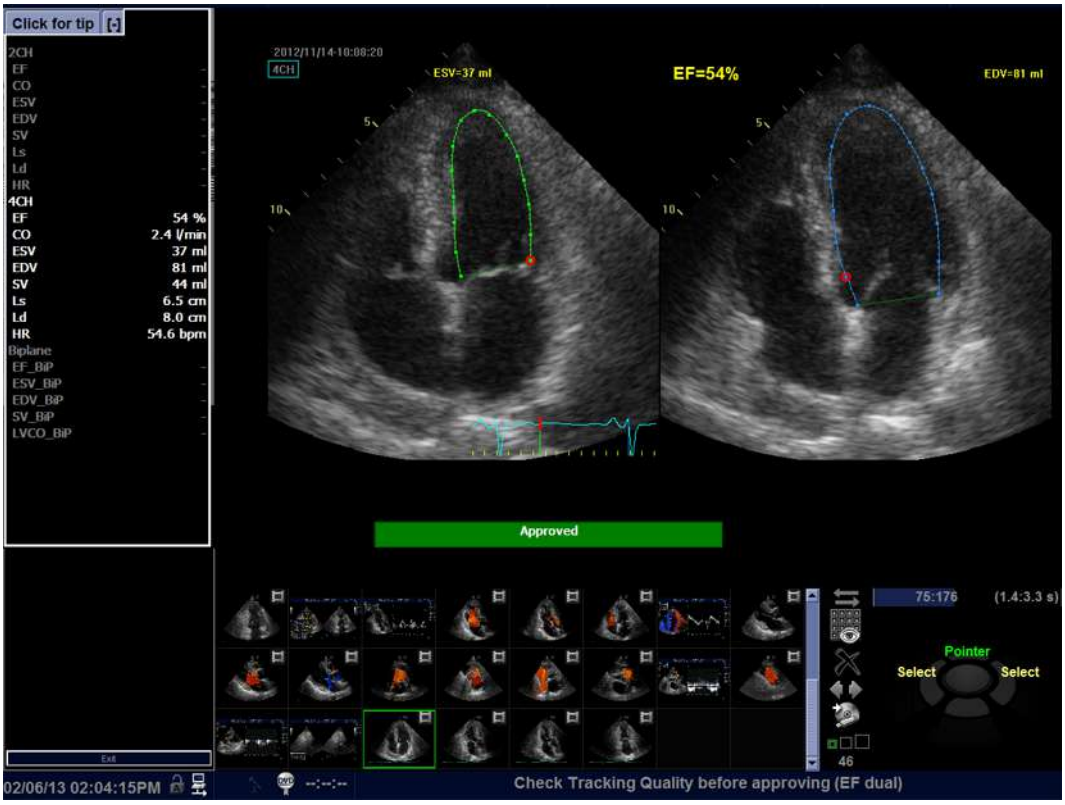


Figure 13-164. AutoEF Results Dual Screen - Alternative screen mode

Tracking Validation

The tracking must be visually controlled and validated. If the tracking results are visually correct press the red Approve button. The button turns green and is labeled Approved. The calculated values will be stored and appear in the worksheet.

The following can be done if tracking needs correction:

- Press ***EF Dual*** to enlarge ES and ED frames and position them side-by-side (Figure 13-164 *on page 13-293*).
- You may manually select a different ED frame or ES frame using the ED frame or ES frame rotary.
- You may edit any misaligned point on either ED or ES frames. This is done by:
  a. Placing the trackball cursor over the desired point.
  b. Clicking over the red circle, it will turn to a square.
  c. Pressing **Set** and moving the square to re-align the border trace.
  d. The ESV, EDV and EF will be recalculated accordingly.

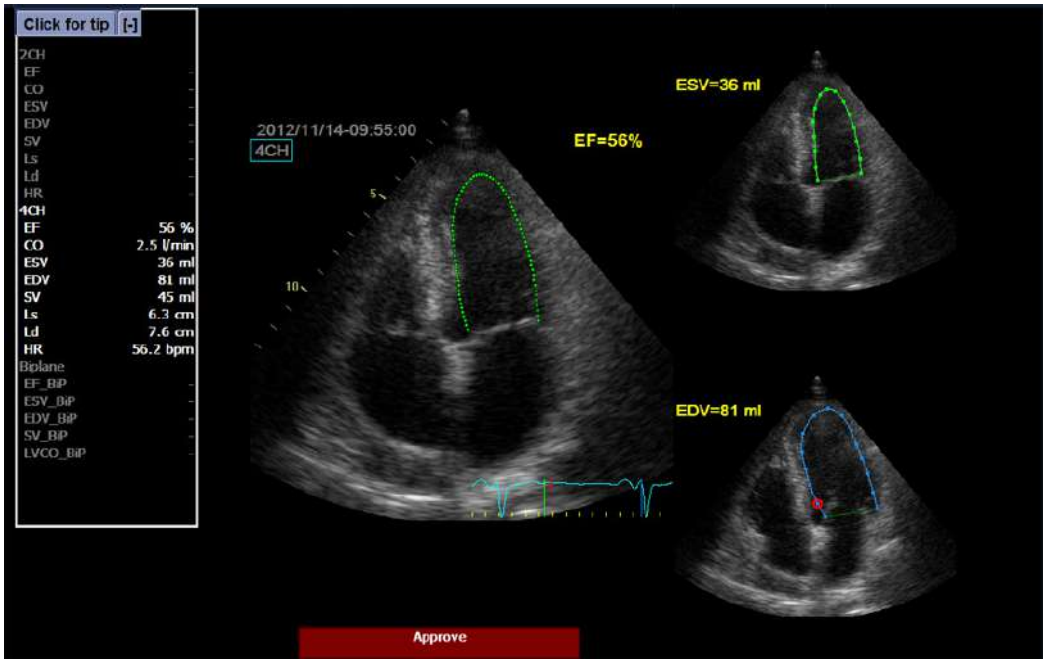


Figure 13-165. Border trace edit

Tracking Validation (continued)

- 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 13-287*).
- 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 13-287*).

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 13-163 *on page 13-292*) in a mini-report. The mini-report appears on the left side of the results window.

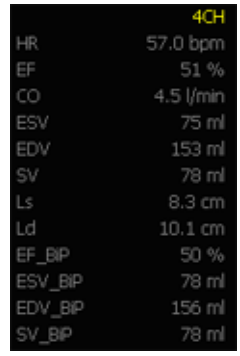


Figure 13-166. Mini Report

Results (continued)

The results are summarized in the worksheet and in the report.

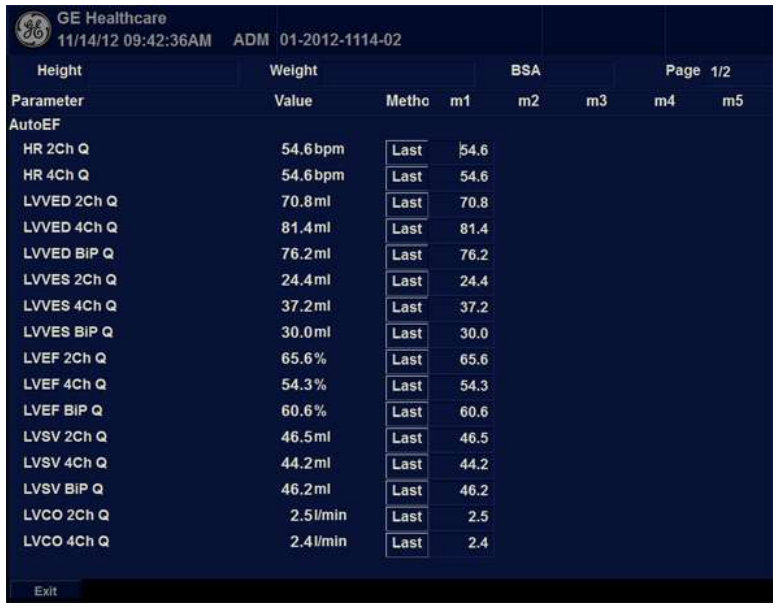


Figure 13-167. Results in Worksheet - Page 1

Results (continued)

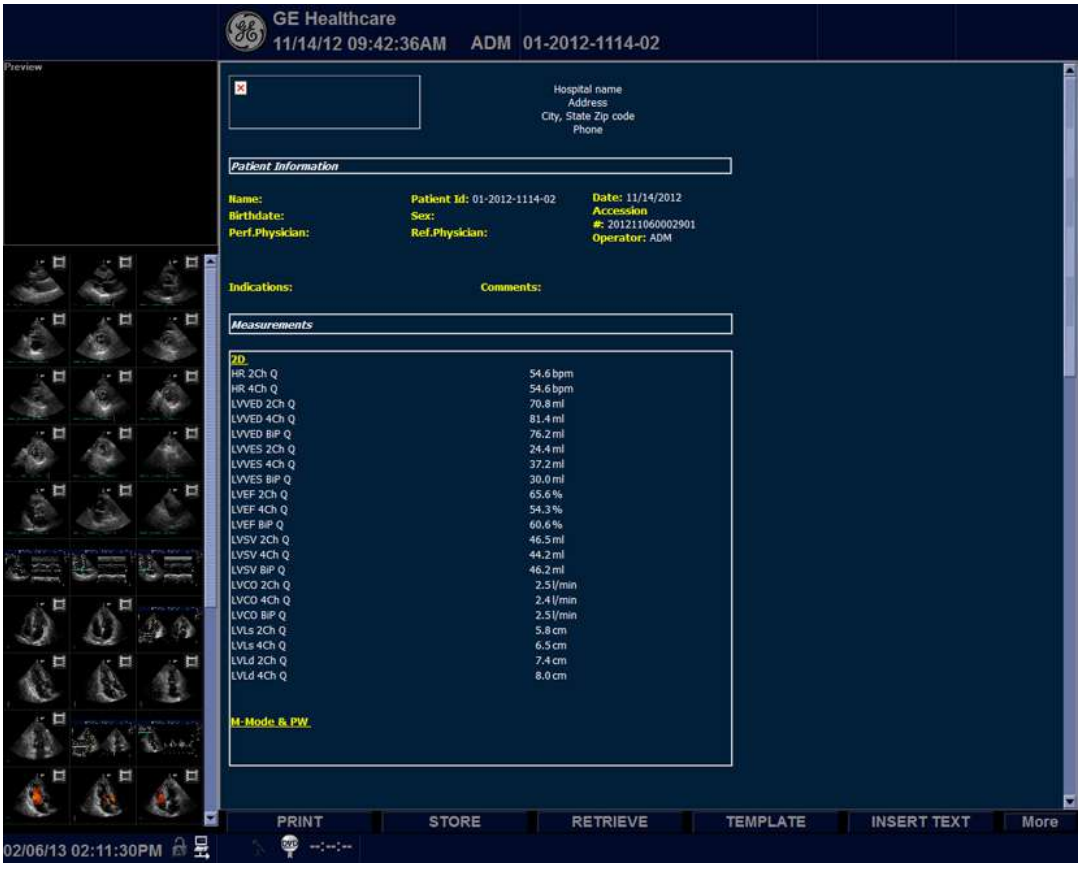


Figure 13-168. Results in Report template

Exit AutoEF

Press **Exit** to end AutoEF.

Pressing Report, Patient or Scan also closes the AutoEF package.

NOTE: Do not disable any sub-measurement of AutoEF in Utility --> Measure, as this will disable the whole set of AutoEF measurements.

NOTE: For consistent results, do not delete individual AutoEF measurements from the worksheet. Always delete a full column.

Cardiac Automated Function Imaging (Cardiac Strain)

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 13-58: Cardiac Strain Workflow

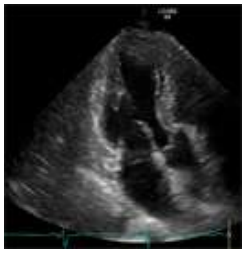
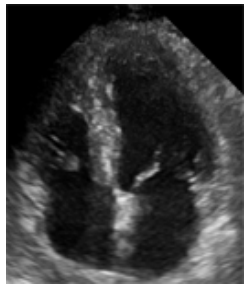
	1	2	3	
	APLAX	**4-CH**	**2-CH**	**Step**
1				Acquired views

Table 13-58: Cardiac Strain Workflow (Continued)

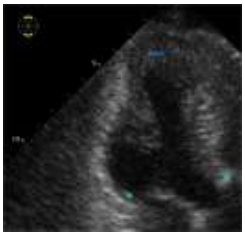
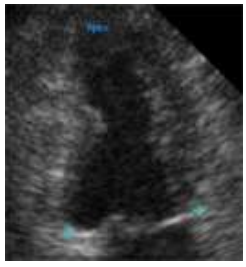
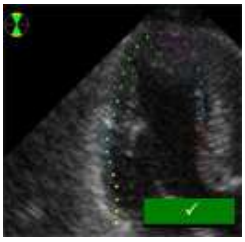
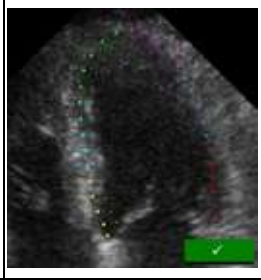
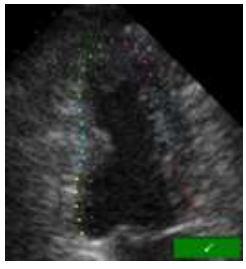
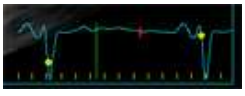
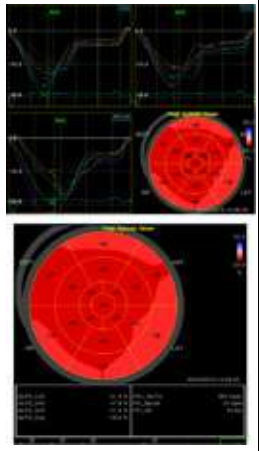
	1	2	3	
	APLAX	4-CH	2-CH	Step
2				Defining a ROI
3				Tracking Validation
4		-	-	AVC Timing Adjustment
5			-	Parametric image result

Table 13-58: Cardiac Strain Workflow (Continued)

	1	2	3	
	APLAX	4-CH	2-CH	Step
6	-	-		Trace and Bull's eye result

Acquisition

CAUTION

Cardiac Strain is only recommended for adult cardiac images acquired with the 3Sc-RS, 6S-RS, 12S-RS, 6Tc-RS and M5Sc-RS.

1. Specify Cardiac Strain-specific values for certain parameters in M&A Advanced Preset if needed.
2. Create an exam, connect the ECG device and make sure to obtain a stable ECG trace.
3. Select ***CARD*** -> ***Adult*** from the model menus. Acquire a sequential acquisition.

   Acquire B-Mode gray scale cineloops 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 cineloops 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.

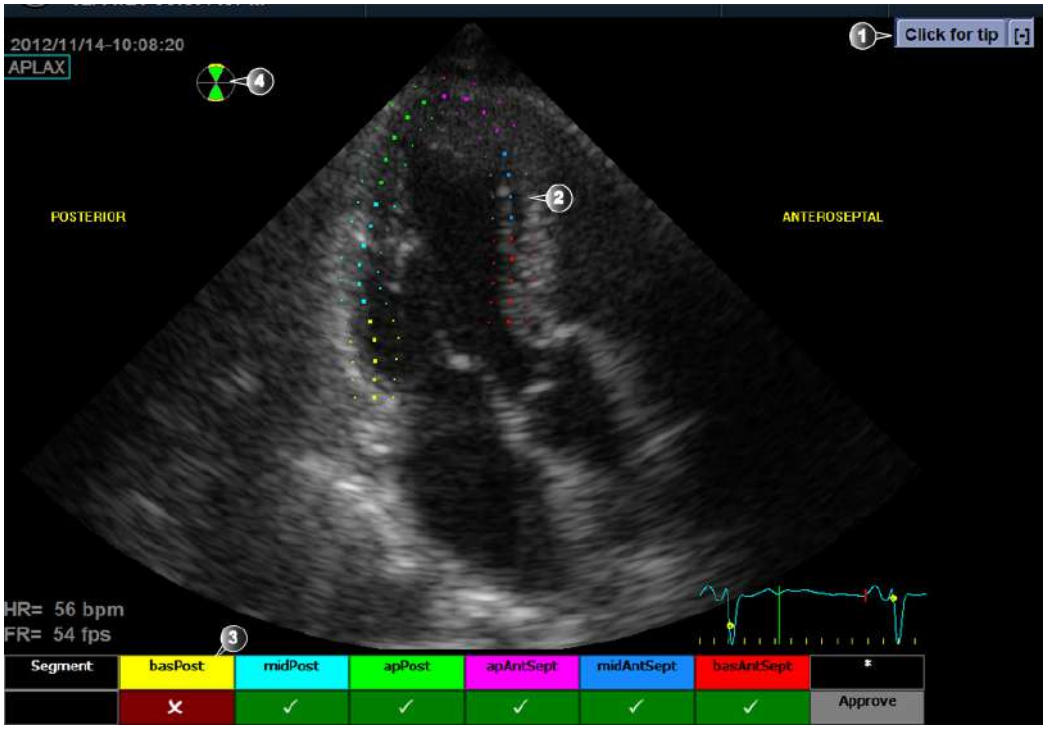


Figure 13-169. Tracking Validation screen

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: views 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 13-310* . 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 13-169 *on page 13-305*).

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 13-169 *on page 13-305*) 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 2D image 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 13-309* or create a new ROI as described in ‘To create a new ROI’ on *page 13-310* .

   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 ‘Timing Validation’ on *page 13-314*).

ROI adjustment

If the automatic ROI is not optimal resulting in poor tracking, the user can either adjust the ROI or create a new ROI as described below.

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.

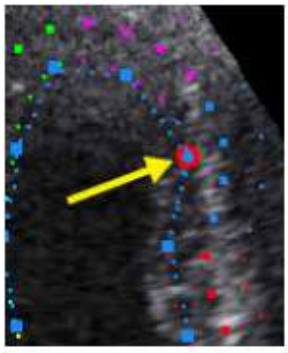


Figure 13-170. Selected anchor point on the inner ROI border

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 13-307*).

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 13-171). 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.

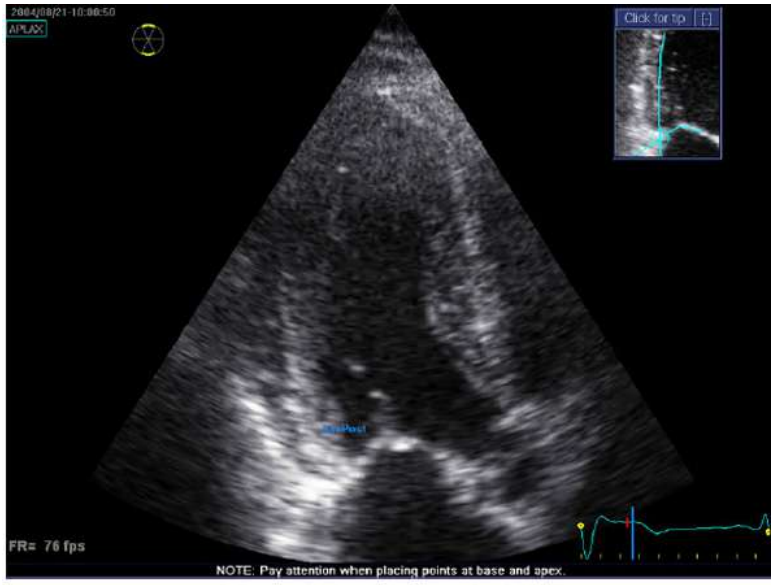


Figure 13-171. Defining a ROI

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.

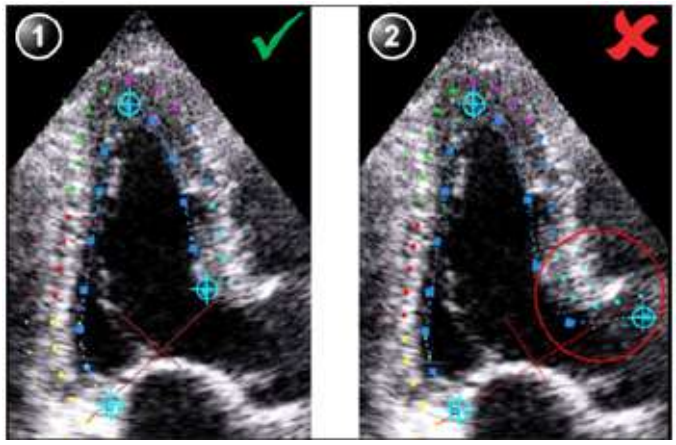
Data processing is started automatically if the cursor is not moved for a few seconds.

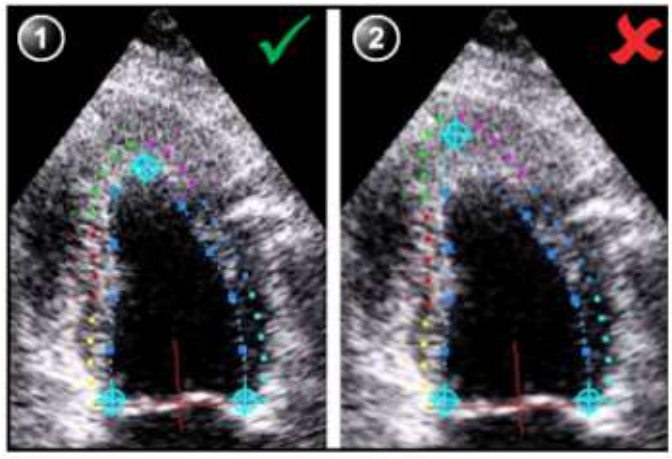
The Tracking validation screen is displayed.

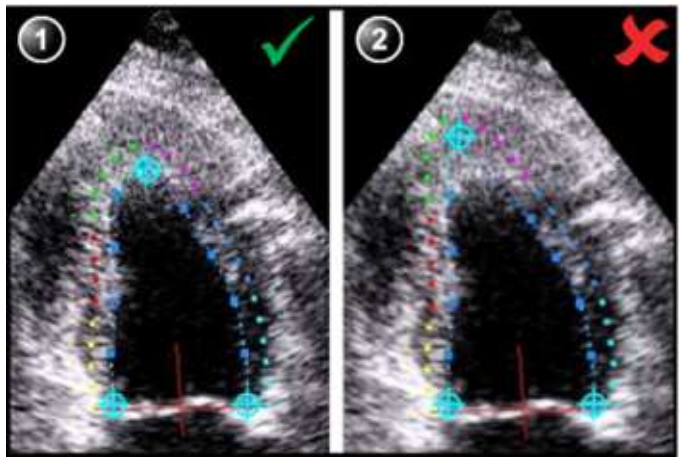
4. Perform Tracking validation (see ‘Tracking Validation’ on *page 13-307*).

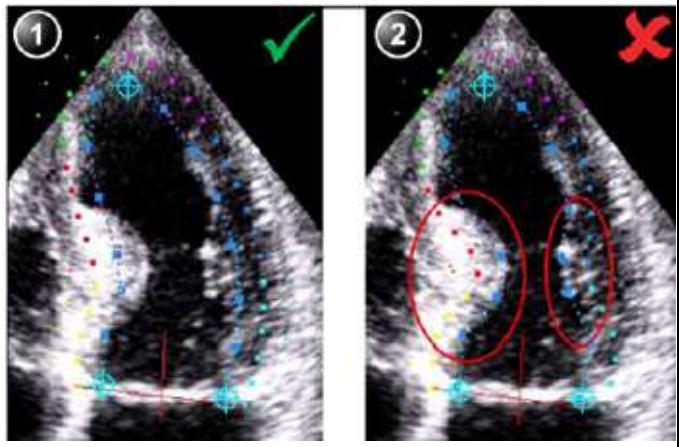
Quick tips when re-creating the ROI

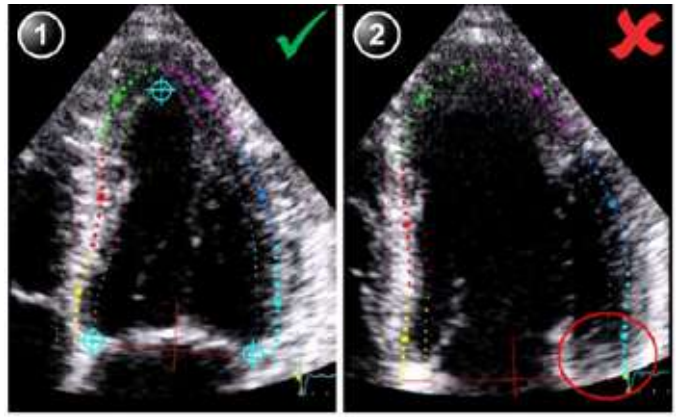
Correct ROI definition is crucial to get good tracking. Refer to the example displayed in the Tip window for correct point placements. To display additional guidelines, select Click for Tip. Make sure to follow the recommendations when placing the three points (see below).

Base	Correct	Wrong
1. Correct position of the base points. 2. The ROI extends into the aortic tract.		

Apex	Correct	Wrong
1. Correct position of the Apex points. 2. The apex point is placed too high. The ROI is extending beyond the epicardium.		

Apex	Correct	Wrong
1. Correct position of the Apex points. 2. The upper right border of the ROI is way too much into the chamber cavity..		

Bulges	Correct	Wrong
1. Correct ROI. 2. ROI should not be bulging or follow the papillary muscle. To edit the ROI, see 'ROI adjustment' on *page 13-309* .		

General	Correct	Wrong
The left ventricle must be visible through the entire cycle. 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.

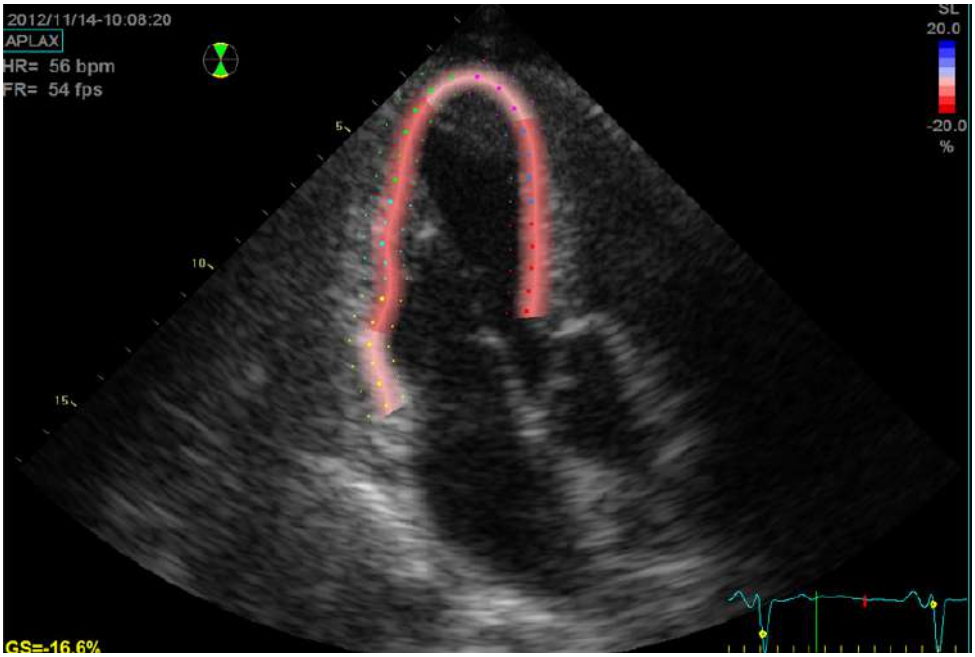


Figure 13-172. Parametric systolic strain APLAX view

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

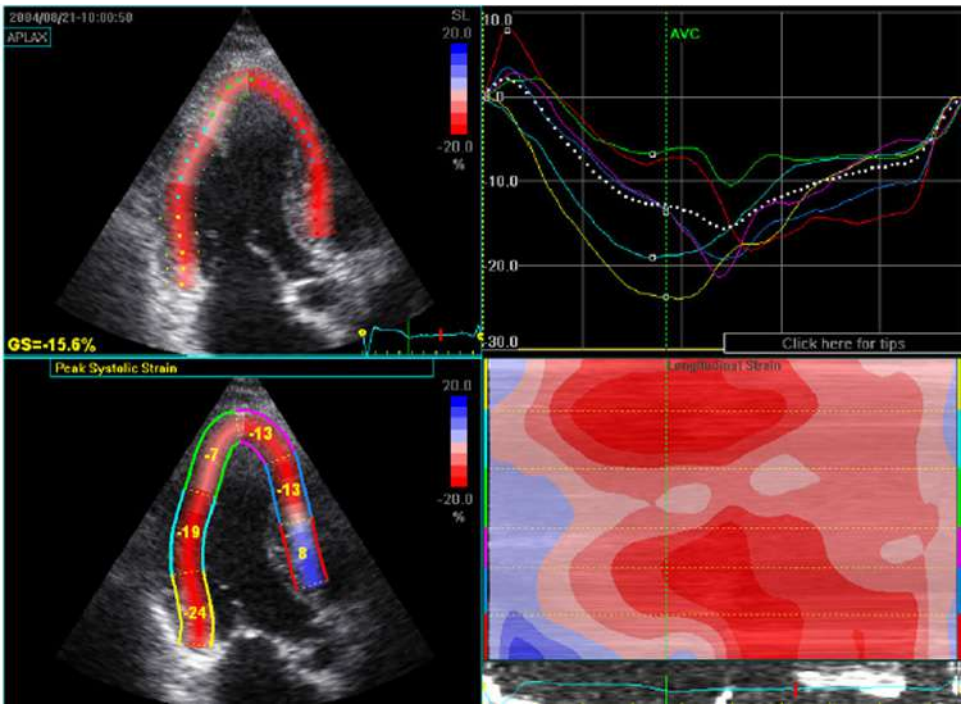


Figure 13-173. Quad screen for the APLAX view

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 13-307*).

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 13-172 *on page 13-315*) displaying a 2D image with strain parametric data.
- Quad screen (see Figure 13-173 *on page 13-316*) 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 ‘Timing Validation’ on *page 13-314*), 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.

The strain values displayed in the Quad screen on APLAX and 4 Chamber views are therefor 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.

Results (continued)

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.

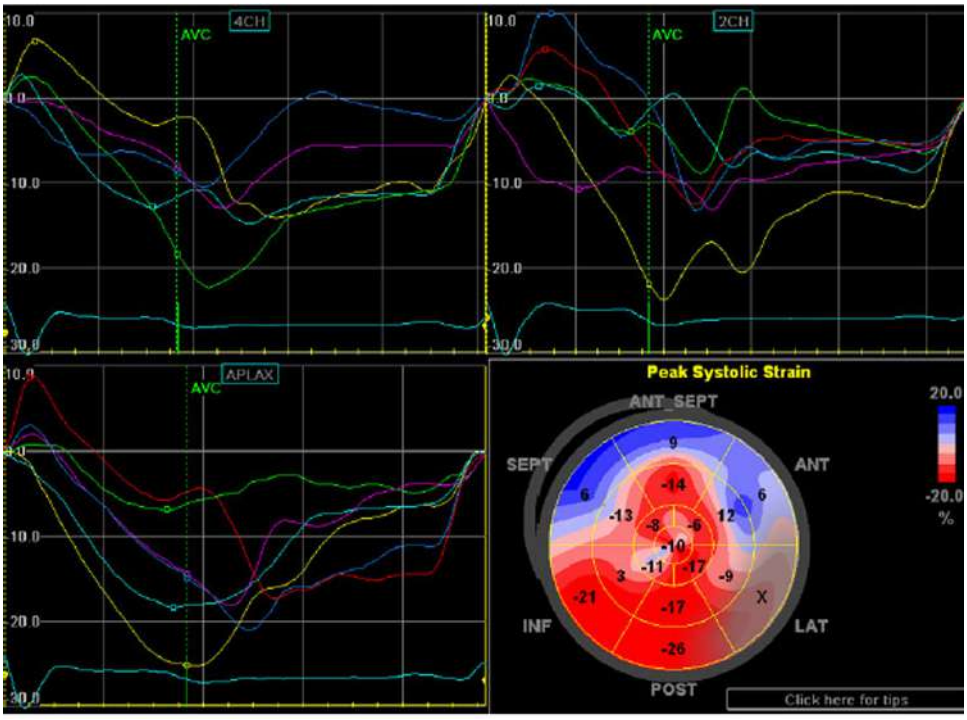


Figure 13-174. BE+Trace screen

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.

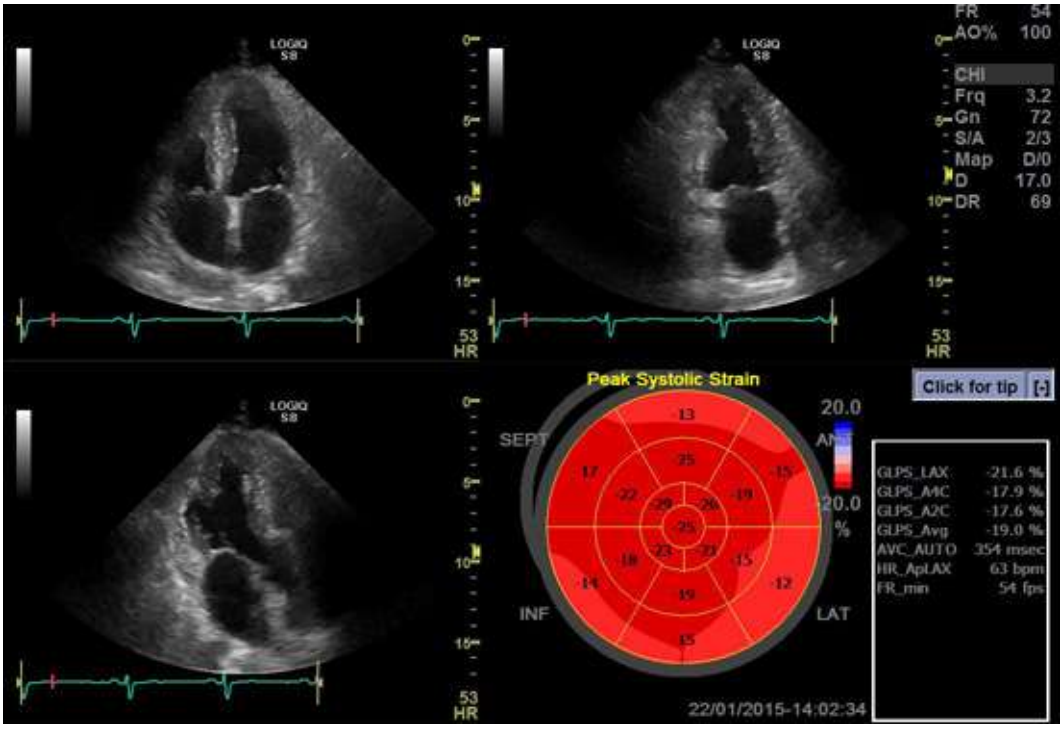


Figure 13-175. BE+Review screen

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 ‘Timing Validation’ on *page 13-314*)

Results (continued)

Select ***BE+Only*** to display.

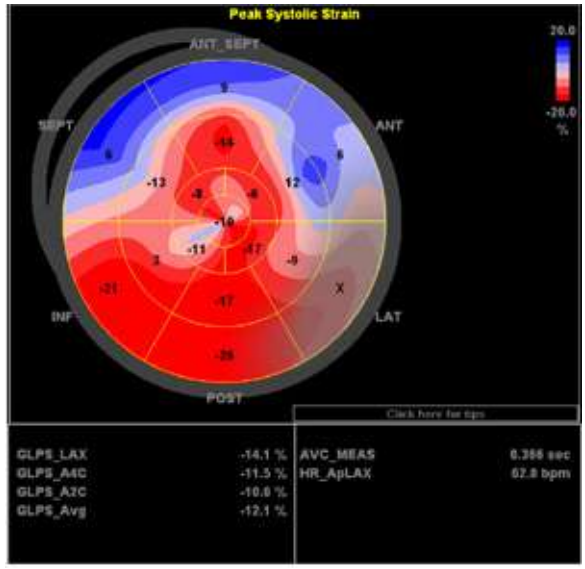


Figure 13-176. Bull's Eye Only screen

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.

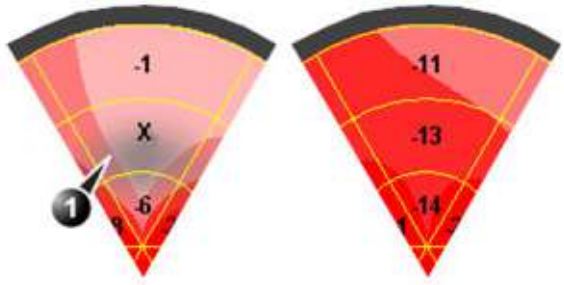


Figure 13-177. Colorimetric display

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.

Stress Echo

Introduction

The LOGIQ P8/P9/P10 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 Wall Motion Segment Score is not displayed on the screen, select the "Wall Motion" 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.

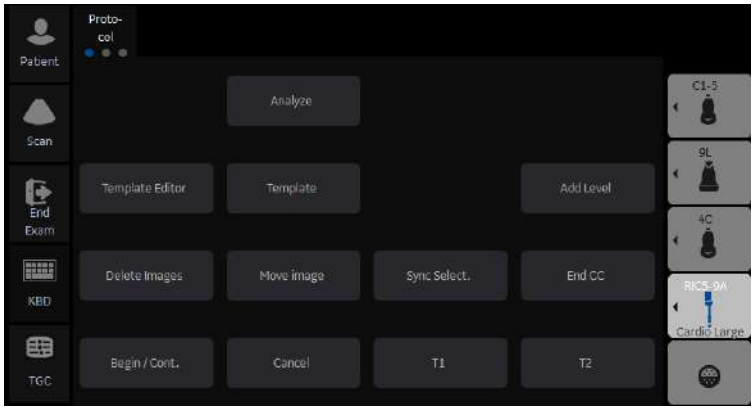


Figure 13-178. Protocol Tab

Table 13-59: 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.

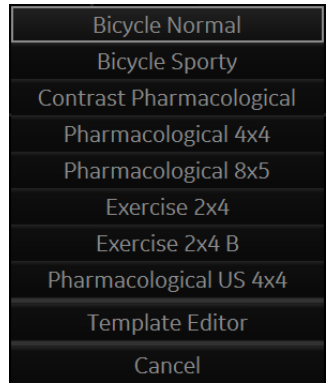


Figure 13-179. Template List

3. **Trackball** to the desired template and press **Set**.

Getting started with a stress study (continued)

4. The selected template displays.

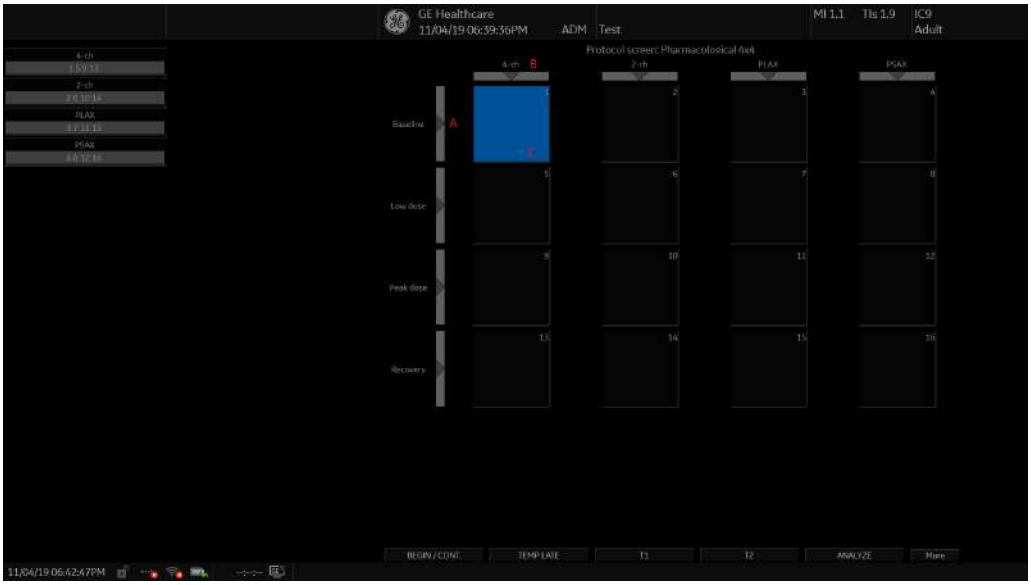


Figure 13-180. Template (Example)

a. Level
b. Projection
c. Current Acquisition (green)

5. Press ***Begin/Cont.*** to initiate scanning using the new template.

Image acquisition

Images are acquired in a pre-defined order, according to the selected template. The highlighted (green) cell of the template matrix, displayed in the Clipboard window, indicates which view is currently being acquired.

The names of the view and levels for the current cell are displayed on the top left corner of the image area and under the template matrix.

Acquisition Screen

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.

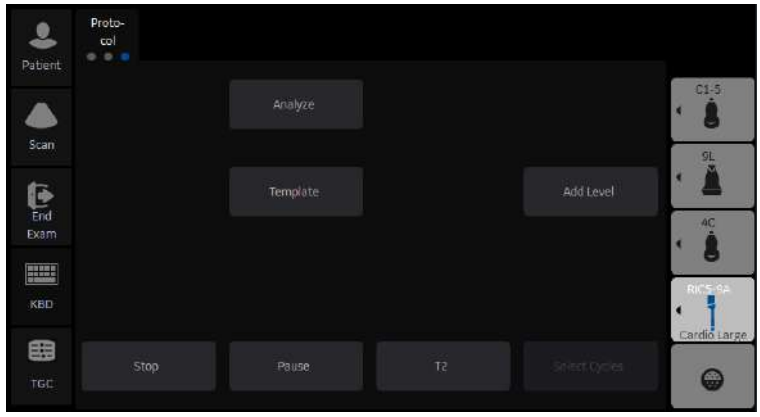


Figure 13-181. Protocol Tab during acquisition

Table 13-60: 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.

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

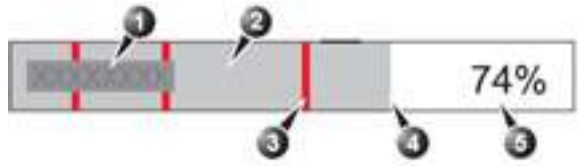


Figure 13-182. Buffer Bar

1. System's state
2. Capture session
3. Pause session
4. Buffer gauge
5. Percentage of filled buffer

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.

    If the buffer is full, the system automatically displays the Continuous Capture Selection screen.

    Refer to the next section if additional image acquisitions are necessary after the buffer is full.

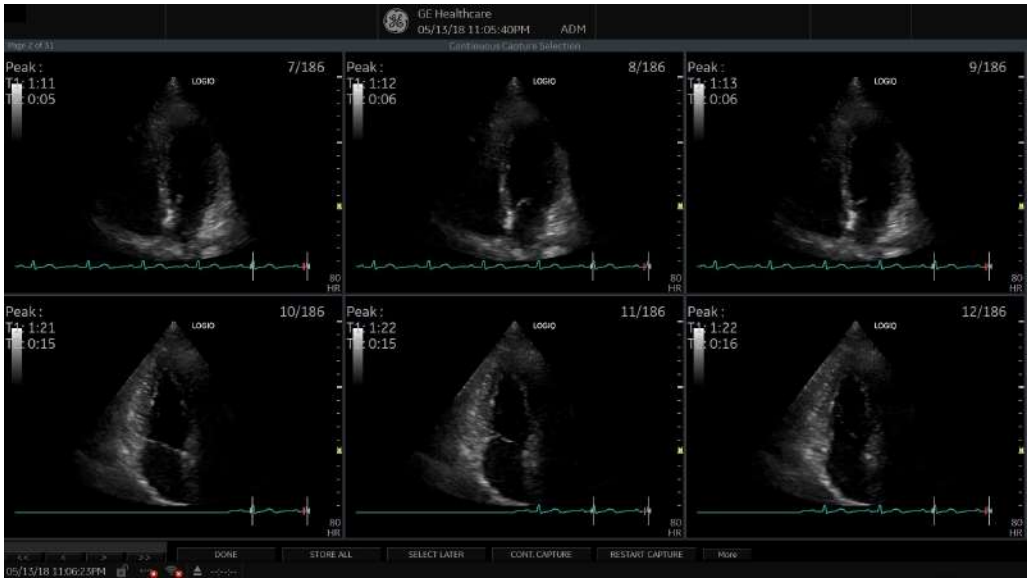


Figure 13-183. Continuous Capture Selection Screen

Activating Continuous Capture (continued)

12. Assign the cine loops to the four views.
    a. **Trackball** to the desired loop.
    b. Press **Set**. A drop-down menu appears with the available choices.
    c. **Trackball** to the appropriate view.
    d. Press **Set**.

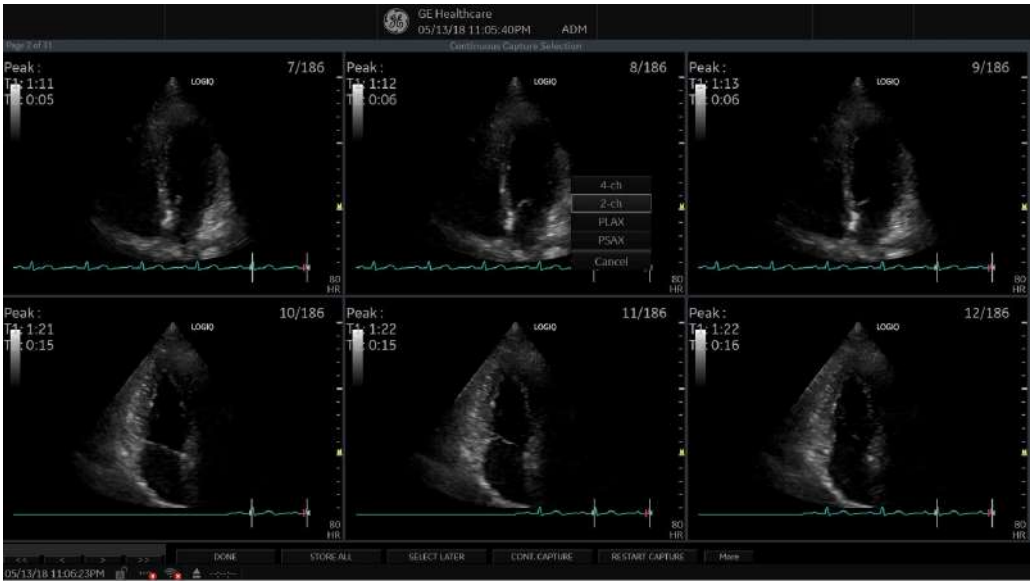


Figure 13-184. Drop-down Menu

e. Continue these steps until all views are selected.

NOTE: To access additional cycles, use the arrow keys on the lower left portion of the select cycle screen.

Activating Continuous Capture (continued)

f. Select ***Done*** when complete. A dialogue window displays, asking whether the entire Continuous Capture acquisition should be saved.

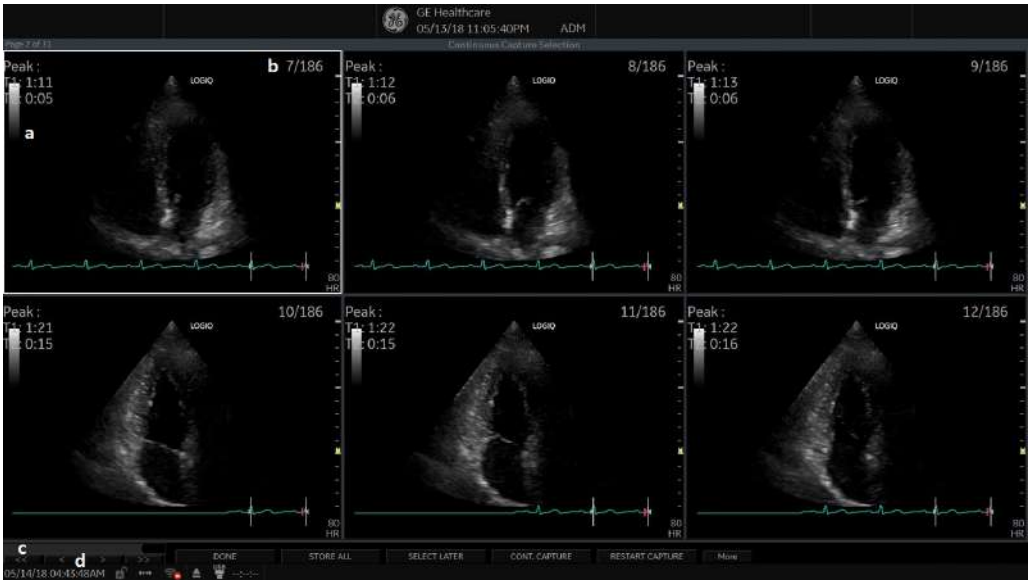


Figure 13-185. Dialogue Window

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 13-337 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 13-337 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 13-337 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 13-337 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.

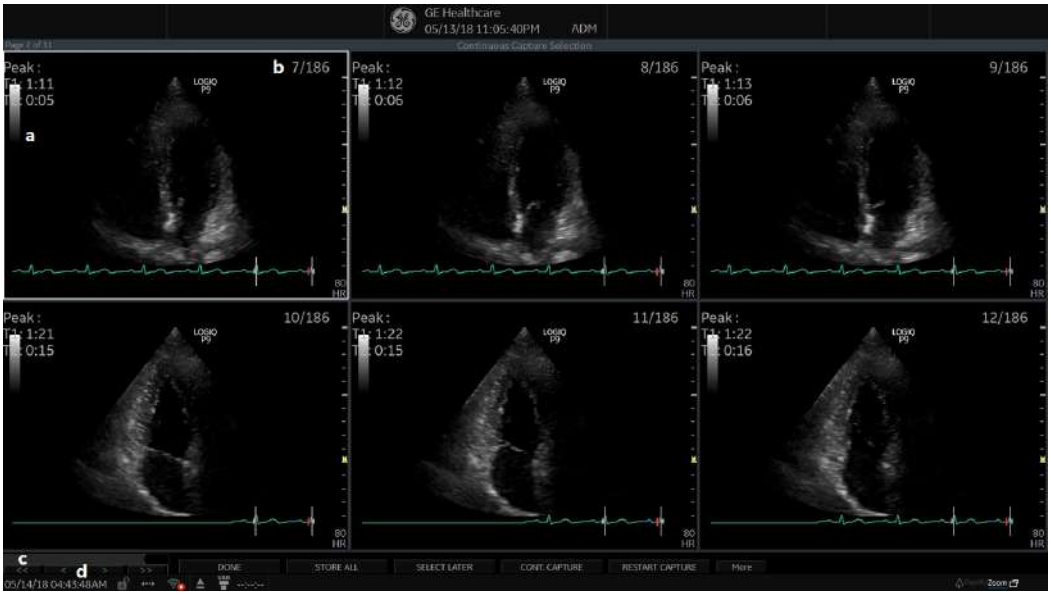


Figure 13-186. Continuous Capture Selection Screen

a. Highlighted loop
b. Cycle number and total number of cycles
c. Gray Gauge: Position of the highlighted loop within buffer area.
d. Navigation Controls: << < > >> (back to first selection, back to previous selection, forward to next selection, and forward to final selection).

Assigning a cine loop to a view

1. Use the **Trackball** to move the cursor to the desired cine loop in order to assign it to a particular view of the stress template.

   The frame of the loop is highlighted.

2. Press **Set**.

   A pop-up menu displays with the view names of the template.

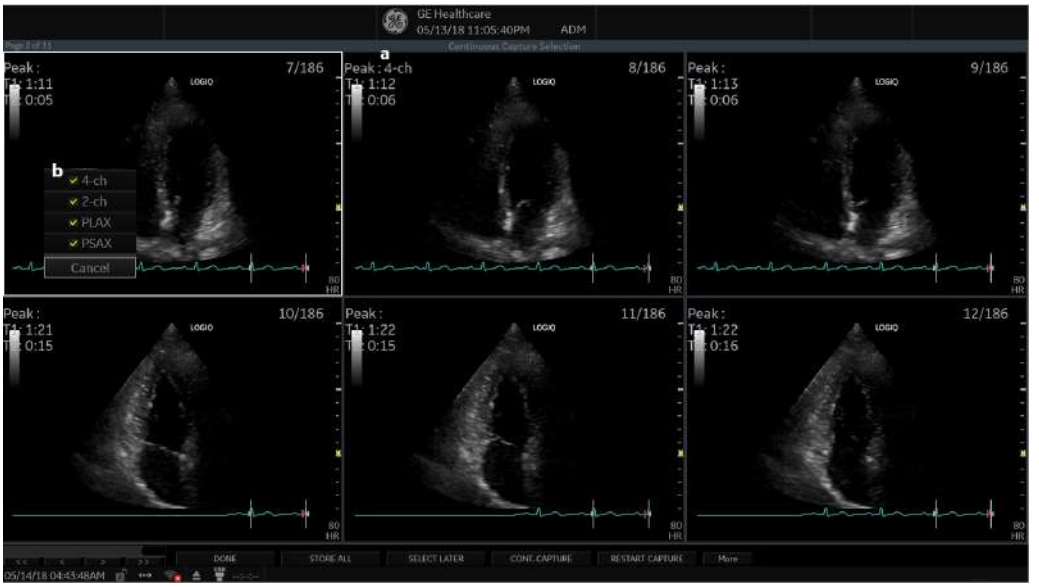


Figure 13-187. Loop Assignment

a. Already assigned view

b. Views pop-up menu

NOTE: A checkmark appears on the Views pop-up after you have assigned a view to an image.

Assigning a cine loop to a view (continued)

3. Use the **Trackball** to select the required view name.
4. Press **Set**.

   The name of the view displays above the timers in the window.
5. Repeat steps 1 through 4 to assign loops to the other views of the level.
6. Press ***Done*** when complete.

   A dialogue window displays asking whether the entire Continuous Capture acquisition should be saved.
7. Press ***Delete*** to discard the loop or press ***Store all*** to keep the entire loop.

   The normal procedure is to discard the loop. The loop is very big and requires a lot of disk space.

Post Acquisition Features

Post acquisition, you can utilize Raw Data to adjust the following in B-Mode:

- Zoom
- SRI HD
- Rejection
- Frame Average
- TGC
- Maps
- Dynamic Range
- Gain
- Rotation

You can also take measurements post Stress Echo acquisition.

Analysis

Analysis consists of viewing previously saved loops and assigning scores to each cardiac segment, in order to quantify the function of the muscle or wall segment.

Depending on the protocol configuration, the analysis stage can start manually or automatically after completion of the stress test. In this case, the usual procedure consists of sequentially opening all image groups (if defined) and performing scoring from image to image.

The quad screen is the standard display for comparing heart cycles. The heart cycle loops in the display are synchronized to enable comparison. Each loop in the quad screen can be magnified, using the zoom control.

Image Selection for Analysis

Images can be selected manually or from a pre-defined group in the Protocol screen.

Selection of Images from a group

If groups of images have been defined in the protocol template, you can select a group of images for analysis and sequentially analyze all images from all groups from within the Analysis screen.

1. In a stress examination, press ***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 13-188 .

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.

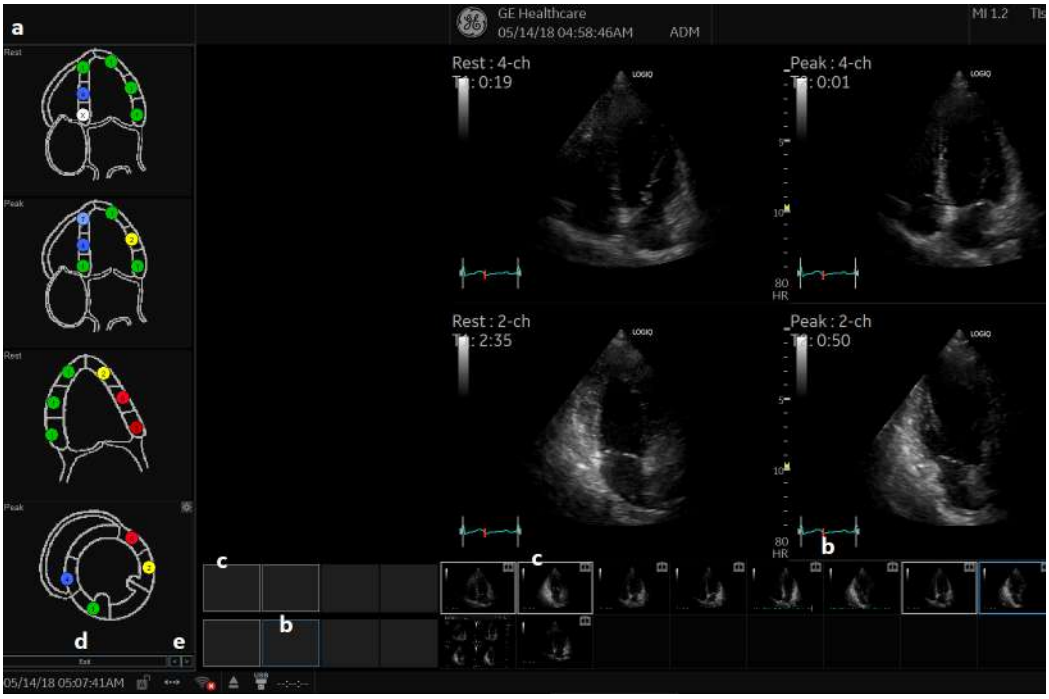


Figure 13-188. Analysis Screen

a. Wall segment diagram
b. Selected loop (Highlighted frame)
c. Displayed loops (Highlighted frames)
d. Exit Wall motion scoring
e. Change page or enter next image group

Scoring acquired loops (continued)

2. Use the **Trackball** to move the cursor to a segment in one of the scoring diagrams and press **Set**.

   The Score pop-up list displays.

3. Use the **Trackball** to move the cursor to a score.
4. Press **Set**.

   The score displays in the relevant segment area in the diagram.

NOTE: To edit a score, select it and choose a new score.

5. Repeat step 1 through 3 to score relevant segments.
6. Press the **Change Page** arrow to display the next group of images.
7. Repeat step 1 through 3 to score relevant segments on the new loops.

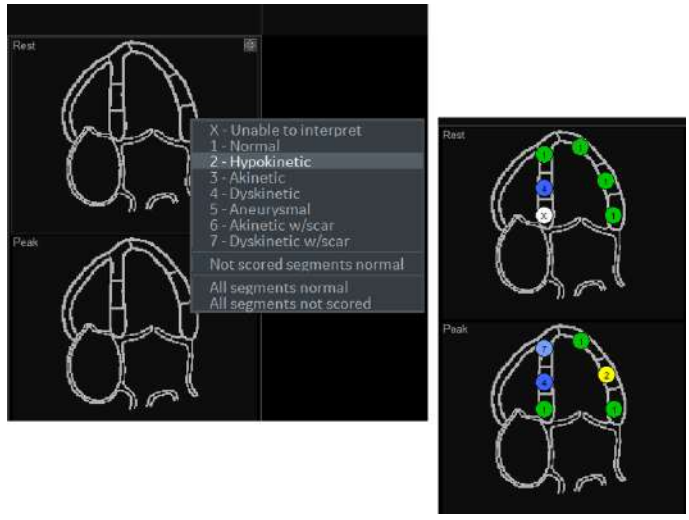


Figure 13-189. Segment Scoring

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

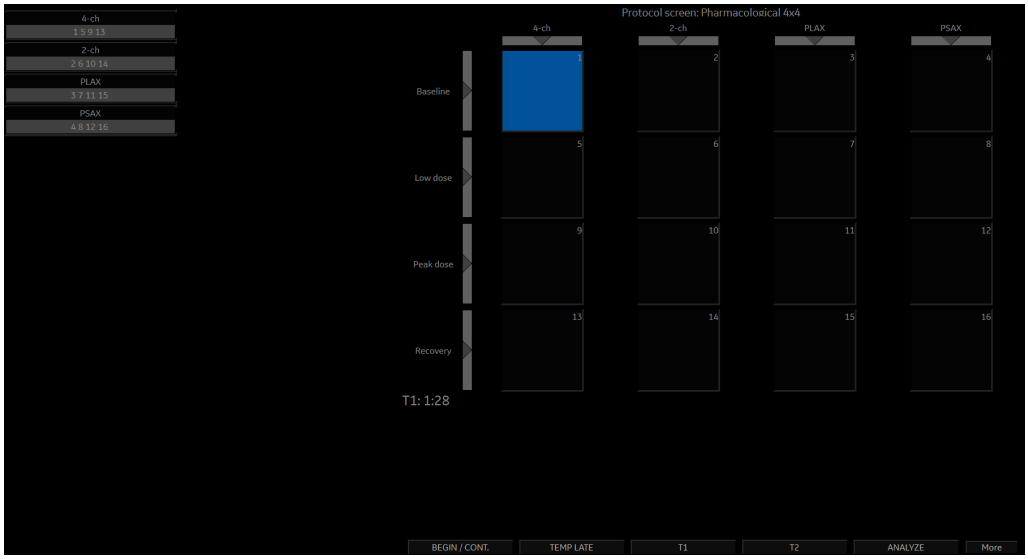


Figure 13-190. Template Editor Screen

Table 13-61: Template

Parameter	Description
Template	Select a pre-defined template from the pull-down menu. The protocol template preview updates accordingly.

Table 13-62: Protocol Template Preview

Parameter	Description
Protocol Template Preview	• Displays an updated preview of the template accordingly to the settings applied. • To change Projection and Stress level labels, select a pre-defined label from the pull-down menu or press **Set** in the actual label field and type a new name.

Table 13-63: Template Settings

Parameter	Description
Template Settings	• Cycles: select the number of cine loop heart cycles to store for each level from the pull-down menu or enter the desired value manually. • Continuous Capture: Checking this parameter enables continuous image acquisition throughout the level. The images acquired are temporarily stored in the system's storage buffer. • Preview of store: Checking this parameter enables review and adjustment of cine loops before store. • Show reference: Checking this parameter displays a dual screen with the reference level (first or previous level) on the left and the live image on the right.

Table 13-64: Scan Mode

Parameter	Description
Scan Modes	• 2D, Color, PW (Pulsed Wave Doppler), CW (Continuous Wave Doppler), MM (M-Mode), Color MM, Color PW, Color CW

Table 13-65: Other options

Parameter	Description
Other Options	• Grid Size: Enter the number of levels and projections for the selected template. • Timers: If you check this parameter, starts T1 and T2 timers automatically. • Auto-start analysis: If you check this parameter, displays the Stress Echo Analysis when the last acquisition is performed. • Show Systole in Analysis: When selected, the systolic part of the cardiac or ECG cycle is only displayed. The whole cycle is not displayed. • Smart Stress: Check Smart Stress to store a subset of the image acquisition settings (e.g., Zoom, Gain, Compress, etc.) for each view in the protocol. Smart Stress enables you to set image acquisition settings for each view at a baseline level and automatically get the same image settings in the corresponding views in the next levels. • Reference image: When Show Reference is selected, selects either corresponding baseline loop or corresponding loop from the previous level to be displayed as reference image during acquisition.

Table 13-66: Pre-defined groups

Parameter	Description
Pre-defined groups	• Shows the image groups created. • New group: Creates a new image group. Select the desired images on the template preview. • Update group: Edits a selected group after new loop selection on the template preview. • Delete group: Deletes a selected group.

Selecting a base template to edit

1. Select the base template from the template pull-down menu on the upper left corner.
2. Press **Set**.

   The selected template displays in the protocol template preview field, showing the levels, projections and their labels.

Adding/Deleting levels and projections

1. Enter the number of levels and projections in the Grid size field.

   The new grid size displays in the protocol template preview field.
2. Press ***New Template*** to create a new template.

   or

   Press ***Save Template*** to update the base template.

Display timers

1. Check the box(es) to display timer(s) as specified.

NOTE: *The timers can also be started or stopped at any time during stress examination by using the T1 and T2 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 in the baseline level view in the corresponding views in the next levels.

Configuring levels

The following options can be set up for each level:

Number of cycles to be stored in the cine loop:

1. Enter 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).

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.

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.

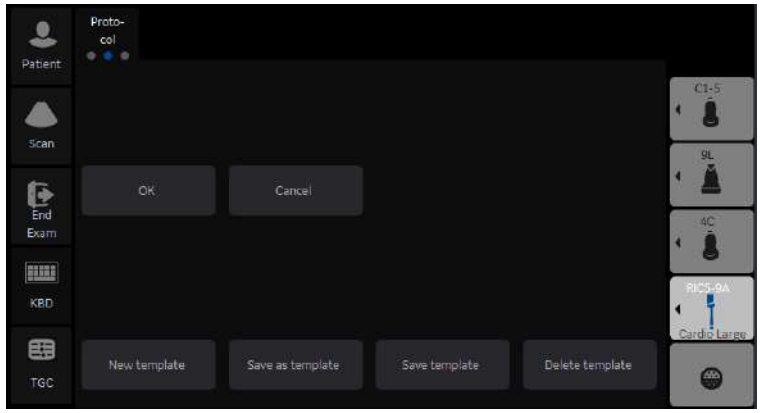


Figure 13-191. Template Editor Touch Panel

Table 13-67: Template Editor Saving Options

Parameter	Value
New Template	Select this option to create an entirely new template.
Save As Template	If you would like to create a new template based on the existing template with your modifications, select to Save this Template As, and give it a name.
Save Template	Select this option to save the default template with your modifications.
Delete Template	Select this option to delete a template.

Wall Motion Segment Setup

You can set up the following parameters for Wall Motion Segment in the Utility screen (Utility--> Measure--> Advanced--> Cardiac).

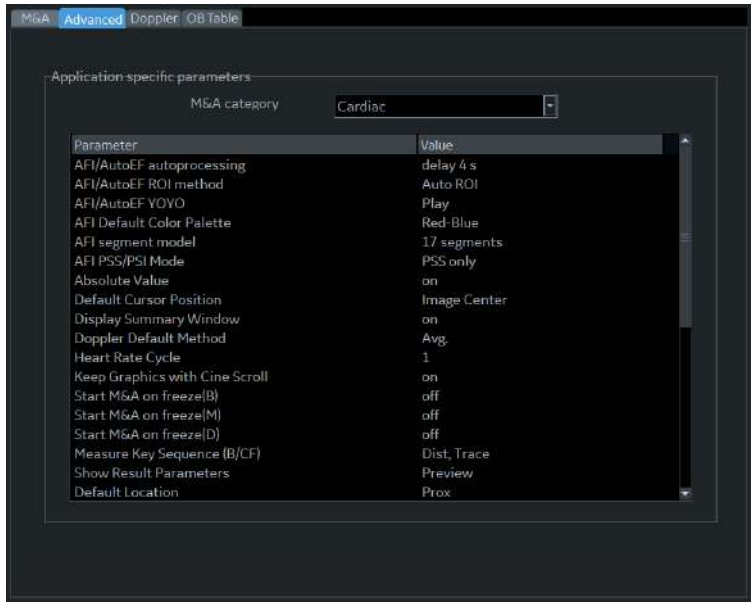


Figure 13-192. Cardiac Wall Motion Segment Setup

Table 13-68: Wall Motion Segment Parameters

Parameter	Value
WMS freeze loop at ES	Specify to freeze the Loop at End Systole
WMS Segment Model	Select 16 or 18 segments
WMS initial scoring	Undefined or Normal
WMS scoring legend	ASE, ASIA or European

Utility Application Settings for Protocol

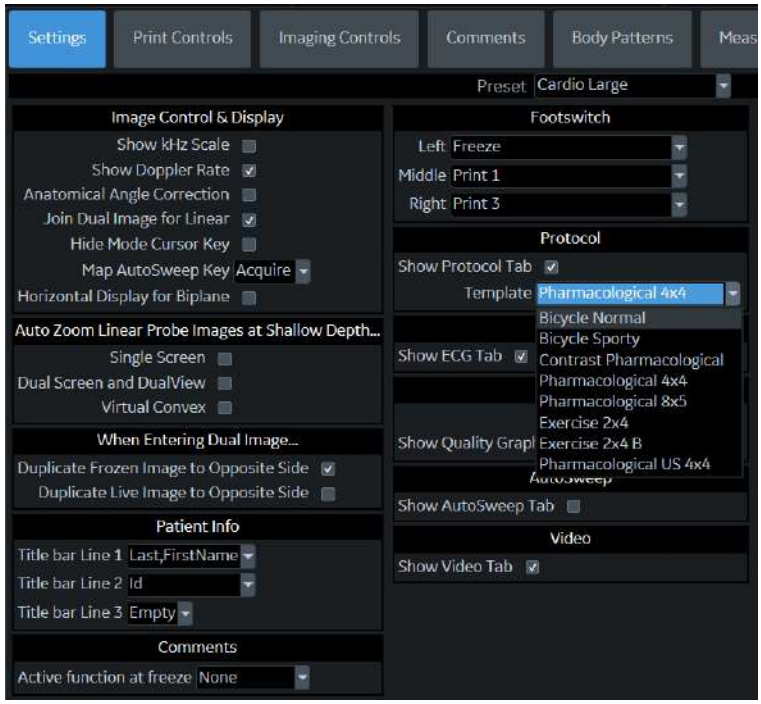


Figure 13-193. Protocol Setup

Table 13-69: 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. See ‘Cardiac Studies Wall Motion Analysis’ on *page 13-442 for more information.*

Select Report to view either the Bull’s Eye or Cut Plane Report.

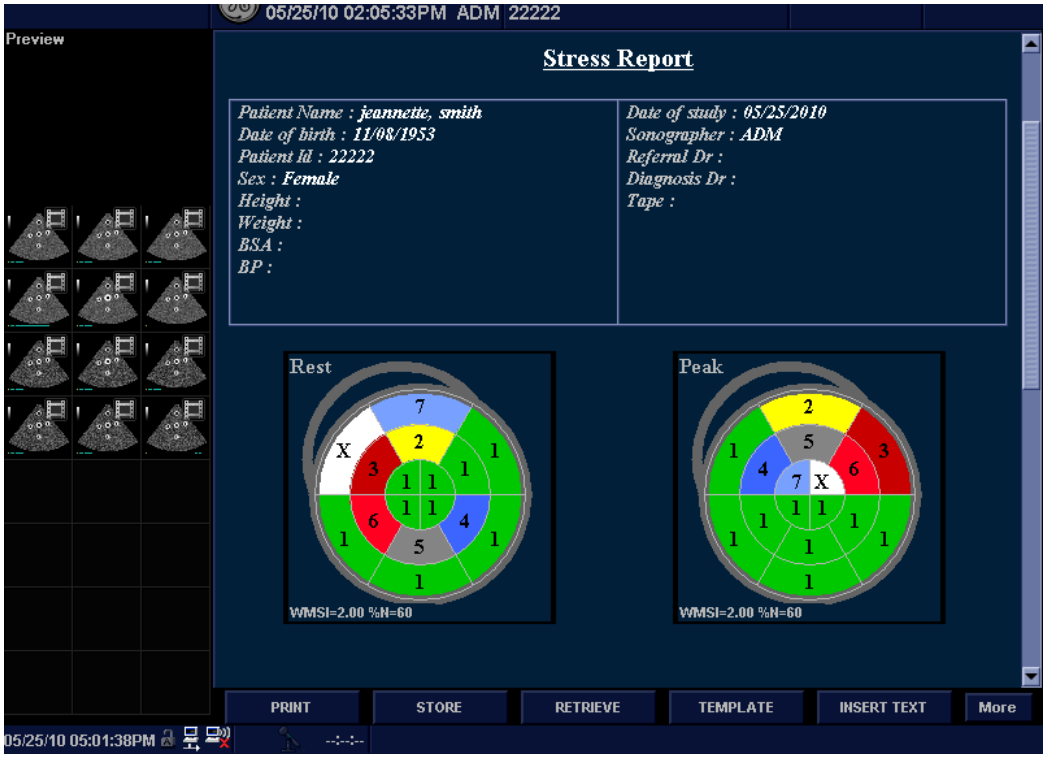


Figure 13-194. Bull’s Eye Report Sample

Report (continued)

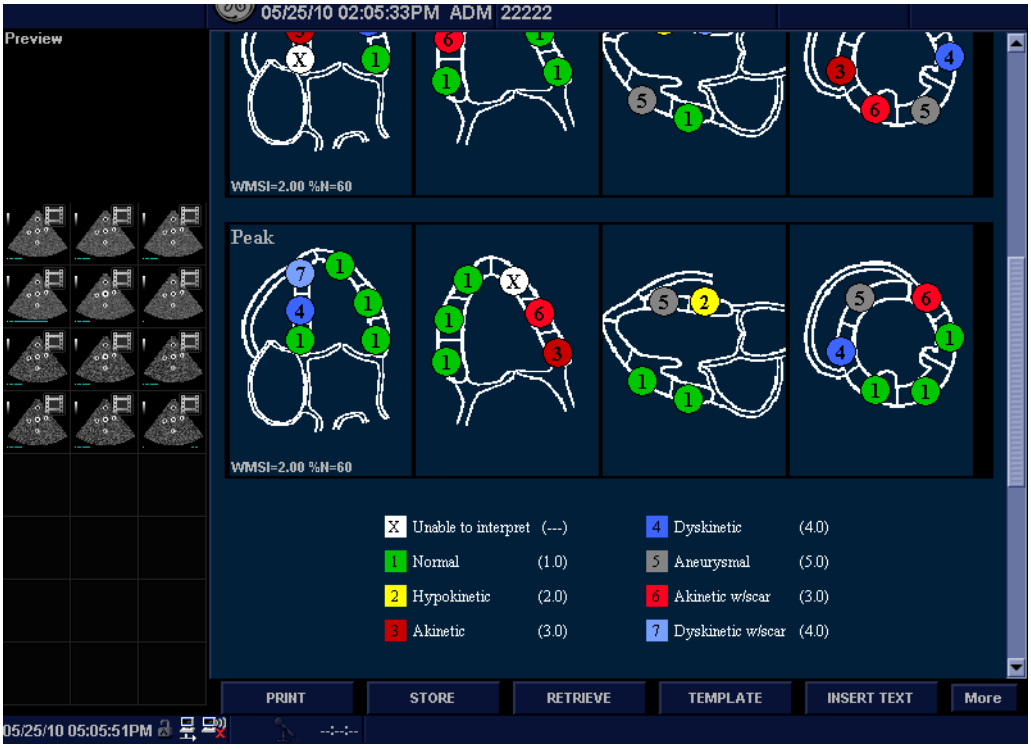
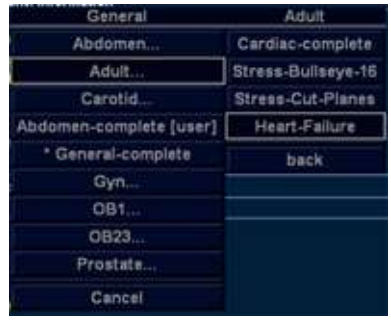


Figure 13-195. Cut Planes Report Example

HINTS

Select either Bull's Eye or Cut Plane on the Reports--> Adult Template.



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

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).

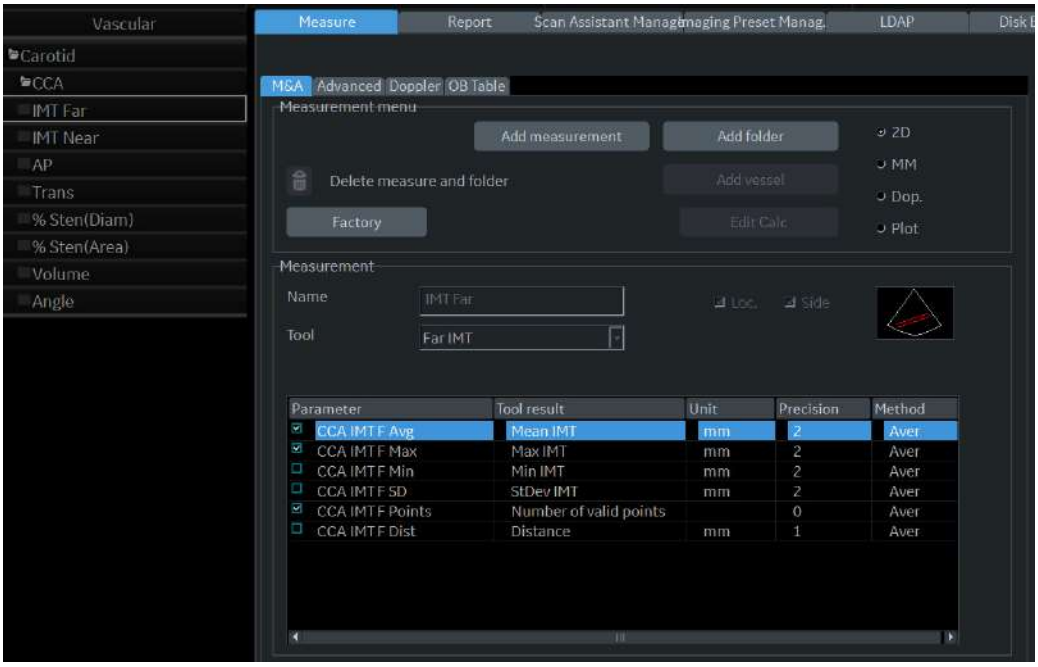


Figure 13-196. Configuring Auto IMT

Controls

In the Vascular Carotid application, the Auto IMT measurement is available.

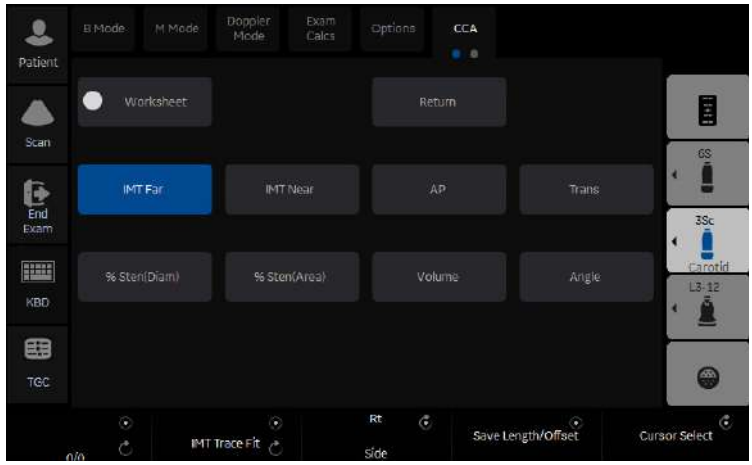


Figure 13-197. Auto IMT Touch Panel

The following controls are available.

Table 13-70: 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	-40/+40 Length. At zero, you can freely adjust the length, but only vertically. Offset distance, -20 (Left) / +20 (Right)
Save Length/Offset	Push to save Length/Offset as a preset. Press key to save value as default.
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.

How to measure

To measure the IMT,

1. In the Carotid application, press **Freeze**, press **Measure**.
2. Select the appropriate IMT measurement. For example, if measuring the IMT of the far wall of the right common carotid artery, select Rt CCA folder, and then ***IMT Far***.
3. Use the **Trackball** to set the length.

   Or

   Use the ***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.

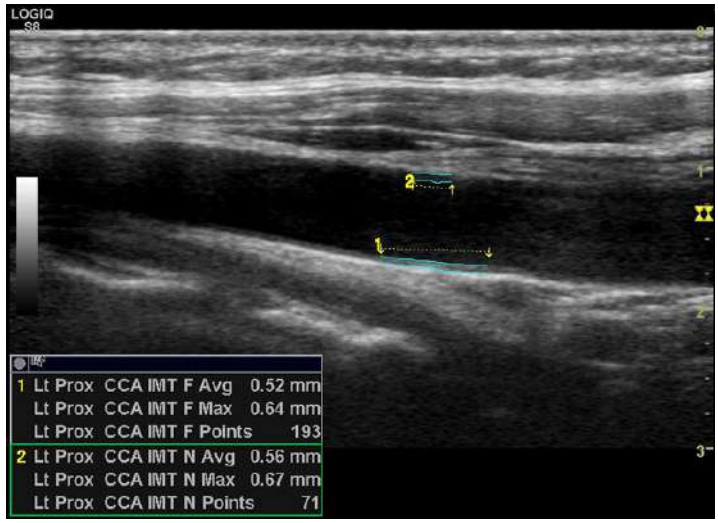


Figure 13-198. Example of Auto IMT Far Measurement

How to measure (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.

ECG

Overview

DO NOT USE the physiological traces of the LOGIQ P8/P9/P10 Ultrasound system for diagnosis and monitoring.

DO NOT USE with the Defibrillator.

- ECG electrodes should not make contact with other conductive parts, including earth.
- After the defibrillator stimulates the patient, the ECG needs 4 to 5 seconds for recovery.
- The quality of the ECG trace depends on the stability and conductivity of the electrodes during the test, especially during high stages when the patient's movements can cause artifacts.
- Make sure that the lead wires do not swing.
- The device is not waterproof. Do not expose the device to water or any kind of liquid. Maintain in a dry place:
  - The exterior of the recorder may be wiped clean with a soft cloth. Do not use harsh cleaning agents to clean the unit. Do not immerse the unit in any liquid.
  - Clean the cables with a hospital approved cleaning procedure such as those recommended by AAMI or AORN. Do not immerse cables in water.
  - Worn or damaged patient cables are the most common cause of poor ECG signals. ECG signals (or wave patterns) that consistently contain noise or artifact may suggest need for ECG wire or cable replacement.
  - Store the device in a dry place.
  - Always protect the recorder from coming into contact with moisture. In rain or snow conditions, protect the recorder from bad weather elements by wearing the recorder inside a coat.
- When Difibrillator is using, all attached patient applied parts connected to ultrasound system must remove from patient.

ECG Cable

WARNING

For defibrillation situation, patient connection cable MUST BE USED with the designated ECG cable only.

WARNING

The patient cable protects against the effects of the discharged of a cardiac defibrillator.

CAUTION

Make sure the leads are attached properly, and use only GE recommended ECG leads. It is important to confirm ECG trace clarity before the scan.

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.

Table 13-71: 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
N or RF	Black	RL	Green	Right Leg (Neutral)

ECG connector

The ECG connector is located on the base of the monitor arm.

Figure 13-199. ECG connector

ECG Trace Monitor Display

The scanned image is synchronized with the ECG trace. In Doppler or M-Mode, the traces are synchronized with that particular mode's sweep.

The user can control the gain, position and sweep speed of the traces using the Touch Panel controls.

Figure 13-200. ECG Trace Display

1. ECG
2. Auto Heart Rate Display

ECG Touch Panel

The ECG Touch Panel provides for control of the input signals.

Without the ECG option, the ECG Touch Panel is not displayed.

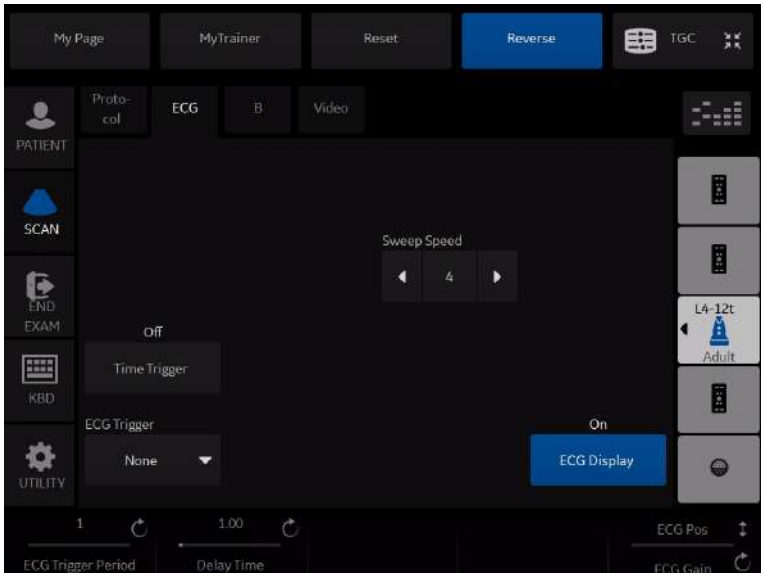


Figure 13-201. ECG Touch Panel

Table 13-72: 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.
Timer Trigger	On/Off. Enables intermittent imaging based on a timer. NOTE: If Timer Trigger is turned on, the ECG Trigger is set to None.
ECG Trigger	Enables intermittent imaging based on the ECG. The trigger location(s) relative to the R trigger are set with the Delay Time key. Press ECG Trigger and select one of the options (None, Trig1, Trig2, and Both) and adjust the delay time using the Delay Time key. • ECG Trig 1 specifies the delay (ms) from R-wave to triggered frame. • ECG Trig 2 specifies the delay from R-wave to second frame. • Both activates ECG Trig 1 and ECG Trig 2 simultaneously. Trig 2 must be greater than Trig 1 for dual triggering (Both) to be active. NOTE: If other than None is selected, Timer Trigger is turned off.
ECG Display	Provides the ability to turn on the ECG trace and Auto Heart Rate for display on the monitor.

Table 13-72: ECG parameters (Continued)

Parameter	Description
ECG Trigger Period	The control specifies the number of heart cycles (R-waves) that are skipped between ECG triggers. The default is 1 or no skipping.
Delay Time	In ECG Trigger Mode: If only ECG Trig1 or ECG Trig2 is selected via the ECG Trigger key, the Delay Time key controls the R-Delay time of the active trigger. If both triggers are selected (Both), press this key to toggle ECG Trig1 and ECG Trig2 and rotate the key to change the delay time. Once the trigger is set, the snap shot image is displayed each time the update line passes the active trigger(s). In Timer Trigger Mode: Rotating the knob changes the delay time between images.
ECG Gain/Position	Allows for the amplitude control of the ECG trace or allows for the vertical positioning of the ECG trace on the image display. Press the knob to toggle between Gain and Position. The default is Gain.

DICOM

Overview

Refer following sections for DICOM usage.

- ‘Save As’ on *page 9-19* .
- ‘DICOM Import’ on *page 9-46* .
- Hide Patient Data in ‘System/General Preset Menu’ on *page 10-7* .
- GSDF in ‘System/System Display Preset Menu’ on *page 10-11* .

Anonymize the patient

Overview

The LOGIQ P8/P9/P10 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 P8/P9/P10 warns the user on possible data loss, data mismatch and data that cannot be copied anonymously, including:

- 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.*

Anonymize the patient (continued)

- ***Empty Other DICOM Tags***: Check to clear all DICOM Tags.
- ***Manage DICOM Tags***: Manage D.ICOM tags dialog displays. Select DICOM tags individually.

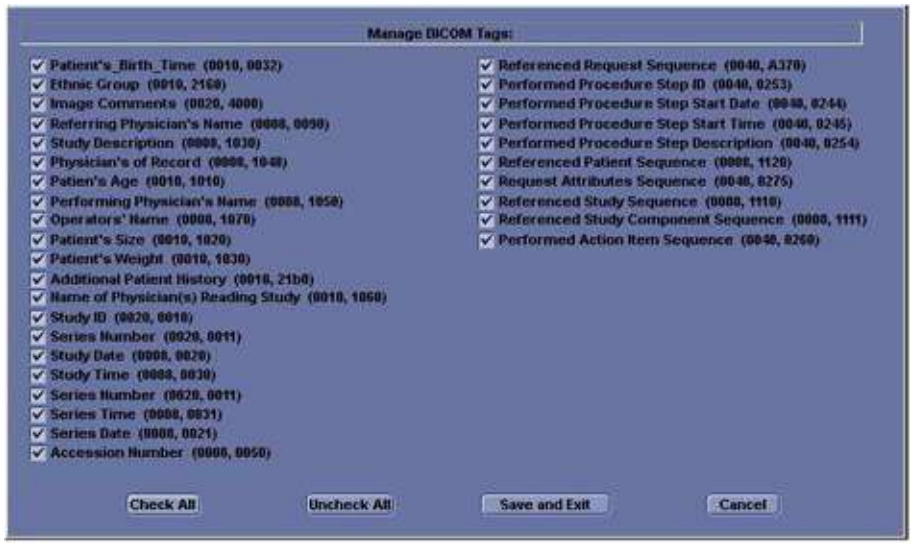


Figure 13-202. Manage DICOM Tags

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 P8/P9/P10 supports the following templates:

- OB-GYN REPORT TEMPLATES
- VASCULAR ULTRASOUND REPORT TEMPLATES

  The system supports selectable vessels with their locations for B-Mode measurements.

  For Vascular studies (Bypass Graft, UEV Map, LEV Map, LEA/UEA, and Carotid), additional measurement locations were added. For instance, for a Bypass Graft, there are now measurements at Inflow, Anast, Thigh, Knee, Calf, Ankle, Graft, RunOff, Pre-Sent, Stent, Post-Stent, and Outflow locations.
- ECHOCARDIOGRAPHY PROCEDURE REPORT TEMPLATES
- Abdomen Report Templates
- Breast Report Templates
- Thyroid Report Templates

These templates do not support all M&A results for the LOGIQ P8/P9/P10.

Supported parameters

The DICOM supported parameters are listed in the DICOM Conformance Statement at the following website under DICOM - Ultrasound:

http://www.gehealthcare.com/usen/interoperability/dicom/

DICOM Image Storage

DICOM Image Storage allows the system to send or receive ultrasound images in a format that can be interpreted by PACS.

GE does not warrant the operation if the DICOM format of send image (US, USMF, SC) does not correspond with the DICOM Server.

Table 13-73: DICOM Image Storage

Preset Parameter	Description
Allow Clips	Select to allow cine loop storage.
Allow raw data	Select to save data in both TruAccess (raw data) and DICOM format. Clear to save in DICOM format only.
Compression	Select the compression type: None, Rle or Jpeg.
Max Frame rate	Select the Max Frame rate : Full, 25, 30, 60, 80.
Color Support	Select: Mixed, Gray or Color
Reopen per image	Reopen per image
Enable Structured Reporting	Select for Structured Reporting.
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 13-74: 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.
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 • 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. • 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 13-75: 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 Worklist Query/Retrieve request. This way, the system ensures that the PACS or 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 minutes.

Box unchecked. The system DOES NOT CHECK the DICOM connection status PRIOR to issuing the Worklist Query/Retrieve request to the PACS or HIS/RIS server. If the server is down, the scanner is accessible only AFTER configured query timeout value with configured number of retries which is ~5 minutes.

Table 13-76: 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.
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 13-77: DICOM Query/Retrieve Search Criteria

Preset Parameter	Description
Select Search Criteria to Add	Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time.
Tags (at least one)	The name of a tag selected to use for search criteria.
Properties: Value	Type the value of the Selected Tag item. For example, if you select Referring Physician's Name in the Select Tag field, you can enter the name of the physician in the Value field.
Properties: Don't Use	Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don't Use and then select Add to List.
Add	Select to add the tag and value to the list of search criteria.
Remove	Select to remove the tag and value from the list of search criteria.
Clear	Clears all tags.

Query/Retrieve Per Series

You can now display/retrieve multiple series by patient on the Patient--> Data Transfer--> Q/R page.

DICOM Storage Commitment

DICOM Storage Commitment provides acknowledgement from PACS that the study has been accepted into archive.

Table 13-78: 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.

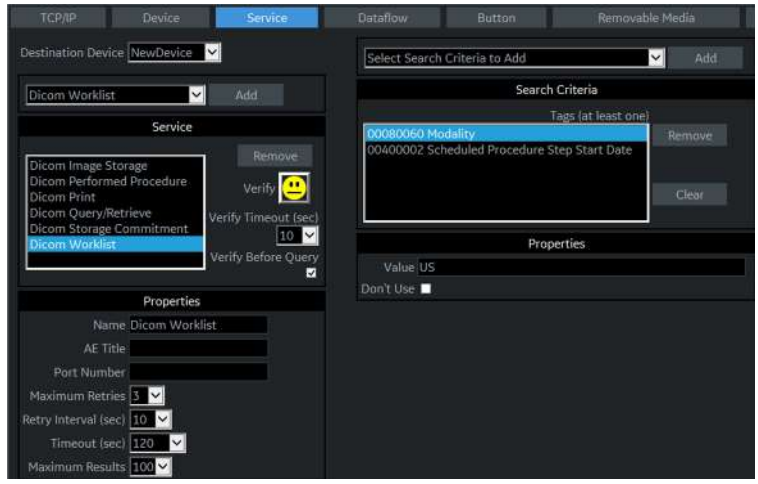


Figure 13-203. DICOM Worklist Service

Verify Before Query

Box Checked. The system DOES CHECK the DICOM connection status PRIOR to issuing the Worklist Query/Retrieve request. This way, the system ensures that the PACS or 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 minutes.

Box unchecked. The system DOES NOT CHECK the DICOM connection status PRIOR to issuing the Worklist Query/Retrieve request to the PACS or HIS/RIS server. If the server is down, the scanner is accessible only AFTER configured query timeout value with configured number of retries which is ~5 minutes.

Table 13-79: 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 13-80: DICOM Worklist Search Criteria

Preset Parameter	Description
Select Search Criteria to Add	Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time.
Tags (at least one)	The name of a tag selected to use for search criteria.
Properties: Value	Type the value of the Selected Tag item. For example, if you select Referring Physician's Name in the Select Tag field, you can enter the name of the physician in the Value field.
Properties: Don't Use	Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don't Use and then select Add to List.
Add	Select to add the tag and value to the list of search criteria.
Remove	Select to remove the tag and value from the list of search criteria.
Clear	Clears all tags.

Query/Retrieve (Search and retrieve the data from DICOM device)

You can display/retrieve individual images or multiple series by patient on the Patient--> Data Transfer--> Q/R page.

NOTE: For Query/Retrieve to find a patient, the patient MUST have a Patient ID.

Query

1. Press **Patient** and select ***Data Transfer***. The Data Transfer screen displays.
2. Select Q/R. The patient/exam list in the Local Archive displays in the Transfer To section.

NOTE: Only "Local Archive - Int.HD" is enabled for Transfer To.

3. Select the Query/Retrieve server from the Transfer From pull-down menu.

NOTE: The server is configured in the Utility screen. Multiple servers are able to be configured.

4. Press Query in the Transfer From section. The Query is performed.
5. The server's patient list displays.

NOTE: Press Query again to refresh the list.

Retrieve

1. Select the patient(s) or the exam(s) to be retrieved from the patient list.
2. Press Transfer. Retrieve the data from the Query/Retrieve Server. The progress bar displays during the transfer.

One Click Query/Retrieve (One Click Q/R)

When a patient is selected on the Patient Screen, you can press the Query This Patient button on the Patient Screen to initiate a DICOM Query.

1. Select the patient.
2. Select ***Query This Patient***.

The following occurs automatically:

- The patient is registered (if needed)
- The Data Transfer page appears with the following steps automatically performed:
  - The Q/R service is selected.

NOTE: *If there is more than one Q/R service defined, the last one used is selected by default.*

  - The current patient ID is filled in as the Search Criteria (not editable by the user).
  - The Query is initiated.

The Queried patient is expanded to show a full list of series with the most recent series at the top.

NOTE: *The current active series is not listed.*

One Click Query/Retrieve (One Click Q/R) (continued)

If the retrieved patient has a single study, the system automatically imports that exam. If the retrieved patient has multiple exams, then:

1. Manually select exam(s) for transfer.
2. Press ***Transfer***. The Retrieve is completed without any confirmation required by the user regarding the patient already existing.

After the retrieve completes, the system automatically returns to the Patient screen with the same patient and exam active as when the ***Query This Patient*** was first selected.

If the Retrieve fails, the system does not auto return to the Patient screen.

If the user manually returns to the Patient screen or otherwise exits the Data Transfer screen, the same patient and exam are active as when the Query this Patient button was first selected.

Send To (Send the image to the DICOM Device)

"Send To" sends the selected exam for a patient and to interactively Send-To the exam to a destination DICOM device configured on the system. An exam in this case includes its images and any corresponding Structured Report.

1. Search and select the patient and press ***Review***. The Patient Exam screen displays.
2. Select the exam which has the images and press ***Send to***.

NOTE: You can only select "Local Archive - Int.HD" for Workflow.

The Send To Dialogue box displays.

3. Select the destination device and press ***OK***.

NOTE: The destination device is configured in the Utility screen. Multiple devices are able to be configured.

The successful/unsuccessful message is displayed at the bottom of the screen.

Selectable Send To

"Selectable Send To" sends the selected exam image(s) and from the Local Archive or DICOM Read device to a destination DICOM device configured in the system via Utility--> Connectivity--> Service.

1. Select a patient or an exam in the Patient menu.
2. Go to Active Images.
3. Select an image (images) and press ***Send To***. The Send To Dialogue displays.

NOTE: If the image is not selected, a warning dialog is displayed and no image is sent.

4. Select a destination from the pull-down menu and press ***OK***.

   "Selected image(s) is (are) send to" message displays on the status bar.

NOTE: Active Images menu and the Touch Panel shall not have "Send To" button if the patient is not selected.

Using the DICOM Spooler

CAUTION

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 are failed or on hold.

To monitor/control DICOM jobs, press F4. You can view, resend, redirect, and delete images from the DICOM spooler by selecting a job, then specifying the action to be performed on this job.

NOTE: If you find a failed job(s) in the Spooler, please remove the failed job(s) from the Spooler.

Table 13-81: Spooler status description

Status	Description
Hold	Waiting for user activity. Select Resend or Send-To to complete the job.
Pending	Waiting for the previous job(s) to finish (a previous job may be Active or Pending). No user interaction required.
Append	Not completed. Example 1: Direct Storing job. Waiting for more images or the end of the exam (by selecting New Patient or End Current Patient). Example 2: Print job with 3x3 images has only 8 images. Waiting for one more image or the end of the exam (by selecting New Patient or End Current Patient).
Active	Signifies network activity (or connection attempt).
Success	Sent successfully.
Failed	Unsuccessful job attempt. Job stays in spooler. Select Retry or Delete to complete the job.
Done	Finished successfully.

Load DICOM Volume Dataset

To load a pre-acquired DICOM volume dataset,

You can exit and re-enter V Nav and retain the Dataset by pressing the V Nav control. OR, to discard the pre-acquired Dataset, press Exit and Clear on the Touch Panel.

From disk

NOTE: Volume datasets that can be loaded from disk may include CT, MR, PET, XA, DX and Invenia (US).

1. If applicable, insert the media containing the pre-acquired 3D dataset.
2. Press ***Load*** and select ***from Disk***.
3. Double click on the DICOMDIR or database file (or single click and select the Open button).
4. Navigate to the location of the 3D dataset.
5. 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***.

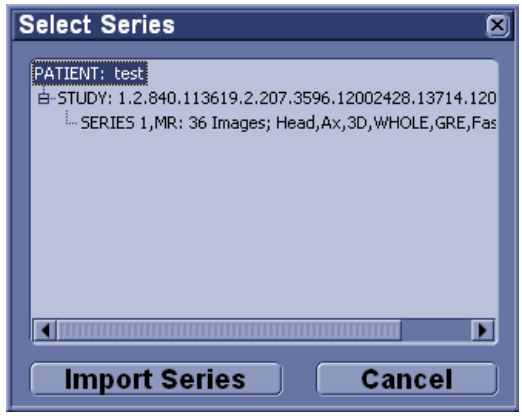


Figure 13-204. Selecting the Patient's 3D Dataset

From disk (continued)

6. 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.

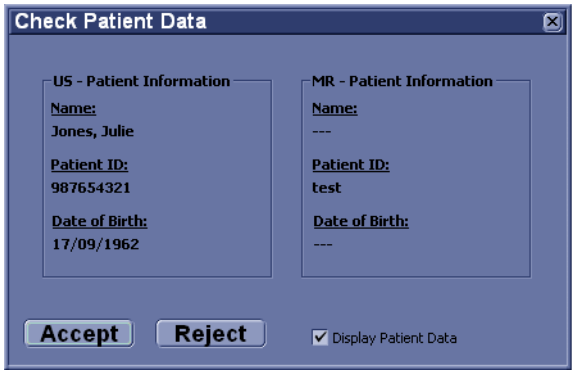


Figure 13-205. Check Patient Data Dialog

NOTE: If Hide Patient Data 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.

7. B-mode image displays on the left side and the loaded volume data displays on the right side.

Load DICOM Volume Dataset (continued)

From Database

NOTE: Volume datasets that can be loaded from the database: CT, MR, PET, XA and Auto Sweep.

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.

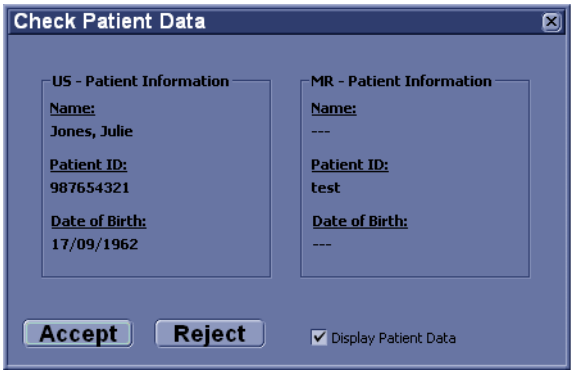


Figure 13-206. Check Patient Data Dialog

NOTE: If Hide Patient Data 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 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:

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 disk, check data of the Select Series pop-up.

Figure 13-207. Select Series pop-up

Load dataset from database, select one image from each exam and press ***Load*** in the Image History screen.

Figure 13-208. Image History screen

Load Multi Volume Datasets (continued)

2. V Nav screen and multiple dataset menu are displayed.

Table 13-82: Multiple dataset menu

Item	Description
1-5	Dataset List (CT, US and MR in this example)
1	Active Dataset Indicator
2	Name of dataset
3	Visivility Indicator
4	Display Weighting
5	Display Color
6-12	Control Area
6	Single Display
7	Multiple Overlapping Display
8	Color Control
9	Volume-to-Volume Registration
10	Delete
11	Compare Volume
12	Expand/Collapse Dataset list

Load Multi Volume Datasets (continued)

Using the Touch Panel control, you can adjust:

Table 13-83:

	Item	Description
	1	Toggle Up/Down: Select the dataset.
	2	Push: Fix the selected dataset.
	3	Rotate: Weight Dataset. You can weight the overlay amount of the volume dataset.
	4	Dataset number and its Weight (%)

*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 disk, from clipboard or from database or if you generate a dataset and switches then back to VNav, the system asks you that add the dataset as an additional or 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.

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.

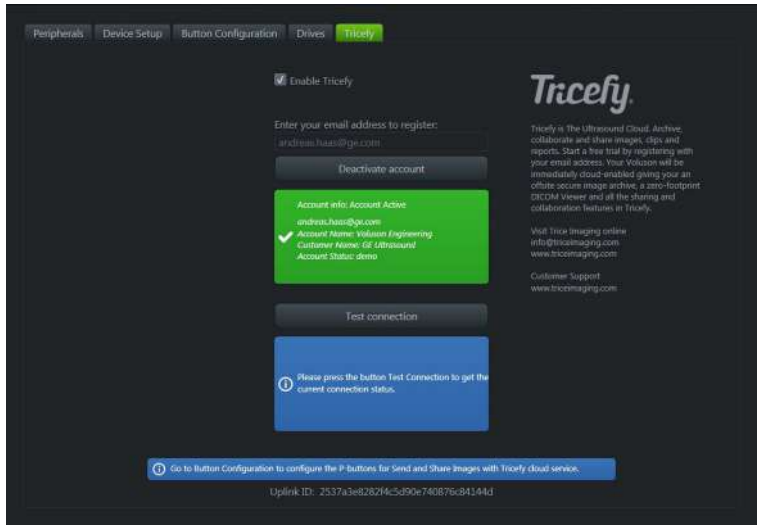


Figure 13-209. Tricefy Account

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

1. 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/Receive 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 13-84: Tricefy Icons

Connection Icons	Store Icons	Share Icons
Connected to Tricefy. Ready to Store and Share	Upload Image to Tricefy	Share Image with Patient via Tricefy.
Disconnected from Tricefy.	Upload CINE to Tricefy	Share CINE with Patient via Tricefy.
Registration incomplete.	Upload 4D Image to Tricefy	ri
	Upload 3D Image to Tricefy	

Tricefy Activation

Refer to Chapter 10 for more information.

Report Writer

Introduction

The LOGIQ P8/P9/P10 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.

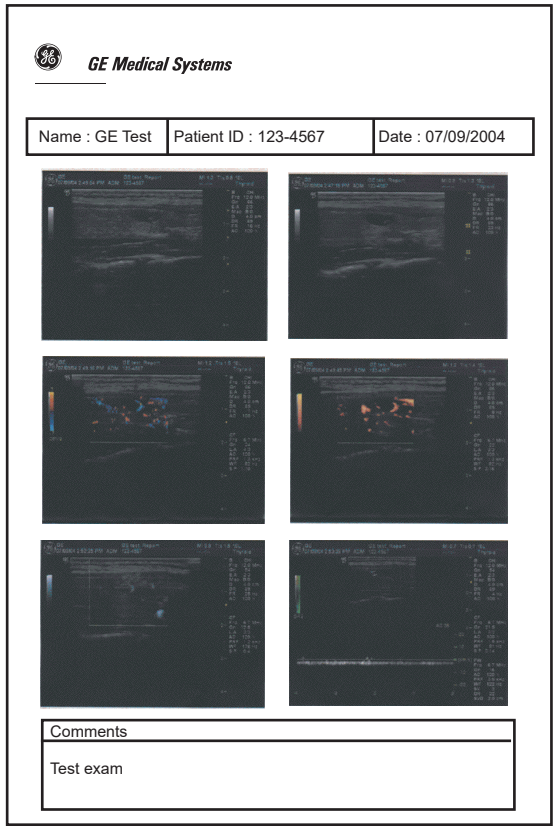


Figure 13-210. Report Example

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 13-211. Report Page Example

Activating the Report (continued)

Table 13-85: 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, Adul, 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.

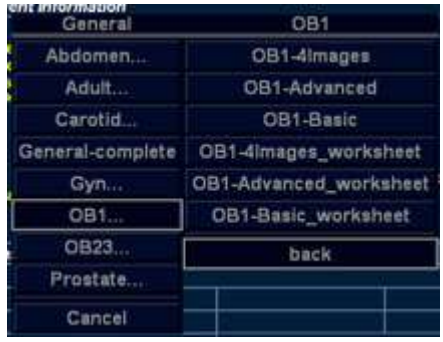


Figure 13-212. Available Template list

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 13-450* 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.

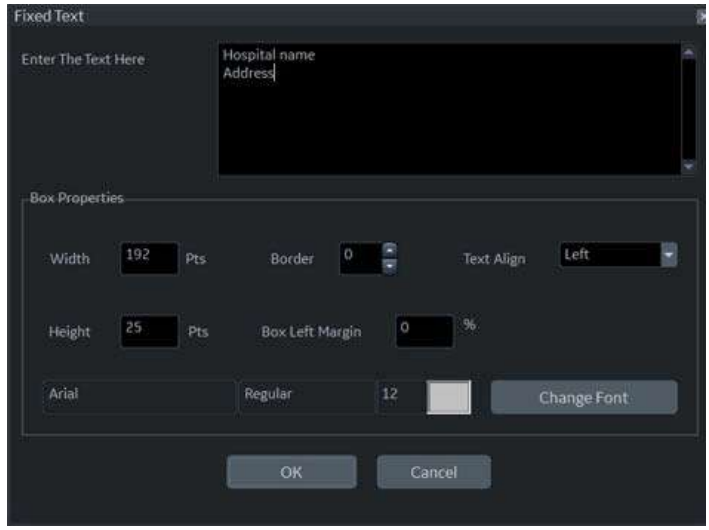


Figure 13-213. Fixed Text Dialogue Box

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 13-450* for more information.

To modify the factory template:

1. Save the preferred hospital logo in either a jpeg or bmp format on the removable media.

NOTE: *Label the logo with a unique name (e.g. HospitalNameLogo.bmp).*

2. Insert the removable media.
3. Select ***Reports***.
4. Select ***Designer***.
5. Double-click logo box at the left top so that the frame is highlighted. The logo box displays.

Figure 13-214. 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. Double-click the yellow text to be changed, e.g. Information or Comments.

   The area where the description was entered (e.g. Patient menu) displays.
2. Change the existing data as necessary.
3. Select ***Report*** to return to the report.

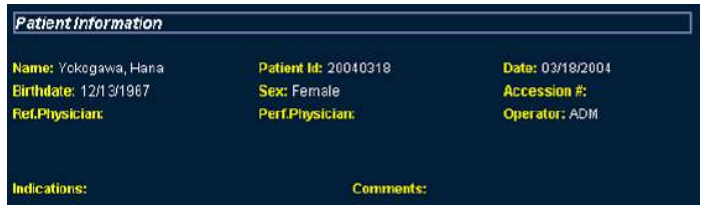


Figure 13-215. Patient Information Area (Example)

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.

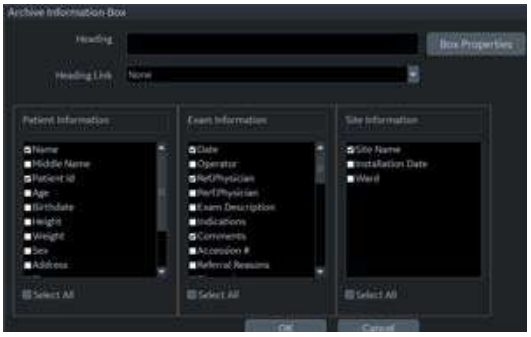


Figure 13-216. Archive Information Box

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.

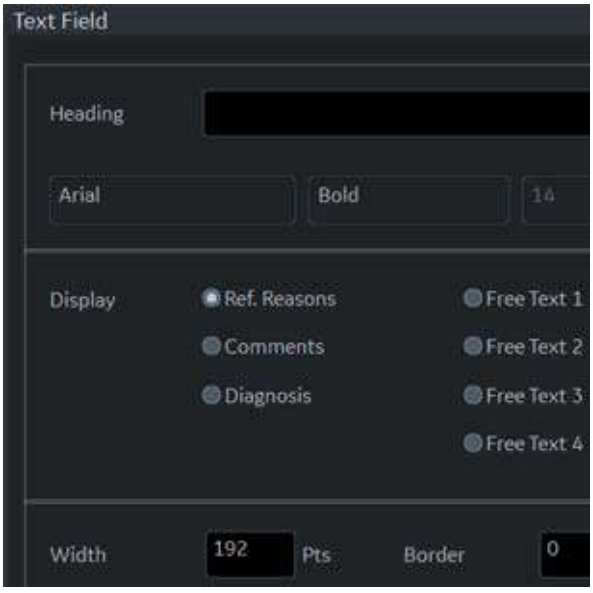


Figure 13-217. Text Field Dialogue Box

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 13-442* 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 13-448* for more information.

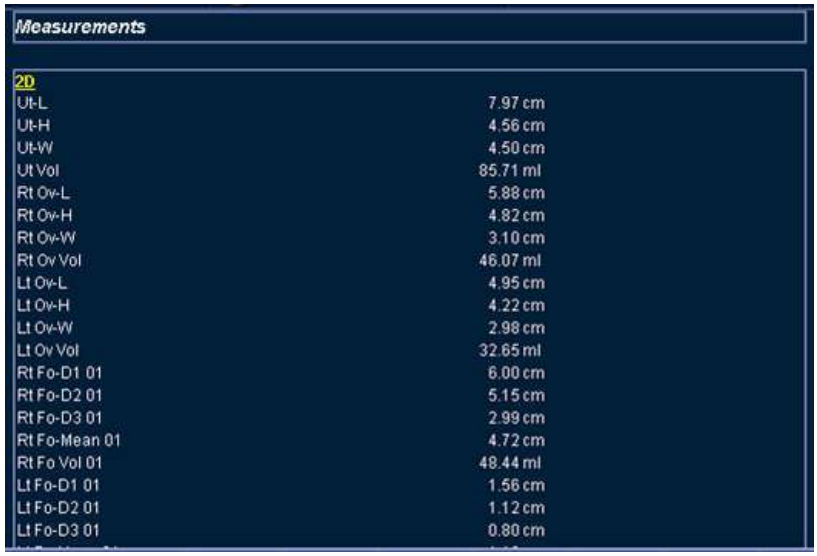


Figure 13-218. Measurement section

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 13-442* 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 13-219. Insert Table Box

5. Set the number of columns to 2 (or more, as required) and change the table parameters, if needed. Select ***OK***.

NOTE: If you do not need a table border, set the Border to 0. Add additional rows if required.

6. Place the cursor in the column and select the desired items from the Insert menu (e.g. logo, image, free text). Specify those items.
7. Repeat step 6 for each column as required.

Placing objects side-by-side (continued)

8. Save the template.

   To keep the same template name:

   - Select ***Save*** from the File menu, and press **Set**. The Save Template dialog box opens.
   - Select ***Yes***. The template retains the same name and adds “[user]”. For example, OB23-Basic[user].

   To save the template with a new name:

   - Select ***Save As*** from the File menu, and press **Set**. The Save Template As dialog box opens.
   - Enter the name of the new template, and press **Set**. The template receives the new name and adds “[user]”. For example, NewReport[user].

You can insert the images in the order preferred, by row or column, on the factory templates. See ‘Inserting the Table’ on *page 13-434 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 13-220. 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.

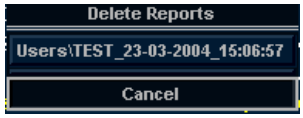


Figure 13-221. Delete Reports Menu (Prefix “User1\” may not appear)

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 13-432* 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 13-222. 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.

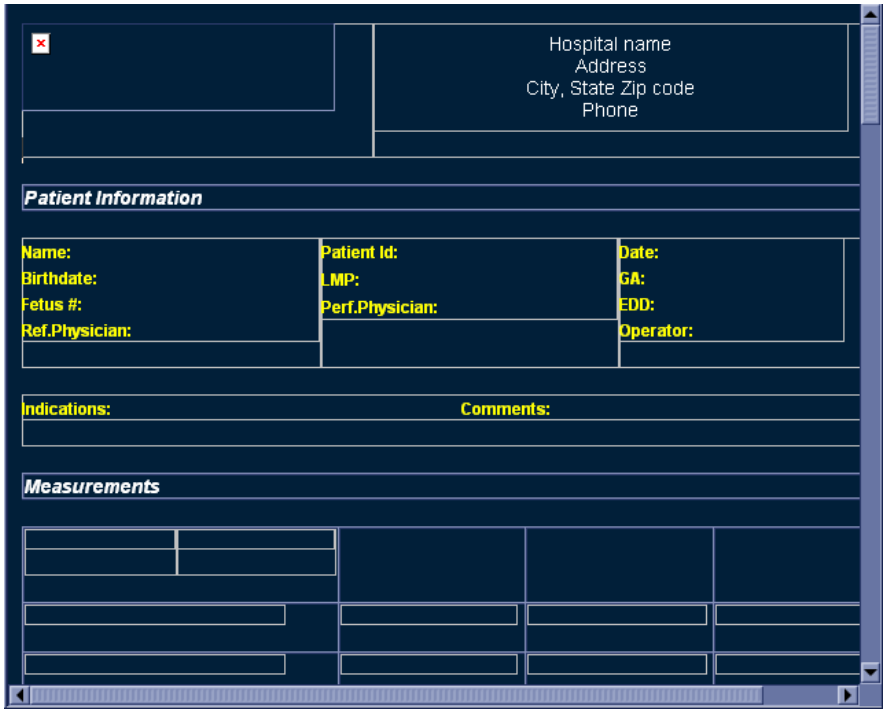


Figure 13-223. Report Designer

File Menu

Table 13-86: 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 13-87: 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.

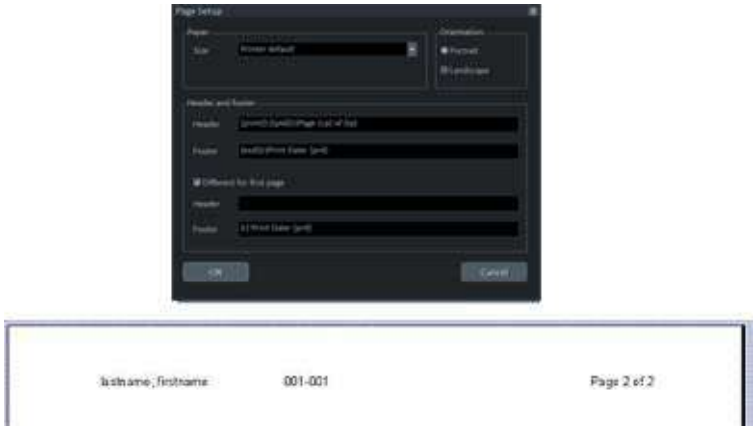


Figure 13-224. Page Setup with Header Example

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 13-88: 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 13-89: 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 13-225. 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.

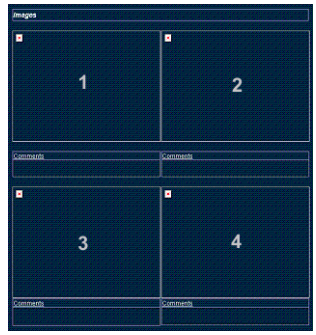


Figure 13-226. Image Order—Row Preference (System Default)

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.

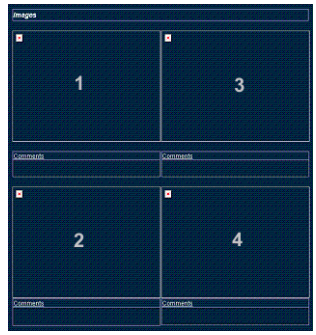


Figure 13-227. Image Order—Column preference

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 13-228. 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.

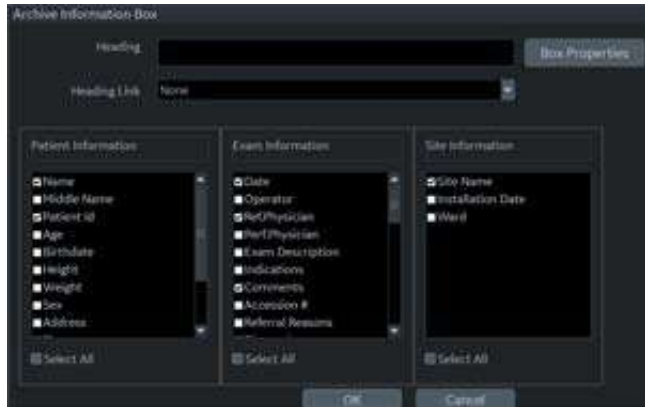


Figure 13-229. Archive Information Box

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 13-230. Table Properties

5. Select ***OK*** or Cancel. The contents of the Archive Information is inserted to the related page automatically.

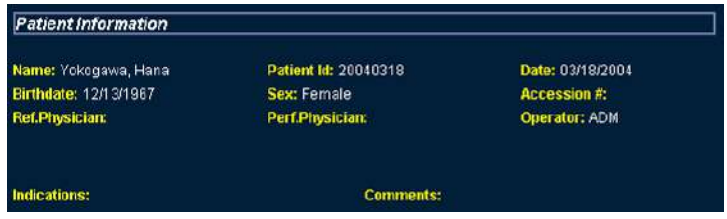


Figure 13-231. Patient (Archive) Information Example

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.

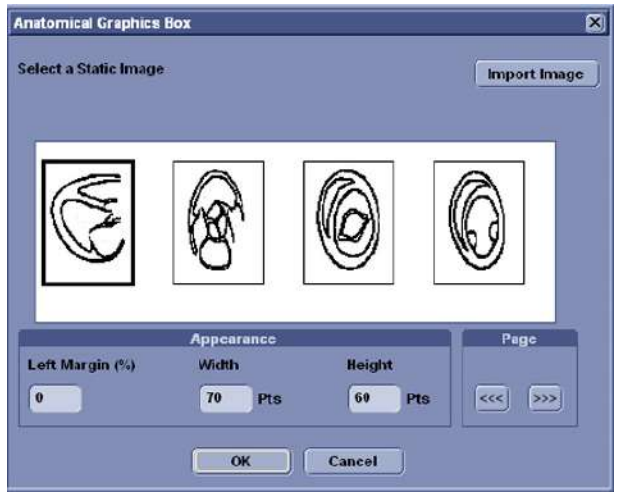


Figure 13-232. Anatomical Graphics Box Example

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 13-233. 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

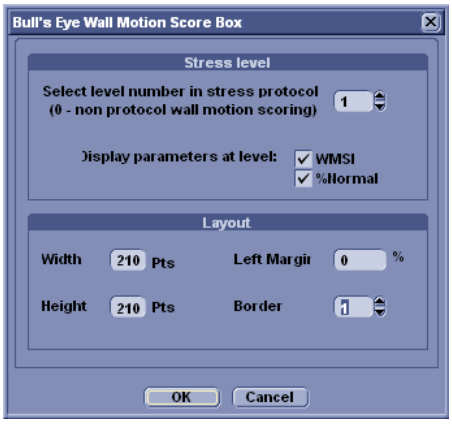


Figure 13-234. Bull's Eye Dialog Box

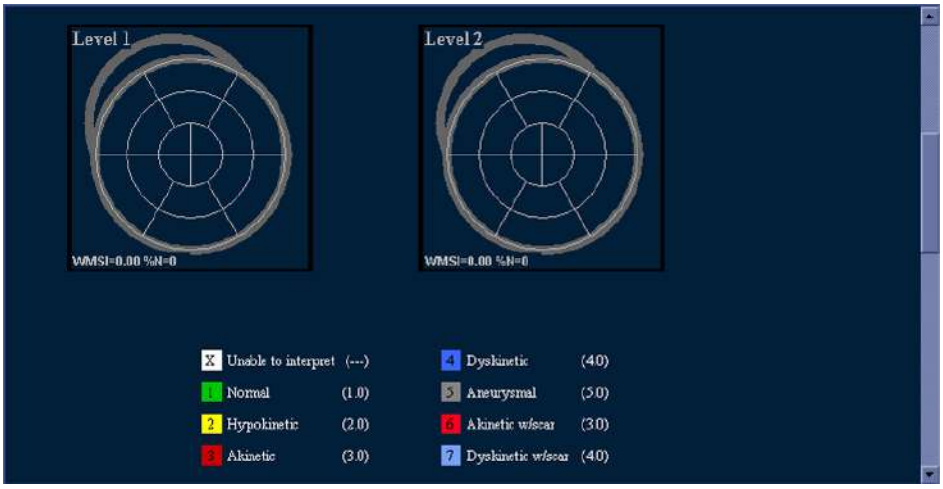


Figure 13-235. Bull's Eye Report Example

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.

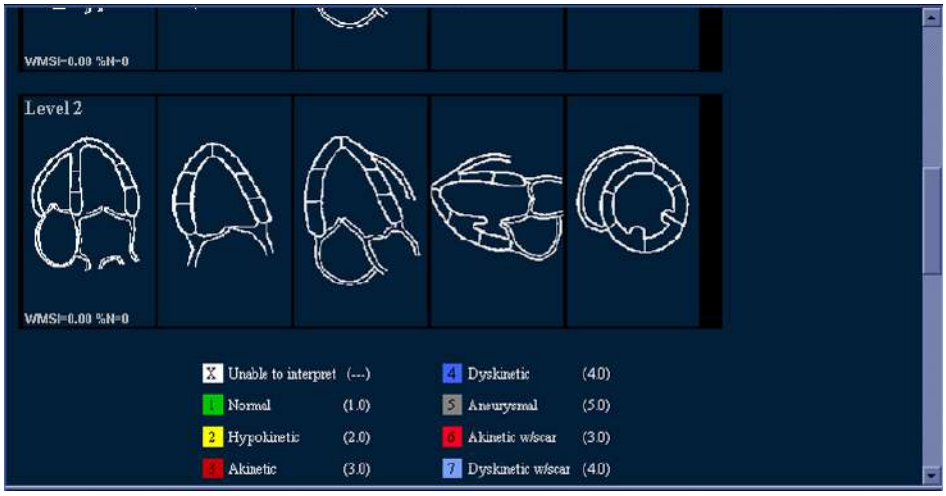


Figure 13-236. Cut Planes Report Example

- Score Table Box

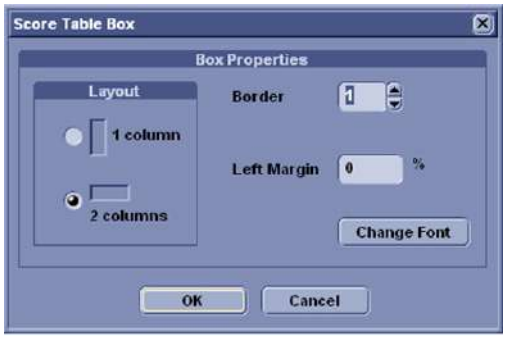


Figure 13-237. Score Table Box Dialog Box

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

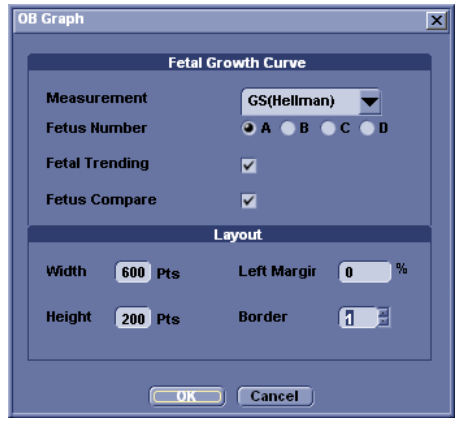


Figure 13-238. OB Graph Dialog Box

   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

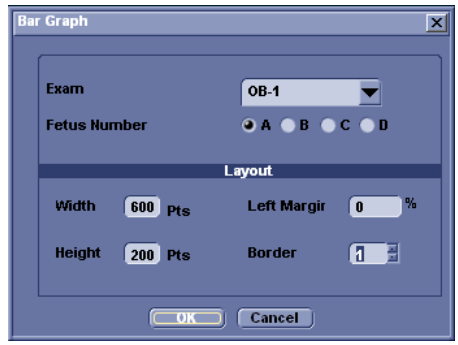


Figure 13-239. Bar Graph Dialog Box

a. Select the exam and fetus number.
b. Modify the Layout, if necessary.
c. Select ***OK***.

NOTE: The Bar Graph already contains default application measurements.

OB/GYN (OB and GYN Only) (continued)

- Anatomy

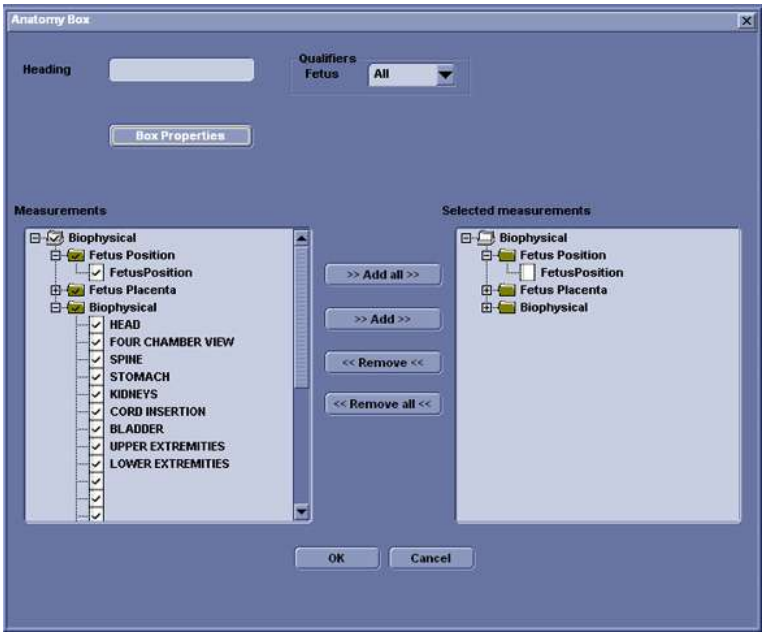


Figure 13-240. Anatomy Dialog Box

a. Type the Heading.
b. Select qualifiers from the pull-down menu.
c. Select "***Add all***" to copy all measurements to the right column
d. Check the box in front of the measurement you need in the left column and select "***Add***". The select measurements copy to the right column.
e. To remove measurements you do not need, check the boxes in front of those measurements in the right column, and select "***Remove***" or "***Remove all***".
f. If you want to modify the properties, select Box Properties and set required parameters.

Measurements

Insert a field to display the measurements. The measured parameters displayed in the measurement display field are configured.

1. Place the cursor where you want to insert the measurement and press **Set**.
2. Select Measurements from the Insert menu and press **Set**. The Measurements Box displays.

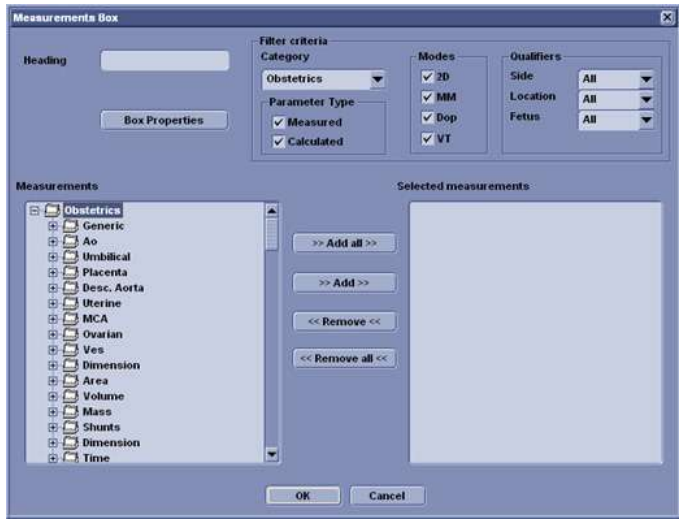


Figure 13-241. Measurement Box

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.

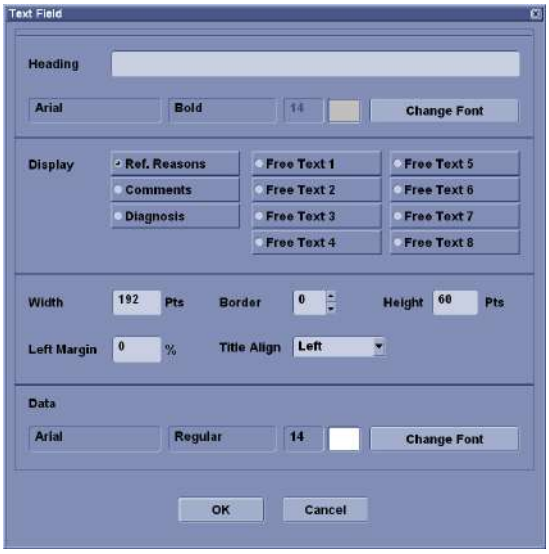


Figure 13-242. Text Field Dialog Box

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 13-243. 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 13-90: 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.

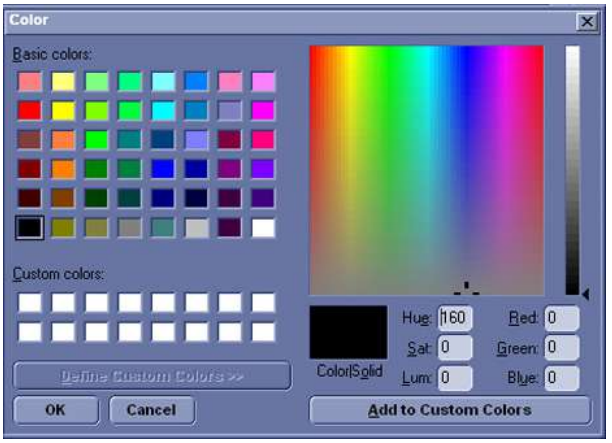


Figure 13-244. Color Dialog

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.

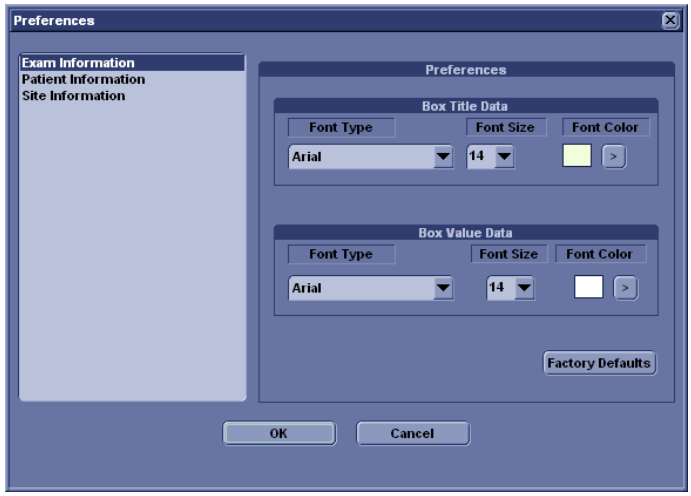


Figure 13-245. Preferences Box

2. Select the information to be modified and set the desired preferences.
3. Select ***OK*** or Cancel.
4. Save the template.

Direct Report

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.

Figure 13-246. Measurement Summary Window

Direct Report (continued)

2. The Direct Report displays on the left side of the screen.

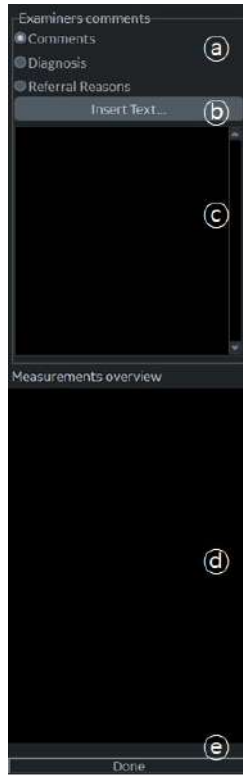


Figure 13-247. Direct Report

a. 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.*

b. Create/insert pre-defined text

c. Text field

d. 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

e. 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.

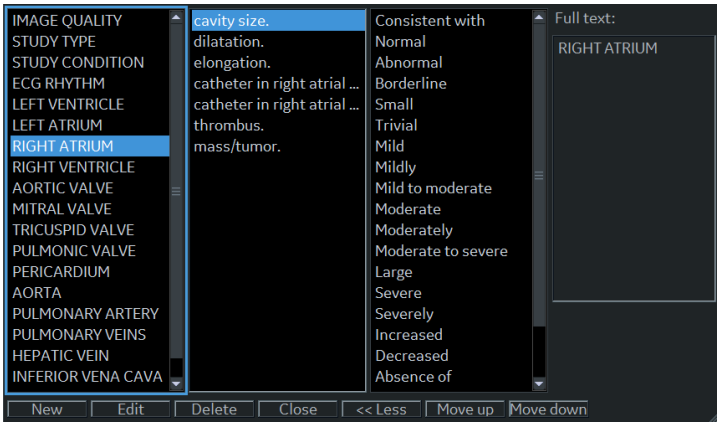


Figure 13-248. Full Insert Text Window

- 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.

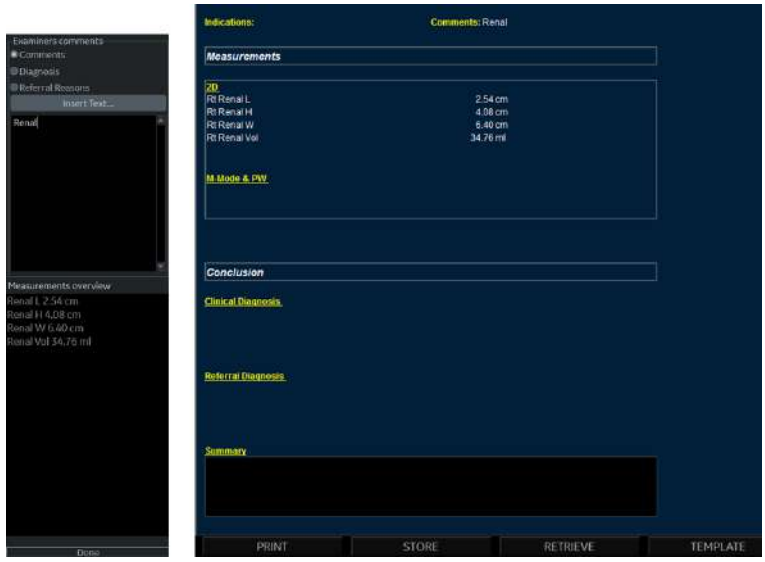


Figure 13-249. Direct Report and Report

Report Presets

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.

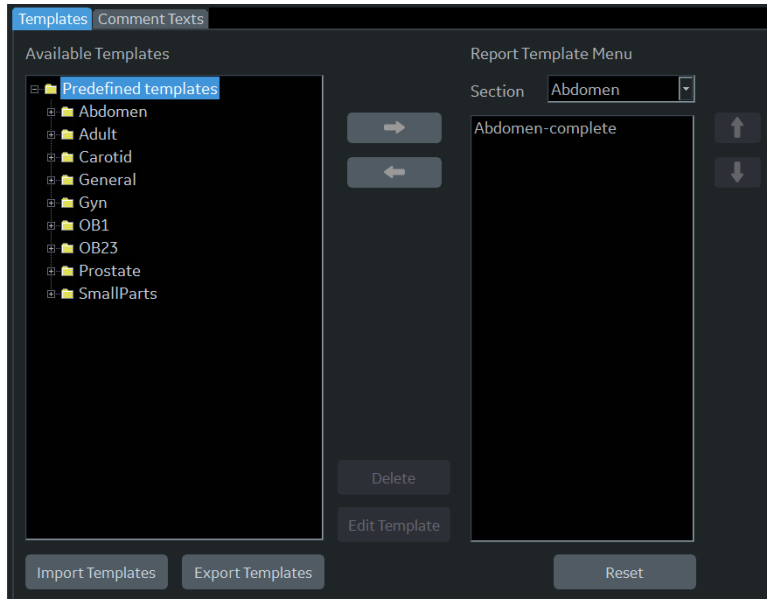


Figure 13-250. Report Template Tab

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 13-428 for more information.*
- To delete the template:
  a. Select the template to be deleted.
  b. Press ***Delete***.

Templates (continued)

- To export the template:

HINTS

Export templates to removable media (CDs, DVDs, USBs) so, at a later time, you can import those templates to a system. Export only works on templates, not data.

a. Insert the removable media in the drive.
b. Move the cursor to “Export Templates” and press **Set**. The available user-defined templates display in the Export Templates window.

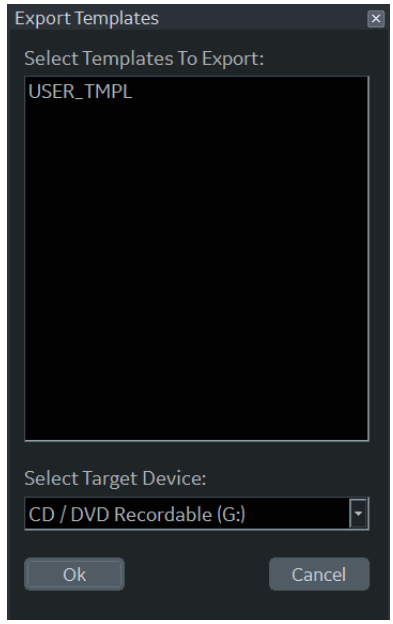


Figure 13-251. Export Templates

c. Select the template(s) to be exported.

*NOTE: To select multiple templates, use the **Ctrl** or **Shift** keys.*

d. Select the desired removable media under the Select Target Device field.
e. Select ***OK***.
f. Press ***F3*** to eject the media.

Templates (continued)

- To import the template:

NOTE: Import only works on templates, not data.

a. Insert the removable media with the report template(s) to be imported.

b. Select ***Import Template***. The Import Template window displays.

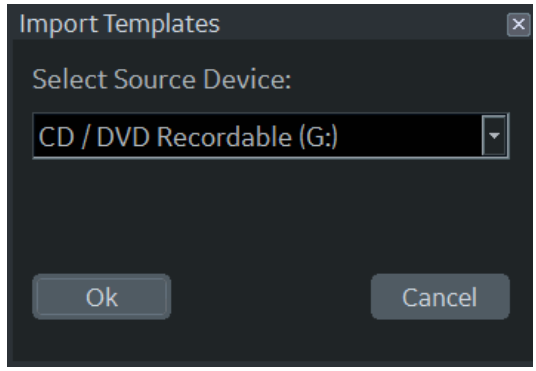


Figure 13-252. Import Templates

c. Select the Source Device from the pull-down menu. Select ***OK***.

d. Press ***F3*** to eject the media.

NOTE: Imported templates are stored in the User defined templates\General directory.

- To move the template from the left column to the right, or from the right to the left:

a. Select the template to be moved.

b. Select the Right Arrow or Left Arrow button.

- To move the template up or down in the right column:

a. Select the template to be moved.

b. Press the Up Arrow or Down Arrow button.

Comment Texts

You can edit the comment text on the Comment Texts tab.

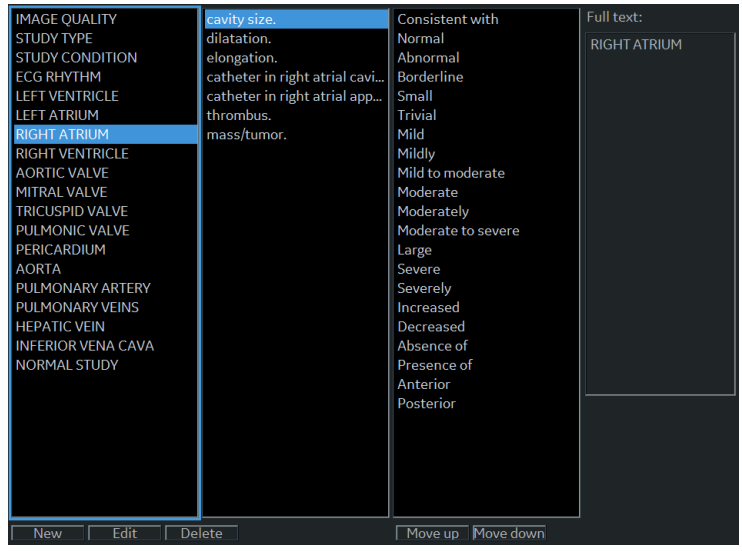


Figure 13-253. Comment Texts Tab

- 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 the LOGIQ P8/P9/P10 with the same software version.

NOTE: To move reports with patient data, use Backup/Restore Report Archive and Patient Archive.

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 13-457 for more information.*)

For preset specifics, see Chapter 11.

Using InSite ExC

Service Desktop (Administrator)

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 13-254. Service Desktop

Accessing the Service Desktop

1. Press Utility. Go to Page 2 of the Utility Menus.
2. Press Service.

Using the Service Desktop

Disruptive mode is a way to control interruptions of operation.

- When Disruptive mode is On, all functionality on the Service Desktop is allowed but operation of the LOGIQ P8/P9/P10 can be limited.
- When Disruptive mode is Off, some functionality on the Service Desktop is not available operation of the LOGIQ P8/P9/P10 is normal.

Additionally, setting Disruptive mode depends on the logged in user.

- Local user – a user locally logged into the machine will be able to set the system to Disruptive mode if they have “Authorize Remote Service Access. If the user does not have this right, the remote user’s request will be denied automatically.
- Remote user – a user remotely accessing the machine will not be able to automatically switch to Disruptive mode. The logged in user (user actually logged on to the LOGIQ P8/P9/P10) needs to have remote log in permissions (ability to grant remote access) The logged in user (user actually logged on to the LOGIQ P8/P9/P10) will be notified through a dialog box and asked to allow Disruptive mode.

Color Statuses

Throughout the Service Desktop, colors indicate the following:

- Green – Status is normal
- Orange – Status is a warning
- Red – Status is an error

Viewing System Information

System Information displays general information about the LOGIQ P8/P9/P10. The information on System Information is available to all class licenses.

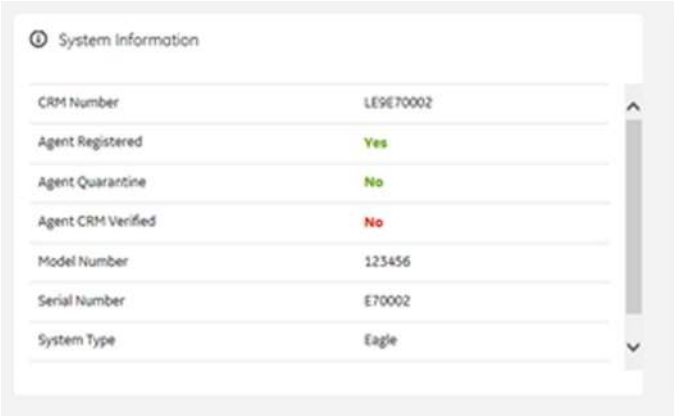


Figure 13-255. System Information

Table 13-91: System Information

Parameter	Description
CRM Number	Customer Relationship Management (CRM) number. System identifier assigned to the customer unit by the service region.
Agent Registered	Registered status of the agent. Valid values are: • Yes – The agent is registered in the back office. • No – The agent is not registered in the back office. • Not Available – Information about the agent is not available.
Agent Quarantine	Quarantine status of the agent. Valid values are: • Yes – The agent has more than one device registered with the same CRM Number in the back office. • No – The agent has one device registered with the listed CRM Number in the back office. • Not Available – Information about the agent is not available.
Agent CRM Verified	CRM verified status of the agent. Valid values are: • Yes – The agent is verified in the back office. • No – The agent is not verified in the back office. • Not Available – Information about the agent is not available.
Model Number	GE part number for the LOGIQ P8/P9/P10. The same number as listed on the rating plate.
Serial Number	Serial number of the LOGIQ P8/P9/P10. The same number as listed on the rating plate.
System Type	Product name of the LOGIQ P8/P9/P10.
Facility	Name of the hospital or facility where the LOGIQ P8/P9/P10 is installed.

Viewing System Information (continued)

NOTE: Please note the following:

- Model number and serial number are in the VPD.
- CRM number and agent issues are corrected on the Agent Configuration page.
- Facility is changed in the Utility Page of the LOGIQ P8/P9/P10.
- A system is successfully configured when the back office is:
  - Registered: Yes
  - Quarantined: No
  - Verified: Yes. The system cannot send data back to GGE or be accessed remotely if the Quarantine status is Yes. It is typically caused by two scanners having the same CRM number.

Viewing Software Status

Use Software Status to view general information about the software installed on the LOGIQ P8/P9/P10. The information on Software Status is available to all class licenses.

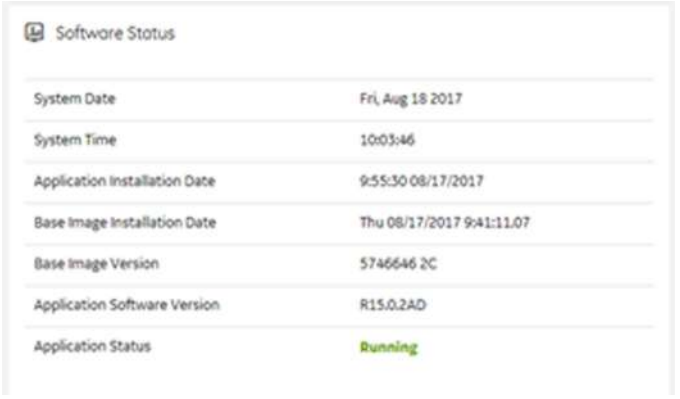


Figure 13-256. Software Status

Table 13-92: Software Status

Parameter	Description
System Date	Current date in the format <day>, <month> <date> <year>.
System Time	Local time based on the last time the system desktop was refreshed in the format <hh:mm:ss>.
Application Installation Date	Date the application software was installed. The application software includes the LOGIQ P8/P9/P10 product-specific software.
Base Image Installation Date	Date the base image software was installed. The base image software includes the Windows operating system and other supporting software.
Base Image Version	Version number of the base image software.
Application Software Version	Version number of the application software.
Application Status	Status of the application. Valid values are: • Running • Stopped

Viewing Connected Probes

Connected Probes shows probes connected to the LOGIQ P8/P9/P10. The order on the user interface is top down matching the left-to-right order on the LOGIQ P8/P9/P10. The information on Connected Probes is available to all class licenses.

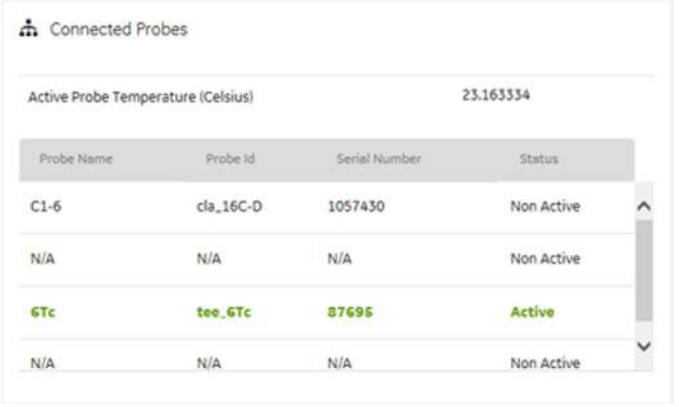


Figure 13-257. Connected Probes

Table 13-93: Connected Probes

Parameter	Description
Active Probe (Celsius)	Temperature of the active probe, if available.
Probe Name	Name of the probe connected to the LOGIQ P8/P9/P10.
Probe ID	Identifier of the probe connected to the LOGIQ P8/P9/P10.
Serial Number	Serial number of the probe connected to the LOGIQ P8/P9/P10.
Status	Statuses of the probe connected to the LOGIQ P8/P9/P10. Valid values are: • Active • Non Active

Gathering Logs

Gather Logs provides a way to collect system logs and place the log files in a directory for retrieval by the online center. These log files do not include protected data such as crash dumps and keyboard shadow logs. The customer can collect logs (including protected data) using Alt+D when Protected Data is checked. Log files are compressed into a .zip file and the file path and file name display. If the application software is not running, use the Gather Logs shortcut on the Windows desktop.

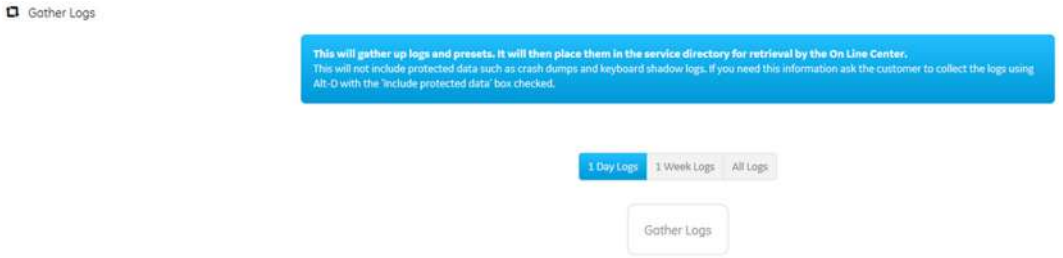


Figure 13-258. Gathering Logs

Table 13-94: Gathering Logs

Parameter	Description
1 Day Logs	When selected, gathers log files for one day.
1 Week Logs	When selected, gathers log files for one week.
All Logs	When selected, gathers all available log files.
Gather Logs	Select to gather the log files for the selected time period.

To gather log files

1. Navigate to Utility > Service > Utilities > Gather Logs
2. Select one of the following:
   - 1 Day Logs
   - 1 Week Logs
   - All Logs
3. Click Gather Logs.
4. In the resulting dialog box, record the location of the log files and click OK.

Deleting Files

Delete Files displays all the files and folders present in the D:\Service folder and allows for their deletion. Deleting unneeded files improves performance and reduces the need to defragment the disk drive. To access Delete Files, select Utility--> Service--> Utilities--> Delete Files.

Figure 13-259. Deleting Files

Table 13-95: Deleting Files

Parameter	Description
Delete Files	Displays the files that are available for deletion.
Delete	Deletes the selected files.

To delete files,

1. Navigate to select Utility > Service > Utilities > Delete Files.
2. Under Delete Files, select the available folders and files that you want to delete.
3. Press Delete.
4. In the resulting dialog box, click Delete and then click OK.

Changing the Password

The selected encryption password and the recovery key(s) must be stored and managed in a safe and secure manner. It is the responsibility of the owner of the system to take care of these keys. If the keys are lost, the patient data stored on the system will be lost. There is no way for GE Healthcare to recover the data if the keys and password are lost.

If 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 backup 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 is will not be lost.

Change Password allows you to change the password for a specified user type. To access Change Password, select Utility > Service > Utilities > Change Password.

Changing the Password (continued)

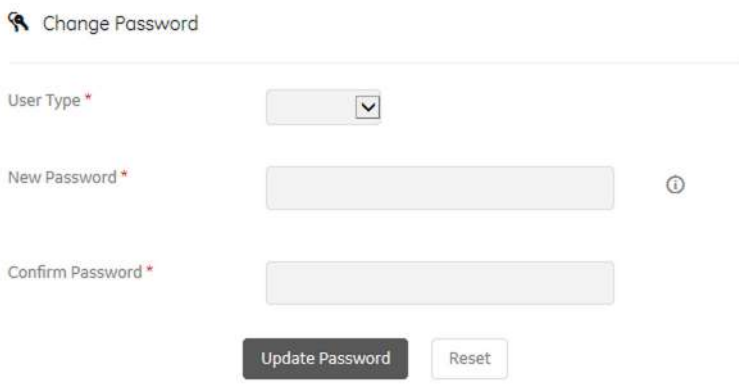


Figure 13-260. Changing the Password

Table 13-96: Changing the Password

Parameter	Description
User Type	Type of user for the password reset.
New Password	Password
Confirm Password	Password
Update Password	Select to update the password.
Reset	Select to reset the information.

Viewing Third Party Licenses

Third Party Software Licenses displays the third-party software licenses used as part of the service platform. To access Third Party Software Licenses, select Utility > Service > Utilities > Third Party Software Licenses.

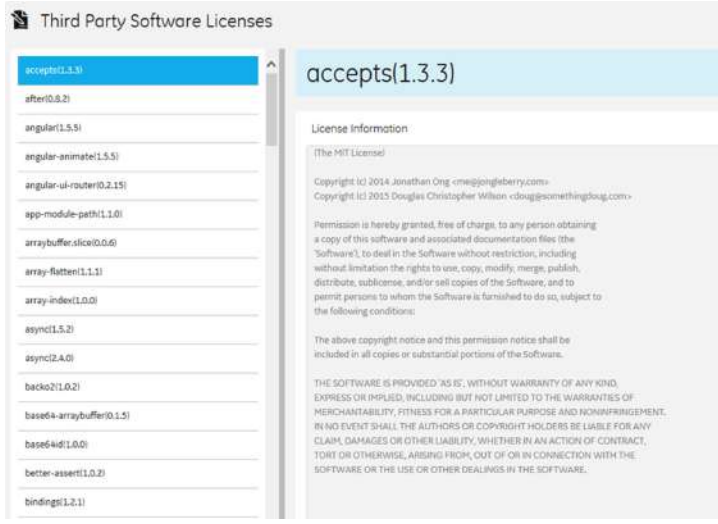


Figure 13-261. Third Party Licenses

Disruptive Mode

Disruptive Mode provides a way to enable and disable Disruptive mode. When enabled, Disruptive mode allows a remote user to access the LOGIQ P8/P9/P10 which can disrupt normal operation. Disruptive mode can be remotely turned on when the logged-in user has "Authorize Remote Service Access" privilege. If the logged-in user does not have remote service privilege, an error message displays.

When initiating Disruptive mode from a remote location, a message displays on the LOGIQ P8/P9/P10 asking whether the user will allow Disruptive mode and notifying them that normal operation might be disturbed.

- If Yes is selected, then Disruptive mode is turned on.
- If No is selected, then Disruptive mode is not turned on and an error message displays saying that permission to change the mode was denied.

When Disruptive mode is On, the GE icon in the status bar changes to red and displays this message: "Due to Service testing restart needed."

When Disruptive mode is changed to Off, the GE icon turns white and this message displays: "Due to Service testing restart needed." In addition, VCO and SSH stop if running.

To access Disruptive Mode, select Utility > Service > Utilities > Disruptive Mode Utility.

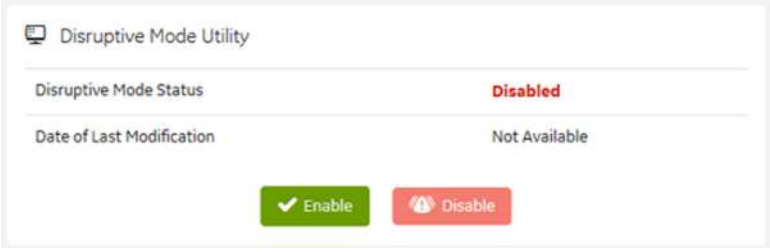


Figure 13-262. Disruptive Mode

Data Transfer

To enable data transfer, the schedule must be configured in the service platform and the types of data transferred must be enabled in the Utility page. Admin rights are needed to access this page.

NOTE: Data is sent incrementally so that only what changed since the last transfer is sent.

Data Transfer provides a way to do the following:

- View information about past transfers of (APM) information.
- Set up automatic/scheduled transfer of allowed data files from the LOGIQ P8/P9/P10 to the server.
- Manually transfer data files allowed data files from the LOGIQ P8/P9/P10 to the server.

To access Data Transfer, select Utility > Service > Utilities > Data Transfer.

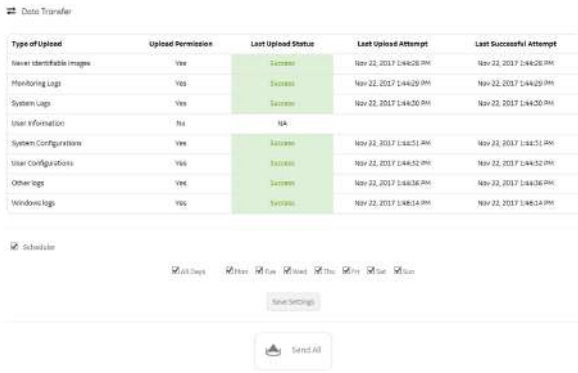


Figure 13-263. Data Transfer

Table 13-97: Data Transfer

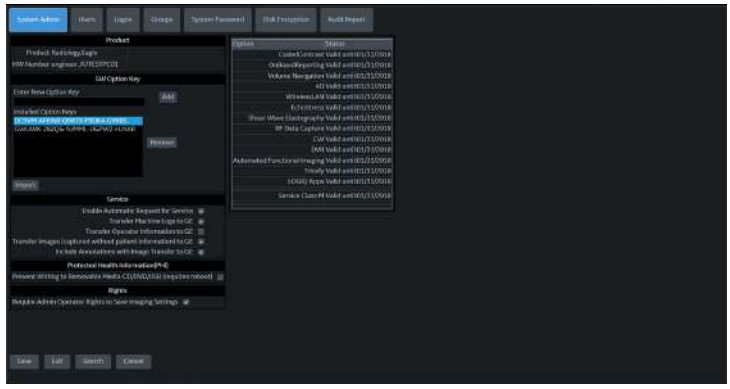
Parameter	Description
Type of Upload	Type of log file. For example, Incremental Logs or Full Logs. Monitoring Logs, System Logs, and Windows Logs are incrementally transferred when automatic transfer is enabled. To enable automatic transfer, navigate to System Admin and, under Service, check Enable Automatic Request for Service.
Upload Permission	Whether the permission to upload the log file is allowed or not.
Last Upload Status	Whether the last log file upload was successful or not.
Last Upload Attempt	Date and time the last log file upload was attempted.
Last Successful Upload	Date and time the last log file was successfully uploaded.

Table 13-97: Data Transfer (Continued)

Parameter	Description
Scheduler	When selected, enables the related day selections. For example, All Days, Monday, and Tuesday.
Save Settings	Saves the information.
Send All	Manually send the selected log files to the server.

To configure automatic data transfers:

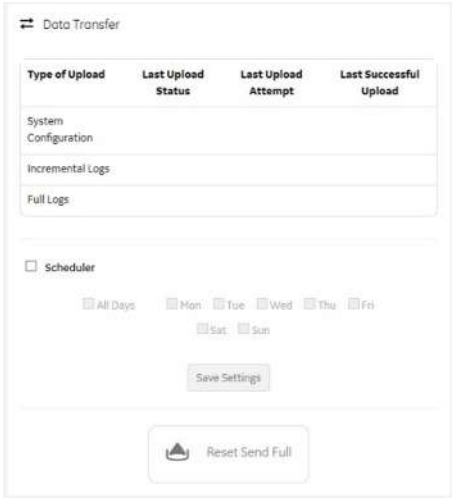
1. Navigate to Utility > System Admin.



2. On System Admin, configure these settings:
   - Transfer Machine Logs to GE – Default is checked
   - Transfer Operator Information to GE
   - Transfer Images (captured without patient information) to GE – Default is checked.
3. Click Save.

Data Transfer (continued)

4. Navigate to Utility > Service > Utilities > Data Transfer



5. On Data Transfer, select Scheduler, and the select the days to perform the data transfer.
6. Click Save Settings.
7. To manually perform a data transfer, click Reset Send Full.

Viewing/Adding Options

Shows the status of all possible options. You can select one of the option keys and view its details. If the key is valid, it reloads; shows which options are included in the selected key.

You can also add a new option key by typing in its Key String and pressing Add.

To access Options, navigate to Utility > Service > Options.

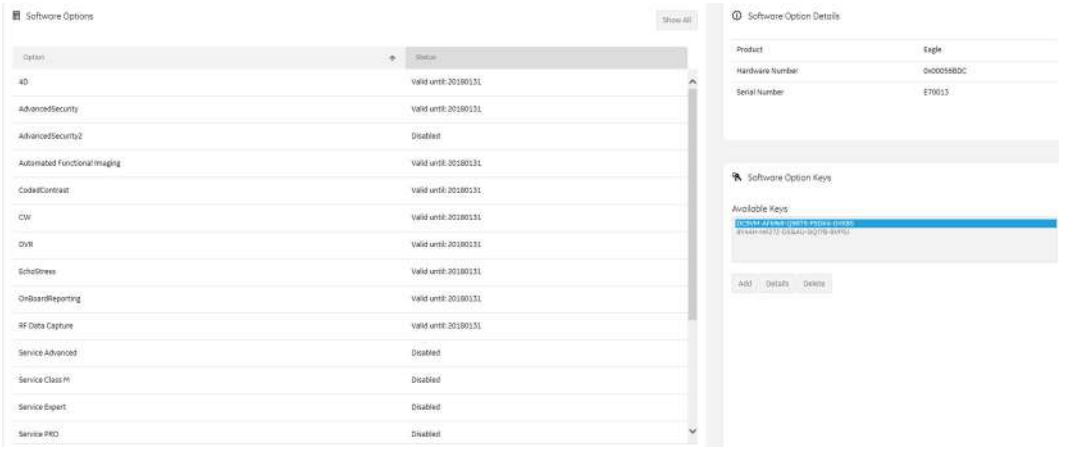


Figure 13-264. Viewing Options

Table 13-98: Viewing Options

Parameter	Description
Software Options	
Option	Software options on the LOGIQ P8/P9/P10.
Status	Status of the options on the LOGIQ P8/P9/P10.
Software Option Details	
Product	Name of the product.
Hardware Number	Number for the hardware. The hardware number is the hash of the serial number that is used to generate the option key.
Serial Number	Serial number of the LOGIQ P8/P9/P10.
Software Option Keys	
Available Keys	List of the option keys installed on the LOGIQ P8/P9/P10.

InSite ExC Agent Configuration

To access Agent Configuration, navigate to Utility > Service > Agent Configuration. Confirm with your IT whether a proxy and proxy confirmation is needed for the CRM. Use Agent Configuration to:

- Edit and configure the following:
  - Enterprise host name in the agent
  - Enterprise port number in the agent
  - Proxy server in the agent
  - Proxy port in the agent
  - CRM number in the agent
  - Display name in the agent
- Set the serial number in the agent
- Enter the username and password for the proxy
- Reset the edited unsaved value

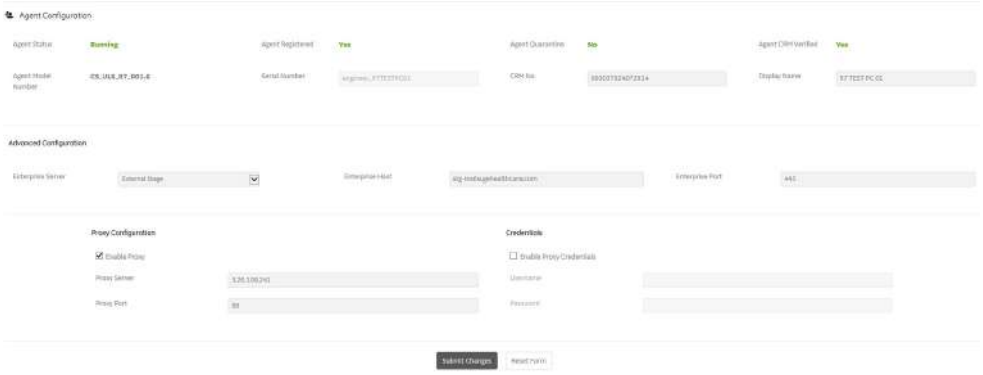


Figure 13-265. Agent Configuration

Table 13-99: Agent Configuration

Parameter	Description
Agent Configuration	
Agent Status	Status for the agent. Valid values are: • Running • Not Running
Agent Registered	Registered status of the agent. Valid values are: • Yes – The agent is registered in the back office. • No – The agent is not registered in the back office. • Not Available – Information about the agent is not available.

Table 13-99: Agent Configuration (Continued)

Parameter	Description
Agent Quarantine	Quarantine status of the agent. Valid values are: • Yes – The agent has more than one device registered with the same CRM Number in the back office. • No – The agent has one device registered with the listed CRM Number in the back office. • Not Available – Information about the agent is not available.
Agent CRM Verified	CRM verified status of the agent. Valid values are: • Yes – The agent is verified in the back office. • No – The agent is not verified in the back office. • Not Available – Information about the agent is not available.
Agent Model Number	GE HEALTHCARE part number for the LOGIQ P8/P9/P10. The same number as listed on the rating plate.
Serial Number	Serial number of the agent (read-only). If the agent is not registered with a serial number, this field is populated with the serial number of the LOGIQ P8/P9/P10. The serial number of the agent is tied to the serial number of the LOGIQ P8/P9/P10.
CRM No	Customer Relationship Management (CRM) number. System identifier assigned to the customer unit by the service region.
Display Name	Displayed name of the agent.
Advanced Configuration	
Enterprise Server	Name of the enterprise server.
Enterprise Host	Number of the enterprise host.
Enterprise Port	Number of the enterprise port.
Proxy Configuration	
Enable Proxy	Enables the proxy server.
Proxy Server	When Enable Proxy is selected, name of the proxy server IP.
Proxy Port	When Enable Proxy is selected, number of the proxy server port.
Credentials	
Enable Proxy Credentials	Enables the proxy credentials.
Username	When Enable Proxy Credentials is selected, name of the user.
Password	When Enable Proxy Credentials is selected, password for the user.

NOTE: A new outbound firewall rule was added for Agent communication. Ports 88, 3011, 3031 have been added to port 443 for available ports.

DVR

Using the DVR

1. Create a patient record or open an existing one.
2. Press ***Video*** assigned key or Video tab.
3. Insert a DVD media or USB storage.

   Advance configurations are required.See ‘Setting up the DVR’ on *page 13-482* for details.

NOTE: *The DVD which formatted in Utility > Connectivity > Removable Media is for data archiving, it cannot use for the DVR recording.*

4. Scan a patient.
5. 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 start any other DVR functionalities.

NOTE: *Recording automatically pauses when start 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 when following operation is in progress: Data Transfer, EZBackup, Utility screen.*

6. Press ***Record*** or ***Pause*** to pause/resume the recording.
7. Press ***Stop*** on the Touch Panel to stop the 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 allow circling) and you cannot operate any DVR functionalities.

NOTE: *Stop recording may take up to 2 minutes for DVD-RW/ DVD+RW.*

NOTE: *The DVR automatically stops recording before media reaches to full.*

8. Press ***Eject*** on the Touch Panel or F3 key to eject.

Setting up the DVR

To set up the Digital Video Recorder (DVR),

1. Set up following parameters in ***Utility --> System --> Peripherals***.
   - Media: DVD, USB
   - DVD Format: NTSC, PAL
   - Picture Quality: HQ, SP, LP, EP
   - DVD Chapter Record Interval (sec.): 15, 30, 60, 120
   - USB Playback Skip Interval (sec.): 15, 30, 60, 120
2. If needed, assign [Video] to one of the User Configurable Key to turn on/off Video tab, in ***Utility*** -> ***System*** -> ***User Configurable Keys***.
3. If needed, check “Show Video Tab” in ***Utility*** -> ***Application*** -> ***Settings*** to display a Video tab on the Touch Panel.
4. 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.
5. Restart the system.

The DVR functions records scan screen.

Video Touch Panel Menu

Following are the Touch Panel menu for the DVR operation.

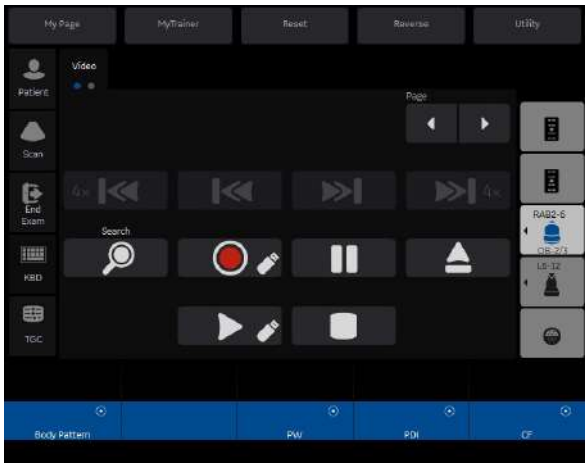


Figure 13-266. Video tab 1

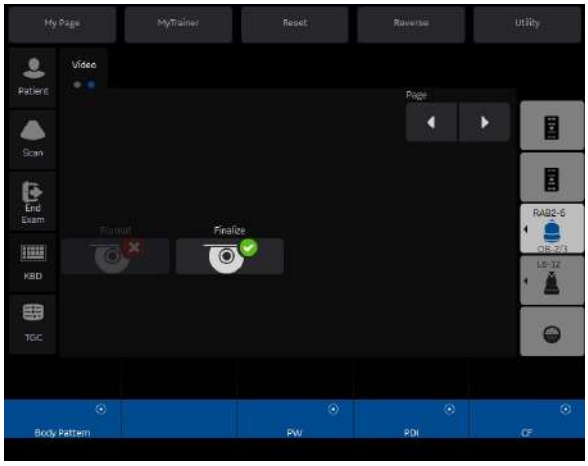
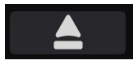


Figure 13-267. Video tab 2

Table 13-100: Touch Panel Keys

Graphic	Explanation
	Skip DVD media: Skip to the previous/next chapter. USB storage: Skip specific time to backward/forward.

Table 13-100: Touch Panel Keys (Continued)

Graphic	Explanation
	4x Skip DVD media: Skip the four chapters to backward/forward. USB storage: Quad time interval skip to backward/forward.
	Search Press Search button to display the dialog. Select Title, then press Search on the dialog. The title name is as following: <Date>_<Time>_<Patient Last name>_<Patient First name>
	Record Start recording.
	Pause Pauses and resumes Recording and Playback. NOTE: Freeze key works the same as Pause button, when Playback.
	Eject Eject the DVD media/USB storage. Also you can eject media pressing F3 key.
	Play Play a video from DVD or USB storage.
	Stop Stop the playback or recording.
	Format Reformats a DVD+RW/-RW. NOTE: Format deletes all the contents in the media.
	Finalize Finalize a DVD-R. NOTE: DVD+RW/-RW is automatically finalized when stop recording.

DVR Display Icons

Displays the following icons in the status bar:

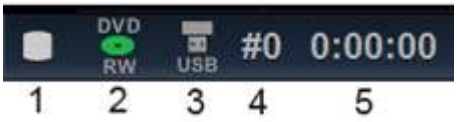


Figure 13-268. DVR Disk Status

Table 13-101: DVR icons

1. DVR status			
	Recording		Stopping
	Pause Recording		Pause Playback
	Playback		Busy
	No media		
2. DVD Media status Displays media type and size of the free space size.			
	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.			

Recording Functionality

Table 13-102: Recording Functionality

Parameter	DVD media	USB Storage
Support media	DVD-R, DVD+RW, DVD-RW	USB-HDD (NTFS only) USB Flash Device (NTFS only) Note: Cannot record or play FAT (exFAT, FAT32, etc) on USB Device. Please format to NTFS file system on PC.
Support video format	NTSC or PAL	MPEG video file (*.mpg) for each title Note: The file size is up to 2GB. Note: The mpeg video file doesn't have a chapter.
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)	• 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.
Number of Titles and Chapters	Up to 99 titles in a disk and 92 chapters in a title. Up to 92 chapters in a title. While recording to DVD, chapter is automatically created at specific interval that is configured in Utility -> System -> Peripherals. When you stop recording, DVR writes the title data. When you end examination (e.g. pressing New Patient, End Current Patient, ...), DVR auto stops recording and creates a title.	N/A
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 edit in Utility -> Connectivity -> Removable Media.	N/A

Table 13-102: Recording Functionality (Continued)

Parameter	DVD media	USB Storage
Video title	<Date>_< Time>_<Patient Last name>_<Patient First name> Note: If a patient name is not provided, a serial number is used as following: <Date>_< Time>_<serial number>.	<Date>_<Time>_<Patient Last name>_<Patient First name>. Note: If a patient name is not provided, the video file name is as following, <Date>_<Time>_<serial number> where serial number is the number of video files in the media plus one.
Compatibility	• Player on LOGIQ P8/P9/P10 • DVD video player on PC • Commercial DVD video player	

NOTE: Properties of the DVD media displays in Utility -> Configuration -> Removable media.

Recovery from power failure (DVD only)

While recording to DVD (DVD-R or DVD+RW/-RW), if power failure occurs the system will automatically start recovery of the media right after system restart.

NOTE: *If the recording is incomplete by the power failure, the last title may be unreadable. Recovery copies the cached last title to the media.*

If the DVD media in the tray does not have sufficient free space, you get the following Recovery menu instead of starting auto recovery.

Figure 13-269. Recovery Menu

- Remind me later

  If you select “Remind me later”, you can cancel the Recovery operation. But if you press Record button, displays the recovery menu again and cannot start the recording.

  Select “Yes” (Recover) or “Delete Data” to enable the recording.

Recovery from power failure (DVD only) (continued)

- Yes (Recover)

  If you select “Yes”, the following dialogue displays. Insert the blank media and press “OK”.

Figure 13-270. Recovery “Yes”

During recovery, the massage "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.

Figure 13-271. Delete Data

OK: Deletes the unburned cached data.

Cancel: Go back to the Recovery menu.

Configuring the Wireless Network

A Wireless Network (WLAN) is available on the LOGIQ P8/P9/P10. When the WLAN is active, an icon appears in the status bar to indicate whether the WLAN is installed or disconnected.

Wireless LAN (WLAN) Specifications

The Wireless LAN (WLAN) supports the following network protocols:

Standards

- IEEE 802.11n, 802.11g, 802.11a, 802.11b, 802.11ac

Security Types

- None/Open
- WPA2 - Enterprise
- WPA2 - Personal

Encryption Type

- None
- WEP
- AES

Frequency

- 2.4 GHz to 2.5 GHz CCK and CFDM modulation
- 5 GHz OFDM, 802. 11ac MCS0-9 coding scheme

Supported Standards

- FCC Part 15
- Japan MIC
- Canada Requirements
- RED (Radio Equipment Directive) Directive 2014/53/EU
- KC (South Korea)
- NCC (Taiwan)
- RCM (Australia, NewZealand)
- SRRC (China)

Connecting to the WLAN

To connect the LOGIQ P8/P9/P10 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.

   If the connection is successful, the status bar Active Wireless LAN indicator will no longer have a red "X".

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 13-103: 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...***

NOTE: If the security features implemented at your facility require signing onto the wireless network using a user name and password on your network, then you will need to contact GE Service to access maintenance mode if you have not purchased a service license.

4. Add the following information to the Wireless Network Properties page:
   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 P8/P9/P10 to connect to this network.

      The LOGIQ P8/P9/P10 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 P8/P9/P10 does not support automatic prompting for user credentials.

- For Microsoft PEAP networks, press Advanced and enter User authentication credentials (user name 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***.

NOTE: If the system is not able to connect to the Enterprise wireless network, please re-enter the user name and password following the steps.

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 P8/P9/P10 to connect to this network.

      The LOGIQ P8/P9/P10 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.

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 P8/P9/P10 does not support automatic prompting for user credentials.

- For Microsoft PEAP networks, press Advanced and enter User authentication credentials (user name 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***.

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. Highlight the wireless network you want to refresh.
3. 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 P8/P9/P10. 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.

If the WLAN is functioning properly, the following message appears. Confirm your decision to repair (Yes), or cancel (No).

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 the WLAN you are connected to.
3. Select ***Disconnect***.

Viewing WLAN Online Help

To view the WLAN Online Help, press F1.

Power Assistant

Overview

With Power Assistant, the system power is maintained by the battery when there is an AC power failure or the power cable is unplugged. This can be used to reduce system startup time for portable exams.

While in Power Assistant, the system maintains the current patient. As a result, when power is restored, the current patient's details and stored images are readily available.

NOTE: Only GE HealthCareService personnel have access to the battery. Please contact the technical service department or your local GE HealthCare representative for replacement.

Standard battery

Standard battery is housed within the cabinet.

With a fresh battery that is fully charged, the LOGIQ P8/P9/P10 stays powered for approximately 20 minutes when in Power Assistant.

Battery Power mode with the standard battery

Before starting Battery Power 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.
- Any access to the Network device, such as DICOM transfer or Network Storage.
- DVR recording should be stopped.

NOTE: If the system is switched to Battery Power mode when any of operations above are in progress, the system terminates the operation.

Starting Battery Power mode

When the AC cable is unplugged or if there is an AC power failure, the system transitions to Battery Power mode. The following dialog displays before entering Battery Power mode.

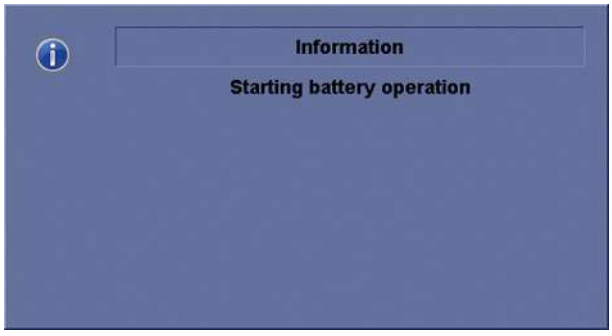


Figure 13-272. Battery Power mode

NOTE: Verify that the system is in Battery Power mode after unplugging the power cable. The following message "Running on Battery. Key operation locked" appears on the display during Battery Power mode.

NOTE: If the system does not transition to Battery Power mode, contact the technical service department or your local GE HealthCare representative.

When in Battery Power mode

In Battery Power mode, most of the console devices, such as the keyboard, gel warmer and printers, are turned off to minimize battery usage.

When in Battery Power mode, DO NOT perform the following operation:

- Connect and disconnect probes.
- Remove peripheral devices.
- Eject or insert CD/DVD media and the external USB storage device.

NOTE: To shut down the system while in Battery Power mode, plug in the power cable, exit from Battery Power mode, and then perform regular shut down operations.

Recovering from Battery Power mode

The system recovers from Battery Power mode when power is supplied to the LOGIQ P8/P9/P10. The system returns to full functionality in 10 seconds.

Battery deterioration

When the system detects battery deterioration, the following dialog displays:

Figure 13-273. Battery life message

If this message displays, contact the technical service department or your local GE HealthCare representative.

Refreshing the battery

To maintain the battery life, it is recommended to refresh the battery every 6 months. Refresh 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 3 hours (Standard battery)/9 hours (Extended battery) to fully charge the battery (depend on the remaining battery capacity).
3. Remove all probes.
4. Turn on the system.
5. Unplug the AC cable and wait until the system shuts down. It may take at least 30 minutes (Standard battery)/60 minutes (Extended battery) to complete shutdown.
6. Wait at least 5 hours.
7. Plug the AC cable to the wall outlet and turn on the circuit breaker.
8. Wait until the battery is fully charged. It takes about 3 hours (Standard battery)/9 hours (Extended battery) to fully charge the battery.

Battery Disposal

Power Assistant uses a Lithium Ion battery. Used battery will require to discard as chemical waste. Please contact your local authority for the directions.

NOTE: When removing a defective battery, ensure that it is disposed of in accordance with local regulations. Alternatively, forward it to GE HealthCare for proper disposal.

Video Converter

Video Converter

The LOGIQ P8/P9/P10 Video Converter Option enables the ability for the console to view or record scanning HDMI Cable.

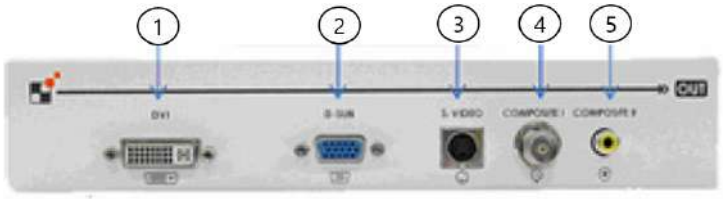


Figure 13-274. Video Converter

1. DVI Output
2. VGA Output
3. S-Video Output
4. Composite Video output (BNC)
5. Composite Video output (RCA)

NOTE: The Video Converter can be used with the Mid and High Cabinet.

Video Converter (External type)

The LOGIQ P8/P9/P10 Video Converter Option enables the ability for the console to view or record scanning via an S-Video Cable.

If the Side cabinet is installed, the external type video converter can be used for the supported countries.

NOTE: The External type of Video Converter can be used in limited countries: EU, Korea, China, USA, Canada, and Japan.

Figure 13-275. Input side configuration

a. Power switch b. Power port c. Function switch	a. Input HDMI LED b. Input HDMI

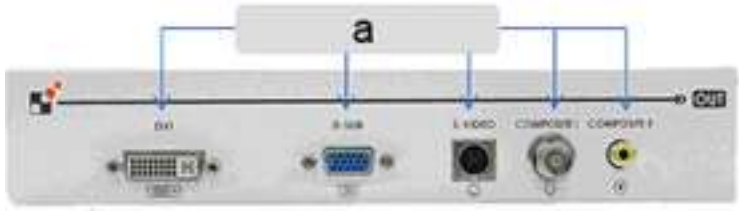


Figure 13-276. Output side configuration

a. Output port

CAUTION

The provided AC/DC adapter is dedicated to the video converter. Never use this AC/DC adapter for other uses.

Storage Options

Probe holder

Multi purpose probe holder

Figure 13-277. Multi purpose probe holder (option)

Attachment for small probe

Figure 13-278. Attachment (Option)

Push the attachment into the probe holder as below.

Figure 13-279. Push the attachment

Figure 13-280. Attachment in the proper position

Wired Footswitch

You can attach this Footswitch to the system by connecting it to any USB port on the system.

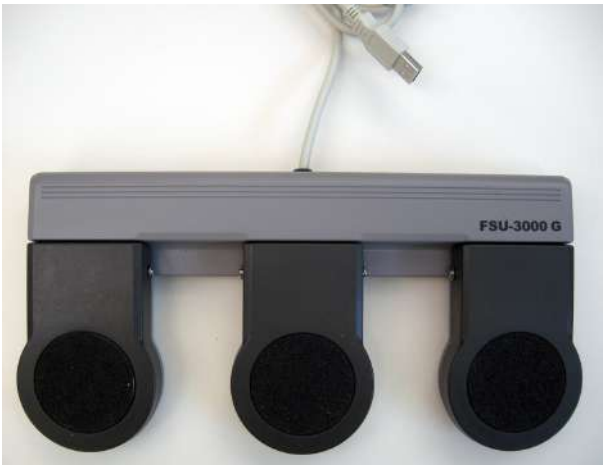


Figure 13-281. Footswitch and USB Cable

This is a 3-pedal Footswitch. You can configure its functionality via the Utility -> Applications -> Footswitch parameters.

CAUTION

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

Touch Control

Description

The Touch Control Function provides to make it possible to easily perform frequently used operations without using Front panel and Touch panel Menu.

Activation

There are 2 ways to activate the Touch Control.

- Assign the Touch Control function to User Defined Hard Key or User Defined Touch Button in Utility -> System -> User Configurable Key.
- Swipe Down from the top of the Touch Panel from the light gray bar

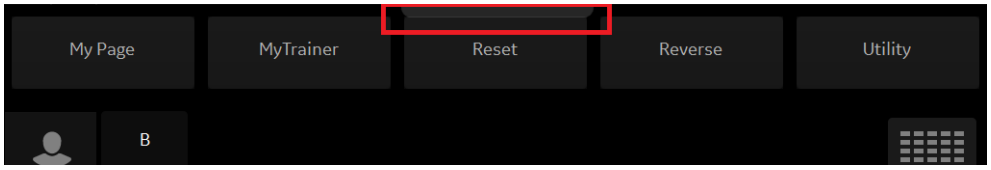


Figure 13-282. The top of the Touch Panel

Deactivation

There are 2 ways to deactivate the Touch Control.

- Use the Exit icon on the top right of the Touch Panel.
- Swipe Up from the bottom of the Touch Panel from the light gray bar.

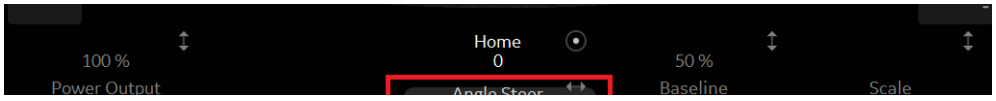


Figure 13-283. The bottom of the Touch Panel

Touch Control Display Layout

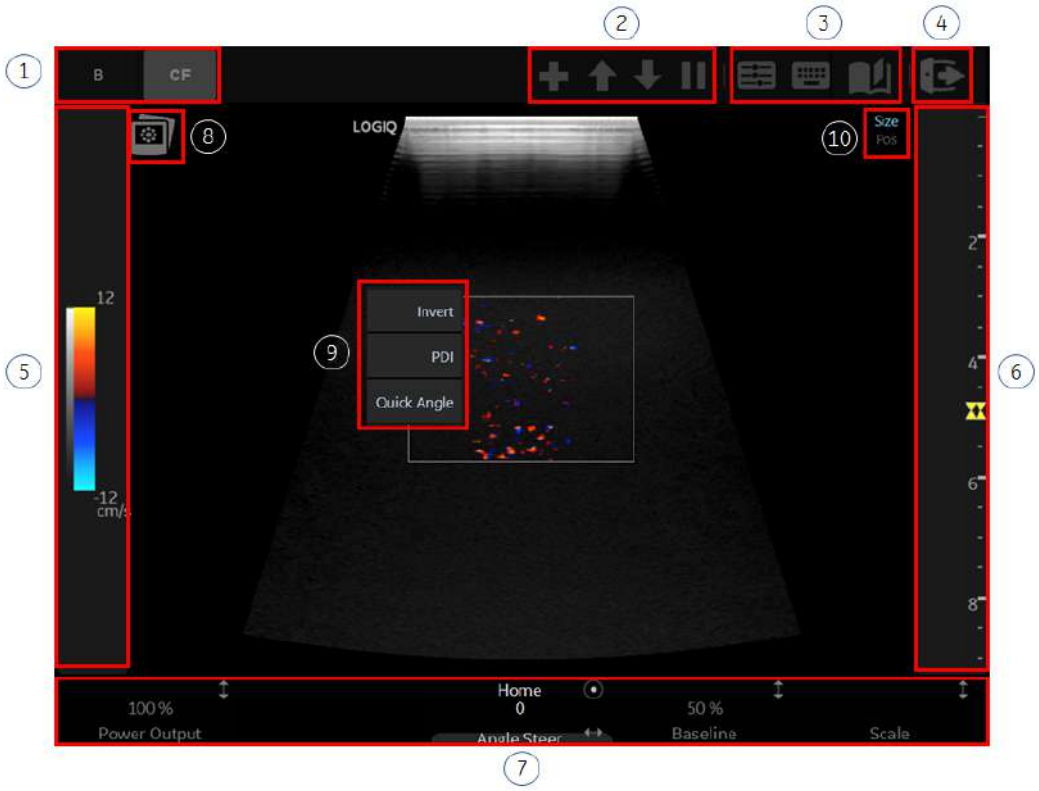


Figure 13-284. Touch Control Display Layout

1. Mode Tab Control
2. Buttons for Scan Assistant (It only appears in Scan Assistant Mode)
3. Shortcut Icons (TGC, Keyboard, My Page)
4. Exit Icon
5. Gain Control (Scrolling up and down changes the gain value)
6. Depth Control (Scrolling up and down changes the depth value)
7. Mode Rotary (Press & Hold The button at the position will operate)
8. Hide/Unhide Scan Image Icon
9. Quick Menu (Anywhere in the image area Press & Hold displays the menu)
10. Trackball Upper Key Indicator

Touch Control

- Touch Control Trackball Functions

  You can either use one finger to move the CF/PDI ROI, PW cursor or trackball functions. One finger double tap will change the active function of the trackball. This is displayed at the top right of the touch panel.

Figure 13-285. Touch Control

- Two fingers will either zoom-in or zoom-out.
- More than 3 Fingers will Freeze/UnFreeze.

Quick Menu

- Press and Hold one finger for additional mode/function controls.

  B - CHI, Virtual Convex (For example)

  CF- Invert, PDI, Quick Angle (For example)

  PW- Invert, Quick Angle, Update (For example)

  Comments - Comments from MyPage

  Bodypatterns - Bodypatterns from MyPage

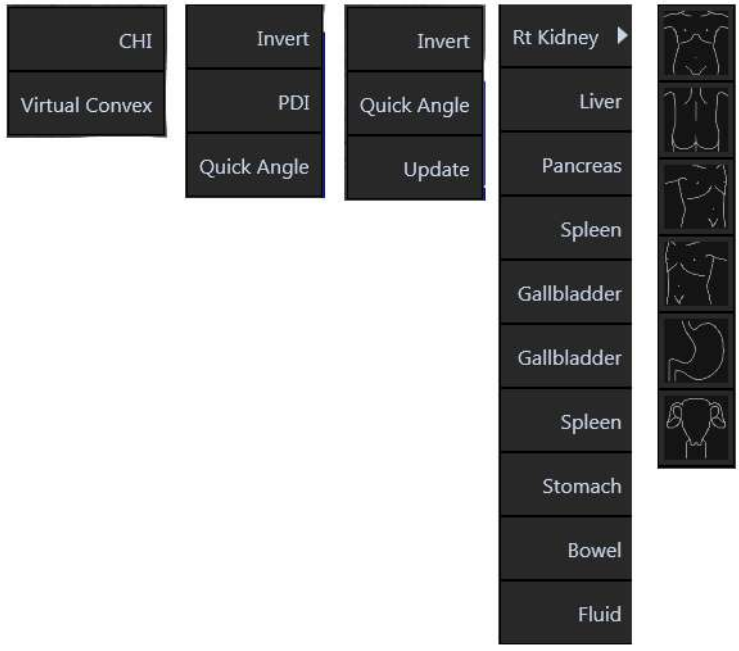


Figure 13-286. Quick Menu

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.

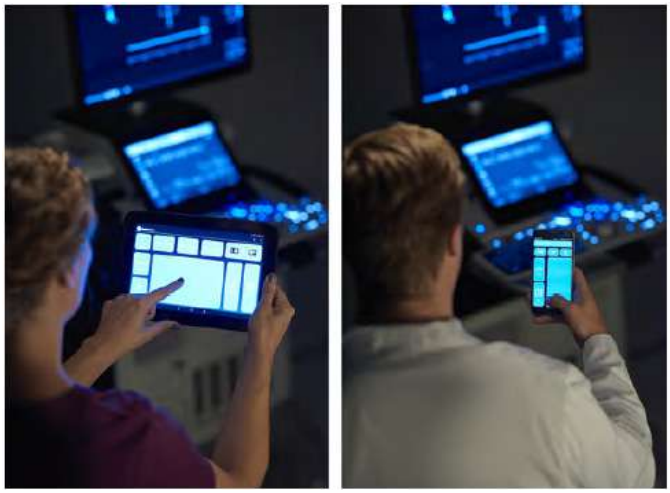


Figure 13-287. Smart Device Apps Mobile Devices

WARNING

DO NOT use the Smart Device Apps if the patient has a life-sustaining device, such as a pacemaker or defibrillator, as these devices do have an effect upon the life-sustaining device.

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)

NOTE: DO NOT use the USB Ports on the LOGIQ P8/P9/P10 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 13-104: Linking the Device to the LOGIQ P8/P9/P10

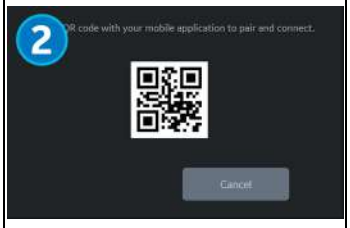
Steps	On LOGIQ P8/P9/P10	On Device
1. Press the Mobile Icon on the LOGIQ P8/P9/P10 that's located on the display.		
2. On the LOGIQ P8/P9/P10, the QR code appears on the display. 3. On the device, press the LOGIQ Remote App.		

Table 13-104: Linking the Device to the LOGIQ P8/P9/P10 (Continued)

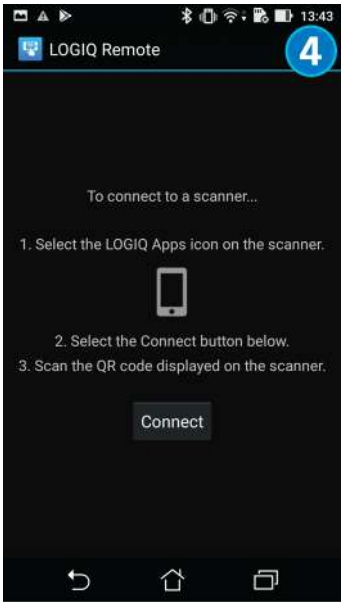
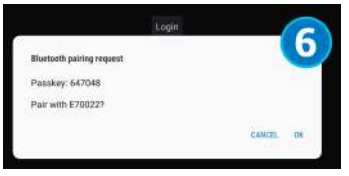
Steps	On LOGIQ P8/P9/P10	On Device
4. Follow the instructions on the device. a. Press “Connect.” b. Scan the QR Code with the device.		
5. Place the device in front of the LOGIQ P8/P9/P10 as directed. “Scan QR code with your mobile application to pair and connect.” The LOGIQ P8/P9/P10 and the device are now ready to pair.		
6. The device displays the Bluetooth pairing request, “Confirm passkey is ##### to pair with the LOGIQ P8/P9/P10.” Press OK.		

Table 13-104: Linking the Device to the LOGIQ P8/P9/P10 (Continued)

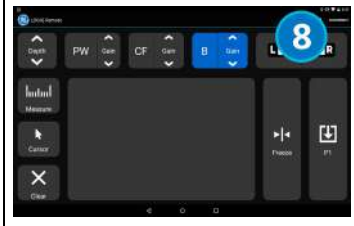
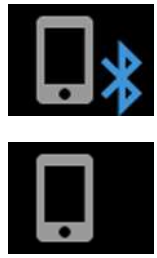
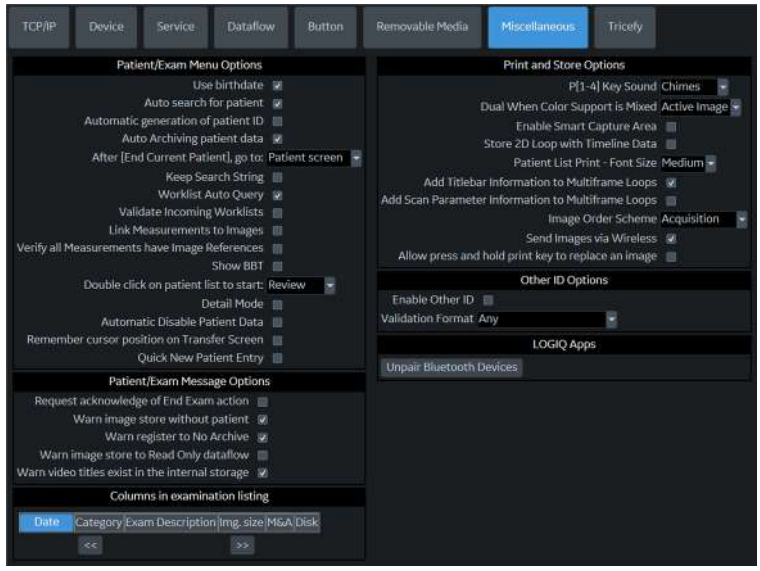
Steps	On LOGIQ P8/P9/P10	On Device
7. The Bluetooth icon on the LOGIQ P8/P9/P10 is now paired to the device. 8. The LOGIQ Remote application appears on the device. The Phone App and Tablet App displays are shown to the right.		 
To switch to the LOGIQ Photo App, press the Camera icon located on the top of the remote device's display. Note: The Camera Icon only appears if LOGIQ Photo App is already installed.		

Table 13-104: Linking the Device to the LOGIQ P8/P9/P10 (Continued)

Steps	On LOGIQ P8/P9/P10	On Device
To disconnect the LOGIQ P8/P9/P10 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.		
To Unpair a Device from the LOGIQ P8/P9/P10, press "Unpair Bluetooth Devices" via Utility> Connectivity> Miscellaneous> LOGIQ Apps.		

To completely break the association between the LOGIQ P8/P9/P10 and the device (unpair the device from the LOGIQ P8/P9/P10):

1. Access the Utility-> Connectivity-> Miscellaneous screen.



2. In the LOGIQApps section, select ***Unpair Bluetooth Devices***.

Assigning LOGIQ Apps to a BT Key

To assign LOGIQ Apps to a BT key, select “LOGIQ Apps” to a “BT Key (restart needed)” via Utility> System> User Configurable Key.

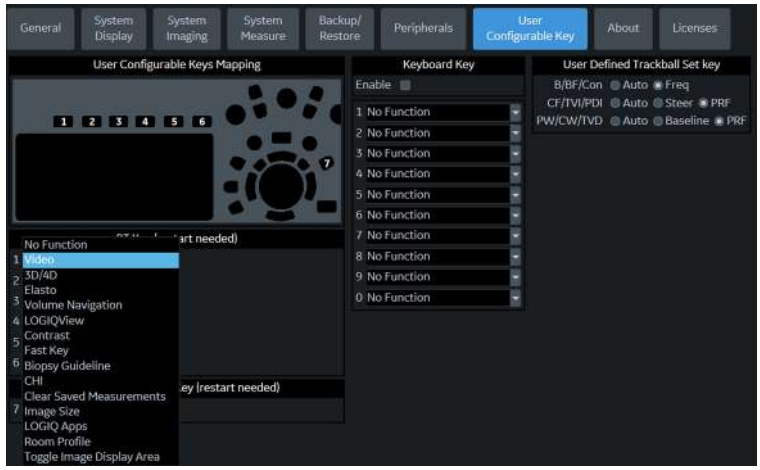


Figure 13-288. Assign LOGIQ Apps to a BT Key

Using the Apps

Table 13-105: Using Smart Device LOGIQ Apps

Tablet/Phone Remote Control and Photo/Barcode reader Apps
1. LOGIQ Remote Control App 2. LOGIQ Photo/Barcode Reader App

Table 13-105: Using Smart Device LOGIQ Apps (Continued)

Tablet/Phone Remote Control and Photo/Barcode reader Apps	
LOGIQ Remote Control App: 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. 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.	Photo/Barcode Reader App 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. Note: The photo does not go directly into the exam; instead the image must be stored from the LOGIQ P8/P9/P10. Note: The barcode scanner scans the barcode into the Patient ID field on the Patient menu.

IOTA LR2 Worksheet

NOTE: IOTA LR2 Calculation is an option.

NOTE: IOTA LR2 Calculation may not be available in all countries.

THe IOTA (International Ovarian Tumor Analysis) LR2 Worksheet contains an ovary measurement tool for women with adnexal tumors that have been selected to undergo surgery. The LR2 model is based on published literature and has been tested only on the stated population. The literature states that the LR2 model can help to estimate the probability of an adnexal mass of being malignant. The IOTA group has evaluated other ways including an LR1 model in additional to the LR2 model.

NOTE: IOTA states that use outside of the intended population can overestimate risk. Users are expected to study the literature and reach their own professional conclusions regarding the clinical utility of the tool. The model cannot replace experience in ultrasonography and cannot compensate for poor quality ultrasound equipment.

The IOTA mathematical logistic regression model, LR2 is stated in literature as described in the Advanced Reference Manual.

NOTE: For details see LOGIQ P8/P9/P10 Advanced Reference Manual - Chapter IOTA LR2.

GE Healthcare is passing on this IOTA LR2 worksheet for your convenience based on published literature of one group, but makes no representation of its effectiveness in your practice. This calculation is not to be used as the primary driver in diagnostic decision making on the probability of malignancy. It is secondary information for a physician to use based on recent literature.

Workflow

1. Select IOTA LR2 Model on the Gynecology Worksheet touch panel.
2. Fill in items 1 to 6. The Patient's age is entered by the system if available from the Patient Information Dialog.
3. The IOTA LR2 model result is displayed.

CAUTION

The IOTA LR2 model should not be used without an independent clinical evaluation and is not intended to be a screening test or to determine whether a patient should proceed to surgery. Incorrect use of the IOTA LR2 model carries the risk of unnecessary testing, surgery, and/or delayed diagnosis.

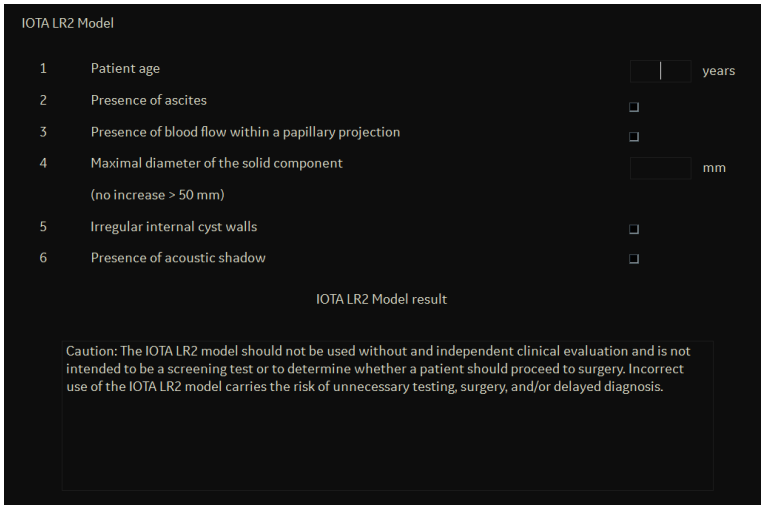


Figure 13-289. IOTA LR2 model

Hepatic Assistant

Overview

Hepatic Assistant is supported on C1-6-D (Abd(Abdomen)) to measure SWE and UGAP simultaneously.

See ‘Shear Wave Elastography’ and ‘Ultrasound- Guided Attenuation Parameter (UGAP) Option’ for detailed workflow.

Activate Hepatic Assistant

1. Configure presets for Hepatic Assistant in Utility -> Imaging -> UGAP -> Abdomen - 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 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.

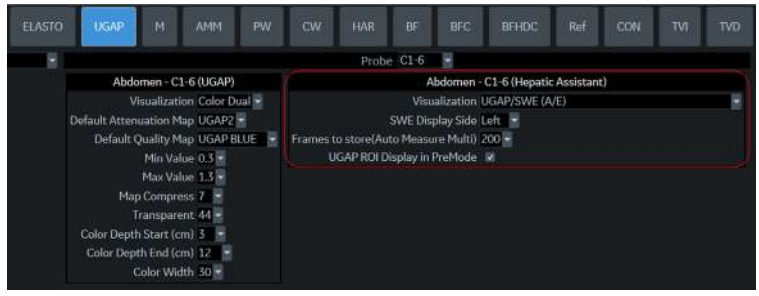


Figure 13-290. Presets for Hepatic Assistnant

2. Assign Hepatic Assistant to any User Defined key in Utility -> System -> User Configurable key. Press ***Save.***
3. Select C1-6-D probe and Abd for application.

Activate Hepatic Assistant (continued)

4. Press assigned User Defined key. Pre Mode is displayed.

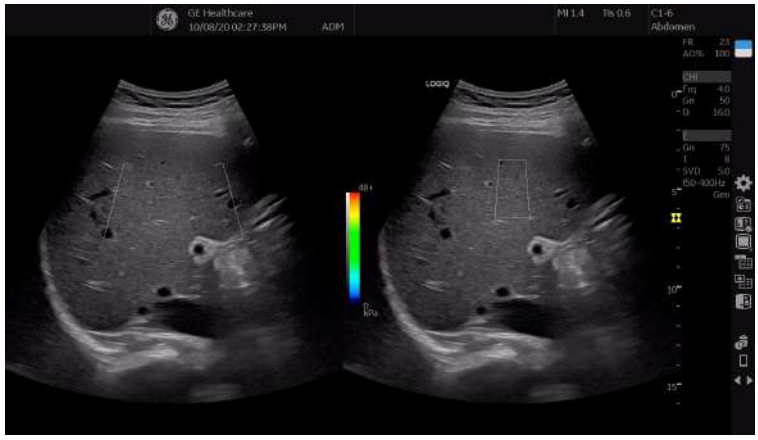


Figure 13-291. Pre Mode

5. Move SWE ROI to desired position if needed.
6. Press ***Start*** to start SWE and UGAP live data acquisition. The UGAP measurement is activated when the SWE measurement is completed.
   - LOGIQ P9/P10 acquires one SWE frame data and one UGAP frame data for Auto Measurement Single.
   - LOGIQ P9/P10 acquires SWE frames data until the user press **Freeze** and the specified number of UGAP frames data for Auto Measurement Multi.
   - LOGIQ P9/P10 acquires SWE frames data until the user press **Freeze** and UGAP frames data the user press ***Store*** for Auto Measurement Off.
7. Press assigned User Defined key to exit Hepatic Assistant.

Visualization

Below Visualizations are selectable in Utility.

- Dual view of UGAP and SWE

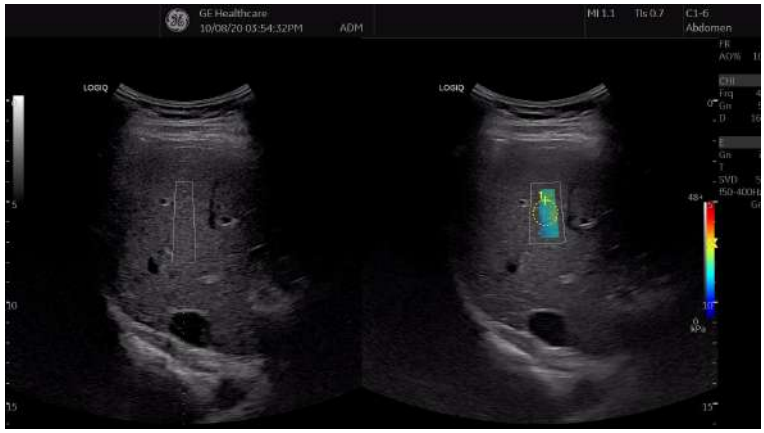


Figure 13-292. Example - UGAP/SWE (A/E)

- Dual view of UGAP Quality Map and SWE

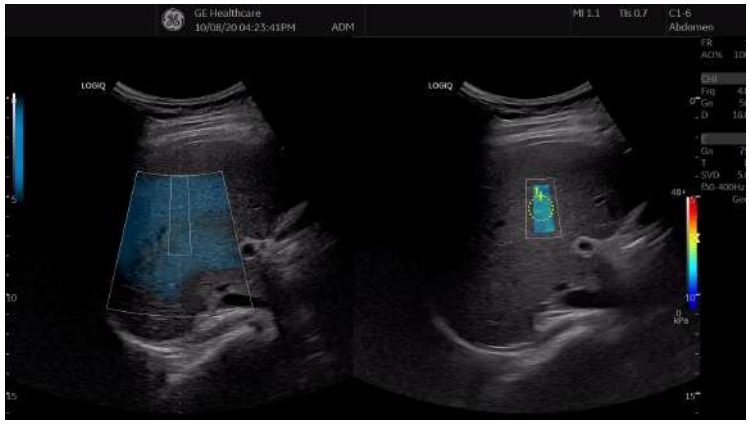


Figure 13-293. Example - UGAP Q/SWE (A Qual./E)

Visualization (continued)

- Dual view of B-mode and SWE to UGAP and UGAP Attenuation Map

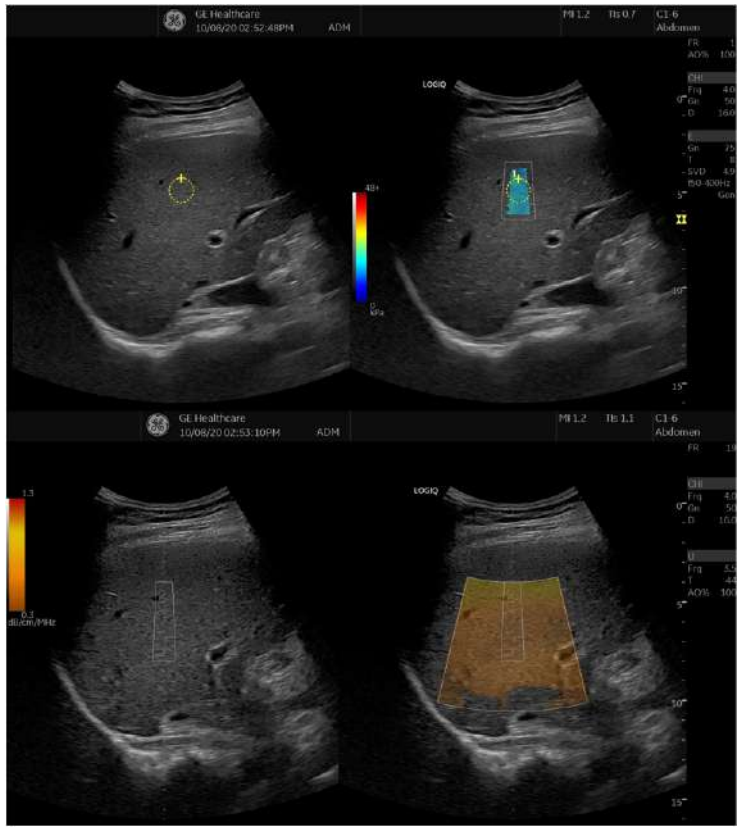


Figure 13-294. Example - B/SWE & UGAP/UGAP A (B/E A/Att.)

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 HealthCare 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.

Probe Check

Probe Check

Automatic Probe Diagnostics (Probe Check) uses automated lens echo acquisition and advanced processing to provide real-time probe health information.

To do Probe Check

1. Turn on the system according to ‘Power On’ on *page 3-30*
2. Select any of the probes you want to run the diagnostic on and activate it.
3. Select the **Test Probe** on the second page of touch panel.
4. The probe check **start UI** will be opened automatically while triggering probe active
5. Once test is done, the result will be shown as Passed or Failed
6. If the test fails, select **Perform the Test Probe** button or Ok window to execute the test.

   Refer to "Enable Automatic Probe Diagnostics" on utility menu.

Probe Check (continued)

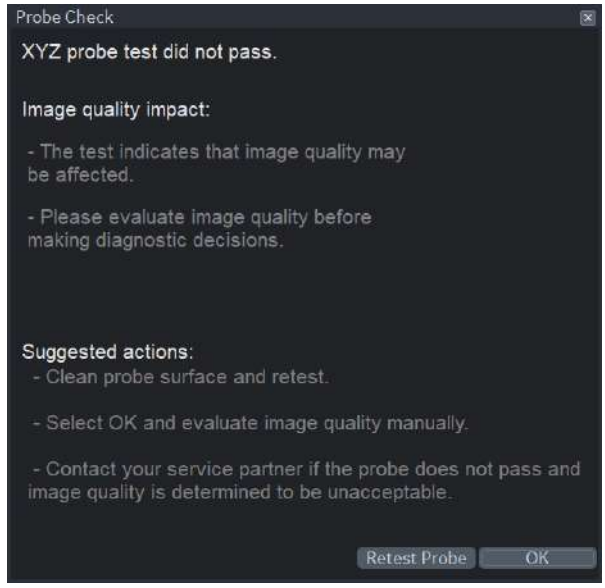


Figure 13-295. Probe Check Result

NOTE: The lens surface or cap surface must be clean (e.g. free of dirt, water or gel) to perform the probe check.

NOTE: Pencil Probe(P2D/P6D/P8D) does not support Probe check.

NOTE: M5Sc-RS Probe check only supports inner row 80 elements.

Advanced urology procedures

Introduction

E7C8L-RS probe can be attached to a stepper to be used for urological procedures including transperineal needle guidance, transperineal grid biopsy and prostate brachytherapy.

Grid Biopsy Accessories for E7C8L-RS

ERB7/ERB Biopsy attachment can been installed on the E7C8L-RS probe to assist you in conducting biopsy procedures. Using this attachment allows a biopsy position to be selected along the guide line while monitoring the Linear and Convex images in real-time.

ERB7/ERB Biopsy Attachment User Instruction

For ERB7/ERB Biopsy Attachment user instruction, please refer to Common Reusable Biopsy Attachment User Manual for more information.

Please pay attention to the alignment tips below:

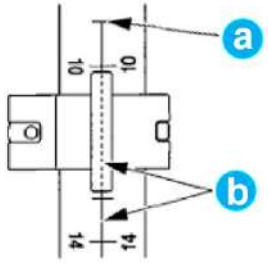


Figure 13-296. Probe/Attachment Alignment

a. Don’t install the guide attachment out of the scale of the probe.
b. Align the scale of the probe and guide attachment.

Grid Biopsy Accessories for E7C8L-RS (continued)

For proper setup recommendation for E7C8L-RS grid biopsy, please visit CIVCO website: https://www.civco.com/catalog/ for User Instruction.

NOTE: Make sure probe and grid are attached correctly and tightly on the stepper.

A typical exam consists of:

The needle placement guide should match with the electronic needle placement grid displayed on the Ultrasound system monitor. Grid is optional for stack of coins measurements. When used with the stepper volume calculation option, a “stack-of-coins” method can be used to calculate the volume of the prostate gland.

- Placing the patient in the supine or dorsal lithotomy position.
- Carefully inserting a properly prepared E7C8L-RS probe and orienting it to scan the prostate at the base position.
- Position the mechanical stepping device and secure the E7C8L-RS probe to the stepper.
- Make as many stepper volume measurements as necessary to calculate the volume of the prostate.
- Retract the probe (utilizing the stepper device) the necessary step between each incremental slice of the gland.
- Once the entire gland has been evaluated detach the probe from the mechanical stepper and carefully remove it from the patient.

Biopsy Guideline Type Preset Selection

A preset, provided in Biopsy Kit on touch panel, is available for choosing the Biopsy Guideline type.

NOTE: Changing the needle guide type may be duplicated by programming a User Define key. When the User Define key is pressed, the programmed needle guide type will be changed with single key operation.

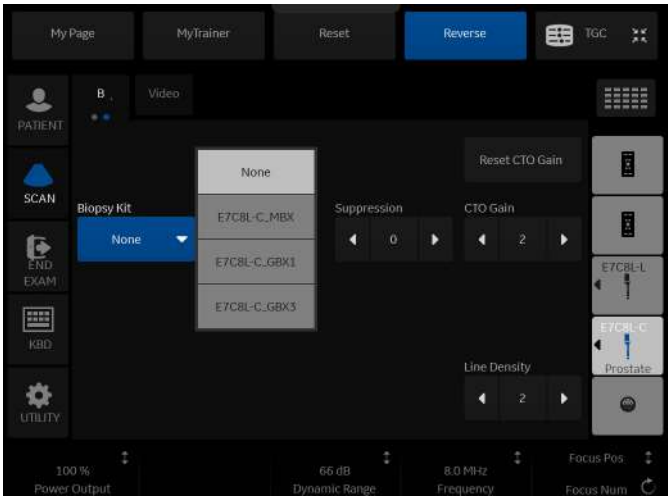


Figure 13-297. Setting the Biopsy Guideline Type for E7C8L-RS (-C: Convex Transducer)

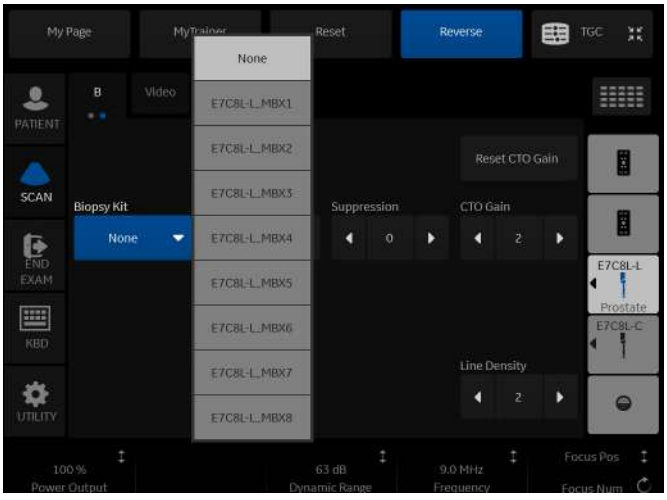


Figure 13-298. Setting the Biopsy Guideline Type for E7C8L-RS (-L: Linear Transducer)

E7C8L-RS Grid Biopsy Accessories

WARNING

The grid is single use only. Please choose the specific grid for your clinical usage.

The E7C8L-RS biopsy guide line accuracy absolute error is less than 1.0mm. Needle guidance accuracy for grid is less than the greater of 1.0mm or 3% when using stabilizer/stepper. The table below lists the accessories included in Multi-Purpose Workstation Stepper Grid Biopsy.

The table below lists the accessories included in E7C8L-RS MPWs Stepper Grid Biopsy.

Table 13-106: E7C8L-RS Grid Biopsy Accessories - Multi-Purpose Workstation Stepper

Grid Biopsy Accessory	CIVCO Part No.	Graphic
Multi-Purpose Workstation Stepper	642-510	
Multi-Purpose Workstation Stepper Cradle Only kit	642-509	
AccuCARE Disposable Template Grids (Disposable - one time use only)	610-905 (17GA)	
	610-906 (18GA)	

Table 13-106: E7C8L-RS Grid Biopsy Accessories - Multi-Purpose Workstation Stepper

Grid Biopsy Accessory	CIVCO Part No.	Graphic
Multi-Purpose Workstation™ Stabilizers	610-974	

E7C8L-RS Grid Biopsy Accessories (continued)

The table below lists the accessories included in E7C8L-RS Classic Stepper Grid Biopsy.

Table 13-107: E7C8L-RS Grid Biopsy Accessories - Classic Stepper

Grid Biopsy Accessory	CIVCO Part No.	Graphic
Classic Stepper	642-512	
Classic Stepper Cradle Only kit	642-511	
AccuCARE Disposable Template Grids (Disposable - one time use only)	610-905 (17GA)	
	610-906 (18GA)	

Table 13-107: E7C8L-RS Grid Biopsy Accessories - Classic Stepper

Grid Biopsy Accessory	CIVCO Part No.	Graphic
Micro-Touch Stabilizers & Transportation Stands (Micro-Touch adjustable dual-sided table mount)	610-911	
Micro-Touch Stabilizers & Transportation Stands (Micro-Touch transportation stand dual-sided table mount)	610-911S	

E7C8L-RS Grid Biopsy Accessories (continued)

The table below lists the accessories included in EX3TM Stepper Grid Biopsy.

Table 13-108: E7C8L-RS Grid Biopsy Accessories - EX3TM Stepper

Grid Biopsy Accessory	CIVCO Part No.	Graphic
EX3TM Stepper	642-514	
EX3TM Stepper Cradle Only kit	642-513	
AccuCARE Disposable Template Grids (Disposable - one time use only)	610-905 (17GA)	
	610-906 (18GA)	
Micro-Touch Stabilizers & Transportation Stands (Micro-Touch adjustable dual-sided table mount)	610-911	
Micro-Touch Stabilizers & Transportation Stands (Micro-Touch transportation stand dual-sided table mount)	610-911S	

Calibration Procedure

For installing the E7C8L-RS probe on the Grid Biopsy guideline, please visit CIVCO website: https://www.civco.com/catalog/ for User Instruction.

NOTE: Follow cleaning and disinfecting process for probe, steppers and reusable accessories properly to avoid disease transmission between patients.

WARNING

The biopsy location/position must be calibrated prior to performing the actual biopsy to compensate dimensional errors on kit and probe.

WARNING

Please do grid calibration step by step and check the accuracy before grid biopsy examination.

Depth Calibration

1. Submerge the probe and E7C8L-RS Grid Biopsy in 47°C (116.6 °F) water.

Figure 13-299. E7C8L-RS Grid Biopsy in water

2. Insert the 18 gauge needle into G11 of the grid biopsy.

NOTE: Please make sure choosing the correct needle according to the grid used with grid biopsy kit.

3. Using the right/left knob of the grid biopsy bracket, adjust the location of the needle image corresponding to the location of the grid.

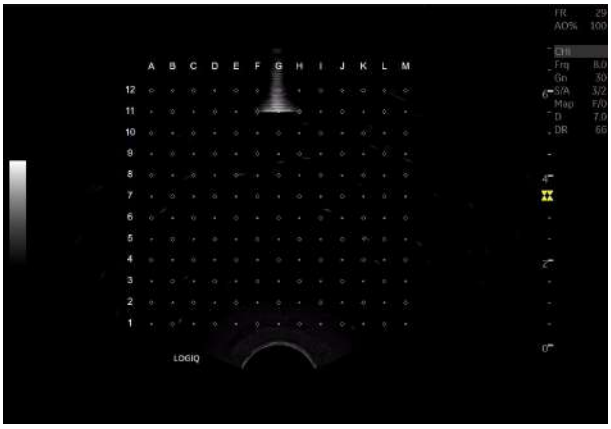


Figure 13-300. Needle Image

Center & Symmetry Calibration

1. Insert two needles on the E7C8L-RS grid biopsy guide in the following locations: B6 and L6.

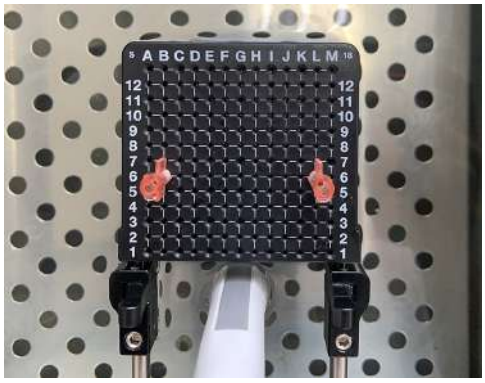


Figure 13-301. Center Calibration I

2. Relocate the probe on the bracket to adjust the center as shown below. Once it is completed, tighten the knob to fix the location.

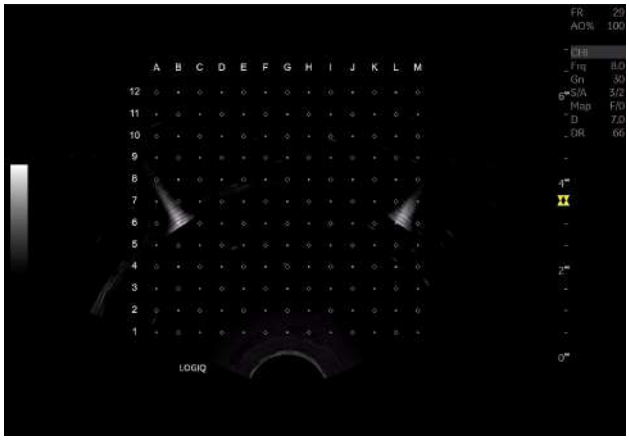


Figure 13-302. Needle Image

3. Repeat the process until the location of the needle exactly coincides with the guide mark.

Stepper Volume Measurement

Stepper volume (STVOL) is the method used to calculate the volume of an organ using urology software, a transaxial probe and a mechanical stepping device that moves the probe in fixed increments.

The volumes between the slices are assumed to be segments of a paraboloid of revolution, where the volume between any slice n and n+1 is $(A_n+A_{n+1})d/2$.

The sum of the volumes between slices is:

$V=d\ [\ ([A_1+A_2]/2) + ([A_2+A_3]/2) + ... + ([(A_{n-1})+A_n]/2)]$

Therefore, the total volume of the organ is calculated as:

$V=d\ [\ (5/6)A_1+A_2+A_3+....+(5/6)A_n]$

d: stepper volume increment;

V: stepper volume;

A: area.

Calculation method: Ellipse, Trace, Caliper, Circle, Spline.

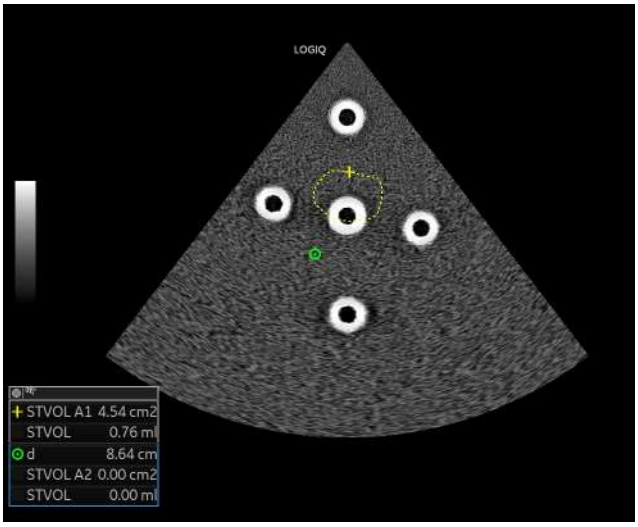


Figure 13-303. Stepper Volume Measurement

Stepper Volume Measurement (continued)

Stepper volume (STVOL) is the method used to calculate the volume of an organ using the urology software.

To perform a stepper volume (STVOL) measurement:

1. Perform the scan in the appropriate scan plane (Convex plane).
2. Press **Freeze**.
3. Press **Measure**.
4. Select the STVOL folder on Touch Panel; an active caliper displays.

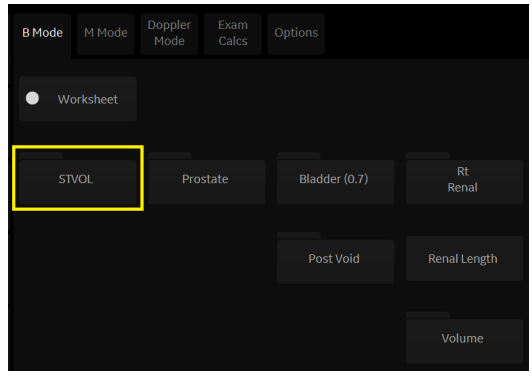


Figure 13-304. Urology Touch Panel Menu

5. Perform a STVOL area measurement.

Stepper Volume Measurement (continued)

6. The system displays the STVOL area and calculated STVOL in the Results Window.

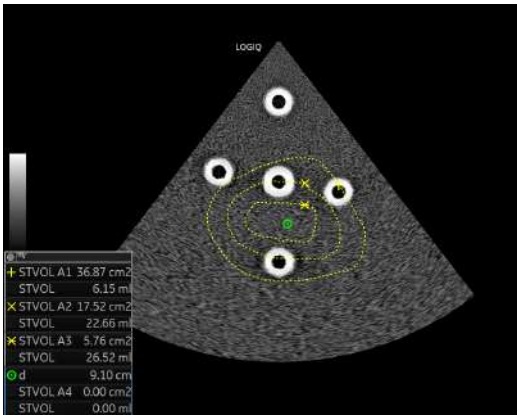


Figure 13-305. STVOL Area Measurement

7. Press Freeze to unfreeze the image.

   Repeat steps 1, 2, 5 and 6. To finish the Stepper Volume measurement, select **STVOL Done**.

WARNING

Measurement data will not be saved until select **STVOL Done**.

WARNING

Do not freeze the image during a procedure, including biopsy procedure.

Stepper Volume Measurement (continued)

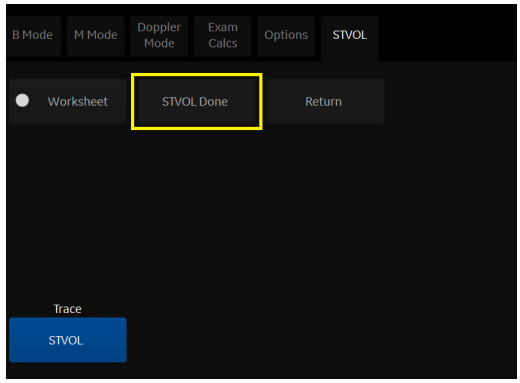


Figure 13-306. STVOL Done

NOTE: The maximum number of stepper volume slices is 50.

8. If it is required to perform the STVOL measurement again, repeat steps 1 through 7.

   The relative error accuracy for B mode stepper volume measurement is <= 30%.

To view the stepper volume worksheet, press **Worksheet** on Touch Panel.

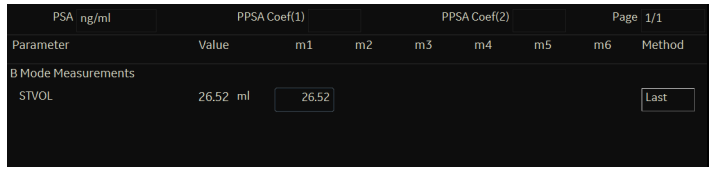


Figure 13-307. STVOL Worksheet

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