GE Healthcare

Technical Publications

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Rev. 3

CE 0197

LOGIQ Book XP Series Basic User Manual

R2.2.x

Operating Documentation

Regulatory Requirement

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

CE 0197

This manual is a reference for the LOGIQ Book XP Series. It applies to all versions of the R2.2.x software for the LOGIQ Book XP Series ultrasound system.

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Revision History

Reason for Change

REV	DATE (YYYY/MM/DD)	REASON FOR CHANGE
Rev. 1	2007/02/06	Initial Release
Rev. 2	2012/09/10	Update cTUVus certification mark
Rev. 3	2013/01/29	Update rating plate

List of Effective Pages

PAGE NUMBER	REVISION NUMBER	PAGE NUMBER	REVISION NUMBER
Title Page	Rev. 3	Chapter 9	Rev. 3
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Please verify that you are using the latest revision of this document. Information pertaining to this document is maintained on ePDM (GE Medical Systems electronic Product Data Management). If you need to know the latest revision, contact your distributor, local GE Sales Representative or in the USA call the GE Ultrasound Clinical Answer Center at 1 800 682 5327 or 1 262 524 5698.

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Regulatory Requirements

Conformance Standards

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

- According to 93/42/EEC Medical Device Directive, this is Class IIa Medical Device.
- According to IEC/EN 60601-1:
  - AC adapter is Class I.
  - LOGIQ Book XP Series console is Class II.
- According to CISPR 11, this is Group 1, Class A ISM Equipment.
- According to IEC 60529, the footswitch rate is IPx1.

This product complies with the regulatory requirement of the following:

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

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

  European registered place of business:

  GE Medical Systems Europe

  Quality Assurance and safety Regulatory Manager

  BP 34

  F 78533 Buc Cedex, France

  Tel: +33 (0) 1 30 70 4040

Conformance Standards (continued)

- International Electrotechnical Commission (IEC).
  - IEC/EN 60601-1 Medical Electrical Eqiupment, Part 1 General Requirements for Safety.
  - IEC/EN 60601-1-1 Safety requirements for medical electrical systems.
  - IEC/EN 60601-1-2 Electromagnetic compatibility - Requirements and tests.
  - IEC/EN 60601-1-4 Programmable electrical medical systems.
  - IEC 60601-2-37 Medical electrical equipment. Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment.
  - IEC 61157 Declaration of acoustic output parameters.
- International Organization of Standards (ISO)
  - ISO 10993-1 Biological evaluation of medical devices.
- Underwriters' Laboratories, Inc. (UL), an independent testing laboratory.
  - UL 2601-1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
- Canadian Standards Association (CSA).
  - CSA 22.2, 601.1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
- NEMA/AIUM Acoustic Output Display Standard (NEMA US-3, 1998).
- 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 9001 and ISO 13485 certified.

Original Documentation

- The original document was written in English.

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Chapter 16 — Customizing Your System

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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 Book XP Series system.

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

Documentation

LOGIQ Book XP Series documentation consists of various manuals:

- The Basic User Manual (TRANSLATED) 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.

NOTE: Probe information displayed on screen examples does not necessarily reflect the probes available on your ultrasound system. Please refer to the Probes chapter for a listing of available probes and features.

- The Advanced Reference Manual (ENGLISH ONLY) contains data tables, such as OB and Acoustic Output tables.
- The Quick Guide (TRANSLATED) provides descriptions of basic system features and operation. It is intended to be used in conjunction with the Basic User Manual in order to provide the information necessary to operate the system safely. Quick Cards may also be provided with additional feature information.
- The User Guide is a condensed user instruction guide (translated into Swedish, Danish, Russian, Greek, Dutch, Finnish, Norwegian, Korean and Polish).

NOTE: The documentation kit provides the Quick Guide and Release Notes on paper and electronically and the Basic User Manual and Advanced Reference Manual are only provided in electronic format. The CD-ROM includes English and all translations. Paper documentation may be ordered by using a form in the Quick Guide.

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

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 Book XP Series is intended for use by a qualified physician for ultrasound evaluation. Specific clinical applications and exam types include:

- Fetal/Obstetrics
- Abdominal (including GYN)
- Pediatric
- Small Parts (breast, neck, thyroid, prostate, limbs and extremities)
- Obstetric
- Gynecology
- Cardiac (adult and pediatric)
- Vascular
- Urology (including prostate)
- Transrectal
- Transvaginal

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

Contraindication

The LOGIQ Book XP Series 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.

Contact Information

Contacting GE Healthcare Ultrasound

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

INTERNET

http://www.gehealthcare.com

http://www.gehealthcare.com/usen/ultrasound/products/probe_care.html

USA

GE Healthcare TEL: (1) 800-437-1171
Ultrasound Service Engineering FAX: (1) 414-721-3865
9900 Innovation Drive
Wauwatosa, WI 53226

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

For service for compact products in the United States, call

TEL: (1) 877-800-6776

In other locations, contact your local Service Representative.

Accessories Catalog Requests

To request the latest GE Accessories catalog or equipment brochures in the United States, call the Response Center

TEL: (1) 800-643-6439

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

Contacting GE Healthcare Ultrasound (continued)

Placing an Order

To place an order, order supplies or ask an accesory-related question in the United States, call the GE Access Center

TEL: (1) 800-472-3666

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

CANADA

GE Healthcare TEL: (1) 800-664-0732
Ultrasound Service Engineering
9900 Innovation Drive
Wauwatosa, WI 53226
Customer Answer Center TEL: (1) 262-524-5698

LATIN & SOUTH AMERICA

GE Healthcare TEL: (1) 262-524-5300
Ultrasound Service Engineering
9900 Innovation Drive
Wauwatosa, WI 53226
Customer Answer Center TEL: (1) 262-524-5698

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D-42655 Solingen

ASIA

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Service Department - Ultrasound FAX: 65-272-3997
298 Tiong Bahru Road #15-01/06
Central Plaza
Singapore 169730

JAPAN
GE Yokogawa Medical Systems TEL: (81) 426-48-2950
Customer Service Center FAX: (81) 426-48-2902

Contacting GE Healthcare Ultrasound (continued)

ARGENTINA
GEME S.A. TEL: (1) 639-1619
Miranda 5237 FAX: (1) 567-2678
Buenos Aires - 1407

AUSTRIA
GE GesmbH Medical Systems Austria TEL: 0660 8459 toll free
Prinz Eugen Strasse 8/8 FAX: +43 1 505 38 74
A-1040 WIEN TLX: 136314

BELGIUM
GE Medical Systems Benelux TEL: 0 800 11733 toll free
Gulkenrodestraat 3 FAX: +32 0 3 320 12 59
B-2160 WOMMELGEM TLX: 72722

BRAZIL
GE Sistemas Medicos TEL: 0800-122345
Av Nove de Julho 5229 FAX: (011) 3067-8298
01407-907 Sao Paulo SP

DENMARK
GE Medical Systems TEL: +45 4348 5400
Fabriksparken 20 FAX: +45 4348 5399
DK-2600 GLOSTRUP

FRANCE
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GE Medical Systems Italia TEL: 1678 744 73 toll free
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LUXEMBOURG
TEL: 0800 2603 toll free

Contacting GE Healthcare Ultrasound (continued)

MEXICO
GE Sistemas Medicos de Mexico S.A. de C.V.
Rio Lerma #302, 1° y 2° Pisos TEL: (5) 228-9600
Colonia Cuauhtemoc FAX: (5) 211-4631
06500-Mexico, D.F.

NETHERLANDS
GE Medical Systems Nederland B.V. TEL: 06 022 3797 toll free
Atoomweg 512 FAX: +31 304 11702
NL-3542 AB UTRECHT

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GE Medical Systems Polska TEL: +48 2 625 59 62
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GE Medical Systems Portuguesa S.A.
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123100 MOSCOW TLX: 613020 GEMED SU

SPAIN
GE Medical Systems Espana TEL: 900 95 3349 toll free
Hierro 1 Arturo Gimeno FAX: +34 1 675 3364
Poligono Industrial I TLX: 22384 A/B GEMDE
E-28850 TORREJON DE ARDOZ

SWEDEN
GE Medical Systems TEL: 020 795 433 toll free
PO-BOX 1243 FAX: +46 87 51 30 90
S-16428 KISTA TLX: 12228 CGRSWES

SWITZERLAND
GE Medical Systems (Schweiz) AG TEL: 155 5306 toll free
Sternmattweg 1 FAX: +41 41 421859
CH-6010 KRIENS

TURKEY
GE Healthcare Turkiye TEL: +90 212 398 07 00
FAX: +90 212 284 67 00
Esentepe Mah. Harman sok. 34394 No:8
Sisli-Istanbul Turkey

Contacting GE Healthcare Ultrasound (continued)

UNITED KINGDOM

GE Medical Systems TEL: 0800 89 7905 toll free
Coolidge House FAX: +44 753 696067
352 Buckingham Avenue
SLOUGH
Berkshire SL1 4ER

OTHER COUNTRIES

NO TOLL FREE TEL: international code + 33 1 39 20 0007

Manufacturer

GE Medical System (China) Co., Ltd.
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WuXi National Hi-Tech Development Zone
Jiangsu, P.R. China 214028
TEL: +86 510 85225888; FAX: +86 510 85226688

Chapter 2

Safety

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

Safety Precautions

Precaution Levels

Icon description

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

DANGER

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

- Severe or fatal personal injury
- Substantial property damage.

WARNING

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

- Severe personal injury
- Substantial property damage.

CAUTION

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

- Minor injury
- Property damage.

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

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

Hazard Symbols

Icon Description

Potential hazards are indicated by the following icons:

Table 2-1: Potential Hazard

Icon	Potential Hazard	Usage	Source
	• Patient/user infection due to contaminated equipment.	• Cleaning and care instructions • Sheath and glove guidelines	ISO 7000 No. 0659
	• Electrical micro-shock to patient, e.g., ventricular	• Probes • ECG, if applicable • Connections to back panel	
	• Patient injury or tissue damage from ultrasound radiation.	• ALARA, the use of Power Output following the ‘as low as reasonably achievable’ principle	
	• Risk of explosion if used in the presence of flammable anesthetics.	• Flammable anesthetic	
	• 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.

Improper use can result in serious injury. 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 Medical Systems if needed.

The equipment user is obligated to be familiar with these concerns and avoid conditions that could result in injury.

Patient Safety

Related Hazards

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.

Diagnostic information

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.

Allowing the machine to transmit acoustic output with the probe not in use (or in its holder) can cause the transducer to build up heat. Preset Auto Freeze to freeze the image when the machine is not in use.

Related Hazards (continued)

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. Become familiar with all instructions and precautions provided with special purpose probes.

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

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

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.

Related Hazards (continued)

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 by GE Application Specialists. 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

Related Hazards

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

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

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

Only approved and recommended peripherals and accessories should be used.

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

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

Related Hazards (continued)

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.

CAUTION

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

Smoke & Fire Hazard

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

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.

Related Hazards (continued)

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

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

DO NOT use high-frequency surgical equipment with the LOGIQ Book XP Series.

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 are the sole responsibility of the user. The user must consider contraindications for the use of a calculation or chart as described in the scientific literature. The diagnosis, decision for further examinations and medical treatment must be performed by qualified personnel following good clinical practice.

General Caution

CAUTION

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

CAUTION

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

CAUTION

Capacity load of the Isolation Cart: The maximum capacity load of B/W Printer (1) is 4kg, Color Printer Shelf (2) is 7kg, DVD-RW Shelf (3) is 2kg and Bottom Shelf (4) is 6kg, refer to the following figure.

Figure 2-1. Capacity load of the Isolation Cart

General Caution (continued)

CAUTION

Capacity load of the Isolation Cart Enhanced Version: The maximum capacity load of ACDC Shelf (1) is 1.5kg, DVD-RW Shelf (2) is 1.5kg, B/W Printer Shelf (3) is 3kg, Basket (4) is 3kg and Drawer (5) is 3kg, refer to the following figure.

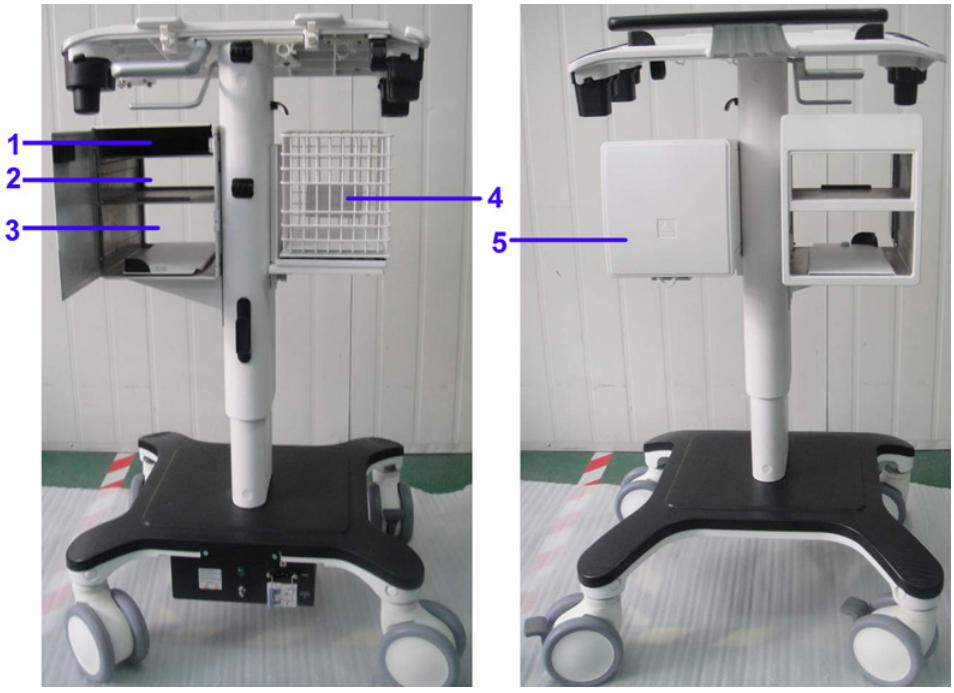


Figure 2-2. Capacity load of the Isolation Cart Enhanced Version

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 2-2: Label Icons

Label/Icon	Purpose/Meaning	Location
Identification and Rating Plate	• Manufacture's name and address • Date of manufacture • Model and serial numbers • Electrical ratings (Volts, Amps, phase, and frequency)	See Figure 2-5/Figure 2-6 for location information. AC Adapter Label.
Type/Class Label	Used to indicate the degree of safety or protection.	
IP Code (IPX1)	Indicates the degree of protection provided by the enclosure per IEC60 529. Cannot be used in operating room environment.	Bottom of Footswitch
	Type BF Applied Part (man in the box) symbol is in accordance with IEC 878-02-03.	Beside the probe connector
	General Warning.	Various
	"Consult accompanying documents" is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.	Various
	Do not push the system.	Rear of Docking Cart/Isolation Cart
	"CAUTION" - Dangerous voltage" (the lightning flash with arrowhead) is used to indicate electric shock hazards.	Various

Table 2-2: Label Icons (Continued)

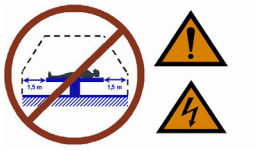
Label/Icon	Purpose/Meaning	Location
	"ON" indicates the power on position of the power switch. **CAUTION:** This Power Switch **DOES NOT ISOLATE** Mains Supply.	See Figure 3-19 for location information.
	"Protective Earth" indicates the protective earth (grounding) terminal.	Inside of AC adapter
	NRTL Listing and Certification Mark is used to designate conformance to nationally recognized product safety standards. The Mark bears the name and/or logo of the testing laboratory, product category, safety standard to which conformity is assessed and a control number.	Bottom
	Type CF Defib-Proof Applied Part (heart in the box with paddle) symbol is in accordance with IEC 60878-02-06.	ECG Module
	Do not connect the CD-RW to the system while scanning.	CD-RW
	This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.	Bottom

Table 2-2: Label Icons (Continued)

Label/Icon	Purpose/Meaning	Location
	Indicates the product contains hazardous materials in excess of the limits established by the Chinese standard SJ/T11363-2006 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 toxic or hazardous substances or elements contained in electronic information products will not leak or mutate under normal operating conditions so that the use of such electronic information products will not result in any severe environmental pollution, any bodily injury or damage to any assets.	Real Panel, Rating Plate
	This product consists of devices that may contain mercury, which must be recycled or disposed of in accordance with local, state, or country laws. (Within this sytem, the backlight lamps in the monitor display, contain mercury.)	Real Panel, Rating Plate

Label Icon Description (continued)

Classifications

Type of protection against electric shock

- Class I Equipment—AC Adapter (*1)
- Class II Equipment—LOGIQ Book XP Series Console (*2)

Degree of protection against electric shock

- Type BF Applied part (*3) (for Probes marked with BF symbol)
- Type CF Applied part (*4) (for ECG marked with CF symbol)

Continuous Operation

System is Ordinary Equipment (IPX0)

Footswitch is IPX1

1. Class I Equipment

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

2. Class II Equipment

EQUIPMENT in which protection against electric shock does not rely on BASIC INSULATION only, but in which additional safety precautions such as DOUBLE INSULATION or REINFORCED INSULATION are provided.

3. Type BF Applied Part

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

Table 2-3: Type BF Equipment

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

Label Icon Description (continued)

Classifications ***4. Type CF Applied Part***

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

Table 2-4: Type CF Equipment

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

EMC (Electromagnetic Compatibility)

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

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

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

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

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

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.

EMC Performance (continued)

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.

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.

EMC Performance (continued)

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

Table 2-5: 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

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 Medical Systems or ones designated by GE Medical Systems. 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 Medical Systems. 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 Chapter 18 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)

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 Book XP Series to image recording and other devices or communication networks.

Peripheral used in the patient environment

The LOGIQ Book XP Series has been verified for overall safety, compatibility and compliance with the following on-board image recording devices:

- Sony UP-D897 Diital Printer
- Sony UP-D23MD Color Printer

The LOGIQ Book XP Series 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 60601-1-1.

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

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. There must be adequate mechanical mounting of the device and stability of the combination.
3. Risk and leakage current of the combination must comply with IEC/EN 60601-1.
4. Electromagnetic emissions and immunity of the combination must conform to IEC/EN 60601-1-2.

Peripheral Update for EC countries (continued)

Peripheral used in the non-patient environment

The LOGIQ Book XP Series has also been verified for compatibility, and compliance for connection to a local area network (LAN) via a wireless LAN, provided the LAN components are IEC/EN 60950 compliant. See ‘Assistance’ on *page 18-32 for more information.*

The LOGIQ Book XP Series has also been verified for compatibility, and compliance for connection to a Cd-Writer via the system USB port, provided the CD-Writer is IEC/EN 60950 compliant.

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

1. The added device(s) must have appropriate safety standard conformance and CE Marking.
2. The added device(s) must be used for their intended purpose having a compatible interface.

Please make sure to disconnect the CD-Writer when scanning the patient.

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 2-6: Declaration of Emissions

Guidance and manufacturer's declaration - electromagnetic emissions		
The system is intended for use in the electromagnetic environment specified below. The user of the system should assure that it is used in such an environment.		
Emission Type	**Compliance**	**Electromagnetic Environment**
RF Emissions CISPR 11	Group 1	This system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF Emissions CISPR 11	Class A	This system is suitable for use in all establishments, other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes, provided the following warning is heeded: WARNING: This system is intended for use by healthcare professionals only. This system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the system or shielding the location.
Harmonic Emissions IEC 61000-3-2	Class A	
Voltage Fluctuations/Flicker Emissions IEC 61000-3-3	Complies	

Declaration of Immunity

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

Table 2-7: Declaration of Immunity

Immunity Type	Equipment Capability	Regulatory Acceptable Level	EMC Environment and Guidance
IEC 61000-4-2 Static discharge (ESD)	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%. Mains power quality should be that of a typical commercial and/or hospital environment. If the user requires continued operation during power mains interruptions, it is recommended that the system be powered from a UPS or a battery. NOTE: UT is the a.c. mains voltage prior to application of the test level. Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial and/or hospital environment. Separation distance to radio communication equipment must be maintained according to the method below. Interference may occur in the vicinity of equipment marked with the symbol:  Image degradation or interference may occur due to conducted RF noise on the equipment mains power supply or other signal cable. Such interference is easily recognized and distinguishable from patient anatomy and physiological waveforms. Interference of this type may delay the examination without affecting diagnostic accuracy. Additional mains/ signal RF isolation or filtering may be needed if this type interference occurs frequently.
IEC 61000-4-4 Electrical fast transient/burst	± 2 kV for mains ± 1 kV for SIP/ SOP	± 2 kV for mains ± 1 kV for SIP/SOP	
IEC 61000-4-5 Surge Immunity	± 1 kV differential ± 2 kV common	± 1 kV differential ± 2 kV common	
IEC 61000-4-11 Voltage dips, short interruptions and voltage variations on mains supply	< 50_T (> 95% dip) for 0.5 cycle; 400_T (60 0ip) for 5 cycles; 700_T (30 0ip) for 25 cycles; < 50_T (>95% dip) for 5 sec	< 50_T (> 95% dip) for 0.5 cycle; 400_T (60 0ip) for 5 cycles; 700_T (30 0ip) for 25 cycles; < 50_T (>95% dip) for 5 sec	
IEC 61000-4-8 Power frequency (50/ 60 Hz) magnetic field	3 A/m	3 A/m	
IEC 61000-4-6 Conducted RF	3 V_{RMS} 150 kHz - 80 MHz	3 V_{RMS} 150 kHz - 80 MHz	
IEC 61000-4-3 Radiated RF	3 V/m 80 MHz - 2.5 GHz	3 V/m 80 MHz - 2.5 GHz	
NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people. If noise generated from other electronic equipment is near the probe's center frequency, noise may appear on the image. Good power line isolation is required.			

Patient Environmental Devices

Figure 2-3. Patient Environmental Devices

1. Left side: Security lock
2. Bottom side: Lithium-ion battery port
3. Right side: Probe port
4. Rear panel:
   - 2 USB Ports—Peripheral devices, B/W Printer, Color Printers, Memory Stick, Footswitch.
   - 1 VGA Port.
   - PC Card—Wireless LAN.

Acceptable Devices

The devices shown in Figure 2-3 are specified to be suitable for use within the PATIENT ENVIRONMENT.

CAUTION

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

See ‘Peripheral Update for EC countries’ on *page 2-23 for more information.*

Unapproved Devices

CAUTION

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 Book XP Series must conform to one or more of the requirements listed below:

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

Accessories, Options, Supplies

CAUTION

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

Acoustic Output

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.

Display precision is ±0.1 and accuracy is ±50%. Accuracy of the power output displayed value on the Top/Sub Menu is ±10%.

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 chapter.

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 sections in Chapter 5 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 Book XP Series 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 Top/Sub Menu.

Warning Label Locations

LOGIQ Book XP Series warning labels are provided in English.

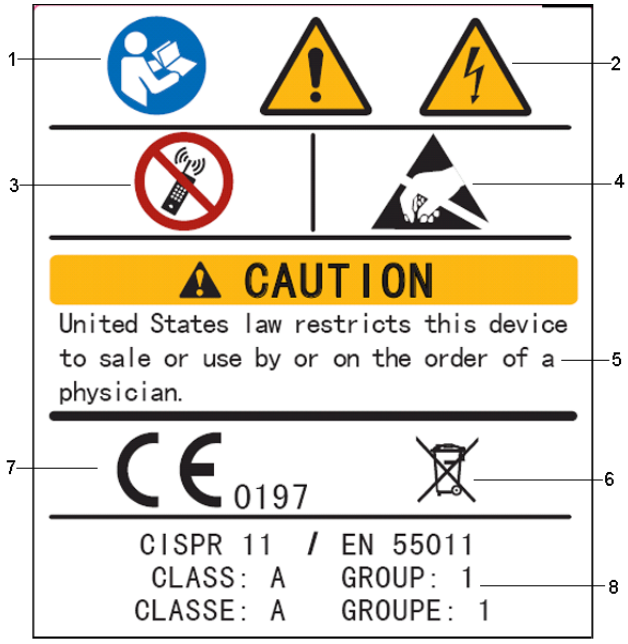


Figure 2-4. Label location explanations

Table 2-8: Label Location Explanations

1. “Consult accompanying document” is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.
2. Possible shock hazard. Do not remove covers or panels. No user serviceable parts are inside. Refer servicing to qualified service personnel.
3. Do not use the following devices near this equipment: cellular phone, radio receiver, mobile radio transmitter, radio controlled toy, 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.
4. Be careful of static.
5. Prescription Device (For U.S.A. Only).
6. WEEE Label.
7. The CE Mark of Conformity indicates this equipment conforms with the Council Directive 93/42/EEC.
8. CISPR **CAUTION**: The LOGIQ Book XP Series conforms to the CISPR11, Group 1, Class A of the international standard for Electromagnetic disturbance characteristics.

Warning Label Locations (continued)

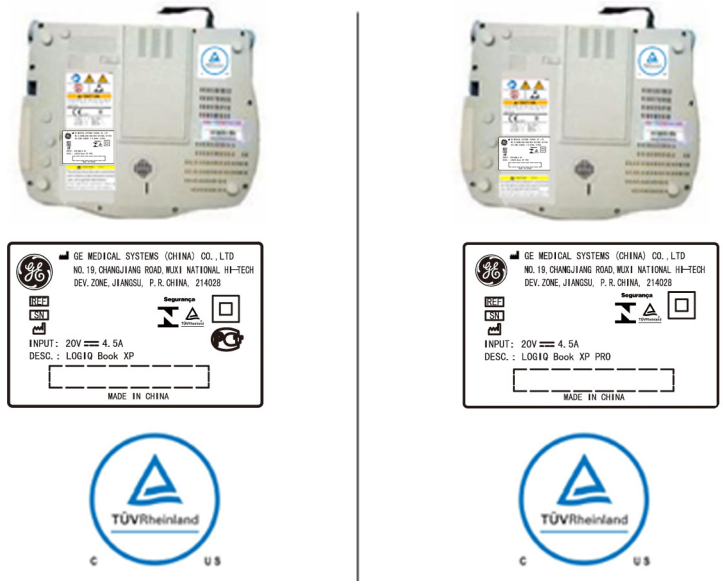
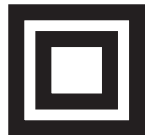


Figure 2-5. TUV and Identification/Rating Plate Label Location

Warning Label Locations (continued)

Table 2-9: Rating Plate Explanations

	**Date of manufacture:** The date could be a year, year and month, or year, month and day, as appropriate. See ISO 8601 for date formats.
	**Catalog or model number**
	**Serial number**
	**Equipment Class II:** For products not relying on protective earth, such as products having double or reinforced insulation
	**Direct Current:** For products to be powered from a DC supply.

Warning Label Locations (continued)

Figure 2-6. TUV and Identification/Rating Plate Label Location

Warning Label Locations (continued)

Figure 2-7. AC Adapter Label

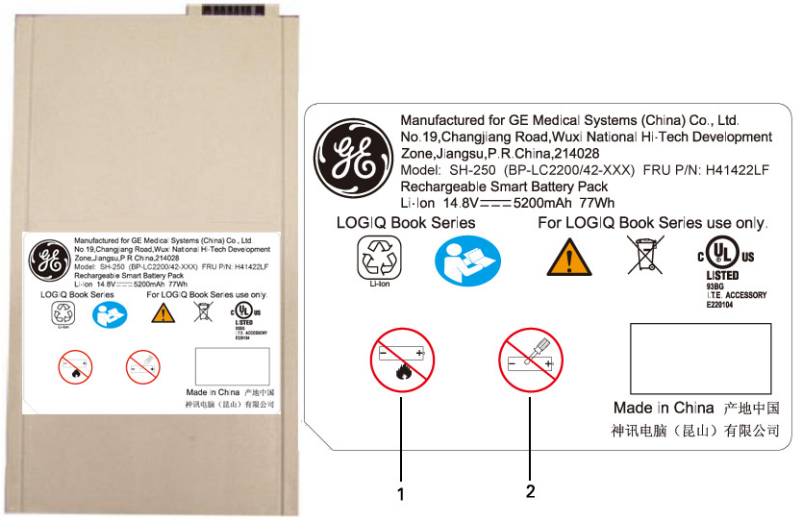


Figure 2-8. Battery Label

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

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.

ReportWriter not available on LOGIQ Book XP PRO

Site Requirements

Introduction

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

The LOGIQ Book XP Series does not contain any operator serviceable internal components. Ensure that unauthorized personnel do not tamper with the unit.

Perform regular preventive maintenance. See ‘System Care and Maintenance’ on *page 18-9 for more information.*

Maintain a clean environment. Turn off, and if possible, disconnect the system before cleaning the unit. See ‘Cleaning the system’ on *page 18-11 for more information.*

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

Before the system arrives

NOTICE

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

Ensure that the following is provided for the new system:

- A separate power outlet with a 6 amp circuit breaker for 220-240 VAC or a 10 amp circuit breaker for 100-120 VAC.
- Take precautions to ensure that the console is protected from electromagnetic interference.

  Precautions include:

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

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° - 40°C 50° - 104°F	-5° - 50°C 23° - 122°F	-5° - 50°C 23° - 122°F
Humidity	30 - 75% non-condensing	10 - 90% non-condensing	10 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

Acclimation Time

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

Table 3-2: System Acclimation Time Chart

° **C**	60	55	50	45	40	35	30	25	20	15	10
° **F**	140	131	122	113	104	95	86	77	68	59	50
hours	8	6	4	2	0	0	0	0	0	0	0

° **C**	5	0	-5	-10	-15	-20	-25	-30	-35	-40
° **F**	41	32	23	14	5	-4	-13	-22	-31	-40
hours	2	4	6	8	10	12	14	16	18	20

Console Overview

Console graphics

The following are illustrations of the console:

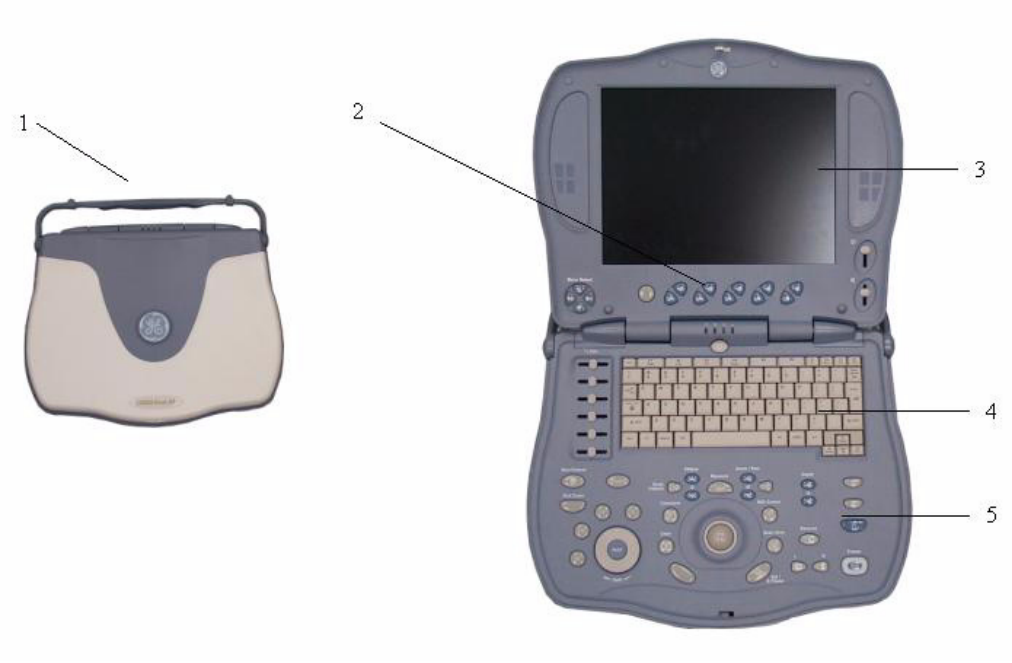


Figure 3-1. LOGIQ Book XP Series System (closed and opened views)

1. Handle
2. Soft Menu (use same as menu key)
3. LCD
4. Alphanumeric keys
5. Control Panel

Console graphics (continued)

Figure 3-2. LOGIQ Book XP Series System (side views)

CAUTION

Do not push objects into air vents and openings of LOGIQ Book XP Series. Doing so can cause fire or electric shock by shorting out interior components.

WARNING

The system should rest on the handle to allow an air gap to prevent overheating.

Battery

The lithium ion battery provides power when an AC power source is not available. A battery in the battery bay is standard with the LOGIQ Book XP Series. Lithium ion batteries last longer than conventional batteries and do not require replacement as often. You can expect one hour of battery life with a single fully charged battery.

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

NOTE: The battery is designed to work with LOGIQ Book XP Series systems only. Only use the batteries authorized by GE.

- The battery has a safety device. Do not disassemble or alter the battery.
- Charge the batteries only when the ambient temperature is between 0° and 65° C (32° and 149° F) and discharge the batteries between -10° and 55° C (14° and 131° F).
- Do not short-circuit the battery by directly connecting the negative terminals with metal objects.
- Do not heat the battery or discard it in a fire.
- Do not expose the battery to temperature over 60° C (140° F). Keep it away from fire and other heat sources.
- Do not charge the battery near a heat source, such as a fire or heater.
- **Do not leave the battery in direct sunlight.**
- Do not pierce the battery with a sharp object, hit it, or step on it.
- Do not use a damaged battery.
- Do not solder a battery.
- Do not connect the battery to an electrical power outlet.

Battery (continued)

If the LOGIQ Book XP Series is not being used on a monthly basis, the battery needs to be removed during the lengthy non-use period.

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

- Do not immerse the battery in water or allow it to get wet.
- Do not put the battery into a microwave oven or pressurized container.
- If the battery leaks or emits an odor, remove it from all possible flammable sources.
- If the battery emits an odor or heat, is deformed or discolored, or in a way appears abnormal during use, recharging or storage, immediately remove it and stop using it. If you have any questions about the battery, consult GE or your local representative.
- Short term (less than one month) storage of battery pack:
  - Store the battery in a temperature range between 0° C (32° F) and 50° C (122°F).

Battery (continued)

CAUTION

- Long term (3 months or more) storage of battery pack:
  - Store the battery in a temperature range between -20° C (-4° F) and 45° C (113°F)
  - Upon receipt of the LOGIQ Book XP Series and before first time usage, it is highly recommended that the customer performs one full discharge/charge cycle.

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

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

    1. Full discharge of battery to let the LOGIQ Book XP Series automatically shut down.

    2. Charge the LOGIQ Book XP Series to 100% FCC (full current capacity).

    3. Discharge of LOGIQ Book XP Series for complete shut down (takes one hour for discharge).
  - When storing packs for more than 6 months, charge the pack at least once during the 6 month timeframe to prevent leakage and deterioration in performance.
- Use only GE recognized batteries.

Battery (continued)

View current battery status

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

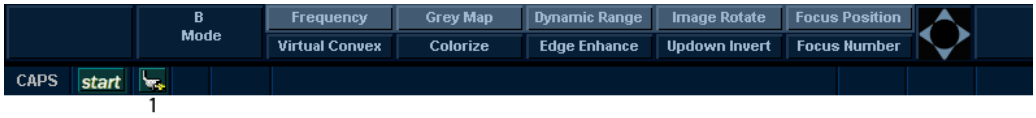


Figure 3-3. Battery icon

1. Battery icon

When you select this icon, the following appears:

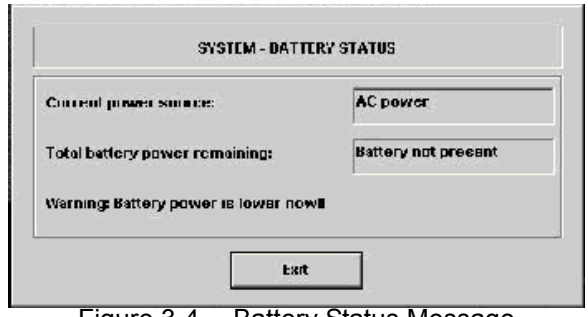


Figure 3-4. Battery Status Message

Current power source–displays the current power source, AC power or Battery.

Total battery power remaining–displays the current power remaining capacity. When there is no battery, “Battery not present” appears. When using a battery, it’s current capacity in percent appears “current capacity (unit: percent)”. If the battery is not in use, it states “current capacity (charging)”.

Warning information–displays warning information when battery power is low. See Figure 3-5.

Battery (continued)

Battery power low warning

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

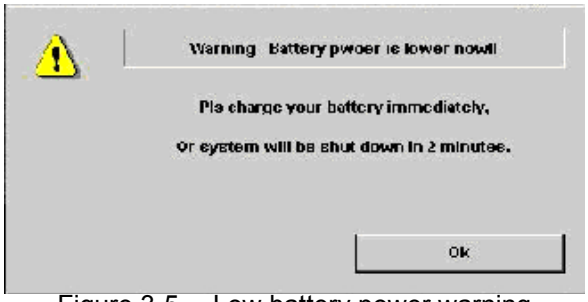


Figure 3-5. Low battery power warning

NOTE: When the battery power is low and the user cannot charge the battery in time, the system automatically shuts down in 2 minutes. This protects the whole system. You need to save all unsaved data before the system shuts down or you may lose useful information.

AC Adapter

CAUTION

Do not use an AC adapter without approval by GE.

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

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

Peripheral/Accessory Connection

Peripheral/Accessory Connector Panel

LOGIQ Book XP Series peripherals and accessories can be properly connected using the rear connector panel.

CAUTION

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

Signal ground lines are Not Isolated.

CAUTION

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

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

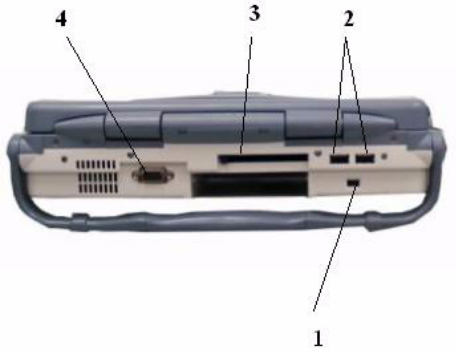


Figure 3-6. Peripheral/Accessory Connector Panel

1. Port for DC In (AC Adapter)
2. 2 USB Ports for digital B/W printer, color printer, memory sticks, footswitch, CD-RW, USB Lamp and Bluetooth Adapter
3. PCMCIA Port for PC card, network card and wireless card
4. SVGA Output (Video Adapter)—CRT monitor Option is not supported

Peripheral/Accessory Connector Panel (continued)

NOTE: The USB devices should be connected to the LOGIQ Book XP Series first, power on the USB devices before turning on the LOGIQ Book XP Series.

NOTE: The PC card should be inserted into the LOGIQ Book XP Series port when the system is on. After you insert the PC card into the PCMCIA port, a beep is heard which means the card works properly. Otherwise, please remove the card and insert it again.

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 60601-1-1 by the installer.

Footswitch (Option)

Use only the GE recommended footswitch. The footswitch may be used as select keys.

Use the footswitch to freeze the real-time image. Use the footswitch as P1, P2 and P3 buttons on the keyboard.

The footswitch connection is located on the USB port.

ECG (Option)

CE 0473

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

CAUTION

- ECG electrodes should not make contact with other conductive parts, including earth.
- After the defibrillator stimulates the patient, the ECG needs 4 to 5 seconds for recovery.
- The quality of the ECG trace depends on the stability and conductivity of the electrodes during the test, especially during high stages when the patient's movements can cause artifacts.
- Make sure that the lead wires do not swing.

CAUTION

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.

NOTE: For information on ECG installation, refer to the LOGIQ Book XP Series Peripheral Installation Instruction.

ECG (Option) (continued)

Electrode Placement

The ECG cable has triple color-coded electrode connectors on the end. Each electrode cable hooks up to the appropriate stick-on electrode by a color-coded clip type connector.

Table 3-3: ECG Lead Placement

Lead	Marking	Position on Patient
I	RA/R	Right Arm
II	LL/F	Left Leg
III	RL/N	Right Leg

Table 3-4: ECG Technical Specifications

Feature	Specification
Size [mm]	85x46x16 mm
Power consumption	USB 5V supply
Current	80 mA +/_10%
ECG samples/sec	1000
A/D bits	12 (2.44 uV/LSB)
Defibrillation protection	Built in
Patient Leads	3 leads (R, L, Common)
CMMR	> 80 dB
Input resistance	> 10 Mohm
Signal snamic range	10mV (-5 to +5 mV)
Patient isolation	4000V
Patient leakage current	< 10 uA
Frequency range (-3db)	0.05 - 150 Hz
Safety standard	IEC 60601-1, EN 60601-2, IEC 60601-2-27, and EC11
Operating temperature	0 to 70 degree C
Storing temperature	(-65) to 150 degree C
Humidity	< 80%

Peripherals Connection

1. Connect the B/W printer to the system. The B/W printer can be properly connected using the USB Port 1 or 2.

Figure 3-7. B/W Printer Connection

2. Connect the CD-RW to the system. The CD-RW can be properly connected using the USB Port 1 or 2.

Figure 3-8. CD-RW Connection

CAUTION

Do not connect the CD-RW to the system while scanning.

Peripherals Connection (continued)

3. Connect the footswitch to the system. The footswitch can be properly connected using the USB Port 1 or 2.

Figure 3-9. Footswitch Connection

4. Connect the Wireless LAN Adapter to the system. The wireless LAN adapter can be properly connected using the Signal Port for Card.

Figure 3-10. Wireless LAN Connection

Peripherals Connection (continued)

5. Connect the USB Lamp to the system. The USB Lamp can be properly connected using USB Port 1 or 2.

Figure 3-11. USB Lamp connection

Peripherals Connection (continued)

6. Connect the USB Memory to the system. The USB Memory can be properly connected using USB Port 1 (the right portion of the figure).

Figure 3-12. USB Memory Connection

7. Connect the Bluetooth PC Card to the system. The Bluetooth PC Card can be properly connected using USB Port 1 (the right portion of the figure).

Figure 3-13. Bluetooth PC Card Connection

Peripherals Connection (continued)

8. Connect the Color Printer to the system. The Color Printer can be properly connected using USB Port 1 or 2.

Figure 3-14. Color Printer Connection

NOTE: HP 6800/HP6500/HP5700 Deskjet Color Printer must be connected with PIT (Printer Isolation Transformer) when being used.

Figure 3-15. HP Printer Connection

NOTE: Please refer to the operation manual of each peripheral for information needed by the user to operate the system safely.

For detailed installation information, please refer to the LOGIQ Book XP Series Peripheral Installation Instruction manual.

System Positioning/Transporting

Moving the System

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

Before moving the system

1. Shut down the system.See ‘Power Off’ on *page 3-30 for more information.*
2. Unplug the power cord (if the system is plugged in).
3. Disconnect all cables from off-board peripheral devices (external printer, etc.) from the console.

   To prevent damage to the Power Cord, DO NOT pull excessively on the cord or make sharp bends while wrapping.
4. Store all probes in their original cases or in soft cloth or foam to prevent damage.
5. Store sufficient gel and other essential accessories in the special storage case.

When moving the system

1. Always use the handle to move the system.

The system weighs approximately 5 kg (11 lbs). To avoid possible injury and equipment damage:

- Do not let the system strike walls or door frame.
- Limit movement to a slow careful walk.

Transporting the System

Use extra care when transporting the system using vehicles. In addition to the instructions used when moving the system (See ‘Moving the System’ on *page 3-21 for more information.*), also perform the following:

1. Before transporting, place the system in its special storage case.
2. Ensure that the system is firmly secured while inside the vehicle.
3. Secure system with straps or as directed otherwise to prevent motion during transport.

Attaching the Security Cable

To ensure that the LOGIQ Book XP Series is not removed from the premises, attach the security cable.

1. Wrap the cable around an imovable object.

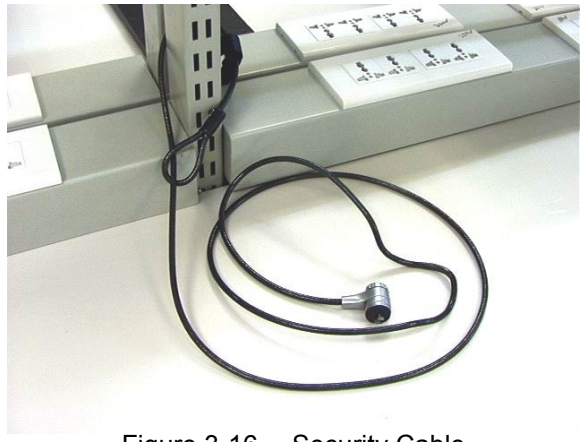


Figure 3-16. Security Cable

2. Be sure to rotate the key to the unlocked position (to the right).
3. Insert the lock into the security slot to the system's side cover.

Figure 3-17. LOGIQ Book XP Series with Security Cable

4. Rotate the key to the locked position (to the left).

Powering the System

Connecting and Using the System

To connect the system to the electrical supply,

1. Ensure that the wall outlet is of the appropriate type.
2. Plug the AC adapter connector on the LOGIQ Book XP Series.
3. Push the power plug securely into the wall outlet.

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

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

The system should rest on the handle to allow an air gap to prevent overheating.

DO NOT use the LOGIQ Book XP Series on plastic foam, paper or similar type surfaces. The system could overheat and slow down. Ensure that the LOGIQ Book XP Series is on a sturdy, heat resistant surface.

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.

Connecting and Using the System (continued)

Table 3-5: Example Plug and Outlet Configurations

AC DC Type	Specification		AC DC Type	Specification
	220-240 VAC, 108 VA (China)			220-240 VAC, 108 VA (Switzerland)
	220-240 VAC, 108 VA (India)			220-240 VAC, 108 VA (U.K.)
	220-240 VAC, 108 VA (Italy)			100-120 VAC, 108 VA (USA)
	220-240 VAC, 108 VA (Europe)			220-240 VAC, 108 VA (Israel)
	100-120 VAC, 108 VA (Japan)			220-240 VAC, 108 VA (Australia)

Power On

CAUTION

Press the top portion of the ***Power On/Off*** switch to turn the power on.

Figure 3-18. Power On/Off Switch Location

LED

Figure 3-19. LED Indicators

1. Indicates hard disk working status. When the LED is flashing, the system is writing or reading from the hard disk.

   Color: Green

2. Indicates power status. After pressing the Power On/Off switch, the system power is on and this LED is lit.

   Color: Green

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

   Color: Green and Orange

4. The fourth LED does not work on the LOGIQ Book XP Series.

Power Up Sequence

The system is initialized. During this time:

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

Figure 3-20. Power Up Graphic Sequence

- Probes are initialized for immediate operation.

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

Power Off

To power off the system:

1. Lightly press the **Power On/Off** switch at the front of the system once. The "**Full Maintenance Shutdown**" window is displayed.

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

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

   The shutdown process takes a few seconds and is completed when the second LED turns from green to off.

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

3. Disconnect the probes.

   Clean or disinfect all probes as necessary. Store them in their shipping cases to avoid damage.

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

NOTE: Disconnect the AC adapter mains plug from the outlet to ensure the system is disconnected from the power source.

Adjusting the Display Monitor

Rotate the LCD monitor

The LCD monitor position can be adjusted for easy viewing.

- Tilt the LCD monitor for the optimum viewing angle. The maximum angle is 160.

Figure 3-21. LCD Monitor

CAUTION

To avoid damage, DO NOT push the LCD monitor too much when the viewing angle is at maximum.

CAUTION

To avoid damage, DO NOT push or force the LCD monitor when there is a PCMCIA card in the port.

Brightness

Adjusting the LCD monitor's brightness is one of the most important factors for proper image quality.

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

You can obtain the optimum screen angle if you can see the LOGIQ Book XP Series watermark in the lower left portion of the screen (LOGIQ Book XP Series).

To adjust the brightness:

1. Adjust the Brightness slider, located beside the Top/Sub Menu (on the right side of the LCD monitor).

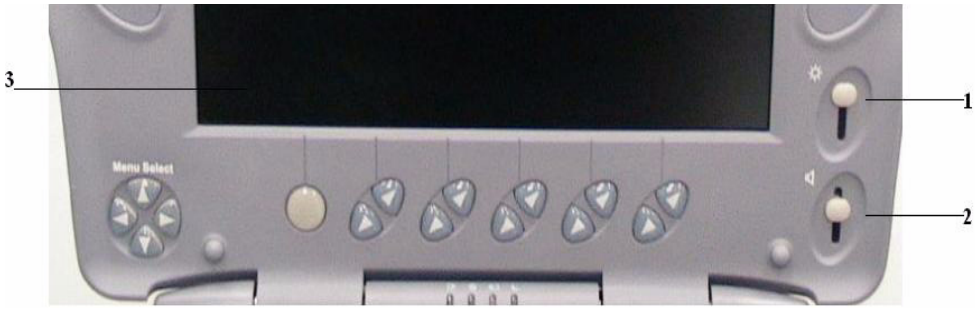


Figure 3-22. Brightness

1. Brightness
2. Volume
3. LOGIQ Book XP Series Watermark

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

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

Speakers

Audio is provided by speakers located on the sides of the display monitor.

Probes

Introduction

Only use approved probes.

All GE approved imaging probes can be connected into the probe port of the LOGIQ Book XP Series.

Refer to the *Probes* chapter.

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 ***Preset***.
- Begin the scan session using the default Power Output setting for the probe and exam.

Connecting the Probe

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

To connect a probe:

1. Place the probe's carrying case on a stable surface and open the case.
2. Carefully remove the probe and unwrap the probe cord.
3. DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage. Use the integrated cable management hook to wrap the cord.

   Inspect the probe before and after each use for damage or degradation to the housing, strain relief, lens, seal 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. Align the connector with the probe port and carefully push into place with the cable facing the front of the system.
5. Flip the connector locking lever up.
6. Carefully position the probe cord so it is free to move and is not resting on the floor.
7. When the probe is connected, it is automatically activated.

Figure 3-23. Probe connection to LOGIQ Book XP Series

Connecting the Probe (continued)

Figure 3-24. Probe connector locking handle

CAUTION

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.

Cable Handling

Take the following precautions with probe cables:

- Do not bend the cable acutely

Deactivating the Probe

To deactivate a probe:

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

Disconnecting the Probe

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

- Press the connector locking lever down.
- Pull the probe and connector straight out of the probe port.
- Carefully slide the probe and connector away from the probe port and around the right side of the keyboard.
- Ensure the cable is free.
- Be sure that the probe head is clean before placing the probe in its storage box or a wall hanging unit.

Figure 3-25. Probe connector locking handle

Figure 3-26. Probe connection to LOGIQ Book XP Series

Transporting Probes

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

Storing the Probe

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

- 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.

Operator Controls

Control Panel Map

Figure 3-27. Control Panel

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

Control Panel Map (continued)

1. Time Gain Compensation (TGC).
2. New Patient.
3. End Exam.
4. Mode/Gain/Auto keys: M-Mode, Pulsed Wave Doppler (PW) Modes, Color Flow (CF) Mode and B-Mode.
5. Preset Key.
6. Imaging/Measurement Keys: Clear, Comment, Body Pattern, Ellipse, Measure, Zoom/Size, M/D Cursor, Scan Area, Set/B Pause.
7. Depth.
8. Reverse.
9. Imaging Keys: Multi Image and 3D Left/Right Select.
10. Programmable Print Keys.
11. Freeze.
12. Alphanumeric Keyboard. Use the keyboard to enter patient information and annotations.

NOTE: Easy 3D is not available on the LOGIQ Book XP Pro.

Keyboard

	The standard alphanumeric keyboard has some special functions.
Esc	Exit current display screen.
Help (F1 Key)	Access Online help / user manual.
PDI (F2 Key)	Power Doppler Image.
3D (F3 Key)	Three dimensional.
Steer (F4 Key)	PWD/CFM Steer
User Define Function (F5 and F6 Keys)	The F5 and F6 keys are programmable. Options include: Arrow, ECG, Eject, Harmonics, Report, Spooler, Utility, Vet and Worksheet. See 'Key Configuration' on *page 16-114 for more information.*
NOTE:	*Report is not available on the LOGIQ Book XP Pro.*
NOTE:	*Easy 3D is not available on the LOGIQ Book XP Pro.*

Top/Sub Menu

The Top/Sub Menu contains exam function and mode/function specific controls.

Figure 3-28. Top/Sub Menu Controls

NOTE: Different menus are displayed depending on which Top/Sub Menu is selected.

The Top/Sub Menu contains up/down two-button softkeys associated with it. The functionality of these controls change, depending upon the currently displayed menu.

Mode, Display and Record

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

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

- During dual display modes the **L** and **R** keys activate the Left or Right displayed image.
- B Pause freezes the B-Mode image while keeping the Doppler spectrum display active.
- Auto is used to:
  - initiate auto optimize
  - turn off auto optimize.
- Depth controls the image display depth.
- The Reverse key toggles the left/right orientation of the scan image.
- Record keys are used to activate/print the designated recording device (e.g. video page printer, multi-image camera, image archive option).
- 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.
- P1 key saves the image to hard disk (factory default setting).
- P2 key print the image (factory default setting).
- P3 key captures the screen (factory default setting).

NOTE: The function of the P1, P2 and P3 keys can be customized.

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 Top/Sub Menu.
- 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.
- When the Ellipse control is pressed, 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.
- When the Body Pattern control is pressed, it enables the Body Pattern Top/Sub Menu and displays the default pattern on the screen.

  The Clear key is used to clear the body pattern.
- The Measure key is used in all types of basic measurements. It also becomes the “mouse” arrow for making selections along with the Set key (to fix or finish a selection). When the Measure key is pressed, the measurement Top/Sub Menu is displayed.

Measurement and Annotation (continued)

- When the Zoom control is pressed, it activates the write zoom function.
- The Zoom Clear key is used to quit from all zoom layers and restore to the default display mode.
- The M/D Cursor key enables Trackball control of the M-Mode or Doppler cursor line (not angle correction) or the CFM window in real-time Color Flow Mode.
- The Scan Area key enables Trackball control of the B-Mode image area size and position in B/W, the CFM window size and position in Color mode, and the Zoomed area size and position in Zoom.
- The Set key is used for various functions, but is generally used to fix or finish an operation (e.g. to fix a measurement caliper).
- The Trackball is used with almost every key function in this group. Trackball control depends on the last key function pressed.

Monitor Display

Monitor Display

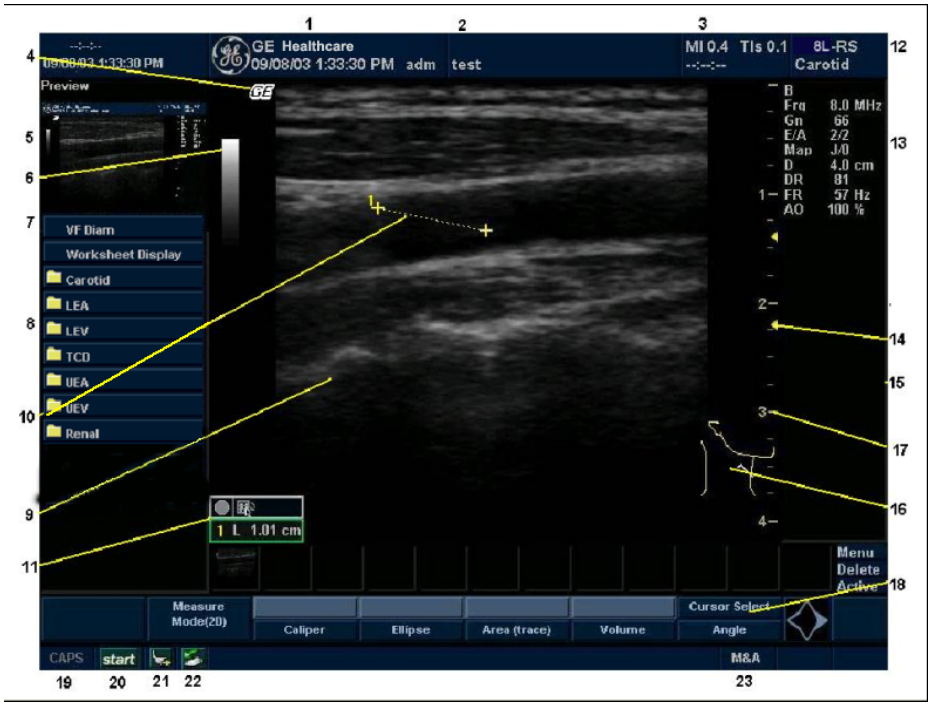


Figure 3-29. Monitor Display Tour

1. Institution/Hospital Name, Date, Time, Operator Identification.
2. Patient Name, Patient Identification.
3. Power Output Readout
4. GE Symbol: Probe Orientation Marker.
5. Image Preview.
6. Gray/Color Bar.
7. Cine Gauge.
8. Measurement Summary Window.
9. Image.
10. Measurement Calipers.
11. Measurement Results Window.
12. Probe Identifier. Exam Preset.
13. Imaging Parameters by Mode.
14. Focal Zone Indicator.
15. TGC.
16. Body Pattern.
17. Depth Scale.
18. Top/Sub Menu.
19. Caps Lock (On or Off)
20. Start Menu Icon
21. Battery Icon
22. Card Icon
23. Trackball Functionality Status: Scroll, M&A (Measurement and Analysis), Position, Size, Scan Area Width and Tilt

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

The **New Patient** key on the keyboard should be pressed at the beginning of each patient study. Pressing this key displays the Patient Entry Menu in the LCD display.

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 “Select All” if you are unsure of saving. Exams and patients can always be erased later.

Patient Screen

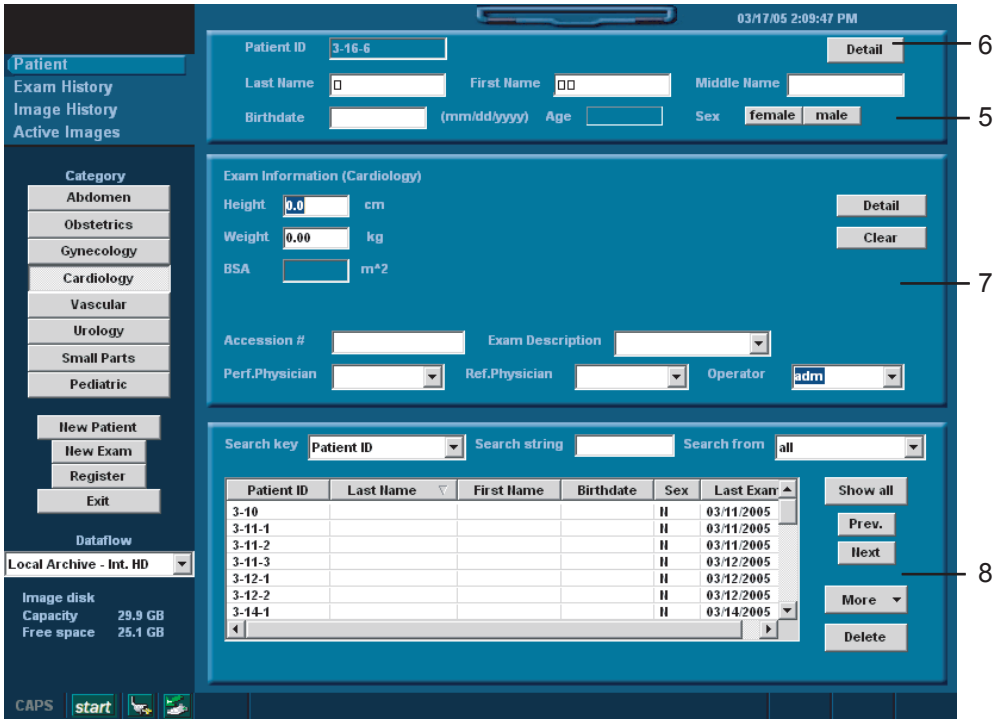


Figure 4-1. Patient Screen (Category: Cardiology)

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 white arrow cursor.

Figure 4-1 shows the location of these windows on the Patient Screen. The Patient Screen details are:

1. Image Management
   - Patient–New patient screen (currently selected)
   - Exam History–Exam History screen.
   - Image History–Image History screen.
   - Active Images–Active Images screen.
2. Category Selection
   - Select from 8 exam application categories: Abdomen, Obstetrics, Gynecology, Cardiology, Vascular, Urology, Small Parts or Pediatrics.

     When a category is selected, the measurement and category presets are displayed.
3. Function Selection
   - New Patient–Used to clear patient entry screen in order to input a new patient's data into the database.
   - New Exam–Used to create a new exam on a current patient.
   - Register–Used to enter new patient information into the database prior to the actual exam being performed. **REQUIRED**
   - Exit–Used to exit Patient Menu.
4. Dataflow Selection
   - Select the appropriate dataflow.
   - The default is *Local Archive Int HD*

Patient Screen (continued)

5. Patient Information
   - Patient ID Number
   - Patient Name–Last, First and Middle
   - Birthdate
   - Age (automatically calculated when birthdate is input)
   - Sex
6. Patient Detail
   - Patient's Address
   - Telephone Number
   - Comments

Figure 4-2. Detail Window

CAUTION

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

Patient Screen (continued)

7. 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.
   - Detail–Select the Detail box to activate/deactivate the exam details. Exam details include Indications, Comments, Admission Number, Perf. Physician's Telephone Number, Ref. Physician's Telephone Number and Operator Telephone Number.
8. Patient List
   - Lists the patients in the database.

   NOTE: If "Exam Date Between" is selected, the Input Dialog displays and you can select the date from the displayed calender.
   - Search key–select search item from Patient ID, Last Name, First Name, Birthdate, Sex(f.m), Examdate Before, Examdate, Examdate after, Accession Number and Exam Description.
   - Search string–enter appropriate information.
   - Search from–select appropriate database.
   - Show all–displays the entire patient list
   - More–gives you options like moving images, export, import and DICOM properties.
   - Delete–use to remove the selected patient from the database.
9. Press ***Register***.
10. Press ***Esc*** or **Patient**. The patient informaiton is displayed on the title bar.

Changing Patient Information or an Exam

If patient information needs to be edited, press ***Patient*** on the control panel to modify information.

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

1. Display the Patient screen by pressing ***Patient*** on the control panel.
2. Select patient from the Patient list. The system automatically searches to see if the patient is already in the database.
   - Select Search key by choosing one of the following: Patient ID, First Name, Last Name, Birthdate, Sex (f.m), Examdate Before, Examdate, Examdate after, Accession Number and Exam Description.
   - Enter search string (for example, initial letter of Patient Name)
   - Select the database in the “From” box. There are two choices, searching the entire database list or searching the list currently displayed.

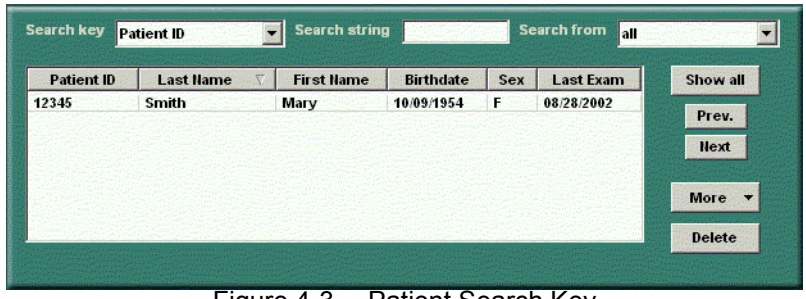


Figure 4-3. Patient Search Key

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.

Changing Patient Information or an Exam (continued)

4. To have the database shown in its entirety, ***Backspace*** on the Search string and all patient names appear.
5. Press 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.

   If an exam already exists for that patient, the following warning is displayed.

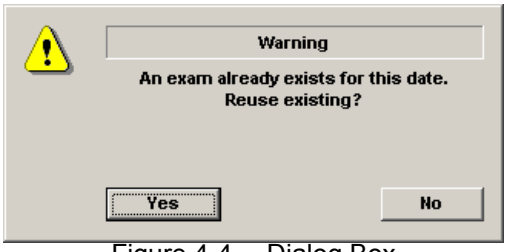


Figure 4-4. Dialog Box

   Select “Yes“ to reuse the existing data.

   Select “No” to create a new exam for the patient.

6. To display patient information on the title bar, press the ***Esc*** key or the **B-Mode** key. Select the Preset and appropriate probe Top/Sub Menu keys, if necessary.

User-Defined Application Presets

1. From the keyboard, press the **Preset** key. The Probe screen appears.

Figure 4-5. Probe Screen

2. Press ***Create New Preset***. A pop-up menu appears:

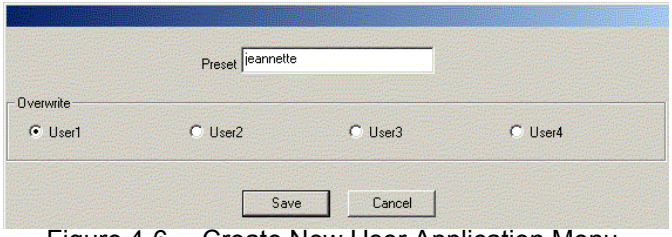


Figure 4-6. Create New User Application Menu

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

User-Defined Application Presets (continued)

3. Type the name of the new application. Specify which User Top/Sub Menu key you want to use and press ***Save***.

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

The new application now appears on the Top/Sub Menu.

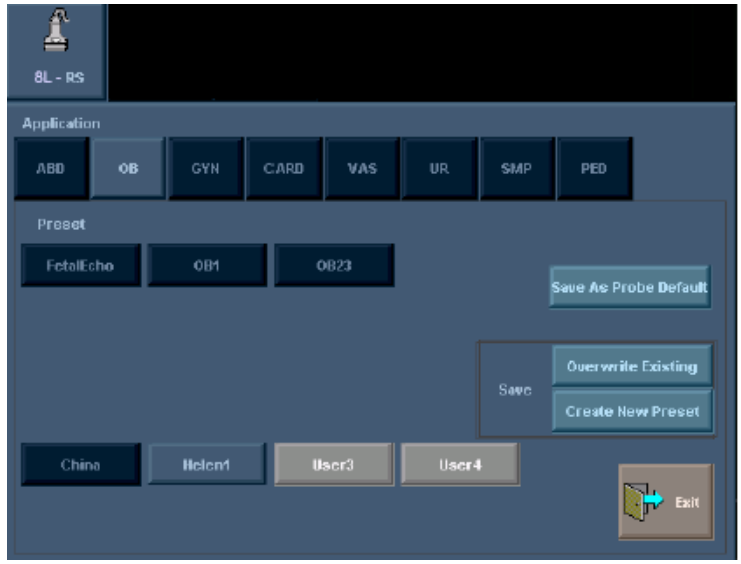


Figure 4-7. New User Application

NOTE: You can set up to four (4) user-defined application presets for each exam category.

User-Defined Application Presets (continued)

4. To view/edit the parameters for the user-defined preset, press ***Utility*** --> Presets.

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

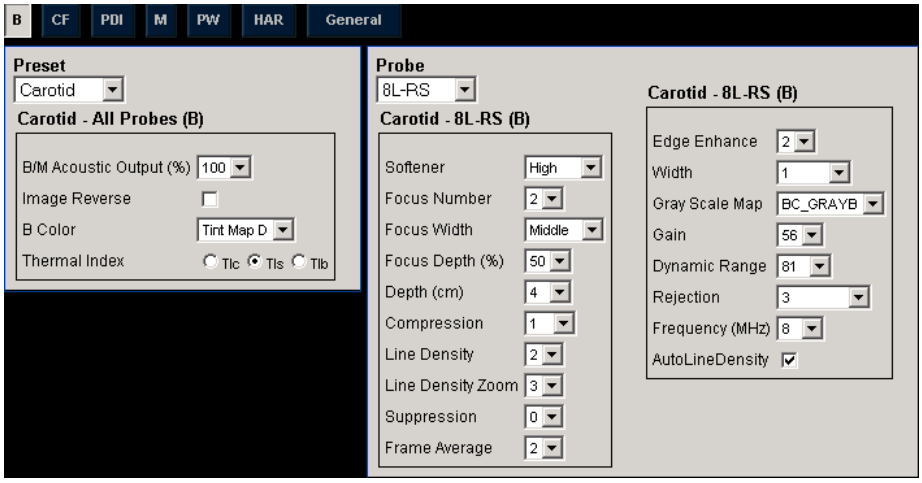


Figure 4-8. Imaging Presets for User-Defined Application

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

NOTE: Currently, there is no way to delete a user-defined application.

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, Doppler Mode, and 3D Mode.

Easy 3D not available on LOGIQ Book XP PRO

Optimizing B-Mode

Intended Uses

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

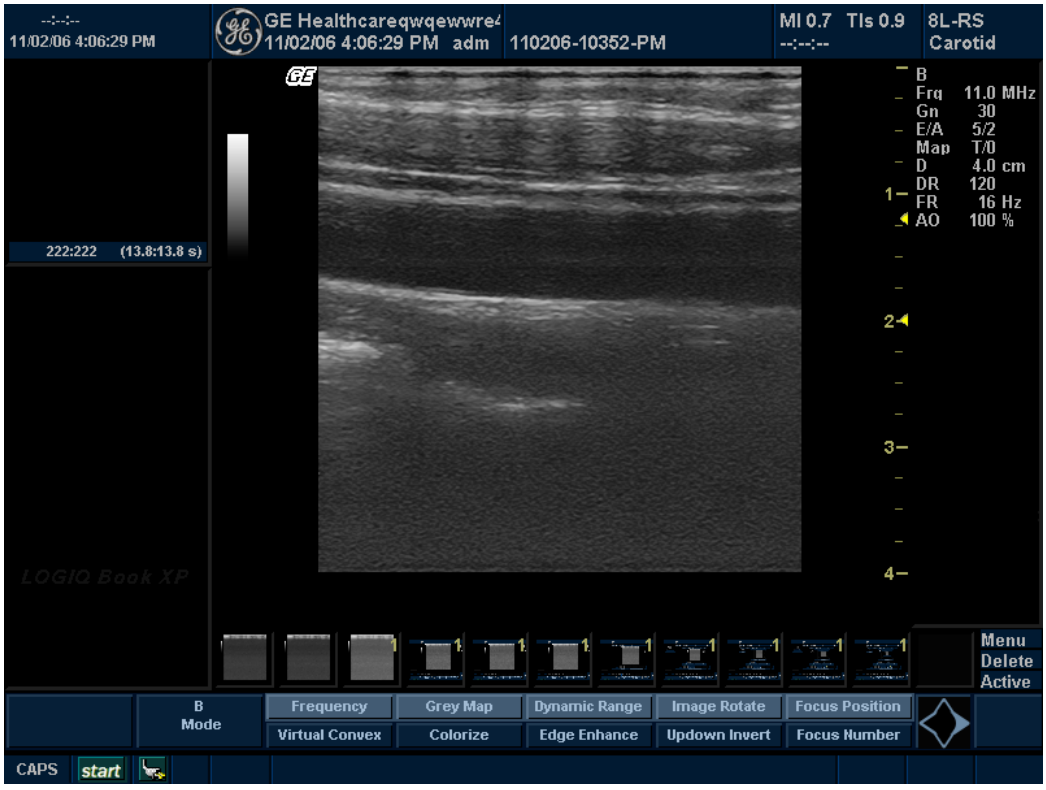


Figure 5-1. B-Mode Display

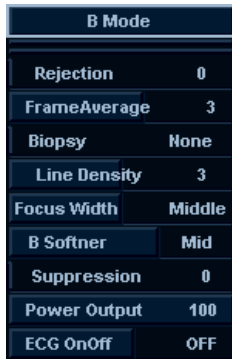
Typical B-Mode Exam Protocol

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.

B-Mode Top/Sub Menu

Figure 5-2. B-Mode Top/Sub Menu



B-Mode Scanning Hints

HINTS

These B-Mode controls produce the following results:

Auto Optimize. Improves imaging performance while reducing optimization time. Available in B-Mode and Doppler Mode.

Tissue Harmonics. Enhances near and mid field resolution for improving imaging contrast and reducing noise as well as far field penetration.

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. Affects the amount of gray scale information displayed. If you increase the gain, you may want to decrease the Dynamic Range.

Edge Enhance. Affects the amount of border crispness.

Frame Average. Smooths the image by averaging frames. Affects the amount of speckle reduction.

B Softener. Affects the amount of lateral smoothing.

Suppression. Suppresses the noise in the image.

TGC. Adjust TGC to adjust Gain in specific areas.

Focus Number/Position. The best focusing is at the focal zone location. Put focal zone(s) at the area of interest. Be conscious of where the focal zones are. Focal zones must be moved to track at the center of the anatomy of interest.

Scan Area. Sizes region of interest. Adjust the Scan Area 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**.

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 Calc, 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

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.

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

Values

Gain displays on the monitor in Gn (dB). Maximum gain varies by probe. The current gain value is displayed. Gain values vary by probe, application, and frequency setting.

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

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

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 or moves the focal zone(s) 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 Number.

NOTE: Focus Position and Focus Number share the same control. Press the control to toggle between Focus Position and Focus Number.

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

NOTE: Each adjustment cycles you to the next setting.

Values The LOGIQ Book XP Series is capable of presenting up toeight focal zones. Focus zone number and position vary depending on the depth, zoom, probe, application, and frequency setting selected.

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

Description	Auto lets you optimize the image based upon a specified region of interest or anatomy within the B-Mode image or Spectral Doppler in order to improve the contrast of the displayed image data. Auto Optimize is available in B-Mode, specifically in single or multi image, on live, frozen or CINE images, and while in zoom and in Spectral Doppler. However, it is not available in Display Zoom. Auto in Doppler Mode optimizes the spectral data. Auto adjusts the Velocity Scale/PRF, baseline shift, dynamic range, and invert (if preset). The benefit of Auto can be found in reduced optimization time and a more consistent and accurate optimization process. Upon deactivation, the spectrum is returned to the original dynamic range; however, the velocity scale, baseline, and angle is still optimized.
Adjusting	To activate, press **Auto On**.
Values	Auto Optimize is active until you deactivate it. However, Auto Optimize values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calc, New Patient, or Multi Frequency.
Affect on other controls	You may need to adjust the Gain.

M/D Cursor

Description	Displays the M/D-Mode cursor on the B-Mode image.
Adjusting	To activate/deactivate the M/D-Mode cursor, press **M/D Cursor**. **Trackball** to position M/D-Mode cursor.
Values	On/Off.
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.

Harmonics

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

Adjusting To activate Harmonic imaging,

Press ***Ctrl + H*** to access the harmonics function.

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

Values On/Off. See Chapter 17 for probe availability. `THI' appears next to the active probe indicator.

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 Harmonics diminishes low frequency high amplitude noise and improves imaging technically difficult patients. Harmonics may be especially beneficial when imaging isoechoic lesions in shallow-depth anatomy in the breast, liver, and hard-to-visualize fetal anatomy. Harmonics may improve B-Mode image quality without introducing a contrast agent.

Affect on other controls You may need to change the field of view (Depth). DO NOT use contrast agents while in Tissue Harmonics.

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,

1. Select ***Frequency***.
2. Select the desired frequency.

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

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

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.

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.

NOTE: TGC adjusts automatically when using zoom. The TGC curve does not change while in CINE.

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

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

Scan Area

Description — You can widen or narrow the size of the sector angle to maximize the image's region of interest (ROI).

Adjusting — To narrow/widen the angle, press **Scan Area** until *Width* is highlighted in the message line and move the **Trackball** left/right to decrease/increase the angle size. Then press **Scan Area** to set the ROI.

Values — Varies, depending upon the probe (not applicable to linear probes) and application.

Benefits — Increase the sector angle to see a wide field of view; decrease the sector angle when you need to have a faster frame rate, as in fetal heart.

Affect on other controls — Changing the sector angle affects the frame rate. The narrower the sector angle, the faster the frame rate.

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

Reverse

Description — Flips the image 180 degrees left/right.

Adjusting — To flip the image 180 degrees, select Reverse.

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.

Dynamic Range (Compression)

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 steps from 30 dB to 120 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 only in realtime, not in Freeze, CINE, CINE Timeline and affects Gain.

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.
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.

Map

Description The system supplies B, M, and Doppler Mode system maps.

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

Values Gray maps gradually change from least contrasty or softest to most contrasty.

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

Map	Description
A	Assigns a greater amount of gray scale pixel values to bright reflectors in the image. Useful when imaging abdomen, liver, kidney, OB, pelvic, etc.
B	Assigns a greater amount of gray scale pixel values to bright reflectors in the image. Useful when the abdomen, liver, kidney, OB, pelvic, etc.
C	Assigns a greater amount of gray scale pixel values to bright reflectors in the image. Useful when imaging the abdomen, liver, kidney, OB, pelvic, etc.
D	Assigns a lesser amount of gray scale pixel values to bright reflectors in the image, compared to Maps B and C. Useful when imaging bright carotid plaque reflectors.
E	Assigns a equal amounts of gray scale pixel values to all reflectors in the image. Useful when imaging tissue with bright reflectors, e.g., cyst with septations or calcifications.
F	Assigns a lesser amount of gray scale pixel values to bright reflectors in the image. Useful when imaging arteries and grafts.
G	Assigns a lesser amount of gray scale pixel values to weak reflectors in the image than Map F. Useful when imaging small parts.
H	Assigns an s-shape to gray scale pixel values. Useful when imaging anatomical signals with less tissue differentiation, e.g., tendon, vein, carotid, thyroid, breast, etc.
I	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., renal, tendon, vein, carotid, thyroid, breast, etc.
J	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., renal, tendon, vein, carotid, thyroid, breast, etc.
K	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., renal, tendon, vein, carotid, thyroid, breast, etc.

Map	Description
L	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., cardiology.
M	Assigns a lesser amount of gray scale pixel values to weak reflections in the image than Map C. Useful when imaging abdomen and liver.
N	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., renal, tendon, vein, carotid, thyroid, breast, Cardiology, etc.

Frame Average

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

Adjusting To adjust frame averaging, adjust Frame Average on the Top/Sub Menu.

Values The current value displays on the Top/Sub Menu. Frame Average values vary by probe, application, and multi frequency setting.

Frame Average values are returned to the preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient, Multi Frequency.

Benefits Smooths the image.

Virtual Convex

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

Virtual Convex is always active with linear probes.

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

Values On/Off.

Benefits Virtual Convex allows for a wider field of view. Available in B-Mode, Color Flow Mode, and Doppler Mode.

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

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

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, select ***Colorize*** on the Top/Sub Menu.

To deselect, select a gray map.

Edge Enhance

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

Adjusting To cycle through settings, adjust ***Edge Enhance*** on the Top/Sub Menu.

Values 0-5, with 0 = Off and 5 = High. The current value displays on the Top/Sub Menu. Values vary by probe, application, and multi frequency setting. Values are returned to the preset value when you change: Probe, Exam Category, Exam Calcs, New Patient, or Multi Frequency.

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 realtime only; not in Freeze or CINE.

Updown Invert

Description You can flip the image up/down.

Adjusting To flip the image vertically, select ***Updown Invert***.

Values Up/down. Values vary by probe and application. Values are returned to the preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits Beneficial in transvaginal and transrectal scanning.

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

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).

Adjusting Adjust to the right to increase and left to decrease.

Values Values vary.

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

Image Rotate

Description Flips the image every 90 degrees.

Adjusting To flip the image vertically, select ***Rotation***.

Values Up/down. Values vary by probe and application. Values are returned to the preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits Orient image display for easy reference.

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

B Softner

Description Affects the amount of lateral smoothing. It's similar to dynamic range by softening the appearance/edges of the image.

Values Off, Low, Medium, High

Suppression

Description Suppression the noise in the image.

Values 0-5

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.

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 **M/D 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

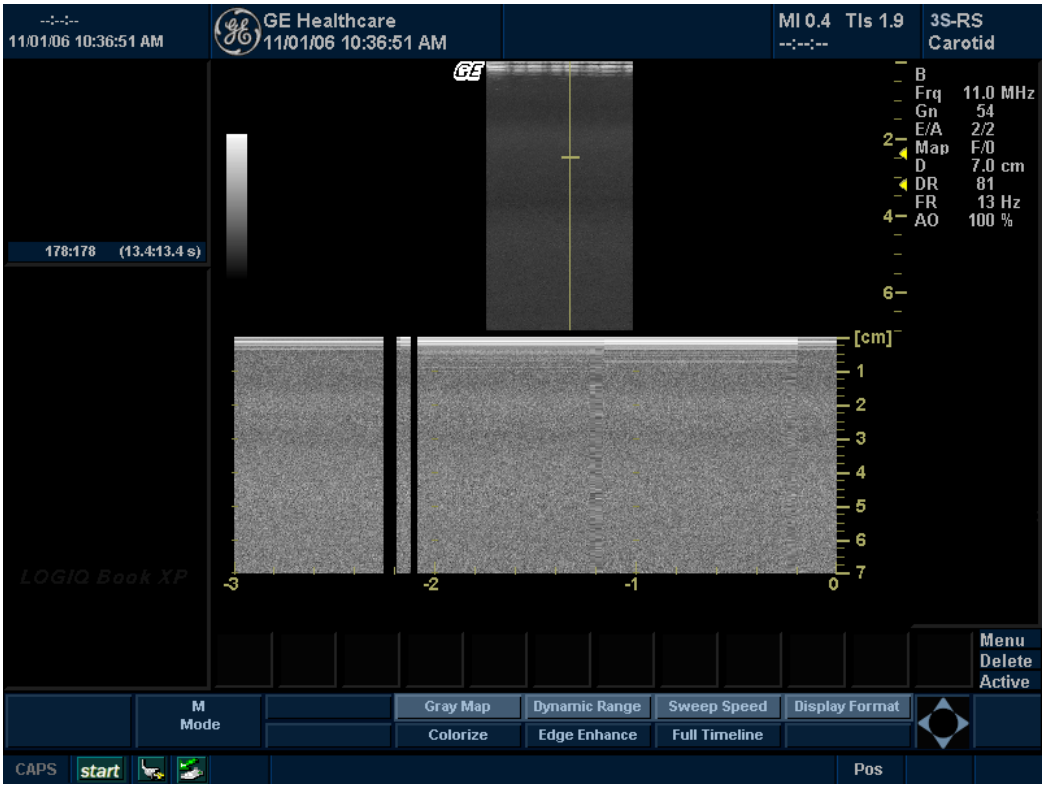
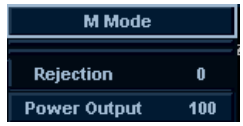


Figure 5-3. M-Mode Display

M-Mode Top/Sub Menu

Figure 5-4. M-Mode Top/Sub Menu



Scanning Hints

HINTS

These M-Mode controls produce the following results:

Edge Enhance. Affects border sharpness.

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.

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.

Bioeffects

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

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

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.
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.

Activating Color Flow

To activate Color Flow Mode,

1. Press **CF** (Color Flow). The CF window appears over the B-Mode image. Move the **Trackball** to move the CF window.

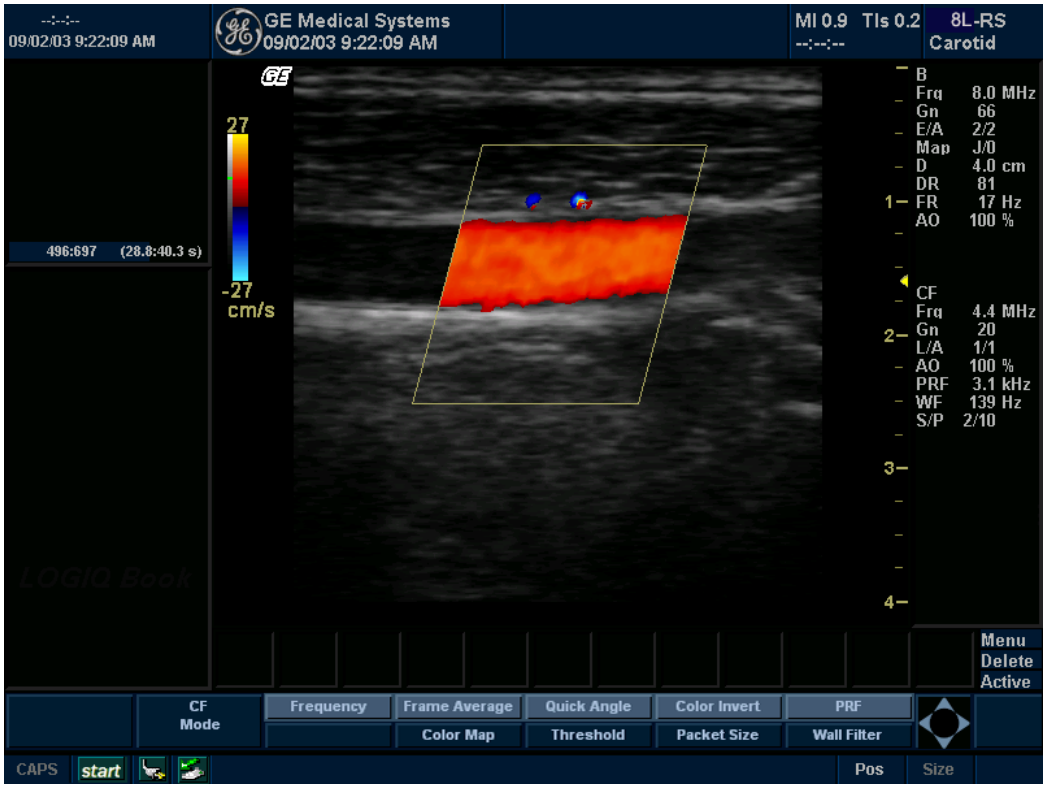


Figure 5-5. Color Flow Mode Display

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.

Exiting Color Flow

To exit Color Flow, select **CF**-Mode or **B**-Mode.

Color Flow and Power Doppler Scanning Hints

HINTS

Color Flow Mode controls produce the following results:

Line Density. Trades frame rate for sensitivity and spatial resolution. If the frame rate is too slow, reduce the size of the region of interest, decrease the line density, or reduce the packet size.

Wall Filter. Affects low flow sensitivity versus motion artifact.

Color ***Threshold***. Percentage of gray scale level where color Doppler is overwritten.

Frame Average. Affects temporal smoothing and color Doppler `robustness.'

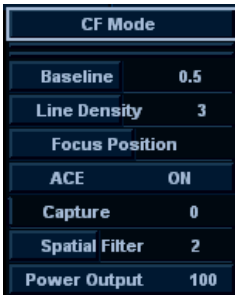
Packet Size. Affects the amount of color Doppler sensitivity versus frame rate.

Scan Area. Increases/decreases size of color window.

Focus Position. The best focusing occurs at the focal zone caret location. Put focal zone(s) at the area of interest.

Color Flow Mode Top/Sub Menu

Figure 5-6. Color Flow Mode Top/Sub Menu



Gain

Description	Gain amplifies the overall strength of echoes processed in the Color Flow window or spectral Doppler timeline.
Adjusting	Gain values change depending on the probe and application; they are not associated with a particular position of the button. To decrease/increase Gain, adjust the dial to the left/right.
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 output level can usually be reduced to produce an equivalent image quality.

PRF (Pulse Repetition Frequency)

Description	Increases/decreases the PRF on the color bar.
Adjusting	To raise/lower the velocity scale, press PRF/Wall Filter until you reach PRF, then adjust PRF up/down.
Values	PRF is in kHz. PRF 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 PRF may affect Power Output, frame rate, and wall filter. When you adjust the velocity scale, CINE memory is cleared.
Bioeffects	Changing the PRF 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 ***PRF***/***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.

Color Scan Area

Description	Color Scan Area sizes and positions the color window.
Adjusting	The window grows from the center of the color flow window. To adjust the size, press **Scan Area** (Size appears in the **Trackball** Status area on the monitor display) then move the Trackball left/right, up/down. To adjust the position, press **Scan Area** (Pos appears in the Trackball Status area on the monitor display) then move the **Trackball** to position the color window.
Values	Sector and Convex Probes. Ranges from 5 degrees to 133 degrees in 5 degree to 23 degree increments. Linear Probe. Ranges from 10% 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.

Invert (Color Invert)

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

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

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

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

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

Baseline

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

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

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

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

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

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

Quick Angle

Description Quickly adjust the angle by 30 degree.

Adjusting To quickly adjust the angle, press ***Quick Angle***.

Values -60, -30, 0, 30 and 60 degrees.

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*** Top/Sub Menu key.
Values	The current frame rate is shown on the Top/Sub Menu. 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.

Color 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 Top/Sub Menu displays. To cycle through available maps, select ***Color Map*** and toggle through the map choices using up/down.
Values	Velocity Maps (VL). 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.

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 Top/Sub Menu.

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 Top/Sub Menu.

Values Frame Average values vary by probe and application; the highest value is color capture in both PDI and Color Flow. 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.

Spatial Filter

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

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

Values 0-5.

Benefits Smooths the image.

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.
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.

Power Doppler Imaging (PDI)

Description

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

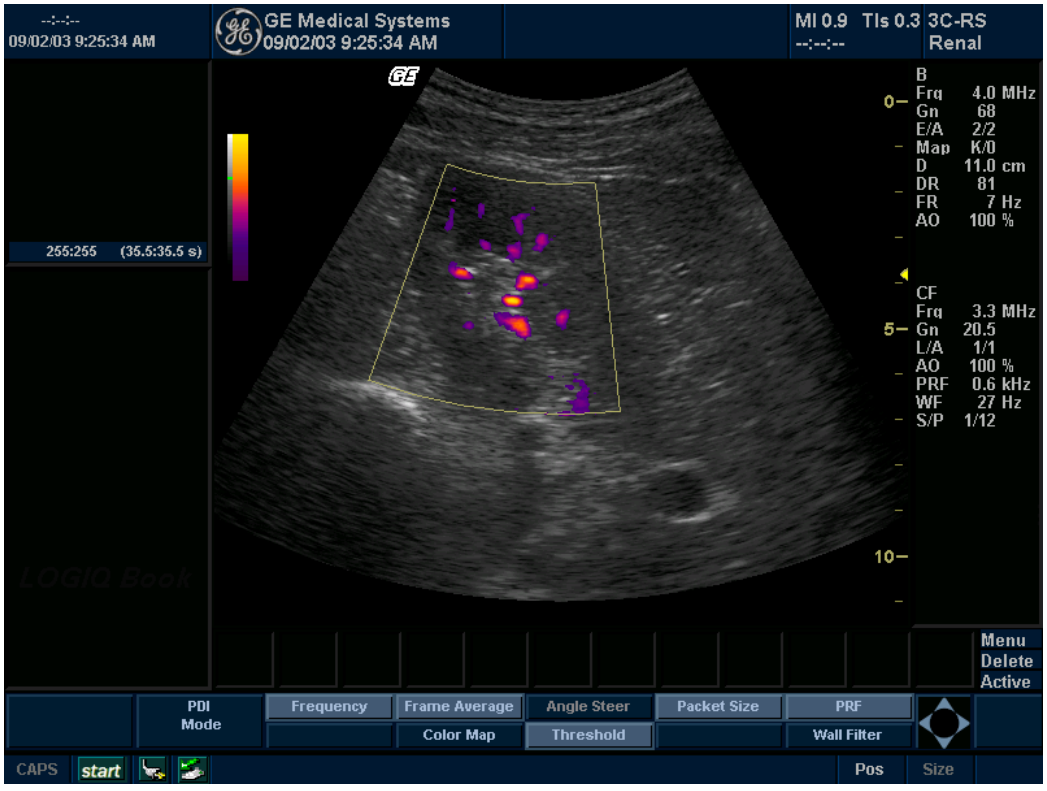


Figure 5-7. Power Doppler Imaging Display

Benefits

Since PDI does not display velocity, it does not aliase.

Power Doppler Imaging (PDI) (continued)

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.

Values

On/Off.

Twelve power (P0-P6 and P8-P12) and one Directional PDI map (P7) is available.

Affect on other controls

When PDI is activated, the following controls are adjusted: PRF is set to a lower setting. Color Map is set to a power map. Line Density is adjusted. Wall Filter is set to a lower setting. 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.

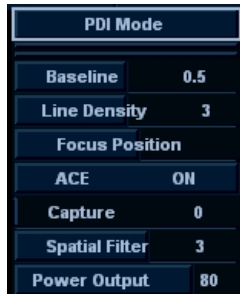
P-1. The expanded map is designed to expand or increase the dynamic range of data displayed in a PDI image to show both low and high flow states. It is especially useful for highlighting very low flow states just above the noise floor as in renal vessels.

P-3. The compressed map is designed to compress or decrease the dynamic range of the PDI image data to highlight high flow states and suppress noise.

P-7. Directional PDI displays the direction of flow while in Power Doppler Imaging. Gives all the benefits of PDI while also providing directional information not available in traditional PDI. Used in applications where sensitivity and angle independence is desired, but directional information is also required. Flow towards the transducer is red; flow away is dark blue to light blue.

PDI (Power Doppler Imaging) Mode Top/Sub Menu

Figure 5-8. PDI Mode Top/Sub Menu



NOTE: For more details on the controls, see the Color Flow Mode optimization control descriptions.

Optimizing Spectral Doppler

Intended Use

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

Typical Use - PW Doppler

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

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

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

Typical exam protocol

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

1. Connect the appropriate probe, leaving the probes in their respective holders.
2. Position the patient for the examination.
3. Press **Patient**. Enter the appropriate patient data using the appropriate exam category.
4. Select the preset, application and probe to be used.
5. Locate the anatomy to be examined. Get a good B Mode image. Press CF to help locate the vessel you wish to examine.
6. Press **M/D 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 **B Pause** to toggle between real time B-Mode with Doppler Mode (with audio).
10. Sample along the whole length of the vessel. Make sure that the probe is parallel to flow. Listen, then look, when positioning the sample volume cursor.
11. Press **Freeze** to hold the trace in memory and stop imaging. Activate CINE Timeline, as necessary. See ‘Activating CINE’ on *page 6-6 for more information.*
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.

Activating Doppler Mode

To activate PW Doppler Mode, press PW.

The 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.

B Pause toggles between real time B-Mode with Doppler Mode and real time spectral display.

Use Doppler is used to examine blood flow information.

To exit PW Doppler Mode, press PW.

Activating Triplex Mode

To activate Triplex Mode, press CF. Press PW.

The Doppler spectrum displays along with the Color Flow and 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.

Use Triplex Mode is used to examine blood flow information.

To Exit PW Doppler Mode, press CF, then PW.

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 Repitition 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.

Imaged Doppler

When you view the PW Doppler spectrum and a B-Mode image with a 3.5 MHz probe, this means that you are viewing the image at 3.5 MHz and `Dopplering' at 2.5 MHz.

Doppler Mode Display

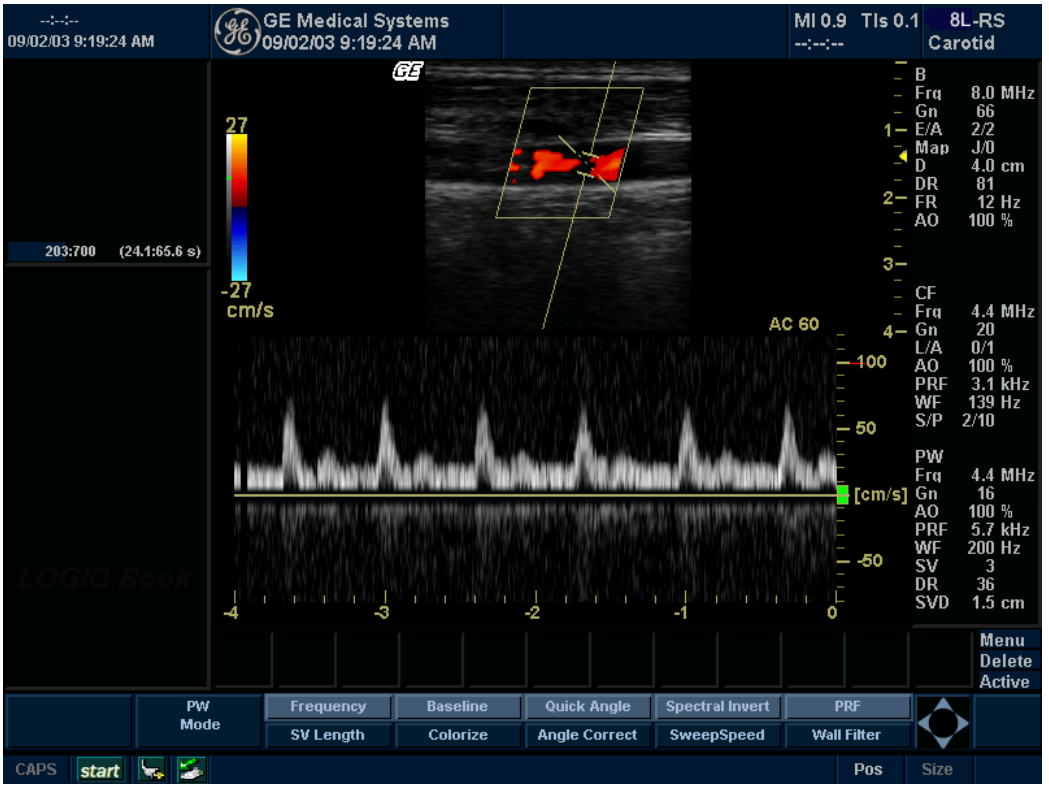


Figure 5-9. Doppler Mode Display

Table 5-1: Doppler Mode Display Explanations

Doppler Display	Description, Format, Values
PRF	Pulse repetition frequency, displayed as PRF in kHz.
Wall Filter	Wall filter size, displayed as WF in Hz.
Doppler Gain*	Displays as GN in decibels (db).
Sample Volume Depth	Displays (in Cm) when Doppler cursor is present.
Doppler Angle (AC ##)	Indicates angle in degrees between the Doppler mode cursor and the angle correction indicator. Displays when Doppler cursor is present. The Doppler Angle displays in red when the angle exceeds 60°. Velocities obtained when the angle is greater than 80° are displayed as asterisks (***).
Spectral Invert	INVERT appears when the spectral trace is inverted and the plus/minus signs (+/-) are reversed.

Table 5-1: Doppler Mode Display Explanations

Doppler Display	Description, Format, Values
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 PRF.

Doppler Mode Scanning Hints

HINTS

The best Doppler data is collected when parallel to flow, with orientation also parallel to the anatomic target; whereas, the best B-Mode image data is collected perpendicular to the anatomic target. Therefore, you don't usually get both an ideal B-Mode image and ideal Doppler data simultaneously.

Control overview

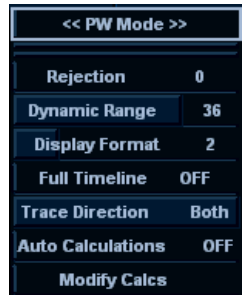
Dynamic Range. Affects the amount of Doppler amplitude data displayed.

Wall Filter. Removes the noise caused by vessel or heart wall motion at the expense of low flow sensitivity.

Sweep Speed. Controls speed of spectral update.

Doppler Mode Top/Sub Menu

Figure 5-10. PW Mode Top/Sub Menu



B Pause

Description Toggles between simultaneous and update presentation while viewing the timeline.

Adjusting To activate, press **B Pause** 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.

Doppler sample volume gate position (Trackball)

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

Adjusting To move Doppler Mode cursor position, move **Trackball** left or right until positioned over the vessel.

To move sample volume gate position, move **Trackball** up or down until positioned inside the vessel.

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

Benefits Positions the sample volume gate to sample blood flow.

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

Doppler sample volume length

Description Sizes the sample volume gate.

Adjusting To increase/decrease the gate size, adjust ***SV Length*** on the Top/Sub Menu. Hold down key to continuously size gate. A black bar appears indicating changes made to the sample volume size, but this is not a time discontinuity.

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

Values Values vary by probe and application.

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

Benefits A smaller gate produces accurate sampling results because it is more sensitive. You can also enlarge the gate to hear the Doppler audio better or 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.

PRF

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 PRF capability, the system automatically switches to high PRF mode. Multiple gates appear, and HPRF is indicated on the display.

High PRF

High Pulse Repetition Frequency (HPRF) is a special operating mode of PW Doppler. In HPRF mode, multiple energy pulses are used. This allows higher velocities to be detected without causing aliasing artifacts. HPRF mode is used when detected velocities exceed the processing capabilities of the currently selected PW Doppler scale or when the selected anatomical site is too deep for the selected PW Doppler scale. The pulse repetition frequency (PRF) is displayed to the left of the spectrum in frames per second.

NOTE: Ensure that only one gate overlays a blood vessel at a time. Otherwise, signals from more than one flow area are superimposed.

Adjusting

To raise/lower, adjust the ***PRF*** on the Top/Sub Menu (PRF and Wall Filter share the same control. Press the control to toggle between PRF and Wall Filter). 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.

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.

Angle Correct

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

NOTE: When the Doppler Mode Cursor and angle correct indicator are aligned (The angle is 0 degree.), 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 on the Top/Sub Menu. The velocity scale changes when you adjust angle correct.

Values 1 increments from 0 to 90. The possible range of operation is from 0 degrees to 90 degrees in either direction. For optimum velocity measurements, the angle of incidence should be between 45-60 for vascular applications.

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 adjust the angle by 30 degree.

Adjusting To quickly adjust the angle, press ***Quick Angle***.

Values -60, -30, 0, 30 and 60 degrees.

Wall Filter

Description Insulates the Doppler signal from excessive noise caused from vessel movement.

Adjusting To increase/decrease, select ***Wall Filter***, then adjust ***Wall Filter*** on the Top/Sub Menu (PRF and Wall Filter share the same control. Press the control to toggle between PRF and Wall Filter). Each adjustment cycles you to the next setting.

Values Values vary, depending upon the probe and application. The current value displays on the Top/Sub Menu 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.

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 Top/Sub Menu.

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 12% increments, with 0 being the center of the display and +100% being the top edge of the display and -100% being 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.

M/D Cursor

Description	Displays the Doppler Mode cursor on the B-Mode image.
Adjusting	To activate/deactivate the Doppler Mode cursor, press M/D Cursor. Trackball to position sample volume graphic. The M/D Cursor key backlights.
Values	On/Off.
Benefits	Lets you position the cursor before you go into Doppler Mode.

Audio Volume

Description Controls audio output.

Adjusting To adjust the audio, adjust the **Volume** control. The volume defaults to the last Doppler audio volume setting.

Audio sounds change rapidly, often abruptly. Increase the volume in small steps to avoid startling the patient.

Values Usually, a one-third adjustment of the dial gives you the best volume. The volume decreases/increases logarithmically.

Benefits An audio representation of the flow within a vessel can be used to evaluate proper probe angle and position.

Spectral Invert

Description Vertically inverts the spectral trace without affecting the baseline position.

Adjusting To invert the spectral trace, press ***Spectral Invert***. 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.

Dynamic Range

Description Dynamic range controls how echo intensities are converted to shades of gray, thereby increasing the range of contrast you can adjust.

Adjusting You access Doppler dynamic range from the Doppler Mode Top/Sub Menu. Each click cycles you to the next setting. To increase/decrease, press ***Dynamic Range***.

Values The settings cycle in 4 dB increments. The current value displays on the Top/Sub Menu. Dynamic Range 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.

Affect on other controls Dynamic range operates only in realtime, not in freeze, CINE, or CINE Timeline.

Spectral Trace (Trace Method)

Description Traces the average mean and peak velocities in realtime or frozen images.

Adjusting Select the spectral trace method from ***Trace Method***.

To activate the Spectral Trace Top/Sub Menu, press the Top/Sub Menu.

To get a peak trace, click MAX TRACE. A green trace displays on the spectrum.

To get a mean trace, click MEAN TRACE. A blue trace displays on the spectrum.

Selecting Trace Position Trace direction key lets you trace the cardiac cycle in the timeline above, below, or above and below (composite) the baseline.

Benefits Lets you trace the cardiac cycle.

Trace Sensitivity

Description	Adjust the trace to follow the waveform for signal strength.
Adjusting	Select the appropriate Top/Sub Menu control to adjust the value.
Values	From -10 to 10.
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.
Adjusting	Select ***Trace Direction***.
Values	Above, Below, or Both.
Benefits	You can select where on the waveform to perform the trace, above, below, or both.

Full Timeline

Description	Expands display to full timeline display.
Adjusting	Select ***Full Timeline***.
Values	On/Off.
Benefits	Allows you to view just the timeline, to see more detail.

Display Format

Description Changes the horizontal/vertical layout between B-Mode and M-Mode, or timeline only.

Adjusting Select ***Display Format***.

Values Vertical 1/3, 1/2, or 2/3 B-Mode, Horizontal 1/4 or 1/2 B-Mode, or Timeline Only.

Benefits You can select how to have your Doppler timeline and anatomy displayed.

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.

Adjusting Select ***Time Resolution***.

Values 1-3

1-3. For TVD: 0, 1, 2, 3, 4 & 5.

Benefits Time Resolution = 3 (high) smooths the Timeline; Time Resolution =1 (low) increases the time resolution (sharpens the image).

Modify Calcs

Description Activates the menu to select which calculations are automatically calculated.

Adjusting Select ***Modify Calcs*** to activate Modify Calcs Top/Sub Menu.

Benefits Provides flexibility.

Using 3D

Overview

Not available on LOGIQ Book XP PRO

DO NOT scan any pacemaker patient using the sensor device. The magnetic fields emitted from the device may interfere with the pacemaker operation.

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 control panel key. Two screens appear.

NOTE: Set appropriate values for Acq Mode and Scan Plane. Also, set the scan distance before scanning.

3. To start acquiring the image, press ‘L’ (the left split screen key).
4. To perform a parallel scan, scan evenly. To perform a sweep (fan) scan, rock the probe once. Note the distance of the scan.
5. 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.

6. To complete the 3D scan, press ‘R’ (the right split screen key).

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

3D Notes

- Adjust the 3D 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.

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.

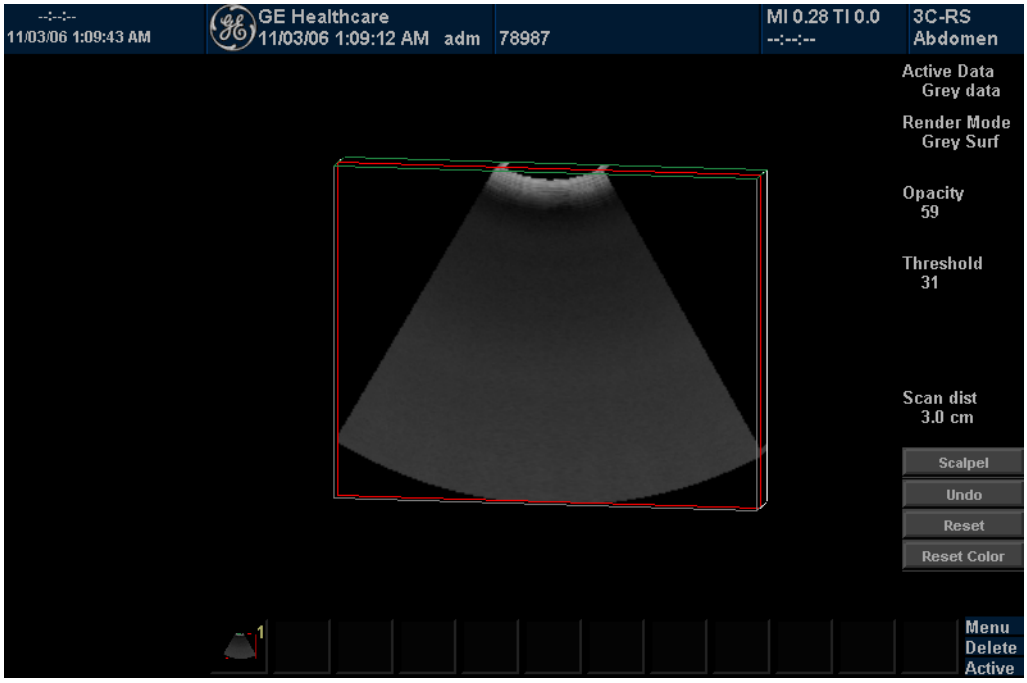


Figure 5-11. Manipulating the 3D Volume of Interest (White Hand)

Moving Through the 3D VOI

You can move through the 3D VOI using the red hand. Press Set when the red pointer finger is positioned on the red box. Move the closed red hand to move through the 3D VOI.

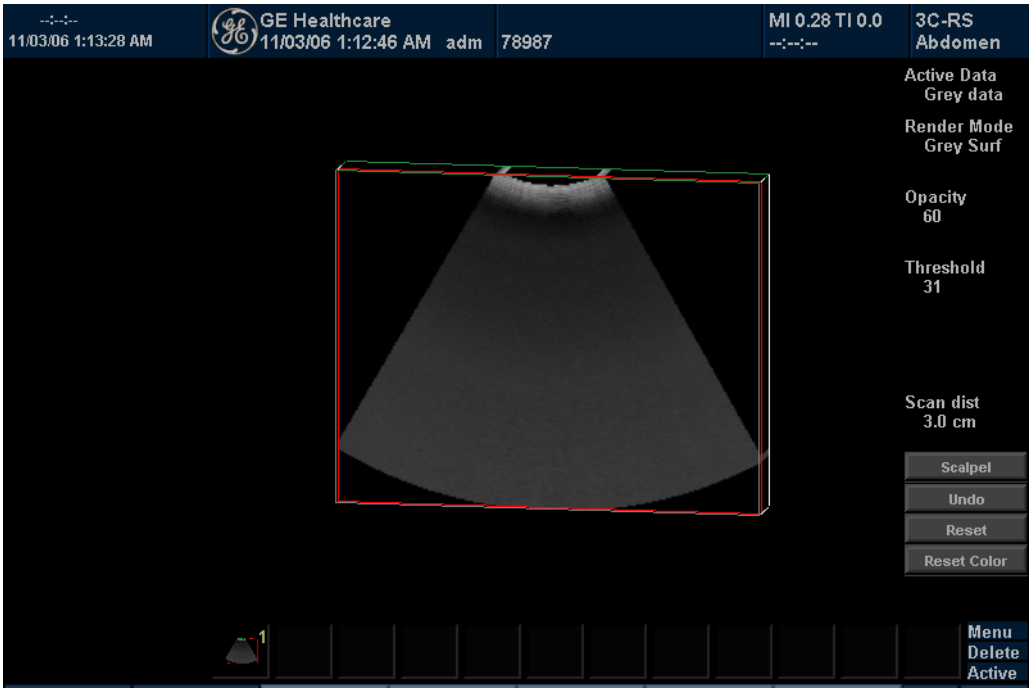


Figure 5-12. Moving through a 3D Volume of Interest (Red Hand)

NOTE: Any plane in the volume can be made active (highlighted with red box) by clicking on it.

Viewing Specific Portions of the Anatomy

You can pull back tissue to view specific portions of anatomy using the yellow hand. Press Set when the yellow pointer finger is positioned on the yellow box. Move the closed yellow hand to manipulate the 3D VOI.

NOTE: This actually moves an edge. A yellow hand appears only when the pointer is on an edge of the VOI.

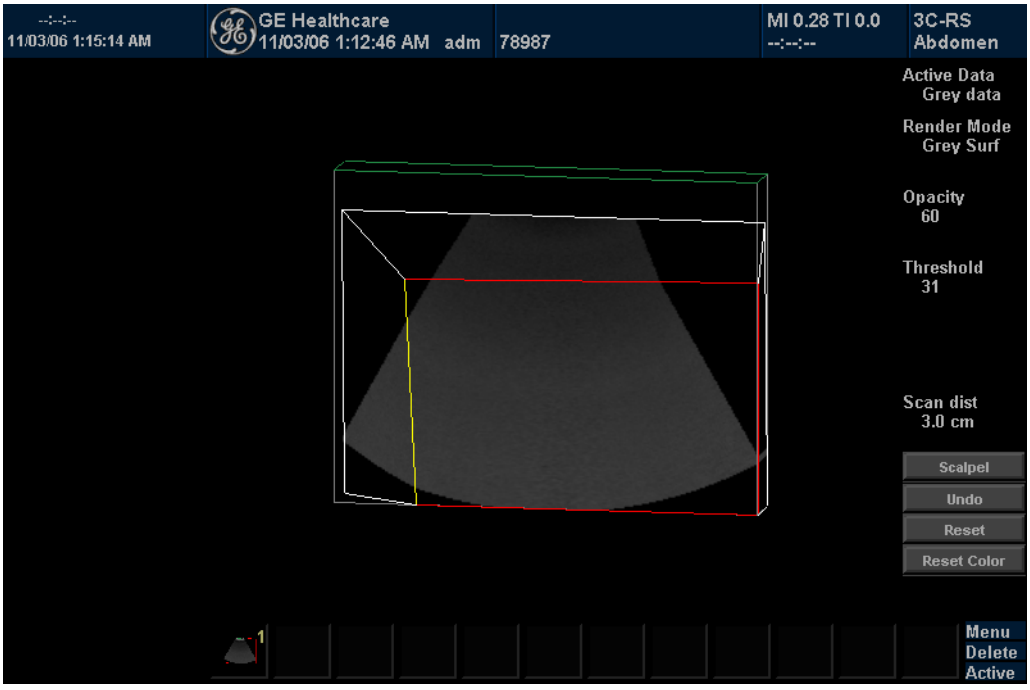


Figure 5-13. Manipulating the Edge of a 3D Volume of Interest (Yellow Hand)

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.

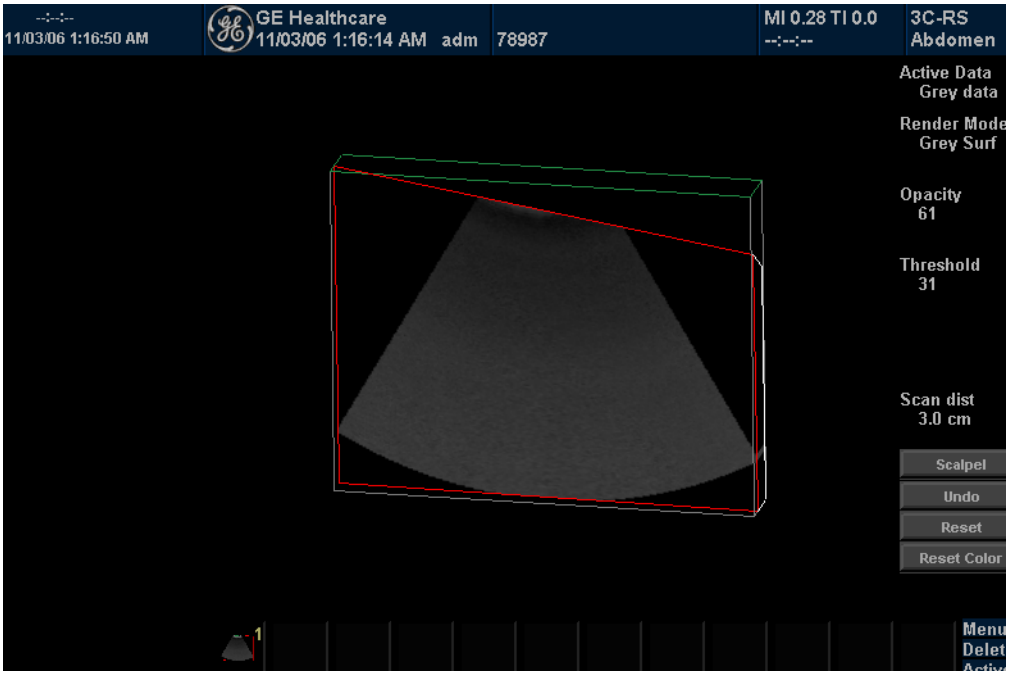


Figure 5-14. Manipulating a Corner of the 3D Volume of Interest (Green Hand)

Easy 3D

Not available on LOGIQ Book XP PRO

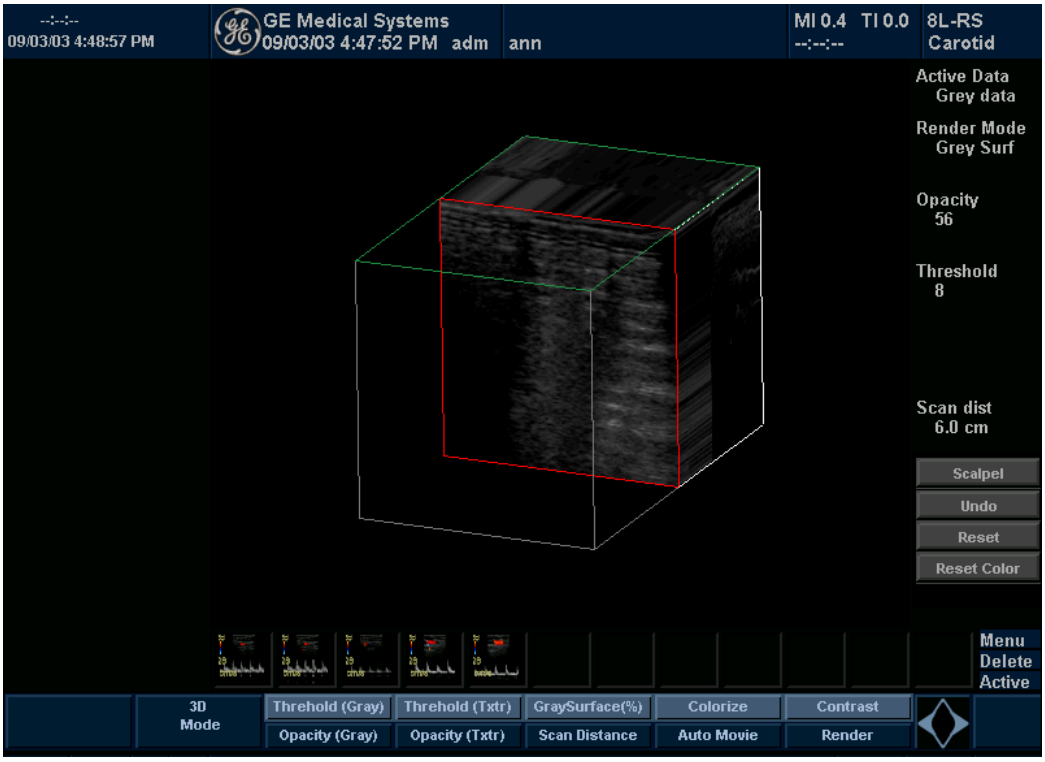


Figure 5-15. Easy 3D

Descriptions and instructions for using Easy 3D follow:

Table 5-2: Easy 3D Description and Instructions for Use

3D Parameter	Description
Reset	Resets the 3D volume of interest back to its original orientation.
Utilities	Select Average Off, Average Light, Average Medium, or Average Strong.
Undo	Undoes any manipulation you have done to your 3D dataset.
Auto Movie	Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated.

Table 5-2: Easy 3D Description and Instructions for Use

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.
Gray Surface	Activates the gray surface rendering mode. It leads to a transparent appearance of the object, generated by displaying only a surrounding shell of structures.
Texture	Activates the texture or photorealistic rendering mode. It creates a photorealistic appearance of the object. The shading depends on the orientation of the surface of the object. If both Texture and Gray Surface mode are switched on, the mixture percentage of both modes can be defined.
Render	Changes between the rendered image view and the view of a volume of interest. The volume of interest shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. The volume of interest can be manipulated as described above.
Threshold/Opacity	Threshold defines which gray values are used for rendering and which are considered noise. Opacity defines how strict Threshold is used for discrimination. A low opacity value creates a firmer appearance of the surface. A high opacity value leads to a transparent appearance of the rendered image.
Colorize/Contrast	Colorizes the 3D render or adds contrast to the 3D rendered image.

Chapter 6

Scanning/Display Functions

Describes additional ways in which to adjust the image. In addition, describes additional ways to get useful information electronically.

Zooming an Image

Introduction

Zoom is used to magnify a zoom region of interest (ROI). The system adjusts all imaging parameters accordingly. You can also zoom frozen images.

Zoom

Bioeffect

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 may change.

Acoustic Output Hazard

Observe the output display for possible effects.

To zoom an image, adjust Zoom. A reference image appears in the upper, left-hand section of the display.

To exit zoom, press the right Clr key (Zoom Clear).

Freezing an Image

Introduction

Freezing a real-time image stops all movement and allows you to measure and print the image.

NOTE: While the image is frozen, all Power Output is suspended.

NOTE: Selecting a new probe unfreezes the image

Freezing an image

To freeze an image,

1. Press Freeze. The key backlights.

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

Use the Trackball to start CINE after pressing Freeze.

Freezing an Image (Footswitch Option)

You can also freeze the image via the footswitch.

See ‘Footswitch (Option)’ on *page 3-13 for more information.*

To freeze an image,

1. Step on the footswitch, the realtime icon is removed from the monitor.
2. 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.

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

2. Use the Trackball to start CINE after pressing Freeze.

Post processing

You can use the following controls to process a frozen B-Mode image.

- Map
- Zoom
- Rotation
- Reverse
- Up/Down Invert
- Rejection
- Gain
- Colorize
- Suppression

You can use the following controls to process a frozen Color Flow image.

- Angle Correct
- Threshold
- Color Map
- Color Invert
- Baseline
- Transparency map

Auto Optimize. Optimizes the B-Mode image or Doppler Spectrum.

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.

Activating CINE

To activate CINE,

1. Press Freeze.
2. Move the Trackball.

CINE and Monitor Display

The CINE display (located on the left-hand side of the monitor) indicates which frame you are viewing of the whole loop (62:123), as well as the time at which this frame occurs within the loop (1.6:3.2 s).

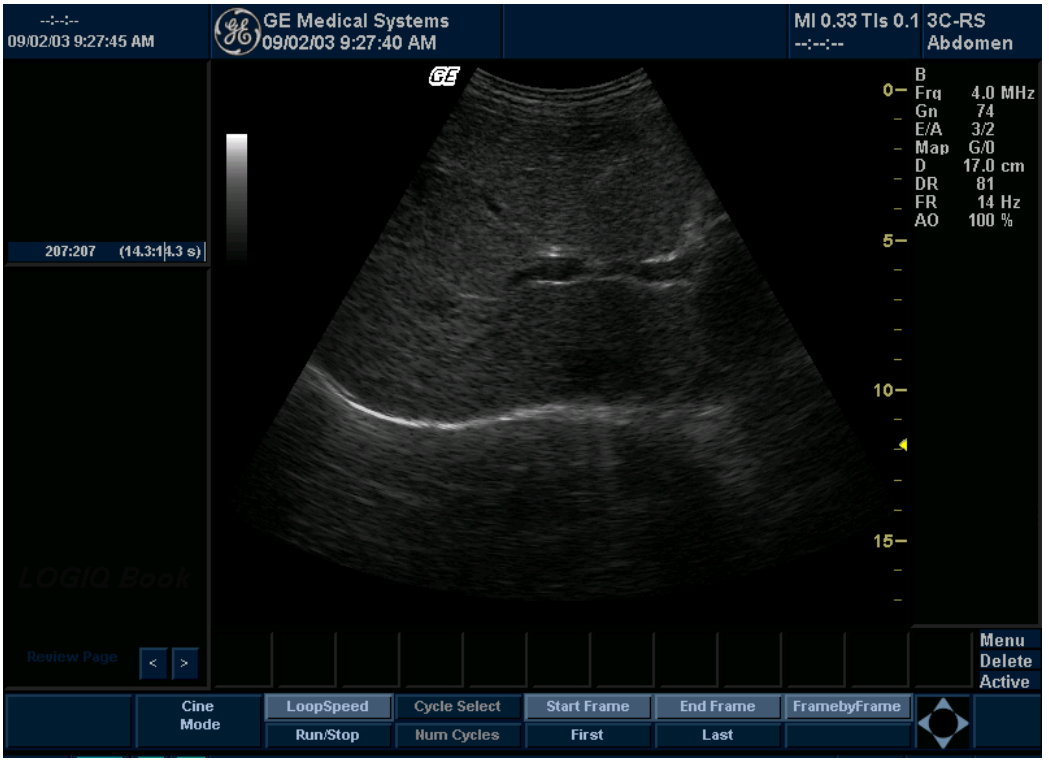


Figure 6-1. CINE Display

Using CINE

Adjusting CINE Loop Speed

Adjust the Loop Speed control at the bottom of the Top/Sub Menu.

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.

Pressing the **Comment** key or any keys on the alphanumeric keyboard initiates the comment mode. This assigns the trackball function to controlling the cursor and displays the comment library on the Top/Sub Menu menu.

Figure 6-2. Comment Key on the Front Panel

1. Comment Key

Introduction (continued)

In comment mode, text can be added by using the comment library or by typing from the alphanumeric keyboard.

Comments can be erased by powering down, when you press ***Clear*** or ***New Patient***, or when preset via Utility--> Comments.

In addition, the display's home position can be changed (preferred comment area) for each display so that all subsequent comments begin in the same spot.

Pressing the ***Ctrl P*** keys 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 ***Ctrl Alt P***.

Comment Mode is activated by pressing the ***Comment*** key. Comment Mode can also be automatically activated by typing from the alphanumeric keyboard.

NOTE: In this case, the cursor begins at the same location where the comment mode was exited.

The system automatically searches for the word you want in the comment bar and you can press tab to choose it.

After activating the comment mode, a vertical bar type cursor appears on the screen. Use the ***Trackball*** to move the cursor.

The factory default color for comments is yellow. The color selection can be changed to any of the colors available on the system. The choices are white, yellow, bright red, orange, etc.

NOTE: The user cannot change the Font Family and Size.

To indicate a specific comment or text group is selected, the color turns to green. Once the comment is set or fixed, the color returns to yellow or to the user selected color.

To delete comments by character, press the ***Backspace*** key.

To delete all comments, press the ***Clear*** key twice immediately after entering the comment mode. To clear arrow markers, select arrow marker (programmable F5 or F6 key) and then select Clear.

Adding Comments to an Image

Comment Retention

Comments from the B-Mode images are retained and carried over when switching to multi-image format or duplex mode.

The position of the comments is adjusted so that it is at the same relative position with respect to the display window in the new format as it was in the single image format.

NOTE: Comments may not be retained when the image is switched to M-Mode image format depending on the preset.

Arrows and Pointers

Arrows and pointers can be used by activating the ***F5*** or ***F6*** key (if programmable as arrows) on the keyboard. When the pointer comes up, it is a GREEN color, indicating it is active and can be moved.

To activate the arrows and points as a programmable function key, See 'Key Configuration' on *page 16-114 for more information.*

- Move the pointer using the ***Trackball*** to any place on the screen. The pointer head direction can be controlled by how the trackball is moved.
- Press **Set** to fix the place of the pointer and direction of the pointer head. The GREEN color turns to YELLOW (or the default color if changed).
- To delete all arrow marks, press the ***Clear*** key right after pressing the ***F5*** or ***F6*** key.

NOTE: This action clears the arrows only, not the comments on the screen. To erase all comments as well as arrows, press the Clear key right after the Comment key.

Annotating an image using the library

To reduce the amount of time spent annotating an image, store frequently-used comments in the Comment Library. As many as 6 libraries are available per study. One of the selected libraries is designated as the default and its entries are displayed on the Comment Menu when the comment mode is activated for that study.

Press **Comment** and move the comment cursor location using the **Trackball**.

Select the desired comment from the comment menu.

To activate the library, select ***More*** from the comment menu. A list of measurement categories is displayed. Select the desired annnotation library from the categories.

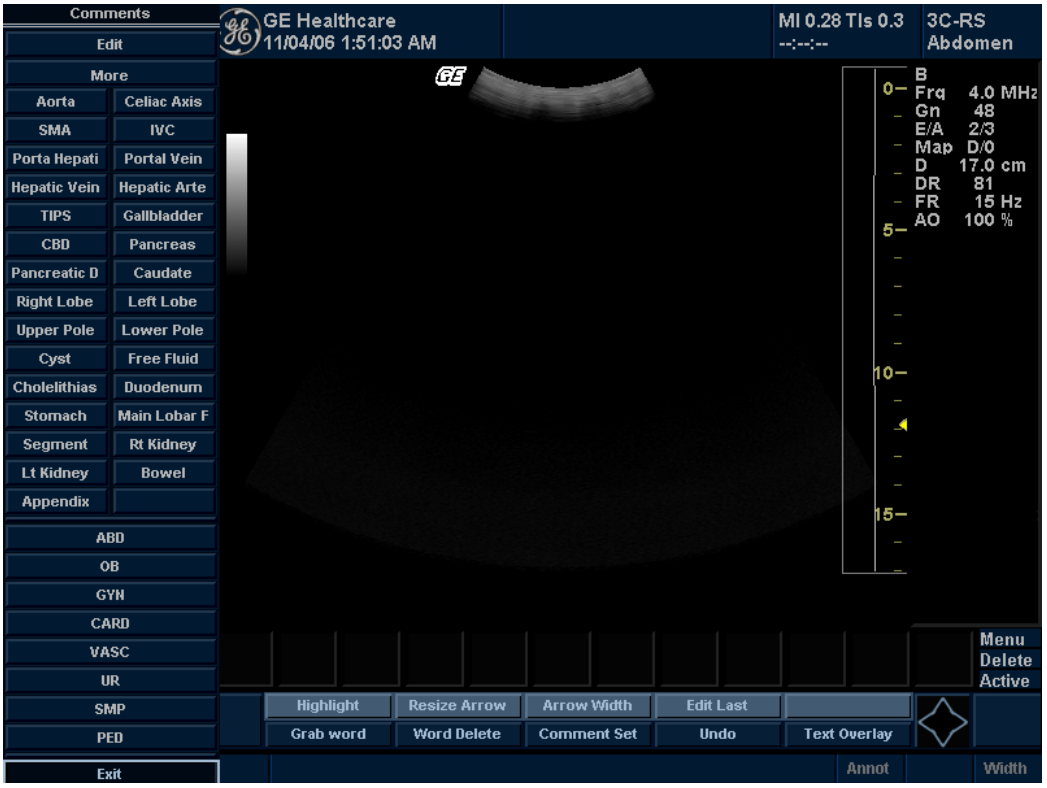


Figure 6-3. Comment Menu

Accessing/Editing the Library

Access the Comment Library by selecting ***Utility***.

Use the **Trackball** to move the arrow cursor to the desired comment. Press **Set**. The 20 character space for that library locatiaon will be in reverse video. Add or edit the desird script.

Select the next library entry and press **Set**.

Continue until all additions or edits are complete.

To save all entries and edits, Trackball to the SAVE selection and press **Set**.

Users can add frequently-used keywords (e.g. LEFT/RIGHT, LONG/TRANS) in the Comment Library for use as a prefix or suffix.

To avoid saving unwanted changes (all current changes), select RESET and press **Set**.

Annotating an image with typed words

- Press **Comment** and type the comments where the cursor is currently located (the display's home position) and use the **Trackball** to further place the comment cursor in the desired location.
- Press ***Enter*** to move to the next line.

NOTE: Comments wrap to the next line when they are within one character of the right margin if Word Wrapping is selected in the Text Boundary preset. See 'Comments Libraries/Libraries Preset Menu' on page 16-39 for more information.

The word wrap starts one line below the start of that comment.

Comments appear on all prints, and photos.

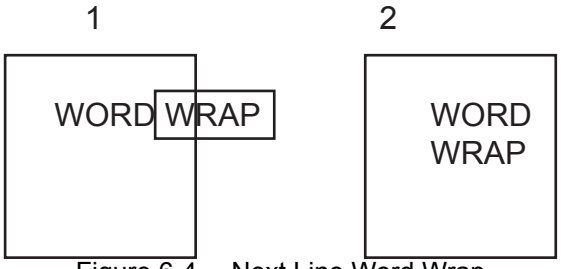


Figure 6-4. Next Line Word Wrap

1. Before
2. After

If the cursor appears at the right edge of the lowest line, or a word cannot be completed in the lower right corner, word wrap cannot be executed.

NOTE: The same word wrap principles apply for library scripts as typed comments.

Moving Texts You have the ability to move comments already on the screen and place them in different locations.

- Place the cursor on the desired text or text group and press ***Set***.
- The selected text color turns green.
- Use the ***Trackball*** to move the selected text and press ***Set***.

Annotating an image with typed words (continued)

Editing while annotating

Backspace over any error(s) made. Blank spaces take the place of the letter(s) that were there. Continue typing the comment after backspacing over all incorrect letters.

To delete previous character(s),

- Press ***Backspace*** as many times as necessary to make the deletion.
- Once all texts within the selected text group are deleted, then the cursor will find another text group to delete to the upper left direction.
- If there is no more text to delete, the cursor will be located at home position.

To move through the text a word at a time,

- Press ***Tab*** to move to the right by text group (Preset Keyboard Tab = Word)

NOTE: Press Shift + Tab to move to the left.

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.

To activate body patterns, press the ***Body Pattern*** control. A maximum of 8 body pattern packages are displayed according to exam category and preset.

The body pattern packages may be customized to accommodate user preference. Up to 30 individual body patterns in the packages can be changed. See ‘Body Pattern Libraries/Applications Preset Menu’ on *page 16-50 for more information*.

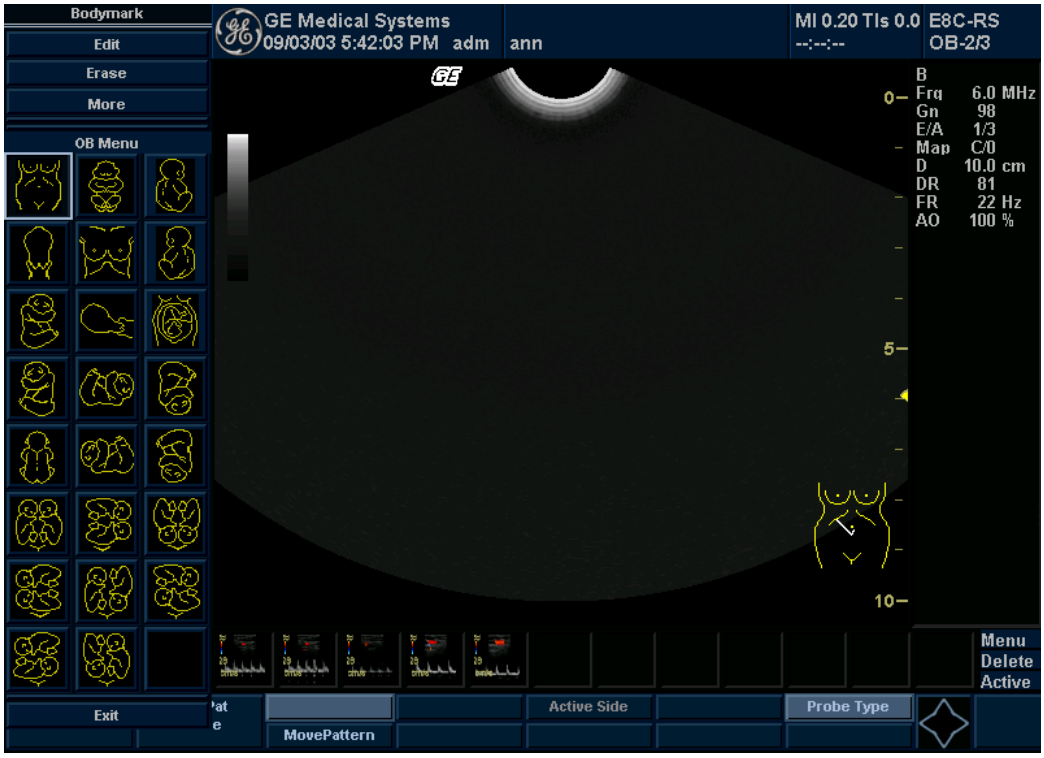


Figure 6-5. Top/Sub Menu displays of Body Pattern

Body Patterns (continued)

Select the desired body pattern on the Top/Sub Menu. The selected body pattern is displayed on the monitor.

Press the **Move Pattern** control on the Top/Sub Menu to reposition the body pattern with the **Trackball** and **Set** controls.

A probe mark is associated with the body patterns and illustrates the probe position on the body pattern. This marker can be placed with the ***Trackball*** and rotated with the ***Ellipse*** control.

There are two probe marker choice selections. The probe marker icon is selected by pressing the ***Probe Type*** control on the Top/Sub Menu.

Press the **Body Pattern** and **Clear** controls to erase the body pattern. The pattern is erased and the system exits the body pattern mode.

Press ***Set*** on the keyboard to exit without erasing the body pattern.

Body Patterns (continued)

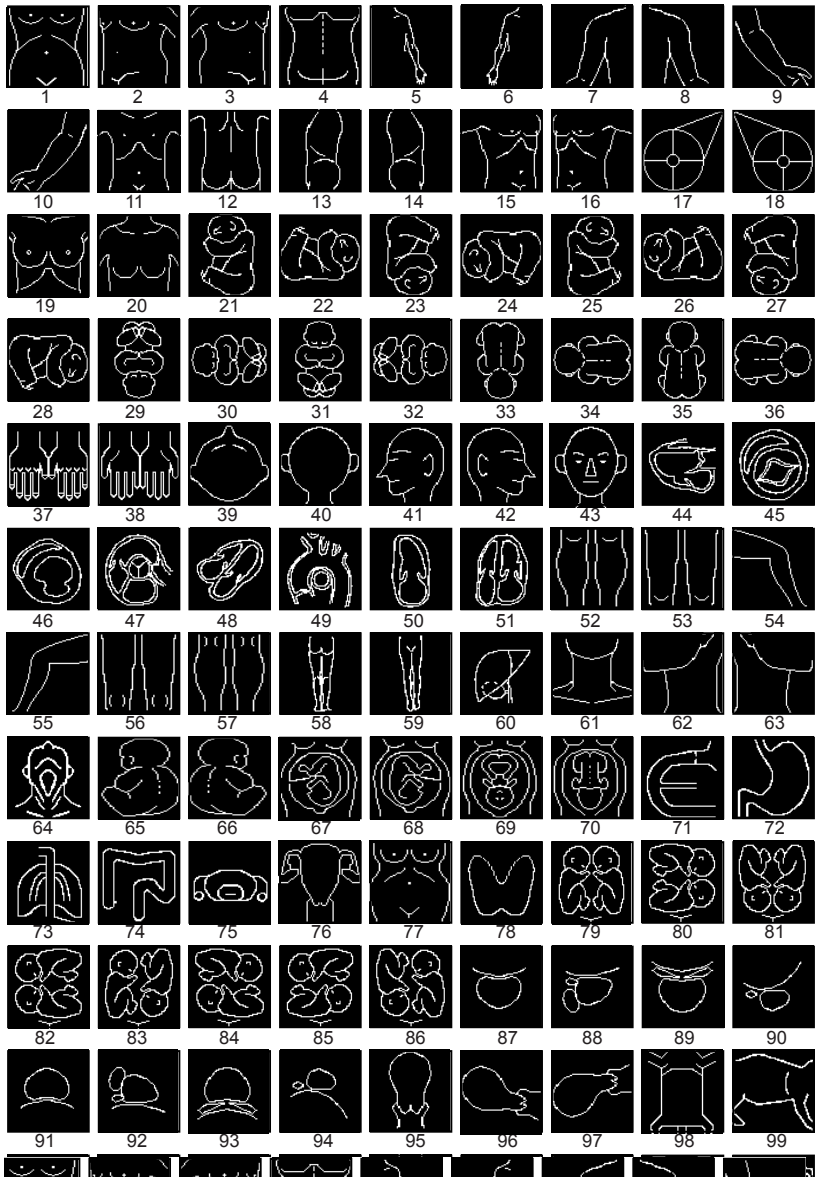


Figure 6-6. Body Patterns Available

Body Patterns (continued)

1. abdom1
2. abdom2
3. abdom3
4. abdom4
5. arm1
6. arm2
7. arm3
8. arm4
9. arm5
10. arm6
11. body1
12. body2
13. body3
14. body4
15. body5
16. body6
17. breast1
18. breast2
19. breast3
20. chest
21. fetus1
22. fetus2
23. fetus3
24. fetus4
25. fetus5
26. fetus6
27. fetus7
28. fetus8
29. fetus9
30. fetus10
31. fetus11
32. fetus12
33. fetus13
34. fetus14
35. fetus15
36. fetus16
37. hand1
38. hand2
39. head1
40. head2
41. head3
42. head4
43. head5
44. heart1
45. heart2
46. heart3
47. heart4
48. heart5
49. heart6
50. heart7
51. heart8
52. leg1
53. leg2
54. leg3
55. leg4
56. leg5
57. leg6
58. leg7
59. leg8
60. liver
61. neck1
62. neck2
63. neck3
64. neck4
65. ob1
66. ob2
67. ob3
68. ob4
69. ob5
70. ob6
71. organ1
72. organ2
73. organ3
74. organ4
75. organ5
76. pelvis1
77. pelvis2
78. thyroid
79. twin1
80. twin2
81. twin3
82. twin4
83. twin5
84. twin6
85. twin7
86. twin8
87. uro1
88. uro2
89. uro3
90. uro4
91. uro5
92. uro6
93. uro7
94. uro8
95. uterus1
96. uterus2
97. uterus3

Start Menu

The Training CD information can be viewed on the LOGIQ Book XP Series in two ways:

1. Select the Start Menu (bottom left hand corner of the screen) and select “Training CD”.
2. Select ***Ctrl*** + ***T*** on the alphanumeric keyboard.

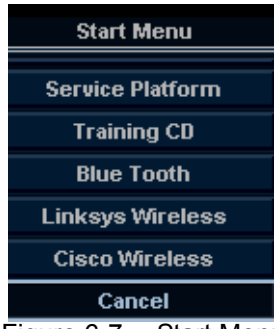


Figure 6-7. Start Menu

NOTE: The Training CD that arrives with the LOGIQ Book XP Series can be viewed on a personal computer. The CD is both PC and MacIntosh friendly.

Electronic Documentation

Documentation Distribution

Documentation is being provided via:

- Release Notes (supplied on paper)
- Quick Guide or User Guide (supplied on paper)
- AIUM Acoustic Output Booklet
- Online Help (on the Ultrasound Scanner via F1)
- CD-ROM. You can view user documentation on a PC or on the Ultrasound Scanner via the Customer Documentation CD-ROM, which includes:
  - Basic User Manual
  - Advanced Reference Manual
  - Quick Guide
  - User Guide
  - Quick Card(s)
  - Release Notes and Workarounds
  - Basic Service Manual

NOTE: *All user documentation is provided in multiple languages if translations were available at the time of CD publication.*

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.

*NOTE: If the cursor is lost while using Online Help, press **Alt** + **F4** to exit or press **F1** to activate the cursor.*

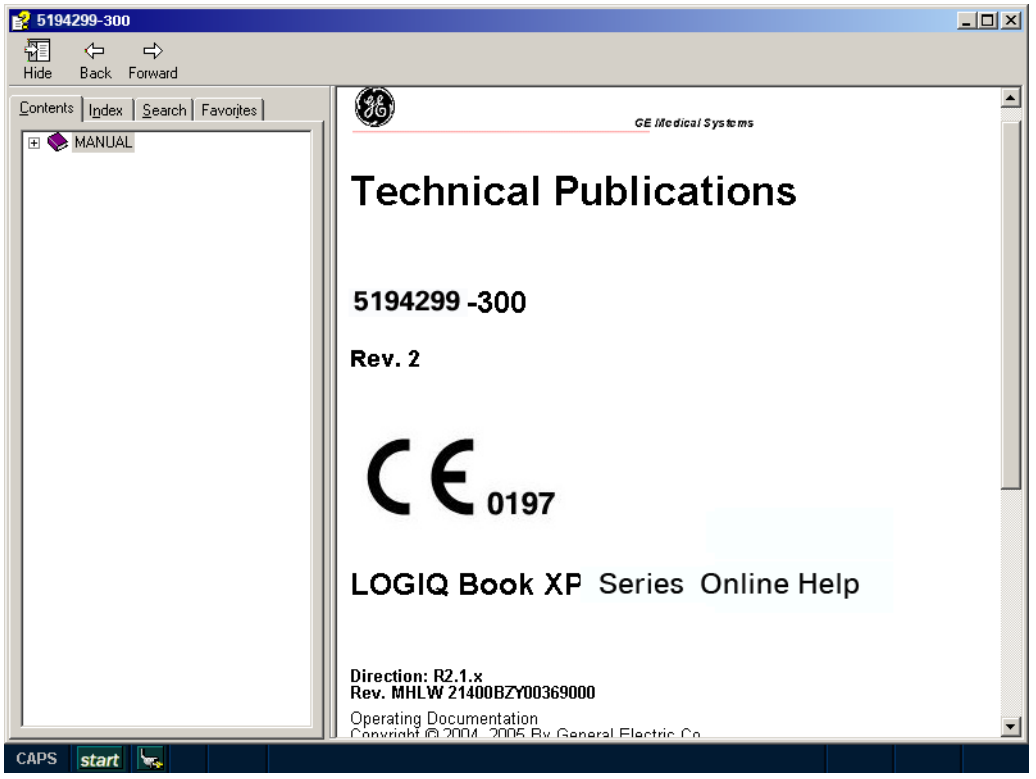


Figure 6-8. Opening Help Screen

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.

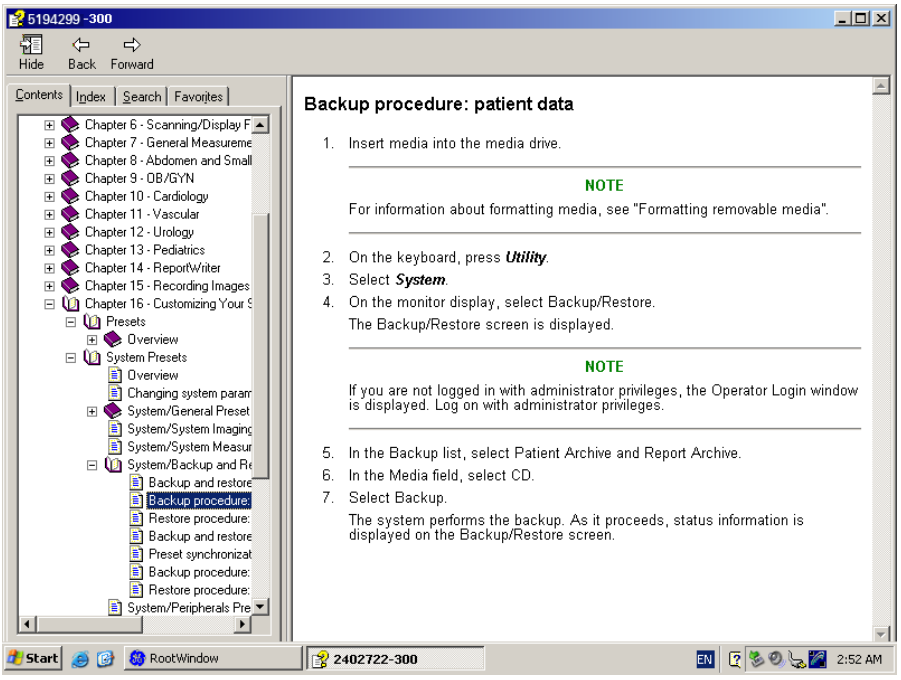


Figure 6-9. Sample Help Topic

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.

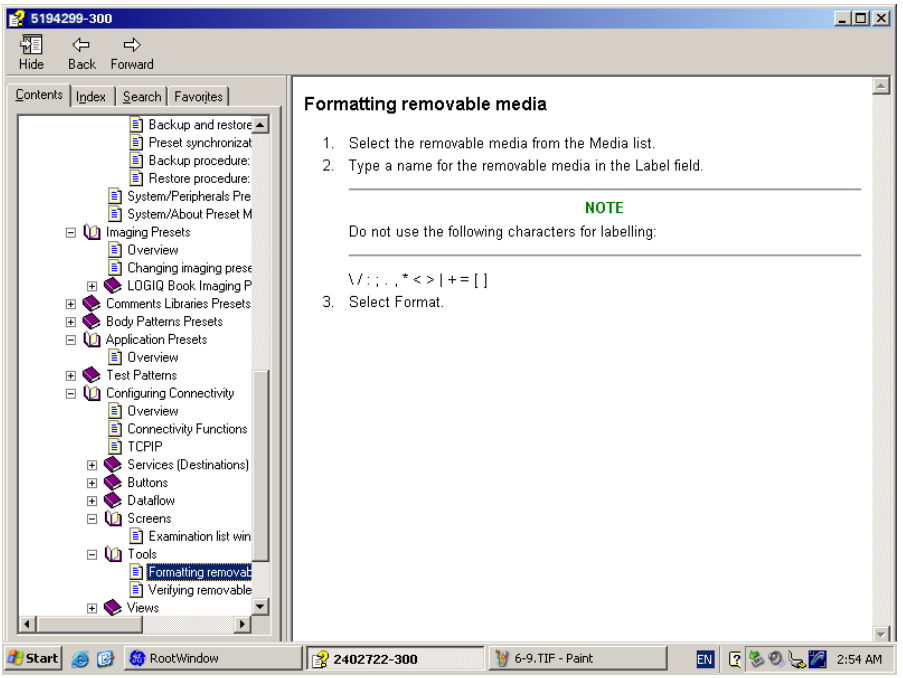


Figure 6-10. Topic Link

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.

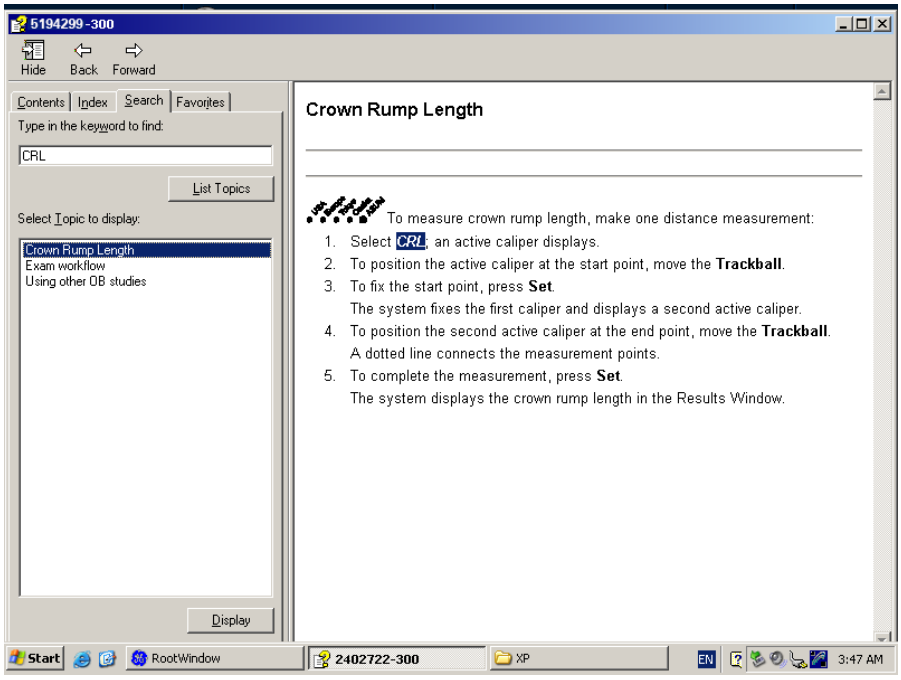


Figure 6-11. Search Results

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

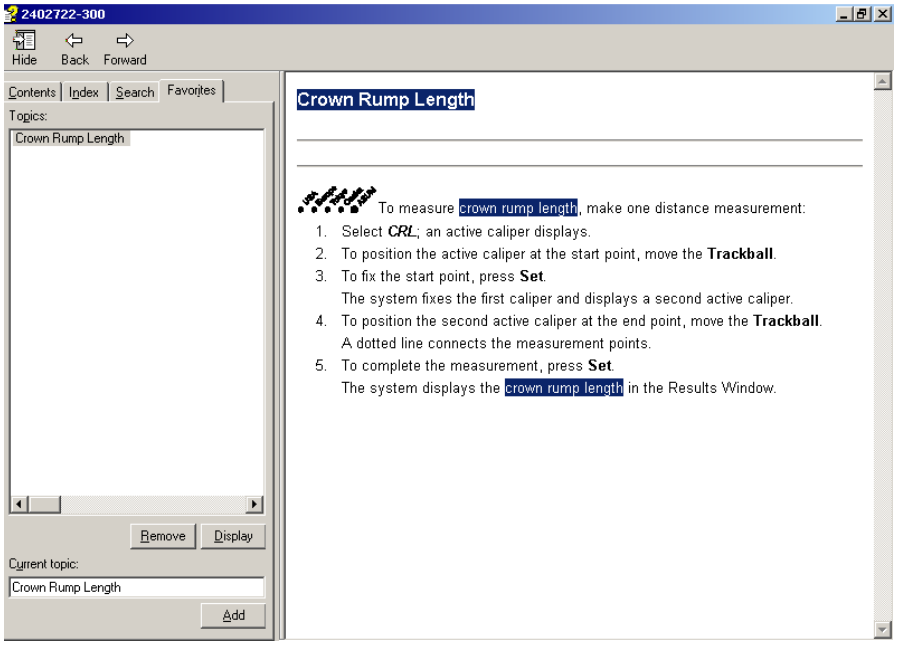


Figure 6-12. Adding Favorites

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.

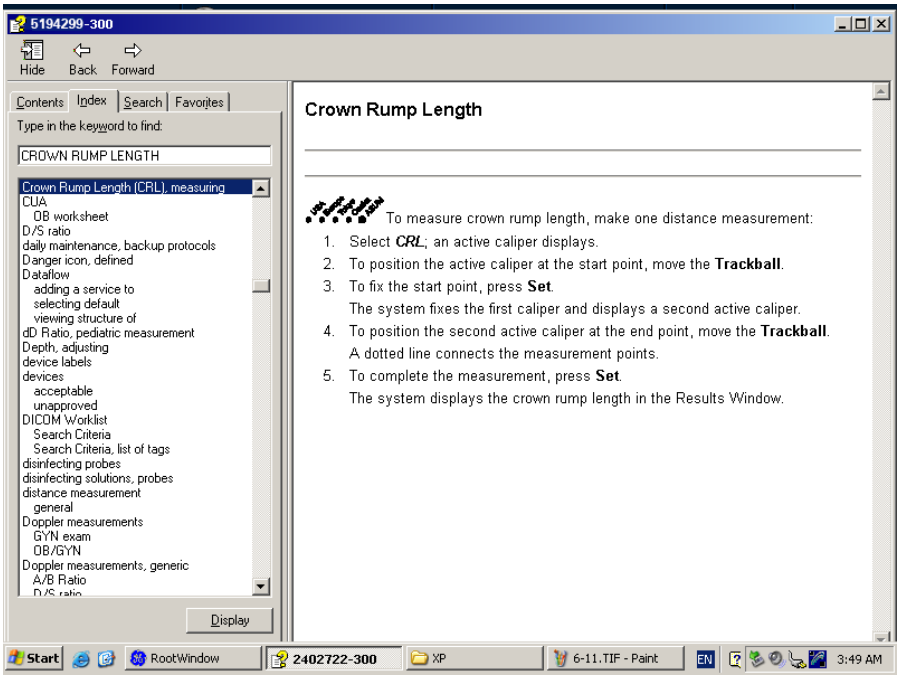


Figure 6-13. Index

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 Top/Sub Menu display, position and hold down the cursor at the very top of the Help window while moving the Trackball to the Top/Sub Menu display.

Exiting Online Help

To exit Online Help, press the ‘X’ in the upper, right-hand corner of the Online Help window.

CD-ROM

Accessing Documentation Via a PC

To view user documentation on a PC,

1. Insert the CD into the CD drive.
2. Open the CD 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 the Adobe Acrobat Reader, the PC version is supplied on the CD. Open the CD and double click on ‘ar505enu.exe. Follow the prompts to install Adobe Acrobat Reader on your PC.

Chapter 7

General Measurements and Calculations

Describes how to perform general measurements and calculations.

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by system accuracy, but also by the use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

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

Overview

This section provides information about taking measurements and describes calculations available in each mode. It includes the following topics:

- Exam workflow
- Location of measurement controls
- Description of calipers
- List of generic measurements
- General information about taking measurements
- Mode Measurements: Step-by-step instructions for taking specific measurements, organized by mode
- Basic steps to view and edit worksheets

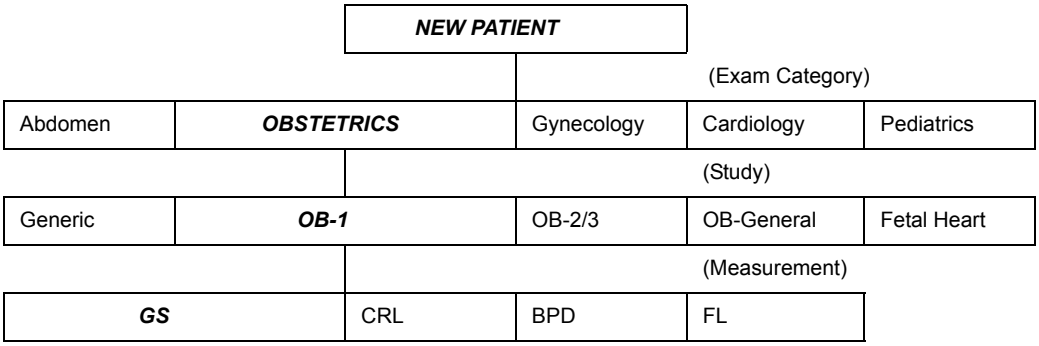
Exam workflow

For each patient, the system organizes information by exam category, study, and measurement. The definitions of these terms are as follows:

- **Exam Category** – categories include the following:
  - Abdomen
  - Obstetrics
  - Gynecology
  - Cardiology
  - Vascular
  - Urology
  - Small Parts
  - Pediatrics
- **Study/Preset** – after you choose an exam category, the system allows you to select a study. For example, when you choose the Obstetrics exam category, you can choose one of the following studies:
  - Generic
  - OB-1
  - OB-2/3
  - OB-General
  - Fetal Heart
  - OB/GYN Vessel
- **Measurement** – the measurements and calculations needed to analyze an item of anatomy. For example, a femur length is a measurement. A measurement can include several pieces of measurement data. For example, to calculate the area of a gestational sac, you need to measure width, length, and depth.

Exam workflow (continued)

The following shows a workflow example for an obstetrics exam.



For details on how to start a new patient, See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Location of Measurement Controls

Figure 7-1. Locating Measurement Controls

1. **Measure**. Activates a measurement caliper and the associated calculation package.
2. **Set**. Fixes the caliper for measurements and completes the measurement sequence.
3. **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.
4. **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.
5. **Trackball**. Moves the measurement calipers, selects the measurement on the Summary Window.

Description of calipers

While you are making a measurement, the measurement caliper is either active (open plus sign) or fixed (closed plus sign). An active caliper is yellow and a fixed caliper is green.

The system allows you to identify measurements by number or by unique symbol. If you choose Number as the Cursor Type, after you complete a measurement, it is assigned a number. If you choose Symbol as the Cursor Type, after you complete a measurement, the caliper symbol changes to one of the nine shown below. The symbols are used in sequence as listed. The first symbol is used for the first measurement, the second symbol for the second measurement, and so on. The numbers or symbols also identify measurements in the Results Window.

Figure 7-2. Fixed Caliper Symbols

For information about how to choose Cursor Type of Number or Symbol, see Table 16-11.

Measurement line display

While you are making a measurement, the system displays a dotted line to show the measurement. After you press Set to complete the measurement, if Cursor Line Display is On, the dotted line remains on the display. If Cursor Line Display is Off, the system erases the dotted line after you press Set and only the measurement calipers with a number or symbol are displayed. For information about how to turn Cursor Line Display On or Off, see Table 16-11.

List of general measurements

The following table shows the types of general measurements available when you press **Measure** but do not choose a specific calculation. The type of measurement depends on the current scan mode and the number of times **Measure** is pressed.

Table 7-1: General Measurements by Mode

If you press *Measure* (while frozen)	MODE		
	B and CF	**Doppler**	**M**
Once	• Distance • Circumference and area (ellipse)	Velocity	Tissue depth
Twice	Circumference and area (trace)	TAMAX, TAMIN, and TAMEAN	Time interval
Three times		Two velocities, slope, and time interval	Depth difference, slope, and time interval
Four times		Time interval	

*NOTE: The type of measurement repeats as you press **Measure**. For example, in M–Mode, when you press **Measure** the fourth time, the Tissue depth measurement is available, and so on.*

General Instructions

You can take measurements in all modes and image formats, including real-time, frozen, or CINE. After you select an exam category, the available calculations are displayed on the Top/Sub Menu.

Measurement and calculation results

As you take measurements, each measurement is given a sequential number on the display and in the Results Window. The system can display nine measurements on the screen at one time.

While you are taking a measurement, the value in the Results Window updates until you complete the measurement.

Once the Results Window has nine measurements, if you make any further measurements, the system erases the first measurement and adds the new measurement ("first in, first out").

Specifying measurement and display options

Specifying heart rate cycles

When you measure heart rate, the system assumes a specific number of cycles are measured. You can change the number of cycles used in the calculation. To specify the number of heart rate cycles, press the Utility key, select Advanced -> Measure. Select the Advanced tab, then select ***Heart Rate Cycle***. The system displays a list of choices from 1 – 10. Select the number you want.

After you choose a number, the next time you measure heart rate, the system assumes you are measuring the specified number of cycles. That number is used when calculating the heart rate.

After changing patients, the system defaults to the number specified in the Heart Rate Cycle parameter. See 'M&A Advanced Preset' on *page 7-36 for more information.*

Moving the Results Window

You may want to change where the Results Window is positioned on the monitor display. There are two ways to move the Results Window:

1. Move the pointer over the "Move Results Window Icon" and press **Set**. Position the window in the desired location and press **Set** again to fix that position.

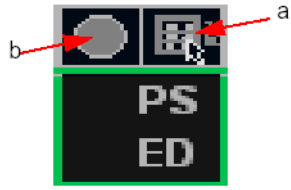


Figure 7-3. Results Window Icons

   a. Move Results Window Icon
   b. Minimize Results Window Icon

2. Select Utility -> System -> System Measure. In the Results Window portion, you can position the window on the screen. The display can be moved into the following locations:

   - Left Top
   - Right Top
   - Right Bottom
   - Left Bottom

Minimizing the Results Window

To minimize the Results Window, move the pointer over the "Minimize Results Window Icon" and press **Set**.

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.

Selecting a calculation (continued)

If there is a measurement listed in the Results Window that has not been assigned a calculation, to assign the measurement:

1. Press Measure.
2. To select the measurement in the Results Window, move the **Trackball** to the measurement.

   The measurement is highlighted.
3. Press **Set**.

   The system displays a list of applicable calculations. For example, if it is a distance measurement, the list includes all distance calculations for the current study.
4. To select an item in the list, move the **Trackball** to highlight the item and press **Set**.

   The system assigns the calculation to the measurement.

Selecting a measurement in a different application

While scanning a patient, you may find that you want to measure an item that is not in the current application. To select a calculation from a different application:

1. Press **Measure**.
2. Move the cursor to the exam category on the Top/Sub Menu and press **Set**.
3. The system lists the exam categories.
4. Select the exam category that has the calculation you want to make.

   The system displays the Top/Sub Menu for the selected exam category.
5. Select the study and the desired measurement.
6. 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.*

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 **Measure** to toggle between active calipers.
- Before completing the measurement sequence, to erase the active measuring caliper and the current data measured, press **Clear**.
- After the sequence is complete, to erase all data that has been measured to this point, but not data entered on 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 Top/Sub Menu.

Calculation formulas are available in the *Advanced Reference Manual*.

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.

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 Top/Sub Menu. The LOGIQ Book XP Series 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. Press ***Utility***.

   The system displays the Utility screen on the monitor display.
2. Select ***Advanced***.
3. Select ***Measure***.
4. Move the **Trackball** to the Measure button at the bottom of the screen and press **Set**.

   The system displays the Measurement & Analysis screen.

Starting Study and Measurement SetUp (continued)

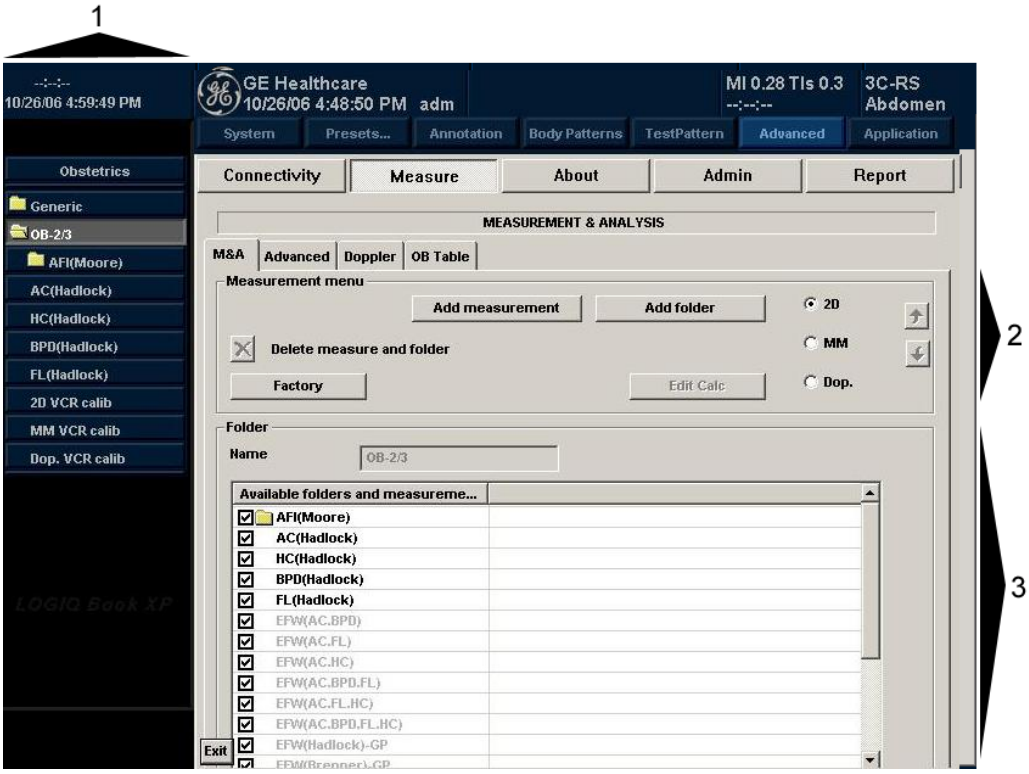


Figure 7-4. Measurement & Analysis screen

1. **Selection menu**: select exam category, study, or measurement.
2. **Measurement menu**: add and delete studies (folders) and measurements; select mode.
3. **Folder or measurement**: define studies and measurements. This section changes between Folder and Measurement, depending on what you select in the Selection menu.

NOTE: In the Measure menu, the navigational tabs across the top may differ from system to system but the functionality is the same.

Selecting an exam category

When you open the Measurement & Analysis screen, it displays the exam category that was last used on the system. To select the exam category you want to work with:

1. Move the **Trackball** to highlight the exam category at the top of the Selection menu.
2. Press **Set**.

   The system displays a list of exam categories.
3. Move the **Trackball** to highlight the exam category you want.
4. Press **Set**.

The Selection menu lists studies and measurements for the selected exam category.

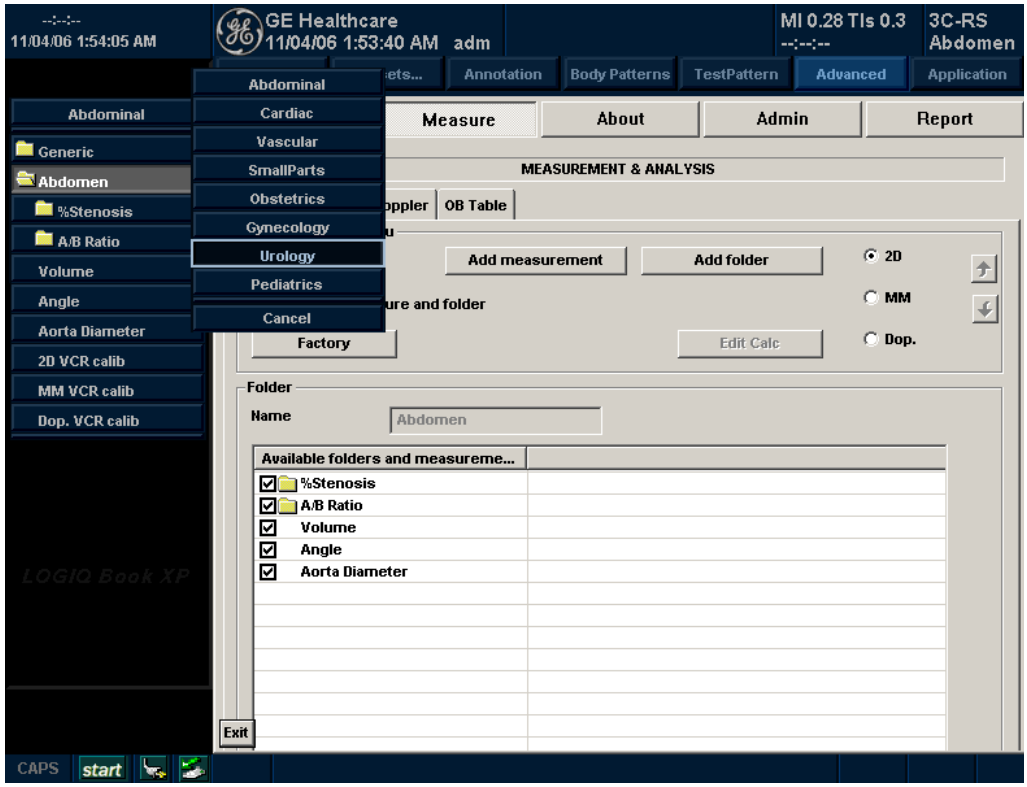


Figure 7-5. Select Exam Category

Selecting the measurement mode

In the Measurement menu section of the Measurement & Analysis screen, select one of the following:

- 2D (B-Mode)
- MM (M-Mode)
- Dop (Doppler Mode)

The Selection menu lists studies and measurements for the selected mode.

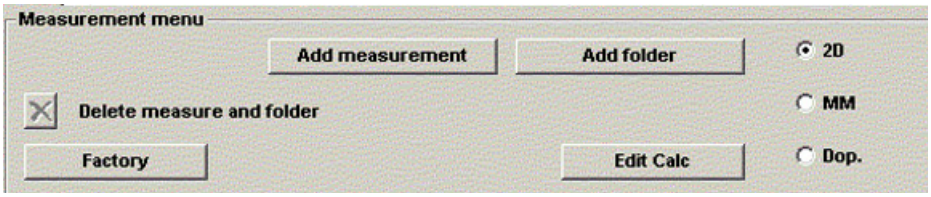


Figure 7-6. Select Mode

Selecting a study or measurement

To work with a folder or measurement, you must first select it in the Selection menu. The Selection menu lists the studies and measurements for an exam category. The studies and measurements are organized in a hierarchy, in the same order that they are organized on the Top/Sub Menu while doing measurements. The following example shows the highest level of the Obstetrics exam category, with the OB studies listed.

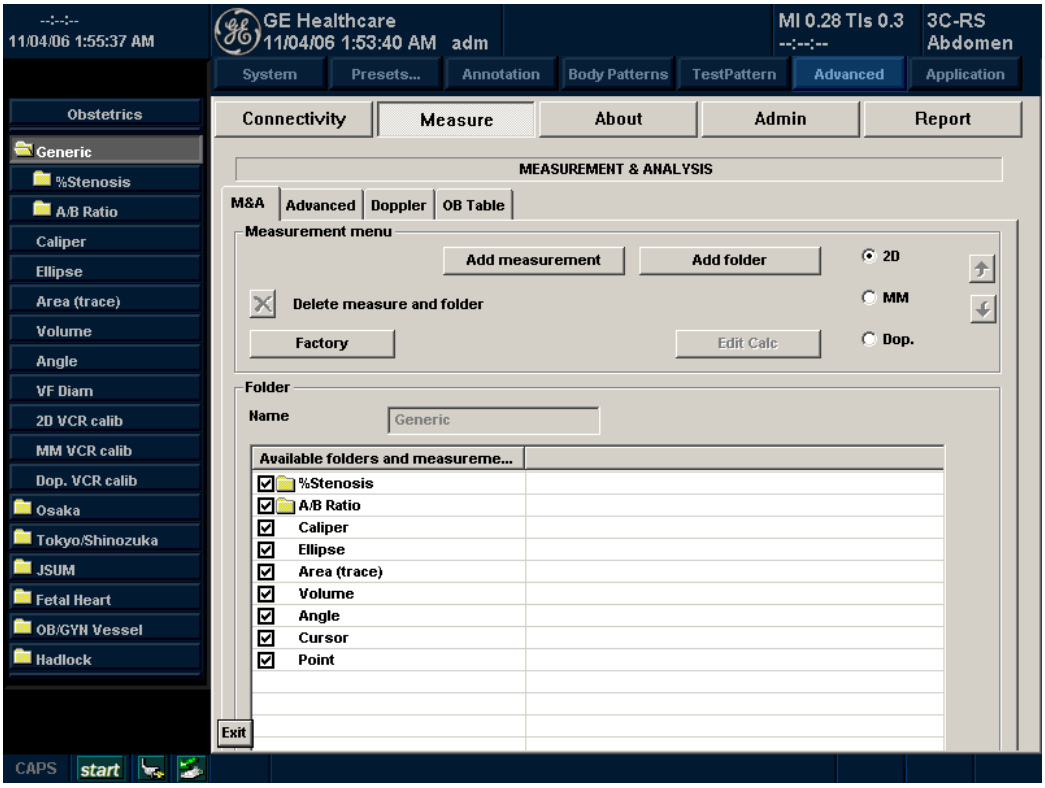


Figure 7-7. Selection Menu: Exam Studies

Selecting a study or measurement (continued)

After you select a study, the Selection menu shows all folders and measurements in the study. The Folder section of the Measurement & Analysis screen changes, and lists the measurements. The Selection menu shows all measurements for the OB-1 exam category.

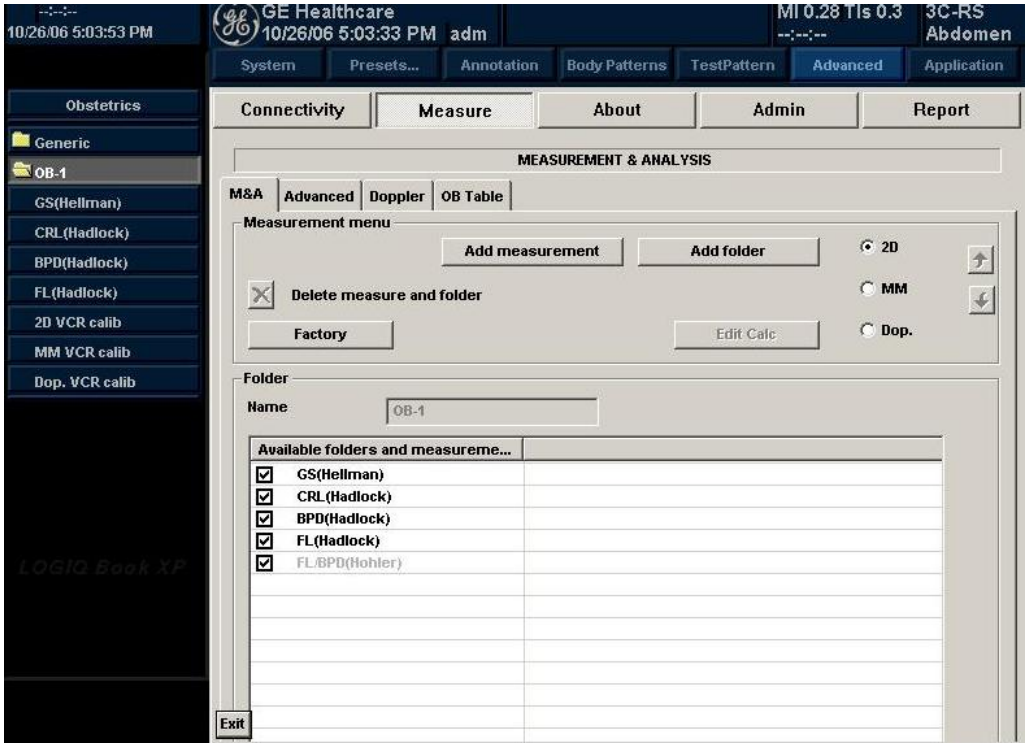


Figure 7-8. Selection Menu: OB-1 Exam Category

Selecting a study or measurement (continued)

The following example shows the Selection menu after the BPD measurement is selected. The Measurement section is now displayed, with information about the BPD measurement.

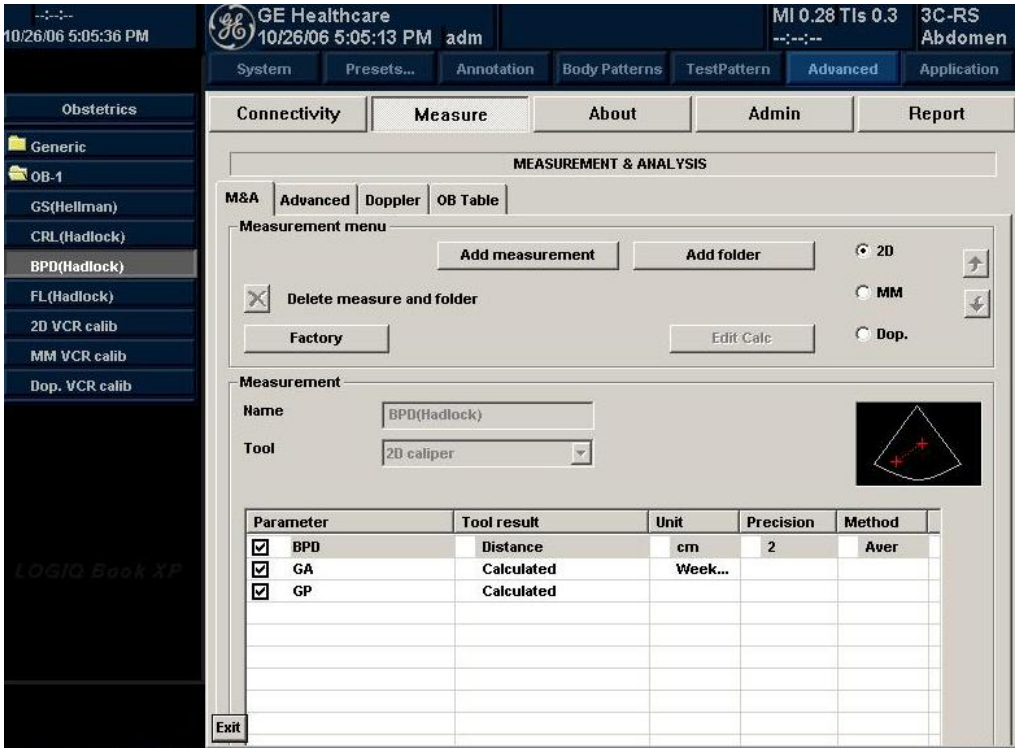


Figure 7-9. Selection Menu: BPD Measurement

Selecting a study or measurement (continued)

To select a folder or measurement,

1. Move the **Trackball** to the Selection menu and highlight the folder or measurement.
2. Press **Set**.
   - If you selected a folder, the system displays the folder in the Folder section of the Measurement & Analysis screen.
   - If you selected a measurement, the system displays the measurement in the Measurement section of the Measurement & Analysis screen.

NOTE: *Items must be selected in the Available folders and measurements list to be in the Selection menu. To move or change an item that is in the Available folders and measurements list but not in the Selection menu, move the **Trackball** to the check box for the item, and press **Set**. The item is now listed in the Selection menu.*

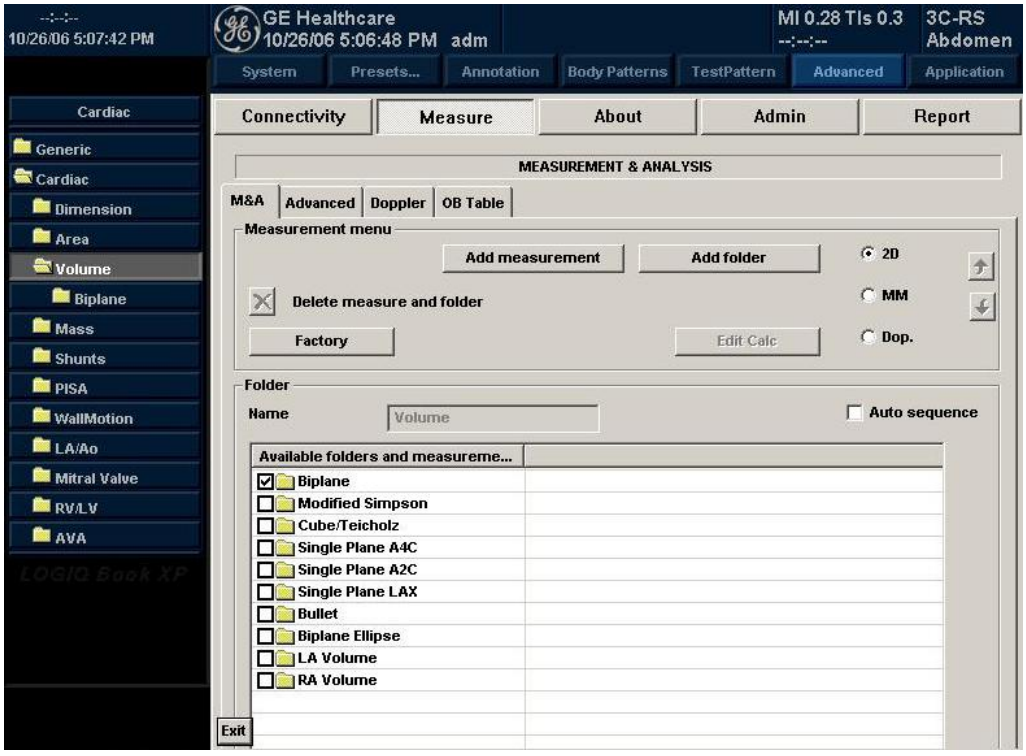


Figure 7-10. Available folders and measurements check boxes

Using folders

When you select a folder in the Selection menu, the system displays all folders and measurements that are in the folder. A folder can indicate a study, or can indicate a measurement group that contains related measurements. For example, a calculation such as OB Amniotic Fluid Index (AFI) requires four measurements, one of each quadrant. The AFI folder contains four measurements.

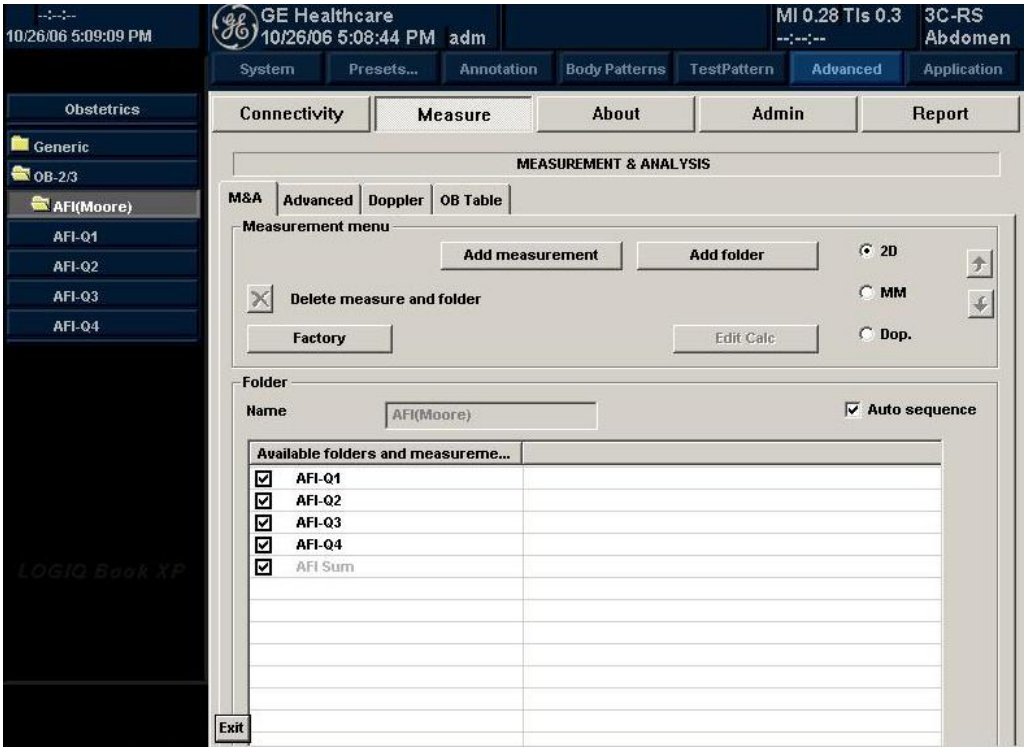


Figure 7-11. AFI Folder

Specifying Which Measurements Go in a Study or Folder

The Folder section of the Measurement & Analysis screen has two lists of folders and measurements. This is where you specify which items go in a study or folder.

- **Available folders and measurements.** The left list contains all possible folders and measurements for the selected study or folder.
- **Selection Menu.** The list has all folders and measurements currently selected for the study or folder. These are selected from the available folders and measurements list. These are the folders and measurements you see when you are scanning and choose an exam category.

Setting up an automatic exam flow

In some cases, related measurements are put in a measurement folder. This allows you to logically organize measurements. It also allows you to specify that the system automatically start each measurement in a folder, one after the other. This is the automatic sequence feature. To use this feature:

1. In the Selection menu, select the folder that contains the measurements you want.

   The system displays the folder and lists the measurements.

2. In the Folder section of the Measurement & Analysis screen, select Auto sequence. For OB/GYN Vessel measurements, Umbilical Doppler measurements are put in the Umbilical measurement folder.

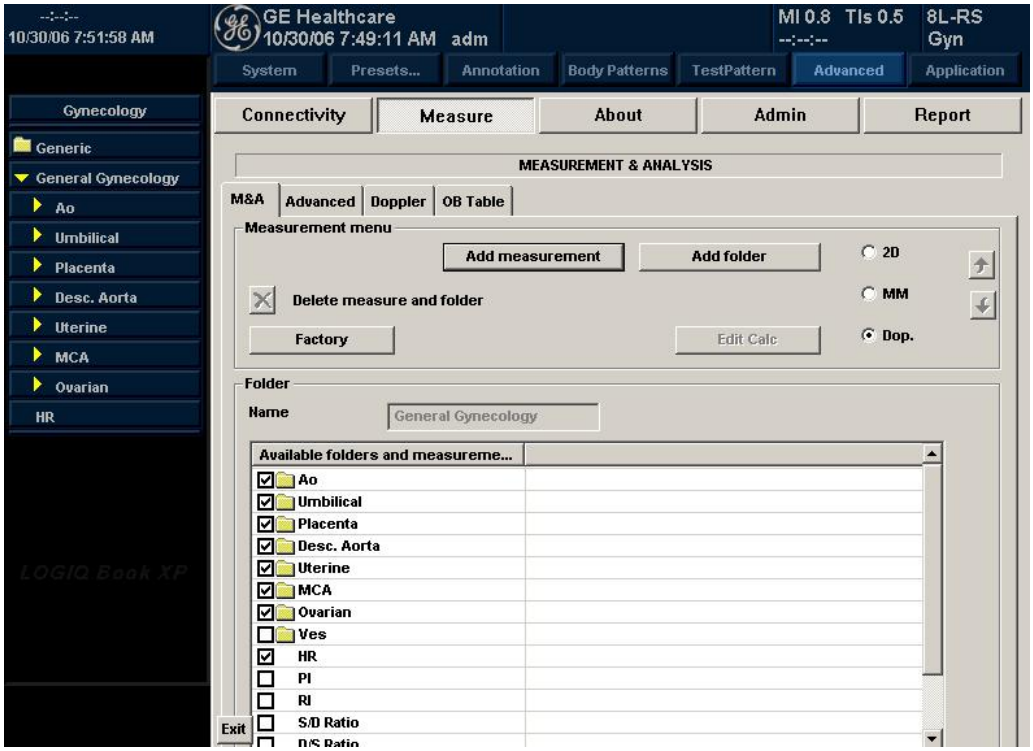


Figure 7-12. Measurement & Analysis screen: Auto sequence

1. Selection Menu
2. Auto Sequence

Changing Measurements

You can make changes to some of the measurements. For example, Head Circumference can be measured with an ellipse, a trace, or two distances. You can specify which measurement type you want the system to use as the default. You specify the measurement type by selecting the tool to use to make the measurement.

- To change the tool used to make a measurement:

  In the Measurement section of the Measurement & Analysis screen, select the desired tool from the Tool list. Select the arrow to display the drop-down list.

NOTE: *If the Tool field is gray, it cannot be changed.*

After you choose the tool, this is what the system expects when you scan and choose this measurement.

NOTE: *The diagram to the right of the Tool list shows the measurement type. In the following example, ellipse is selected and the diagram shows an ellipse.*

Changing Measurements (continued)

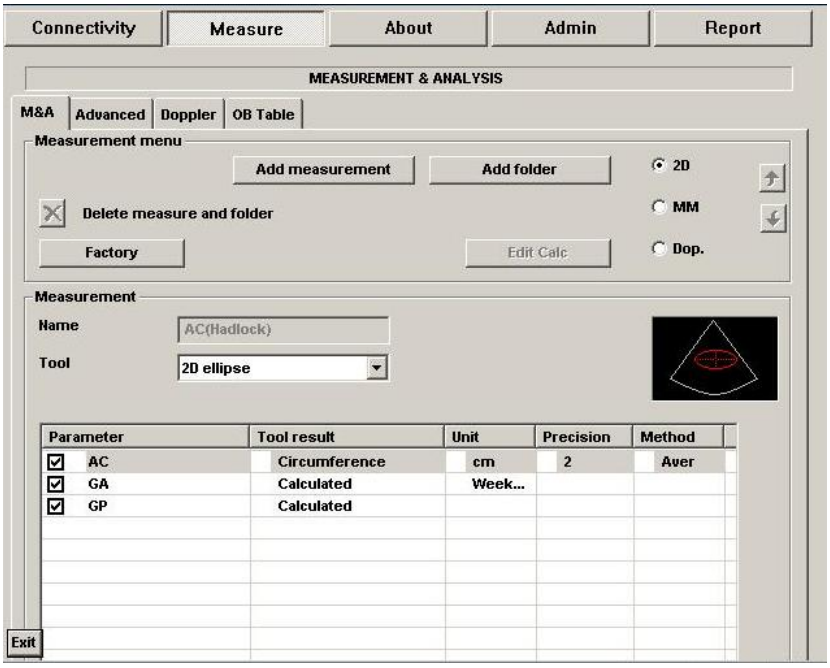


Figure 7-13. Measurement & Analysis screen: Change measurements

1. Tool field: select the default tool used to make the measurement

Adding Folders and Measurements

Adding a folder

When you add a folder, it can be a study, or a measurement folder that includes related measurements.

1. In the Selection menu, select the study or folder where you want to add the folder.
2. In the Measurement menu section, select Add folder.
   - If you select Blank, the system adds a folder with a name such as USERDEFS1. It is listed in the Selection menu. See Figure 7-15.
   - If you want to use an existing folder, select Insert, and then select a folder from the list. The list includes all folders defined for the current exam category and selected mode. You cannot edit this folder.

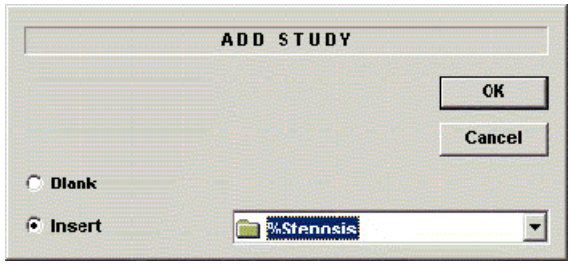


Figure 7-14. Add folder Window

3. Select the user-defined folder in the Selection menu.

   The system displays the new folder in the Folder section of the Measurement & Analysis screen.
4. To name the folder, move the **Trackball** to highlight the Name field, press **Set** twice, and type the name.
5. To add measurements to the folder, See ‘Adding a user-defined measurement’ on *page 7-30 for more information.*

Adding a folder (continued)

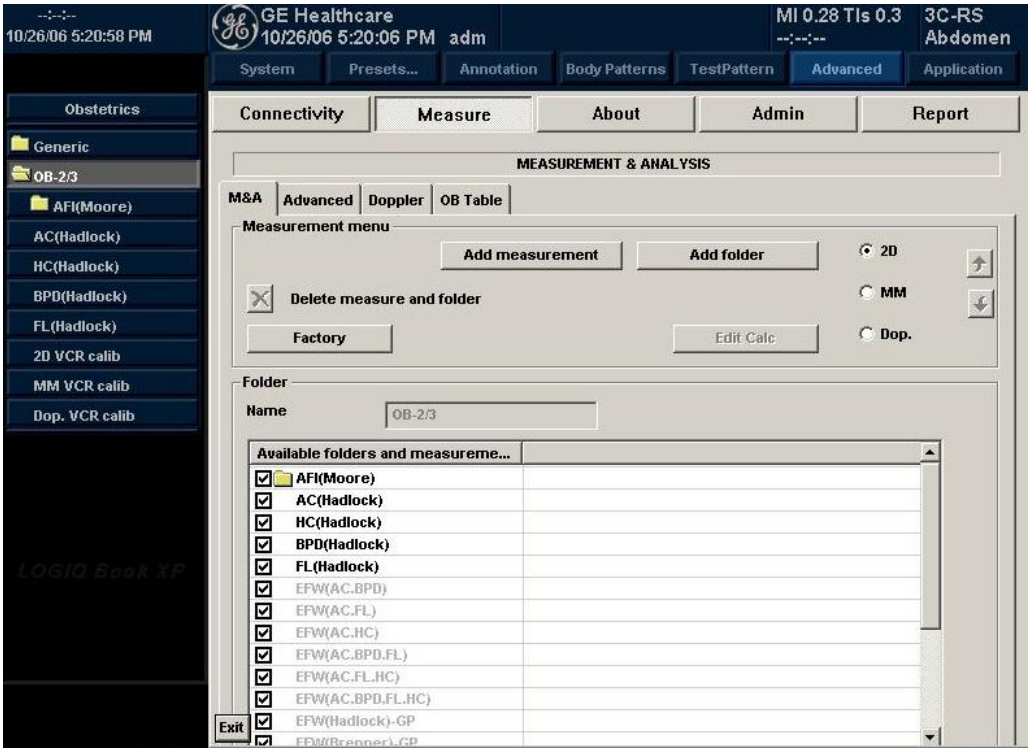


Figure 7-15. Measurement & Analysis: Add folder

Adding a user-defined measurement

You can create a user-defined measurement in a system-defined folder or in a folder you created.

1. In the Selection menu, select the study or folder where you want to add the measurement.
2. In the Measurement menu section, select Add measurement.

   The system displays the Add Measurement window.

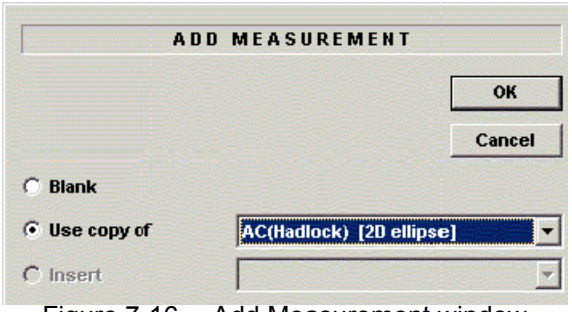


Figure 7-16. Add Measurement window

3. Do one of the following:
   - If you want to create this measurement from a copy of an existing measurement, select Use copy of, and then select a measurement from the list. The list includes all measurements defined for the current exam category and selected mode.

NOTE: *This only applies to OB and Cardiac.*

   - If you want to use an existing formula, select Insert, and then select a measurement from the list. The list includes all measurements defined for the current exam category and selected mode. You cannot edit this formula.
   - If you want to create a blank new measurement, select Blank.

Adding a user-defined measurement (continued)

4. Select OK.
   - If you created a blank measurement, the system adds a measurement with a name such as USERDEFM1.
   - If you created a measurement from a copy of an existing measurement, the system lists the measurement and its parameters in the Measurement section.
5. When you create a new measurement, the measurement name is automatically highlighted. Type a name for the new measurement. You can change the name of a measurement you created from a copy.

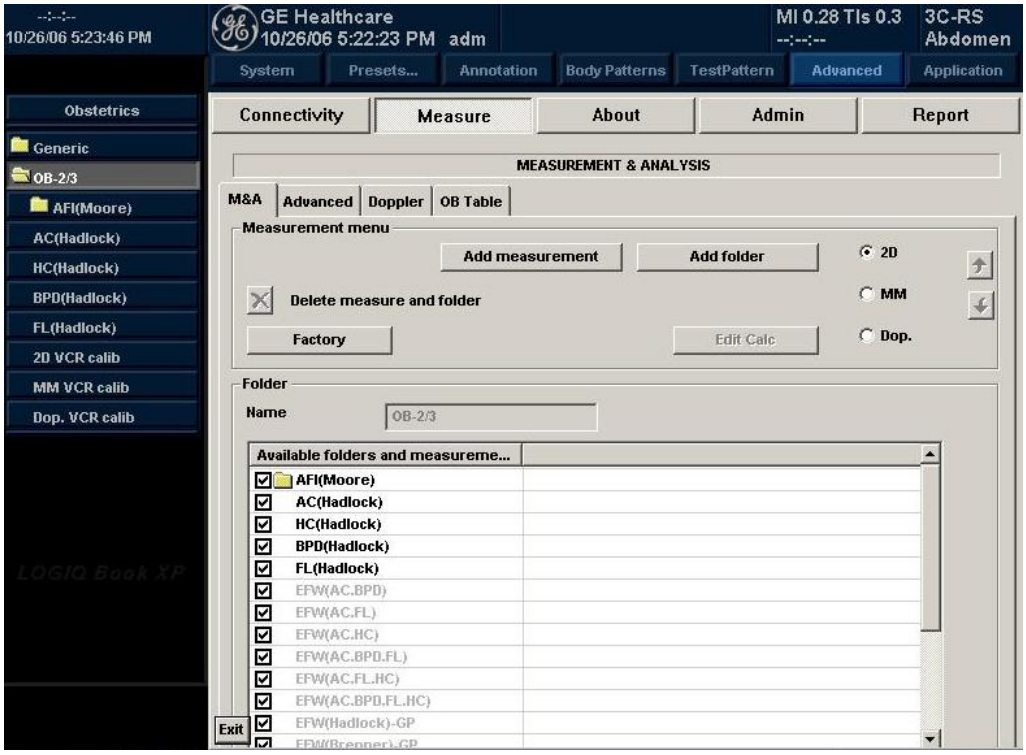


Figure 7-17. Measurement & Analysis: Add measurement

Adding a user-defined measurement (continued)

Defining measurement parameters

After you add a measurement, you can add parameters. You may also want to change parameters if you copied an existing measurement. See ‘Changing or adding measurement parameters’ on *page 7-32 for more information.*

Changing or adding measurement parameters

You can make changes to measurement parameters and you can add measurement parameters.

Changing measurement parameters

To change a measurement parameter:

1. In the Selection menu, select the measurement.
2. To change the name of the Parameter, move the **Trackball** to the parameter name and press **Set** three times. Type a name for the parameter.

For a description of other measurement changes, See ‘Changing Measurements’ on *page 7-26 for more information.*

Changing or adding measurement parameters (continued)

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.

Changing or adding measurement parameters (continued)

Adding measurement parameters (continued)

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).

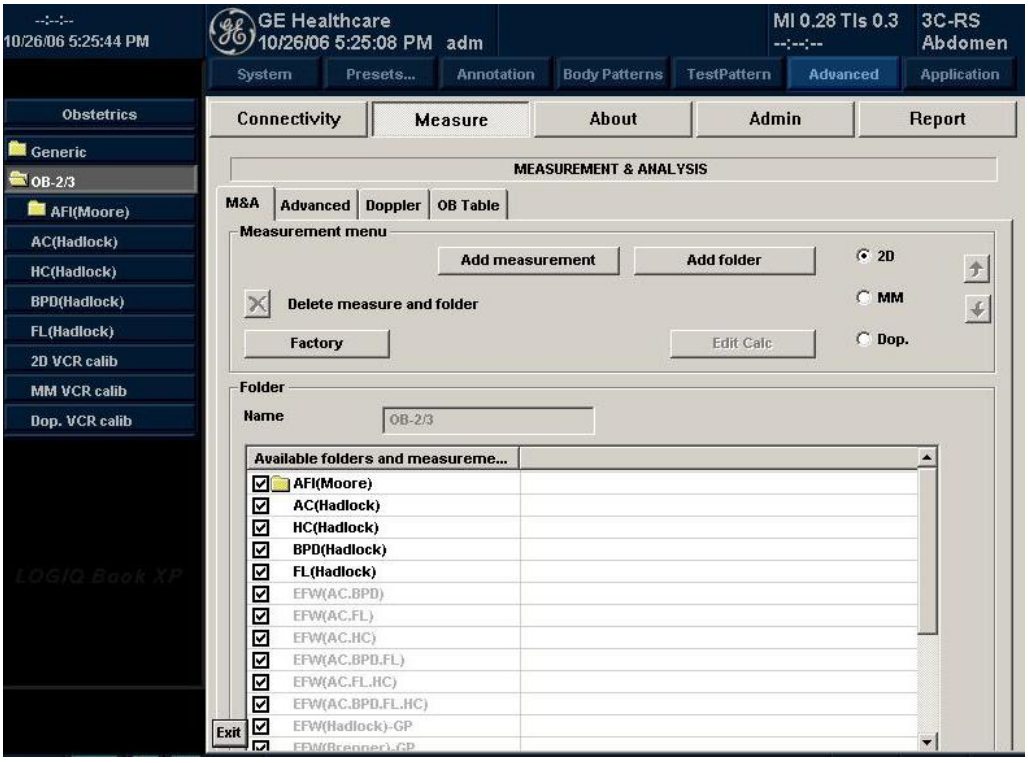


Figure 7-18. Adding a Parameter

5. To change the name of the Parameter, move the Trackball to the (Name) and press **Set** twice. Type a name for the parameter.

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 X next to Delete measure and study.

M&A Advanced Preset

The system allows you to specify application-specific values for certain parameters. You specify the parameter values on the Advanced tab of the Measurement & Analysis screen.

1. Press ***Utility***.

   The system displays the Utility screen on the monitor display.
2. Select ***Advanced***.
3. Select ***Measure***.
4. On the monitor display, select the Advanced tab.

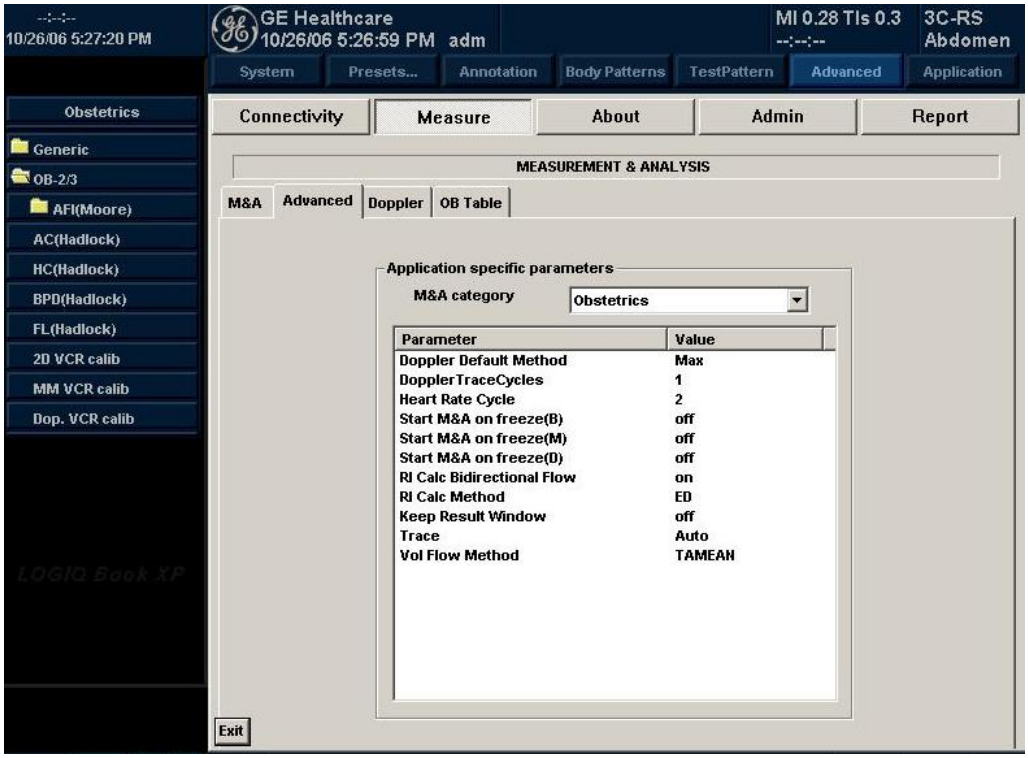


Figure 7-19. M&A Advanced Preset Menu

M&A Category: Display and select current exam category.

Parameter: Lists application specific parameters.

Value: Select the value for a parameter.

M&A Advanced Preset (continued)

5. To select an exam category, select it from the M&A category list.

   The Parameters list displays parameters for the selected category.

6. To select a value for a parameter, select it from the Value list.

Manual Calcs Presets

The system allows you to preset the parameters for manual calculations. You specify the parameter values on the Doppler tab of the Measurement & Analysis screen.

1. Press ***Utility***.

   The system displays the Utility screen on the monitor display.
2. Select ***Advanced***.
3. Select ***Measure***.
4. On the monitor display, select the Doppler tab.

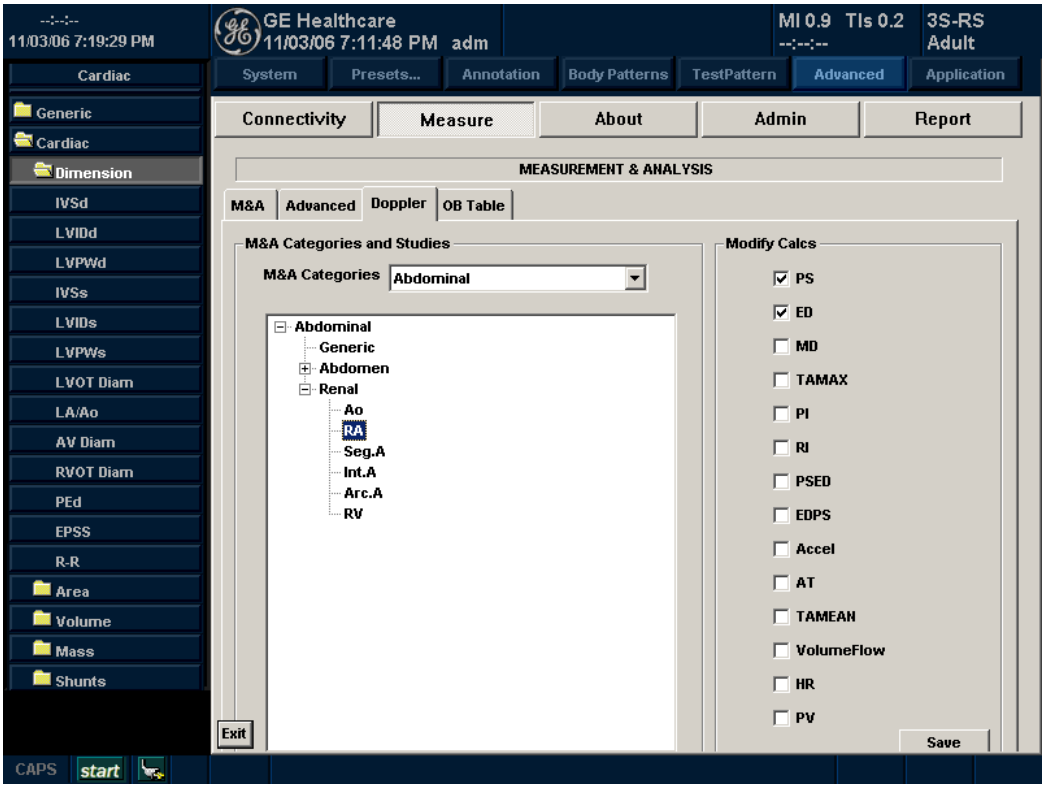


Figure 7-20. M&A Doppler Preset Menu

Manual Calcs Presets (continued)

5. To select an exam category, select it from the M&A category list.

   The system displays a hierarchical view of the exam category and the studies and folders in the category.
6. In the hierarchical view, select a study or folder.
7. In the Modify Calcs column, select the measurements that you want to the system to show for manual calcs for the selected study or folder.
8. To save the changes, select the Save button.

Mode Measurements

B-Mode Measurements

Two basic measurements can be made in B-Mode.

- Distance
- Circumference and Area
  - Ellipse Method
  - Trace Method

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

Distance measurement

To make a distance measurement:

1. Press **Measure** 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.

Distance measurement (continued)

The following hints can help you to perform distance measurements:

HINTS

- **Before** you complete a measurement:
  - To toggle between active calipers, press **Measure**.
  - 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 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 upward. To decrease the size, adjust the **Ellipse** control downward.
8. To toggle between active calipers, press **Measure**.
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** twice; a trace caliper displays.
2. To position the trace caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**. The trace caliper changes to an active caliper.
4. To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.
5. 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 trace caliper, press **Clear** once.
- To clear the trace caliper and the current data measured, press **Clear** twice.

Doppler Mode Measurements

Four basic measurements can be made in Doppler Mode.

- Velocity
- TAMAX and TAMEAN (Manual or Auto Trace)
- Two Velocities with the Time Interval and Acceleration between them
- Time Interval

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.

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** twice; a trace caliper displays.
2. To position the caliper at the trace start point, move the **Trackball**.
3. To fix the start point, press **Set**.
4. To trace the maximum values of the desired portion of the spectrum, move the **Trackball**.

   NOTE: To edit the trace line, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the measurement values in the Results Window.

Auto Trace

The value measured depends upon the Vol Flow Method preset. The selection available is the Peak (TAMAX).

To auto trace TAMAX:

1. Press **Measure** twice; an active caliper with a vertical dotted line displays.
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.

Velocity, Time Interval and Acceleration

To measure two velocity values, the time interval (ms), and acceleration (m/s^2):

1. Press **Measure** three times; 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** four times; an active caliper with a vertical dotted line displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the time interval between the two calipers in the Results Window.

M-Mode Measurements

Basic measurements that can be taken in the M-Mode portion of the display are:

- Tissue Depth (Distance)
- Time Interval
- Time Interval and Velocity

NOTE: The following instructions assume that you do the following:

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the M-Mode part of the display.
3. Press **Freeze**.

Tissue depth

Tissue depth measurement in M-Mode functions the same as distance measurement in B-Mode. It measures the vertical distance between calipers.

1. Press Measure 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** twice; an active caliper with a vertical dotted line displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the time interval between the two calipers in the Results Window.

Time interval and Velocity

To measure time and velocity between two points:

1. Press Measure three times; an active caliper with a vertical and horizontal dotted line displays.
2. To position the active caliper at the start point, move the Trackball.
3. To fix the start point, press Set.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the Trackball.
5. To complete the measurement, press Set.

   The system displays time(s) and slope between the two points in the Results Window.

Viewing and Editing Worksheets

As you complete measurements, the system puts measurement data in the appropriate worksheets.

To view a worksheet

To view a worksheet, select ***Worksheet*** on the Top/Sub Menu.

The system displays the worksheet for the current study.

Figure 7-21. OB B-Mode Worksheet

To view a worksheet (continued)

To return to scanning, do one of the following:

- Press ***Esc***.
- Select the *Exit* button.

To view a different worksheet, select the worksheet key for the desired worksheet.

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

To change data on a worksheet:

1. To position the cursor at the field you want to change, move the **Trackball**.

   The field is highlighted.
2. Press **Set**.
3. Type the new data in the field.

   The new data is displayed in blue to indicate that it was manually entered.

To delete or exclude data on a worksheet:

1. 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 delete the field, select ***Delete Value***.
   - To exclude the field, select ***Exclude Value***.

     The data in the field is not visible and is not included in worksheet calculations.
   - To include a value that you previously excluded, select ***Exclude Value***.

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***.

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.

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 Top/Sub Menu, 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
- A/B Ratio

Figure 7-22. 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 Book XP Series automatically activates the % Stenosis with the default selection. If another method is preferred, select it from the Top/Sub Menu.

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 Top/Sub Menu, 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 7-40 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 Top/Sub Menu, select ***% Stenosis***.
2. Select ***%sten(Area)***.

   The system displays a trace 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 trace caliper.
5. Make a trace measurement of the outer area of the blood vessel.

   The system displays the two area measurements and percent stenosis in the Results Window.

See ‘Circumference and area (ellipse) measurement’ on *page 7-42 for more information.*

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 7-40 for more information.*

For details on how to make an ellipse measurement, See ‘Circumference and area (ellipse) measurement’ on *page 7-42 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.*

To make a volume calculation using one or two distances,

1. Select ***Volume***.
2. Make one or two distance measurements.
3. Select ***Volume***.

   The system displays the distances and the volume in the Results Window.

*NOTE: Use the **Clear** key to erase the green caliper.*

To make a volume calculation using three distances,

1. Make three distance measurements.

*NOTE: Three distances can be done in the dual format mode (side by side images). One measurement is usually made in the sagittal plane and two measurements in the axial plane. To use the dual format mode, press the **L** or **R** key on front panel.*

2. Select ***Volume***.

   The system displays the distances and the volume in the Results Window.

Volume (continued)

To make a volume calculation using one ellipse,

1. Make one ellipse measurement.
2. Select ***Volume***.

   The system displays the ellipse measurement and the volume in the Results Window.

To make a volume calculation using one ellipse and one distance:

1. Make one distance measurement and one ellipse measurement.
2. Select ***Volume***.

   The system displays the distance and ellipse measurement and the volume in the Results Window.

HINTS

- Volumes are most accurate when measurements are taken in the sagittal and axial scan planes.
- To display sagittal and axial plane images simultaneously, use the side-by-side dual format option.

Calculation formulas are available in the *Advanced Reference Manual*.

Volume (continued)

Table 7-2: Volume Calculations

Calc Name	Input Measurements
Volume (spherical)	One distance
Volume (prolate spheroidal)	Two distances, d1>d2
Volume (spheroidal)	Three distances
Volume (prolate spheroidal)	One ellipse: (d1 major axis, d2 minor axis)
Volume (spheroidal)	One distance d1, and one ellipse (d2 major axis, d3 minor axis)

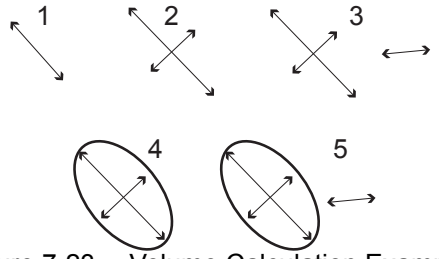


Figure 7-23. Volume Calculation Examples

1. One distance
2. Two distances
3. Three distances
4. One ellipse
5. One distance and one ellipse

Angle

This function measures the angle between two intersecting planes.

1. From the Generic Top/Sub Menu, select ***Angle***.
   The system displays an active caliper.
2. To position the caliper, move the **Trackball**.
3. To fix the position of the first caliper, press ***Set***.
   The system displays a second active caliper.
4. To position the second caliper at the apex of the angle, move the **Trackball**.
5. To fix the position of the second caliper, press **Set**.
   The system displays a third active caliper.
6. To position the third caliper, move the **Trackball**.
7. To complete the angle measurement, press **Set**.
   The system displays the angle in the Results Window.

*NOTE: To rotate through and activate previously fixed calipers, adjust the **Cursor Select** control.*

A/B Ratio

In B-Mode, you can calculate A/B ratio by diameter or by area.

NOTE: The LOGIQ Book XP Series automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Top/Sub Menu.

Diameter To calculate A/B ratio by diameter,

1. From the Generic Top/Sub Menu, 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 7-40 for more information.*

Area To calculate A/B ratio by area,

1. From the Generic Top/Sub Menu, select ***A/B Ratio***.
2. Select ***ratio(Area)***.

   The system displays a trace caliper.
3. Make a trace measurement of the A area.

*NOTE: To erase an open trace, move the **Trackball**.*

   The system displays a second trace 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 7-43 for more information.*

M-Mode Measurements

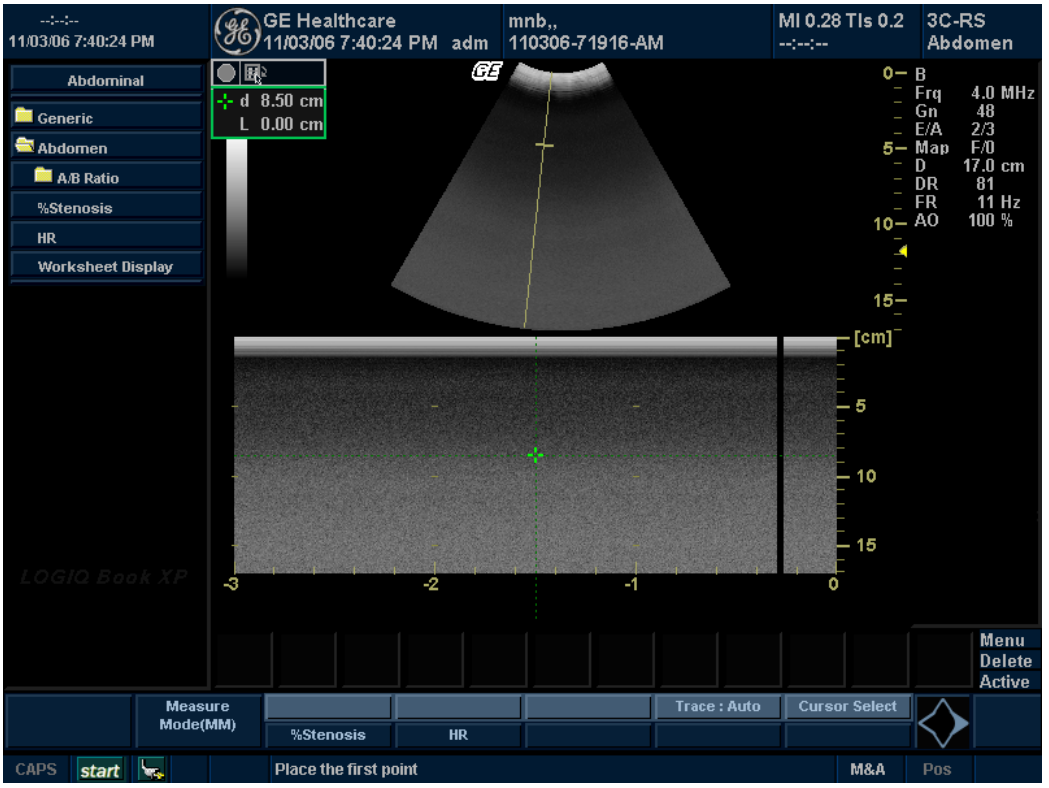


Figure 7-24. M-Mode Generic Study

% Stenosis

See '% Stenosis' on *page 7-55 for more information.*

A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity.

NOTE: The LOGIQ Book XP Series automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Top/Sub Menu.

Diameter See 'Diameter' on *page 7-61 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.

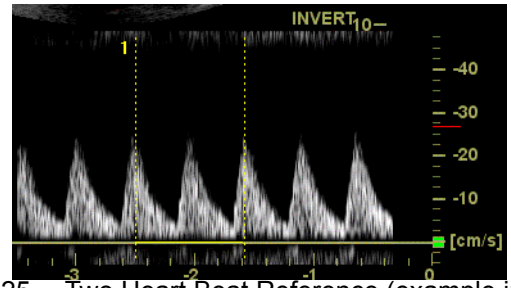


Figure 7-25. Two Heart Beat Reference (example in Doppler mode)

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 'Specifying measurement and display options' 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
- Max PG (Pressure Gradient)
- Mean PG (Pressure Gradient)
- SV (Stroke Volume)
- HR (Heart Rate)
- Modify Auto Calcs

Doppler Mode Measurements (continued)

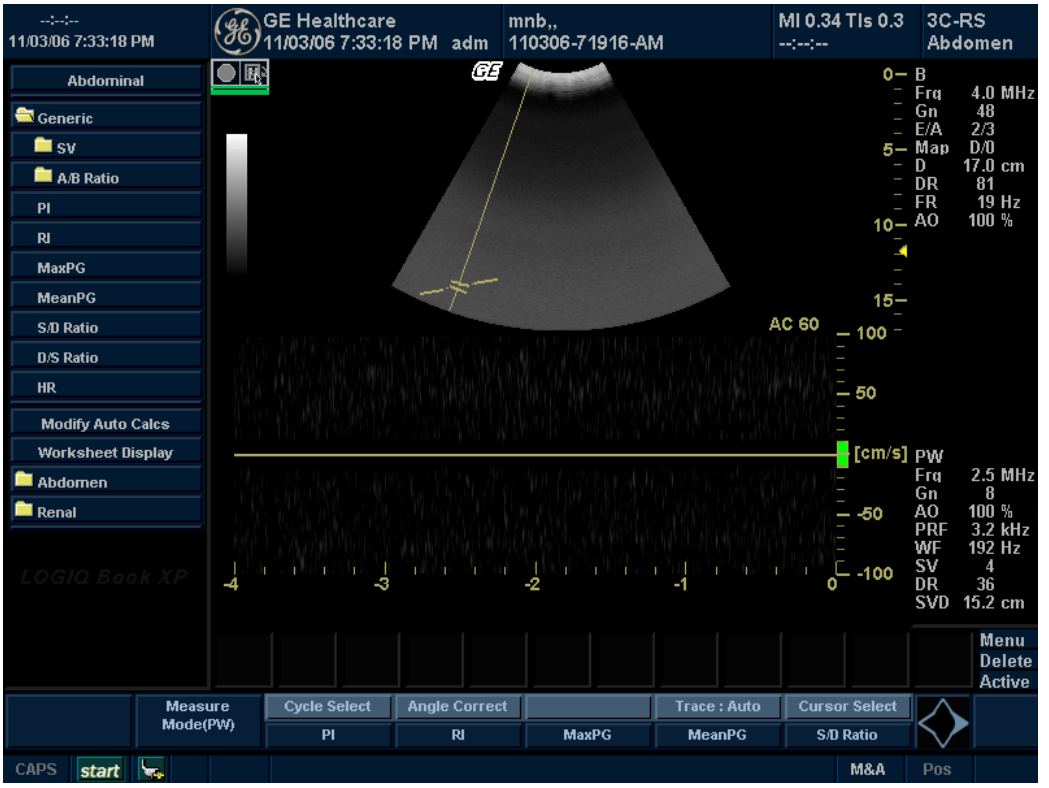


Figure 7-26. Doppler Mode Generic Study

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**.

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 trace 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 Top/Sub Menu, 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.

A/B Ratio

In Doppler Mode you can measure A/B ratio by velocity, time, or acceleration.

NOTE: The LOGIQ Book XP Series automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Top/Sub Menu.

Velocity See 'Velocity' on *page 7-63 for more information.*

Time See 'Time' on *page 7-63 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.

Max Pressure Gradient (PG)

To measure Max PG,

1. From the Doppler Generic Top/Sub Menu, select ***Max PG***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the first pressure gradient point, 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 second pressure gradient point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the two V_{max} measurements and the Max PG in the Results Window.

Set the first caliper on V_{max} and the second on V_d.

Automatic Calculation of Max PG

When you select Max PG, if you previously measured and calculated velocity in Doppler Mode, the system automatically calculates Max PG from the V_{max} and V_d measurements taken for velocity.

Mean Pressure Gradient (PG)

To measure Mean PG (Mean Pressure Gradient):

1. From the Doppler Generic Top/Sub Menu, select ***Max PG***.

   The system displays a trace caliper.
2. To position the caliper at the beginning of the waveform (V_{max}), move the **Trackball**.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. To trace the waveform from V_{max} to V_d move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays TAMAX and Mean PG in the Results Window.

If Trace Auto is selected, the waveform is automatically traced after the second caliper is fixed.

If Trace Auto is not selected, manually trace the desired portion of the waveform.

Automatic Calculation of Mean PG

If velocity was previously measured and calculated in Doppler Mode, Mean PG is calculated from the velocity value when Mean PG is first selected in the Top/Sub Menu.

The waveform is automatically traced. Velocity and Mean PG are also displayed on the screen.

If Trace Auto is off, the Auto Trace function is off and traces can be performed manually.

Heart Rate

To measure heart rate, See ‘Heart Rate’ on *page 7-64 for more information.* or select any of the following measurements.

SV Diam (Stroke Volume Diameter)

To measure SV Diam:

1. From the Doppler Generic Top/Sub Menu, select the SV folder.
2. Select SV Diam.

SV TAMEAN (Stroke Volume TAMEAN)

To measure SV TAMEAN:

1. From the Doppler Generic Top/Sub Menu, select the SV folder.
2. Select SV TAMEAN.

CO HR (Cardiac Output Heart Rate)

To measure CO HR:

1. From the Doppler Generic Top/Sub Menu, select the SV folder.
2. Select CO HR.

Helpful hints

HINTS

The following hints can help when making a measurement

- Prior to making measurements, use the Cine function, if necessary, to display the best image.
- As you take measurements, each measurement is given a sequential number on the display and in the Results Window. Nine measurements can be displayed in the Results Window at one time.
- Once the Results Window has nine measurements, if you make any further measurements, the system erases the top (first) measurement and adds the new measurement last ("first in, first out").
- While you are taking a measurement, the value in the Results Window updates until you complete the measurement.

Chapter 8

Abdomen and Small Parts

Describes how to perform Abdomen and Small Parts measurements and calculations.

Abdomen/Small Parts Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

Calculation formulas are available in the *Advanced Reference Manual*.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu.

Abdomen

Introduction

Abdominal measurements offer a few different types of measurement studies:

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-53 for more information.*
- Abdomen
- Renal

1. Press **Measure**.
2. Select the Top/Sub Menu key.
3. Press ***Exam Calcs***.

   The Abdomen exam category allows you to choose from the displayed studies.
4. To choose another study, select the desired study folder.

B-Mode Measurements

The following measurements are located in the Exam Calcs tab for the Abdomen exam category. Some measurements are only available in certain Exam Calcs. Those specific measurements (splenic length, splenic width, splenic height, Aorta Diameter, and Renal Length) are listed on the following pages.

In B-Mode, the Generic Exam Calcs for Abdomen includes the following measurements:

- % Stenosis
- Volume
- Angle
- Renal Volume
- A/B Ratio
- VF Diam

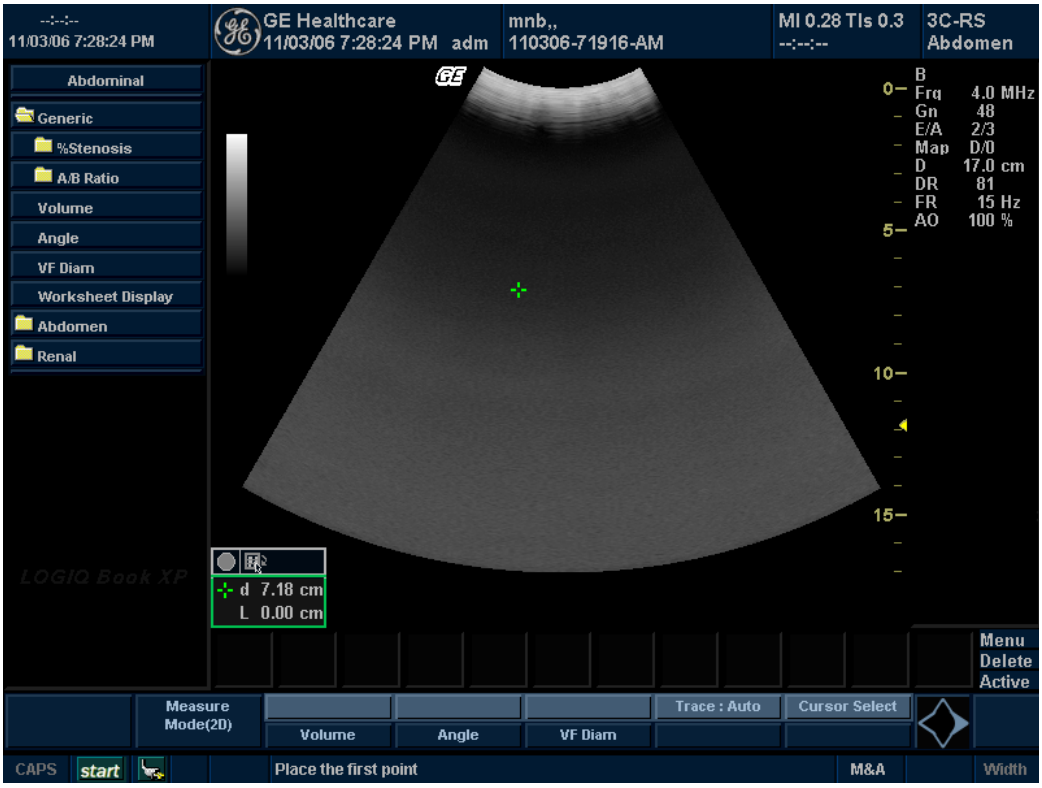


Figure 8-1. Generic Calculations B-Mode Top/Sub Menu

See ‘B-Mode Measurements’ on *page 7-54 for more information.*

Aorta Diameter

This measurement is found in the Abdomen Exam Calcs tab. To measure aorta diameter, make one distance measurement:

1. Select **Aorta Diameter**; 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 aorta diameter in the Results Window.

Renal Length

This measurement is found in the Renal Exam Calcs tab. To measure renal length, make one distance measurement:

1. Select the appropriate orientation (side): Right or Left.
2. Select **Renal Length**; an active caliper displays.
3. To position the active caliper at the start point, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points, if preset accordingly.
6. To complete the measurement, press **Set**.

   The system displays the renal length in the Results Window.

M-Mode Measurements

In M-Mode, all Exam Calcs include the following measurements:

- % Stenosis
- A/B Ratio
- Heart Rate

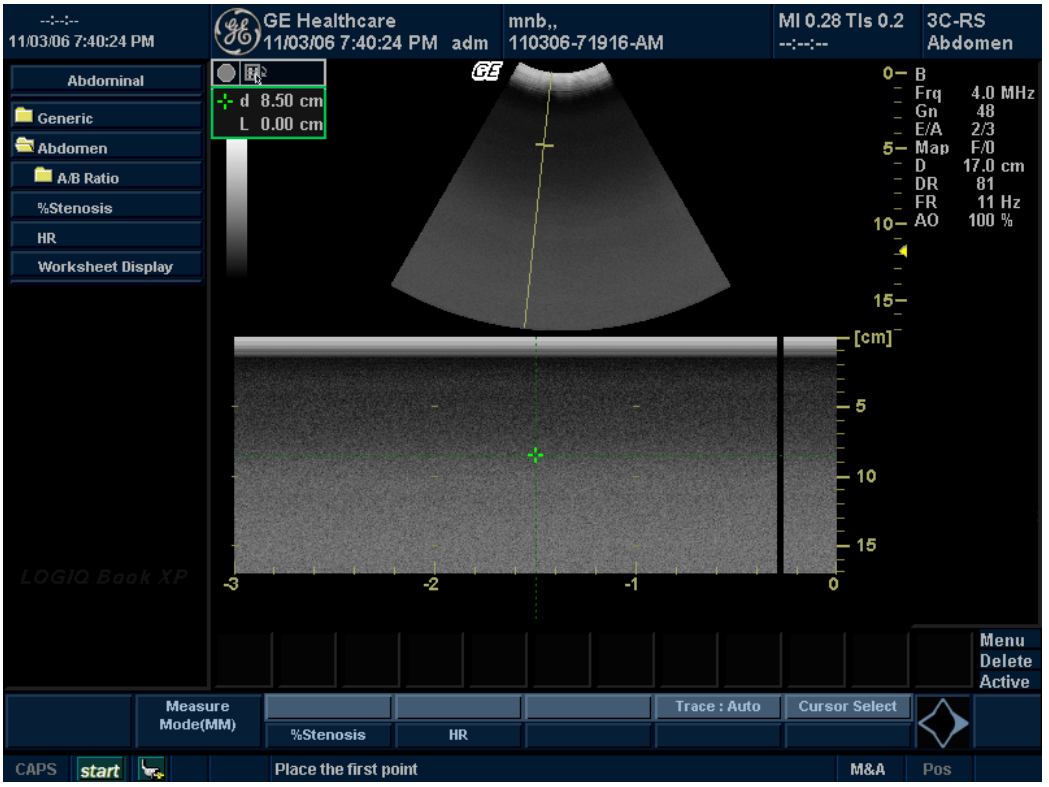


Figure 8-2. Abdomnal Calculations M-Mode Top/Sub Menu

See ‘M-Mode Measurements’ on *page 7-62 for more information.*

Doppler Mode Measurements

Generic Exam Calcs

In Doppler Mode, the Generic Exam Calcs tab includes the following measurements:

- PI (Pulsatility Index)
- RI (Resistive Index)
- S/D Ratio
- D/S Ratio
- A/B Ratio
- Max PG (Pressure Gradient)
- Mean PG (Pressure Gradient)
- SV (Stroke Volume)
- Heart Rate
- Modify Auto Calcs

Generic Exam Calcs (continued)

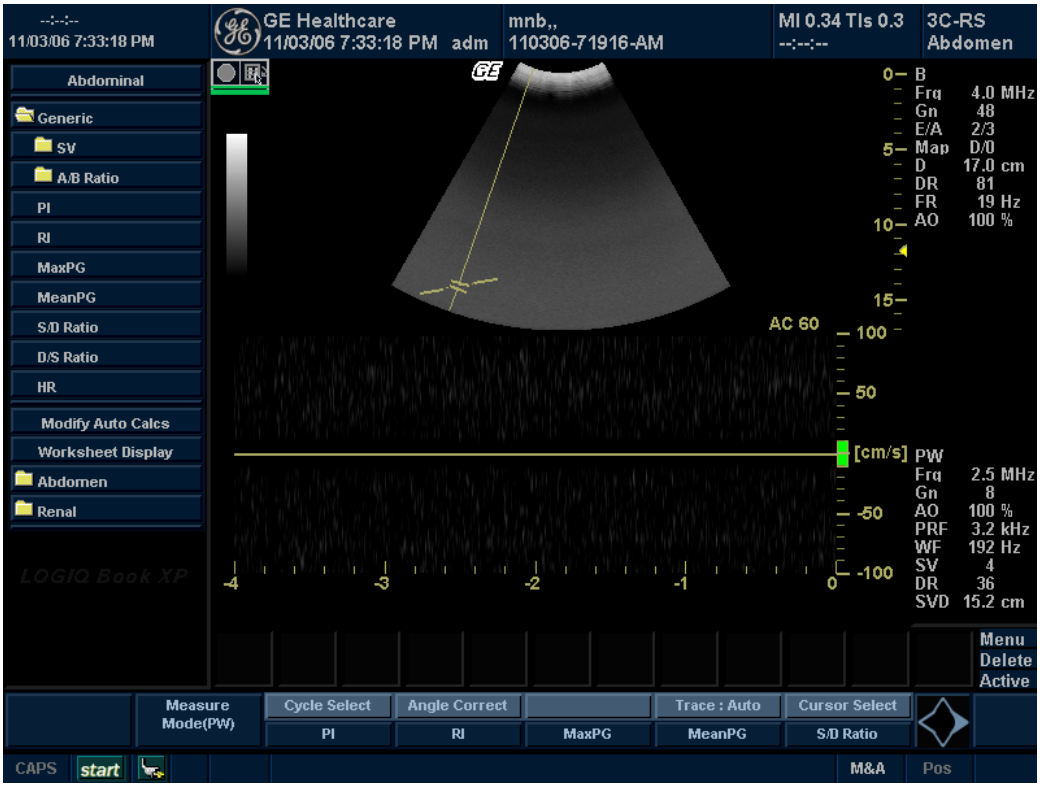


Figure 8-3. Doppler Mode Top/Sub Menu: Abdominal Calculations

See ‘Doppler Mode Measurements’ on *page 7-65 for more information.*

Abdomen and Renal Exam Calcs

Your system is set up to show the measurements that you usually make for each region of interest. To make a measurement that is not shown for the selected region:

1. Select the folder for the region you want to measure.

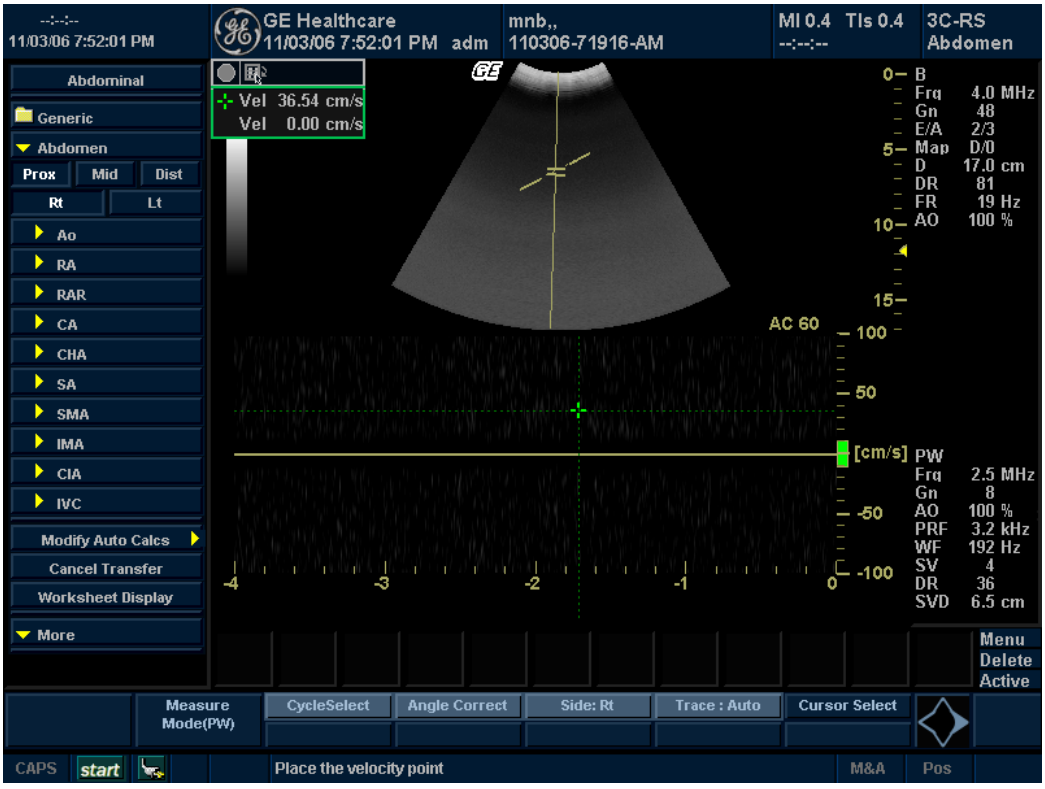


Figure 8-4. Abdomen Exam Calcs Folder (Doppler Mode) in Abdomen exam category

Abdomen and Renal Exam Calcs (continued)

2. Press Show All.

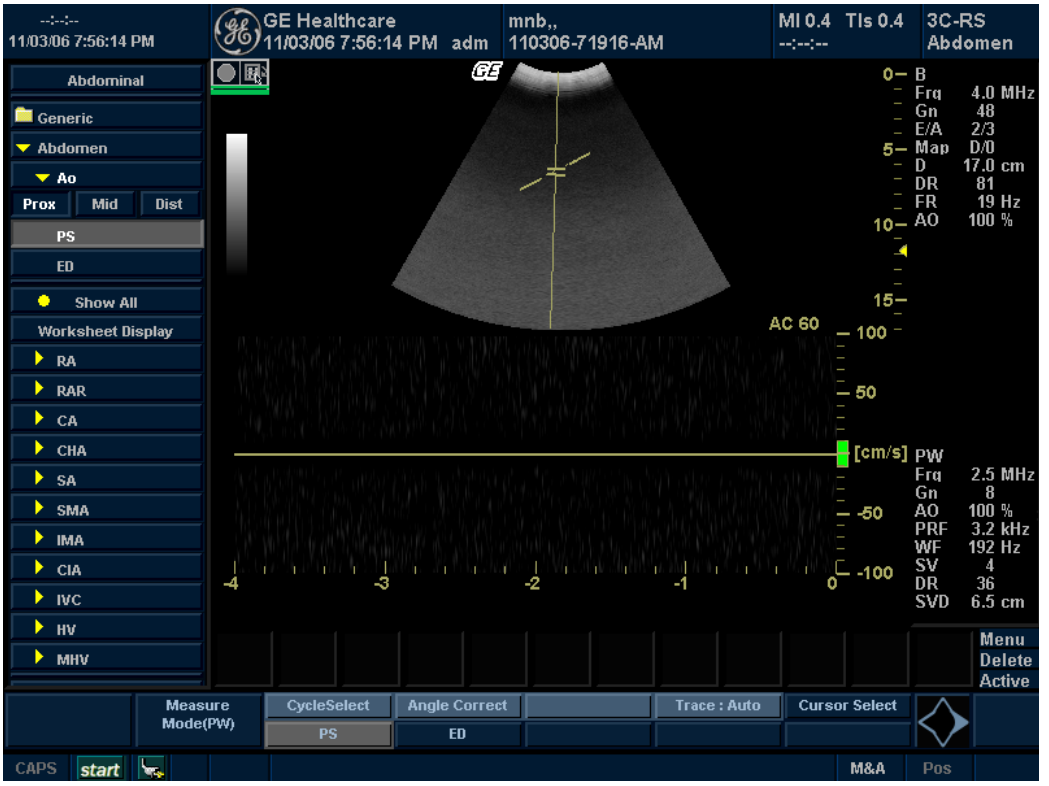


Figure 8-5. Aorta folder

Abdomen and Renal Exam Calcs (continued)

The system displays all possible measurements.

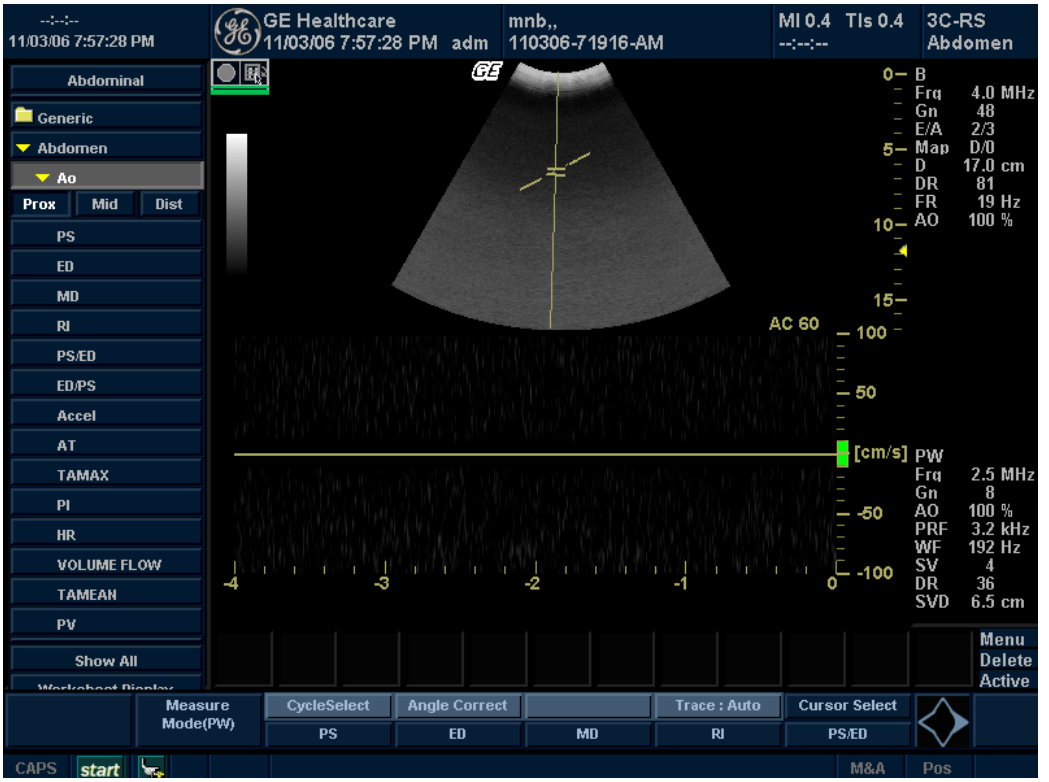


Figure 8-6. Show All measurements

3. Select the desired measurement.

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

Abdomen and Renal Exam Calcs (continued)

Acceleration

1. Select ***Accel***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole, move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, acceleration time, and acceleration in the Results Window.

Acceleration Time (AT)

1. Select ***AT***.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the acceleration time in the Results Window.

Abdomen and Renal Exam Calcs (continued)

Heart Rate (HR)

See ‘Heart Rate’ on *page 7-64 for more information.*

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.

Abdomen and Renal Exam Calcs (continued)

Pulsatility Index (PI)

See 'Pulsatility Index (PI)' on *page 7-67 for more information.*

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.

Abdomen and Renal Exam Calcs (continued)

Resistive Index (RI) See ‘Pulsatility Index (PI)’ on *page 7-67 for more information.*

TAMAX See ‘TAMAX and TAMEAN’ on *page 7-45 for more information.*

Small Parts

B-Mode Measurements

The Small Parts exam category includes the following two folders:

- Generic, measurements listed on the following page
- Small Parts, which includes the thyroid measurements described in this section

Generic Measurements

In B-Mode, the Generic Exam Calcs for Small Parts includes the following measurements:

- % Stenosis
- Volume
- Angle
- A/B Ratio
- VF Diam

Figure 8-7. Generic Calculations B-Mode Top/Sub Menu

See ‘B-Mode Measurements’ on *page 7-54 for more information.*

Thyroid length, width, and height

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*** tab, select the ***Small Parts*** folder.
2. Select the ***Thyroid*** folder.
3. Select the appropriate orientation (side): Right or Left.
4. Select ***Thyroid L***, ***Thyroid W***, or ***Thyroid H***.

   An active caliper displays.
5. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.
6. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the thyroid volume in the Results Window.

M-Mode Measurements

In M-Mode, all Exam Calcs include the following measurements:

- % Stenosis
- A/B Ratio
- Heart Rate

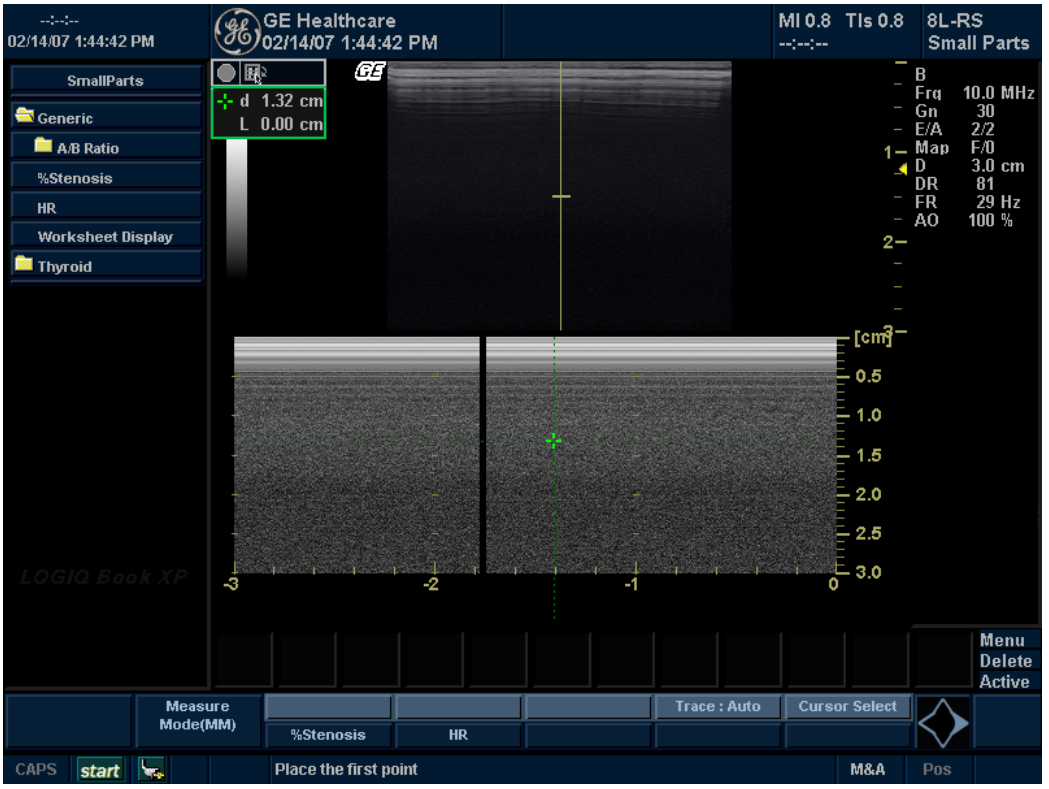


Figure 8-8. Abdomnal Calculations M-Mode Top/Sub Menu

See ‘M-Mode Measurements’ on *page 7-62 for more information.*

Doppler Mode Measurements

In Doppler Mode, the Exam Calcs tabs include the following measurements:

- PI (Pulsatility Index)
- RI (Resistive Index)
- SV
- S/D Ratio
- D/S Ratio
- A/B Ratio
- Max PG (Pressure Gradient)
- Mean PG (Pressure Gradient)
- Heart Rate
- Modify Auto Calcs

Doppler Mode Measurements (continued)

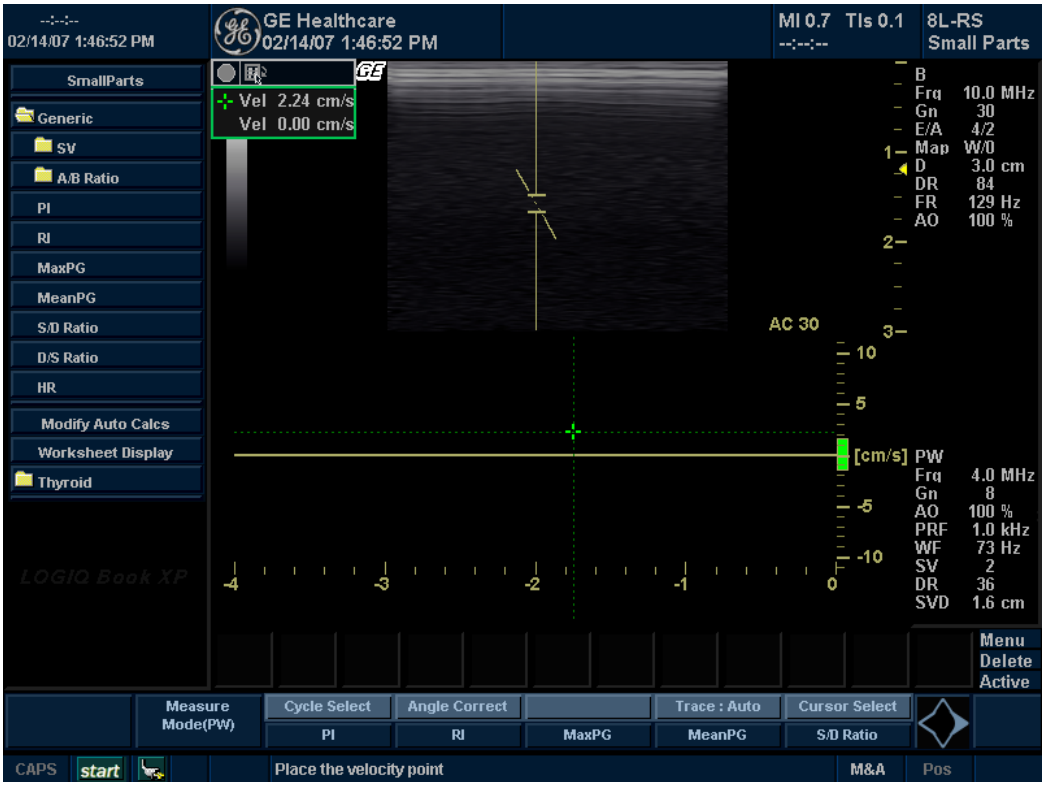


Figure 8-9. Doppler Mode Top/Sub Menu Abdominal Calculations

See ‘Doppler Mode Measurements’ on *page 7-65 for more information.*

Calculation formulas are available in the *Advanced Reference Manual*.

Chapter 9

OB/GYN

Describes how to perform obstetric and gynecology measurements and calculations, and how to use OB graphs and worksheets.

ReportWriter not available on LOGIQ Book XP PRO

OB Exam

Exam Preparation

Prior to an ultrasound examination, the patient should be informed of the clinical indication, specific benefits, potential risks, and alternatives, if any. In addition, if the patient requests information about the exposure time and intensity, it should be provided. Patient access to educational materials regarding ultrasound is strongly encouraged to supplement the information communicated directly to the patient. Furthermore, these examinations should be conducted in a manner and take place in a setting which assures patient dignity and privacy.

- Prior material knowledge and approval of the presence of nonessential personnel with the number of such personnel kept to a minimum.
- An intent to share with the parents per the physician’s judgement, either during the examination or shortly thereafter, the information derived.
- An offer of choice about viewing the fetus.
- An offer of choice about learning the sex of the fetus, if such information becomes available.

Ultrasound examinations performed solely to satisfy the family's desire to know the fetal sex, to view the fetus, or to obtain a picture of the fetus should be discouraged.

Acoustic Output Considerations

General warning

The LOGIQ Book XP Series system is a multi-use device which is capable of exceeding FDA Pre-enactment acoustic output (spatial peak-temporal average) intensity limits for fetal applications.

It is prudent to conduct an exam with the minimum amount and duration of acoustic output necessary to optimize the image's diagnostic value.

Concerns surrounding fetal exposure

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

Training

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

To Start an Obstetrics Exam

NOTE: Calculation formulas are listed in the Advanced Reference Manual.

To begin an Obstetrics exam, you enter patient data or, if the patient data from a previous exam is saved in the system, find the patient information.

1. On the control panel, press ***Patient***.

   The Patient Data Entry screen is displayed.
2. On the Patient Data Entry screen, select New Patient.
3. To choose an Obstetrics exam, move the ***Trackball*** to highlight Obstetrics, then press ***Set***.

   The obstetric fields are listed in the Exam Information section of the Patient Data Entry screen.
4. Do one of the following:

   - If the patient data is already stored in the system, search for the data. Use the search fields in the bottom section of the Patient Data Entry screen. For information about how to search for patient data, See ‘Changing Patient Information or an Exam’ on *page 4-7 for more information.*

     When the correct patient data is listed in the search list, move the ***Trackball*** to highlight the patient name and press ***Set***. The system displays the patient data.

*NOTE: To change patient data, use the **Trackball** to move the cursor to the field and press **Set**. Press **Backspace** to delete the data, and then type the correct data.*

   - If the patient data is not stored in the system, enter the data. To enter data in a field, move the ***Trackball*** to highlight the field and then press ***Set***. Use the ***Tab*** key to move between fields. Obstetric patient fields are listed in Table 9-1.

NOTE: For information about entering general patient data such as Patient ID and name, See ‘Beginning a New Patient’ on page 4-3 for more information.

Table 9-1: Obstetric fields

Field	Description
LMP	Last Menstrual Period; enter the date that the patient started her last menstrual period, in mm/dd/yyyy format. You must enter 4 digits for the year. When you type the month and day, the system fills in the /.

Table 9-1: Obstetric fields

Field	Description
BBT	Basal Body Temperature; the date of the basal body temperature changing
EDD by LMP	Estimated Delivery Date by LMP; the system fills in the date after you enter the LMP.
GA by LMP	Gestational Age by LMP; the system fills in the age after you enter the LMP.
Gravida	Number of pregnancies.
Para	Number of births.
AB	Number of abortions.
Ectopic	Number of ectopic pregnancies.
Fetus #	Number of fetuses; default is 1. Can be 1-4.
Accession #	Exam number used with hospital information system (DICOM). This is a tracking number from the worklist.
Exam Description	Describe the type of exam.
Perf Physician	The physician who performs the exam. Choose from the list or type the name.
Ref. Physician	The physician who requested the exam. Choose from the list or type the name.
Operator	The person (not a physician) who performs the scan. Choose from the list.

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

Table 9-2: Obstetric fields: Detail

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

To Start an Obstetrics Exam (continued)

After you complete the patient information, you can begin the scan.

1. To change from the Patient Data Entry screen to the Scan screen, do one of the following:
   - On the keyboard, press ***Esc***.
   - On the Control Panel, select **Patient** or **Freeze**.
   - On the Control Panel, press the **B-Mode** key.

   The system displays the Scan screen.
2. On the Control Panel, press ***Measure***.

   The default Obstetrics study is displayed on the Top/Sub Menu. Figure 9-1 shows the OB-General study.

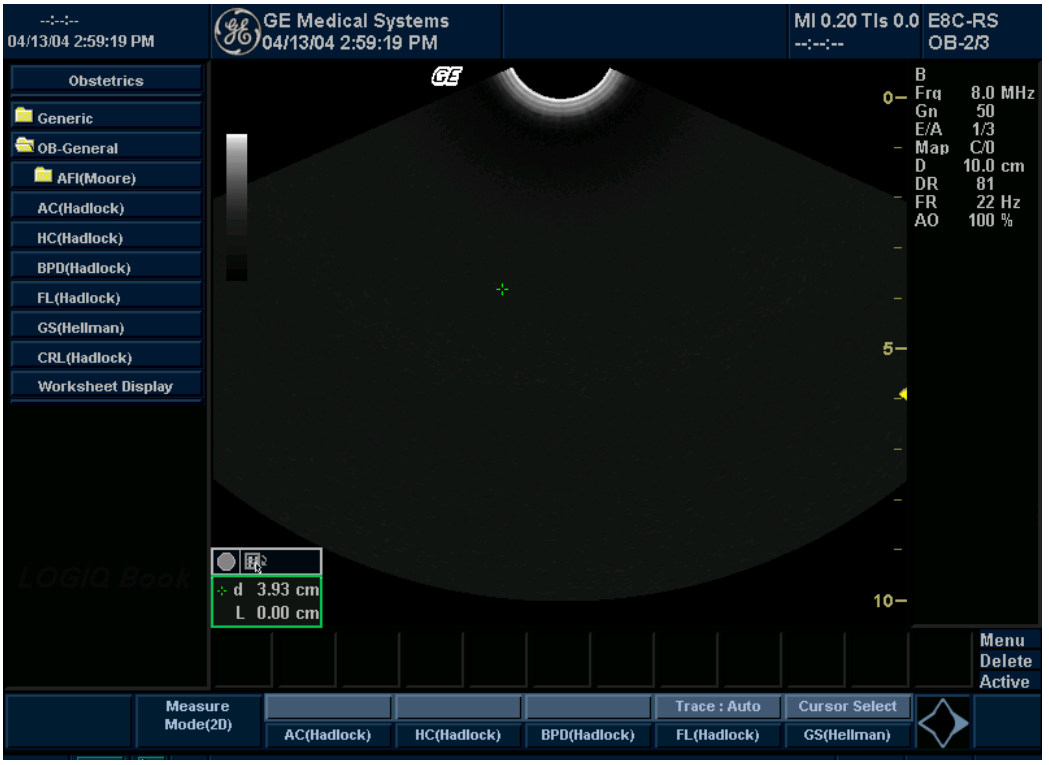


Figure 9-1. OB-General Study

To choose a study

1. To change the study on the exam category, select ***Preset***.

   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 Top/Sub Menu.

Figure 9-2. OB Study Top/Sub Menu

NOTE: The folders you see on the Top/Sub Menu may be different if your system has been customized.

OB Measurements and Calculations

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

Introduction (continued)

When you make measurements, you can select the calculation before you make the measurement or after you make it. If you select the calculation before you make the measurement, the Results Window shows the estimated fetal age as you make the measurement. If you select the calculation after you make the measurement, the estimated fetal age is displayed after you complete the measurement. The measurements steps in this section tell you to select the calculation before you make the measurement.

The following pages describe how to make OB measurements and calculations. The measurements are organized by mode, and within mode are listed in alphabetical order.

Out of Range – If the system indicates that a measurement is out of range (OOR), it means one of the following:

- The measurement is out of the normal range based on the gestational age that is calculated from the LMP. The system determines OOR from the ultrasound age compared to the gestational age. The gestational age is calculated from the last menstrual period or the estimated delivery date.
- The measurement is outside of the range for the data used in the calculation. That means that the measurement is either less than or more than the range of measurements used to determine fetal age based on the measurement.

NOTE: Calculation formulas are listed in the Advanced Reference Manual.

B-Mode Measurements

This section describes all B-Mode measurements that you typically find in OB studies. Additional OB measurements follow the typical ones.

Abdominal Circumference (AC)

To calculate abdominal circumference, you make an ellipse, trace or two distance measurements.

Ellipse

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***AC*** until *Ellipse* is displayed.
3. To position the active caliper, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second caliper, move the **Trackball**.
6. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control upward.
   - To decrease the size, adjust the **Ellipse** control downward.
   - To toggle between active calipers, press **Measure**.
7. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Abdominal Circumference (AC) (continued)

Trace

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***AC*** until *Trace* is displayed.
3. To position the trace caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**.

   The trace caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy.
6. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control downward.
- To erase the dotted line but not the trace caliper, press **Clear** once.
- To clear the trace caliper and the current data measured, press **Clear** twice.

Abdominal Circumference (AC) (continued)

Two distances

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***AC*** until *Caliper* is displayed.
3. To make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.
      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.
      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.
      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.

   The system displays the abdominal circumference in the Results Window.

HINTS

- Before you complete a measurement (press **Set**):
  - To toggle between active calipers, press **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate fixed calipers from other measurements, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

Biparietal Diameter

To measure biparietal diameter, make one distance measurement:

1. Select ***BPD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the biparietal diameter in the Results Window.

Crown Rump Length

To measure crown rump length, make one distance measurement:

1. Select ***CRL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the crown rump length in the Results Window.

Femur Length

To measure femur length, make one distance measurement:

1. Select ***FL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the femur length in the Results Window.

Gestational Sac

To calculate the gestational sac, you make three distance measurements in two scan planes. To display two scan planes, press the **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.

Head Circumference (HC)

To calculate head circumference, you make an ellipse, trace, or two distance measurements.

Ellipse

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***HC*** until *Ellipse* is displayed.
3. To position the active caliper, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second caliper, move the **Trackball**.
6. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control upward.
   - To decrease the size, adjust the **Ellipse** control downward.
   - To toggle between active calipers, press **Measure**.
7. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Head Circumference (HC) (continued)

Trace

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***HC*** until *Trace* is displayed.
3. To position the trace caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**.

   The trace caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy.
6. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control downward.
- To erase the dotted line but not the trace caliper, press **Clear** once.
- To clear the trace caliper and the current data measured, press **Clear** twice.

Head Circumference (HC) (continued)

Two distances

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***HC*** until *Caliper* is displayed.
3. To make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.
      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.
      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.
      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.

   The system displays the abdominal circumference in the Results Window.

HINTS

- Before you complete a measurement (press **Set**):
  - To toggle between active calipers, press **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate fixed calipers from other measurements, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

Amniotic Fluid Index (AFI)

To calculate the amniotic fluid index, you make measurements of the four quadrants of the uterine cavity. The system adds these four measurements together to calculate the Amniotic Fluid Index.

NOTE: The four quadrants can be measured with distance (caliper) or circumference (circle) measurements. Press the appropriate AFI quadrant Top/Sub Menu key to toggle between caliper and circle.

1. Select ***AFI***.

   The first distance measurement, AFI-Q1, is already selected.
2. Make a standard distance measurement for the first quadrant:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.
3. When the measurement of the first quadrant is completed, unfreeze and move to the second quadrant.
4. After you obtain the image, press **Freeze** and then **Measure**.

   The system prompts you to continue with the AFI measurements. Make sure that the next quadrant has been selected.

Amniotic Fluid Index (AFI) (continued)

5. Perform a standard distance measurement for the second, third, and fourth quadrants (see step 2).

   When all four quadrants have been measured, the system calculates the AFI total and displays it in the Results Window.

HINTS

- If you unfreeze the image after doing an AFI measurement, the system does not delete the previous measurements. Unfreeze and change scan planes as necessary.
- To specify that an unassigned distance measurement be used for an AFI measurement:
  - Select ***AFI***.
  - Press **Measure**.
  - Move the **Trackball** to highlight the unassigned distance measurement in the Results Window.
  - Select the AFI measurement on the Top/Sub Menu.
- If the fluid in a pocket is zero, set the second caliper on top of the first one to give it a zero value.

A/B Ratio

In B-Mode you can calculate A/B ratio by diameter or by area. See ‘A/B Ratio’ on *page 7-61 for more information.*

Angle

See ‘Angle’ on *page 7-60 for more information.*

Antero-Postero Trunk Diameter & Transverse Trunk Diameter (APTD-TTD)

Make two distance measurements, one of the antero-postero trunk diameter and one of the transverse trunk diameter.

1. Select ***APTD_TTD***; an active caliper displays.
2. Make a distance measurement of the antero-postero trunk diameter:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
3. To make a distance measurement of the transverse trunk diameter, repeat steps a–d above.

   The system displays the antero-postero trunk diameter and the transverse trunk diameter in the Results Window.

Antero-PosteroTrunk Diameter by Transverse Trunk Diameter (AxT)

Make two distance measurements, one of the antero-postero trunk diameter and one of the transverse trunk diameter.

1. Select ***AxT***; an active caliper displays.
2. Make a distance measurement of the antero-postero trunk diameter:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
3. To make a distance measurement of the transverse trunk diameter, repeat steps a–d above.

   The system displays the antero-postero trunk diameter, the transverse trunk diameter, and AxT in the Results Window.

Cardio-Thoracic Area Ratio (CTAR)

To calculate cardio-thoracic area ratio, you make two ellipse measurements.

1. Select ***CTAR***; an active caliper displays.
2. Make an ellipse measurement of the cardiac area:
   a. To position the active caliper, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second caliper, move the **Trackball**.
   d. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control upward.
   - To decrease the size, adjust the **Ellipse** control downward.
   - To toggle between active calipers, press **Measure**.

   e. To complete the ellipse measurement, press **Set**.

      The system displays the cardiac area measurement in the Results Window
3. To make an ellipse measurement of the thoracic area, repeat steps a–e.

   The system displays the cardio-thoracic area ratio in the Results Window.

Estimated Fetal Weight (EFW)

To measure estimated fetal weight, you make several OB measurements. These measurements can vary, based on how your system is set up. Measurements can include biparietal diameter, fetal trunk area, femur length, antero-postero trunk diameter and transverse trunk diameter, abdominal circumference, head circumference and spinal length.

1. Select ***EFW***.

   The system displays the required measurements.

2. Make each measurement.

   The system displays each measurement and the estimated fetal weight in the Results Window.

NOTE: For a description of any of the required measurements, refer to that measurement.

Fetal Trunk Area (FTA)

To measure fetal trunk area, you make an ellipse, trace, or two distance measurements.

Ellipse

1. Select ***FTA***; an active caliper displays.
2. To position the active caliper, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper, move the **Trackball**.
5. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control upward.
   - To decrease the size, adjust the **Ellipse** control downward.
   - To toggle between active calipers, press **Measure**.
6. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Fetal Trunk Area (FTA) (continued)

Trace

1. Select ***FTA***; a trace caliper displays.
2. To position the trace caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The trace caliper changes to an active caliper.
4. To trace the measurement area, move the **Trackball** around the anatomy.

   A dotted line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

HINTS

Before you complete the trace measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control downward.
- To erase the dotted line but not the trace caliper, press **Clear** once.
- To clear the trace caliper and the current data measured, press **Clear** twice.

Fetal Trunk Area (FTA) (continued)

Two distances

1. Select ***FTA***; an active caliper displays.
2. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.
      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.
      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.
      The system displays the distance value in the Results Window and displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.
   The system displays the measurement in the Results Window.

HINTS

- Before you complete a measurement:
  - To toggle between active calipers, press **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate previously fixed calipers, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

Foot Length

To measure foot length, make one distance measurement:

1. Select ***Ft***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the foot length in the Results Window.

Humerus Length

To measure humerus length, make one distance measurement:

1. Select ***HL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the humerus length in the Results Window.

Spinal Length (SL)

To measure spinal length, make one distance measurement:

1. Select ***SL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the spinal length in the Results Window.

Occipitofrontal Diameter

To measure occipitofrontal diameter, make one distance measurement:

1. Select ***OFD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the occipitofrontal diameter in the Results Window.

% Stenosis

In B-Mode, you can calculate % Stenosis by diameter or by area. See ‘% Stenosis’ on *page 7-55 for more information.*

Transverse Abdominal Diameter

To measure transverse abdominal diameter, make one distance measurement:

1. Select ***TAD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the transverse abdominal diameter in the Results Window.

Transverse Cerebellar Diameter

To measure transverse cerebellar diameter, make one distance measurement:

1. Select ***TCD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the transverse cerebellar diameter in the Results Window.

Thorax Transverse Diameter

To measure thorax transverse diameter, make one distance measurement:

1. Select ***ThD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the thorax transverse diameter in the Results Window.

Tibia Length

To measure tibia length, make one distance measurement:

1. Select ***Tibia***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the tibia length in the Results Window.

Ulna Length

To measure ulna length, make one distance measurement:

1. Select ***Ulna***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the ulna length in the Results Window.

Volume

See ‘Volume’ on *page 7-57 for more information.*

M-Mode Measurements

In M-Mode you can measure % stenosis, A/B ratio, and heart rate.

% Stenosis

In M-Mode, you measure % Stenosis by diameter. See ‘% Stenosis’ on *page 7-55 for more information.*

A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity. See ‘A/B Ratio’ on *page 7-63 for more information.*

Heart Rate

See ‘Heart Rate’ on *page 7-64 for more information.*

Doppler Mode Measurements

You can use Doppler mode to study fetal blood flow in the heart, umbilical cord, placenta, and middle cerebral arteries. OB/GYN Doppler mode also allows you to study uterine and ovarian blood flow.

The OB/GYN vessel study includes the following vessels:

- Aorta
- Desc. Aorta
- Middle Cerebral Artery (MCA) (right and left)
- Ovarian (right and left)
- Placenta
- Umbilical
- Uterine (right and left)

For each of these studies, you can make any of the following measurements:

- Peak Systole (PS)
- End Diastole (ED)
- Minimum Diastole (MD)
- Heart Rate
- TAMAX
- Pulsatility Index (PI)
- Resistive Index (RI)
- PS/ED Ratio
- ED/PS Ratio
- Acceleration
- AT
- TAMEAN
- Volume Flow
- PV

To select OB/GYN vessel measurements

OB/GYN Vessel measurements use the auto sequence feature. With this feature, when you select a folder for the vessel you want to measure, the system automatically starts the first measurement. It then continues with each of the other measurements in that study.

1. Select the folder for the vessel you want to measure.

   The system shows all the measurements for that vessel. The caliper for the first measurement is automatically displayed.
2. Make the measurement.

   After you complete each measurement, the system starts the next measurement. After the last measurement is complete, the system returns to the OB/GYN Vessel Top/ Sub Menu.

Your system is set up to show the measurements that you usually make for each vessel. To make a measurement that is not shown for the selected vessel:

1. Select the folder for the vessel you want to measure.
2. Select Show All.

   The system display all possible vessel measurements.
3. Select the desired measurement.

The following pages describe the steps to make each specific measurement in the OB/GYN Vessel study.

Acceleration

1. Select ***Accel***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the onset of 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 early systolic peak, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the 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.

Heart Rate

This measurement is available in the Fetal Heart study and the OB/GYN Vessel study. See ‘Heart Rate’ on *page 7-64 for more information.*

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.

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.

Pulsatility Index (PI)

See ‘Pulsatility Index (PI)’ on *page 7-67 for more information.*

Resistive Index (RI)

See ‘Resistive Index (RI)’ on *page 7-68 for more information.*

TAMAX

See ‘TAMAX and TAMEAN’ on *page 7-45 for more information.*

OB Worksheet

The OB Worksheet lists patient information, and all measurement and calculation data.

To view the OB Worksheet:

1. Press **Measure**.
2. Select ***Worksheet Display***.

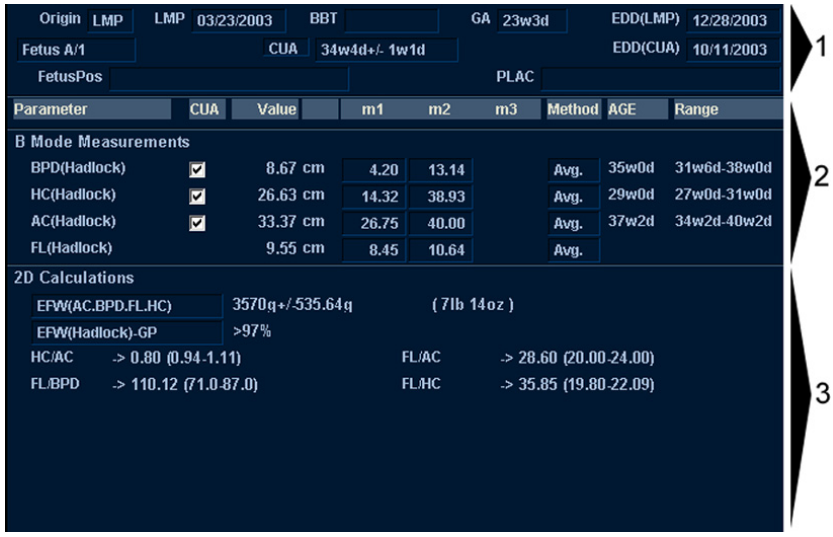


Figure 9-3. OB Worksheet

The OB Worksheet has three sections of information:

1. Patient data
2. Measurement information
3. Calculation information

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.

You can enter information in the following fields:

- FetusPos – type information about the fetus position.
- PLAC – type information about the placenta.

Measurement information

This section lists the results of all measurements.

- CUA or AUA – If this field is checked, the system uses the measurement to calculate the ultrasound age.
- Value – The measured value. If more than one measurement was made for an item, the system uses the specified method (average, maximum, minimum, or last) to determine this value.
- m1–m3 – Up to three measurement values for each item. If you make more than three measurements, the worksheet uses the last three.
- Method – When there is more than one measurement for an item, this specifies the method used to calculate the measurement value listed in the Value column. Choices are average, maximum, minimum, or last. To change the method:
  a. Move the **Trackball** to the Method field.
  b. Press **Set**.
  c. Move the **Trackball** to select from the list.
  d. Press **Set**.
- AGE – The fetal age for this measurement.
- Range – The typical range of fetal age for this measurement.

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 ‘Viewing and Editing Worksheets’ on *page 7-50 for more information*.

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 Book XP Series 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 ***Worksheet Display***.
3. Select ***Graph***.

Figure 9-4. B-Mode OB Measurement Top/Sub Menu

To View OB Graphs (continued)

After you select ***Graph Display***, the system displays the OB Graph keys on the Top/Sub Menu.

The monitor display shows the Fetal Growth Curve Graph.

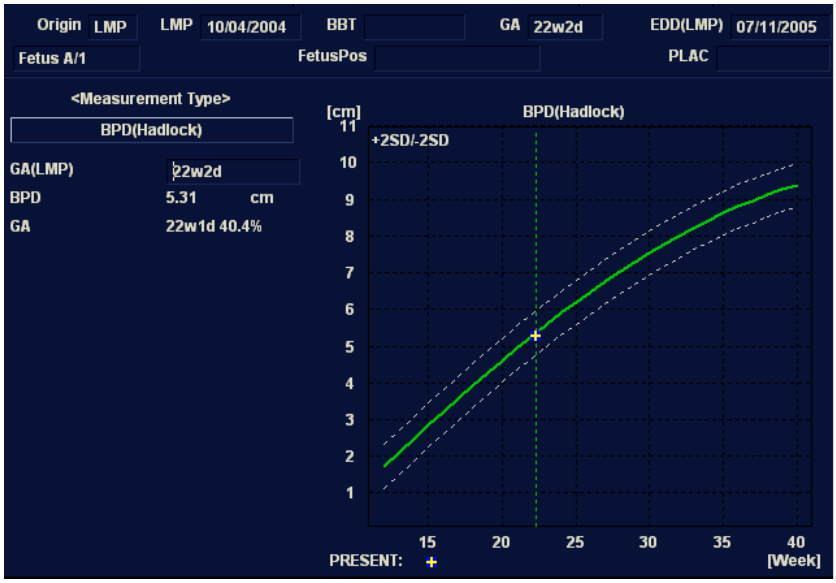


Figure 9-5. Fetal Growth Curve Graph

Fetal Growth Curve Graph

The horizontal axis shows the fetal age in weeks. The system determines this age from the data on the Patient Data Entry screen. The vertical axis shows one of the following:

- For measurements, mm or cm
- For ratios, percent
- For fetal weight, grams

The Fetal Growth Curve Graph shows the following information for the selected measurement:

- The normal growth curve
- The standard deviations or relevant percentiles
- The gestational age of the fetus, using patient data (vertical dotted line)
- Using the current ultrasound measurement data, where the fetus is on the growth curve

The legend at the bottom of the graph shows the symbols and colors that indicate data for fetal trending (Past and Present) and multiple gestation (Fetus).

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.

Fetal Growth Curve Graph (continued)

To view a single or four graphs

You can view either a single Fetal Growth Curve Graph or you can view four graphs at the same time. To select each view, press ***Single*** or ***Quad***.

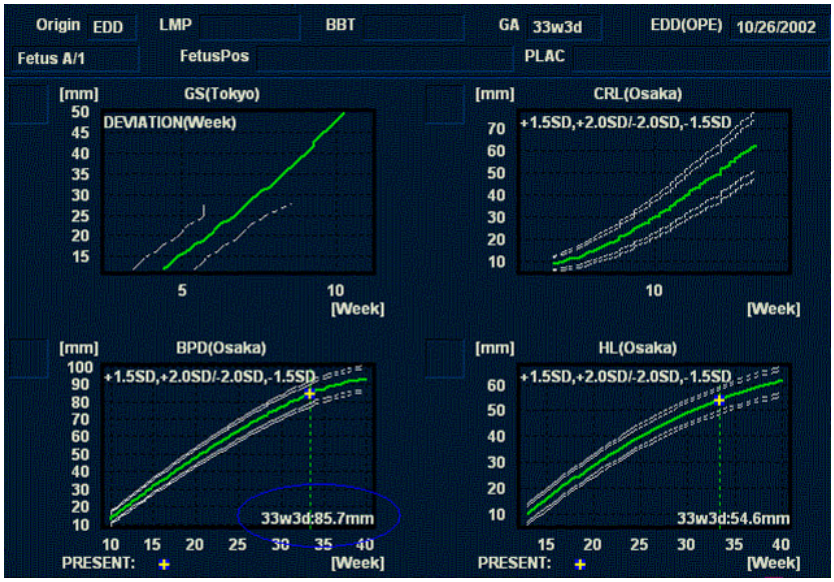


Figure 9-6. Fetal Growth Curve Graph: Quad View

The measurement values are displayed at the bottom of the graph.

Fetal Growth Curve Graph (continued)

To change measurements in quad view

When you view four graphs simultaneously, you can select which four you want to see. To change each graph in quad view:

1. On the graph display, use the **Trackball** to move the cursor to the small box that is upper left of each graph, then press **Set**.

   The system displays a list of measurements.

2. Move the **Trackball** to select the desired measurement and press **Set**.

   The system displays the Fetal Growth Curve Graph for the selected measurement.

To scroll through all Fetal Growth Curve Graphs, adjust the **Graph Change** control.

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.

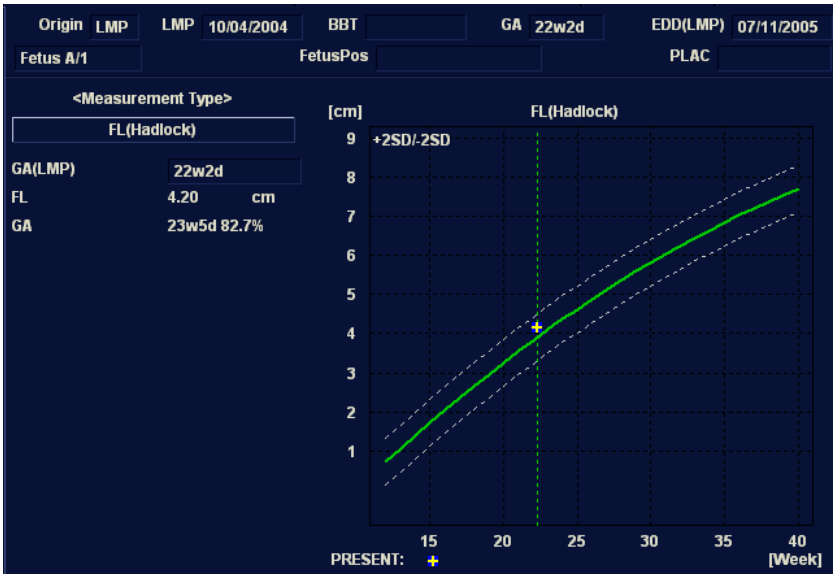


Figure 9-7. Fetal Trending on Fetal Growth Curve Graph: FL

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 9-8.
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 9-8. Input Past Exam screen, page 1

Fetal Trending (continued)

Figure 9-9. Input Past Exam screen, page 2

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 Top/Sub Menu, select ***Graph Display***.

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***.

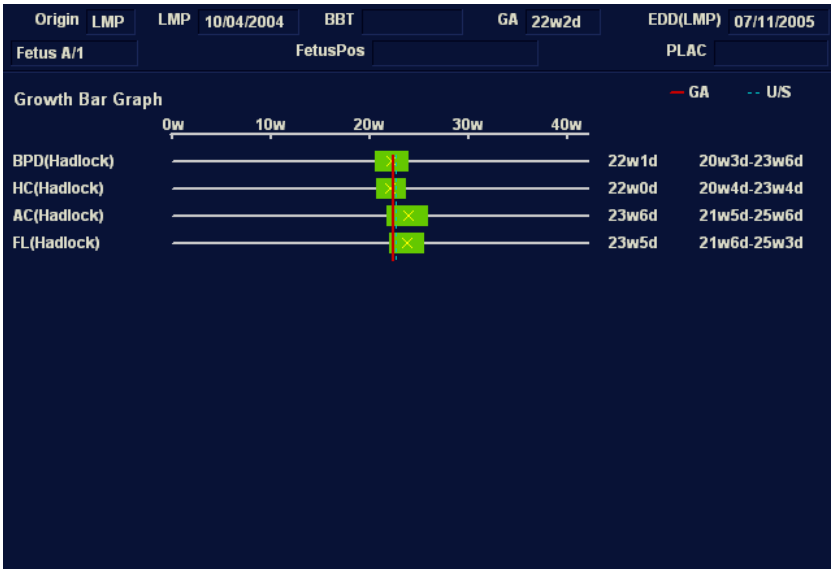


Figure 9-10. Fetal Growth Bar Graph

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

Using other OB studies

The LOGIQ Book XP Series system includes measurements for the following studies: USA, Europe, Tokyo, Osaka, and ASUM. The following figures show the OB Top/Sub Menu displays for the Tokyo and Osaka studies and for the ASUM studies. For information about how to change studies, refer to “Measurement and Analysis (M&A) System Presets” on page 16-10.

Figure 9-11. OB Top/Sub Menu: Tokyo and Osaka studies

NOTE: Tokyo and Osaka studies have a folder for JSUM measurements. JSUM measurements include AC, BPD, CRL, and FL.

Using other OB studies (continued)

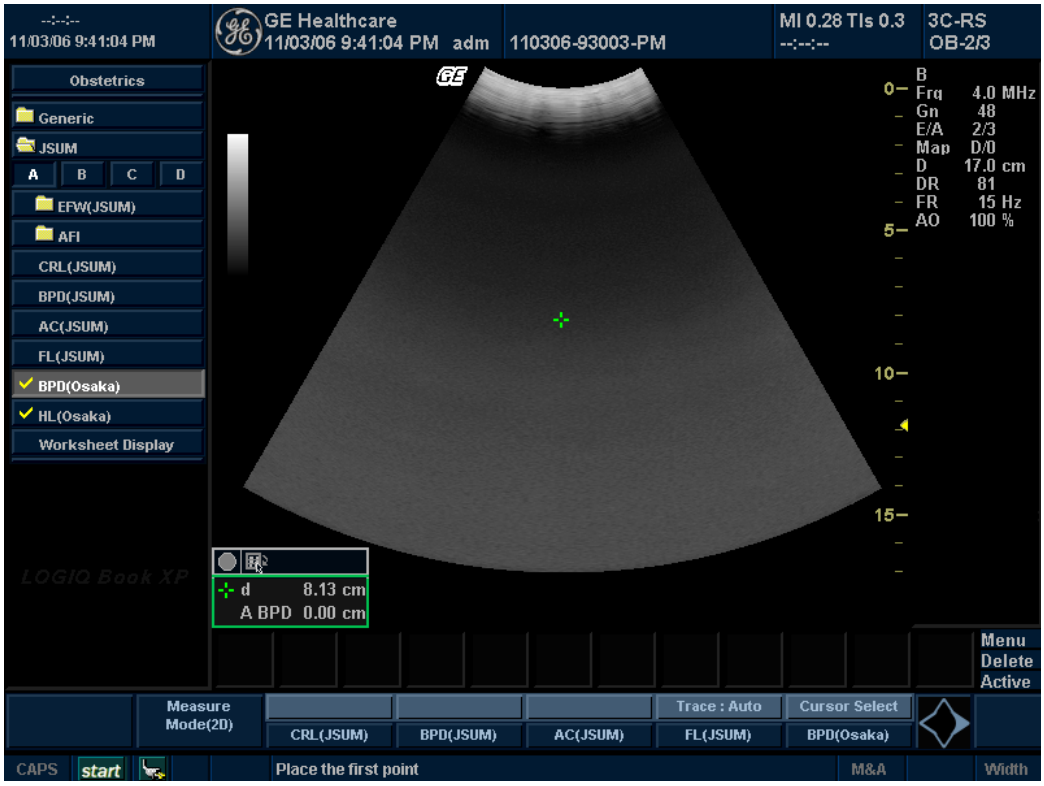


Figure 9-12. OB Top/Sub Menu: ASUM studies

NOTE: ASUM studies include the following measurements:

- ASUM: AC, BPD, and CRL
- ASUM 2001: AC, BPD, CRL, FL, HC, HL, and OFD

Multiple Fetus

LOGIQ Book XP Series 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.

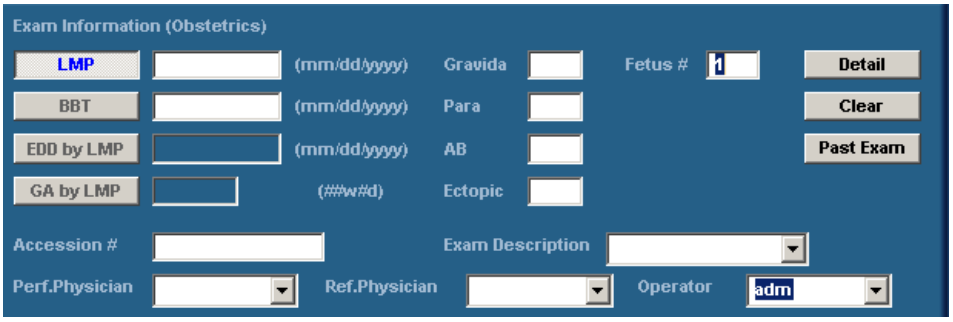


Figure 9-13. Fetus Number

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 9-14. 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 9-15. 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 Display***.

- 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**.
- To display data for multiple fetuses on the same graph, select ***Fetus Compare***.

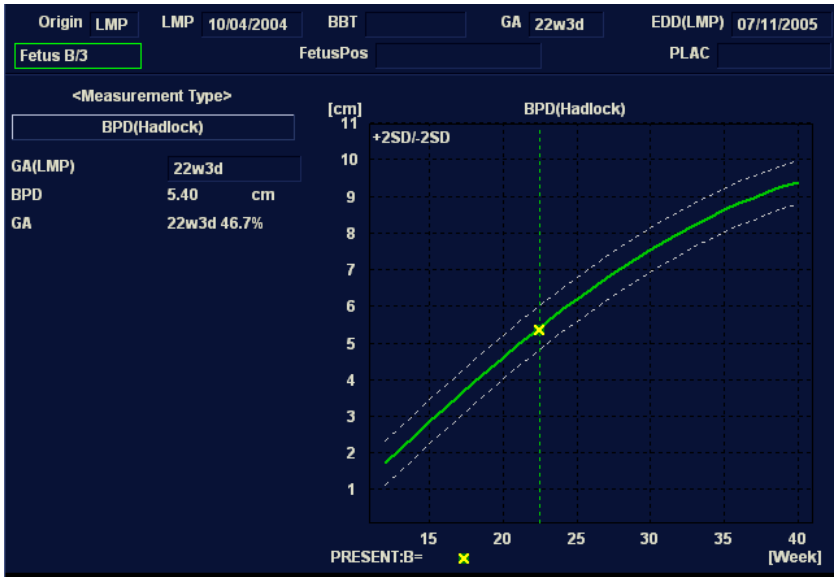


Figure 9-16. Fetal Growth Curve Graph: Fetus Compare

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 Display***, then select ***Fetus Compare***.

When you select ***Fetus Compare***, the system lists the measurement results for each fetus on the Worksheet.

Figure 9-17. 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 Display***.
2. Select ***Fetus Compare***.
3. Select ***Plot Both***.

NOTE: You can only view fetal trending for multiple fetuses in single graph display.

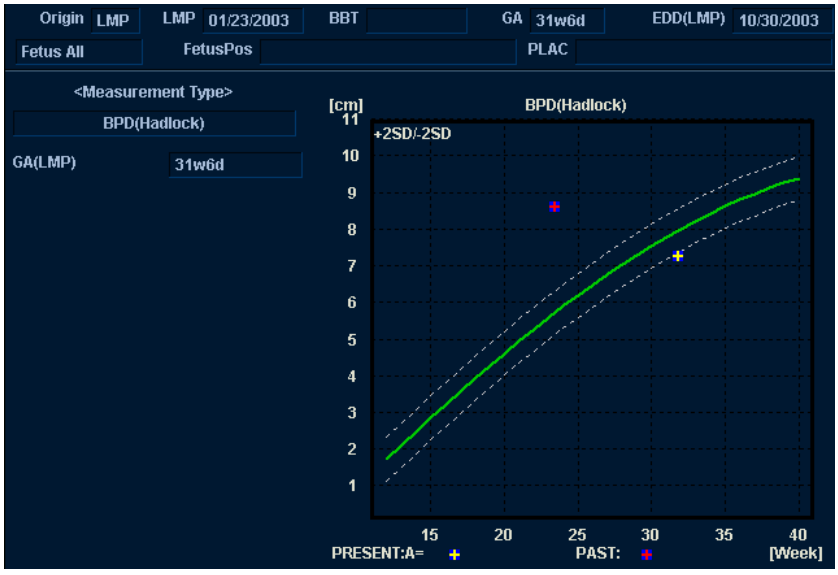


Figure 9-18. Multigestation Fetal Growth Curve Graph

The symbol key for fetal trending and multiple fetuses is shown at the bottom of the graph.

GYN Measurements

Introduction

The Gynecology exam category includes the following three studies:

- Generic. This study is common to all exam categories. See ‘Generic Measurements’ on *page 7-53 for more information.*
- General Gynecology. This study includes uterine, ovarian, ovarian follicle, and endometrium measurements.
- OB/GYN Vessel. This study includes the following vessels: uterine, ovarian, umbilical, middle cerebral artery, aorta, placenta, and descending aorta.

NOTE: The calculation formulas are listed in the Advanced Reference Manual.

To Start a Gynecology Exam

To begin a gynecology exam, you enter patient data or, if the patient data from a previous exam is saved in the system, find the patient information.

For details about how to start an exam, See ‘To Start an Obstetrics Exam’ on *page 9-4 for more information.*

After you complete the patient information, you can begin the scan.

1. To change from the Patient Data Entry screen to the Scan screen, do one of the following:
   - On the keyboard, press ***Esc***.
   - On the Control Panel, select **Patient** or **Freeze**.
   - On the Control Panel, press the B-Mode key.

   The system displays the Scan screen.
2. On the Control Panel, press ***Measure***.

   The default Gynecology study is displayed on the Top/Sub Menu.

B-Mode Measurements

In B-Mode, you make the measurements in the General Gynecology study. These measurements include:

- Uterine length, width, and height
- Ovarian length, width, and height
- Ovarian follicle
- Endometrium thickness

Follicle measurements

You can make left and right ovary follicle measurements from one, two, or three distances.

One distance

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. To position the active caliper at the start point, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
6. To complete the measurement, press **Set**.
7. Press **Clear**.

   The system displays the ovary follicle measurement in the Results Window.

Follicle measurements (continued)

Two distances

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.
5. Press **Clear**.

   The system displays the ovary follicle measurement in the Results Window.

Follicle measurements (continued)

Three distances

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second distance measurement, the system displays an active caliper.
4. To make the second and third distance measurement, repeat steps a–d above.

   After the third measurement, the system displays the ovary follicle measurement in the Results Window.

Endometrium thickness (Endo)

To measure the endometrium thickness, make one distance measurement.

1. Select ***Endo***; 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 saggital plane while the width is measured on the axial/transverse plane.

To measure ovarian length, width, or height:

1. Scan the patient's right or left ovary in the appropriate plane.
2. To select left or right, adjust the **Side** selection.
3. Select the ***OV*** folder, then select ***OV L***, ***OV W***, or ***OV H***.
4. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second measurement, the system displays an active caliper for the next measurement.
5. To make the second and third distance measurements, repeat steps 3–4.

   After you complete the length, width, and height measurements, the system displays the ovarian volume in the Results Window.

Uterus length, width, and height

Each of these is a standard distance measurement. Typically, length and height are measured on the saggital plane while the width is measured on the axial/transverse plane.

To measure uterus length, width, or height:

1. Scan the patient in the appropriate scan plane.
2. Select the ***UT*** folder, then select ***UT L***, ***UT W***, or ***UT H***.

   An active caliper displays.
3. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second measurement, the system displays an active caliper for the next measurement.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the uterine volume in the Results Window.

M-Mode Measurements

M-Mode measurements for the Gynecology exam are identical to M-Mode measurements for the Obstetrics exam. These measurements include % stenosis, A/B ratio, and heart rate.

For details regarding these measurements, See ‘M-Mode Measurements’ on *page 9-34 for more information.*

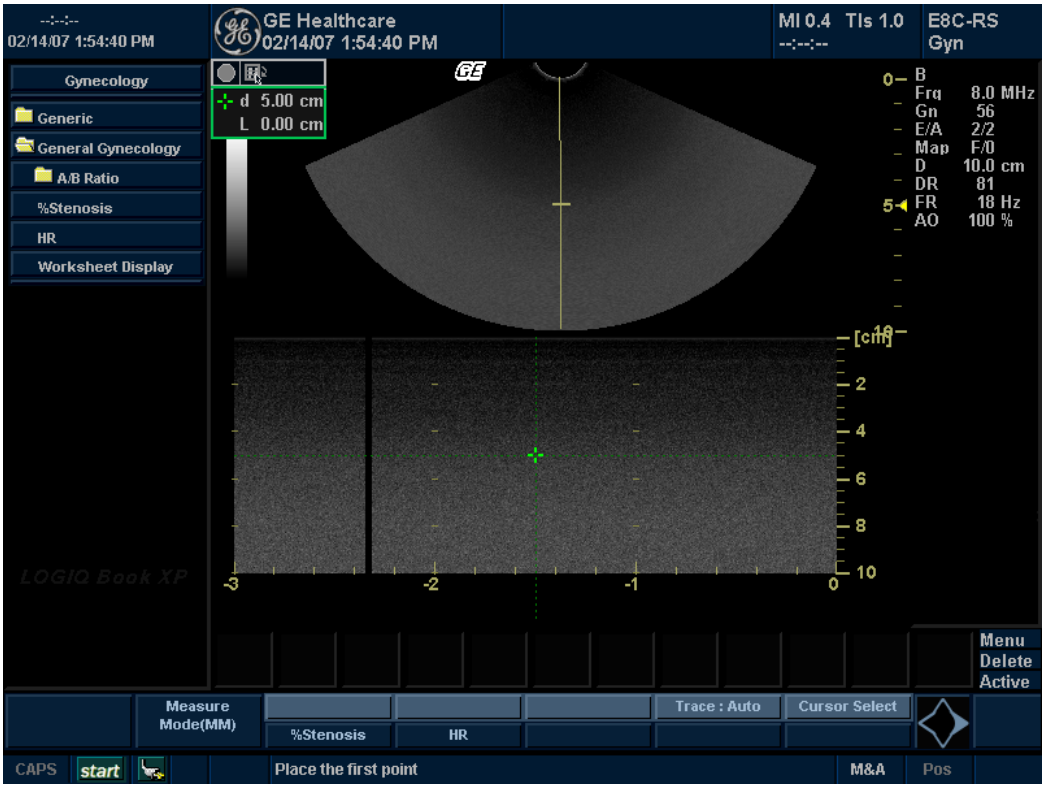


Figure 9-19. M-Mode Generic study

Doppler Mode Measurements

Doppler measurements for the Gynecology exam are identical to Doppler measurements for the Obstetrics exam. These measurements include the following vessels: uterine, ovarian, umbilical, middle cerebral artery, aorta, placenta, and descending aorta. For each vessel, you can make any of the following measurements: peak systole, minimum diastole, end diastole, heart rate, TAMAX, pulsatility index, resistive index, acceleration, PS/ED, ED/PS, and acceleration time.

For details regarding these measurements, See ‘Doppler Mode Measurements’ on *page 9-35 for more information.*

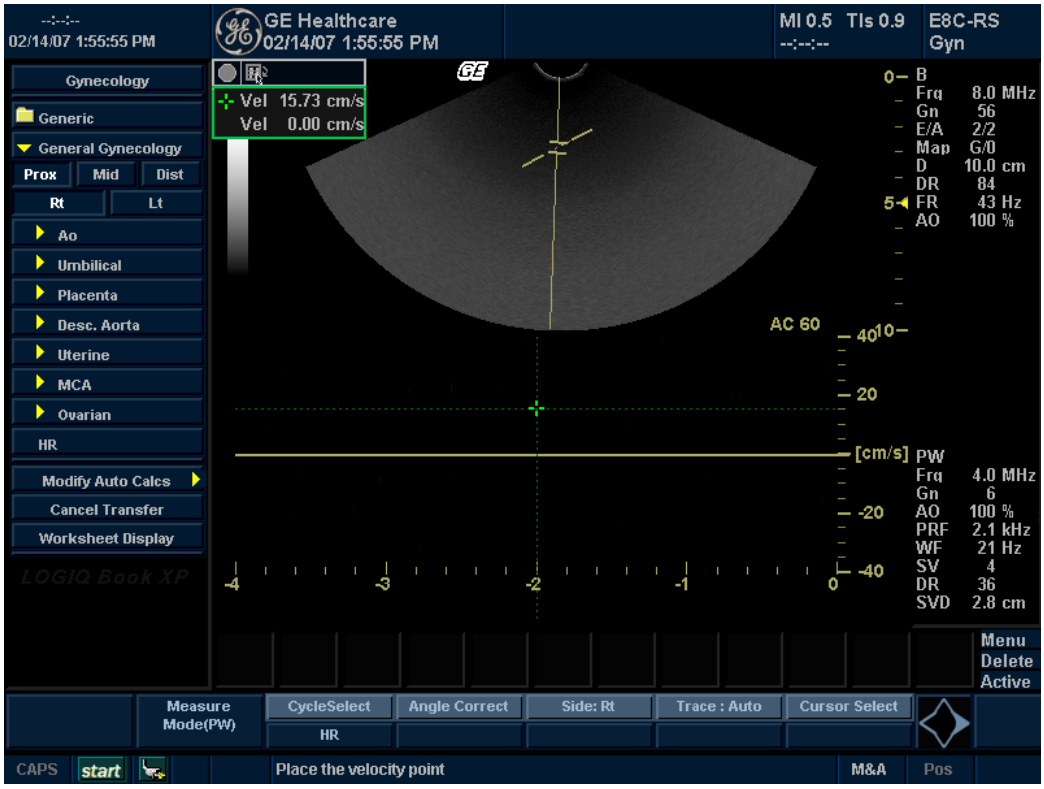


Figure 9-20. Doppler Mode General Gynecology study

Chapter 10

Cardiology

Describes how to perform cardiac measurements and calculations.

ReportWriter not available on LOGIQ Book XP PRO

Cardiology Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu Menu.

Cardiology Measurements

Overview

Cardiology measurements offer two different types of measurement studies, Generic and Cardiac.

- Generic – 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. For details on most of the generic measurements, See ‘Generic Measurements’ on *page 7-53 for more information.* This chapter includes a section describing generic measurements that are specific to the cardiac exam category.
- Cardiac – This study includes all cardiac measurements.

Naming Format for Cardiac Measurements

When you make a measurement, on the Top/Sub Menu you select the abbreviation for the measurement. Most abbreviations are made using acronyms. The following table lists acronyms used for naming cardiac measurements.

Table 10-1: Cardiology Abbreviations

Acronym	Name
% STIVS	% Interventricular Shortening
A	Area
Acc	Acceleration
AccT	Flow Acceleration Time
ALS	Aortic Leaflet Separation
Ann	Annulus
Ao	Aorta
AR	Aortic Regurg
Asc	Ascending
ASD	Atrial Septal Defect
AV	Aortic Valve
AV Cusp	Aortic Valve Cusp Separation
AVA	Aortic Valve Area
AV-A	Aortic Valve Area by Continuity Equation
BSA	Body Surface Area
CI	Cardiac Index
CO	Cardiac Output
d	Diastolic
D	Diameter
Dec	Deceleration
DecT	Deceleration Time
Desc	Descending
Dur	Duration
EdV	End Diastolic Volume
EF	Ejection Fraction
EPSS	E-Point-to-Septum Separation

Table 10-1: Cardiology Abbreviations

Acronym	Name
EsV	End Systolic Volume
ET	Ejection Time
FS	Fractional Shortening
FV	Flow Volume
FVI	Flow Velocity Integral
HR	Heart Rate
IVRT	IsoVolumetric Relaxation Time
IVS	Interventricular Septum
L	Length
LA	Left Atrium
LAA	Left Atrium Area
LAD	Left Atrium Diameter
LPA	Left Pulmonary Artery
LV	Left Ventricle
LVA	Left Ventricular Area
LVID	Left Ventricle Internal Diameter
LVL	Left Ventricle Length
LVM	Left Ventricular Mass
LVPW	Left Ventricle Posterior Wall
ML	Medial to Lateral
MPA	Main Pulmonary Artery
MR	Mitral Regurgitation
MV	Mitral Valve
MVcf	Mean Velocity Circumferential Fiber Shortening
MVO	Mitral Valve Orifice
OT	Outflow Tract
P	Papillary Muscles
PA	Pulmonary Artery
PAP	Pulmonary Artery Pressure
PDA	Patent Ductus Arterosis

Table 10-1: Cardiology Abbreviations

Acronym	Name
PEP	Pre-Ejection Period
PFO	Patent Foramen Ovale
PG	Pressure Gradient
PHT	Pressure Half Time
PI	Pulmonary Insufficiency
PISA	Proximal Isovelocity Surface Area
PR	Pulmonic Regurgitation
PV	Pulmonic Valve
PV-A	Pulmonic Valve Area by Continuity Equation
PVein	Pulmonary Vein
PW	Posterior Wall
Qp	Pulmonic Flow or CO
Qs	Systemic Flow or CO
RA	Right Atrium
RAA	Right Atrium Area
Rad	Radius
RAD	Right Atrium Diameter
RPA	Right Pulmonary Artery
RV	Right Ventricle
RVA	Right Ventricle Area
RVAW	RIght Ventricle Anterior Wall
RVD	Right Ventricle Diameter
RVID	Right Ventricle Internal Diameter
RVL	Right Ventricle LEngth
RVOT	Right Ventricle Outflow Tract
s	Systolic
SI	Stroke Index
ST	Shortening
SV	Stroke Volume
SVI	Stroke Volume Index

Table 10-1: Cardiology Abbreviations

Acronym	Name
T	Time
TA	Tricuspid Annulus
TAML	Tricuspid Annulus Medial to Lateral
TR	Tricuspid Regurgitation
TV	Tricuspid Valve
TVA	Tricuspid Valve Area
Vcf	Velocity Circumferential Fiber Shortening
Vel	Velocity
VET	Valve Ejection Time
Vmax	Maximum Velocity
Vmean	Mean Velocity
VSD	Ventricular Septal Defect
VTI	Velocity Time Integral

In this manual, the abbreviation for each measurement is listed in parenthesis after the measurement, as follows:

- Aortic Root Diameter (***Ao Root Diam***)
- Left Ventricle Posterior Wall Thickness, Diastolic (***LVPWd***)

For example, to measure the Aortic Root Diameter, you select ***Ao Diam*** on the Top/Sub Menu.

Cardiac Measurements

This section lists cardiac measurements and the steps to perform them. The measurement information in this section is organized by mode, then by region of interest, and then by type of measurement. The organization is as follows:

- Mode; there is a section for B-Mode, M-Mode, Color Flow Mode, and Doppler Mode. There is also a Combination Mode section, which includes calculations that are a result of measurements made in more than one mode.
- Within each mode section, there are sections for region of interest, such as aorta or mitral valve.
- Within each region of interest section, there are sections for type of measurement, such a one distance, two distance, trace, or velocity flow trace. Each measurement type section lists all cardiac measurements that are that type, and then describes the steps to perform that type of measurement.

Some measurements, such as Aortic Root Diameter or Aortic Valve Cusp Separation, can be made in B-Mode or M-Mode. The information for these measurements is included in both B-Mode and M-Mode sections.

B-Mode Measurements

Aorta

The following are cardiac B-Mode aorta measurements:

One distance measurements

- Aortic Root Diameter (***Ao Diam***)
- Aortic Arch Diameter (***Ao Arch Diam***)
- Ascending Aortic Diameter (***Ao Asc***)
- Descending Aortic Diameter (***Ao Desc Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Aortic Valve

The following are cardiac B-Mode aortic valve measurements:

One distance measurements

- Aortic Diameter (***Ao Diam***)
- Aortic Valve Cusp Separation (***AV Cusp***)
- Aortic Valve Diameter (***AV Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One trace measurements

- Aortic Valve Area Planimetry (***AVA Planimetry***)
- Transverse Aortic Valve Area (***Trans AVA(d), Trans AVA(s)***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Atrium

The following are cardiac B-Mode Left Atrium measurements:

Two distance measurements

- Left Atrium Diameter to AoRoot Diameter Ratio (***LA/Ao Ratio***)

Making two distance measurements

1. Select ***LA/Ao Ratio***; an active caliper displays.
2. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurements and ratio in the Results Window.

Left Atrium (continued)

One distance measurement

- Left Atrium Diameter (***LA Diam***)
- Left Atrium Length (***LA Major***)
- Left Atrium Width (***LA Minor***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Atrium (continued)

One trace measurements

- Left Atrium Area
  - Diastolic (***LAA(d)***)
  - Systolic (***LAA(s)***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.
   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.
   A line shows the traced area.
5. To complete the measurement, press **Set**.
   The system displays the measurement in the Results Window.

One trace measurement and one distance measurement

- Left Atrium Volume, Single Plane, Method of Disk
  - Diastolic (***LAEDV A2C***) (***LAEDV A4C***)
  - Systolic (***LAESV A2C***) (***LAESV A4C***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.
   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.
   A line shows the traced area.
5. To complete the measurement, press **Set**.
6. To position the active caliper at the end point of the axis, move the **Trackball**.
7. To complete the measurement, press **Set**.
   The system displays the measurement in the Results Window.

Left Ventricle

The following are cardiac B-Mode Left Ventricle measurements:

One distance measurements

- Left Ventricle Volume, Teichholz
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Volume, Cubic
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Internal Diameter
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Length
  - Diastolic (***LVLd***)
  - Systolic (***LVLs***)
- Left Ventricle Outflow Tract Diameter (***LVOT Diam***)
- Left Ventricle Posterior Wall Thickness
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)
- Left Ventricle Length (***LV Major***)
- Left Ventricle Width (***LV Minor***)

Left Ventricle (continued)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Ventricle (continued)

One trace measurements

- Left Ventricle Outflow Tract Area (***LVOT Diam***)
- Left Ventricle Area, Two Chamber
  - Diastolic (***LVA (d)***)
  - Systolic (***LVA (s)***)
- Left Ventricle Area, Four Chamber
  - Diastolic (***LVA (d)***)
  - Systolic (***LVA (s)***)
- Left Ventricle Area, Short Axis
  - Diastolic (***LVA (d)***)
  - Systolic (***LVA (s)***)
- Left Ventricle Endocardial Area, Width (***LVA (d)***)
- Left Ventricle Epicardial Area, Length
  - Diastolic (***LVAepi (d)***)
  - Systolic (***LVAepi (s)***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Ventricle (continued)

One time interval measurements

- Heart Rate, Teichholz
- Heart Rate for Two Chamber study
- Heart Rate for Four Chamber study
- Heart Rate for Two Chamber Area-Length study
- Heart Rate for Two Chamber Method of Disk study
- Heart Rate for Four Chamber Area-Length study
- Heart Rate for Four Chamber Method of Disk study
- Heart Rate for Bi-Plane Method of Disk study

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Left Ventricle (continued)

Body surface area and LV mass measurements

- Left Ventricle Mass Index,
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)

  The system calculates body surface area from the patient's height and weight.

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Two distance measurements

- Ejection Fraction, Teichholz (***LVIDs***)
- Ejection Fraction, Cubic (***LVIDs***)
- Left Ventricle Posterior Wall Fractional Shortening (***LVPWs***)
- Left Ventricle Stroke Index, Teichholz (***LVIDs***, and Body Surface Area)
- Left Ventricle Fractional Shortening (***LVIDs***)
- Left Ventricle Stroke Volume, Teichholz (***LVIDs***)
- Left Ventricle Stroke Volume, Cubic (***LVIDs***)

Left Ventricle (continued)

Body surface area and stroke volume measurements

- Left Ventricle Stroke Index, Single Plane, Two Chamber, Method of Disk (***LVIDd***, ***LVIDs***)
- Left Ventricle Stroke Index, Single Plane, Four Chamber, Method of Disk (***LVIDd***, ***LVIDs***)
- Left Ventricle Stroke Index, Bi-Plane, Bullet
- Left Ventricle Stroke Index, Bi-Plane, Method of Disk (***LVAd***, ***LVAs***)

The system calculates body surface area from the patient's height and weight.

Body surface area and LV Mass

- Left Ventricle Mass Index
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWd***)

The system calculates body surface area from the patient's height and weight.

Left Ventricle Study

- Diastolic (***LVd***)
- Systolic (***LVs***)

The Left Ventricle study automatically sequences the following measurements:

- Interventricular Septum (***IVSd***, ***IVSs***)
- Left Ventricle Internal Diameter (***LVIDs***, ***LVIDd***)
- Left Ventricle Posterior Wall Thickness (***LVPWs***, ***LVPWd***)

Mitral Valve

The following are cardiac B-Mode Mitral Valve measurements:

One distance measurements

- Mitral Valve Annulus Diameter (***MV Ann Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One trace measurement

- Mitral Valve Area Planimetry (***MVA Planimetry***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Pulmonic Valve

The following are cardiac B-Mode Pulmonic Valve measurements:

One distance measurement

- Pulmonic Valve Annulus Diameter (***PV Ann Diam***)
- Pulmonic Diameter (***Pulmonic Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Atrium

The following are cardiac B-Mode Right Atrium measurements:

One distance measurement

- Right Atrium Diameter, Length (***RA Major***)
- Right Atrium Diameter, Width (***RA Minor***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Atrium (continued)

One trace measurements

- Right Atrium Area (***RA Area***)
- Right Atrium Volume, SIngle Plane, Method of Disk (***RAAd***)
- Right Atrium Volume, Systolic, SIngle Plane, Method of Disk (***RAAs***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Ventricle

The following are cardiac B-Mode Right Ventricle measurements:

One trace measurement

- Left Pulmonary Artery Area (***LPA Area***)
- Right Pulmonary Artery Area (***RPA Area***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Ventricle (continued)

One distance measurements

- Right Ventricle Internal Diameter
  - Diastolic (***RVIDd***)
  - Systolic (***RVIDs***)
- Right Ventricle Diameter, Length (***RV Major***)
- Right Ventricle Diameter, Width (***RV Minor***)
- Right Ventricle Wall Thickness
  - Diastolic (***RVAWd***)
  - Systolic (***RVAWs***)
- Right Ventricle Outflow Tract Diameter (***RVOT Diam***)
- Left Pulmonary Artery (***LPA***)
- Main Pulmonary Artery (***MPA***)
- Right Pulmonary Artery (***RPA***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

System

The following are cardiac B-Mode System measurements:

One distance measurements

- Interventricular Septum Thickness
  - Diastolic (***IVSd***)
  - Systolic (***IVSs***)
- Inferior Vena Cava (***IVC***)
- Main Pulmonary Artery Diameter (***MPA Diam***)
- Systemic Vein Diameter (***Systemic Diam***)
- Patent Ductus Arterosis Diameter (***PDA Diam***)
- Patent Foramen Ovale Diameter (***PFO Diam***)
- Pericard Effusion Diastole (***PEd***)
- Ventricular Septal Defect Diameter (***VSD Diam***)
- Atrial Septal Defect Diameter (***ASD Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Body surface area and stroke volume measurements

- Interventricular Septum (IVS) Fractional Shortening (***IVSs***)

  The system calculates body surface area from the patient's height and weight.

Tricuspid Valve

The following are cardiac B-Mode Tricuspid Valve measurements:

One distance measurements

- Tricuspid Valve Annulus Diameter (***TV Ann Diam***)
- Tricuspid Valve Area (***TV Area***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

M-Mode Measurements

Aorta

The following are cardiac M-Mode aorta measurements:

One distance measurement

- Aortic Root Diameter (***Ao Root Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Aortic Valve

The following are cardiac M-Mode aortic valve measurements:

One distance measurements

- Aortic Valve Cusp Separation (***AV Cusp***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Atrium

The following are cardiac M-Mode Left Atrium measurements:

One distance measurement

- Left Atrium Diameter (***LA Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Atrium (continued)

Two distance measurement (ratio)

- Left Atrium Diameter to AoRoot Diameter Ratio (***LA/Ao***)

Making two distance measurements

1. Select ***LA/Ao***; an active caliper displays.
2. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurements and ratio in the Results Window.

Left Ventricle

The following are cardiac M-Mode Left Ventricle measurements:

One distance measurements

- Left Ventricle Internal Diameter
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Posterior Wall Thickness
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Ventricle (continued)

One time interval measurement

- Heart Rate, Teichholz

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Left Ventricle Study

The Left Ventricle study (***LV Study***) automatically sequences the following measurements:

- Interventricular Septum (***IVSd, IVSs***)
- Left Ventricle Internal Diameter (***LVIDd, LVIDs***)
- Left Ventricle Posterior Wall Thickness (***LVPWd, LVPWs***)

Mitral Valve

The following are cardiac M-Mode Mitral Valve measurements.

One distance measurements

- E-Point-to-Septum Separation (***EPSS***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Mitral Valve (continued)

One slope measurements

- Mitral Valve Anterior Leaflet Excursion (***D-E Excursion***)
- Mitral Valve D-E Slope (***D-E Slope***)
- Mitral Valve E-F Slope (***E-F Slope***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

Right Ventricle

The following are cardiac M-Mode Right Ventricle measurements:

One distance measurements

- Right Ventricle Internal Diameter
  - Diastolic (***RVIDd***)
  - Systolic (***RVIDs***)
- Right Ventricle Wall Thickness
  - Diastolic (***RVAWd***)
  - Systolic (***RVAWs***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Ventricle Study

The Right Ventricle study (***RV study***) automatically sequences the following measurements:

- Right Ventricle Internal Diameter (RVIDd, RVIDs))

System

The following are cardiac M-Mode System measurements.

One distance measurements

- Interventricular Septum
  - Diastolic (***IVSd***)
  - Systolic (***IVSs***)
- Pericard Effusion (***PEd***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Two distance measurement:

- Interventricular Septum (IVS) Fractional Shortening (***LVD - LVS / LVD x 100***)

Doppler Mode Measurements

Aortic Valve

Velocity flow trace measurements

The following are cardiac Doppler Mode aortic valve measurements:

- Aortic Insufficiency Mean Pressure Gradient (***AI Trace***)
- Aortic Insufficiency Peak Pressure Gradient (***AI Vmax***)
- Aortic Insufficiency Mean Velocity (***AI Trace***)
- Aortic Insufficiency Mean Square Root Velocity (***AI Trace***)
- Aortic Insufficiency Velocity Time Integral (***AI Trace***)
- Aortic Valve Mean Velocity (***AV Trace***)
- Aortic Valve Mean Square Root Velocity (***AV Trace***)
- Aortic Valve Velocity Time Integral (***AV Trace***)
- Aortic Valve Mean Pressure Gradient (***AV Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Aortic Valve (continued)

One peak velocity measurements

- Aortic Valve Peak Pressure Gradient (***AR Vmax***)
- Aortic Insufficiency Peak Velocity (***AR Vmax/AI Vmax***)
- Aortic Insufficiency End-Diastolic Velocity (***ARend Vmax/ Alend Vmax***)
- Aortic Valve Peak Velocity (***AV Vmax***)
- Aortic Valve Peak Velocity at Point E (***AV Vmax***)
- Aorta Proximal Coarctation (***Coarc Pre-Duct***)
- Aorta Distal Coarctation (***Coarc Post-Duct***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Aortic Valve (continued)

One slope measurements

- Aortic Valve Insufficiency Pressure Half Time (***AR PHT***)
- Aortic Valve Flow Acceleration (***AV Trace***)
- Aortic Valve Pressure Half Time (***AV Trace***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

Aortic Valve (continued)

One time interval measurements

- Aortic Valve Acceleration Time (***AV AccT***)
- Aortic Valve Deceleration TIme (***AI PHT***)
- Aortic Valve Ejection Time (***AVET***)
- Time

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Two time interval measurement

Slope through aortic valve trace:

- Aortic Valve Acceleration to Ejection Time Ratio (***AVET***)
- Aortic Valve Area according to PHT

Left Ventricle

The following are cardiac Doppler Mode Left Ventricle measurements:

One peak velocity measurements

- Left Ventricle Outflow Tract Peak Pressure Gradient (***LVOT maxPG***)
- Left Ventricle Outflow Tract Peak Velocity (***LVOT Vmax***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Left Ventricle (continued)

One velocity flow trace measurements

- Left Ventricle Outflow Tract Mean Pressure Gradient (***LVOT Trace***)
- Left Ventricle Outflow Tract Mean Velocity (***LVOT Trace***)
- Left Ventricle Outflow Tract Mean Square Root Velocity (***LVOT Trace***)
- Left Ventricle Outflow Tract Velocity Time Integral (***LVOT Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Mitral Valve

The following are cardiac Doppler Mode Mitral Valve measurements:

One velocity flow trace measurements

- Mitral Valve Regurgitant Flow Acceleration (***MR Trace***)
- Mitral Valve Regurgitant Mean Velocity (***MR Trace***)
- Mitral Regurgitant Mean Square Root Velocity (***MR Trace***)
- Mitral Regurgitant Mean Pressure Gradient (***MR Trace***)
- Mitral Regurgitant Velocity Time Integral (***MR Trace***)
- Mitral Valve Mean Velocity (***MR Trace***)
- Mitral Valve Mean Square Root Velocity (***MR Trace***)
- Mitral Valve Velocity Time Integral (***MR Trace***)
- Mitral Valve Mean Pressure Gradient (***MR Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Mitral Valve (continued)

One peak velocity measurements

- Mitral Regurgitant Peak Pressure Gradient (***MR Vmax***)
- Mitral Valve Peak Pressure Gradient (***MV Vmax***)
- Mitral Regurgitant Peak Velocity (***MR Vmax***)
- Mitral Valve Peak Velocity (***MV Vmax***)
- Mitral Valve Velocity Peak A (***MV A Velocity***)
- Mitral Valve Velocity Peak E (***MV E Velocity***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Mitral Valve (continued)

One slope measurements

- Mitral Valve Area according to PHT (***MV PHT***)
- Mitral Valve Flow Deceleration (***MV DecT***)
- Mitral Valve Pressure Half Time (***MV PHT***)
- Mitral Valve Flow Acceleration (***MV AccT***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

Mitral Valve (continued)

Two distance measurement

- Mitral Valve E-Peak to A-Peak Ratio (A-C and D-E) (***MV E/A Ratio***)

Making a two distance measurement

1. Select ***MV E/A Ratio***; an active caliper displays.
2. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurements and ratio in the Results Window.

Mitral Valve (continued)

One time interval/ slope measurements

- Mitral Valve Acceleration Time (***MV AccT***)
- Mitral Valve Deceleration Time (***MV DecT***)

Making a time interval/slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the time interval and slope measurements in the Results Window.

Mitral Valve (continued)

One time interval measurements

- Mitral Valve Ejection Time ((***MV Trace***)
- Mitral Valve A-Wave Duration (***MV A Dur***)
- Mitral Valve Time to Peak (***MV Trace***)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Two time interval measurement

Body surface area and stroke volume measurements:

- Stroke Volume Index by Mitral Flow (***MV Trace***)

  The system calculates body surface area from the patient's height and weight.

One distance and two velocity measurement:

- Mitral Valve Area from Continuity Equation (***MV Vmax***)

Pulmonic Valve

The following are cardiac Doppler Mode Pulmonic Valve measurements:

One peak velocity measurements

- Pulmonic Insufficiency Peak Pressure Gradient (***PI Vmax***)
- Pulmonic Insufficiency End-Diastolic Pressure Gradient (***PR Trace***)
- Pulmonic Valve Peak Pressure Gradient (***PV Vmax***)
- Pulmonic End-Diastolic Pressure Gradient (***PR Trace***)
- Pulmonic Insufficiency Peak Velocity (***PR Vmax***)
- Pulmonic Insufficiency End-Diastolic Velocity (***PRend Vmax***)
- Pulmonic Valve Peak Velocity (***PV Vmax***)
- Pulmonic End-Diastolic Velocity (***PV Trace***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Pulmonic Valve (continued)

One velocity flow trace measurements

- Pulmonary Artery Diastolic Pressure (***PV Trace***)
- Pulmonic Insufficiency Mean Pressure Gradient (***PR Trace***)
- Pulmonic Valve Mean Pressure Gradient (***PV Trace***)
- Pulmonic Insufficiency Mean Velocity (***PR Trace***)
- Pulmonic Insufficiency Mean Square Root Velocity(***PR Trace***)
- Pulmonic Insufficiency Velocity Time Integral (***PR Trace***)
- Pulmonic Valve Mean Velocity (***PV Trace***)
- Pulmonic Valve Mean Square Root Velocity (***PV Trace***)
- Pulmonic Valve Velocity Time Integral (***PV Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Pulmonic Valve (continued)

One slope measurements

- Pulmonic Insufficiency Pressure Half Time (***PR PHT***)
- Pulmonic Valve Flow Acceleration (***PV AccT***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

One time interval measurements

- Pulmonic Valve Acceleration Time (***PV AccT***)
- Pulmonic Valve Ejection Time (***PVET***)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Two time intervals measurements

- Pulmonic Valve Acceleration to Ejection TIme Ratio (***PV AccT***, ***PVET***)
- Pulmonic Valve Pre-Ejection to Ejection Time Ratio (***PVPEP***, ***PVET***)

Right Ventricle

The following are cardiac Doppler Mode Right Ventricle measurements:

One peak velocity measurements

- Right Ventricle Outflow Tract Peak Pressure Gradient (***RVOT Vmax***)
- Right Ventricle Systolic Pressure (***RVOT Vmax***)
- Right Ventricle Outflow Tract Peak Velocity (***RVOT Vmax***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

One velocity flow trace measurement

- Right Ventricle Diastolic Pressure (***RVOT Trace***)
- Right Ventricle Outflow Tract Velocity Time Integral (***RVOT Trace***)

Right Ventricle (continued)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One time interval measurement

- Right Ventricle Ejection Time (***PV Trace***)

Right Ventricle (continued)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

One velocity flow trace and one area measurements:

- Stroke Volume by Pulmonic Flow (***RVOT Trace***)

Body surface area and stroke volume measurements:

- Right Ventricle Stroke Volume Index by Pulmonic Flow (***RVOT Trace***)

  The system calculates body surface area from the patient's height and weight.

System

The following are cardiac Doppler Mode System measurements:

One peak velocity measurements

- Pulmonary Artery Peak Velocity (***PV Vmax***)
- Pulmonary Vein Velocity Peak A (reverse) (***P Vein A***)
- Pulmonary Vein Peak Velocity
  - End-Diastolic (***P Vein D***)
  - Systolic (***P Vein S***)
- Systemic Vein Peak Velocity
  - End-Diastolic (***PDA Diastolic***)
  - Systolic (***PDA Systolic***)
- Ventricular Septal Defect Peak Velocity (***VSD Vmax***)
- Atrial Septal Defect Peak Velocity (***ASD Vmax***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

System (continued)

One velocity flow trace measurements

- Pulmonary Artery Velocity Time Integral (***Pulmonic VTI***)
- Systemic Vein Velocity Time Integral (***Systemic VTI***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One time interval measurements

- Pulmonary Vein A-Wave Duration (***P Vein A Dur***)

System (continued)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Two peak velocity measurements

- Pulmonary Vein S/D Ratio (***P Vein D, P Vein S***)
- Ventricular Septal Defect Peak Pressure Gradient (***VSD Vmax***)

Two velocity flow trace measurements:

- Pulmonic-to-Systemic Flow Ratio (***Qp/Qs***)

Tricuspid Valve

The following are cardiac Doppler Mode Tricuspid Valve measurements:

One peak velocity measurements

- Tricuspid Regurgitant Peak Pressure Gradient (***TR Vmax***)
- Tricuspid Valve Peak Pressure Gradient (***TV Vmax***)
- Tricuspid Regurgitant Peak Velocity (***TR Vmax***)
- Tricuspid Valve Peak Velocity (***TV Vmax***)
- Tricuspid Valve Velocity Peak A (***TV A Velocity***)
- Tricuspid Valve Velocity Peak E (***TV E Velocity***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Tricuspid Valve (continued)

One velocity flow trace measurements

- Tricuspid Regurgitant Mean Pressure Gradient (***TR Trace***)
- Tricuspid Regurgitant Mean Velocity (***TR Trace***)
- Tricuspid Regurgitant Mean Square Root Velocity (***TR Trace***)
- Tricuspid Regurgitant Velocity Time Integral (***TR Trace***)
- Tricuspid Valve Mean Pressure Gradient (***TV Trace***)
- Tricuspid Valve Mean Velocity (***TV Trace***)
- Tricuspid Valve Mean Square Root Velocity (***TV Trace***)
- Tricuspid Valve Velocity Time Integral (***TV Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Tricuspid Valve (continued)

One time interval measurements

- Tricuspid Valve Time to Peak (***TV TTP***)
- Tricuspid Valve Closure to Opening (***TCO***)
- Tricuspid Valve A-Wave Duration (***TV A Dur***)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

One slope measurements

- Tricuspid Valve Pressure Half Time (***TV PHT***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

Tricuspid Valve (continued)

One velocity flow trace and one area measurement	• Stroke Volume by Tricuspid Flow (***TV Trace***)
Two peak velocity measurement	• Tricuspid Valve E-Peak to A-Peak Ratio (***TV E/A Velocity***)

Color Flow Mode

Aortic Valve

The following are cardiac Color Flow Mode Aortic Valve measurements:

One distance measurements

- Proximal Isovelocity Surface Area: Regurgitant Orifice Area (***PISA AR***)
- Proximal Isovelocity Surface Area: Radius of Aliased Point (***PISA AR***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Aortic Valve (continued)

One velocity flow trace measurements

- Proximal Isovelocity Surface Area: Regurgitant Flow (***PISA AR***)
- Proximal Isovelocity Surface Area: Regurgitant Volume Flow (***PISA AR***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One peak velocity measurement

- Proximal Isovelocity Surface Area: Aliased Velocity (***PISA AR***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Mitral Valve

The following are cardiac Color Flow Mode Mitral Valve measurements:

One distance measurements

- Proximal Isovelocity Surface Area: Regurgitant Orifice Area (***PISA MR***)
- Proximal Isovelocity Surface Area: Radius of Aliased Point (***PISA MR***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One velocity flow trace measurements

- Proximal Isovelocity Surface Area: Regurgitant Flow (***PISA MR***)

Mitral Valve (continued)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One peak velocity measurement

- Proximal Isovelocity Surface Area: Aliased Velocity (***PISA MR***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Combination Mode Measurements

Some cardiac calculations, such as Aortic Valve Area and Left Ventricle Stroke Volume, require you to make measurements in more than one mode. This section includes those measurements, organized by the region of interest. You can find the descriptions of how to perform these measurements elsewhere in this chapter.

Aortic Valve

One distance and two peak velocity measurement

- Aortic Valve Area (***Ao Diam***, ***LVOT Vmax***, ***AV Vmax***)
- Aortic Valve Area by Continuity Equation by Peak Velocity (***Ao Diam***, ***LVOT Vmax***, ***AV Vmax***)

Velocity flow trace and one trace measurement

- Stroke Volume by Aortic Flow (***AVA Planimetry***, ***AV Trace***)

Velocity flow trace, one trace, and one time interval measurement

- Cardiac Output by Aortic Flow (***AVA Planimetry***, ***AV Trace***, ***HR***)

Two velocity flow trace and one distance measurement:

- Aortic Valve Area by Continuity Equation VTI (***Ao Diam***, ***LVOT Vmax***, ***AV Trace***)

Left Ventricle

Two distance measurements and heart rate

- Cardiac Output, Teichholz (***LVIDd***, ***LVIDs***, ***HR***)
- Cardiac Output, Cubic (***LVIDd***, ***LVIDs***, ***HR***)

Two distance, two trace measurements, and heart rate

- Cardiac Output Two Chamber, Single Plane, Area-Length (***LVAd***, ***LVAs***, ***HR***)
- Cardiac Output Two Chamber, Single Plane, Method of Disk(Simpson) (***LVAd***, ***LVAs***, ***HR***)
- Cardiac Output Four Chamber, Single Plane, Area-Length (***LVAd***, ***LVAs***, ***HR***)
- Cardiac Output Four Chamber, Single Plane, Method of Disk(Simpson) (***LVAd***, ***LVAs***, ***HR***)

Two distance and two trace measurements

- Ejection Fraction, Two Chamber, Single Plane, Area-Length (***LVAd***, ***LVAs***)
- Ejection Fraction, Two Chamber, Single Plane, Method of Disk(Simpson) (***LVAd***, ***LVAs***)
- Ejection Fraction, Four Chamber, Single Plane, Area-Length (***LVAd***, ***LVAs***)
- Ejection Fraction, Four Chamber, Single Plane, Method of Disk(Simpson) (***LVAd***, ***LVAs***)
- Left Ventricle Stroke Volume, Single Plane, Two Chamber, Area-Length (***LVAd***, ***LVAs***)
- Left Ventricle Stroke Volume, Single Plane, Two Chamber, Method of Disk(Simpson) (***LVIDd***, ***LVIDs***, ***LVAd***, ***LVAs***)
- Left Ventricle Stroke Volume, Single Plane, Four Chamber, Area-Length (***LVAd***, ***LVAs***)
- Left Ventricle Stroke Volume, Single Plane, Four Chamber, Method of Disk(Simpson) (***LVIDd***, ***LVIDs***, ***LVAd***, ***LVAs***)
- Left Ventricle Volume, Two Chamber, Area-Length
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)
- Left Ventricle Volume, Four Chamber, Area-Length
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)

Left Ventricle (continued)

Four distance and four trace measurements

- Ejection Fraction, Bi-Plane, Method of Disk (***LVAd***, ***LVAs***, 2CH, 4CH)
- Left Ventricle Stroke Volume, Bi-Plane, Method of Disk (***LVAd***, ***LVAs***, 2CH, 4CH)
- Left Ventricle Volume, Bi-Plane, Method of Disk
  - Diastolic (***LVAd***, 2CH, 4CH)
  - Systolic (***LVAs***, 2CH, 4CH)

One distance and one trace measurements

- Left Ventricle Stroke Index, Single Plane, Two Chamber, Area-Length (***LVSd***, ***LVSs***, and Body Surface Area)
- Left Ventricle Stroke Index, Single Plane, Four Chamber, Area-Length (***LVSd***, ***LVSs***, and Body Surface Area)
- Left Ventricle Volume, Single Plane, Four Chamber, Method of Disk
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)
- Left Ventricle Volume, Single Plane, Two Chamber, Method of Disk
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)
- Left Ventricle Volume, Apical View, Long Axis, Method of Disk
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)

One velocity flow trace and one distance measurement

- Stroke Volume by Aortic Flow (***AVA Planimetry***, ***AV Trace***)

Mitral Valve

One velocity flow trace and one trace measurements	• Stroke Volume by Mitral Flow (***MVA Planimetry***, ***MV Trace***)
One velocity flow trace, one trace, and one time interval measurements	• Cardiac Output by Mitral Flow (***MVA Planimetry***, ***MV Trace***, ***HR***)

Pulmonic Valve

One velocity flow trace and one trace measurement	• Stroke Volume by Pulmonic Flow (***PV Planimetry***, ***PV Trace***)
One velocity flow trace, one trace, and one time interval measurement	• Cardiac Output by Pulmonic Flow (***PV Planimetry***, ***PV Trace***, ***HR***)

Right Ventricle

One velocity flow trace, one area, and one time interval measurements	• Cardiac Output by Pulmonic Flow (***RV Planimetry***, ***RV Trace***, ***HR***)

Tricuspid Valve

One velocity flow trace, one area, and one time interval measurement	• Cardiac Output by Tricuspid Flow (***TV Planimetry***, ***TV Trace***, ***HR***)

Cardiac Worksheet

After you make cardiac measurements, you can review all the data on the cardiac worksheet. To view the worksheet, select the ***Worksheet Display*** key on the Top/Sub Menu. See Figure 10-1.

The cardiac worksheet has a heading for each mode, and for each folder. In Figure 10-1, the mode heading is 2D Measurements, followed by Cube/Teichholz. Each measurement from that folder is listed next. It can list up to six values for each measurement. The next folder is then listed, in this example, RV/LV.

Figure 10-1. Cardiac Worksheet: Page 1

Cardiac Worksheet (continued)

If a worksheet has more data on a second page, to view the next page, select **Page Change**. To see page 2 and 3 of this report, see Figure 10-2 and Figure 10-3.

To return to scanning, select the ***Worksheet Display*** key or press ***Esc***.

Figure 10-2. Cardiac Worksheet: Page 2

Worksheet information

The information on the cardiac worksheet is as follows:

- Parameter – This column lists the mode, the measurement folder, and the specific measurement.
- Value – The measured value. If more than one measurement was made for an item, the system uses the specified method (average, maximum, minimum, or last) to determine this value.
- m1–m6 – Up to six measurement values for each item. If you make more than six measurements, the worksheet uses the last six.
- Method – When there is more than one measurement for an item, this specifies the method used to calculate the measurement value listed in the Value column. Choices are average, maximum, minimum, or last. To change the method:

  a. Move the **Trackball** to the Method field.

  b. Press **Set**.

  c. Move the **Trackball** to select from the list.

  d. Press **Set**.

For more information about working with worksheets, See ‘Viewing and Editing Worksheets’ on *page 7-50 for more information.*

Cardiac Worksheet (continued)

Figure 10-3. Cardiac Worksheet: Page 3

Setting up and Organizing Measurements and Calculations

When you receive your LOGIQ Book XP Series system, the studies and measurements are organized for typical work flows. If you want, you can change this set up. You can change studies, create studies, and specify which measurements and calculations are in each study. You can change the measurements that are available on the Top/Sub Menu. The LOGIQ Book XP Series allows you to quickly and easily set up your system so that you can work most efficiently.

For information about how to customize studies and measurements, See ‘Measurement and Calculation Setup’ on *page 7-14 for more information.*

When you make cardiac measurements, the results you see in the Results Window and the Worksheet can vary, depending on what you have set up in the Utility screens.

Generic Study

B-Mode

The Cardiology M-Mode Generic exam category includes the following measurements:

- Caliper
- Area (Trace)
- Volume
- Volume (d)
- Volume (s)
- Dist (Distance) Ratio
- Area Ratio
- R-R

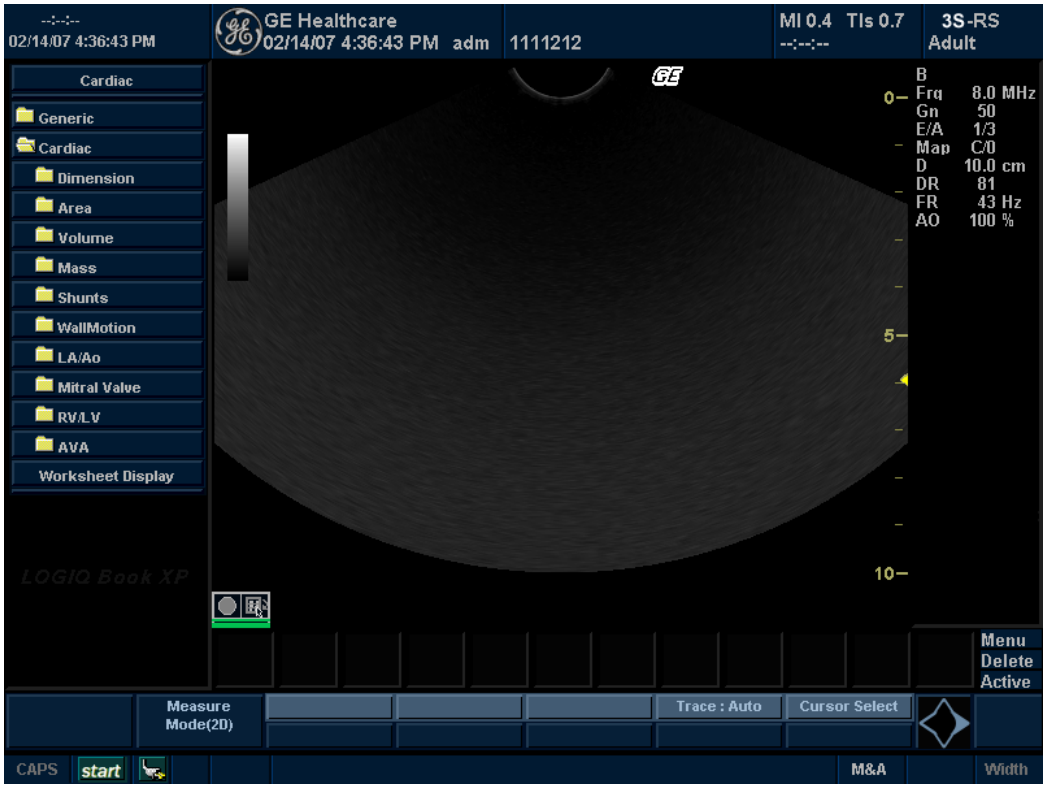


Figure 10-4. Cardiology B-Mode Worksheet Display

M-Mode

The Cardiology M-Mode Generic exam category includes the following measurements:

- LV Study
- LA/Ao
- RV Study
- D-E Excursion
- Slope Caliper
- Caliper
- Time
- Heart Rate

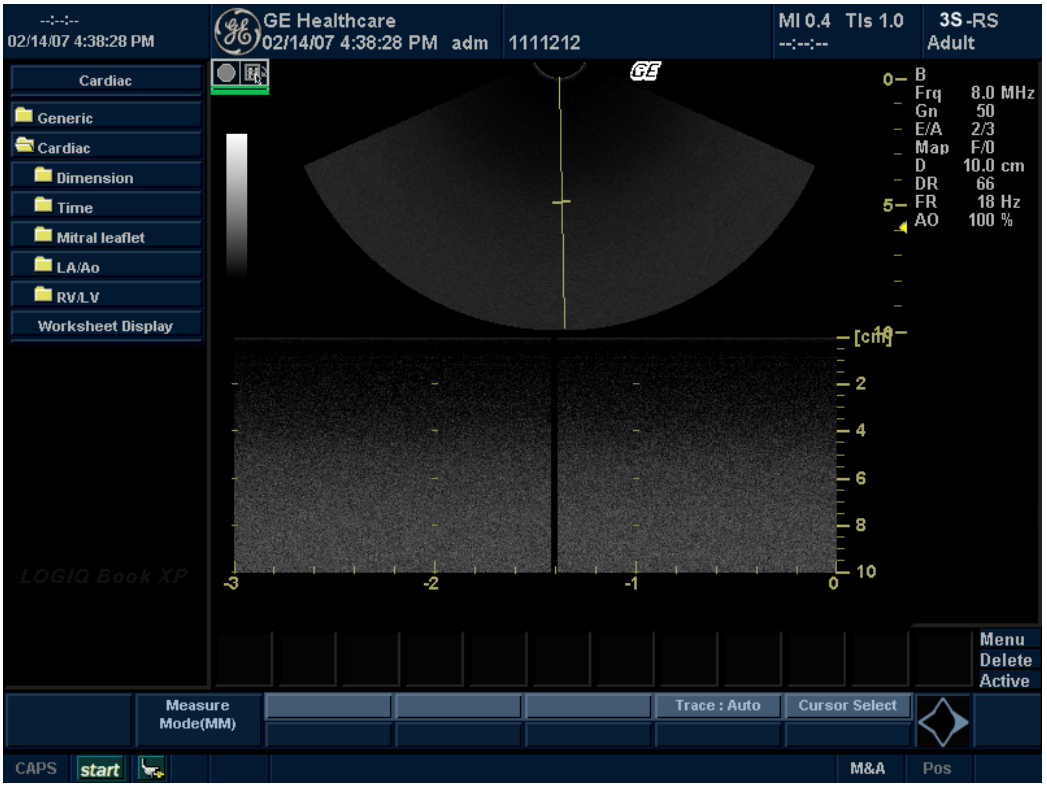


Figure 10-5. Cardiology M-Mode Worksheet Display

Doppler Mode

The Cardiology Doppler Mode Generic exam category includes the following measurements:

- Point
- Manual Trace
- MV E/A Ratio
- PHT
- Time
- Heart Rate

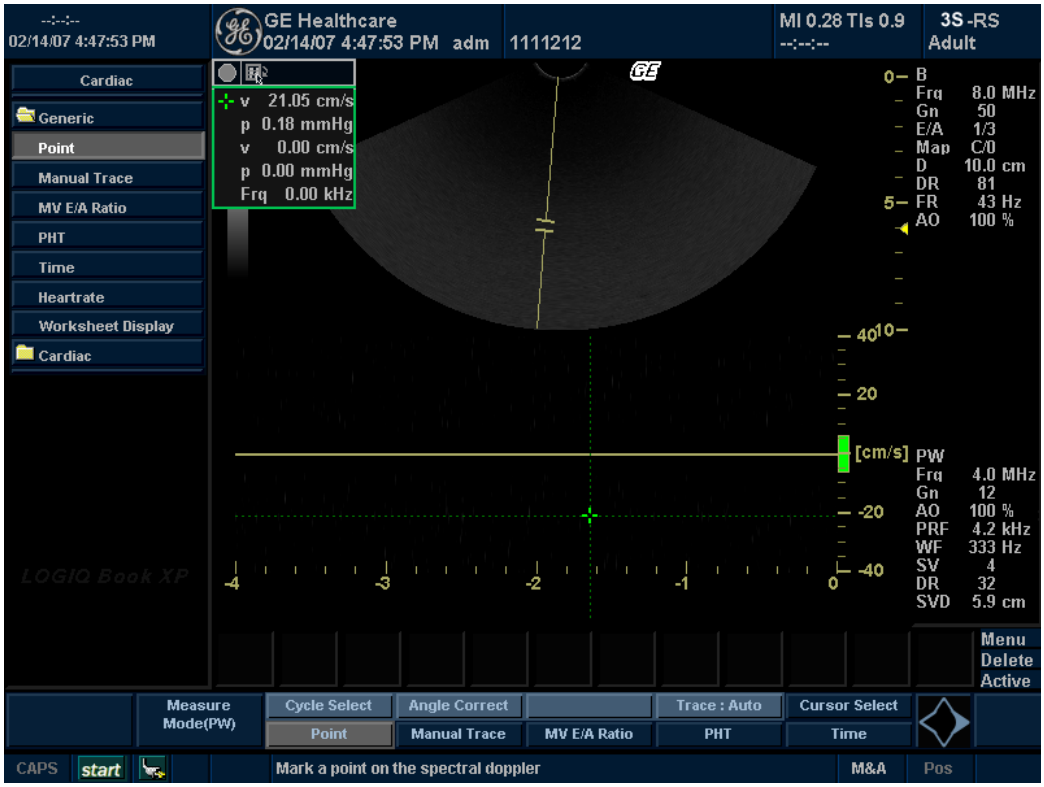


Figure 10-6. Cardiology Doppler Mode Worksheet Display

ECG Option

CE 0473

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

Overview

A physiological input panel is available for the LOGIQ Book XP Series. This panel has inputs for ECG signals.

The scanned image that is displayed is synchronized with the ECG trace. In Doppler or M-Mode, the traces are synchronized to that particular mode's sweep.

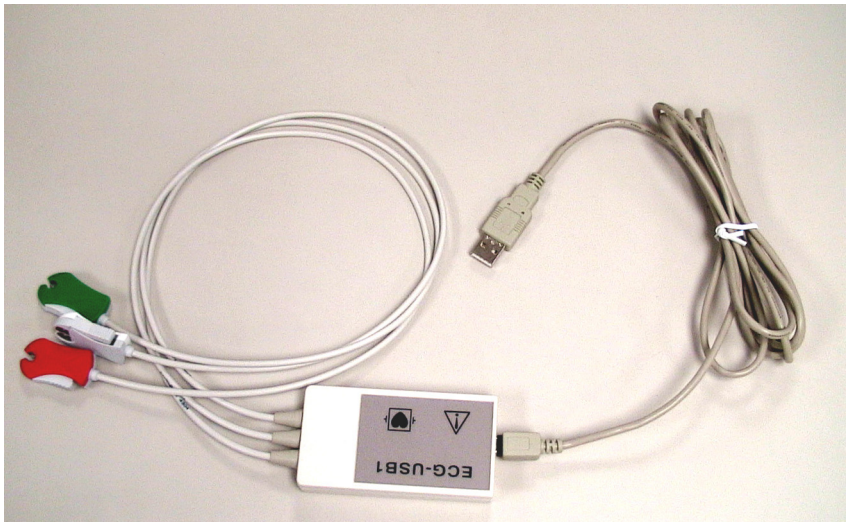


Figure 10-7. ECG

WARNING

- Do not use the LOGIQ Book XP Series Ultrasound system Physiological traces for diagnosis and monitoring.
- Only approved and recommended peripherals and accessories should be used.

Physiological 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 Top/Sub Menu controls.

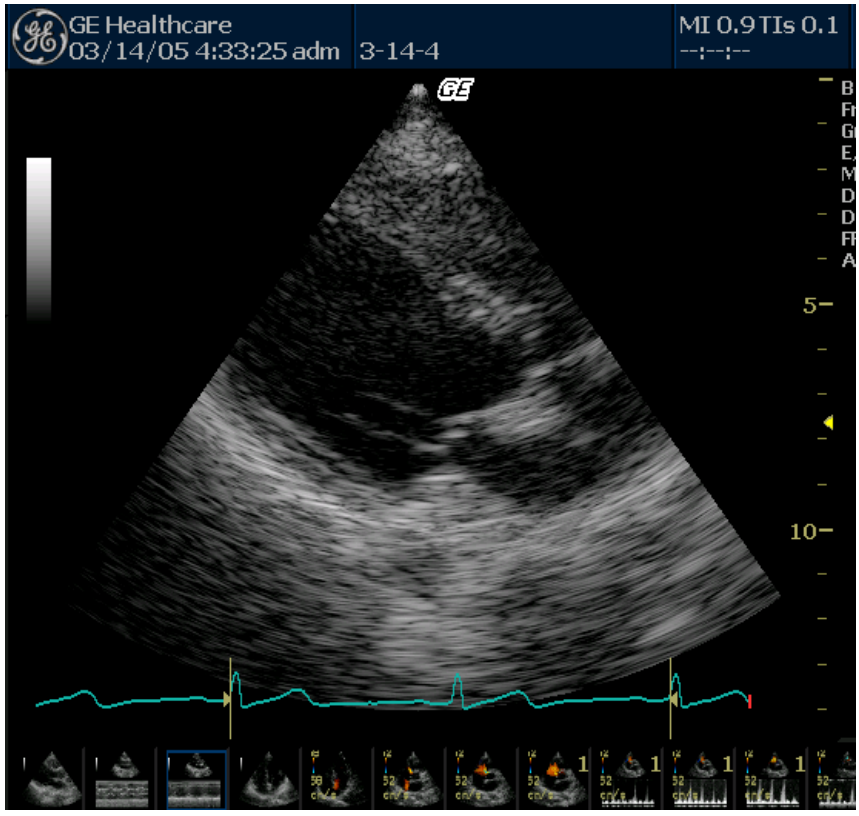


Figure 10-8. Physiological Trace Monitor Display

ECG Top/Sub Menu

The ECG Top/Sub Menu provides for control of the physiological input signals.

Without the ECG option, the ECG Top/Sub Menu is not displayed.

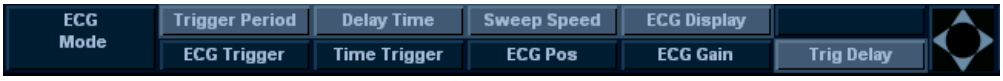


Figure 10-9. ECG Top/Sub Menu

Sweep Speed

Description	Change the speed of the trace. The sweep speed of the physio signal on the B-Mode image can be set independent of the timeline (Doppler and M-Mode) sweep speed.
Value	1 - 16.

ECG Trigger Period

Description	The control specifies the number of heart cycles (R-waves) that are skipped between ECG triggers. The default is 1 or no skipping.
Adjusting	Adjust the corresponding control.
Value	1 - 30

Timer Trigger

Description	Enables intermittent imaging based on a timer.
NOTE:	*If Timer Trigger is turned on, the ECG Trigger is set to None.*
Value	On or Off.

Trigger Delay

Description	In ECG trigger mode, rotating the knob changes the delay time related to the R trigger in corresponding the period whic is controlled by the Trigger Period control.
Value	0.10 - 10.00

Delay Time

Description	In Timer Trigger Mode: Rotating the knob changes the delay time between images.
Adjusting	Adjust the corresponding control.
Value	0.10 - 10.00

ECG Gain/Position

Description	Allows for the amplitude control of the ECG trace or allows for the vertical positioning of the ECG trace on the image display.
Value	Gain: 0.00 - 0.23 Position: 0.00 - 100.00

ECG Display

Description	Provides the ability to turn on the ECG trace and Auto Heart Rate for display on the monitor.
Adjusting	When the key is selected, the ECG trace and Auto Heart Rate toggle between on and off.
Value	0 or 1.

ECG Trigger

Description	Enables intermittent imaging based on the ECG. The trigger location(s) relative to the R trigger are set with the Delay Time key.
NOTE:	*If other than None is selected, Timer Trigger is turned off.*
Value	On or Off

Chapter 11

Vascular

Describes how to perform Vascular measurements and calculations.

Vascular Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu Menu.

Vascular Measurements

Introduction

Vascular measurements offer several different types of measurement studies:

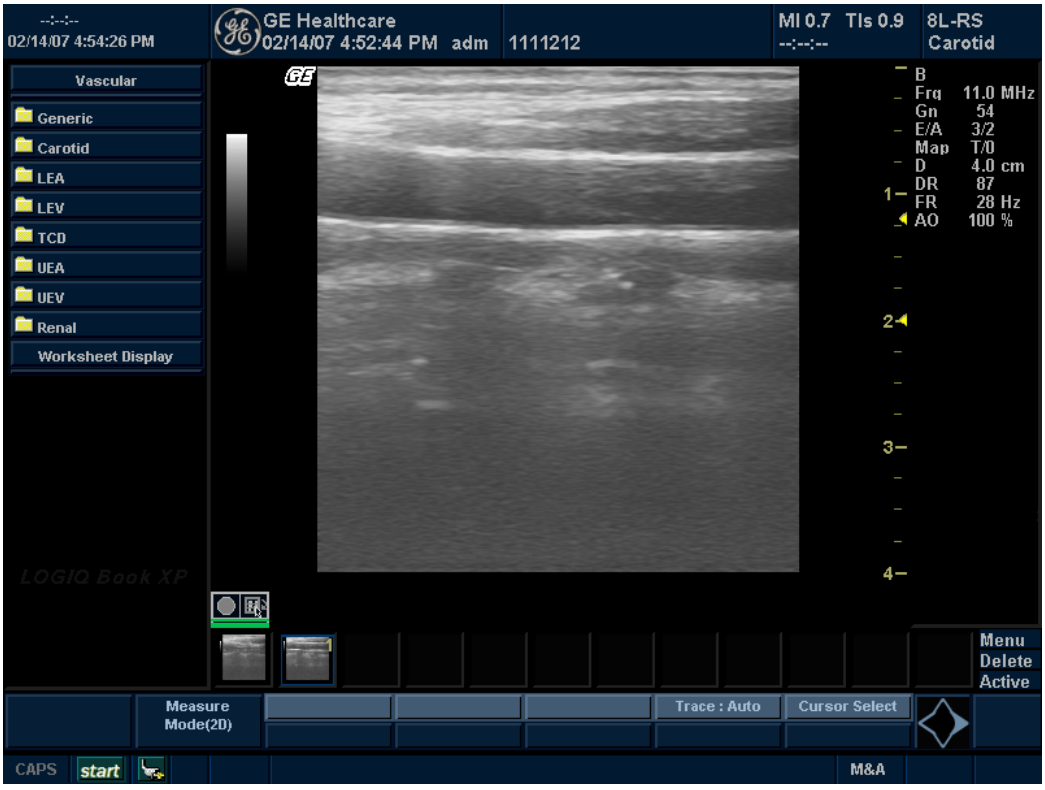


Figure 11-1. Vascular Exam Category Top/Sub Menu

Introduction (continued)

- Generic – Common to all applications. See ‘Generic Measurements’ on *page 7-53 for more information.*
- Carotid
- LEA (Lower Extremity Artery)
- LEV (Lower Extremity Vein)
- TCD (Transcranial Doppler)
- UEA (Upper Extremity Artery)
- UEV (Upper Extremity Vein)
- Renal

To change an exam calc:

Press the **Measure** key and select the desired calcs folder.

A vascular study is a group of particular vessels. You can customize the vessel exam calcs in the configuration menu. See ‘Measurement and Calculation Setup’ on *page 7-14 for more information.*

When you use Auto Vascular calculation, you use the vessel keys on the Top/Sub Menu to post-assign vascular calculations. When you are not using Auto Vascular calculation, the vessel key is used for manual measurement.

B-Mode Measurements

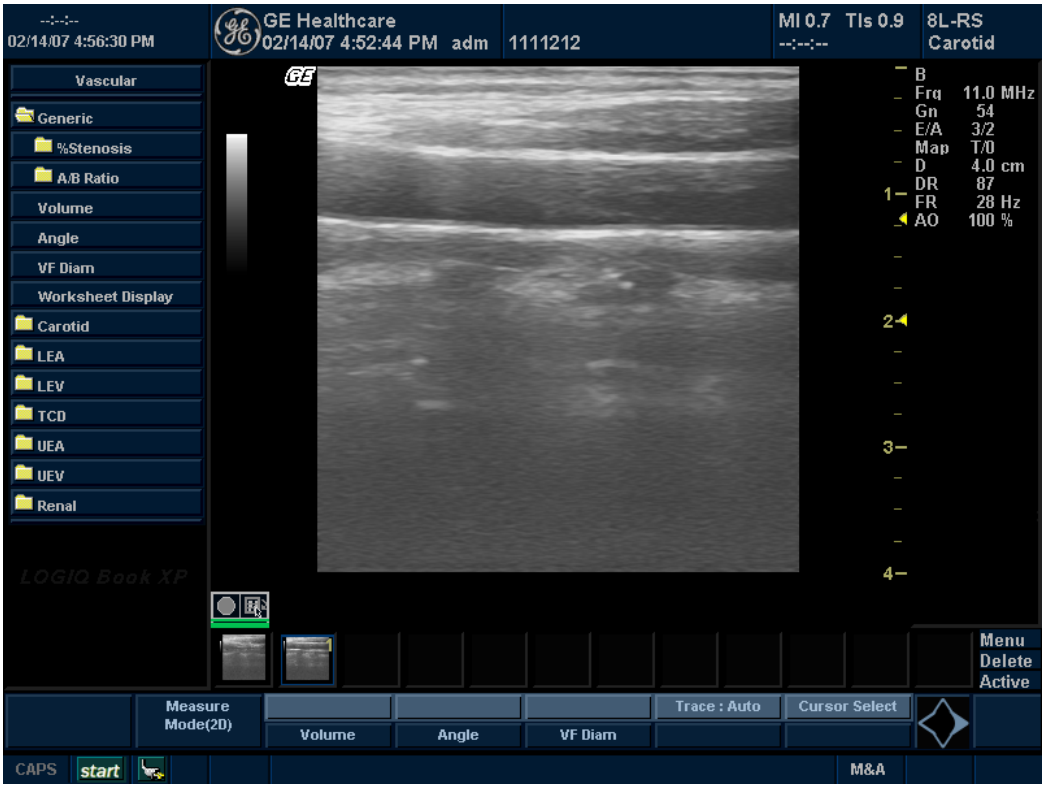


Figure 11-2. B-Mode Top/Sub Menu

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

% Stenosis

See '% Stenosis' on *page 7-55 for more information.*

Volume

See 'Volume' on *page 7-57 for more information.*

A/B Ratio

See 'A/B Ratio' on *page 7-61 for more information.*

M-Mode Measurements

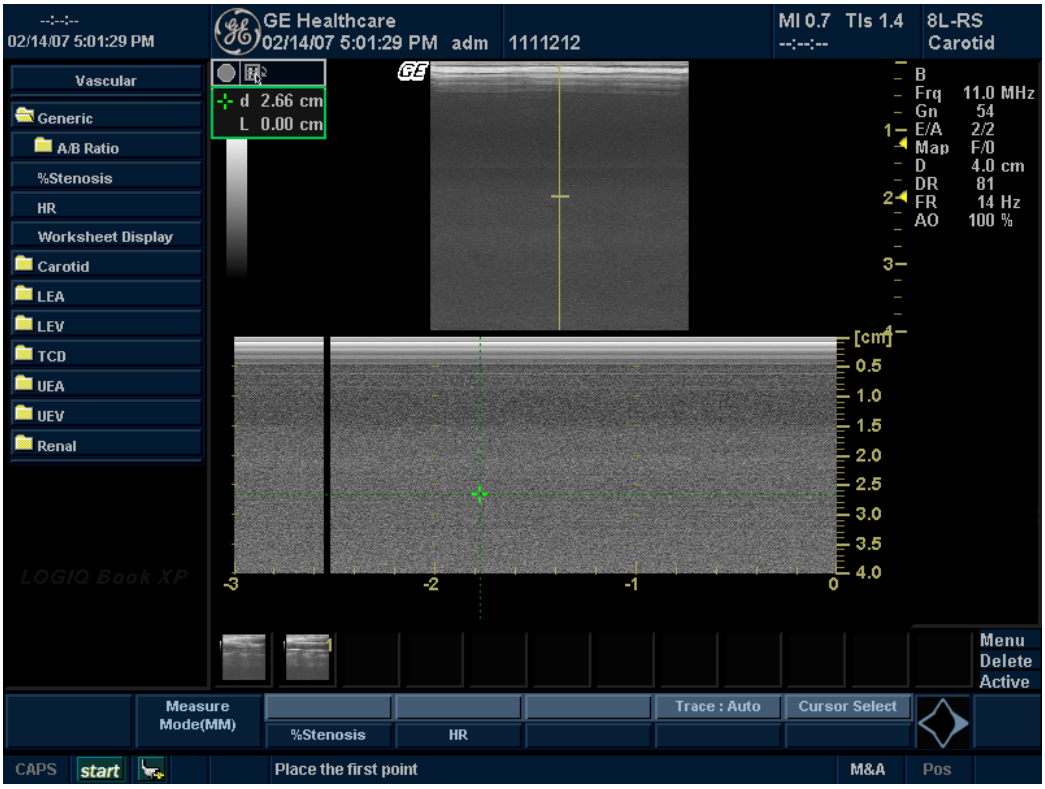


Figure 11-3. M-Mode Top/Sub Menu

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

% Stenosis

See '% Stenosis' on *page 7-55 for more information.*

A/B Ratio

See 'A/B Ratio' on *page 7-63 for more information.*

Doppler Mode Measurements

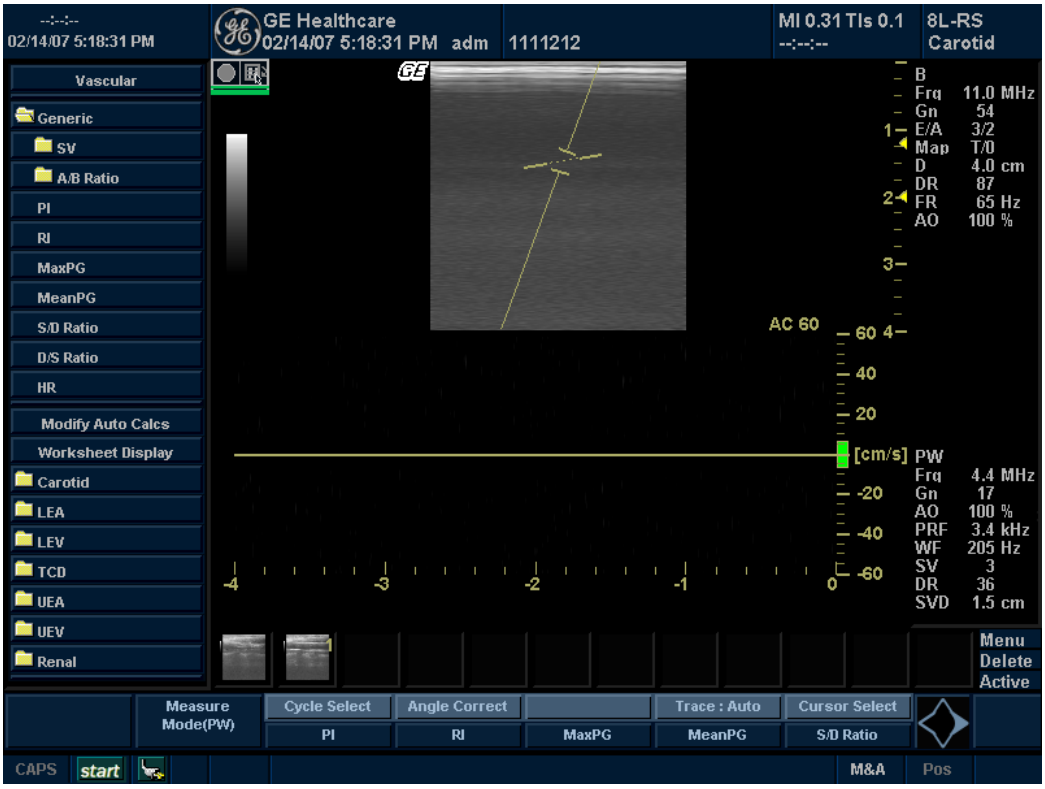


Figure 11-4. D-Mode Top/Sub Menu Example

Control Assignment

Cancel Transfer 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.

Side Rt/Lt The system has measurements for the patient's right and left side. Choose the appropriate side on the Top/Sub Menu.

Control Assignment (continued)

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 Top/Sub Menu screen.

If you select ***PV***, all selected parameters are turned off. When you deselect ***PV***, the system returns to the previously selected calculation.

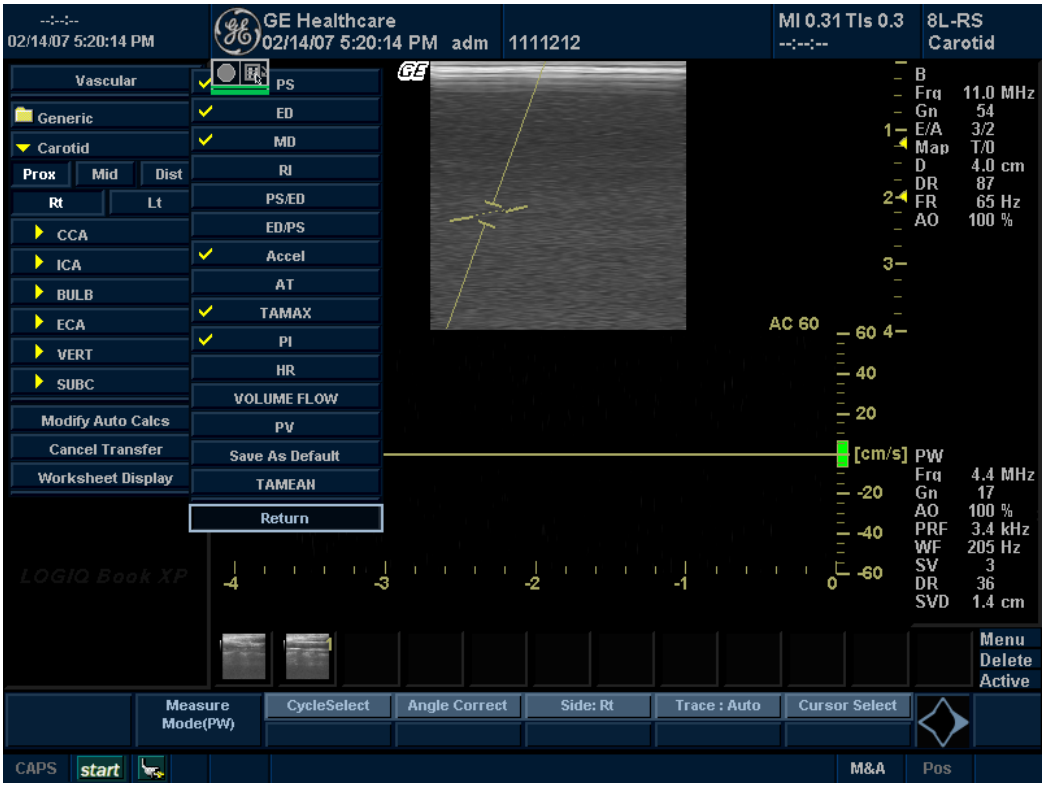


Figure 11-5. Modify Auto Calculation Menu (Page1)

Naming format for vessels

When you want to measure a vessel, on the Top/Sub Menu you select the folder for the vessel. Many vessel folders are labeled with an abbreviation. The following table lists abbreviations used for naming vascular vessels.

Table 11-1: Vascular Vessel Abbreviations

Acronym	Name
ACA	Anterior Cerebral Artery
AComA	Anterior Communicating Artery
ATA	Anterior Tibial Artery
ATV	Anterior Tibial Vein
Axill	Axillary Artery
Axill V	Axillary Vein
BA	Basilar Artery or Brachial Artery
Ba V	Basilic Vein
Br V	Brachial Vein
CCA	Common Carotid Artery
Ceph V	Cephalic Vein
CFV	Common Femoral Vein
CHA	Common Hepatic Artery
Com Femoral	Common Femoral Artery
CIA	Common Iliac Artery
CIV	Common Iliac Vein
Com Iliac A	Common Iliac Artery
DFA	Deep Femoral Artery
DFV	Deep Femoral Vein
Dors Pedis	Dorsalis Pedis
DPA	Dorsalis Pedis Artery
ECA	Exterior Carotid Artery
EIA	External Iliac Artery
EIV	External Iliac Vein
FV	Femoral Vein

Table 11-1: Vascular Vessel Abbreviations

Acronym	Name
GSV	Greater Saphenous Vein
ICA	Internal Carotid Artery (Transcranial Doppler)
ICA	Interior Carotid Artery (Carotid Artery)
IJV	Internal Jugular Vein
IMA	Inferior Mesenteric Artery
Inn	Innominate
IVC	Inferior Vena Cava
LSV	Lesser Saphenous Vein
MCA	Middle Cerebral Artery
Mcub V	Median Cubital Vein
Mid Hep V	Middle Hepatic Vein
MRA	Main Renal Artery
PCA	Posterior Cerebral Artery
PComA	Posterior Communicating Artery
Peron	Peroneal
POP	Popliteal
PTA	Posterior Tibial Artery
PTV	Posterior Tibial Vein
RA	Radial Artery
SMA	Superior Mesenteric Artery
SMV	Superior Mesenteric Vein
SUBC	Subclavian Artery
SUBC V	Subclavian Vein
SFA	Superficial Femoral Artery
TCD	Transcranial Doppler
TIPS	Transjugular Intrahepatic Portosystemic Shunt
UA	Ulnar Artery
VERT	Vertebral Artery

Auto Vascular Calculation Overview

Auto Vascular Calculation enables the LOGIQ Book XP Series 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.

You can select the calculations to be displayed in the M&A Result window during live scanning or on a frozen image. These calculations are displayed at the top of M&A Result Window located adjacent to the image. These calculations are presettable by application which means you can set up the default calculations to be displayed for each application.

Auto Vascular Calculation

Activating Auto Vascular Calculation

To activate Auto Vascular Calculation, select the **Auto Calc** Top/Sub Menu key to select Live (calculations displayed on the real-time image), or Freeze (calculations displayed on the frozen image).

To deactivate Auto Vascular calculation, select Off.

Setting up Auto Vascular Calculation Parameters

- **Selecting Auto Trace**

  You can select to have a continuous auto trace of the max or mean velocities.

  - Select Max or Mean using the ***Trace Method*** Top/Sub Menu.

- **Selecting Trace Detection**

  Trace Detection 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*** Top/Sub Menu 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.

  For the measurements to remain and be used again, select ***Save As Default*** within this menu.

Auto Vascular Calculation (continued)

Auto Vascular Calculation Exam

1. Preset the system.
2. Perform the scan and press **Freeze**.
3. Activate Auto Calculations (Live or Frozen) from the Top/Sub Menu.

   The system performs a calculation automatically.

   The Auto calculation is assigned to particular vessel measurements.
4. Press **Measure** to display the Measurement menu.
5. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
6. Select the desired vessel name from the Top/Sub Menu.

   Selected vessel measurements are automatically assigned with the Auto Vascular calculation. The results are then displayed in the Results Window.

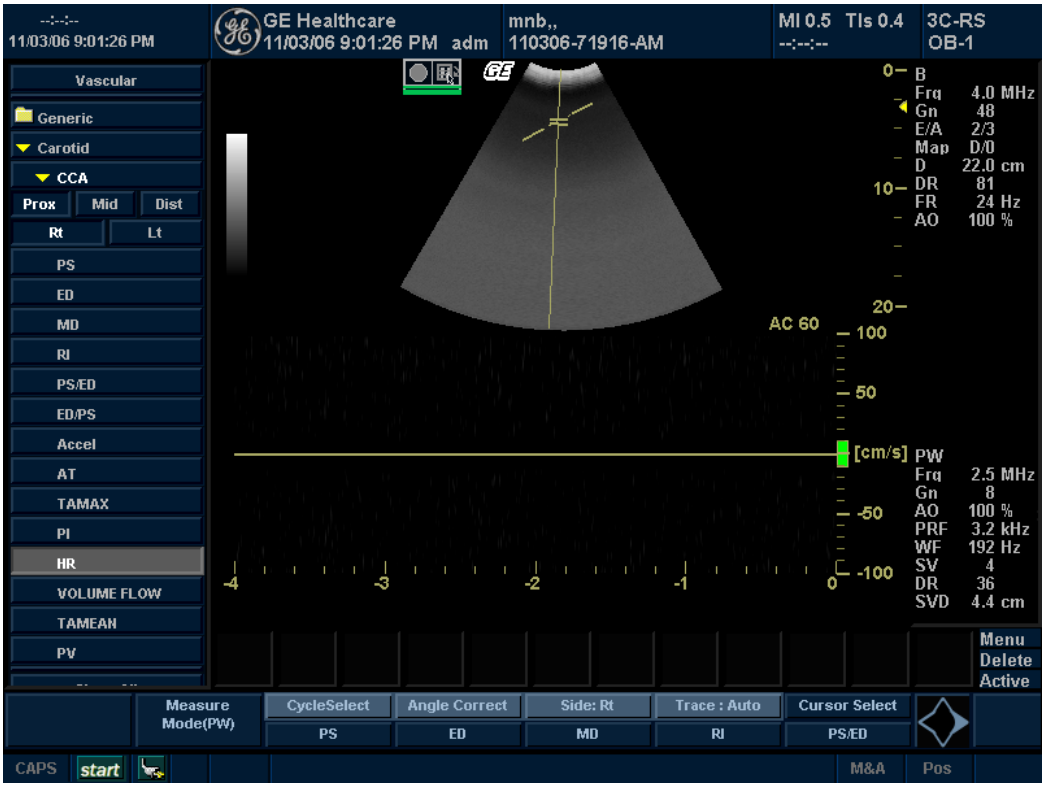


Figure 11-6. Assigned Vessel

Auto Vascular Calculation (continued)

*NOTE: When you want to cancel the assignment, you can use the **Cancel Transfer** Top/Sub Menu key. See 'Cancel Transfer' on page 11-8 for more information.*

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.

To move the systole or diastole position:

- Use the ***Cursor Select*** control to move the start systole position or the end diastole position..

Manual Vascular Calculation

You can perform the following calculations manually when Auto Doppler Calculation is not activated.

1. Press **Measure**.

   If necessary, you can select another Exam Calc and then select parameters from Modify Calculation.
2. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
3. Select the desired vessel folder.

   The Measurement menu is displayed.

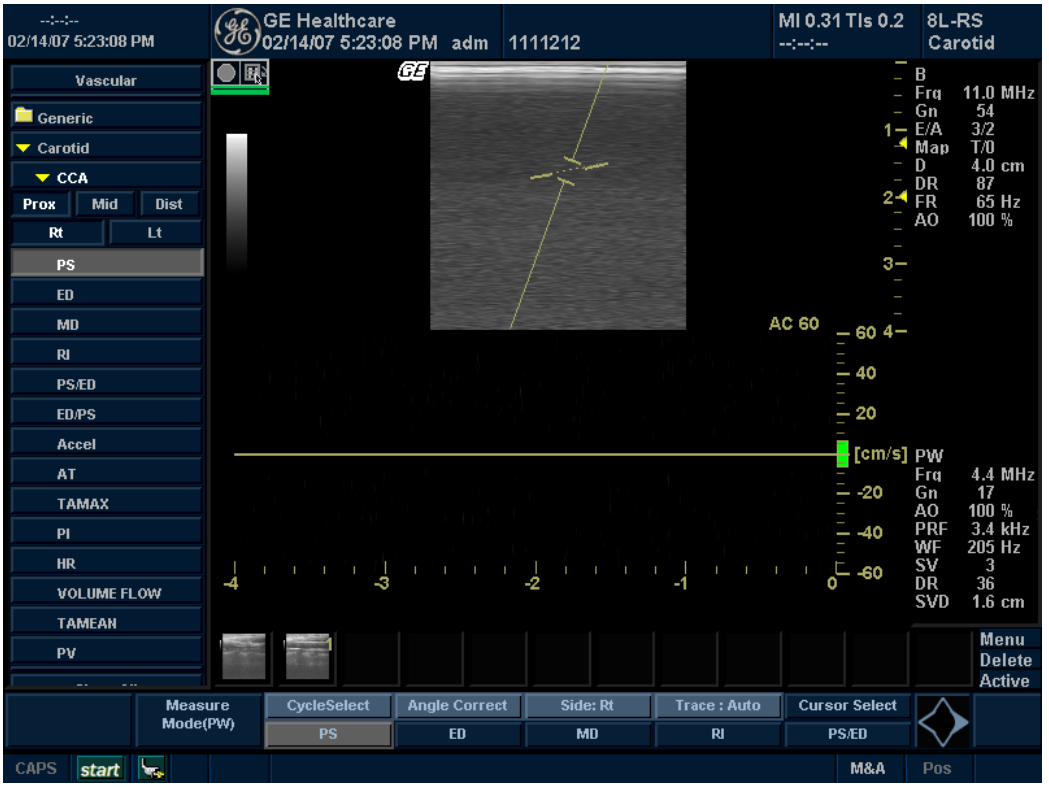


Figure 11-7. Measurement Menu Example

4. Make the required measurements according to the system, or select your preferred measurements.

Manual Vascular Calculation (continued)

For each vessel in Doppler mode, you can make any of the following measurements:

- Peak Systole (PS)
- End Diastole (ED)
- Minimum Diastole (MD)
- Heart Rate
- TAMAX
- Pulsatility Index (PI)
- Resistive Index (RI)
- S/D Ratio
- D/S Ratio
- Acceleration (Accel)
- Acceleration Time (AT)

To select vascular measurements

Your system is set up to show the measurements that you usually make for each vessel. To make a measurement that is not shown for the selected vessel:

1. Select the folder for the vessel you want to measure.
2. Select ***Show All***.

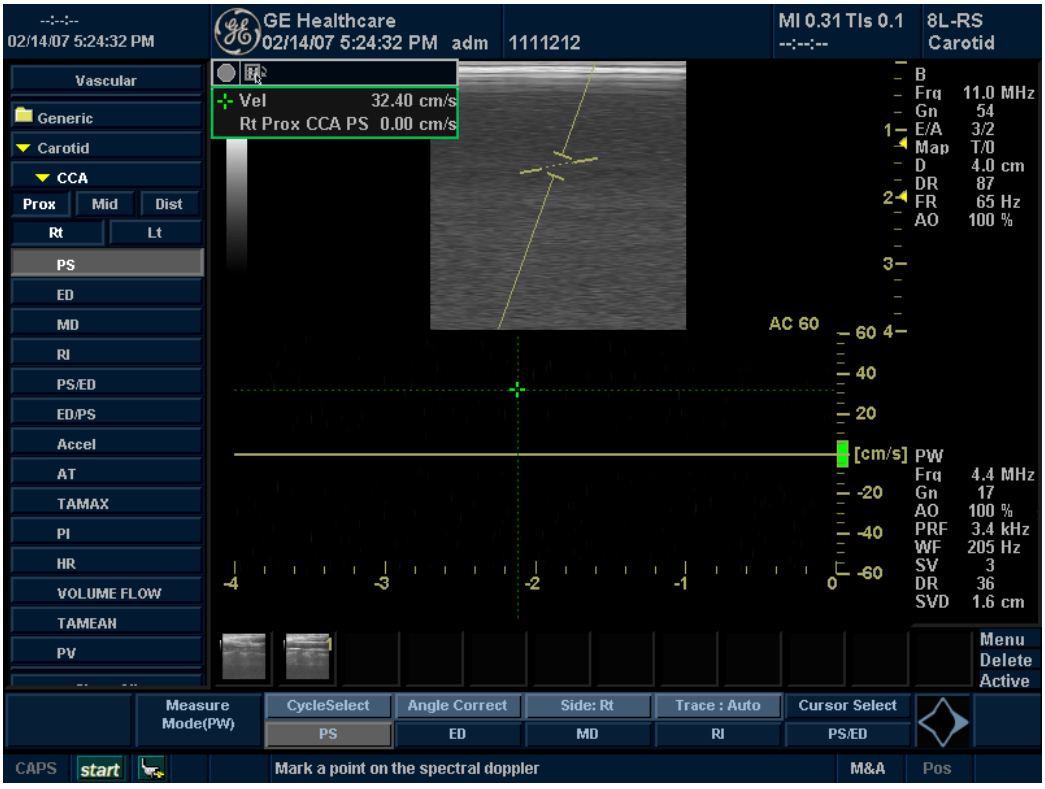


Figure 11-8. ICA folder

The system displays all possible vessel measurements.

To select vascular measurements (continued)

3. Select the desired measurement.

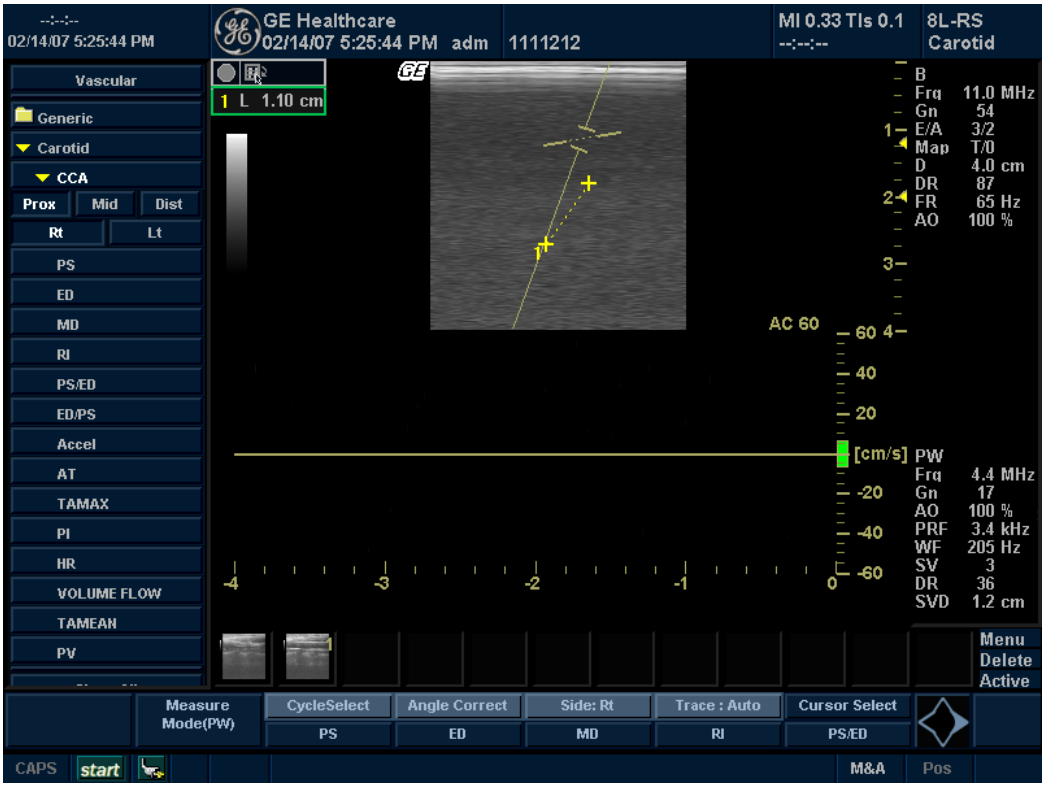


Figure 11-9. Show All measurements

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

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.

Heart Rate

See ‘Heart Rate’ on *page 7-64 for more information.*

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.

ED/PS or PS/ED Ratio

To calculate the End Diastole/Peak Systole ratio or Peak Systole/End Diastole ratio:

1. Select ***ED/PS*** or ***PS/ED***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at end diastole (ED) or peak systole (PS), 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 peak systole (PS) or end diastole (ED), move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the end diastole, peak systole, and ED/PS or PS/ED ratio in the Results Window.

Pulsatility Index (PI)

See ‘Pulsatility Index (PI)’ on *page 7-67 for more information.*

S/D or D/S Ratio

See ‘PS/ED or ED/PS Ratio’ on *page 7-69 for more information.*

Resistive Index (RI)

See ‘Resistive Index (RI)’ on *page 7-68 for more information.*

TAMAX

See ‘TAMAX and TAMEAN’ on *page 7-45 for more information.*

Vascular Worksheet

The vascular worksheet is structured to automatically display vascular measurements made at specific anatomical sites. The worksheet can also display an average, last, maximum, or minimum value of the latest three measurements. Calculated ratios are automatically summarized and displayed.

To view the Vascular Worksheet

1. Press **Measure**.
2. Select ***Worksheet Display***.

   The system displays the worksheet.

Figure 11-10. Vascular Worksheet Example

To view the Vascular Worksheet (continued)

Only measured parameters are displayed. Location information is labeled with vessel name first. Measured parameters of the vessel are grouped under the vessel label.

Selected value by method is highlighted, however, when the average method is selected, the highlighted cursor is removed.

When an entire vessel measurement does not have sides (left or right), the side label is not displayed in that vessel study 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.

Worksheet Display Top/Sub Menu

1. **Worksheet Display**: To exit the worksheet display and return to scanning.
2. **Page Change** (knob): If a worksheet has more data, to view the next page, adjust the Page Change knob.
3. **Vessel Worksheet**: Select this key to display the Vessel Worksheet when the Vessel Summary is displayed.
4. **Vessel Summary**: Select this key to display the Vessel Summary when the Vessel Worksheet is displayed.
5. **Generic Worksheet**: Select this key to display the Generic Worksheet. Generic study measurements/calculations, such as volume and velocity, are displayed on this worksheet.
6. **Intravessel Ratio**: Select this key to display the Intravessel Ratio Calculation window. See ‘Intravessel ratio’ on *page 11-31 for more information.*
7. **Exclude Value**: Use to exclude a value from the result line. See ‘To edit a worksheet’ on *page 11-26 for more information.*
8. **Examiner’s Comment**: Select this key to display the Examiner’s comment window. See ‘Examiner’s Comments’ on *page 11-30 for more information.*
9. **Delete Value**: Use to delete a value (each measurement value). See ‘To edit a worksheet’ on *page 11-26 for more information.*

To edit a worksheet

To change data on a worksheet,

1. Select **Worksheet Display** from any page of the Vascular Calculation Top/Sub Menu.
2. To position the cursor at the field you want to change, move the **Trackball**.

   The field is highlighted.
3. Type the new data in the field and move the cursor to another place, then the new data is displayed in blue and asterisk are appended to value and resultant value to indicate that it was manual entered.

   The average measurements, calculations and ratios are automatically updated to reflect the edited values.

Figure 11-11. Display of the edited value

*NOTE: If the user moves the cursor to the edited value and presses the **Set** key once, the value returns to the original value before the edit.*

To edit a worksheet (continued)

To delete data:

Delete Value key is used to delete value (each measured value). Whenever particular value is deleted, the group (set) of the measurement/study value is also deleted from the worksheet as a group (set). When PS value is deleted, ED and RI is also deleted if this value was measured as the set of RI measurement.

1. Select **Worksheet** from any page of the Vascular Calculation Top/Sub Menu Menu.
2. To position the cursor at the field you want to delete or exclude, move the **Trackball**.

   The field is highlighted.
3. Select ***Delete Value***.

For Example:

1. If the user measured RI 4 times, however, latest 3 sets of measurements were displayed in the 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

1. Then, the user deleted PS value of #3 from the worksheet.
2. The whole set of #3 measurements is deleted from the worksheet and #1 set of measurements is shifted and displayed as below.

Result Number	#1	#2	#4
PS	0.400	0.500	0.700
ED	0.000	0.100	0.300
RI	1.000	0.800	0.571

To edit a worksheet (continued)

To exclude data:

When the user selects a particular value on the 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. Select **Worksheet Display** from any page of the Vascular Calculation Top/Sub Menu Menu.
2. To position the cursor at the field you want to delete or exclude, move the **Trackball**.

   The field is highlighted.
3. Select ***Exclude Value***.
4. The data in the field is not visible and is not included in worksheet calculations as below.
5. To include a value that you previously excluded, select ***Exclude Value***.

Figure 11-12. Display of the excluded value

To edit a worksheet (continued)

To select the method:

The user can select the method for calculating the cumulative value.

This value is only calculated by using displaying values. If the user takes parameters more than 3 times, latest 3 values are used for this calculation.

1. Move cursor to method column and press **Set**.
2. The pull-down menu is displayed. Move to cursor any one of methods and press **Set**. The selected method is displayed in the column.

Figure 11-13. Pop-up menu of methods

Examiner's Comments

To type a comment on a 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***.

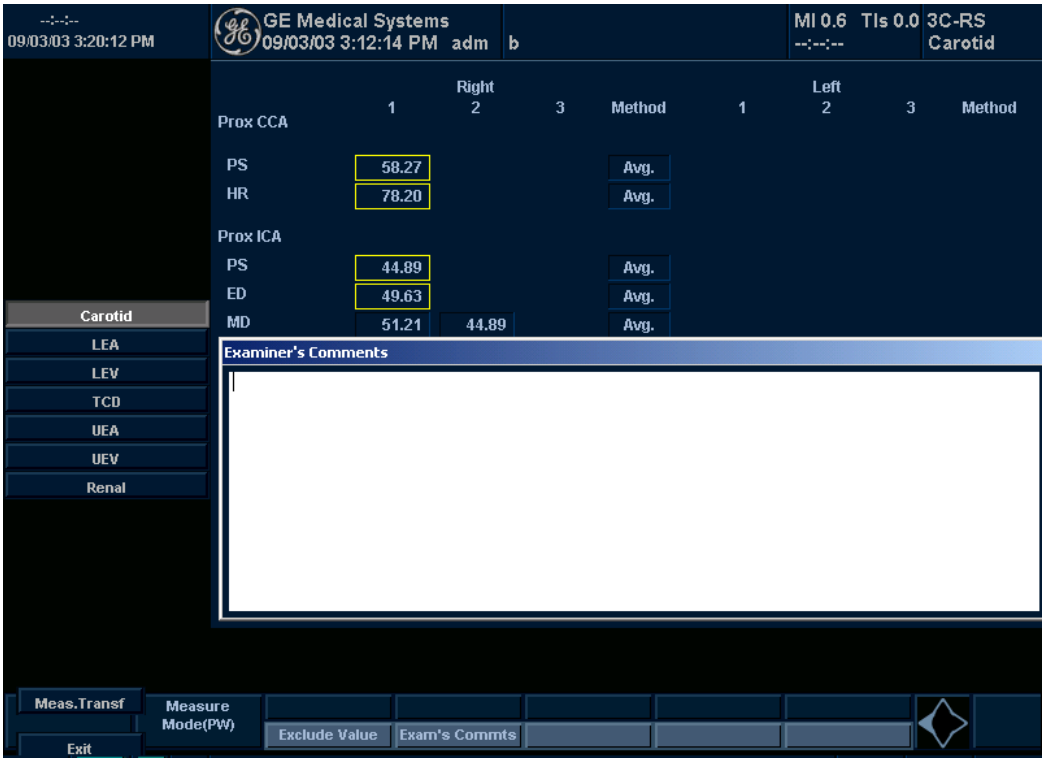


Figure 11-14. Examiner's comment field

Intravessel ratio

To calculate Intravessel ratio, you need a measurement of accessing pressure and stenotic velocities.

1. Select ***Intravessel*** to display the pop-up window in the header section of the worksheet.

Figure 11-15. Intravessel Pop-up Window

Intravessel ratio (continued)

2. Select the second velocity.

   The second value and Result value are displayed in the window.

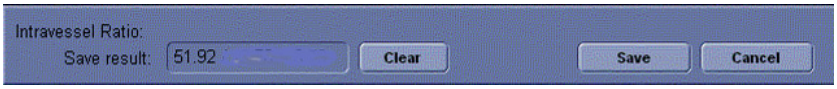


Figure 11-16. Intravessel ratio one

3. Select the second velocity.

   The second value and Result value are displayed in the window.

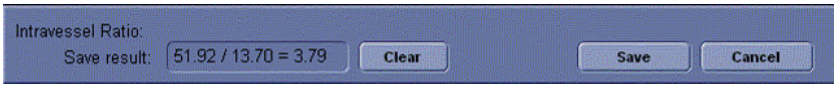


Figure 11-17. Intravessel ratio two

- To save the Intravessel ratio to the Vessel Summary, move the cursor to ***Save*** and press **Set**.
- To clear values, move the cursor to **Clear** and press **Set**.
- To cancel and exit Intravessel ratio, move the cursor to Cancel and press **Set**.

NOTE: Intravessel Ratio is only displayed and saved in the Vessel Summary.

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 Top/Sub Menu.

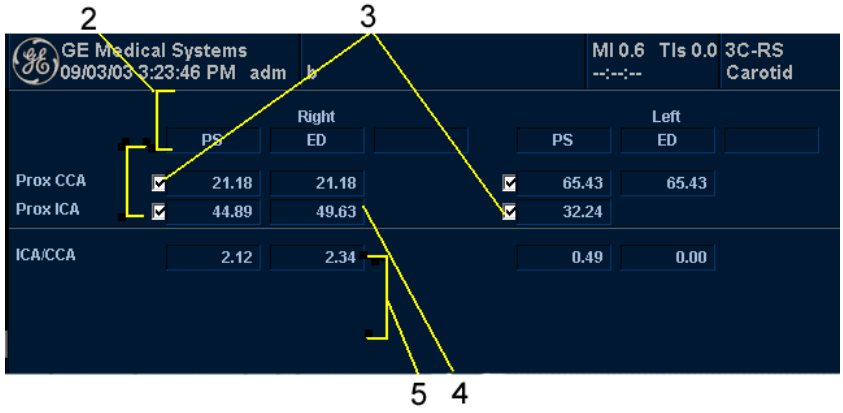


Figure 11-18. Vessel Summary Example

Vessel Summary (continued)

1. The first row, indicating Right or Left, is not displayed when the side is not defined in the vessel. In the third column on the second line, you select the calculations. Move the cursor to the third column, and the pop-up menu is displayed as in Figure 11-19. The selected parameter is displayed in every third column.

Figure 11-19. Pop-up menu

2. Vessel Name with location information.
3. Check Box. Use to select the vessel velocity for calculating the vessel ratio (ex. ICA/CCA). You can only select one location (position) in a vessel.
4. Result value column. This value cannot be changed or excluded from this page.
5. Calculation name and result. ICA/CCA: The ICA/CCA ratio selects the highest systolic ICA and CCA velocities when calculating this ratio, and displays the velocities.

Carotid Study

In the configuration page for ICA/CCA ratio, you can specify which portion of the CCA vessel (Prox, mid, distal) is chosen. You can override the selections on the Vessel summary.

The ICA/CCA ratio is able to be configured for either systole or diastole.

The vertebral vessel also has systole and diastole selections. In the summary page, there is a box to select flow reversal for vertebral flows. The choices are Ante (Antegrade), Retr (Retrograde), and Abs (Absent).

To select the method:

Move cursor to the box and press **Set**. After the pop-up menu (Blank, Ante, Retr, Abs) is displayed, select from a menu of choices. The selected choice is displayed in the column.

The box is independent of Left and Right.

Renal Artery Study

For renal arteries, you can calculate RENAL/AORTIC ratio (RAR) based on peak systolic velocities.

You can combine the two renal summary pages, and have a heading to separate the different measurements (main renal, intra renal). You can scroll between the content. 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 printed on the B/W or color page printer, stored on media with the Image Archive option, or placed on regular paper with a line printer.

Chapter 12

Urology

Describes how to perform Urology measurements and calculations.

Urology Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning an Exam’ on *page 4-2 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu Menu.

The system retains as many as eight measurements, but the worksheet retains only the last six measurements of each type.

The three report page measurements can be averaged and the average used in other calculations.

Urology Calculations

Introduction

Urology measurements offer two different types of measurement studies:

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-53 for more information.*
- Urology
  - This chapter describes Urology B-Mode measurements.
  - The Urology M-Mode measurements are common to other applications. See ‘M-Mode Measurements’ on *page 7-62 for more information.*
  - The Urology Doppler measurements are common to other applications. See ‘Doppler Mode Measurements’ on *page 7-65 for more information.*

To change a study:

1. To select another study, select the desired study folder.

Urology B-Mode Measurements

In B-Mode, the Generic Exam Calcs for Urology includes the following measurements:

- % Stenosis
- Volume
- Angle
- A/B Ratio
- VF Diam

See ‘B-Mode Measurements’ on *page 7-54 for more information.*

The following measurements are located specifically in the Urology Exam Calcs. Those specific measurements (Bladder Volume, Prostate Volume and Renal Volume) are listed on the following pages.

Select the Urology Exam Calcs. The following Touch Panel is displayed.

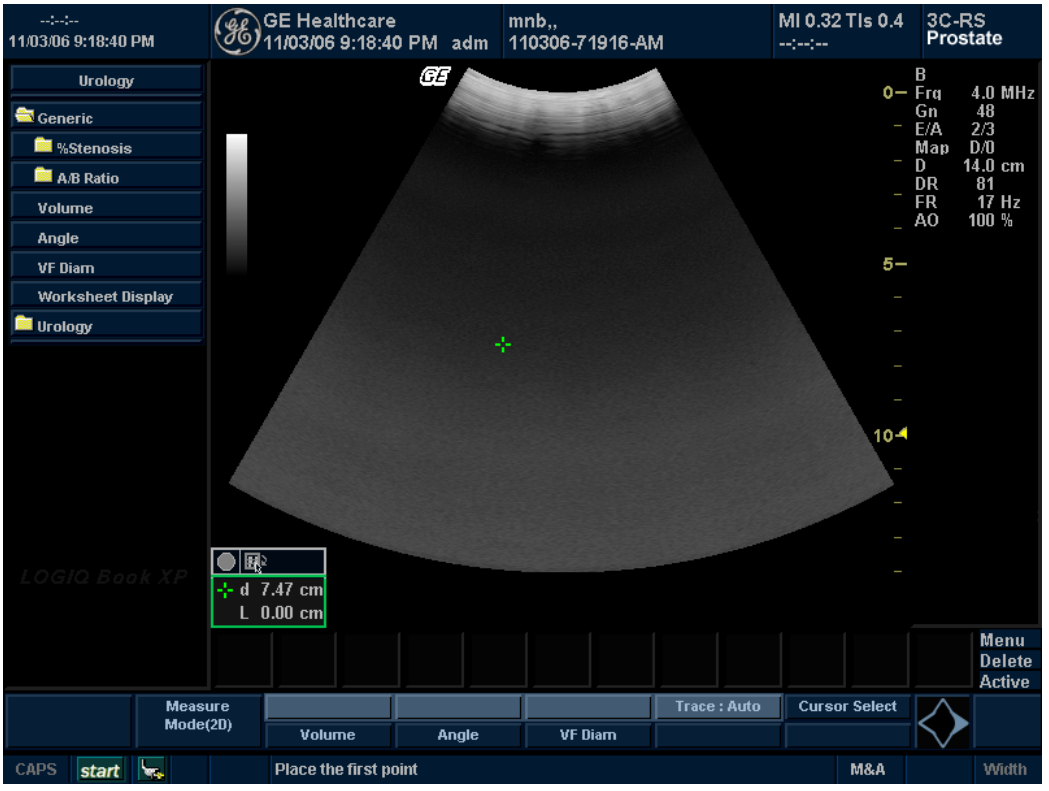


Figure 12-1. Urology Exam Calcs B-Mode Touch Panel

Bladder Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

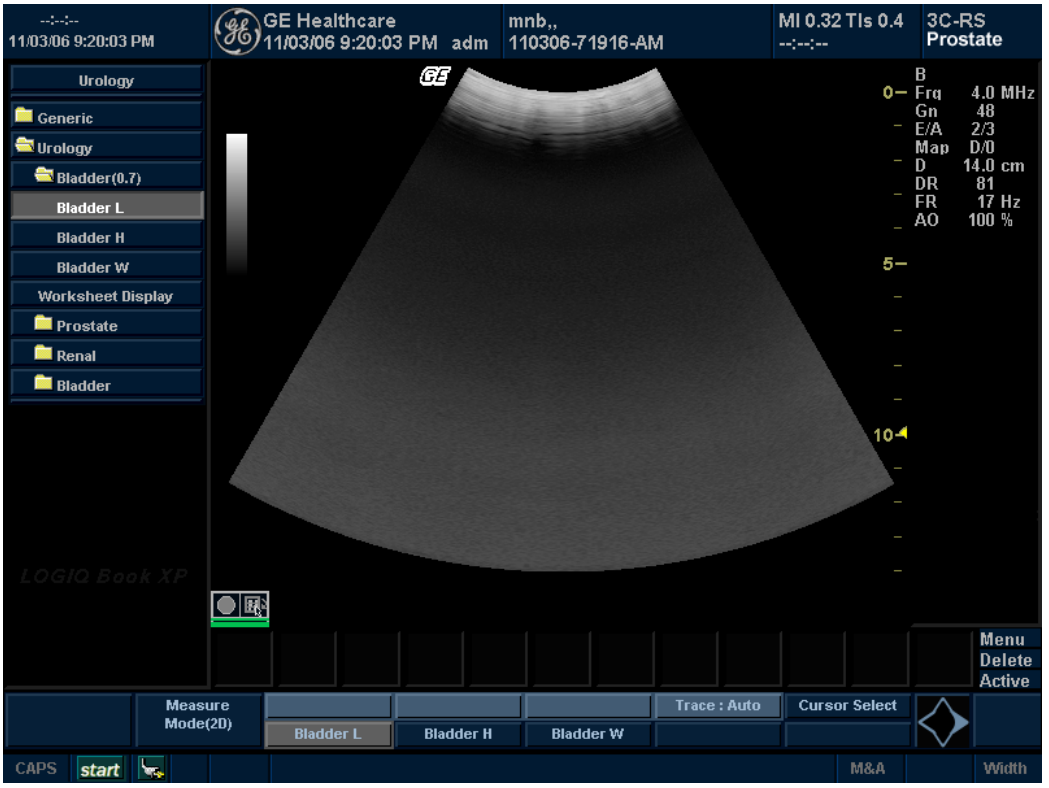


Figure 12-2. Bladder Volume Touch Panel

To measure Bladder Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Bladder*** folder, an active caliper displays.
3. Perform a standard distance measurement.

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the bladder volume in the Results Window.

Prostate Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

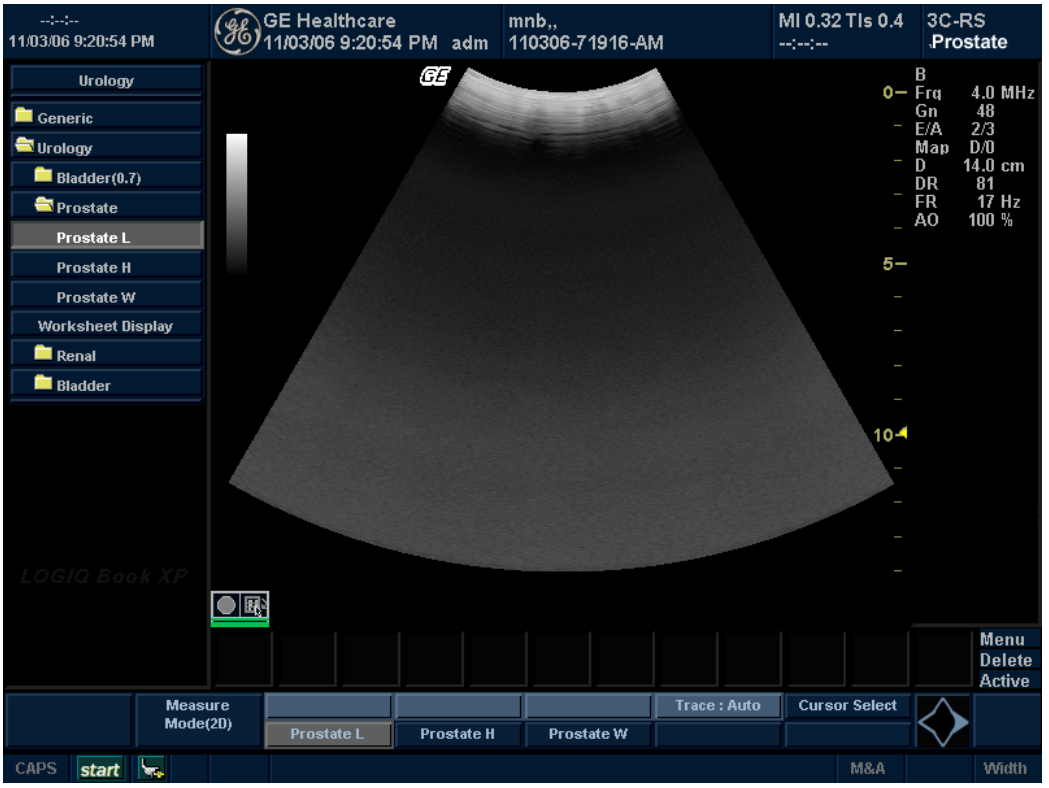


Figure 12-3. Prostate Volume Touch Panel

To measure Prostate Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Prostate*** folder, an active caliper displays.
3. Perform a standard distance measurement.

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the prostate volume in the Results Window.

Prostate Volume (continued)

PSA Measurement

If you enter the value of PSA (Prostatic Specific Antigen) and PPSA Coefficient at the Urology Patient screen, PSAD and PPSA are automatically calculated.

The values are displayed on the Worksheet.

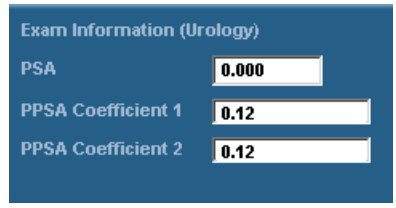


Figure 12-4. Urology Patient Screen

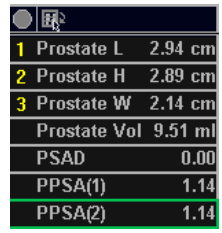


Figure 12-5. Measurement result window

PSAD: Prostatic Specific Antigen (PSA) Density – defined as: PSAD = PSA/Volume

PPSA: Predicted Prostate Specific Antigen – defined as: PPSA = Volume x PPSA Coefficient

Prostate Volume (continued)

Worksheet

- For the prostate volume calculation, you can select the method “m1”, “m2” or “m3” in addition to Avg., Max., Min. and Last.
- The value of PSA and PPSA are displayed.

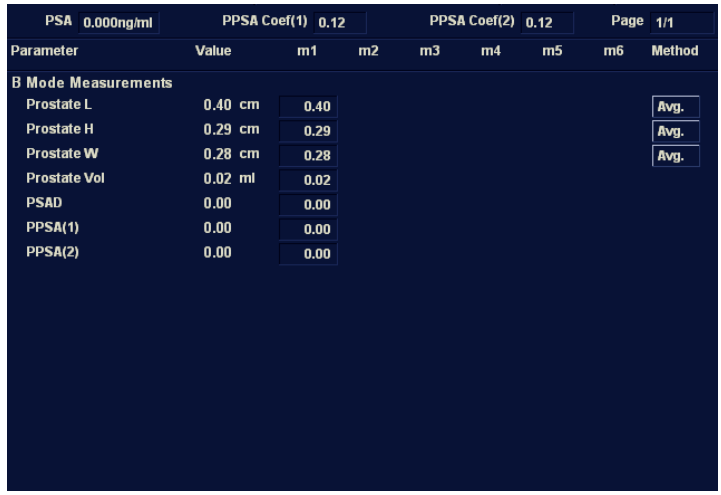


Figure 12-6. Urology Worksheet

Renal Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

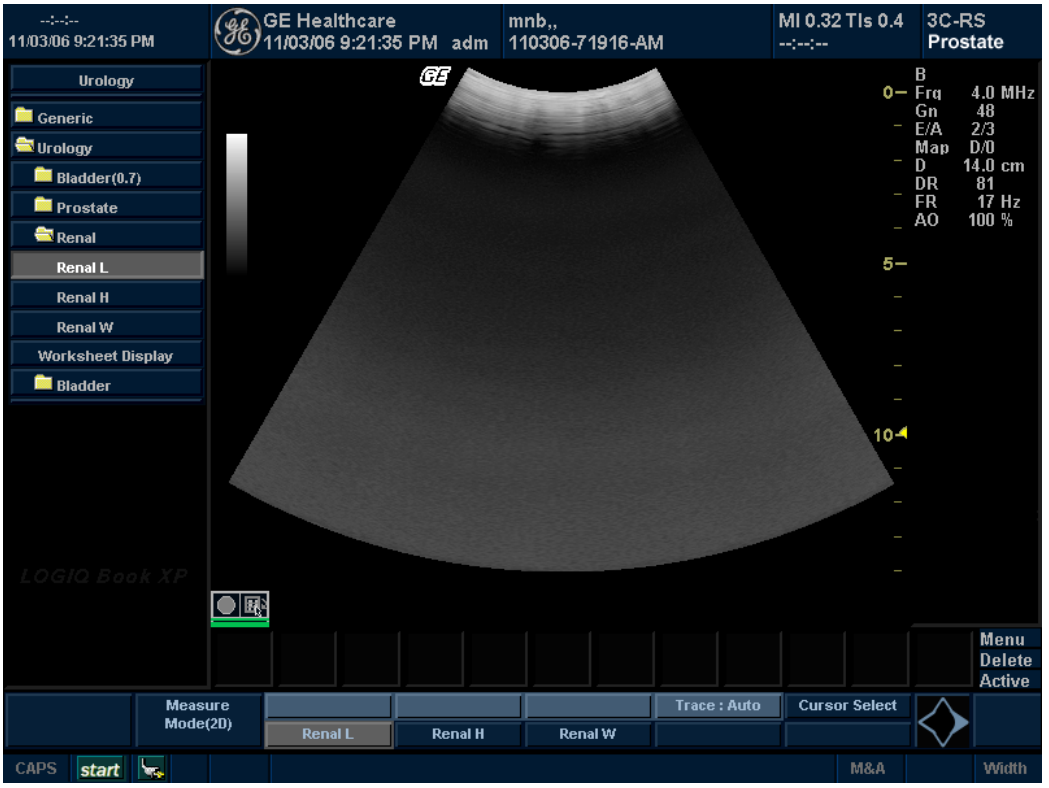


Figure 12-7. Renal Volume Touch Panel

To measure Renal Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Renal*** folder, an active caliper displays.
3. Perform a standard distance measurement:

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the renal volume in the Results Window.

Chapter 13

Pediatrics

Describes how to perform Pediatrics measurements and calculations.

Pediatrics Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning an Exam’ on *page 4-2 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu.

The system retains as many as eight measurements, but the worksheet retains only the last six measurements of each type.

The six worksheet measurements can be averaged and the average used in other calculations.

Pediatrics Calculations

Overview

Pediatrics measurements offer two different types of measurement studies:

- Generic. The Generic Calculations study is common to all applications. See ‘Generic Measurements’ on *page 7-53 for more information.*
- Pediatric Hip (PedHip).
  - This chapter describes Pediatrics B-Mode measurements.
  - The Pediatrics M-Mode measurements are common to other applications. See ‘M-Mode Measurements’ on *page 7-62 for more information.*
  - The Pediatrics Doppler measurements are common to other applications. See ‘Doppler Mode Measurements’ on *page 7-65 for more information.*

Pediatrics

B-Mode Measurements

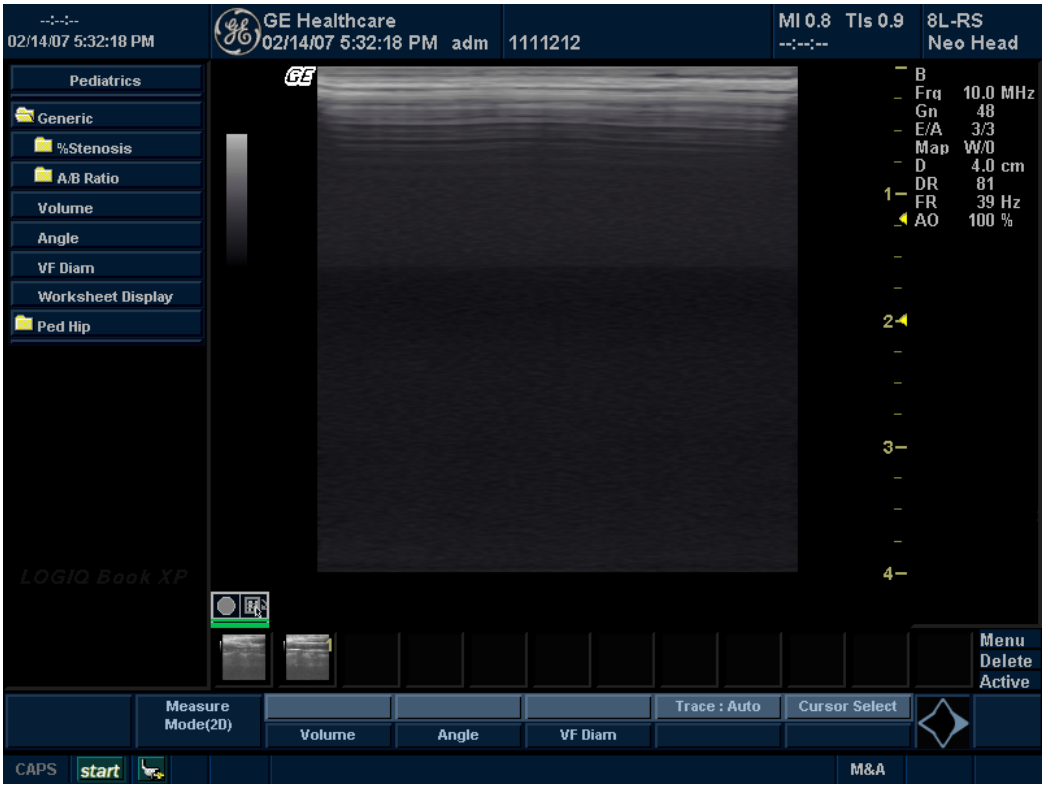


Figure 13-1. Pediatrics B-Mode Measurement Top/Sub Menu

The following generic measurements are common to other exam applications:

- %Stenosis
- Volume
- Angle
- A/B Ratio
- VF Diam

See ‘B-Mode Measurements’ on *page 7-54 for more information.*

B-Mode Measurements (continued)

Hip Dysplasia Measurement

The HIP calculation assists in assessing the development of the infant hip. In this calculation, three straight lines are superimposed on the image and aligned with the anatomical features. The two angles are computed, displayed, and can be used by the physician in making a diagnosis.

The three lines are:[1]

1. The baseline connects the osseous acetabulum convexity to the point where the joint capsule and the perichondrium unite with the iliac bone.
2. The inclination line connects the osseous convexity to labrum acetabulare.
3. The Acetabulum roof line connects the lower edge of the osilium to the osseous convexity.

The α (Alpha) angle is the supplement of the angle between 1 and 3. It characterizes the osseous convexity. The β (Beta) angle is the angle between lines 1 and 2. It characterizes the bone supplementing additional roofing by the cartilaginous convexity.

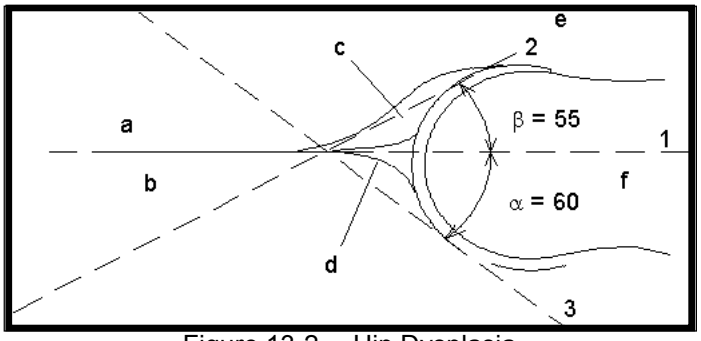


Figure 13-2. Hip Dysplasia

Anatomical Landmarks	
a. Ilium	d. Bony Roof
b. Iliac Bone	e. Cartilaginous acetabular roof
c. Labrum	f. Femoral Head

[1]Source: R GRAF, journal of Pediatric Orthopedics, 4: 735-740(1984)

B-Mode Measurements (continued)

Hip Dysplasia Measurement (continued)

To make a Hip Dysplasia measurement:

1. From the Top/Sub Menu, select either the ***right*** or ***left side*** (orientation) and then select ***HIP***.

   A horizontal dotted line displays.
2. To place the baseline, move the ***Trackball***. Position the crosshairs edge at the osseous convexity of the ilium.
3. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
4. To fix the baseline, press ***Set***.

   The system displays a second dotted line at an angle.
5. To place the line along the inclination line of the osseous convexity to labrum acetabulare, move the ***Trackball***.
6. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
7. To fix the second measurement line, press ***Set***.

   The system displays a third dotted line at an angle.
8. To place the caliper along the acetabular roof line, move the ***Trackball***.
9. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
10. To fix the third measurement line and complete measurement, press ***Set***.

    The system displays the hip measurements (α and β) in the Results Window.

B-Mode Measurements (continued)

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 Top/Sub Menu, 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.

B-Mode Measurements (continued)

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 Top/Sub Menu, select either the ***right*** or ***left side*** (orientation) and then select **d:D Ratio**.

   A horizontal dotted line displays.
2. Use the ***Trackball*** to place the baseline along the ilium. Position the crosshairs edge at the osseous convexity of the ilium.
3. Use the **Ellipse** control to adjust or change inclination or ***Hip Rotate***.
4. Press ***Set*** to fix the baseline.
5. The system displays a circle representing the femoral head. Use the ***Trackball*** to position the circle.
6. Use the **Ellipse** control to size the femoral head circumference.
7. Press ***Set*** to fix the femoral head circumference.

   The system displays the d:D ratio for the femoral head in the Results Window.

Chapter 14

ReportWriter

Describes how to generate reports.

ReportWriter not available on LOGIQ Book XP PRO

Standard Report Pages

Introduction

The LOGIQ Book XP Series 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.

Saved reports are read-only. Therefore, it is recommended that the data be carefully reviewed before the report is created. Use the worksheet to facilitate the review and adjustment of data before generating a report. The final report can be printed on a standard printer.

Creating a report

Reports summarize the data obtained in the examination. They can contain data, images, and cine loops.

Once generated, the report can be viewed, images can be added, and the patient's personal data can be modified. The examination data itself CANNOT be changed.

Figure 14-1. Report Page Example

Creating a report (continued)

Table 14-1: Report Top/Sub Menu Controls

Button	Description
Print	Prints out the report to the default printer.
Store	Stores the report page into Archive as CHM file.
Save As	Export the report page to storage media as CHM format.
Retrieve	Retrieves the report page from Archive. Stored Date/Time is appended to the name of stored report.
Template	Select template from the list of selected applications.
Designer	Enter template editor screen.
Delete	Delete the report page from Archive.

Activating the Report

1. Select ***Report***.
2. The system displays the default report for the current application on the monitor.

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 the lower half of the report.

Selecting another template

You can select another template for the current patient:

1. Select ***TEMPLATE*** at the bottom of the monitor display or the Top/Sub Menu.
2. A list of available templates and applications displays.

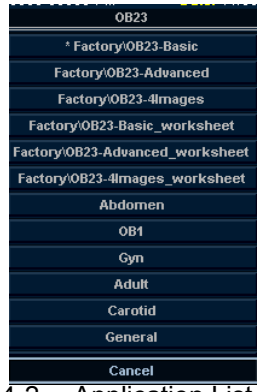


Figure 14-2. Application List Example

3. Select the desired template using the **Trackball** and press **Set**.

   The selected template displays on the monitor.

NOTE: If you select another application, the template list of the selected application displays. Select the desired template.

Figure 14-3. Available Template list

4. Select the desired template name and press **Set**.
5. The report changes to the selected template.

Editing Data

Changing Patient Data

1. Use the **Trackball** to move the cursor to the Data field you want changed.
2. Press **Set**.
3. The original location of the data is displayed. Change the existing data as necessary.
4. Select ***Report*** when completed.

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.

2. Type the text.

Inserting an image to the report

An image can be inserted from the clipboard into the Report.

1. Move the cursor to the desired image on the clipboard.
2. Press and hold down the **Set** key. Use the **Trackball** to drag the selected image into the Image Display Field.
3. Release **Set**.

Figure 14-4. Report with Images Example

NOTE: See ‘Image Display Fields’ on page 14-17 for more information..

Retrieving an archived Report

1. Select ***Retrieve***. The Retrieve menu displays.

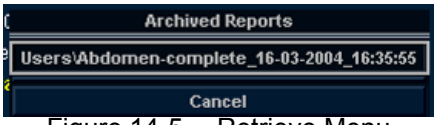


Figure 14-5. Retrieve Menu

2. Select the desired report and press ***Set***.

NOTE: The retrieved report cannot be edited.

Storing the Report

1. Select ***Store***.

   The Report is saved as a CHM file to Archive.

NOTE: The archived report cannot be edited.

Printing the Report

1. Select ***Print*** to print out the report.

   The Report is printed on the default printer.

To preview the Print Layout before printing, See ‘Preview Print Layout’ on *page 14-13 for more information.*

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.

Deleting a Report from Archive

1. Select ***Delete***. The Retrieve menu appears on the screen.

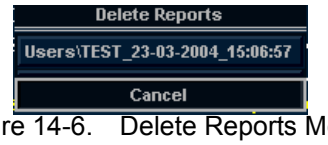


Figure 14-6. Delete Reports Menu

2. Select the report to delete and press **Set**.

Customizing the Report Template

Template Designer

You can create a customized template using a new template or overwrite an existing template (factory or user-defined).

Display the desired template and select ***Designer*** to open the Template Designer page.

File Menu

Table 14-2: File Menu

	Description
New	Creates a new template. A blank template appears.
Save	Overwrites the existing template.
Save As	Saves as a new name.
Page Setup	Enters Print Layout screen.
Print Preview	Executes print preview.
Exit	Exits Report Designer page.

Creating a new (empty) template

1. Select ***Designer*** to open the Report Designer.
2. Move the cursor to the File menu, select New and press **Set**. The blank template displays.

NOTE: The template is saved under "Users".

Save a template as a factory template name

If you make modifications and you want to keep the same name of the factory template:

1. Modify the factory template as necessary.
2. Select **Save** from the File menu and press **Set**.
3. The Save Template dialog box displays.
   - Yes: Saves changes and exits Report Designer.
   - No: Does not save changes and exits Report Designer.
   - Cancel: Returns to Report Designer.

NOTE: The factory template which you modify and save is saved under "Users". For example, "Users/OB23-Basic"

File Menu (continued)

Saving a template with a new name

If you make modifications or copy the template and save it as a new name:

1. Modify the factory template as necessary.
2. Select **Save as** from File menu and press **Set**. The Save Template As dialog box displays.
3. Type the template name and press **Set**.
4. The Report Designer closes and returns to the Report Page.

NOTE: The template is saved under "Users".

Print Layout Setup

1. Move the cursor to the File Menu and select Page Setup. Press **Set**.
2. Change the size or position to fit the print layout, as necessary.
3. Select OK or Cancel.

File Menu (continued)

Preview Print Layout

1. Select ***Template*** to display the Report Template.
2. Move the cursor to the File menu and select Print Preview. Press **Set**. The Print Preview screen displays.

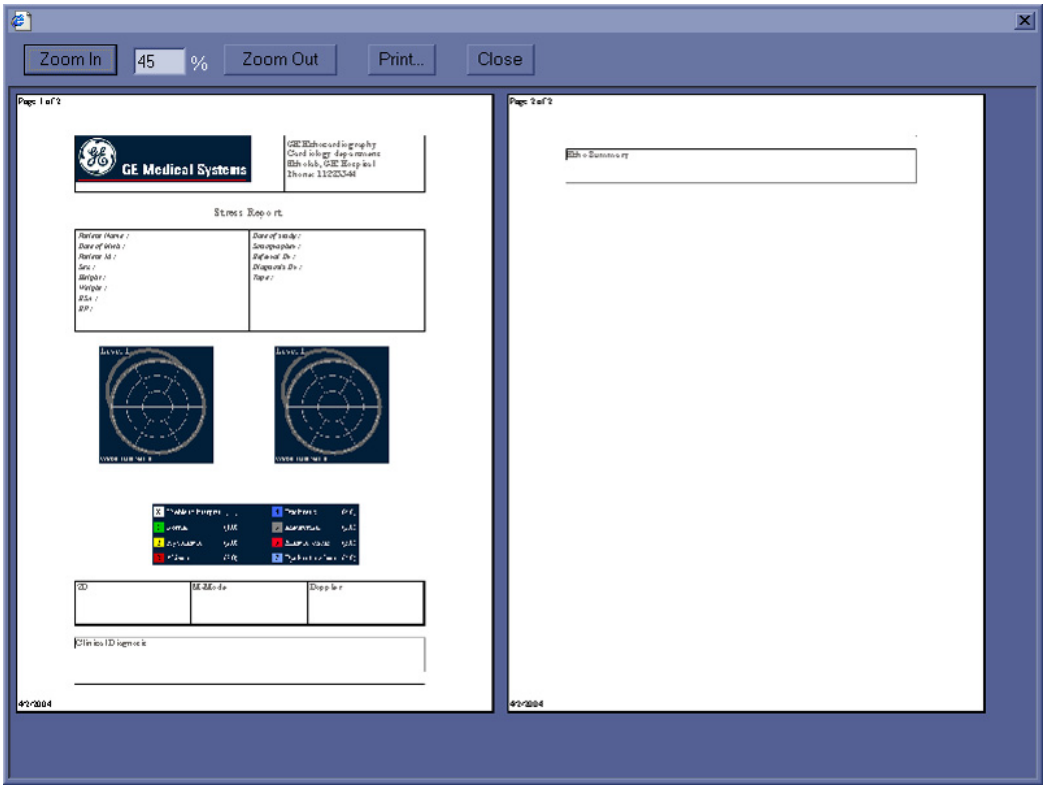


Figure 14-7. Print Preview

3. If the preview is fine, select Print. The report is printed on the default printer.

   If changes need to be made, close this Preview page and modify the template or return to the Report and modify the contents.

Edit Menu

Table 14-3: 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. The object is deleted from the template.

Undoing the operation

1. Select Undo and press **Set**.
2. Repeat as required.

Customize Menu

Table 14-4: Customize Menu

	Description
Page Color	Changes the template color.
Anatomical Graphics	Selects anatomical graphics by category to be inserted into a field.
Image	Inserts the image display field to the template.
Wall Motion Analysis	Selects Cut Planes, Bull's Eye, or Score Table Box.
Text Field	Edits text field.
Fixed Text	Enters any comments as Fixed Text.

Page Color

1. To change the page color, select Page Color from the Customize Menu and press **Set**. The Color dialog box displays.

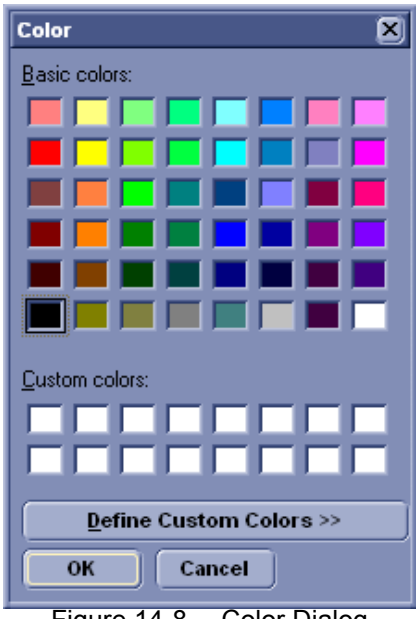


Figure 14-8. Color Dialog

2. Choose the desired color or create a new color.
3. Select OK 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 Customize menu.

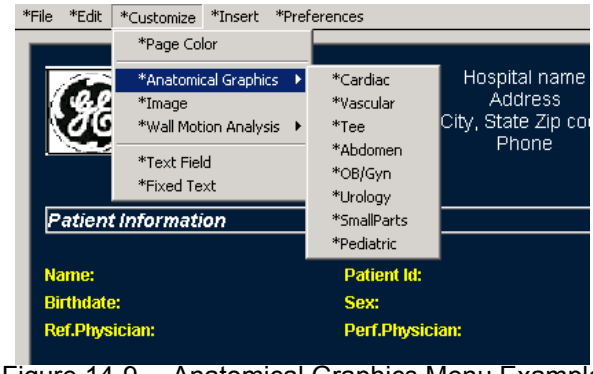


Figure 14-9. Anatomical Graphics Menu Example

3. Select the desired category and press **Set**. The graphic box displays.

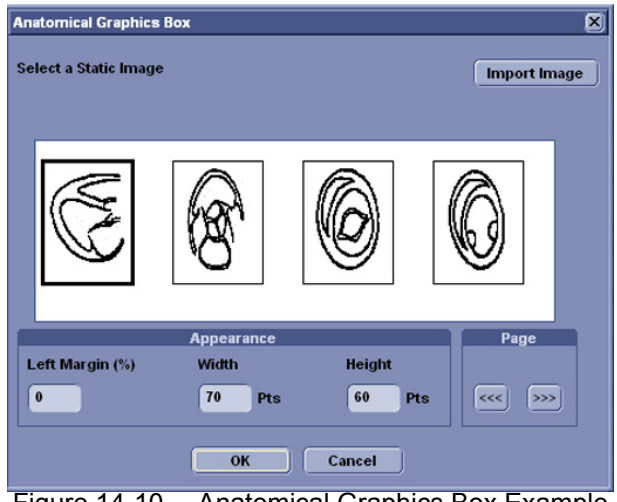


Figure 14-10. Anatomical Graphics Box Example

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 the image from the Customize menu and press **Set**. The Ultrasound Image Box displays.

Figure 14-11. Ultrasound Image Box

3. Type the Heading text, modify the box properties, and change the heading text font, as necessary.

   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.

NOTE: *If you do not need the heading text, type a space.*

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 Customize menu and press **Set**. The Text Field dialog box displays.

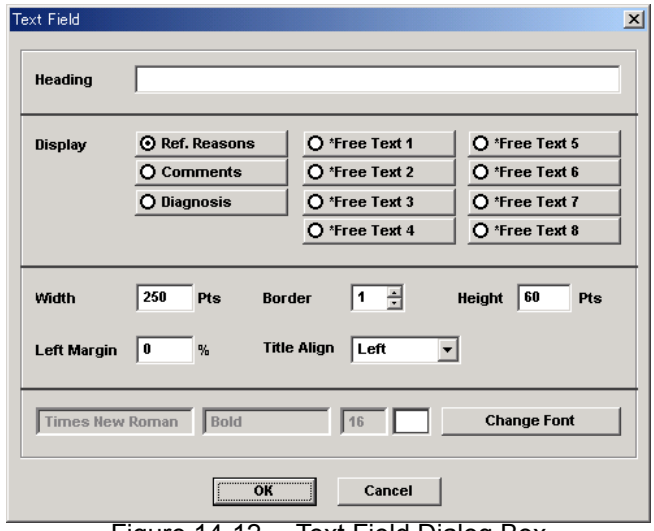


Figure 14-12. Text Field Dialog Box

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.

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 insesrt the fixed text and press **Set**.
2. Select Text Field from the Customize menu and press **Set**. The Fixed Text dialog box displays.

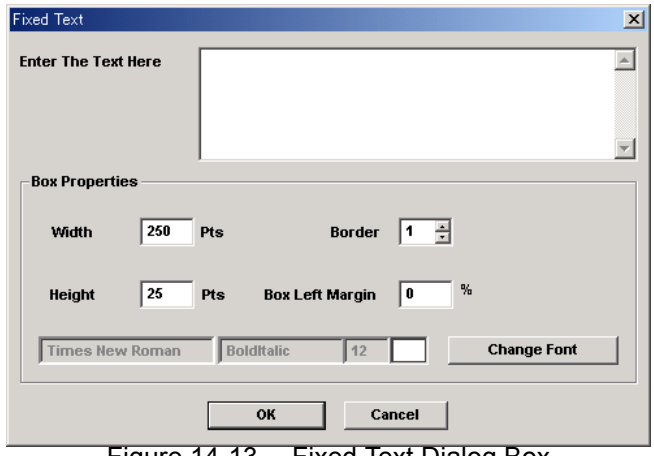


Figure 14-13. Fixed Text Dialog Box

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.

Insert Menu

Table 14-5: Insert Menu

	Description
Page Break	Inserts a Page Break.
Table	Inserts a Table.
Logo	Inserts a Logo Bitmap File.
Archive Info	Inserts Archive Information.

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.

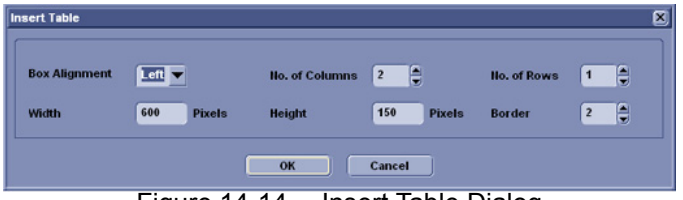


Figure 14-14. Insert Table Dialog

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 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 14-15. 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.

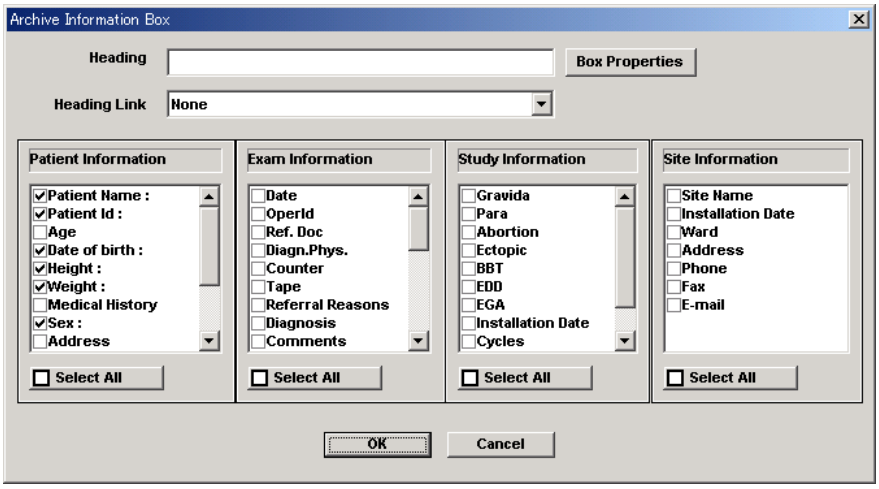


Figure 14-16. Archive Information Box

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.

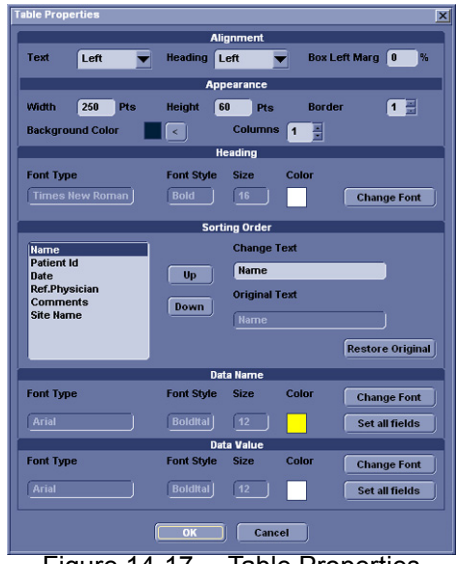


Figure 14-17. Table Properties

5. Select OK or Cancel. The contents of the Archive Information is inserted to the related page automatically.

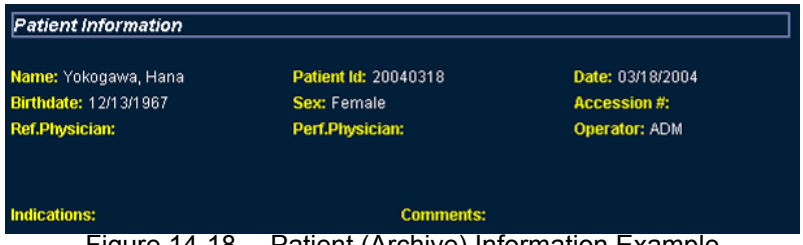


Figure 14-18. Patient (Archive) Information Example

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.

Preferences Menu

Table 14-6: Preference Menu

	Description
Preference	The Preference menu for Archive Information field displays.

Setting Preferences

To set preferences for the Archive Information:

1. Select Preferences from the Preferences menu and press **Set**. The Preference Box displays.

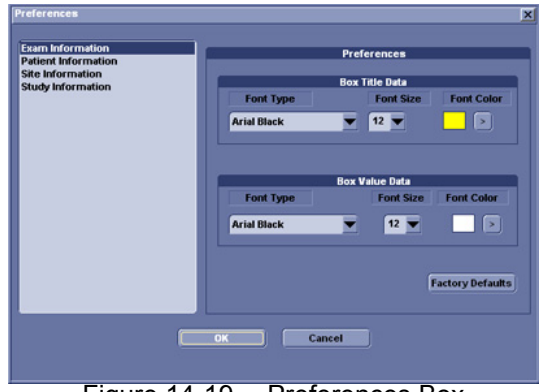


Figure 14-19. Preferences Box

2. Select the information to be modified and set the desired preferences.
3. Select OK or Cancel.

Direct Report

Direct Report

You can use Direct Report to enter Comments, Diagnosis, and Referral Reasons. The comments are reflected on the Report if the Report is configured for those parameters.

1. Place the cursor on Menu at the bottom, right-hand corner of the screen.

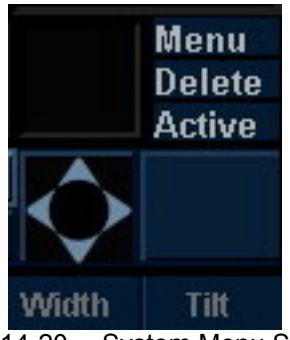


Figure 14-20. System Menu Selection

   Press **Set**. The System Menu displays.

2. Select Direct Report and press **Set**.

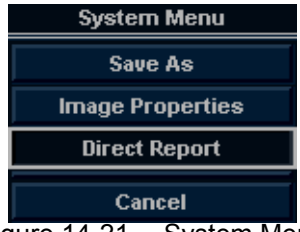


Figure 14-21. System Menu

Direct Report (continued)

3. The Direct Report displays on the left side of the screen.

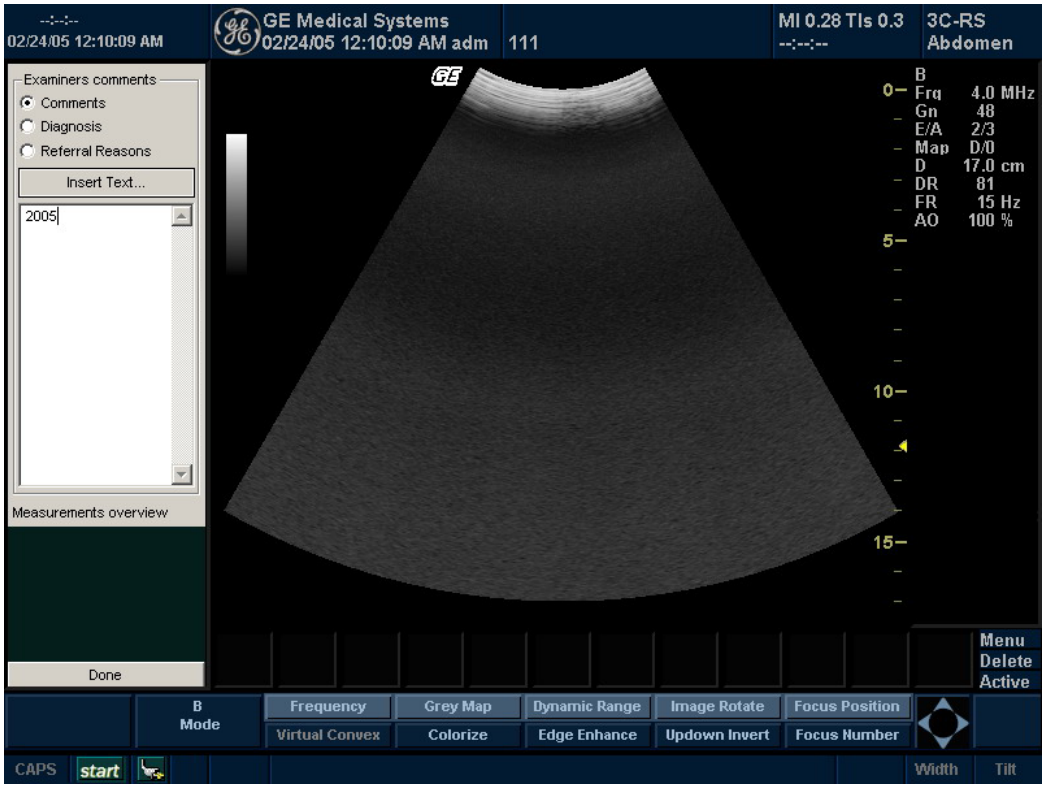


Figure 14-22. Direct Report

Direct Report (continued)

4. 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.

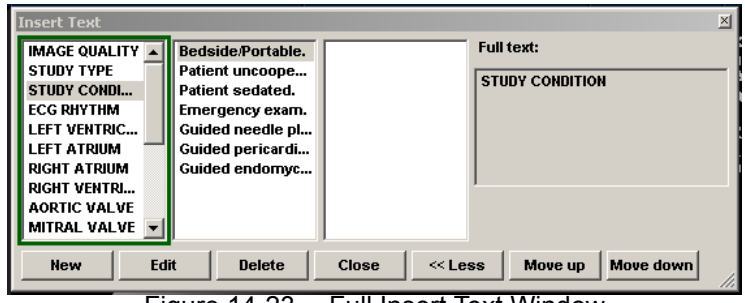


Figure 14-23. Full Insert Text Window

- New: Enters the new text
- Edit: Edits the existing text
- Delete: Deletes the existing text
- More: Displays the Full Insert Text Window
- Close: Closes the insert text window
- <<Less: Minimizes the insert text window
- Move up/Move down: Moves the text up or down

Direct Report (continued)

5. Perform the measurement if necessary. The measurement results display on the Measurement Overview field.
6. 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.

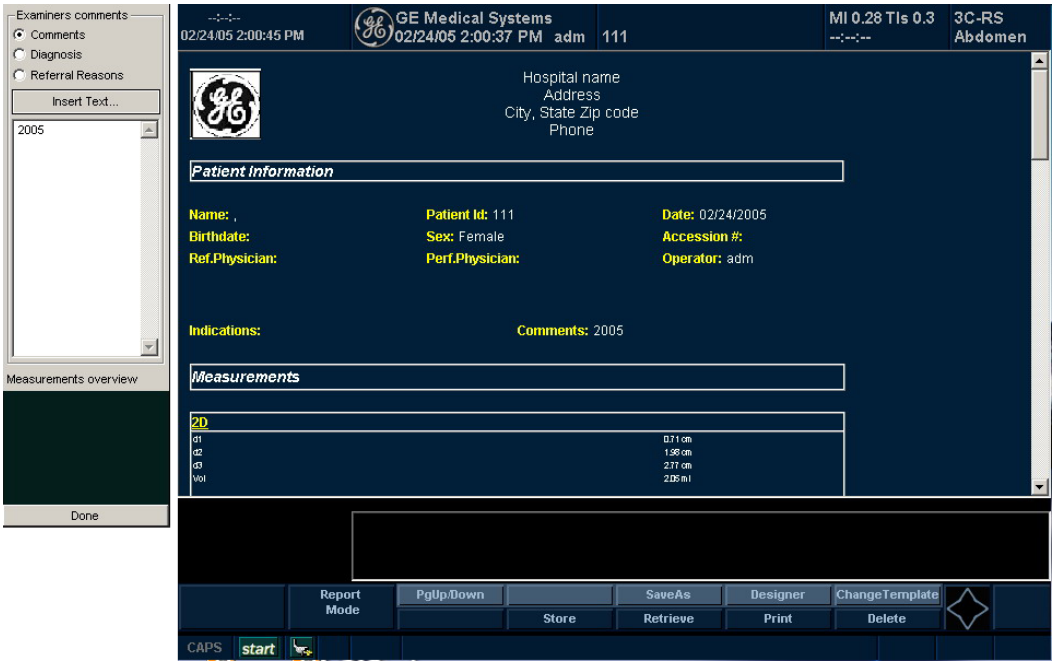


Figure 14-24. Direct Report and Report (Example)

Report Presets

Utility Report Page

You can edit the report template, diagnosis code, and text on the Utility Report page.

Templates

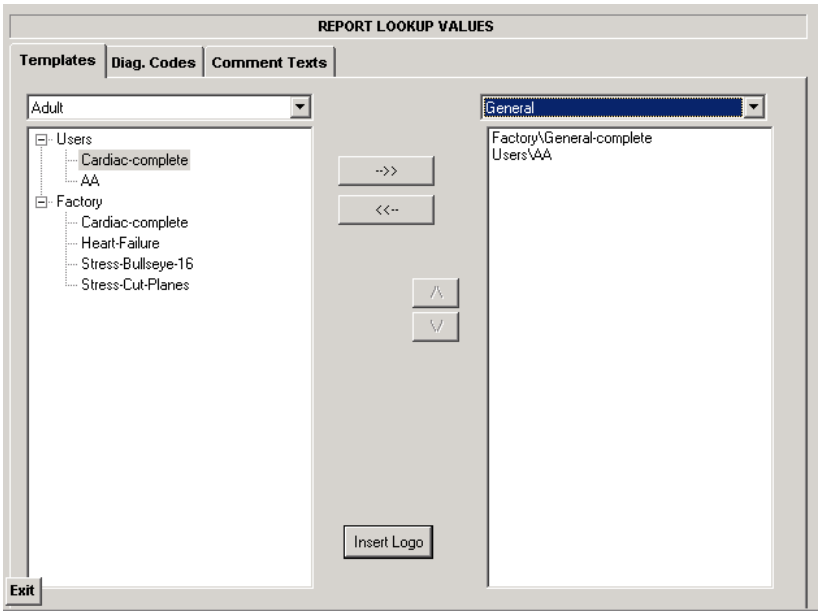


Figure 14-25. Report Template Tab

Templates (continued)

Left Column: The list of all templates (Factory Default, User defined, etc)

Right Column: The list of templates displayed on the template list.

- 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.

Diagnosis Code

You can edit the diagnosis code on the Diag. Codes Tab.

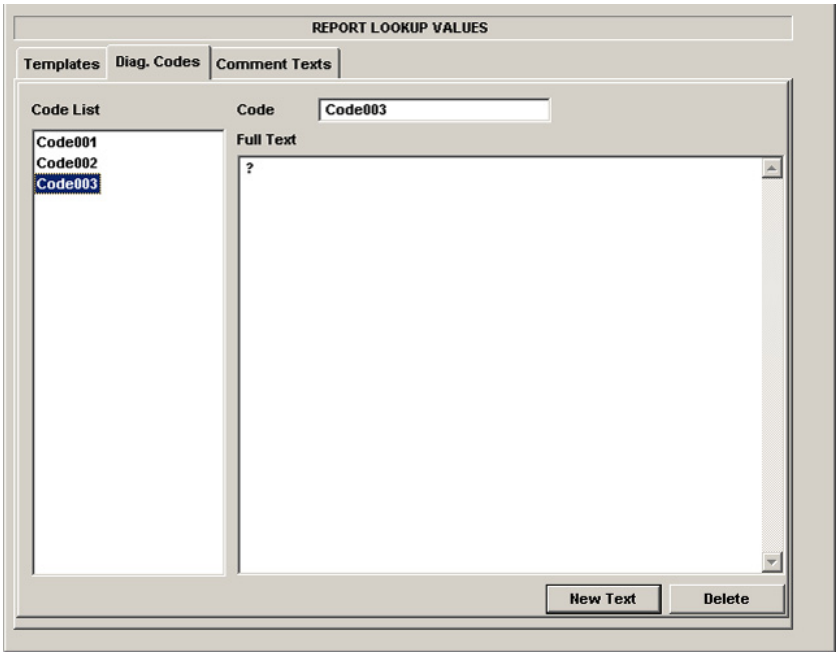


Figure 14-26. Diag. Codes Tab

- To insert the new code:
  a. Select ***New Text***. The code number is added to the Code List and "?" is displayed in the Full Text field.
  b. Delete the "?" and type the text manually.
- To delete the existing code:
  a. Select the existing code that you want to delete.
  b. Select ***Delete***.

Comment Texts

You can edit the comment text on the Comment Texts tab.

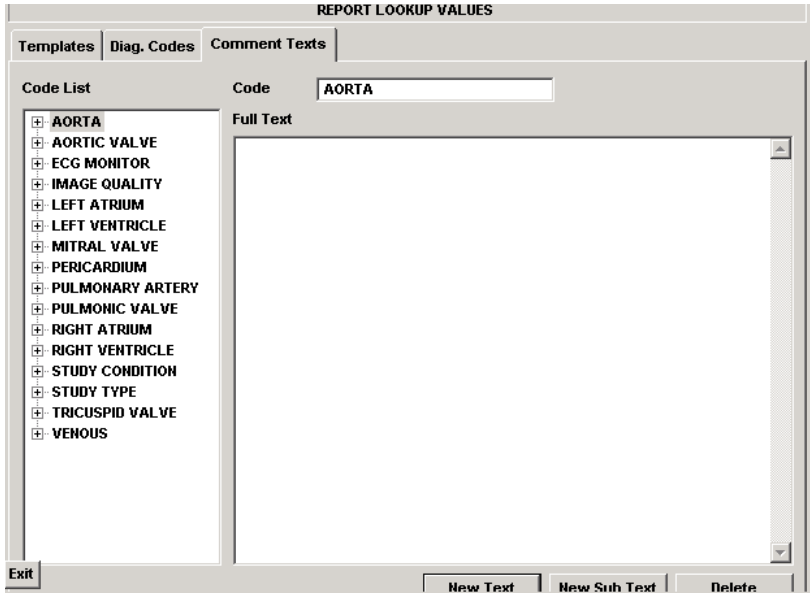


Figure 14-27. Comment Texts Tab

- 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.

Chapter 15

Recording Images

Describes how to record images.

ReportWriter not available on LOGIQ Book XP PRO

Getting Set Up to Record Images

Overview

A typical workflow for connectivity might be as follows (this setup varies by each user setup):

- Select the dataflow, worklist for example.
- Start a new exam. Select the patient.
- Perform the patient scan.
- Store images as multi-frame CINE Loops and Raw DICOM data via the P1 button.
- Check the DICOM Job Spooler via the F5 or F6 keys (if programmed for Spooler).
- Store secondary captures as video via P3.
- End the exam.
- Permanently store images via the Patient menu.

Overview (continued)

Dataflow combines archive, data, DICOM, and onboard records into one coherent workflow. Destination devices are configured and assigned to the print buttons. 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.*

- You need to set up a protocol for locating images stored to external storage media for easy recall
- GE Medical Systems IS NOT responsible for lost data if you do not follow suggested back-up procedures. GE Medical systems WILL NOT aid in the recovery of lost data.

Refer to the Customizing Your System chapter for instructions on seting up your system’s connectivity.

Adding Devices

To add a destination device (printer, worklist server, etc.) to this system, see Chapter 16.

To verify a DICOM device, see Chapter 16.

Adding a Dataflow

To add a new dataflow to this system, see Chapter 16.

Adding Devices to a Print Button

To add devices/dataflows to a print button, see Chapter 16.

Formatting Removable Media

To format removable media, see Chapter 16.

Using the DICOM Spooler

To monitor/control DICOM jobs, select F5 to view the spooler (F5 or F6 can be programmed to bring up the spooler. 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.

Troubleshooting

To troubleshoot connectivity on this system, see Chapter 16.

To verify that a service is connected to the network, see Chapter 16.

Image/Data Management

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.

The active image 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. If an image has a triangle indicator on the lower, left-hand corner, then something has been done to the image (printed, sent to DICOM, etc.). Single images are indicated by a '1'; CINE Loops have no special identifier.

The clipboard fills from left to right, starting on the left. Once the row is full (12 images), the next image stored starts to fill a 'second' row (the first row disappears from the clipboard display, with the second row now becoming the first row).

Clipboard (continued)

All of the images can be viewed in the Active Images screen or in the Analyze screen, available from the display or from the New Patient menu.

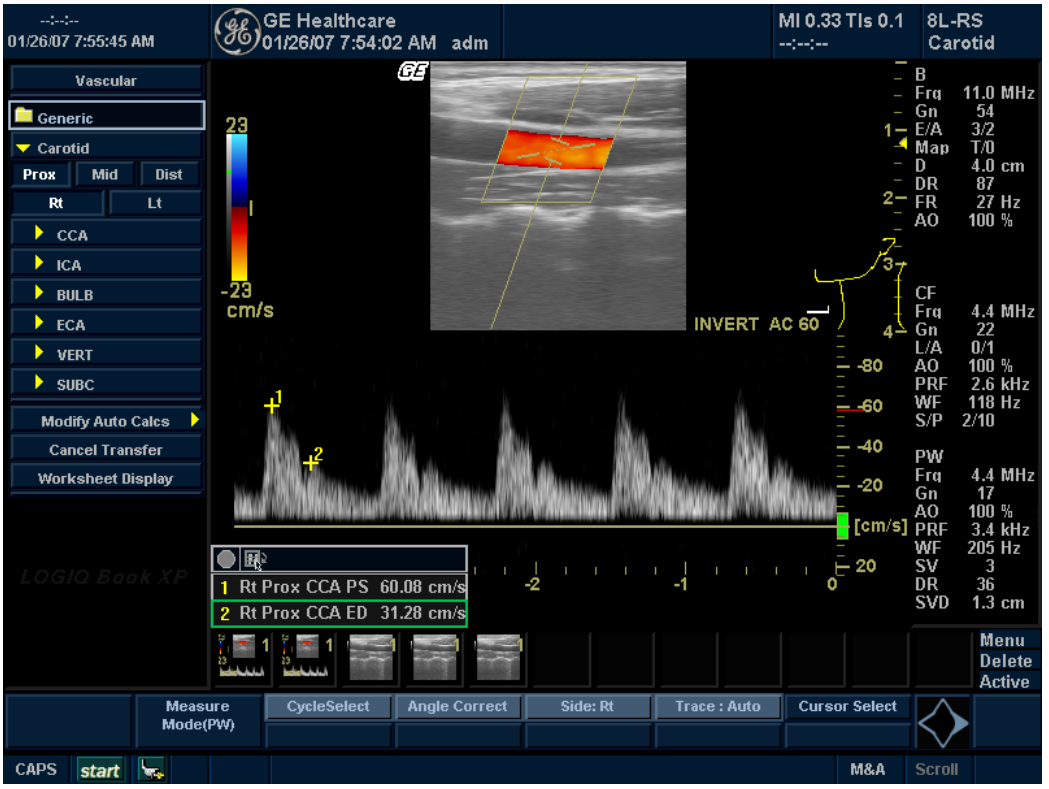


Figure 15-1. Clipboard

Previewing Clipboard Images

1. Select the unmarked key (opposite the **Set** 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 unmarked key (opposite the **Set** 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.

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.

Storing a CINE Loop

A CINE Loop is a sequence of images recorded over a certain timeframe. 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.

Previewing and Storing a CINE Loop

1. While scanning, press Freeze.
2. Determine the best CINE Loop to store.
3. Play the CINE Loop to review it.
4. Press the appropriate Print key.

Depending on whether the system has been configured to enable or disable “Preview Loop before store” (see Chapter 16), 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 thumbnail is displayed on the clipboard.

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 thumbnail is displayed on the clipboard.

Using the Monitor Display Controls to Manage Images

You can also manage images from the display. In the lower, right-hand corner of the monitor display, there are three (3) menu commands: Menu, Delete, and Active Images.

Menu

From the Menu, you can save the image as a RawDicom (.dcm), Dicom (.dcm), Avi (.avi), Jpeg (.jpg), or (.rle) format.

After selecting the appropriate menu, select Save As. Make sure the correct media is selected. Use the drop down menu at the bottom to select the format of the image/loop to save. Name it. Image only saves the image screen; secondary capture saves the entire screen.

Delete

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

Using the Monitor Display Controls to Manage Images (continued)

Active Images

Press Active Images to go to the Patient Active Images page.

Analyzing Images

To review 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.

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. Select new exam.
2. Go to the Image History page.Ensure that the most recent exam is marked as the “Active Exam”.
3. Select the image from the clipboard that you want to view side-by-side.
4. Press R to split the screen. Select L for the active window.
5. Press Measure (to get a cursor that you can then make into an arrow).
6. Change the “Active Exam” to the other exam containing the image you want to compare for your side-by-side presentation. Exit.
7. Press Freeze to unfreeze the image (the side without an image will become active).
8. Press Measure (to get a cursor tha tyou can then make into an arrow).
9. Select the new image from the clipboard.

Image Management Guide

Save As to View on any PC

Use this to save images (Dicom or Raw Dicom) in a computer-friendly format (.avi or .jpeg) so you can view it on any PC.

EZBackup/Move Images to Archive

Use this to take images off your Ultrasound system onto removable media for long-term archive. This is the way to free up hard disk space, rather than deleting images.

Export/Import Data/Images Between Systems

Use this to copy both patient data and images for specified patient(s) from one system to another.

Media Requirements

Only use CD-R CD-ROMs, DO NOT use CD-RW CD-ROMs or DVD-RAM or DVD+R. Also, the CD-R CD-ROM MUST support 16x writing speed or greater.

Media Handling Tips

To eject the CD-ROM, always press ***Ctrl + E***. **DO NOT** press the eject button on the CD Drive.

Always finalize the CD-R. This allows you to read them on any other PC.

DO NOT finalize the CD-R if you want to add more images.

To read the CD on a PC where there is no DICOM viewer, you first need to format the CD. Select Utility -> Advanced -> Connectivity -> Tools -> Format the CD. After the CD is formatted, select Copy CD viewer onto the CD. Wait until it finishes the copy and then save patient information.

Save As (Saving Images to CD-ROM to View on Any PC)

To save images to the CD-ROM,

1. Insert the CD.
2. Go to Utility --> Connectivity --> Tools. Select the Media as CD Rewritable.
3. Label the CD.
4. Press Format to format the CD-ROM.
5. Select the image(s) to be saved to CD-ROM, press Menu, and select Save As. The SAVE AS menu appears.

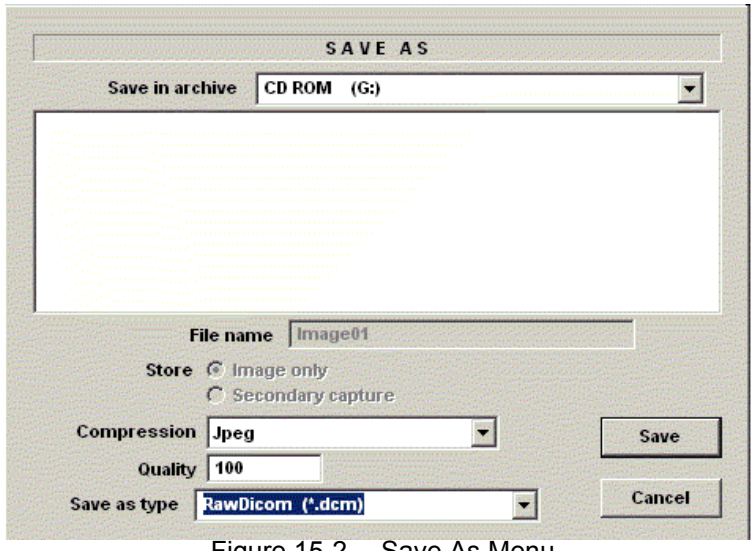


Figure 15-2. Save As Menu

6. Specify Compression and Save As Type and press Save. The image is saved to the CD-ROM.
7. When you have put all the images you want on the CD, press ***Ctrl + E*** to eject the CD-ROM.
8. Finalize the CD-ROM by selecting “Finalize and Eject CD”.

NOTE: If you want to add more images to the CD-ROM, select “Eject CD”.

Storing Images with More Resolution

To store images with more resolution than is available with the JPEG selection, select Save As and select AVI as the Save As Type. You can save single images as .avi files.

Table 15-1: 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.

Save As (Saving Images to USB Memory Stick)

To use the USB Memory Stick, do the following:

1. Insert the Memory Stick into an outer USB port.
2. Select the Menu option from the lower right-hand corner of the screen.
3. Select Save As.
4. Select the Removable disk drive.
5. Select File Type (DICOM, JPG or AVI).
6. Enter the file name and press Save.
7. When the file has been saved, select the Eject-Hardware icon at the bottom of the screen.

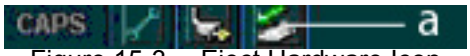


Figure 15-3. Eject Hardware Icon

   a. Eject Hardware Icon

8. Select the device and press Stop.

NOTE: Before pulling out the memory stick, the device should not be active.

Moving Images (Image Archive)

To archive images:

1. Insert the backup media. Format the backup media, CD-ROM. Select the Utility key on the keyboard. Select Connectivity, then Tools. You MUST set up a protocol for locating images on the media by labeling it consistently. The best way is to label images by date.

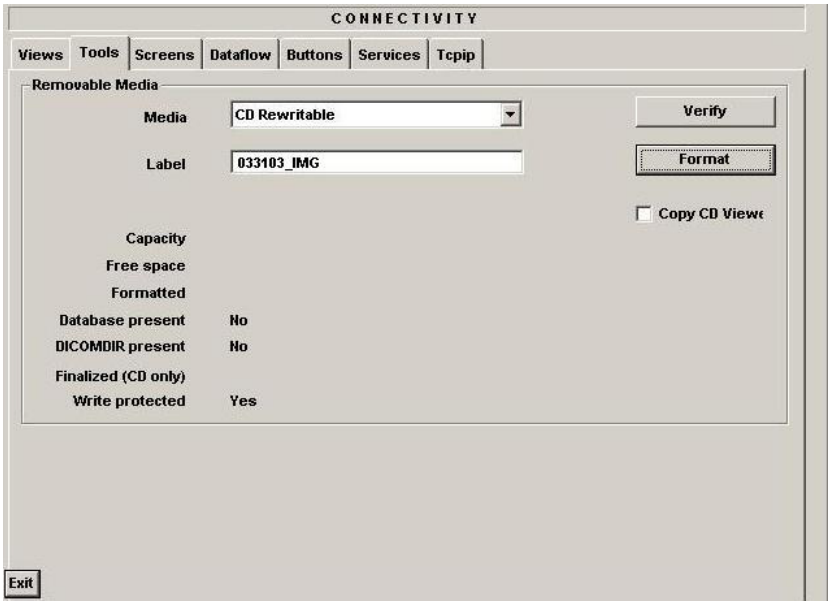


Figure 15-4. Format CD-ROM Screen

2. Format the CD-ROM.
3. Press Patient. Set the Dataflow to store images directly to the CD-ROM - or select the Dataflow tab and select the Removable CD-ROM dataflow.
4. Press More, then select Move Images. The Move Images pop-up appears.
5. Fill in the From Date, then press Recalculate. Specify to Keep days together. Check that you have enough disk space for the images you want to move. Select Move Images, then press OK. An in-progress message appears. The archive operation is complete when you receive this message.

Export/Import (Moving Data Between Ultrasound Systems)

To move exams from one Ultrasound system to another, 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.

Exporting Data

To export an exam(s) to a compatible Ultrasound system,

1. Format the removable media. Label the removable media. Answer Yes/OK to the messages.
2. Press Patient. Deselect any selected patient(s) in the search portion of the Patient screen. Press More (located at the lower, right-hand corner of the Patient menu).
3. Select Export. Specify the type of removable media on the Export pop-up. Press OK. Then, please wait until the Patient menu is visible.

Figure 15-5. Export Pop-up Message

Exporting Data (continued)

4. In the patient list at the bottom of the Patient menu, select the patient(s) you want to export.

   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, Select All from the Select All/Copy Patient Menu:

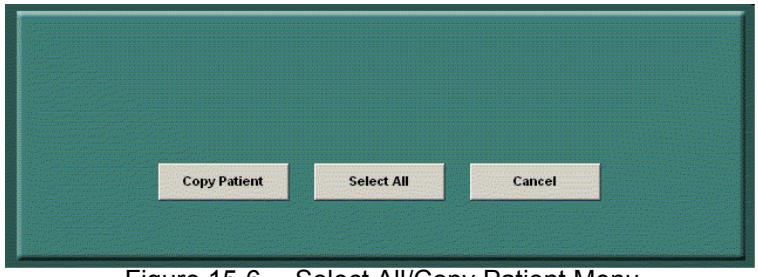


Figure 15-6. Select All/Copy Patient Menu

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.

5. Once you have selected all of the patients to export, press Copy Patient from the Select All/Copy Patient Menu.

   When the system notifies that the patients have copied correctly and/or the system is finished copying images, you MUST select DONE. This allows the directory to be placed on the CD with the images.

Exporting Data (continued)

6. Informational status messages appear as the copy is taking place. A final status report pop-up message appears. Press OK.

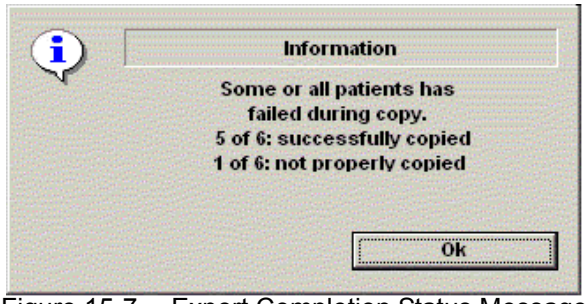


Figure 15-7. Export Completion Status Message

7. Press ***Ctrl + E*** to eject the media. Specify that you want to finalize the media. However, if you want to import this data to another system, do not finalize the media.

Importing Data

To import an exam(s) to another Ultrasound system,

1. At the other Ultrasound system, insert the media.
2. Press Patient, press More, then Import. The Import from pop-up message appears. Press OK.

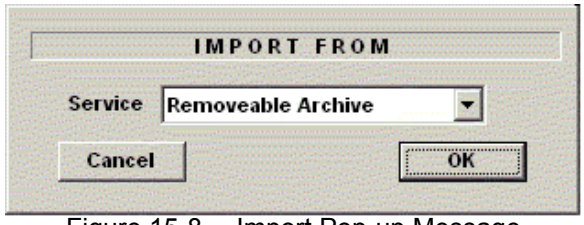


Figure 15-8. Import Pop-up Message

3. The Patient menu just shows the patients available for import from the removable media you just loaded onto the system.
4. Select the patients to be imported.
5. Press Copy Patient from the Select All/Copy Patient menu.
6. Please wait for the patient information to be copied to this Ultrasound system. Informational messages appear while the import is taking place.
7. Press ***Ctrl + E*** to eject the media.

Daily Maintenance

Patient, Report, and User-Defined Backup Protocols

Back up patient data AFTER you've archived (moved) 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 the backup media. Format the backup media. Select ***Utility***--> Connectivity--> Tools. Label the media 'GEMS_BACKUP' in all capital letters.

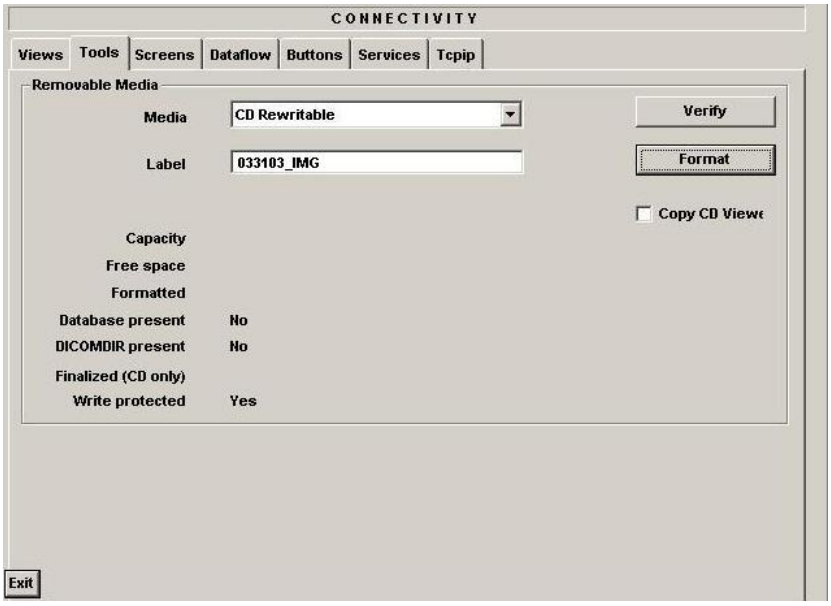


Figure 15-9. Format CD-ROM Screen

Patient, Report, and User-Defined Backup Protocols (continued)

2. The Ultrasound system displays a pop-up menu when the formatting has been completed. Press Ok to continue.Verify that the format was successful.

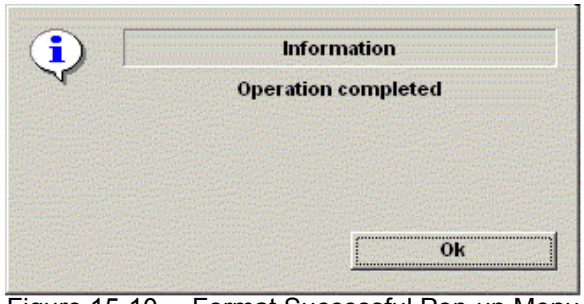


Figure 15-10. Format Successful Pop-up Menu

3. Select ***Utility***. Select System, then Backup/Restore.

Patient, Report, and User-Defined Backup Protocols (continued)

4. Select the media. Select everything under Backup by placing a check mark in front of Patient Archive, Report Archive, and User Defined Configuration. Then press Backup.

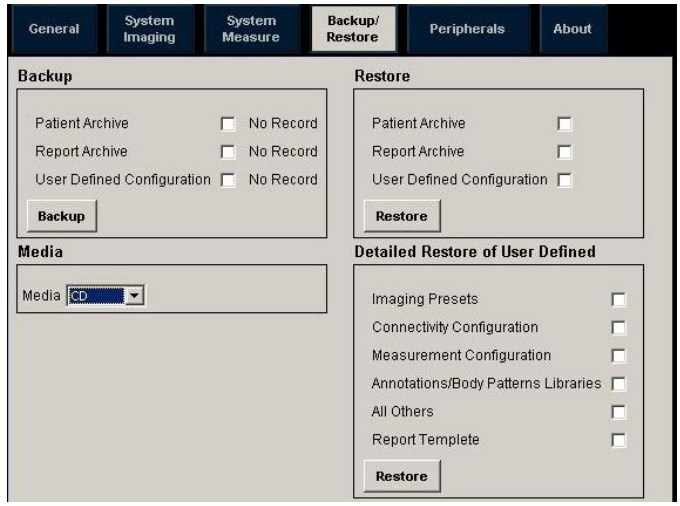


Figure 15-11. Backup Menu

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. Refer to Chapter 16 for more information.

5. Answer 'Ok' to the following pop-up message as many times as the number of items you are backing up.

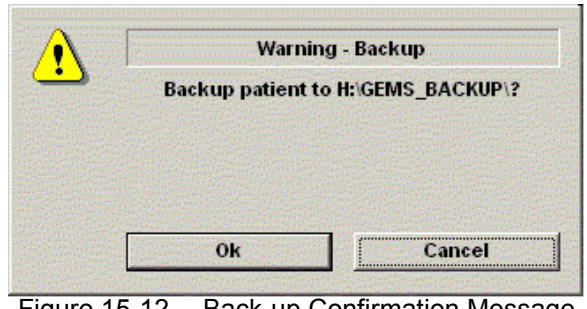


Figure 15-12. Back-up Confirmation Message

Notes

HINTS

DO NOT use the following special characters when saving images: slash (/), dash (-), or asterisk (*).

Other Printing Options

Connecting to a Standard Computer Printer

You can now connect a standard computer printer, via the USB connection (Service).

NOTE: You can connect a different printer if you have the driver for it on a CD-ROM (.inf file).*

1. Connect the printer to the USB port at the back of the system (in the Service port).
2. Install the driver, if necessary. Please refer to the Basic Service Manual for more information.
3. Set the printer as the default printer.

Connecting to a Standard Computer Printer (continued)

4. Assign one of the print keys to the standard printer via Utility --> Connectivity --> Buttons --> Select Destinations and select (Standard Print @ My Computer). This allows you to print the screen by pressing the print screen key. The system automatically determines the portion of the screen to print based upon what is currently displayed.

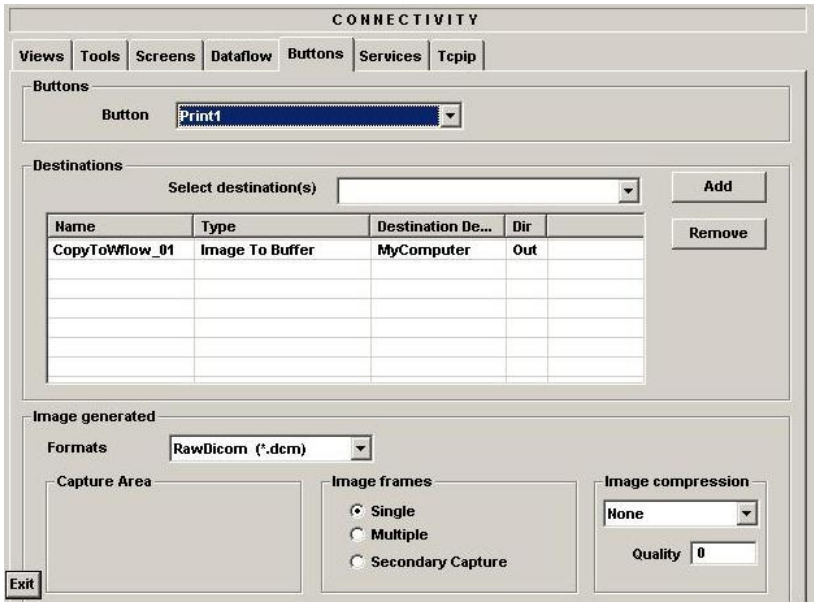


Figure 15-13. Print Button Example

Connecting to a Standard Computer Printer (continued)

5. Bring up the worksheet you want to print on the monitor. Any page displayed on the monitor can be printed.
6. Press the appropriate print key that you assigned in Step 2 above.

NOTE: You can also set a preset to override the automatic area print and force the entire screen to print by pressing Utility -> System --> Peripherals and setting the Standard Printer to Print Full Screen.

NOTE: Worksheets and Graphs are printed in reverse video for easier readibility. You can also set a preset to override this presentation by pressing Utility --> System --> Setup and setting the Standard Printer to Allow Reverse Video.

Chapter 16

Customizing Your System

Describes how to create system, user, and exam presets.

ReportWriter not available on LOGIQ Book XP PRO

Presets

Overview

Preset Menus provides 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.
- **Test patterns**. Helps configure system settings.
- **Connectivity Setup**. Define connection and communication setup, including exam dataflow information.
- **Measurement and Analysis presets**. Customize exam studies, create measurements, set up manual sequencing, and create OB Tables.
- **Reports Presets**. Allows you to edit the report template, diagnosis codes, and report comments. Please refer to Chapter 14 for more information.
- **System Administration presets**. Perform system administrator activities such as setting up user IDs and logon formats.

To access these functions, select the ***Utility*** key on the keyboard.

Utility Descriptions

The Utility screens allow you to perform the following tasks:

System	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
Annotations	Set up annotation libraries by application
Body Patterns	Set up body pattern libraries by application
Application	Configure application-specific settings
Test Patterns	Helps configure system settings.
Connectivity	Define connection and communication setup, including exam dataflow information
Measure	Customize exam studies, create measurements, set up manual sequencing, and create OB Tables
NOTE:	*The Measure screens allow you to customize exam studies, create measurements, set up auto sequencing, and create OB Tables.*
Admin	Perform system administrator activities such as setting up user IDs and logon formats

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 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, Restore, Detailed Restore of User Defined.
- **Peripherals** – Video Settings, Print and Store Options, and Setup configuration
- **About** – System software, patent, and system image information

Changing system parameters

To change system parameters:

1. On the keyboard, select **Utility**.
2. 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.

NOTE: In some cases, you may need to reboot the system for the change to take effect.

System/General Preset Menu

The System/General screen allows you to specify hospital name and system date and time.

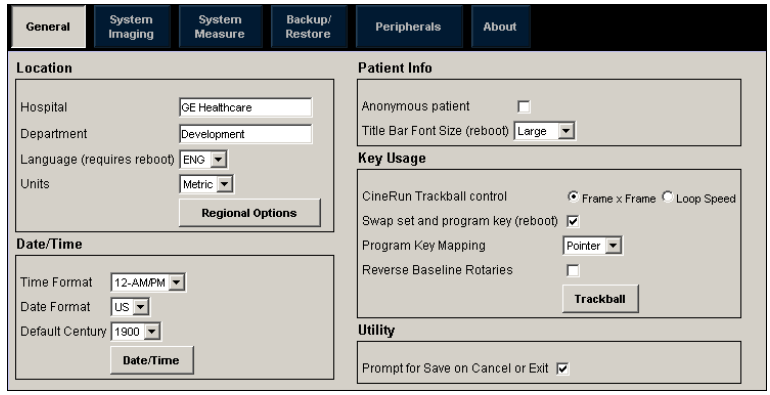


Figure 16-1. System/General Preset Menu

Table 16-1: Location

Preset Parameter	Description
Hospital	Type the *institution*'s name.
Department	Type the institution's department name.
Language	Select the appropriate language from the drop-down list.
Units	Select metric or US units of measurement.
Regional Options	Select to set up Russian/Greek keyboard.

System/General Preset Menu (continued)

Table 16-2: Date and Time

Preset Parameter	Description
Time Format	Select the time format: 12 Hr. AM/PM or 24 Hr.
Date Format	Select the date format: US or Europe.
Default Century	Select the default century for the system to use.
Date/Time	Select to display the Date/Time Properties window, to specify the system date, time, time zone, and to auto adjust for daylight savings time.

Table 16-3: Patient Information

Preset Parameter	Description
Anonymous patient	When selected, no patient information is displayed on the scanning screen Title bar.
Title Bar Font Size (reboot)	Select to display patient information in the title bar using a small, medium, or large font size. You need to reboot the system for this change to take effect.

System/General Preset Menu (continued)

Table 16-4: Key Usage

Preset Parameter	Description
CineRun Trackball control	Select Frame by Frame or Loop Speed. Frame by Frame manually steps through CINE playback by using the Trackball. Loop Speed controls the speed of the CINE Loop playback. Roll the Trackball to the left to slow down playback; roll the Trackball right to speed up playback. The Loop Speed displays in the lower, right-hand corner of the screen.
Swap set and program key	Select the functionality for the left Set key on the Front Panel: Pointer, Set, or Freeze.
Program Key Mapping	Allows you to program the left set key's functionality (Pointer, Set, or Freeze). You need to reboot the system after reprogramming the Set and Select keys.
Reverse Baseline Rotaries	Select to reverse Baseline key operation.

Table 16-5: Utility

Preset Parameter	Description
Prompt for Save on Cancel or Exit	If selected, the system prompts you to save data when you select cancel or exit without saving.

Foreign Language Keyboard Setup

Keyboard Setup for non-Russian/ Greek Languages

To set up the keyboard for non-Russian/Greek languages:

NOTE: You must apply the changes on each setup page before moving to the next page.

1. In Utility--> System--> General, set the Language as desired. Save this setting, but do not reboot the system yet.
2. Press Regional Options, select the Language tab, press Details, under Installed Services press Add to set the Keyboard layout/IME to United States-International, press OK, set the Default input language to English (United States) - United States International, press Apply, Press OK.

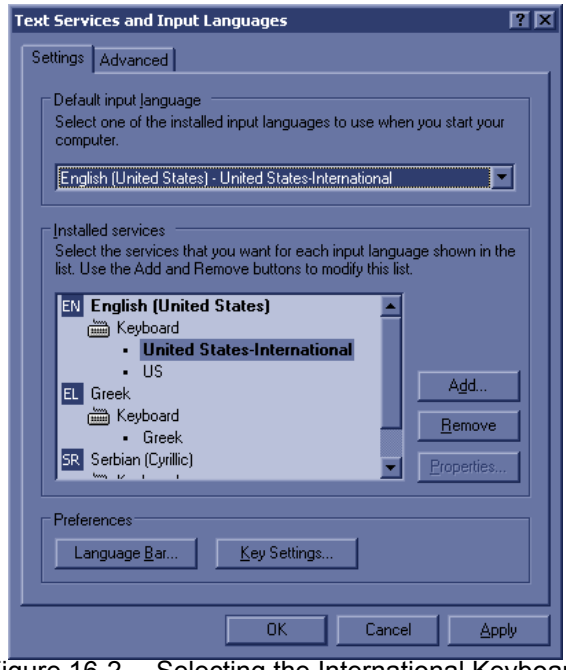


Figure 16-2. Selecting the International Keyboard

Keyboard Setup for non-Russian/ Greek Languages (continued)

3. Select the Advanced tab, then select the language in the Language for non-Unicode programs pull-down menu. Press Apply. Answer Yes to use files already loaded on the hard disk, then answer No to not reboot the system yet, press OK. Press Save and Exit the Utility screen.

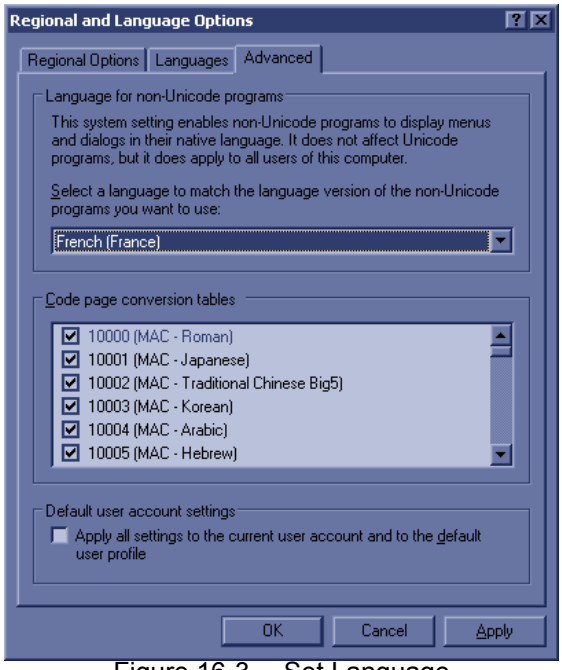


Figure 16-3. Set Language

4. Reboot the system. When your system restarts, the system appears in the selected language.
5. To type foreign characters, press Ctrl+Shift to change the keyboard to the international keyboard, then press the Alt GR+appropriate keyboard key.

Keyboard Setup Procedure for Russian and Greek

1. In Utility--> System--> General, set the Language as Russian or Greek. Save this setting, but do not reboot the system yet.

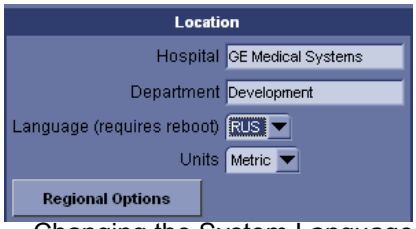


Figure 16-4. Changing the System Language to Russian/ Greek

Keyboard Setup Procedure for Russian and Greek (continued)

2. Press Regional Options, under Standards and Formats select Russian or Greek, under Location select Russia or Greece. Press Apply.

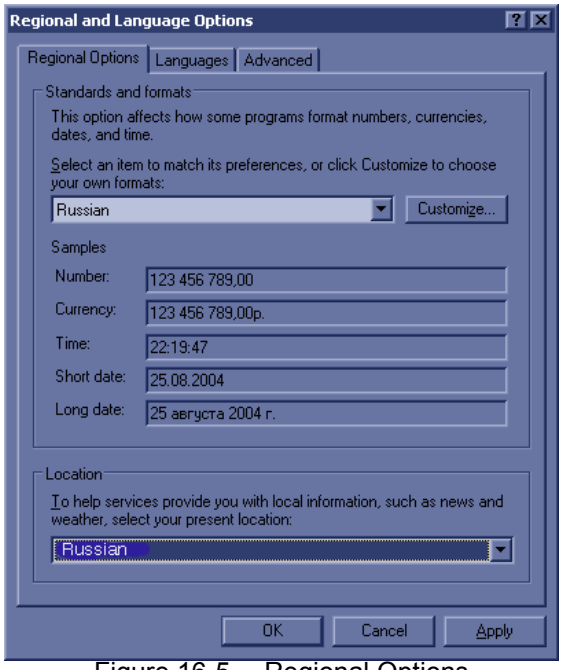


Figure 16-5. Regional Options

3. Select the Language tab, press Details, under Installed Services select the Russian or Greek keyboard, under Default input language select Russian - Russian or Greek - Greek, press Apply, Press OK.

Keyboard Setup Procedure for Russian and Greek (continued)

4. Select the Advanced tab, then select Russian or Greek in the Language for non-Unicode programs pull-down menu. Press Apply. Answer Yes to use files already loaded on the hard disk, then answer No to not reboot the system yet, press OK. Press Save and Exit the Utility screen.

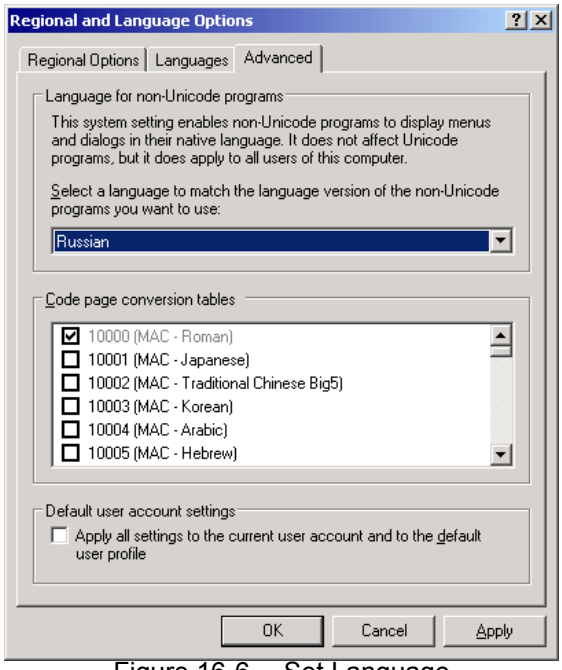


Figure 16-6. Set Language

5. Reboot the system. When your system restarts, the system appears in the selected language.
6. To switch between the English and Russian (or Greek) keyboard, press Alt+Shift to change the keyboard to the Russian or Greek keyboard.
7. Apply the changes by pressing Apply. Press OK TWICE.

*NOTE: To have the settings take effect, you **MUST** turn off the system and turn it back on.*

Keyboard Setup Procedure for Russian and Greek (continued)

Here is an example of the Russian keyboard:

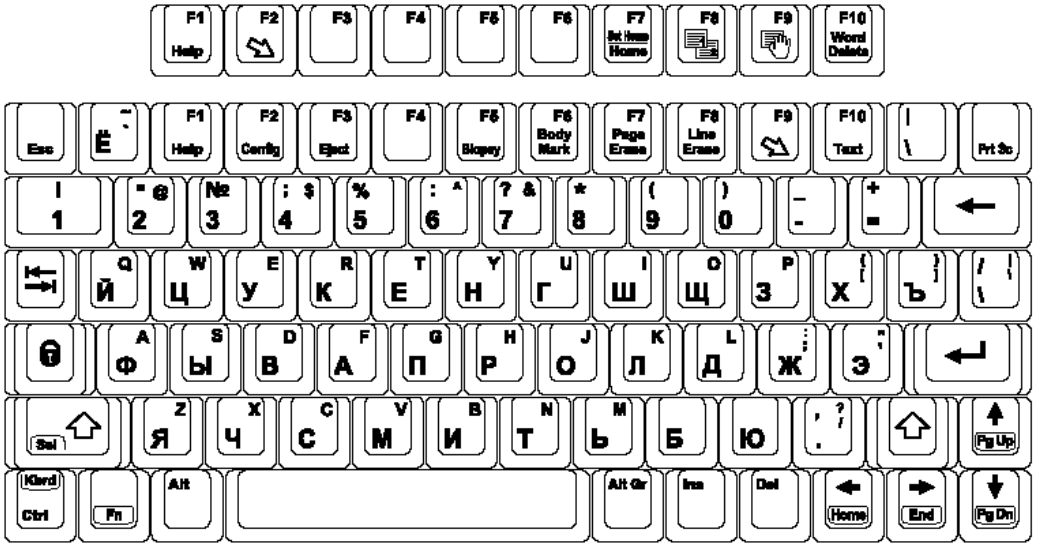


Figure 16-7. Russian Keyboard

Here is an example of the Greek keyboard:

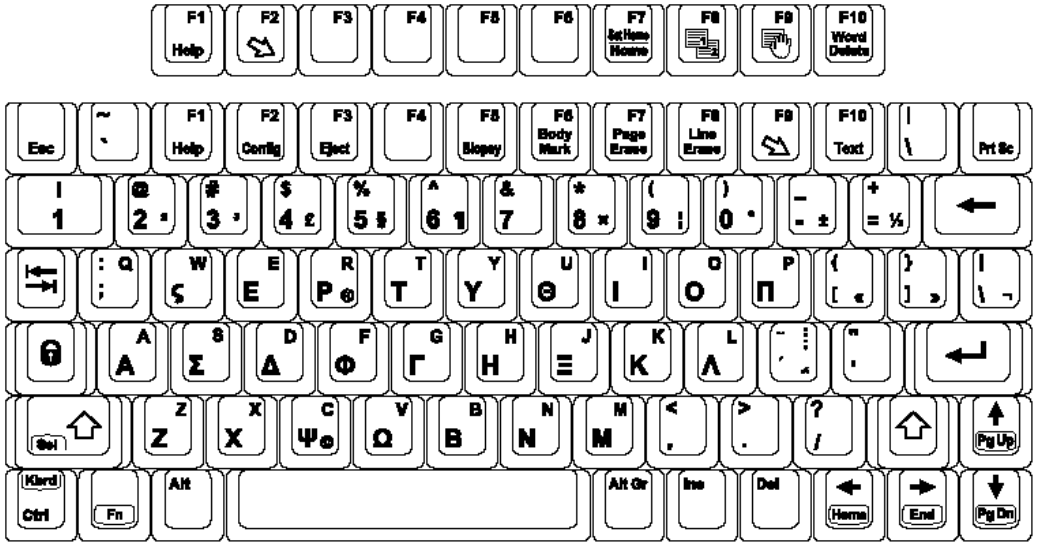


Figure 16-8. Greek Keyboard

Keyboard Setup Procedure for Chinese

1. In Utility--> System--> General, set the Language as Chinese. Save this setting, but do not reboot the system yet.

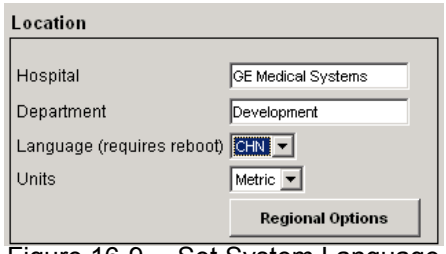


Figure 16-9. Set System Language

2. Press Regional Options, under Standards and Formats select Chinese (PRC), under Location select China. Press Apply.

NOTE: You must apply the changes on each setup page before moving to the next page.

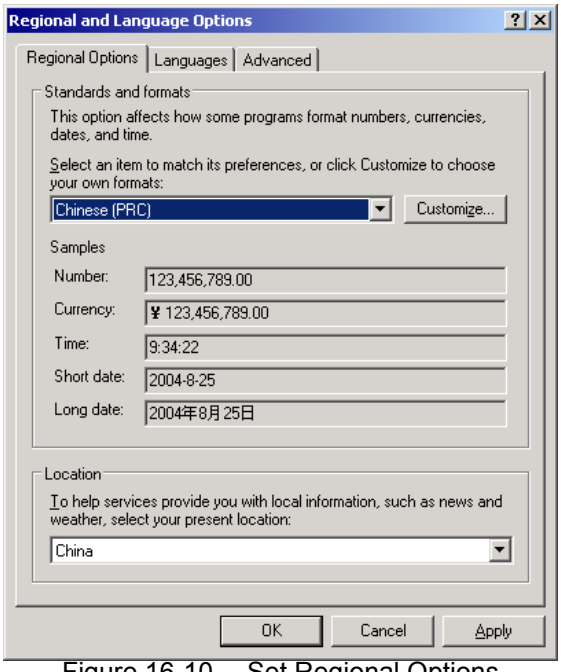


Figure 16-10. Set Regional Options

Keyboard Setup Procedure for Chinese (continued)

3. Select the Language tab, under Supplemental language support checkmark Install files for East Asian languages, press Details, under Installed Services press Add to set the Keyboard layout/IME to Microsoft Pinyin IME 3.0 and select the Input language to Chinese (PRC), press OK, set the Default input language to Chinese (PRC), press Apply, Press OK.

NOTE: Ensure that the Chinese keyboard (Microsoft Pinyin IME 3.0) is highlighted.

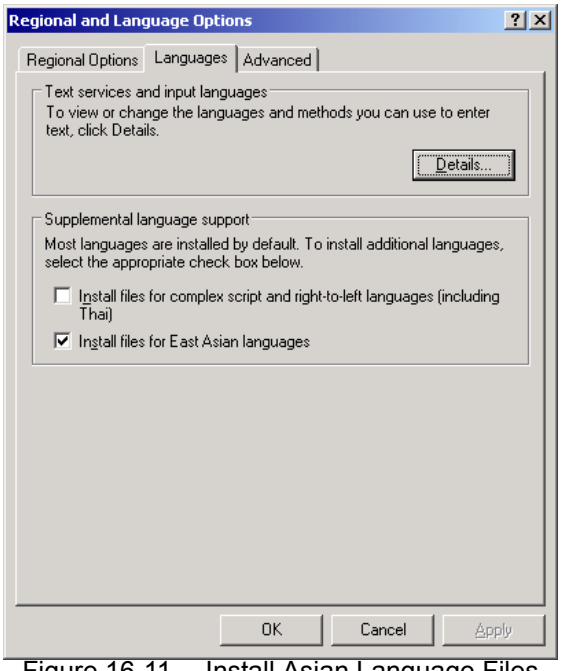


Figure 16-11. Install Asian Language Files

Keyboard Setup Procedure for Chinese (continued)

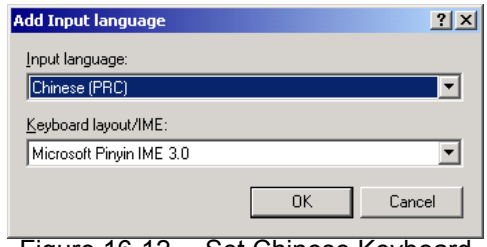


Figure 16-12. Set Chinese Keyboard

4. Select the Advanced tab, then select Chinese (PRC) in the Language for non-Unicode programs pull-down menu. Press Apply. Answer Yes to use files already loaded on the hard disk, then answer No to not reboot the system yet, press OK. Press Save and Exit the Utility screen.

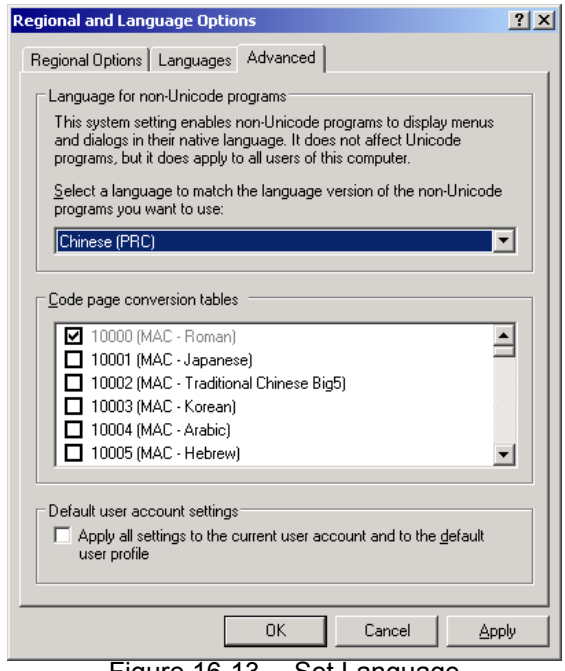


Figure 16-13. Set Language

5. Reboot the system. When your system restarts, the system is in Chinese.

System/System Imaging Preset Menu

The System/System Imaging screen allows you to specify parameters for cine loop storage and display, patient information, key usage, and image control and display.

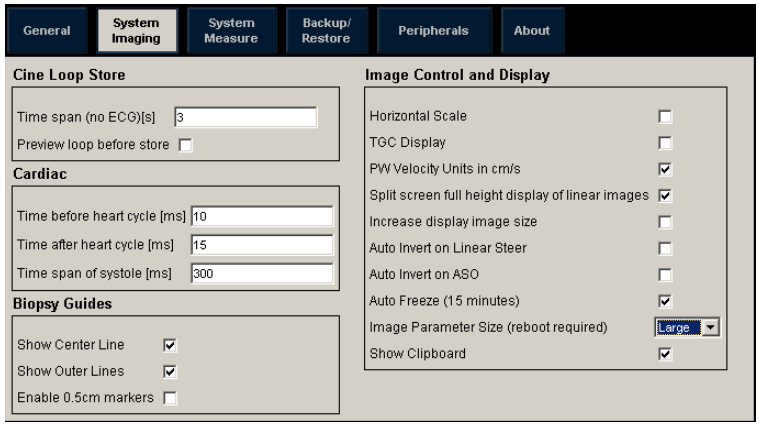


Figure 16-14. System/System Imaging Preset Menu

Table 16-6: Cine Loop Store

Preset Parameter	Description
Time span (no ECG) [s]	Select the number of seconds of CINE Loop storage (no ECG). The default is 3 seconds (approximately 77 B/W frames, 97 Color Frames).
Preview loop before store	When selected, allows you to review cine loops before storage.

System/System Imaging Preset Menu (continued)

Table 16-7: Cardiac

Preset Parameter	Description
Time before heart cycle [ms]	Sets the total storage time span of the cine loop in ECG mode.
Time after heart cycle [ms]	Sets the total storage time span of the cine loop in ECG mode.
Time span of systole [ms]	The default systolic time to enable synchronization of cine loops.

Table 16-8: 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.

Table 16-9: Image Control and 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.
Split screen full height display of linear images	When selected, while in split screen and using a linear probe, the system clips the sides of images so that the image can fill the available display.
Increase display image size	Increases the size of the image.
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.
Auto Freeze (15 minutes)	Automatically freezes the system after 15 minutes of inactivity.
Image Parameter Size (reboot required)	Choices=small, medium, and large. Must reboot the system.
Show Clipboard	Select to show clipboard.

System/System Measure Preset Menu

The System/System Measure screen allows you to specify measurement parameters such as the type of default OB measurements and calculations. You can also define cursor and Results Window default functionality.

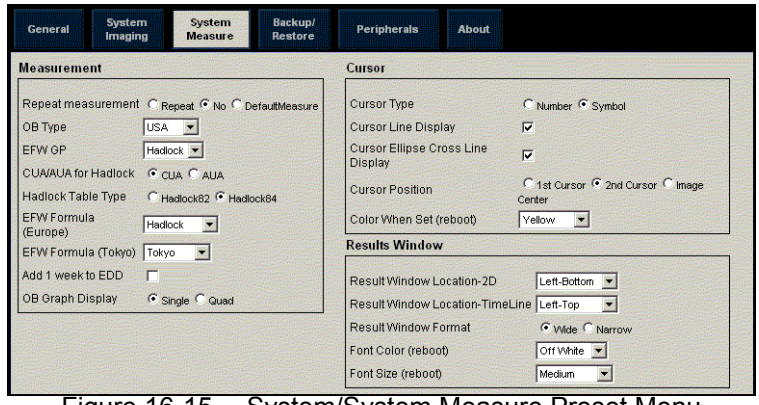


Figure 16-15. System/System Measure Preset Menu

System/System Measure Preset Menu (continued)

Table 16-10: Measurement

Preset Parameter	Description
Repeat Measurement	Select Off, Repeat, DefaultMeas
OB Type	Select which OB measurements and calculations studies to use: USA, Europe, Tokyo, Osaka, or ASUM.
Report Templates CUA/AUA for Hadlock	Select to restore report templates. 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)
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.

Table 16-11: Cursor

Preset Parameter	Description
Cursor Type	Select whether to mark measurements with numbers or symbols.
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 select.
Cursor Position	Select 1st Cursor, 2nd Cursor, or Image Center.
Color When Set	Select white, yellow, bright red, or orange.

Table 16-12: Results Window

Preset Parameter	Description
Result Window Location-2D	Select the Result Window location on the Monitor Display: Left-Bottom, Left-Top, Right-Bottom, or Right-Top.
Result Window Location-Timeline	Select the Result Window location: Left-Bottom, Left-Top, Right-Bottom, or Right-Top.
Result Window Format	Select Wide or Narrow.
Font Color	Select White, Off White, Yellow, Bright Red or Orange (reboots the system)
Font Size	Select small, medium, or large (reboots the system)

System/Backup and Restore Preset Menu

The backup and restore procedures described in this section are divided into two parts. The first part describes procedures to backup and restore patient data. The second part describes procedures to backup and restore system and user-defined configurations.

Depending on the system, you can use either a CD, DVD, MOD, USB Flash Drive, or USB Hard Disk (LOGIQ 7 only) for system backup/restore. For the sake of simplicity, we have used the CD in the following examples.

WARNING

GE Medical Systems is not responsible for lost data if the suggested backup procedures are not followed and will not aid in the recovery of lost data.

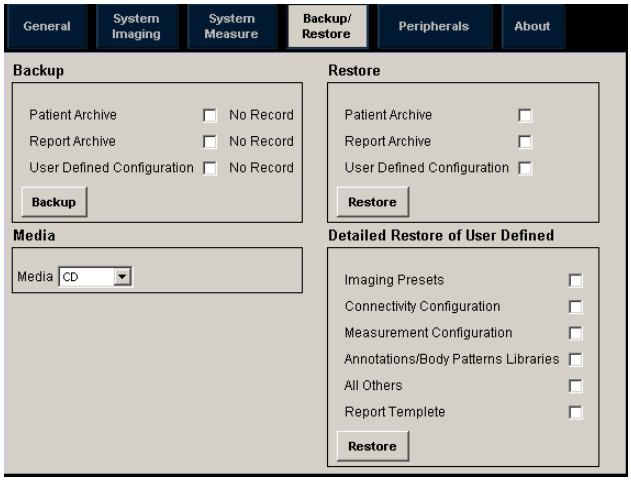


Figure 16-16. System/Backup/Restore Preset Menu

System/Backup and Restore Preset Menu (continued)

Table 16-13: Backup

Preset Parameter	Description
Patient Archive	Select to back up patient data.
Report Archive	Select to report data.
User Defined Configuration	Select to back up the user-defined configuration settings.

Table 16-14: Media

Preset Parameter	Description
Media	Select CD or MO (as appropriate).

Table 16-15: Restore

Preset Parameter	Description
Patient Archive	Select to restore patient data.
Report Archive	Select to report data.
User Defined Configuration	Select to restore the user-defined configuration settings.

System/Backup and Restore Preset Menu (continued)

The detailed section of this menu allows you to restore one area at a time from the user defined configuration. This allows you to selectively restore what you want to restore across multiple machines. Check the box(es) you want to restore, insert the CD-ROM/MOD, and press Restore.

Table 16-16: Detailed Restore of User Defined

Preset Parameter	Description
Imaging Presets	Select to restore imaging presets.
Connectivity Configuration	Select to restore connectivity configurations.
Measurement Configuration	Select to restore measurement configurations.
Annotations/Body Pattern Library	Select to restore comment and body pattern configurations.
All Others	Select to restore all other configurations not listed in the Detailed Restore section. This includes parameters defined on the System preset menus.
Report Templates	Select to restore report templates.

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.

Backup procedure: patient data

1. Insert media into the media drive.

NOTE: For information about formatting media, see "Formatting removable media".

2. On the keyboard, press ***Utility***.
3. Select ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.

NOTE: If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.

5. In the Backup list, select Patient Archive and Report Archive.
6. In the Media field, select CD.
7. Select Backup.

   The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.

Restore procedure: patient data

CAUTION

The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct CD.

1. Insert the Backup/Restore CD into the CD-RW drive.
2. On the keyboard, press ***Utility***.
3. Select ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.

NOTE: *If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.*

5. In the Restore list, select Patient Archive.
6. In the Media field, select the Backup/Restore CD.
7. Select Restore.

   The system performs the restore. As it proceeds, status information is displayed on the Backup/Restore screen.

Backup and restore strategy: user-defined configurations

In addition to generating a safety copy, the backup/restore function of the user-defined configuration (presets) can be used to configure several LOGIQ Book XP Series systems with identical presets (preset synchronization).

Preset synchronization

The procedure for preset synchronization of several scanners is as follow:

1. Make a backup of the user-defined configurations on a removable media from a fully configured LOGIQ Book XP Series system.
2. Restore user-defined configurations from the removable media to another LOGIQ Book XP Series system (you can restore all the user-defined presets or select specific presets to restore via Detailed Restore).

Backup procedure: user-defined configurations

CAUTION

To avoid the risk of overwriting the local patient and report archives on the system to update, DO NOT check Patient Archive when making a backup of configuration settings.

1. Insert media into the media drive.
2. On the keyboard, press ***Utility***.
3. Select ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.

NOTE: *If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.*

5. In the Backup list, select User Defined Configuration.
6. In the Media field, select CD.
7. Select Backup.

   The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.
8. After the backup is complete, press ***Alt+E*** to eject the CD.

Restore procedure: user-defined configurations

CAUTION

The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct CD-ROM/ MOD.

CAUTION

To avoid the risk of overwriting the local patient and report archives, DO NOT check Patient Archive when restoring user-defined configurations.

1. Insert the CD with the user-defined configurations into the CD-RW drive.
2. On the keyboard, press ***Utility***.
3. Select ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.

NOTE: *If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.*

5. In the Restore list, select from the following, depending on which configurations you want to restore:
   - User Defined Configuration,

     OR, in the Detailed Restore section select one of the following:
   - Imaging Presets
   - Connectivity Configuration
   - Measurement Configuration
   - Comment/Body Pattern Configuration
   - All Others
6. In the Media field, select the system and user-defined configurations CD.
7. Select Restore.

   The system performs the restore. As it proceeds, status information is displayed on the System/Backup/Restore screen.

System/Peripherals Preset Menu

The System/Peripherals screen allows you to specify video and system setup parameters.

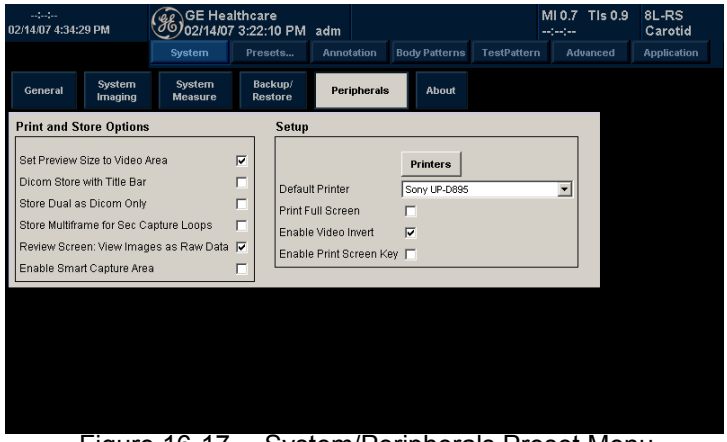


Figure 16-17. System/Peripherals Preset Menu

Table 16-17: Video Settings

Preset Parameter	Description
Format	Select the video format, PAL or NTSC.
Mixed Mode	Allows you to select the PAL format, but still operate the color printer in NTSC mode. This setting has no effect on NTSC mode.

System/Peripherals Preset Menu (continued)

Table 16-18: Print and Store Options

Preset Parameter	Description
Set Preview Size to Video Area	Select to set capture image area as the entire video area -- desired format for DICOM prints.
Dicom Store with Title Bar	Check box to select.
Store Dual as Dicom Only	Select to always store dual images as a DICOM (secondary capture) store, rather than Raw DICOM.
Store Multiframe for Sec Capture Loops	Select this if you want the CINE loop stored as secondary capture.
Review Screen: View Images as Raw Data	Check box to select.
Enable Smart Capture Area	Check box to select.

Table 16-19: Setup

Preset Parameter	Description
Printers	Press this key 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. To exit this wizard, click anywhere outside of the wizard box.
Print Full Screen	Select this if you want the standard printer to print the full screen.
Enable Video Invert	Select this is you want the standard printer to print black on white rather than white on black.

Table 16-20: Standard Printer

Preset Parameter	Description
Print Full Screen	Select this if you want the standard printer to print the full screen.
Enable Video Invert	Select this is you want the standard printer to print black on white rather than white on black.
Enable Print Screen Key	If you have a standard printer connected to the USB port on the system, you can use the print screen key to print to this printer.

System/About Preset Menu

The System/About screen lists information about the system software.

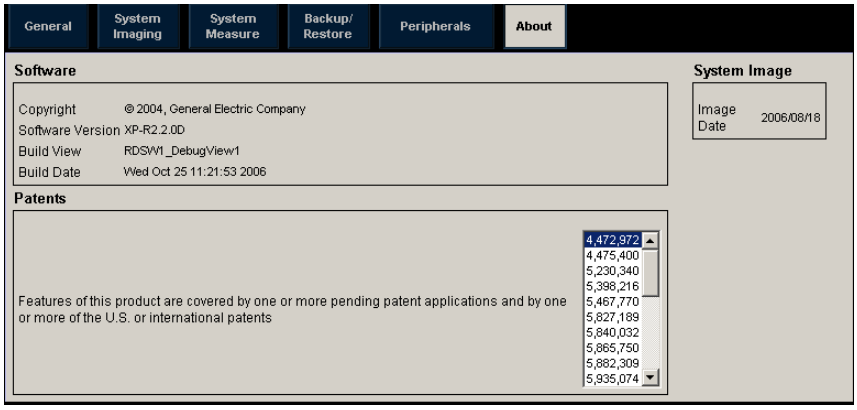


Figure 16-18. System About Preset Menu

Table 16-21: Software

Preset Parameter	Description
Software Version	The current software version on this system.
Build View	The software build view.
Build Date	The software build date.

Table 16-22: System Image

Preset Parameter	Description
Image Date	The image date.

Table 16-23: Patents

Preset Parameter	Description
Patents	Lists system patents.

Imaging Presets

Overview

Imaging screens allow you to specify parameters for the following:

- B-Mode (B)
- Color Flow Mode (CF)
- Power Doppler Imaging (PDI)
- M-Mode (M)
- Pulse Wave Mode (PW)
- Harmonics (HAR)
- General

Changing imaging presets

To change imaging presets:

1. On the keyboard, select ***Utility***.
2. Select ***Presets***.

   The system displays the Imaging screens. See the Imaging screens on the following pages.
3. In the Preset list, select the exam.
4. In the Probe list, select the probe.
5. 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.
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.

LOGIQ Book Imaging Presets

B-Mode

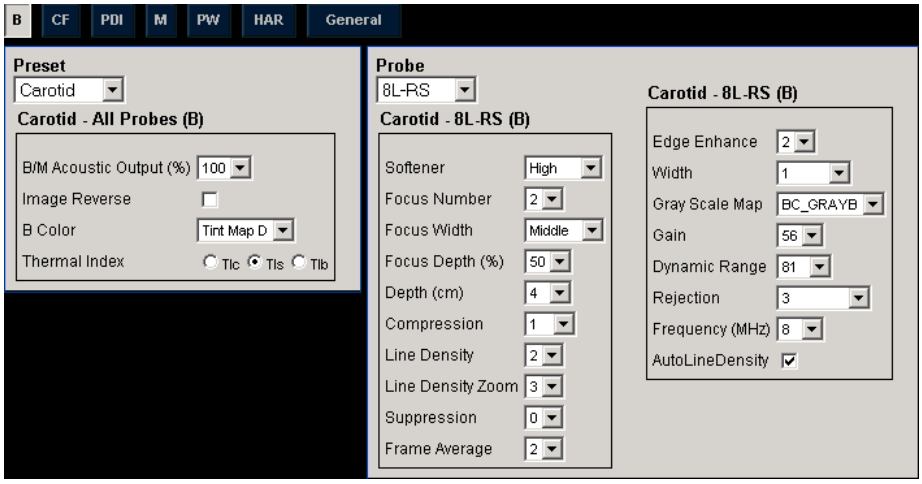


Figure 16-19. B-Mode parameters

Color Flow Mode

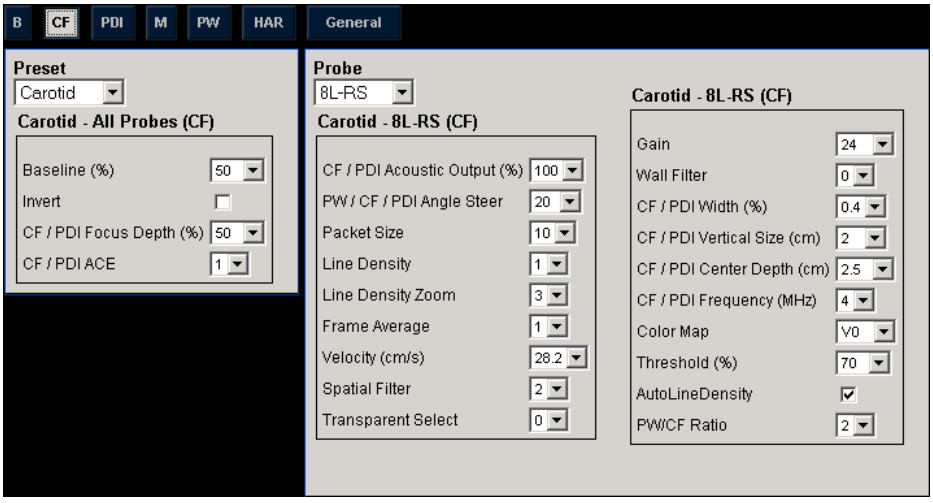


Figure 16-20. Color Flow parameters

Power Doppler Imaging (PDI)

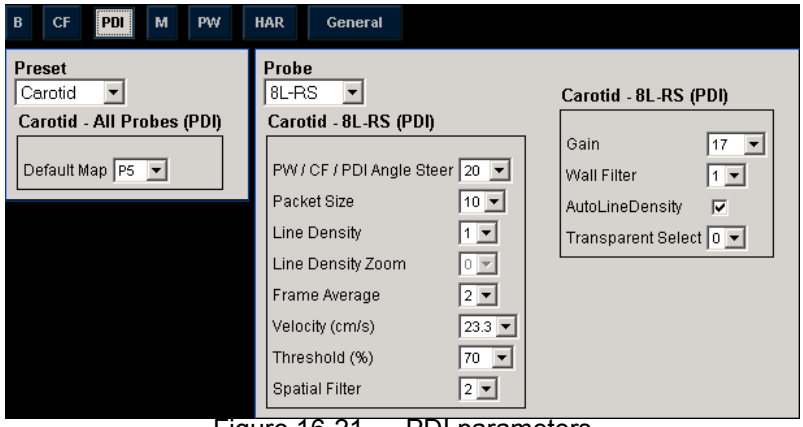


Figure 16-21. PDI parameters

M-Mode

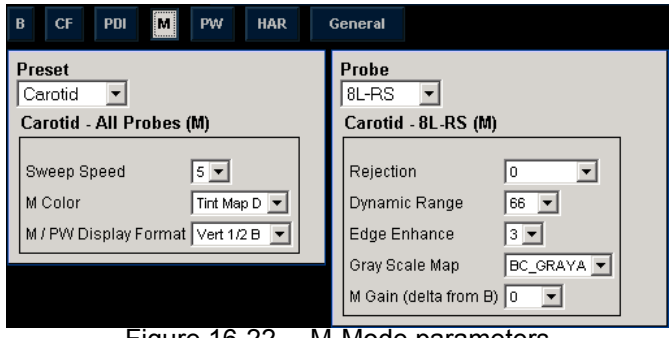


Figure 16-22. M-Mode parameters

Pulse Wave

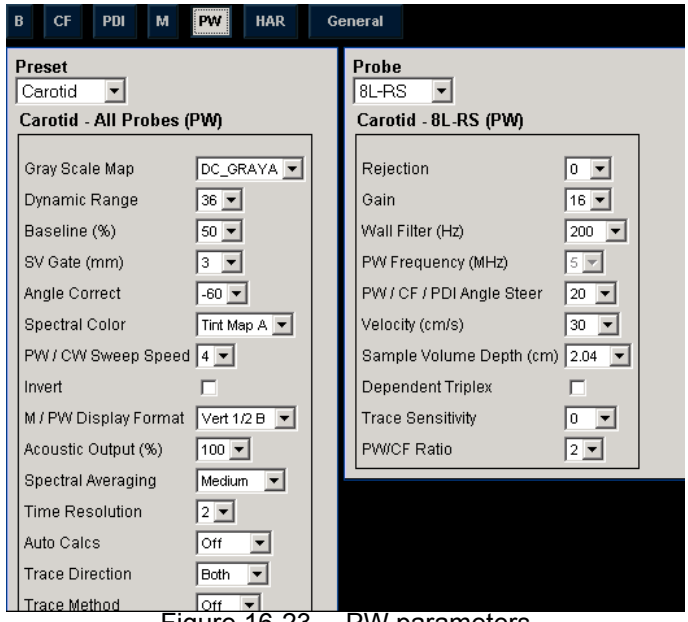


Figure 16-23. PW parameters

General

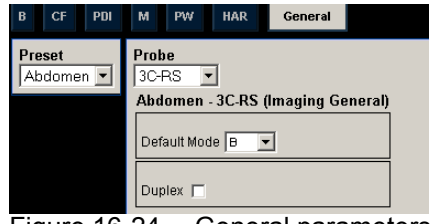


Figure 16-24. General parameters

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 Top/Sub Menu. For each library, you can define two Top/Sub Menu displays of comments (Page1 and Page2), with 15 comments on each Top/Sub Menu.

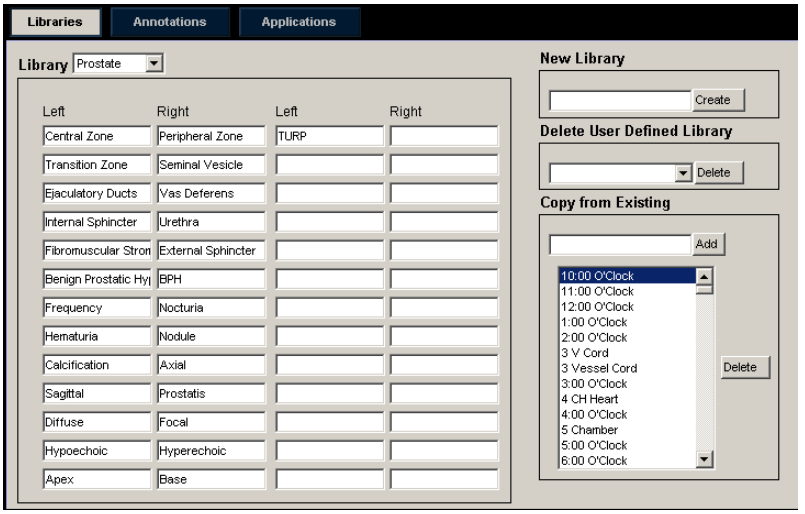


Figure 16-25. Comment Libraries Preset Menu

Comments Libraries/Libraries Preset Menu (continued)

Table 16-24: Libraries

Preset Parameter	Description
Library	The name of the comment library.
Left and Right Columns	The list of comments for the selected library separated by side.
New Library	The name of a new comment library that you want to create.
Delete User Defined Library	The name of a new comment library that you want to delete.
Copy from Existing	A list of comments you can use to create a library.

Defining Comments

1. In the *Library* field, select the library you want.

   The system displays all comments for the library. You can have two Top/Sub Menu displays of comments for each library. The comments are listed in the order that they are shown on the Top/Sub Menu 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.

Comments Libraries/Comments Preset Menu

On the Comments tab, you specify text and pointer options.

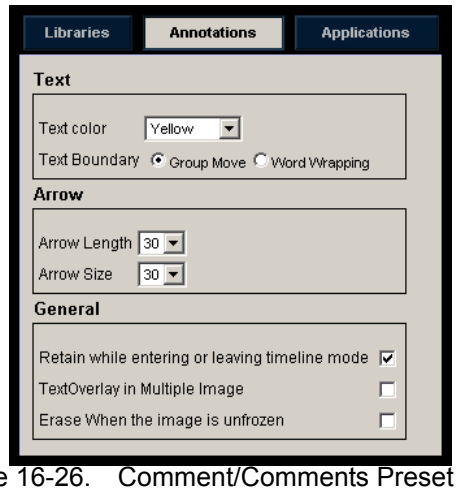


Figure 16-26. Comment/Comments Preset Menu

Comments Libraries/Comments Preset Menu (continued)

Table 16-25: Text

Preset Parameter	Description
Text color	Select the color for comment text.
Text Boundary	Select Group Move or Word Wrapping.

Table 16-26: Arrow

Preset Parameter	Description
Arrow Length	Select the default pointer length.
Arrow Size	Select the default pointer size.

Table 16-27: 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.
Erase When the image is unfrozen	Deletes comments when you unfreeze the image.

After you change comment options, select *Save* to save the changes.

Comments Libraries/Comments Preset Menu (continued)

The Comments Libraries/Applications tab is a link to the Applications preset menu. The Applications preset screen allows you to specify which libraries belong to an application. You also specify which is the default library that displays when you use comments.

Figure 16-27. Applications/Comments Link

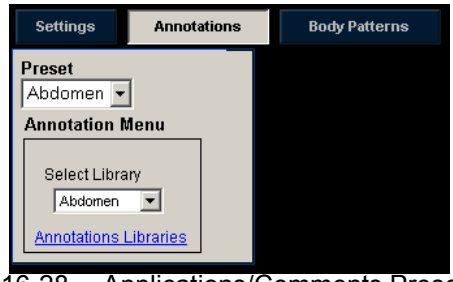


Figure 16-28. Applications/Comments Preset Menu

Table 16-28: Applications

Preset Parameter	Description
Preset	The name of the application preset.

Specifying which libraries belong to an application

1. On the Applications tab, in the Application field, select the application.
2. 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.

3. To save the changes, select the Save button.

Using comments from a library

To use comments, press the **Comment** key on the Control Panel. Comments are then displayed on the Top/Sub Menu.

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 Top/Sub Menu. For each library, you can define two Top/Sub Menu displays of body patterns (Page1 and Page2), with 15 body patterns on each Top/Sub Menu.

Body Pattern Libraries/Libraries Preset Menu (continued)

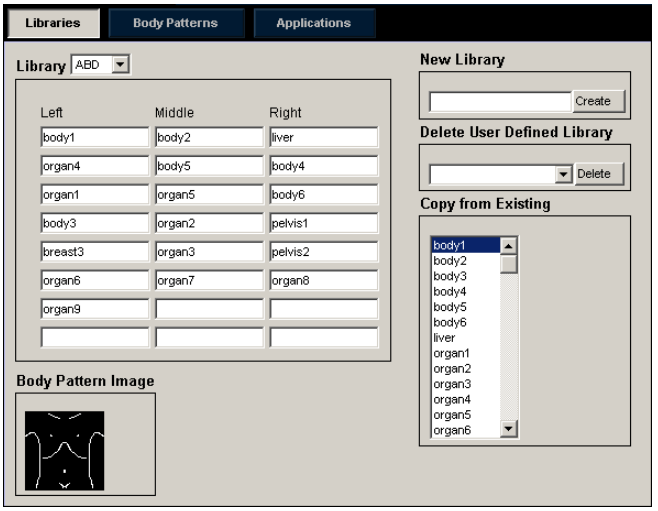


Figure 16-29. Body Patterns Libraries Preset Menu

Table 16-29: Body Patterns Libraries

Preset Parameter	Description
Library	The name of the body pattern application library.
Left, Middle and Right Columns	The list of the body patterns for the selected library.
Body Pattern Image	Displays the image of the currently selected body pattern.
New Library	The name of a new body pattern application library that you want to create.
Delete User Defined Library	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 Top/Sub Menu displays of body patterns for each library. The body patterns are listed in the order that they are shown on the Top/Sub Menu.
2. To change or add a body pattern, select the body pattern or blank location and press **Set**, then do one of the following:
   - Type the body pattern name.
   - Select the body pattern in the *Copy from Existing* list, and press **Set**.

NOTE: When you select a body pattern name in a Top/Sub Menu 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 New Library field, type a name for the library, then select Create.

   The system creates a new library.
2. Enter body patterns as described in step 2 above.
3. To save the changes, select the Save button.

Body Pattern Libraries/Body Patterns Preset Menu

On the Body Patterns tab, you specify body pattern options.

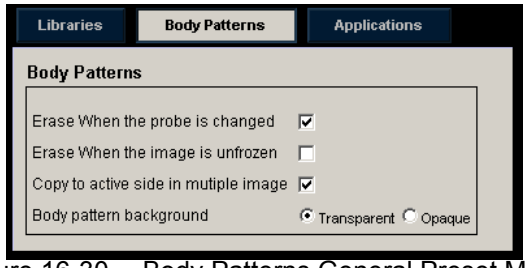


Figure 16-30. Body Patterns General Preset Menu

Table 16-30: Body Patterns

Preset Parameter	Description
Erase When the probe is changed	If checked, when you change probes, 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.

After you change body pattern options, select Save to save the changes.

Body Pattern Libraries/Applications Preset Menu

The Body Patterns Library/Applications tab is a link to the Applications preset menu. The Body Patterns Applications tab allows you to select body pattern application libraries. You also specify which is the default library that displays when you use body patterns.

Figure 16-31. Applications/Body Patterns Link

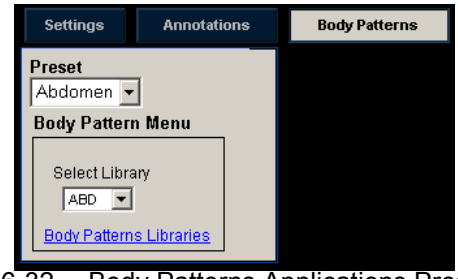


Figure 16-32. Body Patterns Applications Preset Menu

Table 16-31: Applications

Preset Parameter	Description
Application	Defines the Body Pattern option.

Using body pattern application libraries

See the following Body Patterns Small Parts Top/Sub Menu.

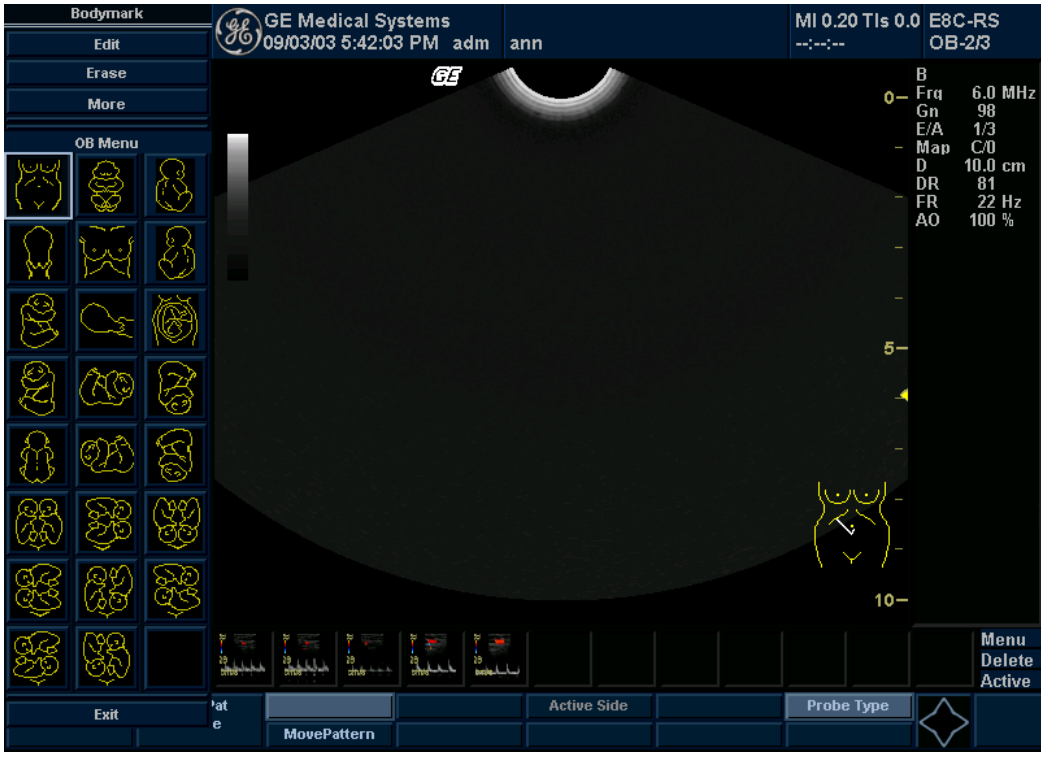


Figure 16-33. Body Patterns OB-2/3 Menu

To select a body pattern library, select the tabs (for example, ABD or OB).

To select body patterns, use the **Body Pattern** control on the Control Panel.

Application Presets

Overview

Application Settings presets allow you to configure the application-specific settings (presets).

The other two tabs, Comments and Body Patterns were described earlier in this chapter.

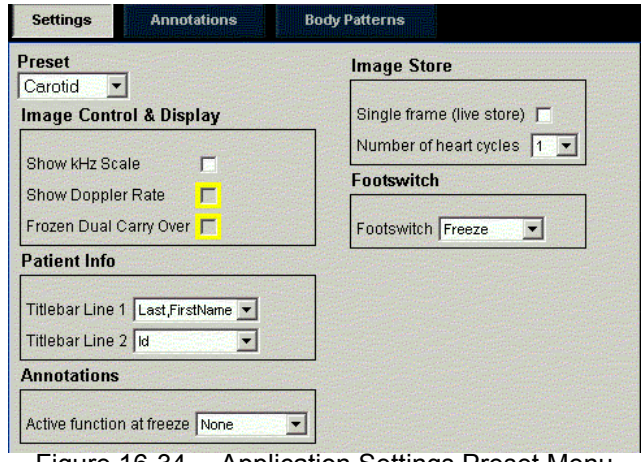


Figure 16-34. Application Settings Preset Menu

Overview (continued)

Table 16-32: 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. See 'User-Defined Application Presets' on *page 4-9 for more information.*

Table 16-33: Image Control & Display

Preset Parameter	Description
Show kHz scale	When selected, displays the kHz scale on the left side of the Doppler spectrum.
Show Doppler Rate	When selected, displays the Doppler rate (mm/s) below the Doppler spectrum.
Frozen Dual Carry Over	Select to carry over the live image's imaging parameters to the other image after pressing Freeze.

Table 16-34: 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.

Table 16-35: Annotations

Preset Parameter	Description
Active function at Freeze	Select None, Body Pattern, or Comments. If Body Pattern or Comment is selected, the Body Pattern or Comment is activated automatically when freezing the system.

Table 16-36: Image Store

Preset Parameter	Description
Single frame (live store)	If selected, stores single frame images only. If not selected, stores cine loop.
Number of heart cycles	Select the number of heart cycles to store. (Must be de-selected for single frame.)

Table 16-37: Footswitch

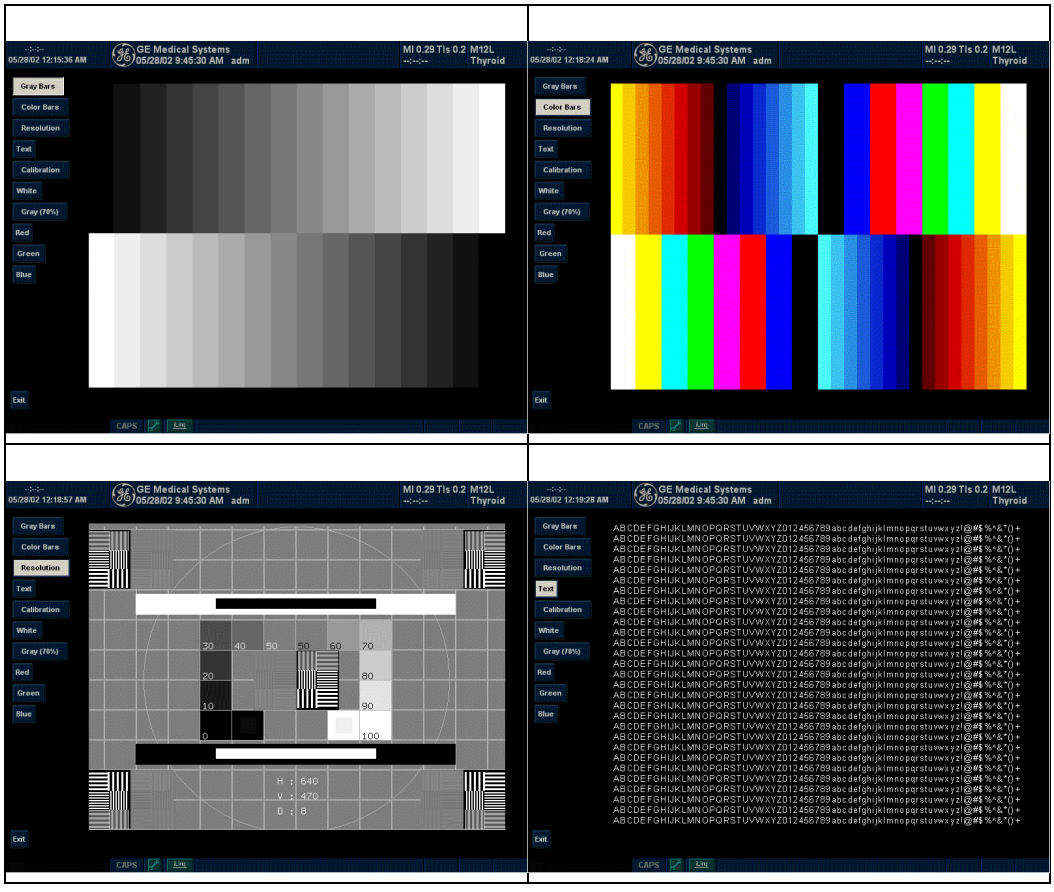
Preset Parameter	Description
No Function	Release footswitch pedal setting.
Print 1 (P1)	Configure footswitch pedal as P1 key.
Print 2 (P2)	Configure footswitch pedal as P2 key.
Print 3 (P3)	Configure footswitch pedal as P3 key.
B Pause	Configure footswitch pedal as B Pause key.

Test Patterns

Overview

There are different test patterns available: Gray Bars, Color Bars, Resolution, Text, Monitor Calibration, White, Gray, Red, Green and Blue.

Table 16-38: Available Test Patterns



Brightness Calibration

To calibrate the monitor,

1. Select Brightness Calibration from the Test Pattern Utility Top/Sub Menu. The test pattern consists of a small box inside a larger box.

NOTE: Calibrate the monitor in a dim room.

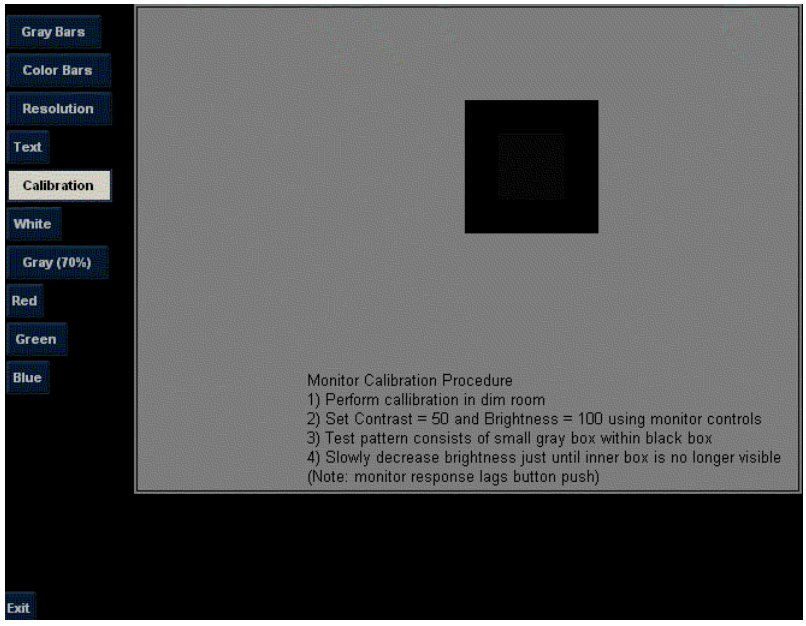


Figure 16-35. Brightness Calibration Test Pattern

2. Press the Brightness/Contrast control on the front of the monitor.
3. Set the Contrast at 50.
4. Set the Brightness at 100. Then slowly decrease the Brightness until the inner box is no longer visible. Please note that the monitor response to this adjustment lags behind the button push.

NOTE: After you calibrate the monitor you may need to adjust peripheral settings.

Configuring Connectivity

Overview

You use Connectivity functionality to set up the connection and communication protocols for the ultrasound system. This page gives an overview of each of the Connectivity functions. Each function is described in detail in the following pages.

Connectivity Functions

To set up your institution's connectivity, you must login with administrator privileges.

1. **TCPIP**: allows you to configure the Internet Protocol.
2. **Services**: 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.
3. **Button**: allows you to assign a pre-configured output service (or a set of output services) to the Print keys on the control panel.
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. **Screens**: enables the configuration of tools related to patient management.
6. **Tools**: enables formatting (DICOM, database, or blank formatting) and DICOM verification of removable media.
7. **Views**: displays an overview of the connectivity architecture of the ultrasound system, including devices and associated services. It also allows you to verify connectivity.

Configure these screens from right to left, 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.

TCPIP

This configuration category enables users with administrative rights to set the TCPIP for the system and connected remote archive.

1. Type the name of the Ultrasound system in the Computer Name field.
2. In the IP settings section, identify the ultrasound system to the rest of the network by one of the following:
   - DO NOT enable DHCP.
   - Type the IP-Address (acquire unique static IP address from hospital network administrator), Subnet Mask, and Default Gateway (if applicable).
3. In the Remote Archive Setup section, type the Remote Archive IP-Addr and Remote Archive Name.

NOTE: Do not type the Remote Archive IP-Addr and Remote Archive Name if you select Enable DHCP.

4. Select Save settings.
5. Re-boot the ultrasound system.

TCPIP (continued)

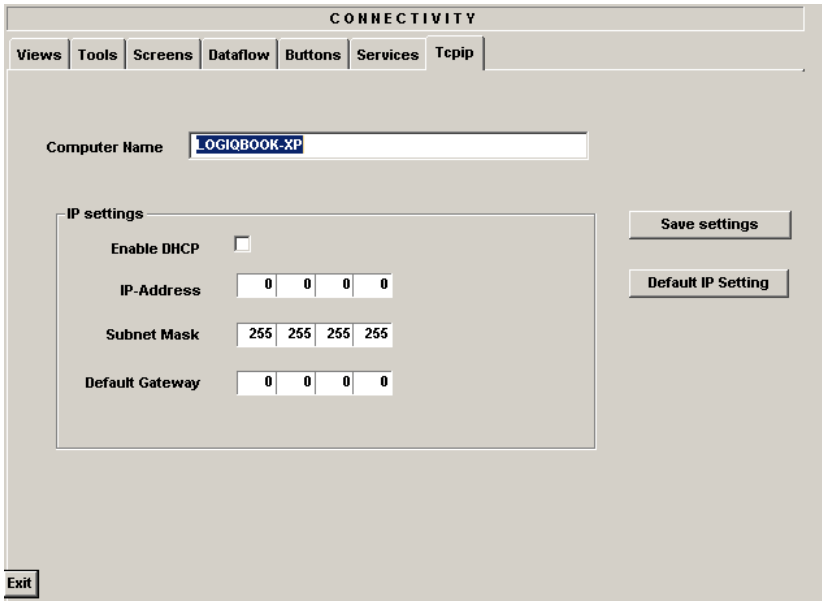


Figure 16-36. Connectivity TCPIP Preset Menu

TCPIP (continued)

Table 16-39: Computer Name

Preset Parameter	Description
Computer Name	Type the AE Title of the Ultrasound system (no spaces in name).

Table 16-40: IP settings

Preset Parameter	Description
Enable DHCP	DO NOT select this box to enable dynamic IP Address selection.
IP-Address	Type the IP Address of the Ultrasound system. NOTE: IP stands for Internet Protocol. Every device on the network has a unique IP address.
Subnet Mask	Type the subnet mask address. NOTE: The Subnet Mask is an IP address filter that eliminates communication/messages from network devices of no interest to your system.
Default Gateway	Type the default gateway address.

Services (Destinations)

The Services screen enables users with administrative rights to add and remove destination devices, add and remove services, and change service parameters. This means that the user can configure a device with the DICOM service(s) that particular device supports.

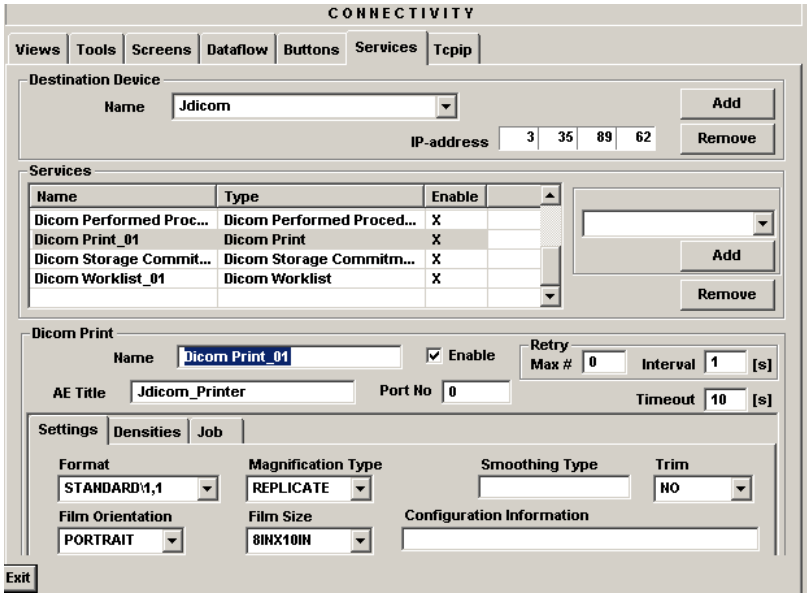


Figure 16-37. Connectivity Services Preset Menu

The Services screen has the following sections of information:

1. **Destination Device** - lists information about destination devices. You can add devices, select from a list of currently existing devices, and remove a device.

Services (Destinations) (continued)

2. **Services** - 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 parameters for the service currently selected in the Services section. The name and parameters in this section change, depending on what service is currently selected. In the above figure, this section shows DICOM Print parameters.

Adding a destination device

Figure 16-38. Destination Device

Table 16-41: Destination Device

Preset Parameter	Description
Name	Free text: give a descriptive name to the device.
AE Title	The Application Entity Title defines DICOM applications running on a specific device. It is set during DICOM configuration. Refer to your network specifications.
IP address	The Internet Protocol address of the device.

1. In the Destination Device section, select Add.

   The system adds a new destination device, with a default name such as Server05.
2. To change the name of the destination device, type a new name in the Name field.

   The system displays a message to confirm that you want to change the name.
3. Select OK.

Removing a destination device

1. In the Destination Device section, select the destination device.
2. In the Destination Device section, select the Remove button.

   The system displays a warning message to confirm that you want to remove the device and associated services.

NOTE: When you remove a destination device, all associated services are automatically removed.

3. Select OK

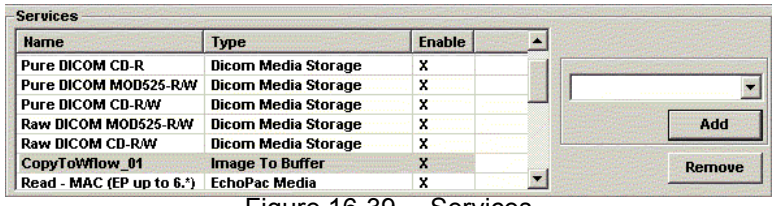


Figure 16-39. Services

Table 16-42: Services

Preset Parameter	Description
Name	Free text: give a descriptive name to the device.
Type	The type of service.
Enable	If selected, this service is enabled.

Adding a service to a destination device

1. In the Destination Device section, in the *Name* field, select the destination device.
2. In the Services section, select the service from the pull-down menu to the right.
3. Select the Add button below the list.

   The system adds the service to the list of services.

Removing a service

1. In the Destination Device section, in the Name field, select the destination device.
2. In the Services section, select the service.
3. In the Services section, select the Remove button.

   The system displays a warning message to confirm that you want to remove the service.
4. Select OK.

Changing parameters for a service

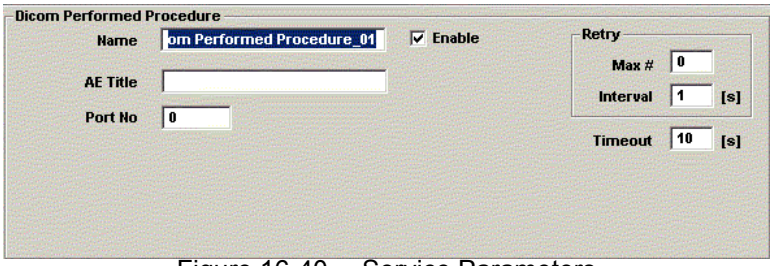


Figure 16-40. Service Parameters

1. In the Destination Device section, in the Name field, select the destination device.
2. In the Services section, move the **Trackball** to highlight a service, and press **Set**.

   The system displays parameters for the service in the bottom section of the screen.
3. Define the appropriate service configuration parameters.

Table 16-43: Service Parameters: Common Fields

Preset Parameter	Description
Name	Free text: give a descriptive name to the device.
Enable	If selected, this service is enabled.
AE Title	The Application Entity Title for the service.
Port No	The port number of the service.
Retry	Max # – the maximum number of times to try establishing a connection to the service. Interval – the time interval, in seconds, to wait before retrying to establish a connection.
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:

- DICOM Verification
- DICOM Image Storage
- DICOM Performed Procedure
- DICOM Print
- DICOM Media Storage
- DICOM Worklist
- Echo Database V1.1
- Echo Database V2.0
- EchoPac Media
- Standard Print

DICOM Verification

Option on LOGIQ Book XP Series

To verify a service:

1. In the Destination Device section, in the Name field, select the destination device.
2. In the Services section, select the service.
3. In the bottom section of the screen with the service parameters, select DICOM Verify.

   If the device is communicating with the network, the yellow face is displayed with a smile. See Figure 16-41.

   If the device is not connected, the face has a frown.

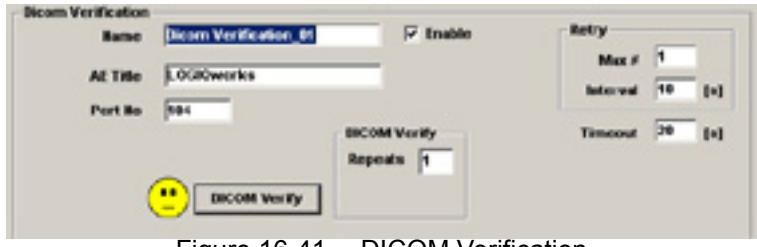


Figure 16-41. DICOM Verification

Table 16-44: DICOM Verification

Preset Parameter	Description
DICOM Verify	Specify how often you want the system to ping the worklist server to update the database.

DICOM Image Storage

Option on LOGIQ Book XP Series

DICOM Image Storage allows the system to send or receive ultrasound images in a format that can be interpreted by PACS.

Figure 16-42. DICOM Image Storage Service Type

Table 16-45: DICOM Image Storage

Preset Parameter	Description
Reopen pr. image	Reopen per image
Allow raw data	Select to save data in both TruAccess (raw data) and DICOM format.Clear to save in DICOM format only.
Color Support	Select: Mixed, Gray or Color
Max Framerate	Select the maximum frame rate: Full, 25, or 30.
Allow Multiframe	Select to allow cine loop storage.
Compression	Select the compression type: None, Rle, or Jpeg.
Quality %	Set picture quality from 1 to 100%. A low picture quality level allows high data compression, while a high picture quality restrains the compression.

DICOM Performed Procedure

Option on LOGIQ Book XP Series

DICOM Performed Procedure provides an acknowledgement that a study has been performed.

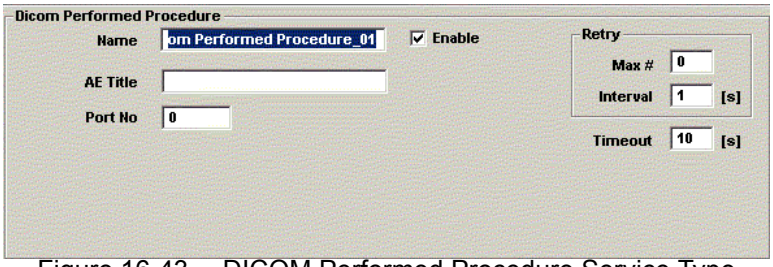


Figure 16-43. DICOM Performed Procedure Service Type

DICOM Print

Option on LOGIQ Book XP Series

DICOM Print provides the ability to send or receive ultrasound image data to DICOM printers.

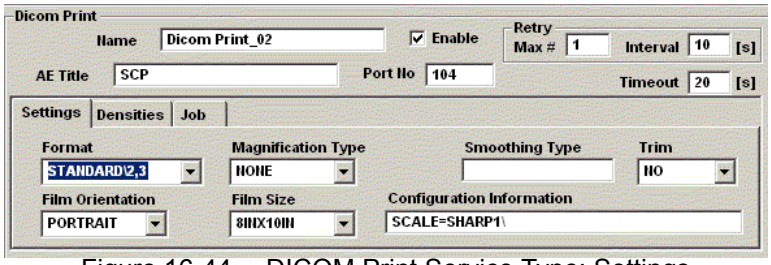


Figure 16-44. DICOM Print Service Type: Settings

Table 16-46: Settings

Preset Parameter	Description
Format	Indicates how many prints to print per page, for example, 1,1, 1,2, 1,3, up to 5,5. Partial prints are displayed as one print job.
Magnification Type	Specify how the printer magnifies the image to fit it onto the film.Replicate – Interpolated pixel are copies of the adjacent pixelsBilinear – Interpolated pixels are created by bilinear interpolations between the adjacent pixelsCubic – Interpolated pixels are created by cubic interpolations between the adjacent pixelsNone – No interpolation
Smoothing Type	Specify the printer's magnification interpolation for the output.
Trim	Specify whether you want a trim box to be printed around each image on the film: Yes or No.
Film Orientation	Specify whether to print the image Portrait (vertically) or Landscape (horizontally).
Film Size	Specify the dimensions of the film size: 8INx10IN, 10INx12IN, 10INx14IN, or 11INx14IN.
Configuration Information	Enter vendor-specific image quality settings.

DICOM Print (continued)

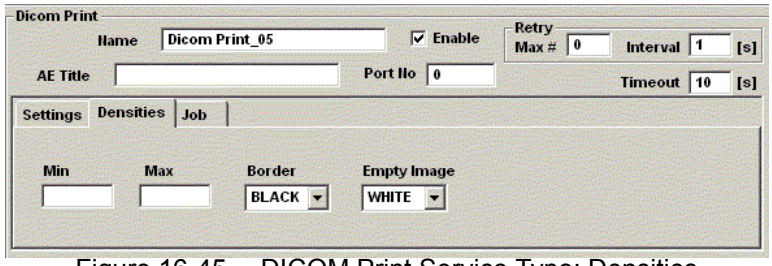


Figure 16-45. DICOM Print Service Type: Densities

Table 16-47: Densities

Preset Parameter	Description
Min	Enter a number indicating the minimum density level of the film.
Max	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.

DICOM Print (continued)

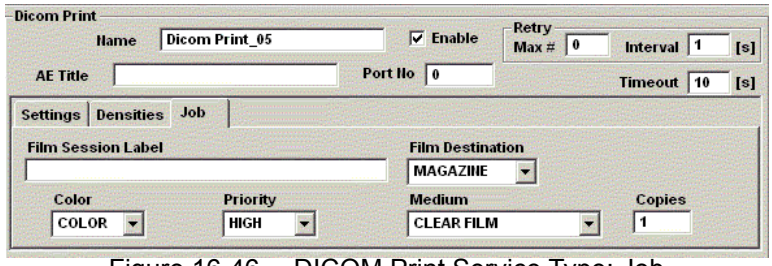


Figure 16-46. DICOM Print Service Type: Job

Table 16-48: Job

Preset Parameter	Description
Film Session Label	Type a name for the group of film labels associated with the print job.
Film Destination	Specify the film destination for the exposed filmMagazine – Store in a film magazineProcessor – Develop in a film processor
Color	Select whether to have the image Color or Gray.
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.

DICOM Media Storage

Option on LOGIQ Book XP Series

DICOM Media Storage provides the ability to send or receive ultrasound cine or multiframe images in a format that can be interpreted by PACS.

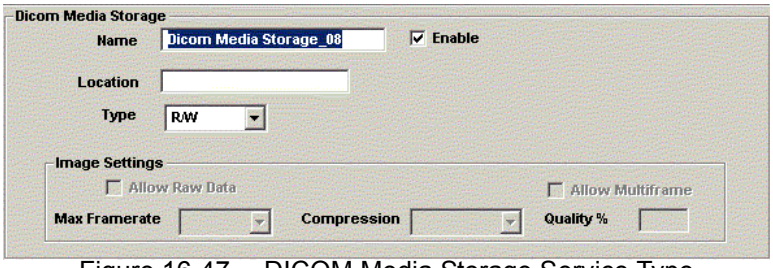


Figure 16-47. DICOM Media Storage Service Type

Table 16-49: DICOM Media Storage

Preset Parameter	Description
Location	Type the location of the media storage.
Type	Select the type of media storage: R or R/W.
Image Settings	Specify image parameters in this section.
Allow raw data	Select to save data in both TruAccess (raw) and DICOM format.Clear to save in DICOM format only.
Allow Multiframe	Select to allow cineloop storage.
Max Framerate	Select the maximum frame rate: Full, 25, or 30.
Compression	Select the compression type: None, Rle, Jpeg, or Lossless_Jpeg.
Quality %	Set picture quality from 1 to 100%. A low picture quality level allows high data compression, while a high picture quality uses less compression.

DICOM Storage Commitment

Option on LOGIQ Book XP Series

DICOM Storage Commitment provides acknowledgement from PACS that the study has been accepted into archive.

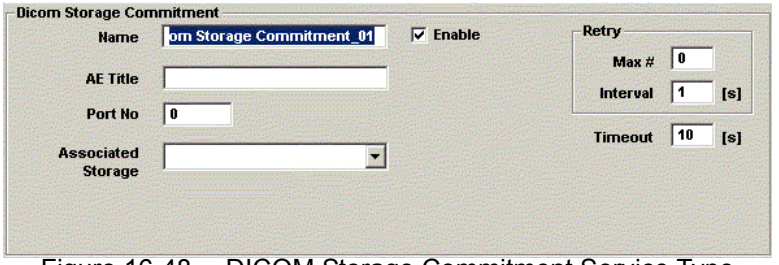


Figure 16-48. DICOM Storage Commitment Service Type

Table 16-50: DICOM Storage Commitment

Preset Parameter	Description
Associated Storage	This selection is based on the services entered by the user.

DICOM Worklist

Option on LOGIQ Book XP Series

DICOM Worklist provides a list of patients sorted by query parameters.

Figure 16-49. DICOM Worklist Service Type

Table 16-51: 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. See Figure 16-50.

DICOM Worklist (continued)

The Search Criteria dialog box allows you to define specific search parameters for the system to use when searching the patient database.

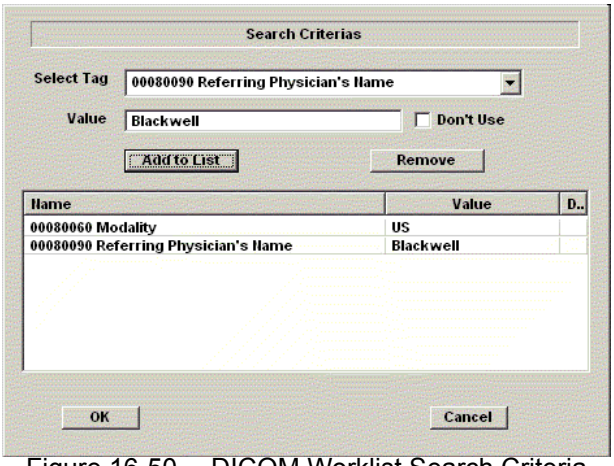


Figure 16-50. DICOM Worklist Search Criteria

DICOM Worklist (continued)

Table 16-52: DICOM Worklist Search Criteria

Preset Parameter	Description
Select Tag	Select the type of information that you want to define for search parameters, such as Referring Physician's Name, Pregnancy Status, Medical Alerts, or Requested Procedure Description. For a list of tags, See 'Search Criteria tags' on *page 16-79 for more information.*.
Value	Type the value of the Selected Tag item. For example, if you select Referring Physician's Name in the Select Tag field, you can enter the name of the physician in the Value field.
Don't Use	Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don't Use and then select Add to List.
Add to List	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.
Name	The name of a tag selected to use for search criteria.
Value	The value of the tag. For example, if the tag is Referring Physician's Name, this field contains the name of the referring physician.
Don't Use	Indicates if the Don't Use check box is selected for this tag.

Search Criteria tags

The following is a list of the tags in the Select Tag field of the DICOM Worklist Search Criteria dialog box (parameters may change).

- Modality
- Referring Physician's Name
- Referenced Study Sequence
- Referenced Patient Sequence
- Patient's Birth Time
- Other Patient IDs
- Patient's Size
- Patient's Weight
- Medical Alerts
- Contrast Allergies
- Ethnic Group
- Additional Patient History
- Pregnancy Status
- Patient Comments
- Study Instance UID
- Requesting Physician
- Requesting Service
- Requested Procedure Description
- Requested Procedure Code Sequence
- Admission Id
- Current Patient Location
- Scheduled Station AE Title
- Scheduled Procedure Step Start Time
- Scheduled Procedure Step Description
- Scheduled Action Item Code Sequence
- Scheduled Procedure Step ID
- Scheduled Station Name
- Scheduled Procedure Step Location
- Names of Intended Recipients of Results
- Req. Procedure Comments
- Imaging Service Request Comments

Echo Database V1.1

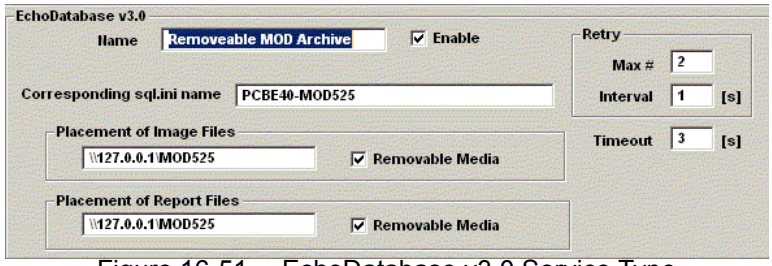


Figure 16-51. EchoDatabase v3.0 Service Type

Table 16-53: EchoDatabase

Preset Parameter	Description
Corresponding sql.ini name	The name of the sql.ini file.
Placement of Image Files	Enter the path to the image archive. If the image archive is on a removable disk, select Removable Media.
Placement of Report Files	Enter the path to the report archive. If the report archive is on a removable disk, select Removable Media.

Echo Database V3.0

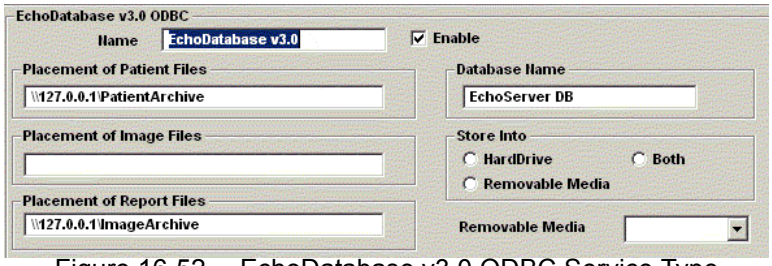


Figure 16-52. EchoDatabase v3.0 ODBC Service Type

Table 16-54: EchoDatabase ODBC

Preset Parameter	Description
Placement of Patient Files	Enter the path to the patient archive. If the patient archive is on a removable disk, select Removable Media.
Placement of Image Files	Enter the path to the image archive. If the image archive is on a removable disk, select Removable Media.
Placement of Report Files	Enter the path to the report archive. If the report archive is on a removable disk, select Removable Media.
Database Name	The name of the database.
Store into	Select HardDrive, Removable Media, or Both.
Removable Media	Select media.

EchoPac Media

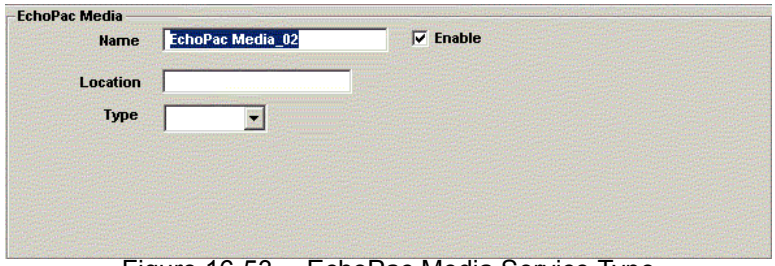


Figure 16-53. EchoPac Media Service Type

Table 16-55: EchoPac Media

Preset Parameter	Description
Location	Type the location of the media storage.
Type	Select the type of media storage: R or R/W.

Image to Buffer

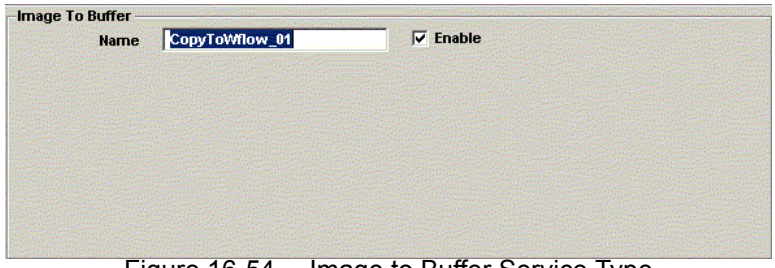


Figure 16-54. Image to Buffer Service Type

Standard Print

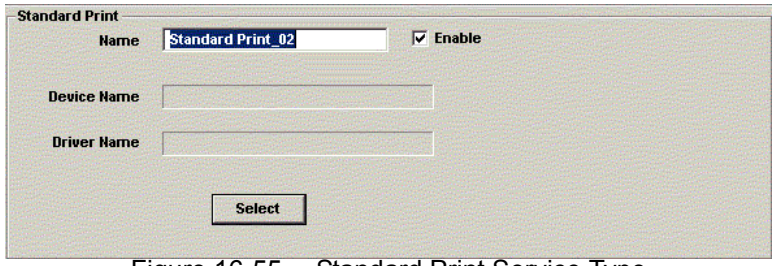


Figure 16-55. Standard Print Service Type

Table 16-56: Standard Print

Preset Parameter	Description
Device Name	The device name of the print service.
Driver Name	The name of the printer driver. The system automatically fills this in when the printer is located.
Select	Displays the Print Setup dialog box. Select to locate the printer device.

Buttons

You can assign print buttons to a device or to a dataflow.

NOTE: You can configure each print key to multiple output devices/ workflows.

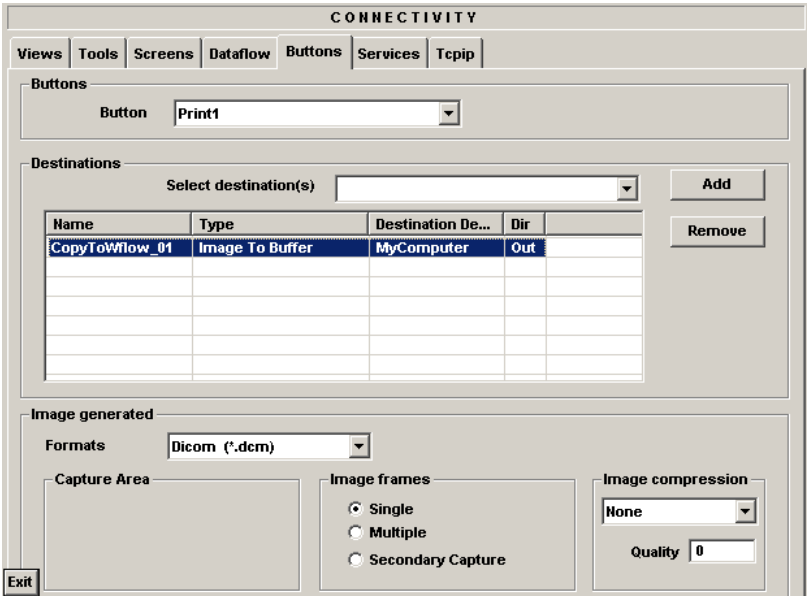


Figure 16-56. Connectivity Buttons Preset Menu

The Buttons screen has the following sections of information:

1. **Buttons** – Select the print button.
2. **Destinations** – Display, add, or remove services for the selected print button.
3. **Service Parameters** – Specify service parameters for the service currently selected in the Destinations section. The name and parameters in this section change, depending on the service that is currently selected.

Buttons (continued)

Table 16-57: Buttons

Preset Parameter	Description
Button	Select the print button.
Select destination	Select output services to associate to the selected button. The system displays the following information about the service:NameTypeServer – the device for which the service was configured.Dir – direction: input, output, or both (I+O). Only output services can be associated to the print buttons.
Add	Add selected service to the button.
Remove	Remove selected service from the button.
Service Parameters	The data in this section varies, depending on the type of service. For a description of service parameters, See ‘Services (Destinations)’ on *page 16-62 for more information.*

Capture Area Definitions

Video Area Video Area example:

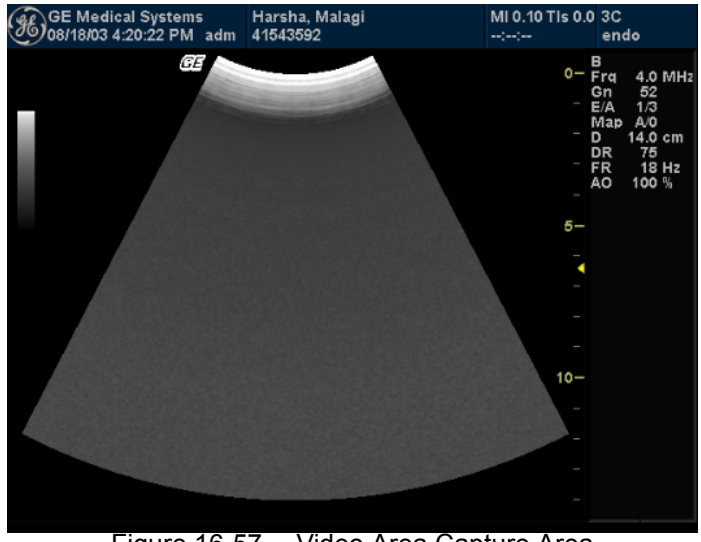


Figure 16-57. Video Area Capture Area

Image Area Image Area example:

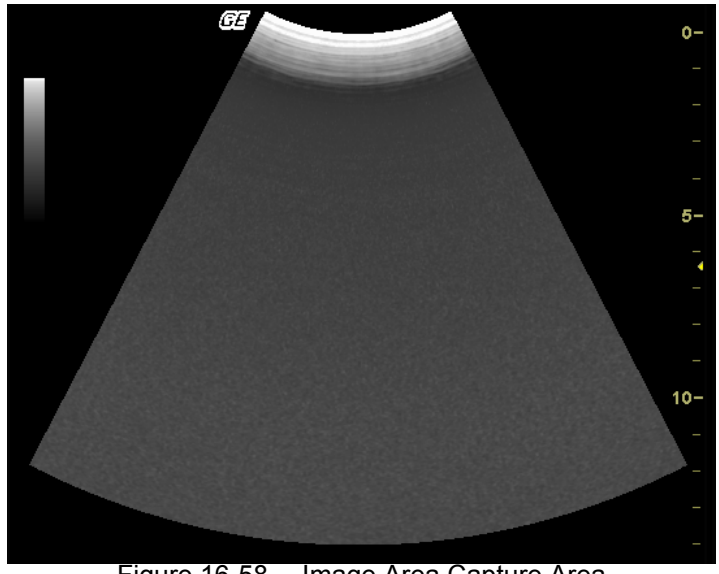


Figure 16-58. Image Area Capture Area

Capture Area Definitions (continued)

Whole Screen Whole Screen example:

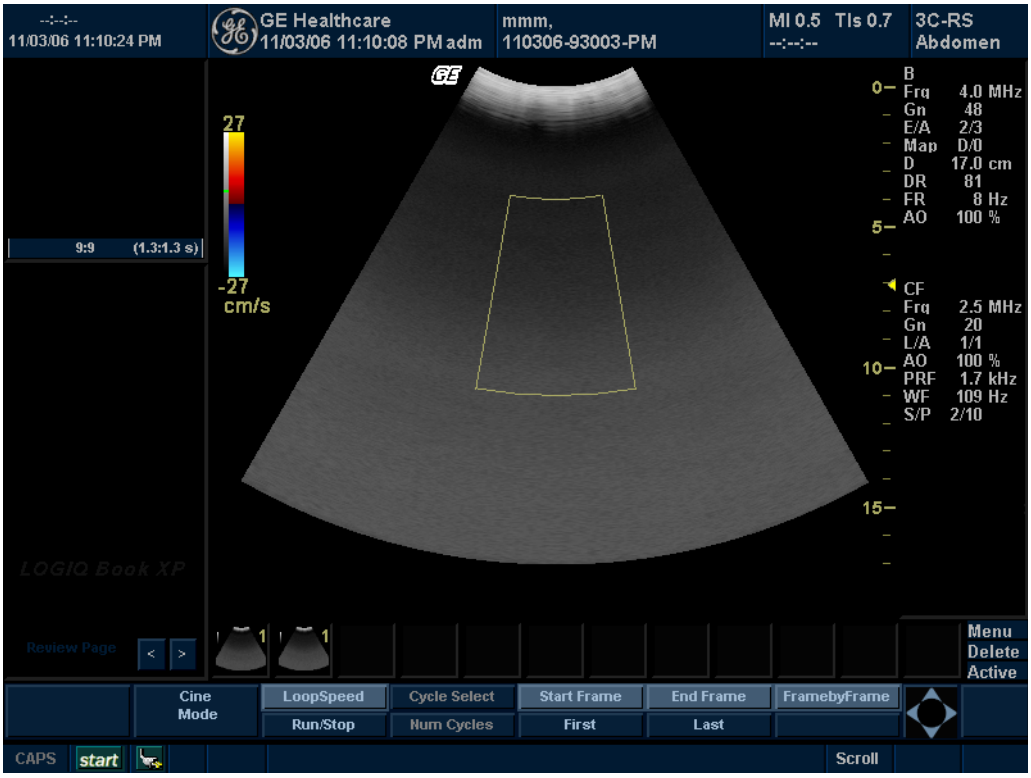


Figure 16-59. Whole Screen Capture Area

Adding a service to a Print key

NOTE: Only output services that have been configured can be associated to a dataflow. To configure a service, See 'Services (Destinations)' on page 16-62 for more information.

1. In the Button field, select one of the Print keys.
2. In the Destinations section, select a service from the Select destination(s) list (see Figure 16-56).
3. In the Destinations section, select Add.

   The new service is displayed in the destinations list. The destinations list displays the following information:

   - Name: user defined during service configuration
   - Type: the type of service
   - Destination Device: the device for which the service was configured
   - Dir: direction: output, input, or both (I+O)

NOTE: Only output services can be associated to the print keys.

4. In the Service Parameters section, set the parameters related to the service. The data in this section varies, depending on the type of service. For a description of service parameters,See 'Services (Destinations)' on *page 16-62 for more information.*

Removing a service from a Print key

1. In the Button field, select the print key you want to remove a service from.
2. In the destinations list, move the **Trackball** to the service you want to remove.
3. Press **Set** to highlight the service.
4. In the Destinations section, select Remove.

   The service is removed from the destinations list.

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.

NOTE: You must be logged on as Administrator to use the Dataflow tab.

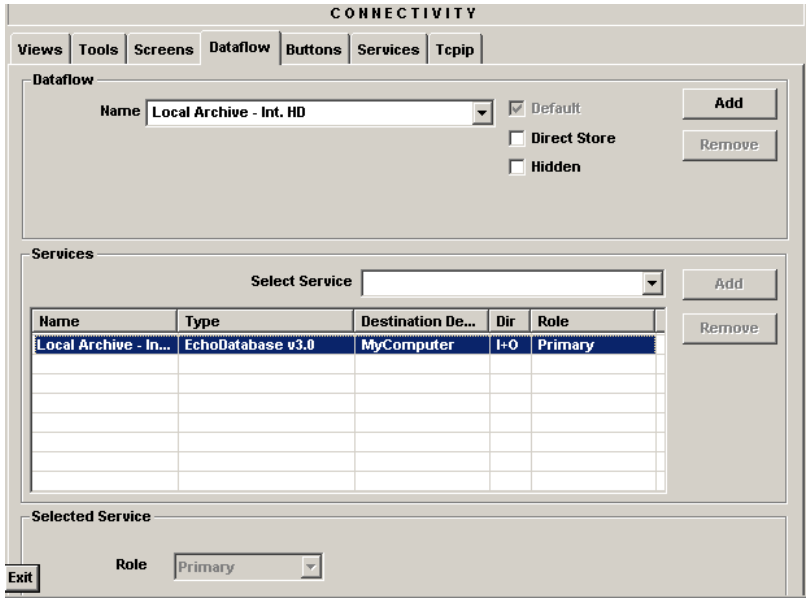


Figure 16-60. Connectivity Dataflow Preset Menu

The Dataflow screen has the following sections of information:

1. **Dataflow** – Displays information about dataflows. You can add dataflows, select from a list of currently existing dataflows, and remove a dataflow.
2. **Services** – Display, add, or remove services for the selected dataflow.
3. **Selected Service** – Display and select Role for the service currently selected in the Services section.

Dataflow (continued)

Table 16-58: Dataflow

Preset Parameter	Description
Name	Select the dataflow from the list.
Default	Select to use this dataflow as the default dataflow when you start the system.
Direct Store	Select to store data directly to archive (no buffer storage).
Hidden	Select to
Select Service	Select the services to associate to the selected dataflow. The system displays the following information about the service:NameTypeDestination Device – the device the service was configured for.Dir – direction: input, output, or both (I+O). Role – the priority of the service. See the following description of Role.
Role	Select the priority of the service:Primary - first priority (can be assigned to input, output, or I+O services). Secondary - second priority (can be assigned to input, output, or I+O services). Primary output - allows primary assignment to an output service even if an I+O service is already defined as primary. You can have a primary out with an I/O and a Primary with Input Service only. You cannot have a Primary In and Primary. If you assign a primary role to two services with the same direction, the system displays a warning. It prompts you to re-define one of the services as secondary.

Selecting the default dataflow

1. In the Dataflow section, in the Name field, select the dataflow.
2. Select Default.

   When you start the system, it selects the dataflow by default.
3. To have the system store data to the archive (no buffer storage), select Direct Store.

NOTE: When you select the Default check box, it becomes grey and cannot be cleared. To change the default dataflow, you must select another dataflow. This ensures that a default dataflow is always defined.

Adding a service to a dataflow

1. In the Dataflow section, in the Name field, select the dataflow.
2. In the Services section, select the service from the Select Service list.

*NOTE: In the Select Service list, the services are listed in the following format: service@destination device. For example, a print service named **DICOM Print_02** that is defined for a destination device of **Server09**, is listed as **DICOM Print_02@Server09**.*

3. Select the Add button to the right of the list.

   The system adds the service to the list of selected services.

NOTE: When you add a service to a dataflow, the system automatically assigns a Role of secondary. To change the Role, See 'Defining a service priority (Role)' on page 16-92 for more information.

Defining a service priority (Role)

A dataflow can have many input, output, or I+O services, but only one of each type can be primary. For output services, the primary service defines the image format and image data contents.

1. In the Dataflow section, in the Name field, select the dataflow.
2. In the Services section, select the service.
3. In the Selected Service section, in the Role field, select the role for the service.
   - Primary – first priority (can be assigned to input, output, or I+O services).
   - Secondary – second priority (can be assigned to input, output, or I+O services).
   - Primary output – allows primary assignment to an output service. With a primary I/O, Primary Out or In are allowed.
   - Primary input – allows primary assignment to an input service. With a primary I/O, Primary Out or In are allowed.

NOTE: Only one primary role is available. The primary service specifies what always happens first to incoming or outgoing data. If you assign a primary role to two services with the same direction, the system displays a warning.

Adding a dataflow

1. In the Dataflow section, select Add.

   The system adds a new dataflow, with a default name such as Workflow05.
2. To change the name of the dataflow, move the **Trackball** to the Name field, press **Set**, and type a new name.

   The system displays a message to confirm that you want to change the name.
3. Select Yes.

Removing a dataflow or service

1. Select the dataflow or service.
2. Select the appropriate Remove button.

   The system displays a warning message to confirm that you want to remove the dataflow or service.
3. Select OK.

Dataflow (continued)

The following table lists dataflows that are pre-configured with the ultrasound system.

Table 16-59: Dataflows

Dataflow	Description
No Archive	Performs an exam without storing the data to the archive.
Local Archive - Int. HD	Local archive internal hard driveUses the local database for patient archiving.Stores images to the internal hard drive.
Local Archive - Int. HD/MOD	Local archive internal hard drive and Magneto-Optical DiskUses the local database for patient archiving.Stores images to the internal hard drive (raw data) and to a MOD as DICOM Media.NOTE: LocArch-HD/MOD enables only “pure” DICOM to both destinations, or both DICOM and raw data to both destinations.
Remote Archive - Remote HD	Remote archive remote hard driveUses a remote database (either on EchoPAC workstation or on EchoServer) for patient archiving.Stores images to a network image volume (either internal HD on EchoPAC workstation or EchoServer volume).
Remote Archive - MOD	Remote archive Magneto-Optical DiskUses a remote database (either on EchoPAC workstation or on EchoServer) for patient archiving.Stores images to a MOD.
Worklist/Local Archive - DICOM Server/Int. HD	Modality Worklist local archive DICOM server and local hard driveSearches the DICOM Modality Worklist. Copies the patient information to the local database. Stores the patient information and the examination results to the local the database.Stores images to a DICOM Server and to an image volume on the local hard drive.NOTE: WL-LA-DServ: Does not search the local database, only the DICOM Modality Worklist.

Screens

The Screens tab allows you to configure tools related to patient management. You can specify default system functionality such whether patient ID is required when you archive data, and if you want the system to automatically search the archive for a patient when you enter patient data.

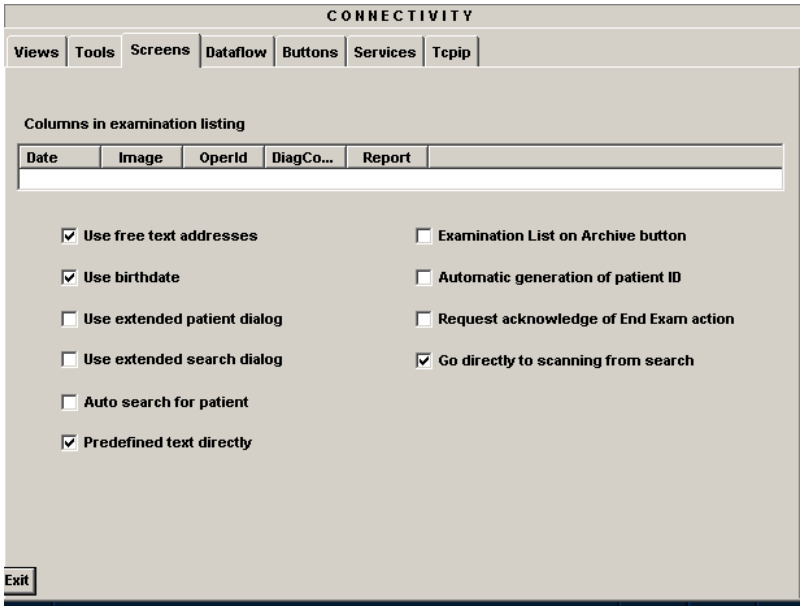


Figure 16-61. Connectivity Screens Preset Menu

Screens (continued)

Table 16-60: Screens

Preset Parameter	Description
Columns in examination listing	Select the columns to add to or delete from the Examination list window.
Use free text addresses	In the Patient information window:When selected, the address information is entered in a single field (free text).When cleared, the address information (e.g. street, city, etc.) is entered in type-specific fields.
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).
Use extended patient dialog	In the Patient information window:When selected, the entire patient information data is displayed. When cleared, patient information data displayed is restricted to a minimum (for example, Name and Patient ID).NOTE: When cleared, to display the entire patient information data in the Patient information window, press More.
Use extended search dialog	In the Search/Create Patient window:When selected, all the searching filters are displayed as default.When cleared, the searching criteria are restricted to a minimum.NOTE: When cleared, to display all the searching filters in the Search/Create Patient window, press More.
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.
Pre-defined text directly	In the Examination list window:When selected, the Insert text key launches pre-defined text input.When cleared, the Insert text key opens the extended text field.
Examination List on Archive button	When a patient is selected, and the user selects Archive:When selected, opens the Examination list window for the selected patient.When cleared, opens the Patient Information window for the selected patient.

Table 16-60: Screens

Preset Parameter	Description
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.
Request acknowledge of End Exam action	When selected, the user is asked to confirm action when ending an examination.
Go directly to scanning from search	When selected, the system goes directly to the Scanning screen after the user selects or creates a patient record.When cleared, after you select or create a patient record, the system displays the Patient information window for further information entry. You must select Begin Exam to go to the scanning screen.

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.**

   The system displays a list of options.
3. Do one of the following:
   - To create a new column to the left of the selected column, select INSERT.
   - To delete the selected column, select DELETE.
   - To select the information to display in the selected column, select from the list of data fields.
4. Press **Set**.

Tools

The Tools tab allows you to:

- Verify the DICOM directory on removable media
- Format removable media (MO disk, rewritable CD, or ZIP disk)
- Copy CD Viewer

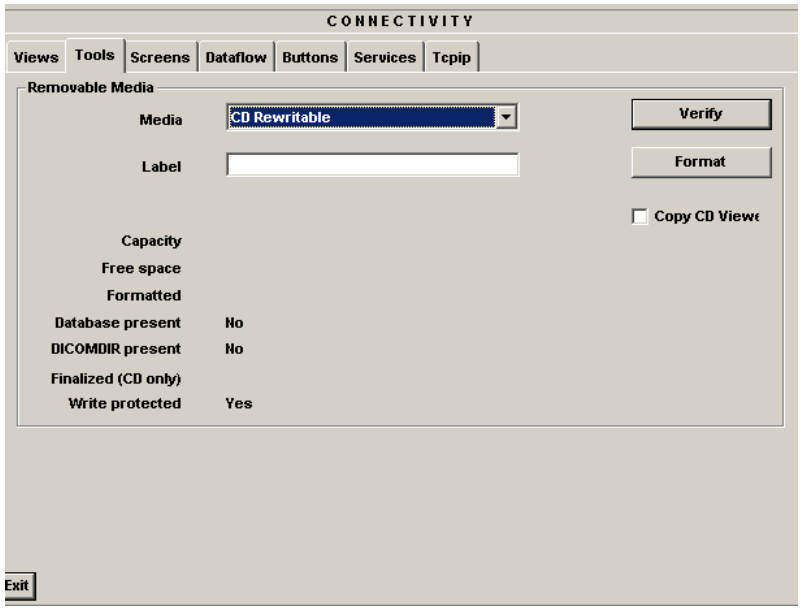


Figure 16-62. Connectivity Tools Preset Menu

Tools (continued)

Table 16-61: Tools

Preset Parameter	Description
Media	Select the removable media to format or verify.
Label	Type a label for a new removable MO disk (free text).
Verify	Select to verify DICOM directory on removable DICOM disk.
Format	Select to format removable media.
Copy CD Viewer	CD-Viewer application can open individual images from the archiving CD on a PC.

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.

Verifying removable media

1. Select the removable media from the Media list.
2. Select Verify.

Views

Views shows you an overview of the Ultrasound system's connectivity architecture:

- The currently selected dataflow
- All configured dataflows
- The network structure tree
- The configured buttons dataflows

Views also allows you to verify service connectivity.

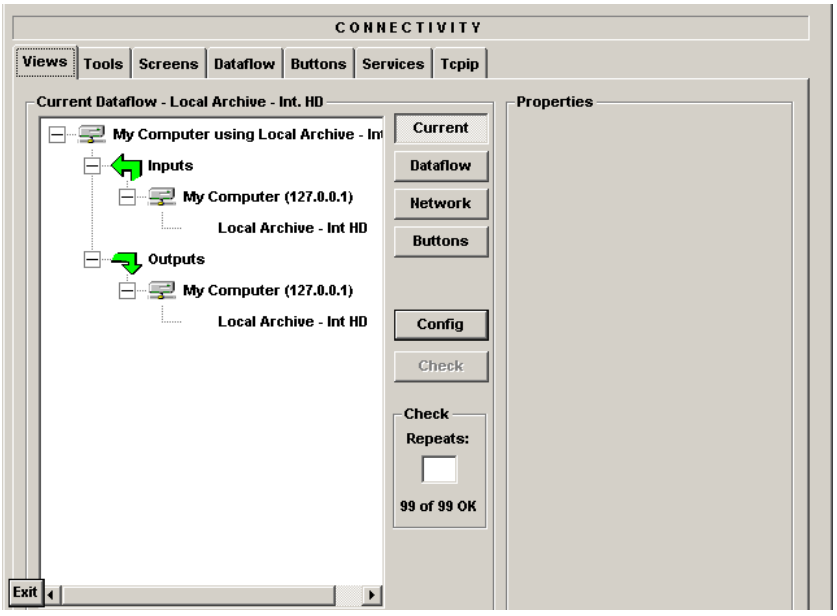


Figure 16-63. Connectivity Views Preset Menu

Views (continued)

Table 16-62: Views

Preset Parameter	Description
Current	Select to show the current dataflow hierarchy.
Dataflow	Select to show all dataflows.
Network	Select to show network structure tree.
Buttons	Select to show configured buttons dataflows.
Config	Select to go to the Services tab and configure this service.
Check	Select to verify connectivity for a device or service.If the service is a ***, the system performs a TCPIP ping.If the service is a ***, the system performs a DICOM echo.
Properties	Lists information about the selected device or service.

A dataflow is a set of services. When you select one of the configured dataflows, the ultrasound system is automatically set up according to the services associated with the selected dataflow. For information about editing dataflows, See ‘Dataflow’ on *page 16-89 for more information.*

Each view includes a structure tree on the left and properties on the right. The properties section lists information about the selected service. The information shown in each view is as follows:

Current dataflow

The current dataflow view displays a three-level structure tree showing the following information:

- The name of the current dataflow (Level 1)
- The type of services associated to the dataflow (input or output services) (Level 2)
- A list of the services configured for the current dataflow (Level 3)

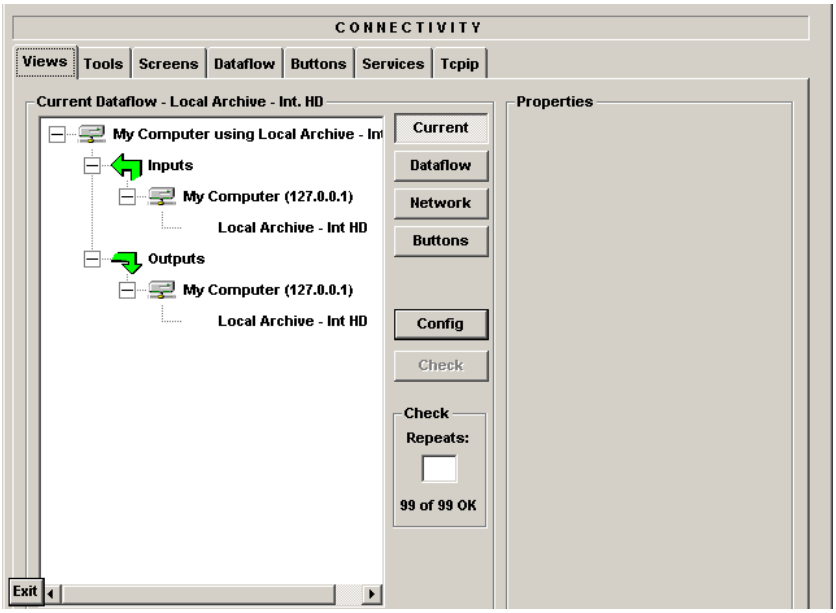


Figure 16-64. Connectivity Views: Current Dataflow

Dataflow overview

The dataflow overview displays a three-level structure tree showing the following information:

- A list of the dataflows configured (Level 1)
- The network devices (Level 2)
- The services associated to the dataflows (Level 3)

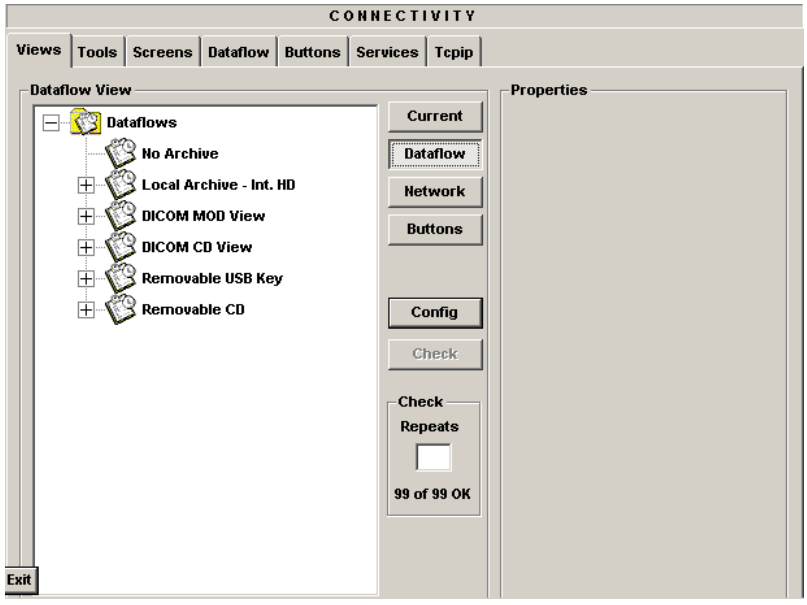


Figure 16-65. Connectivity Views: Dataflows

Network overview

The network overview displays a three-level structure tree showing the following information:

- The network (Level 1)
- Connected devices (Level 2)
- The services configured for each device (Level 3)

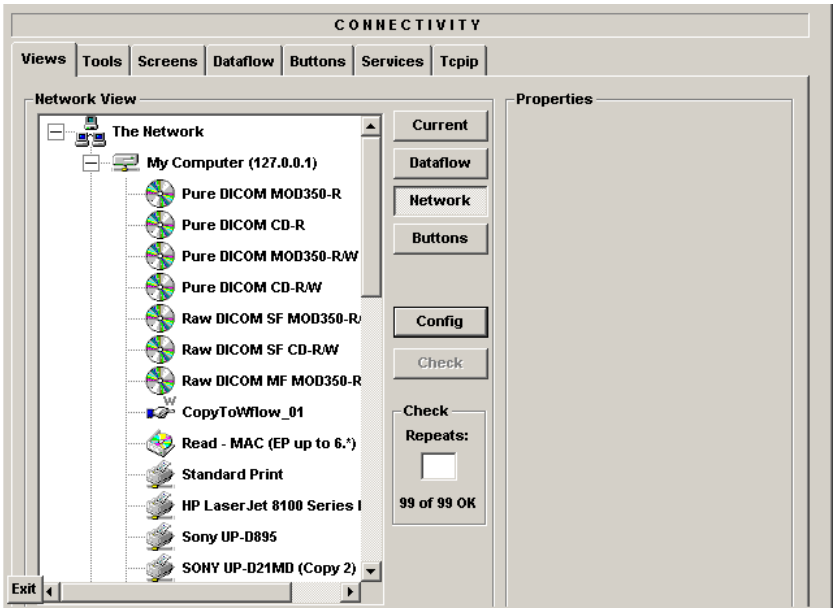


Figure 16-66. Connectivity Views: Network View

Buttons overview

The buttons overview displays a three-level structure tree showing the following information:

- The dataflows configured for the print keys (Level 1)
- The destination device for the print key (Level 2)
- The services associated to the buttons (Level 3)

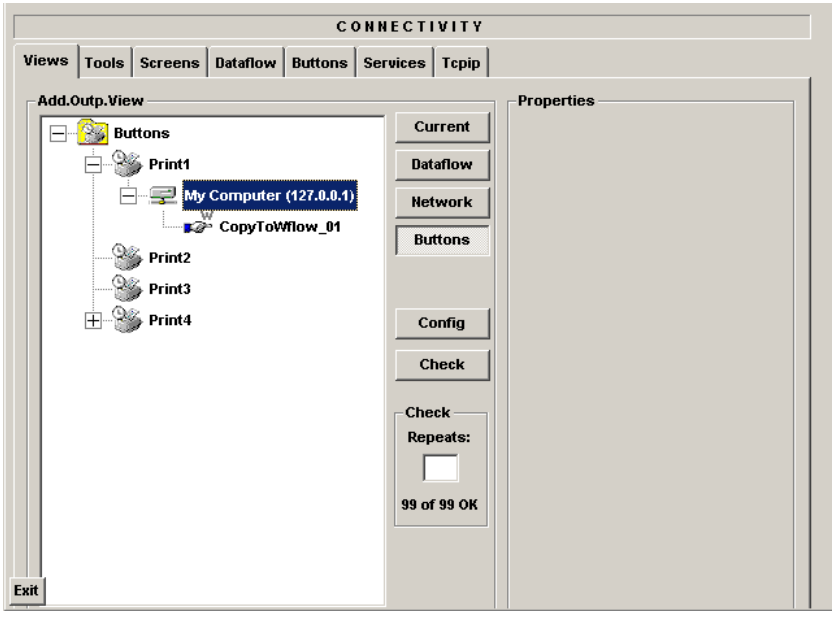


Figure 16-67. Connectivity Views: Add.Outp.View–Buttons

Viewing device or service properties

To display the properties information for a device or service:

1. If necessary, select the + on the structure tree to expand the level.
2. Move the **Trackball** to the device or service.
3. Press **Set** to highlight the device or service.

   The system displays information related to the device or service in the Properties section.

Verifying that a device is connected to the network

To verify that a service is connected to the network, from the Views Menu, select the device and then select Check.

If the service is connected to the network, the system displays a green check mark to the left of the service icon and name. If the service is not connected, the system displays a red X.

Measure

Please refer to Chapter 7, General Measurements and Calculations for more information on setting up Measurement and Analysis Presets.

System Administration

Overview

The Admin screen has the following sections:

- **Users** – allows you to define user IDs, specify operator's registration, operator's rights, and registration of staff related to an examination (for example, referral doctors and sonographers).
- **Logon** – defines logon procedures.
- **System Administration** – lists all the options implemented in the system.
- **Key Configuration** – allows you to program function keys to your preferences.
- **Start Menu** – allows the Field Engineer to customize the start menu.

Users

The Users screen allows you to define user IDs. It also allows you to specify operators registration, operator's rights setting, and registration of staff related to an examination (for example, referring and interpreting physicians).

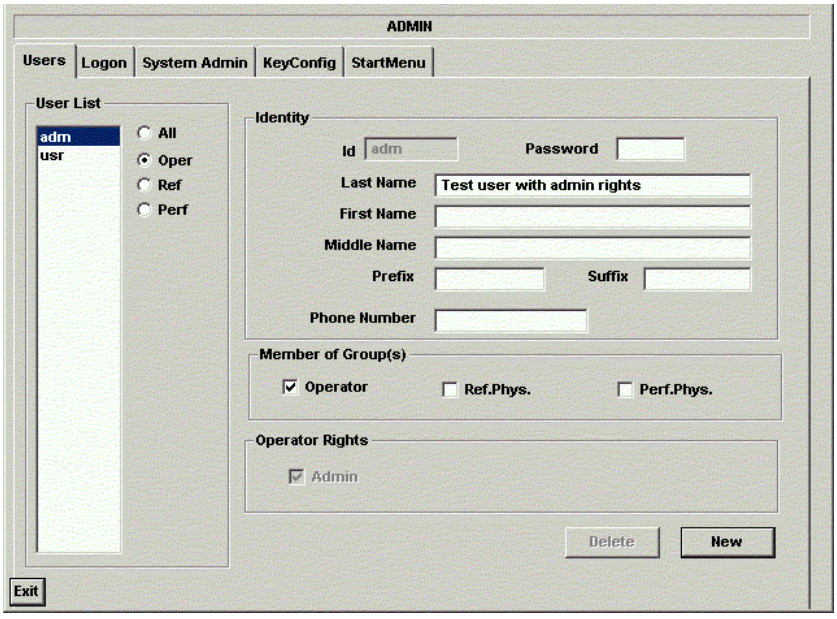


Figure 16-68. Administrative System Admin Preset Menu

Users (continued)

Table 16-63: User List

Preset Parameter	Description
User List	Lists the user ID for operators and other staff defined in the system. You can choose to display all user IDs, or only those for one of the following specific groups:Oper – operatorRef – referring physicianDiag – diagnostic physician

Table 16-64: Identity

Preset Parameter	Description
Id	The operator's user ID.
Password	The operator's password.
Full Name	The operator's name.
Member of Group(s)	Select any of the following:Operator – sonographers, doctors, or any person using the ultrasound system.Ref.Doc. – referring physician can be associated to the patient examination in the extended Patient information window. Has no user rights.Diag.Phys. – diagnostic physician can be associated to the patient examination in the extended Patient information window. Has no user rights.
Operator Rights	Admin – If selected, the operator has extended rights with access to the Admin setup functionality. The operator can also perform advanced operations such as patient record deletion, import, and export.

Creating a user

1. Select New.
2. Type the user ID and password.
3. Type the user's full name.
4. Select the user's group or groups.
5. If the user needs full configuration and advanced operations access, select Admin.

Changing a user configuration

1. Move the **Trackball** to a user ID in the User List.
2. Press **Set**.
3. Make the desired changes.

Deleting a user

1. Move the **Trackball** to a user ID in the User List.
2. Press **Set**.
3. Select Delete.

   The user is removed from the User List.

Logon

The Logon section defines log on procedures.

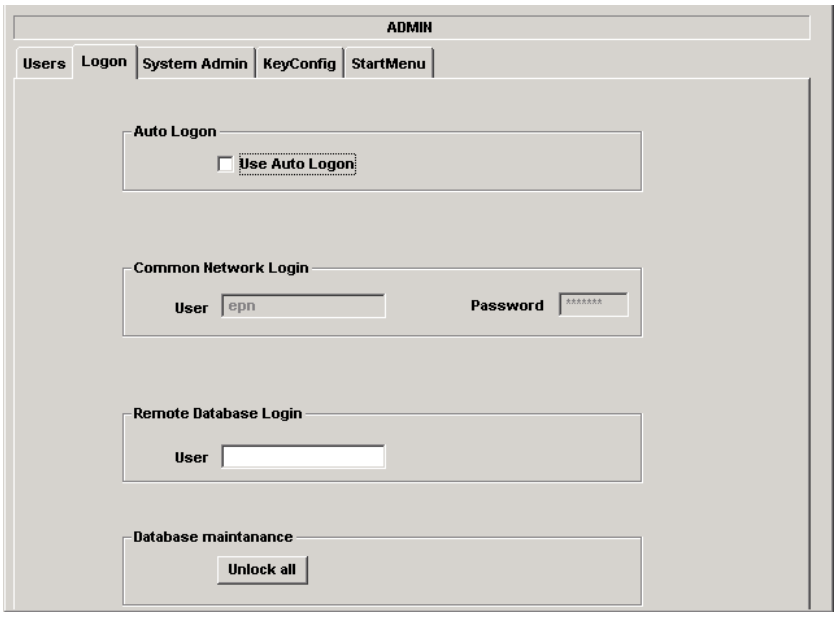


Figure 16-69. Administrative Logon Preset Menu

Table 16-65: Logon

Preset Parameter	Description
Auto Logon	Defines logon procedures: • When cleared, to log on the user must select a user ID and enter a password. • When selected, the system is started automatically, using the last user logon.
Common Network Login	Define the user ID and password used to access the network.User – User ID for network accessPassword – Password for network access
Remote Database Login	Define the user ID for database access.
Database Maintenance	Unlocks all patients.

System Admin

The System Admin screen has information about any options implemented for the system.

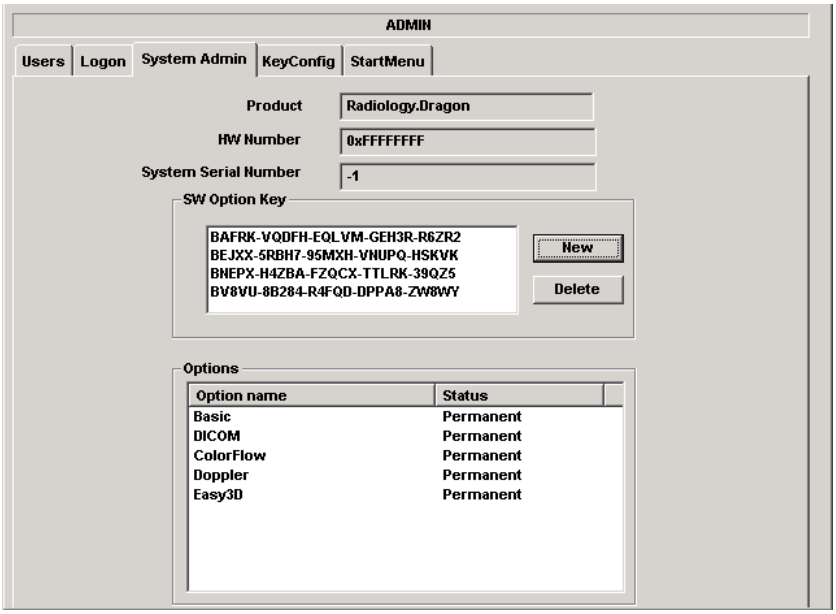


Figure 16-70. Administrative System Admin Preset Menu

Table 16-66: System Administration

Preset Parameter	Description
Product	The name of the product.
HW Number	The hardware number of the product.
System Serial Number	The serial number of the system.
SW Option Key	The software option key.
New	To enter a new software option key, select New and then enter the software option key.
Delete	To remove a software option key, select the key in the SW Option Key list, and then select Delete.
Options	A list of the option name and status.

Key Configuration

The Key Configuration screen allows you to program function keys to your preference.

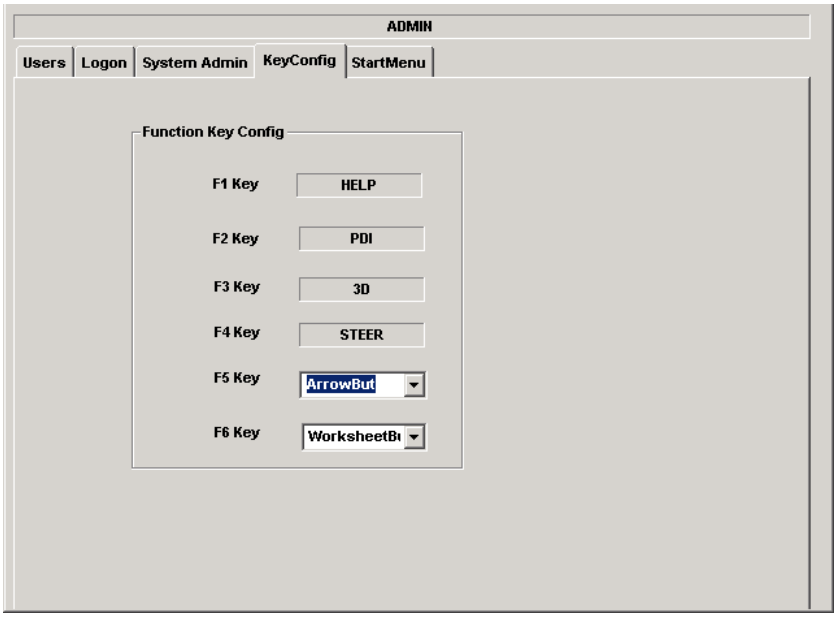


Figure 16-71. Administrative Key Configuration Preset Menu

Table 16-67: Key Configuration

Preset Parameter	Description
F1Key	Help (non-programmable)
F2 Key	PDI (non-programmable)
F3 Key	3D (non-programmable)
F4 Key	Steer (non-programmable)
F5 Key	The following functions are programmable: Arrows, Eject, Report, Spooler, Utility, Veterinary, Worksheet, ECG or Harmonic.
F6 Key	The following functions are programmable: Arrows, Eject, Report, Spooler, Utility, Veterinary, Worksheet, ECG or Harmonic.

Easy 3D not available on LOGIQ Book XP PRO

Start Menu

The Start Menu screen allows the Field Engineer to program the Start Menu.

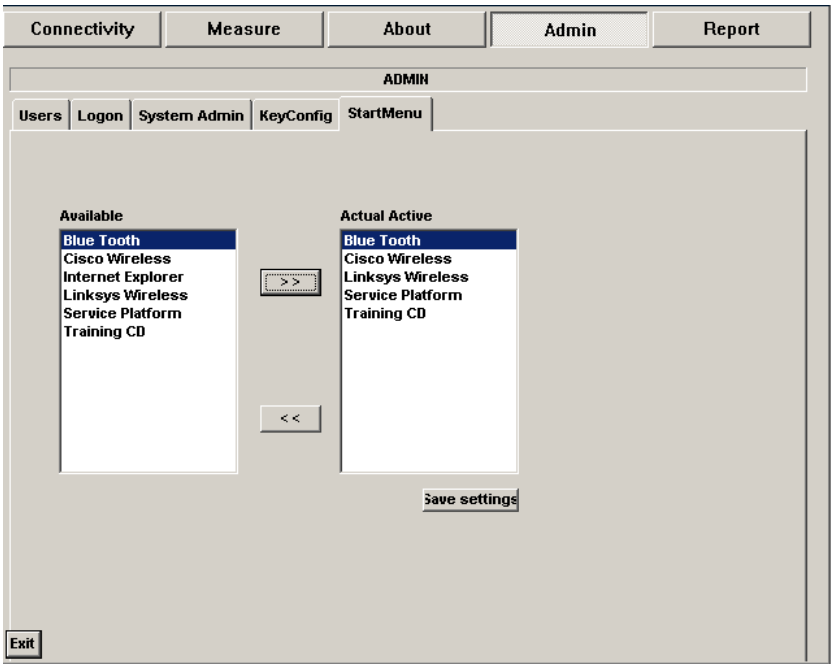


Figure 16-72. Start Menu Preset Menu

Table 16-68: Start Menu

Preset Parameter	Description
Available	All the available items in the Start Menu list.
Actual Active	Current Start Menu's enabled item list.

Chapter 17

Probes and Biopsy

This chapter consists of the information of each probe and describes some special concerns, biopsy kits and accessories as well as basic procedures for attaching a bispsy 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 (refer to Figure 17-1). This mark is used to identify the end of the probe corresponding to the side of the image having the orientation mark on the display.

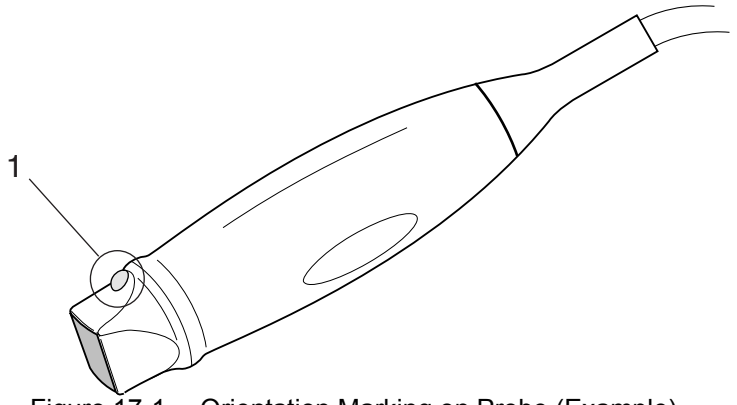


Figure 17-1. Orientation Marking on Probe (Example)

1. Orientation Mark

Labeling

Each probe is labeled with the following information:

- Seller's name and manufacturer
- 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.

Labeling (continued)

Figure 17-2. Probe Adapter Label

Labeling (continued)

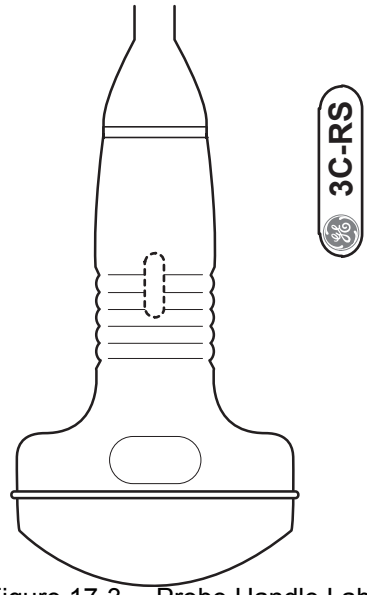


Figure 17-3. Probe Handle Labels

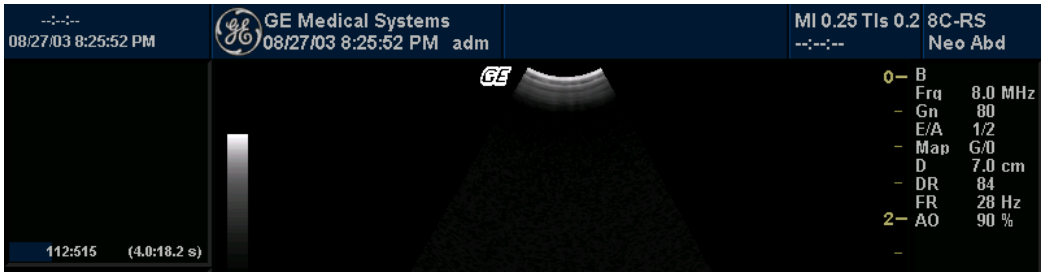


Figure 17-4. Displayed Probe Information

LOGIQ Book XP Series Applications

Table 17-1: Probe Indications for Use

Probe Application	3C-RS	E8C-RS	8L-RS	8C-RS
Abdomen	X			0
Small Parts			X	
Obstetrics	X	X		
Gynecology	X	X		
Pediatrics	X		0	X
Neonatal			0	X
Urology	X	0		
Cardiac				0
Endocavitary		X		
Transcranial				
Intraoperative			0	0
Vascular	0		X	0
Biopsy	X	X	X	
X Main Application		0 Accessory Application		

LOGIQ Book XP Series Applications (continued)

Table 17-2: Probe Indications for Use (continued)

Probe Application	i12L-RS	3S-RS	i739-RS	T739-RS
Abdomen		0		
Small Parts	0			
Obstetrics		0		
Gynecology		0		
Pediatrics	0	0		
Neonatal	0			
Urology		0		
Cardiac		X		
Endocavitary				
Transcranial		X		
Intraoperative	X		X	X
Vascular	X	0		
Biopsy				
X Main Application		0 Accessory Application		

LOGIQ Book XP Series Features

Table 17-3: Probe Features

Probe Application	3C-RS	E8C-RS	8L-RS	8C-RS
Virtual Convex			X	
Easy 3D—Not available on LOGIQ Book XP PRO	X	X	X	X
TruAccess	X	X	X	X
PDI	X	X	X	X

Probe Application	i12L-RS	3S-RS	i739-RS	T739-RS
Virtual Convex				
Easy 3D—Not available on LOGIQ Book XP PRO	X	X		X
TruAccess	X	X		X
PDI	X	X		X

Specifications

Table 17-4: System Probe Definitions

Probe Designation	Center Image Frequency [MHz]
3C-RS	3.8 ± 20%
E8C-RS	6.5 ± 20%
8L-RS	6.2 ± 20%
8C-RS	6.5 ± 20%
i12L-RS	5.6 ± 20%
3S-RS	2.0 ± 20%
i739-RS	6.5 ± 20%
T739-RS	6.5 ± 20%

Probe Usage

For details on connecting, activating, deactivating, disconnecting, transporting and storing the probes, See ‘Probes’ on *page 3-33 for more information.*

Care and Maintenance

Inspecting probes

Perform After Each Use

Inspect the probe's lens, cable, casing, and connector. Look for any damage that would allow liquid to enter the probe. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative.

NOTE: *Keep a log of all probe maintenance, along with a picture of any probe malfunction.*

Environmental Requirements

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

CAUTION

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

Table 17-5: Probe Environmental Requirements

	Operational	Storage	Transport
Temperature	10° - 40° C 50° - 104° F	-5° - 50° C 14° - 140° F	-5° - 50° C -40° - 140° F
Humidity	30 - 75 % non-condensing	10 - 90% non-condensing	10 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

Probe Safety

Handling precautions

Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. DO NOT use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

Electrical shock hazard

The probe is driven with electrical energy that can injure the patient or user if live internal parts are contacted by conductive solution:

- **DO NOT** immerse the probe into any liquid beyond the level indicated by the immersion level diagram. Refer to Figure 17-5. 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 verfify functional and safe performance. You must perform a more thorough inspection, including the cable, strain relief, and connector, each time you clean the probe.
- Before inserting the connector into the probe port, inspect the probe connector pins. If a pin is bent, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative.
- **DO NOT** kink, tightly coil, or apply excessive force on the probe cable. Insulation failure may result.
- Electrical leakage checks should be performed on a routine basis by GE Service or qualified hospital personnel. Refer to the service manual for leakage check procedures.

Mechanical hazards

CAUTION

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. The pin of a probe connector may bend.

Special handling instructions

Using protective sheaths

Protective barriers may be required to minimize disease transmission. Probe sheaths are available for use with all clinical situations where infection is a concern. Use of legally marketed, sterile probe sheaths is strongly recommended for intra-cavitary and intra-operative procedures. Use of legally marketed, sterile, pyrogen free probe sheaths is REQUIRED for neurological intra-operative procedures.

Instructions. Custom made sheaths are available for each probe. Each probe sheath kit consists of a flexible sheath used to cover the probe and cable and elastic bands used to secure the sheath.

Sterile probe sheaths are supplied as part of biopsy kits for those probes intended for use in biopsy procedures. In addition to the sheath and elastic bands, there are associated accessories for performing a biopsy procedure which are included in the kit. Refer to the biopsy instructions for the specific probes in the Discussion section of this chapter for further information.

Reordering. To reorder sheaths, please contact your local distributor or the appropriate support resource.

Devices containing latex may cause severe allergic reaction in latex sensitive individuals. Refer to FDA's March 29, 1991 Medical Alert on latex products.

Do not use pre-lubricated condoms as a sheath. In some cases, they may damage the probe. Lubricants in these condoms may not be compatible with probe construction.

DO NOT use an expired probe sheath. Before using probe sheaths, verify whether the term of validity has expired.

Endocavitary Probe Handling Precautions

If the sterilization solution comes out of the endocavitary probe, please follow the cautions below.

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 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 the the sterilant's instruction manual.

Sterilant Exposure from Probe 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 connector before scanning the paitent. If sterilant comes into contact with the patient, refer the the sterilant's instruction manual.

Endocavitary Probe Point of Contact—Refer to the sterilant's instruction manual.

Probe handling and infection control

This information is intended to increase user awareness of the risks of disease transmission associated with using this equipment and provide guidance in making decisions directly affecting the safety of the patient as well as the equipment user.

Diagnostic ultrasound systems utilize ultrasound energy that must be coupled to the patient by direct physical contact. Depending on the type of examination, this contact occurs with a variety of tissues ranging from intact skin in a routine exam to recirculating blood in a surgical procedure. The level of risk of infection varies greatly with the type of contact.

One of the most effective ways to prevent transmission between patients is with single use or disposable devices. However, ultrasound transducers are complex and expensive devices that must be reused between patients. It is very important, therefore, to minimize the risk of disease transmission by using barriers and through proper processing between patients.

Risk of Infection. ALWAYS clean and disinfect the probe between patients to the level appropriate for the type of examination and use FDA-cleared probe sheaths where appropriate. See Chapter 18 for ordering information.

Adequate cleaning and disinfection are necessary to prevent disease transmission. It is the responsibility of the equipment user to verify and maintain the effectiveness of the infection control procedures in use. Always use sterile, legally marketed probe sheaths for intra-cavitary and intra-operative procedures.

For neurological intra-operative procedures, use of a legally marketed, sterile, pyrogen free probe sheath is REQUIRED. Probes for neuro surgical use must not be sterilized with liquid chemical sterilants because of the possibility of neuro toxic residues remaining on the probe.

Probe Cleaning Process

Cleaning probes

Perform After Each Use

To clean the probe:

1. 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.
2. Wash the probe with mild soap in lukewarm water. Scrub the probe as needed using a soft sponge, gauze, or cloth to remove all visible residue from the probe surface. Prolonged soaking or scrubbing with a soft bristle brush (such as a toothbrush) may be necessary if material has dried onto the probe surface.
3. Rinse the probe with enough clean potable water to remove all visible soap residue.
4. Air dry or dry with a soft cloth.

Cleaning probes (continued)

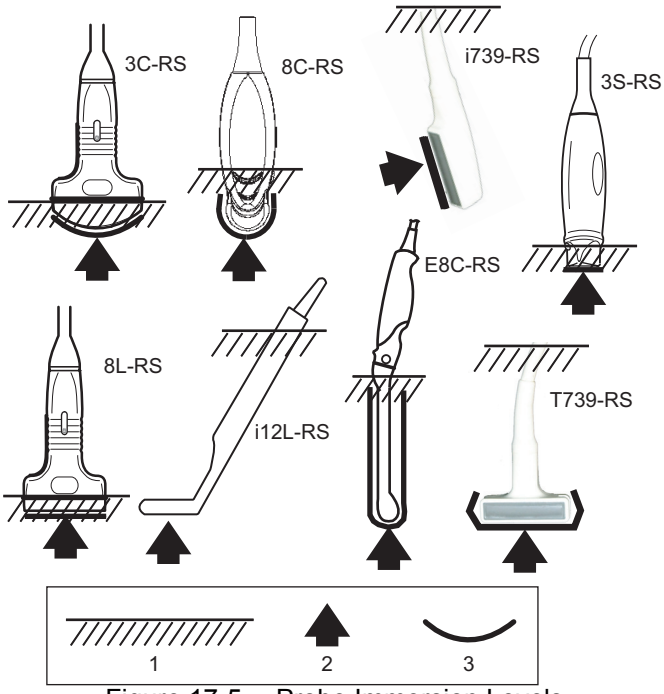


Figure 17-5. Probe Immersion Levels

1. Fluid Level
2. Aperature
3. Contact face within Patient Environment

Disinfecting probes

Perform After Each Use

Ultrasound probes can be disinfected using liquid chemical germicides. The level of disinfection is directly related to the duration of contact with the germicide. Increased contact time produces a higher level of disinfection.

Refer to the probe care card. To view the probe care cards online, the website is the following:

http://www.gehealthcare.com/usen/ultrasound/products/probe_care.html

Table 17-6: Description of Pictogram on Care card

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.

Disinfecting probes (continued)

The following high level disinfectant agents have been approved for use with all probes:

- Cidex OPA
- Cidex

Cidex Plus has been approved for the 8C, 8C-RS, 4DE7C, and 4D3C-L probes.

Sporox II high level disinfectant has been approved for the 7L, 10L, 12L, 4S, 8C, 8C-RS, E8C, E8C-RS, P5D, and P8D probes.

Pera Safe high level disinfectant has been approved for the 7L, 10L, 12L, M7C, M12L, E8C, E8C-RS, 4DE7C, 4D3C-L, and 4D10L probes.

The following low level disinfect agents have been approved for use with all probes:

- Ster Bac Blu
- Sani-Cloth HB (Wipes)

T-Spray and T-Spray II low level disinfectant has been approved for the 7L, 10L, 12L, M7C, M12L, 4S, E8C, E8C-RS, 4DE7C, 4D3C-L, and 4D10L probes.

Virex II 256 low level disinfectant has been approved for the 7L, 10L, 12L, M7C, M12L, E8C and E8C-RS probes.

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.

You MUST disconnect the probe from the LOGIQ Book XP Series prior to cleaning/disinfecting the probe. Failure to do so could damage the system.

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.

Disinfecting probes (continued)

1. Prepare the germicide solution according to the manufacturer's instructions. Be sure to follow all precautions for storage, use and disposal.
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).

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.

3. After removing from the germicide, rinse the probe following the germicide manufacturer's rinsing instructions. Flush all visible germicide residue from the probe and allow to air dry.

CREUTZFIELD-JAKOB DISEASE

Failure of the probe sheath or direct contact of the probe with dura or any intra-cranial tissue of patients with Creutzfield-Jakob disease requires that the probe be destroyed. There is no effective means for decontamination of the probe. For more information, see the Center of Disease Control and Prevention http://www.cdc.gov/ncidod/hip/sterile/cjd.htm.

Disinfecting probes (continued)

WARNING

Ultrasound transducers can easily be damaged by improper handling and by contact with certain chemicals. Failure to follow these precautions can result in serious injury and equipment damage.

- Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector or probe adapters into any liquid.
- Avoid mechanical shock or impact to the transducer and do not apply excessive bending or pulling force to the cable.
- Transducer damage can result from contact with inappropriate coupling or cleaning agents:
  - Do not soak or saturate transducers with solutions containing alcohol, bleach, ammonium chloride compounds or hydrogen peroxide
  - Avoid contact with solutions or coupling gels containing mineral oil or lanolin
  - Avoid temperatures above 60°C.
- Inspect the probe prior to use for damage or degeneration to the housing, strain relief, lens and seal. Do not use a damaged or defective probe.

Coupling gels

Do not use unrecommended gels (lubricants). They may damage the probe and void the warranty.

Applying

In order to assure optimal transmission of energy between the patient and probe, a conductive gel or couplant must be applied liberally to the patient where scanning will be performed.

Do not apply gel to the eyes. If there is gel contact to the eye, flush eye thoroughly with water.

Precautions

Coupling gels should not contain the following ingredients as they are known to cause probe damage:

- Methanol, ethanol, isopropanol, or any other alcohol-based product
- Mineral oil
- Iodine
- Lotions
- Lanolin
- Aloe Vera
- Olive Oil
- Methyl or Ethyl Parabens (para hydroxybenzoic acid)
- Dimethylsilicone

Planned Maintenance

The following maintenance schedule is suggested for the system and probes to ensure optimum operation and safety..

Table 17-7: Planned Maintenance Program

Do the Following	Daily	After Each Use	As Necessary
Inspect the Probes	X		X
Clean the Probes		X	X
Disinfect Probes		X	X

Returning/Shipping Probes and Repair Parts

US Department of Transportation and GE Medical Systems 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.

Probe Discussion

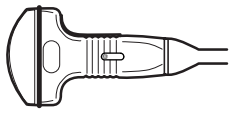
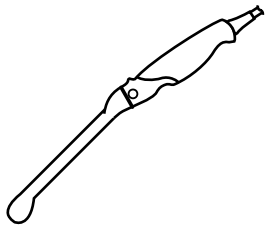
Introduction

The LOGIQ Book XP Series supports the following types of probes:

- **Curved Array (Convex).** Curved Array (Convex) probes, including `micro' convex, are usually designated by the prefix/suffix "C"; the endocavitary probe is designated by the prefix/suffix "E".
- **Linear Array.** Linear Array probes are designated by the prefix/suffix "L"; the linear intra-operative probes are designated by the prefix/suffix "I" or "T".
- **Phased Array Sector.** Phased Array Sector probes are designated by the prefix/suffix "S".

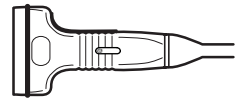
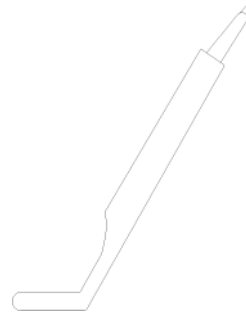
LOGIQ Book XP Series Convex Probes

Table 17-8: Curved Array (Convex) Probes

Probe	Intended Uses	Capabilities and Features	Illustration
3C-RS	• General Purpose	• Wide field of view • Penetration • Good image uniformity • CFM/Doppler detectability • Biopsy capability • Contrast image capability	
E8C-RS	• Transvaginal • Transrectal	• Wide field of view • Small headshell and probe shaft • CFM/Doppler sensitivity • Biopsy capability	
8C-RS	• Pediatrics • Neonatal • Veterinary	• Wide field of view • Good image uniformity • CFM/Doppler detectability	

LOGIQ Book XP Series Linear Probes

Table 17-9: Linear Array Probes

Probe	Intended Uses	Capabilities and Features	Illustration
8L-RS	• Small Parts • Peripheral Vascular	• Wide field of view • Slant scan • Wide field of view for B-Mode resolution & homogenity • CFM Doppler sensitivity	
i12L-RS	• Intraoperative • Small Parts • Vascular • Pediatrics	• Low height I-shaped micro-case • Long, light cable • Wide field of view • High resolution • Compound scan	
i739-RS	• Intraoperative • Small Parts • Vascular • Pediatrics	• Low height I-shaped micro-case • Long, light cable • Slant scan • Wide field of view • High resolution • CFM Doppler sensitivity	
T739-RS	• Intraoperative • Small Parts • Vascular • Pediatrics	• Low height T-shaped micro-case • Long, light cable • Slant scan • Wide field of view • High resolution • CFM Doppler sensitivity	

LOGIQ Book XP Series Sector Probes

Table 17-10: Sector Probes

Probe	Intended Uses	Capabilities and Features	Illustration
3S-RS	• Cardiology • Transcranial • Abdomen	• Small footprint • Wide field of view for B-Mode resolution and homogenity • CFM Doppler sensitivity	

Biopsy Special Concerns

Precautions Concerning the Use of Biopsy Procedures

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.

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.

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.

See ‘Probe Safety’ on *page 17-11 for more information.*

Preparing for a Biopsy

Displaying the Guidezone

Activate the Biopsy Kit by selecting it from the B-Mode Top/Sub Menu.

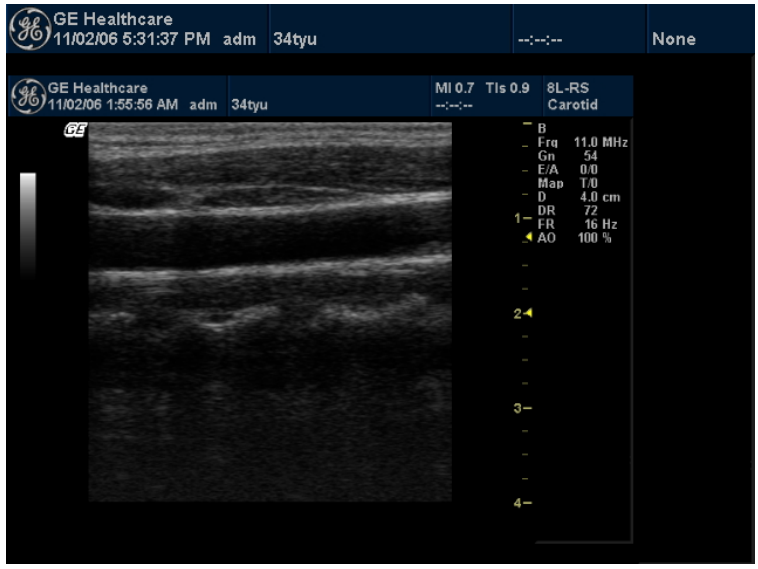


Figure 17-6. B-Mode Top/Sub Menu

The available biopsy options appear when Biopsy Kit is selected. There are fixed and adjustable angle biopsy kits available with the LOGIQ Book XP Series depending on the probe. Select the desired biopsy kit.

Displaying the Guidezone (continued)

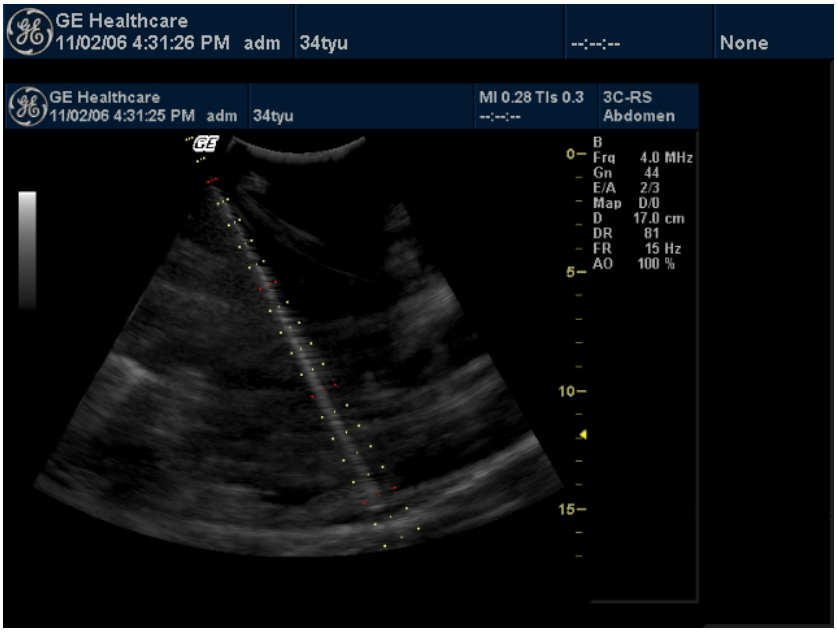


Figure 17-7. Biopsy Guidezones for the 3C Probe

The biopsy guidezone represents a path of the needle. The dots which make up the guidezones is the depth readout where:

- Yellow represent 1 cm increments.
- Red represents 5 cm increments.

The display should be carefully monitored during a biopsy for any needle deviation from the center line or guidezone.

NOTE: To set up biopsy guidezones, refer to Table 16-8 for more details.

Displaying the Guidezone (continued)

The needle may vary from the center line or guidezone for various reasons:

- Needle barrel to needle clearance or strength.
- Bracket manufacturing tolerance.
- Needle deflection due to tissue resistance.
- Needle size chosen. Thinner needles may deflect more.

Table 17-11: LOGIQ Book XP Series Biopsy Guide Availability

Probe	Fixed Angle	Multi-Angle		
		MBX1	MBX2	MBX3
3C-RS		4.0	6.0	8.0
E8C-RS	15.3			

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.

NOTE: Although the multi-angle guides are compatible with the Civco Ultrapro and Ultrapro II, it is recommended the multi-angle guides only be used with the Ultrapro II.

Preparing the Biopsy Guide Attachment

Convex, Sector and Linear probes have optional biopsy guide attachments for each probe. The guide consists of a non-disposable bracket to attach to the probe, disposable needle clip to attach to the bracket, sheath, gel (sterile gel if necessary) and disposable needle barrels.

The disposable needle barrels are available for a variety of needle sizes.

Please refer to the manufacturer's instructions included in the biopsy kit.

Fixed Needle Biopsy Guide Assembly

1. Identify the appropriate biopsy guide bracket by matching the label on the bracket with the probe to be used.
2. Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

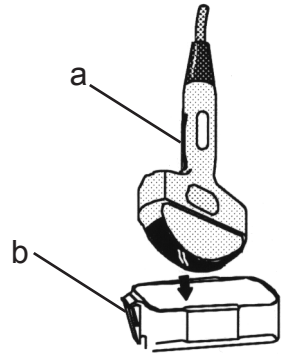


Figure 17-8. Probe/Bracket Alignment

a. Probe Orientation Mark
b. Bracket

3. Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.
4. Place an adequate amount of coupling gel on the face of the probe.
5. Place the proper sanitary sheath over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

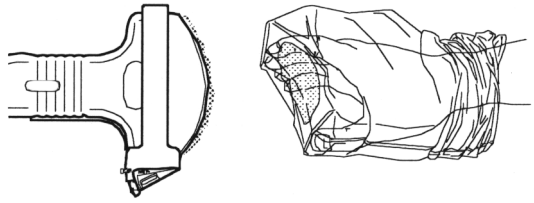


Figure 17-9. Applying Sanitary Sheath

Fixed Needle Biopsy Guide Assembly (continued)

6. Snap the fixed or adjustable needle clip onto the biopsy guide bracket.

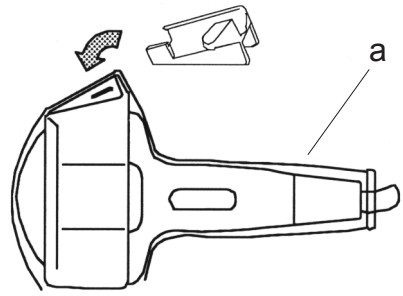


Figure 17-10. Fixed Needle Clip Attachment

a. Sheath

7. Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

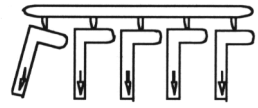


Figure 17-11. Needle Barrel Selection

Fixed Needle Biopsy Guide Assembly (continued)

8. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

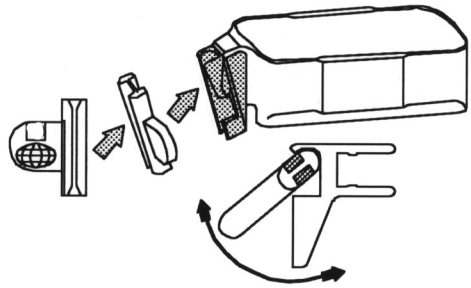


Figure 17-12. Needle Barrel Installation

CAUTION

Ensure that all guide parts are seated properly prior to performing a biopsy.

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 A1 to A3 to decide the best angle setting for needle path.
2. Identify the appropriate biopsy guide bracket by matching the label on the bracket with the probe to be used.

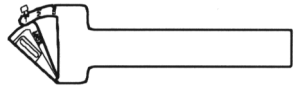


Figure 17-13. Multi-Angle Biopsy Guide Bracket

3. Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

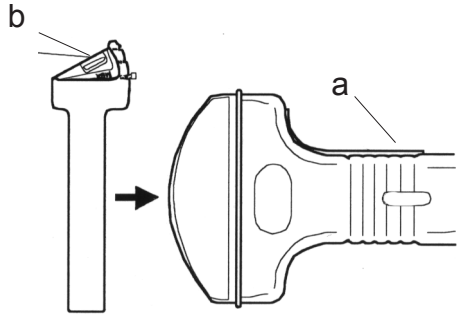


Figure 17-14. Probe/Bracket Alignment

a. Probe Orientation Mark
b. Bracket

4. Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.

Multi Angle Biopsy Guide Assembly (continued)

5. Pull up on the knob to freely move the needle guide attachment. Align the knob with the selected position of the needle guide attachment from MBX1, MBX2 and MBX3, to match the guidezone display on the ultrasound system.

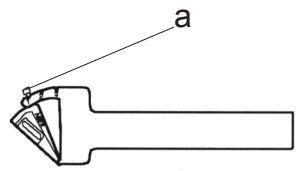


Figure 17-15. Select the angle position

a. Pull up

6. Push the knob down into the desired slot to secure the angle position of the needle guide attachment.

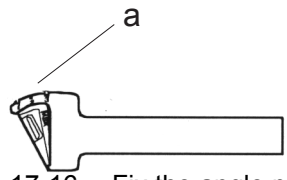


Figure 17-16. Fix the angle position

a. Push

CAUTION

Hold the bracket in place on the probe when pushing the knob to secure the angle position of the needle guide attachment. Excessive force may cause the bracket to release from the probe.

Multi Angle Biopsy Guide Assembly (continued)

7. Place an adequate amount of coupling gel on the face of the probe.
8. Place the proper sanitary sheath tightly over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

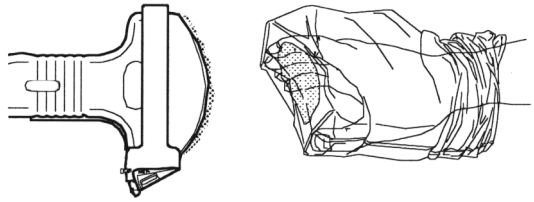


Figure 17-17. Applying Sanitary Sheath

9. Snap the needle clip onto the biopsy guide bracket.

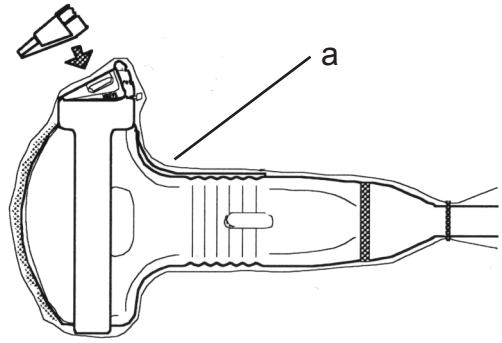


Figure 17-18. Fixing the Needle Clip Attachment

a. Sheath

10. Push the locking mechanism towards the bracket to secure the lock. Make sure the needle guide is firmly attached to the bracket.

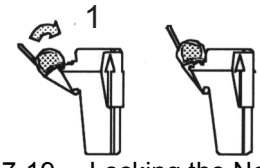


Figure 17-19. Locking the Needle Clip

Multi Angle Biopsy Guide Assembly (continued)

11. Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

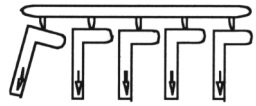


Figure 17-20. Needle Barrel Selection

12. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

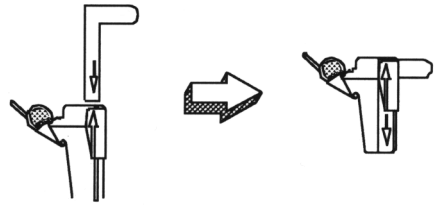


Figure 17-21. Needle Barrel Installation

CAUTION

Ensure that all guide parts are seated properly prior to perfoming a biopsy.

Releasing the needle

According to the following procedure, you remove the needle from a probe and an assembly without moving the needle.

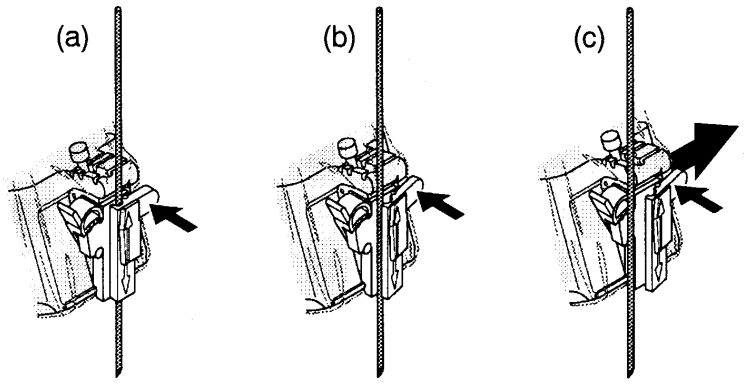


Figure 17-22. Release the needle from assembly

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.

E8C/E8C-RS Probe Biopsy Guide Assembly

When the E8C/E8C-RS probe is attached and active, the needle guide type is the TR5° (Civco disposable guide with a 5° offset angle) or the E8C-RU (Convex Biopsy Guide for E8C [reusable]).

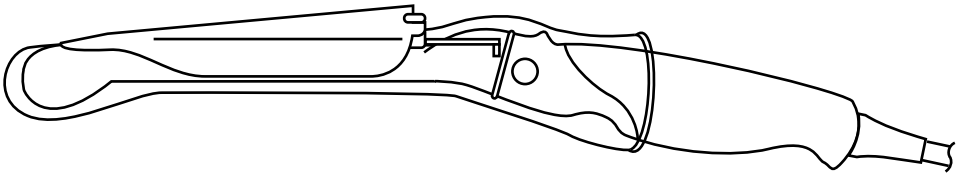


Figure 17-23. TR5° Biopsy Guide

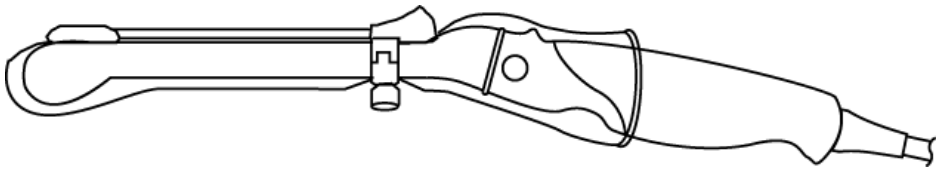


Figure 17-24. Convex Biopsy Guide for E8C (Reusable)

To prepare the E8C/E8C-RS for use:

1. Remove the probe from the box and carefully examine it for any damage.
2. If the biopsy guide is to be attached, use the filling removal tool to clean out the attachment area on the probe head.

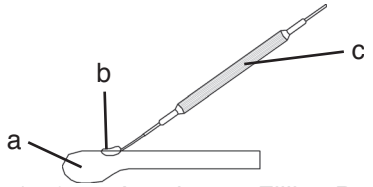


Figure 17-25. Attachment Filling Removal

   a. Probe Head
   b. Attachment
   c. Filling Removal Tool

3. Clean, then disinfect the probe.

NOTE: Ensure that protective gloves are worn.

E8C/E8C-RS Probe Biopsy Guide Assembly (continued)

To install the sheath:

1. Remove the sheath from its package. Do not unroll the sheath.

NOTE: Remember to rinse all sanitary probe sheaths of powder before placing on the probe. Powder can degrade the displayed image.

2. Place an adequate amount of ultrasound gel inside the sheath tip (the gel is between the sheath inner surface and the probe aperture).

NOTE: Ensure that only acoustic coupling gel is used for this purpose.

3. Place the sheath tip over the probe aperture and then pull the sheath end toward the probe handle.
4. Inspect the sheath for nicks, cuts or tears.

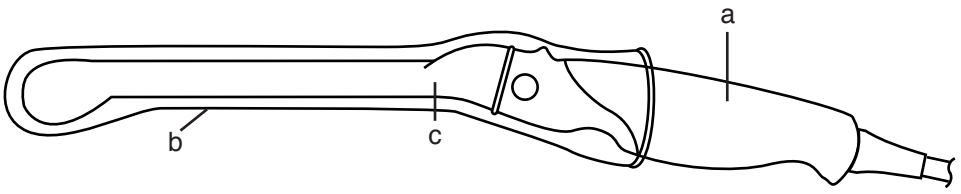


Figure 17-26. Probe with Sheath

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.
6. If a biopsy is to be performed, snap the metal or plastic biopsy guide on to the probe over the sheath.

E8C/E8C-RS Probe Biopsy Guide Assembly (continued)

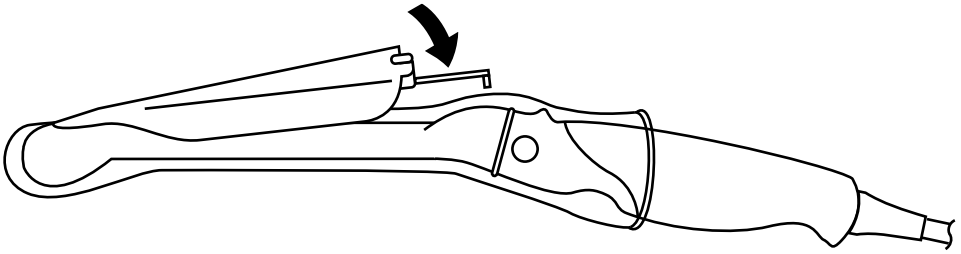


Figure 17-27. Civco Disposable Biopsy Guide 5° Angle

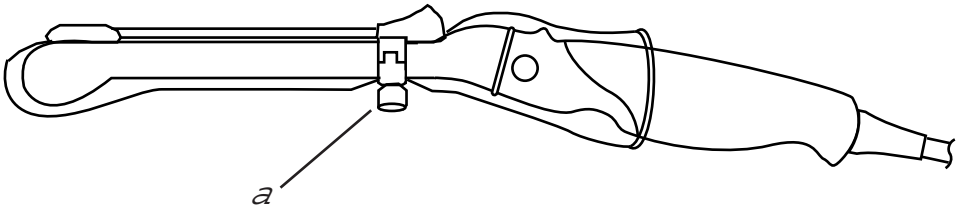


Figure 17-28. Convex Biopsy Guide for E8C (Reusable)

a. Fix wth a screw

7. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.
8. 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.

WARNING

You MUST select E8C_RU from the Top/Sub Menu when using the reusable E8C biopsy guide.

Biopsy Need Path Verification

To verify that the path of the needle is accurately indicated within the guidezone on the system monitor, perform the following:

- Properly install the bracket and biopsy guide.
- Scan in a container filled with water (47° C).
- Display the biopsy guidezone on the monitor.
- Ensure that the needle echo falls within the guidezone markers.

The Biopsy Procedure

WARNING

Biopsy procedures must only be performed on live images.

1. Place coupling gel on the scanning surface of the probe/ sheath/biopsy guide assembly.
2. Activate the biopsy guidezone on the system through the B-Mode Top/Sub Menu. When using multi-angle guides, ensure that the proper guidezone angle is displayed.

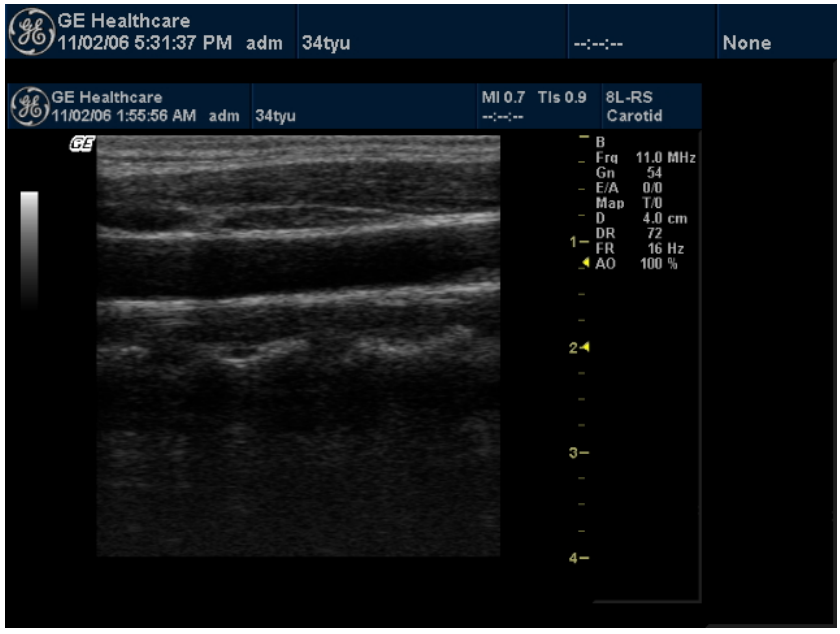


Figure 17-29. B-Mode Top/Sub Menu

3. Scan to locate the target. Center the target in the electronic guidezone path.

NOTE: Enabling color flow would allow for visualization of the vascular structure around the area to be biopsied.

4. Place the needle in the guide between the needle barrel and needle clip. Direct it into the area of interest for specimen retrieval.

Post Biopsy

When the biopsy is complete, remove the needle barrel, needle clip and probe sheath. Properly dispose of these items in accordance with current facility guidelines.

Clean and disinfect the probe. See ‘Probe Cleaning Process’ on *page 17-16 for more information.*

The biopsy bracket can be cleaned and disinfected in a recommended disinfecting agent and reused.

CAUTION

When the biopsy needle guide kit (UP or UP2) 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 17-31 for more information.* Sterile gel is applied to the transducer face and a sterile sheath completely covers the transducer and cable which has first undergone a thorough cleaning and high-level disinfection.

The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure prior to use.

For surgery/intra-operative procedures, a sterile environment is required. Therefore, both the operator and probe 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.

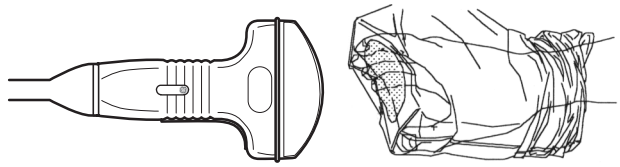


Figure 17-30. Applying Sterile Sheath

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 18

User Maintenance

This chapter supplies system data, assistance information, and system care and maintenance instructions.

System Data

Features/Specifications

Table 18-1: Physical Attributes

Dimensions and Weight • Height: 78 mm (3.07 in) console only 99.5 mm (3.92 in) with handle • Width: 350 mm (13.73 in) • Depth: 280 mm (11 in) console only 320 mm (12.6 in) with handle • Weight: approx. 4.2 kg (9.2 lb) (without batttery) Keyboard • Keyboard width: Minimum 305 mm and Maximum 336 mm • Keyboard Height: Minimum 245 mm and Maximum 271 mm • Ergonomic, intuitive key layout • 'Soft click' hard keys with mechanical and acoustic feedback • Special function keys with additional perceptible marks • Two programmable 'User Define' keys • Back-Lit keys (Freeze only)	Electrical Power AC Adapter (LBAC-66) • Voltage:100-240 Vac • Frequency: 50/60 Hz • Power Consumption: 120W max. • Current: 1.2 Ampere (max.) AC Adapter (GE-90W) • Voltage:100-240 Vac • Frequency: 50/60 Hz • Power Consumption: 108W max. • Current: 1.08 Ampere (max.) Console Design • 1 Active Probe Port • Probe cable management Monitor • High performance TFT LCD • 10.4" display • Opening angle adjustment: 160° (maximum)

Features/Specifications (continued)

Table 18-2: System Overview

Applications • Abdominal • Obstetrical • Gynecological • Cardiac • Urological • Small parts (thyroid and prostate) • Pediatric • Vascular Standard Features • Standard CINE Memory • Automatic Optimization (Auto Tissue Optimization, Auto Spectrum Optimization and Auto Color Optimization) • ACE • Built-in patient archive with images, patient information • Auto Doppler Calculation • Cardiac Calcs • OB Calcs • Fetal Trending • Multi gestational Calcs • Gynecological Calcs • Urological Calcs • Renal Calcs	Transducer Types • Electronic Convex Array • Electronic Micro-convex Array • Electronic Linear Array • Endocavitary Electronic Micro-convex Operating Modes • B-Mode • M-Mode • PW Doppler • Color Flow Doppler (CFM) • B/M-Mode • B/PWD-Mode Options • DICOM 3.0 connectivity • Insite capability • ReportWriter–Not available on LOGIQ Book XP Pro • Easy 3D–Not available on LOGIQ Book XP Pro Accessory Options • Footswitch • Battery Media Options • CD-RW • Type II PCMCIA wireless LAN card (Lucent Orinoco) • Type II PCMCIA memory card (SanDisk) Peripheral Options • B/W Printer

Features/Specifications (continued)

Table 18-3: System Parameters

Post-Processing • ATO (Automatic Tissue Optimization) • ADO (Automatic Doppler Optimization) • 14 B-Mode Grey Maps • 14 M-Mode Grey Maps • Rejection funtion, adjustable from 2 to 20 in 6-digit steps Pre-Processing • B/M-Mode (Gain; TGC; Dynamic Range; Transmission Focus Position; Transmission Focus Number; Transmission Frequency; Edge Enhancement; Image Softener Level; Sweep Speed for M-Mode) • D-Mode (Gain; Dynamic Range; Transmission Frequency; Velocity Scale/PRF; Wall Filter; Baseline Shift; Sweep Speed) • Color Flow (CFM Gain; CFM Velocity Range; MTI Filter; Pulse Packet Size; CFM Spatial Filter; CFM Frame Averaging; Diagnostic Color Display Mode; Baseline Shift; CFM ACE-Filter) Image Processing and Presentation • Image Reverse: Right/ Left • Image Rotation: 4 steps, Rotation: 0°, 90°, 180°, 270° • Imaging Depth: 4-30cm [Minimum: 4 cm (Zoom); Maximum: 30 cm] • Transmission Focus [1-8 Focus Points selectable; Focus Position: 8 steps • Receiving Focus [CDA/CDF (Continuous Dynamic Focus/Continuous Dynamic Aperture)] • 256 Shades of Grey	Zoom • Smart Zoom (2-times write zoom with increased resolution): Image Archive • Archiving Format: DICOM • Possibly exported to other format CINE Memory/Image Memory • CINE Gauge and CINE Image number display • CINE Review Loop • Selectable CINE Sequence for CINE Review (by Start Frame and End Frame) • Measurements/Calculations & Annotations on CINE Playback Images • Memory Stick

Features/Specifications (continued)

Table 18-4: Measurements and Calculations

B-Mode • Distance • Circumference/ Area • Echo Level • Angle • Ratios • Depth from Probe Surface M-Mode • Distance • Time • Slope • Heart Rate Doppler Measurements/Calculations • Velocity • Frequency • Time • Acceleration • Heart Rate • Auto Doppler Trace function with automatic calculations • Time Averaged Max./ Mean Velocity • Ratios • PI (Pulsatility Index) • RI (Resistivity Index)	Vascular Measurements/Calculations • Summary Worksheet • Summary Report Obstetrics Measurements/Calculations • Gestational Age Calculation • Multi-Gestational Calculation • EFW Calculation • Summary Worksheet • Summary Report • Fetal Trend Graph Gynecology Measurements/Calculations • Summary Worksheet • Summary Report Urology Measurements/Calculation • Summary Worksheet • Summary Report Cardiac Measurements/Calculations • Summary Worksheet • Summary Report

Table 18-5: Probes

• 3C-RS Convex Probe (Applications: Abdomen, OB/GYN, Urology, Pediatrics, Biopsy) • 8C-RS Micro Convex Probe (Applications: Pediatrics, Neonatal) • i12L-RS Linear Probe (Applications: Intraoperative, Vascular) • 8L-RS: Linear Probe (Application: Small Parts, Vascular, Biopsy)	• E8C-RS Micro Convex Endocavity Probe (Applications: Obstetrics, Gynecology, Endocavitary, Biopsy) • 3S-RS: Sector Probe (Application: Cardiac, Transcranial) • i739-RS/T739-RS: Linear Array Probe (Application: Intraoperative)

Table 18-6: Inputs and Outputs Signal

• Video Out (VGA)	• Connectors [USB port (1, 2); PCMCIA interface]

Clinical Measurement Accuracy

Basic Measurements

The following information is intended to provide guidance to the user in determining the amount of variation or measurement error that should be considered when performing clinical measurements with this equipment. Error can be contributed by equipment limitations and improper user technique. Be sure to follow all measurement instructions and develop uniform measurement techniques among all users to minimize the potential operator error. Also, in order to detect possible equipment malfunctions that could affect measurement accuracy, a quality assurance (QA) plan should be established for the equipment that includes routine accuracy checks with tissue mimicking phantoms.

Please be advised that all distance and Doppler related measurements through tissue are dependent upon the propagation velocity of sound within the tissue. The propagation velocity usually varies with the type of tissue, but an average velocity for soft tissue is assumed. This equipment is designed for, and the accuracy statements listed on are based on, an assumed average velocity of 1540 m/s. The percent accuracy when stated applies to the measurement obtained (not the full scale range). Where the accuracy is stated as a percent with a fixed value, the expected inaccuracy is the greater of the two.

Basic Measurements (continued)

Table 18-7: System Measurements and Accuracies

Measurement	Units	Useful Range	Accuracy	Limitations or Conditions
Depth	mm	Full Screen	±5% or 1 mm	
Distance:				
Axial	mm	Full Screen	±5% or 1 mm	
Lateral	mm	Full Screen	±5% or 2 mm	Linear Probes
Lateral	mm	Full Screen	±5% or 4 mm	Convex Probes
Lateral	mm	Full Screen	±5% or 4 mm	Sector Probes
Circumference:			±5% or 1 mm	
Trace	mm	Full Screen	±10% or 1 mm	
Ellipse	mm	Full Screen	±5% or 1 mm	
Area:			±5% or 1 mm	
Trace	mm^2	Full Screen	±5% or 1 mm^2	
Ellipse	mm^2	Full Screen	±5% or 1 mm^2	
Time	s	Timeline Display	±5% or 10 ms	M or Doppler Mode
Slope	mm/s	Timeline Display	±5% or 1 mm/s	M-Mode Only
Doppler SV Position	mm	Full Screen	±2 mm	Any Direction
Velocity	cm/s	From 0 to 100 cm/s From 100 to 130 cm/s	±10% or 1 cm/s ±5% or 1 cm/s 50%	PW Doppler Mode Color Flow Mode
Doppler Angle Correction	cm/s	From 0-60° From 60-80°	±5% ±12%	

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.

System Care and Maintenance

Overview

Refer to Section 10 of the LOGIQ Book XP Series Service Manual for any additional maintenance guidance.

Contact the local Service Representative for parts or periodic maintenance inspections.

Inspecting the System

Examine 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 locking operation.

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.

Weekly Maintenance

The system requires weekly care and maintenance to function safely and properly. Clean the following:

- LCD Monitor
- Operator control panel
- Footswitch
- Printer

Failure to perform required maintenance may result in unnecessary service calls.

Cleaning the system

Prior to cleaning any part of the system:

1. Turn off the system power. If possible, disconnect the power cord. See ‘Power Off’ on *page 3-30 for more information.*

System Cabinet

To clean the system cabinet:

1. Moisten a soft, non-abrasive folded cloth.
2. Wipe down the top, front, back, and both sides of the system cabinet.

NOTE: Do not spray any liquid directly into the unit.

LCD Monitor

To clean the monitor face:

Use a soft, folded cloth. Gently wipe the monitor face.

Do NOT use a glass cleaner that has a hydrocarbon base (such as Benzene, Methyl Alcohol or Methyl Ethyl Ketone) on monitors with the filter (anti-glare shield). Hard rubbing will also damage the filter.

NOTE: When cleaning the screen, make sure not to scratch the LCD.

Operator Controls

To clean the operator control panel:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
2. Wipe down operator control panel.
3. Use a cotton swab to clean around keys or controls. Use a toothpick to remove solids from between keys and controls.

NOTE: When cleaning the operator control panel, make sure not to spill or spray any liquid on the controls, into the system cabinet, or in the probe connection receptacle.

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 Tspray or Sani Wipes on the control panel.

Footswitch

To clean the footswitch:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
2. Wipe the external surfaces of the unit then dry with a soft, clean, cloth.

Printer

To clean the printer:

1. Turn off the power. If possible, disconnect the power cord.
2. Wipe the external surfaces of the unit with a soft, clean, dry cloth.
3. Remove stubborn stains with a cloth lightly dampened with a mild detergent solution.

NOTE: Never use strong solvents, such as thinner or benzine, or abrasive cleansers because they will damage the cabinet.

No further maintenance, such as lubrication, is required.

To clean the surface of the print head:

1. Run the cleaning sheet (provided with the printer) through the printer.

For more information, see the Printer's Operator Manual.

Other Peripheral Maintenance

Refer to the peripheral manuals for more information.

Other Maintenance

Replacing illuminated key caps/lamps

Contact a local Service Representative when a key cap or lamp needs to be replaced.

Uninterruptible Power Supply (UPS) Option

Lifetime

The lifetime of a UPS is limited and varies according to circumstances. It lasts for three years under normal conditions; however, it may last one year if the UPS is used over twelve hours per day and if the room temperature is over 30 degrees C.

Possible damage may occur with the HDD, system software and user data by the electrical power outage or by disconnecting the power plug after the battery is dead.

Battery Replacement and Disposition

Battery replacement every three years is recommended.

Contact a local Service Representative for the replacement of the battery. Used batteries will be discarded appropriately by GE.

NOTE: Disposing of the battery should meet local law and regulatory requirements.

NOTE: Dispose of the system according to local law and regulatory requirements.

Quality Assurance

Introduction

A good Quality Assurance Evaluation program consists of periodic systematic actions that provide the user with adequate confidence that their diagnostic ultrasound system will produce consistently high quality images and quantitative information.

Therefore, it is in the best interests of every ultrasound user to routinely monitor equipment performance.

The frequency of Quality Assurance evaluations should be based on user's specific needs and clinical practice.

Periodic monitoring is essential in order to detect the performance changes that occur through normal aging of system components. Routine equipment evaluations may also reduce the duration of exams, number of repeat exams, and maintenance time required.

For details on system and peripheral routine preventive maintenance instructions, See ‘System Care and Maintenance’ on *page 18-9 for more information.*

Typical Tests to Perform

Quality assurance measurements provide results relating to system performance. Typically these are:

- Axial Measurement Accuracy
- Lateral Measurement Accuracy
- Axial and Lateral Resolution
- Penetration
- Functional & Contrast Resolution
- Gray Scale Photography.

With these tests, a performance baseline can be set at installation with the phantom in your department. Future test results can be compared to the baseline in order to maintain a record of system performance trends.

Frequency of tests

Quality assurance tests are used to determine whether a scanner is providing the same level of performance from day to day.

The frequency of testing varies with the amount of system usage and modes to be tested. It is recommended that the user perform quality assurance tests at least every three months or every 400 patient studies. Tests should also be performed when a question about system performance exists.

A mobile system may require more frequent tests.

Image quality should also be tested immediately after the following events:

- Service calls
- System upgrades/modifications
- Dropped probe, power surge, etc.

Phantoms

Quality Assurance Evaluations should be done with phantoms and test objects that are applicable to the parameters being evaluated or to the user's clinical practice.

Typical phantoms are composed of material that acoustically mimic human tissue. Pins, anechoic and echogenic targets are physically positioned to provide information for a variety of tests.

Doppler phantoms are currently expensive and complicated to deal with on the user level. If a problem with any Doppler parameters or measurement is suspected, contact a local service representative for evaluation.

The RMI 403GS phantom is still available. Due to the superior penetration and resolution capabilities of GE ultrasound systems, the RMI 405GSX is recommended. It is the most current one available to our field service personnel and will provide the targets and extended life necessary for consistent system testing.

Phantoms (continued)

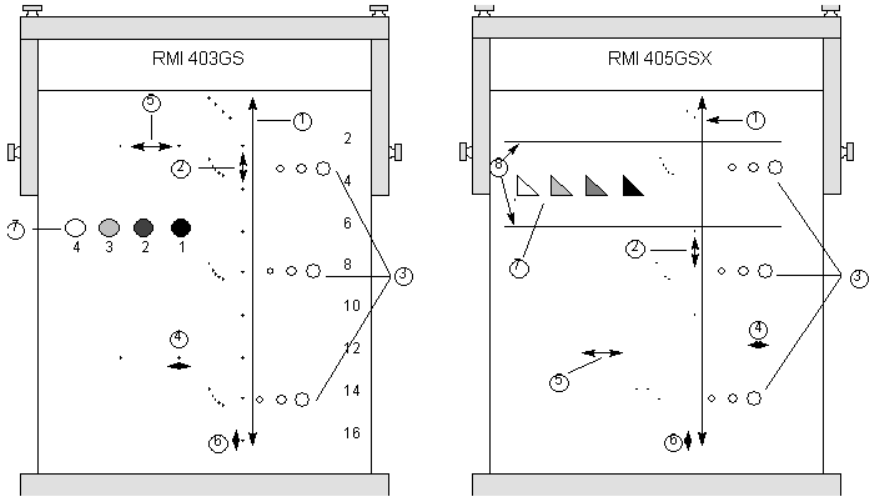


Figure 18-1. Phantoms

1. Penetration
2. Axial Distance Measurement
3. Functional Resolution
4. Lateral Resolution
5. Lateral Distance Measurement
6. Axial Resolution
7. Contrast Resolution and Gray Scale Photography
8. Gray Scale Plane Targets

Baselines

An absolute necessity for a quality assurance program is establishing baselines for each test or check. Baselines are established after the system has been verified to be working properly at installation or after a repair. If a probe or major assembly is replaced, new baselines should be generated.

Baselines can be made by adjusting system parameters to prescribed levels or to the best possible image. The key factor to remember is reproducibility. The same conditions must be reproduced for each periodic check.

All system parameters not displayed on the monitor should be recorded for the permanent record.

Periodic Checks

Periodic checks should be performed in accordance with your facility's quality assurance requirements. For the data to be valid, periodic checks should mimic the baseline setup parameters.

The resulting image, when scanning the phantom exactly as before, should be recorded and compared to the baseline. When a matching image is obtained, it can be assumed that the system performance has not degraded from the baseline.

If a significant difference between the baseline and periodic check is noted, double check the system setup and repeat the test. If the difference between the baseline and periodic check persists, contact a local Service Representative.

Failing to reproduce the control settings as in the baselines will introduce errors in the data and potentially invalidate the results.

Results

Lack of standardization among test instruments, the wide range of acceptance criteria, and incomplete knowledge regarding the significance of certain performance parameters prohibit the establishment of absolute performance criteria for these tests.

Quality Assurance Evaluation results should be compared to previously-recorded results.

Performance trends can then be detected. Unacceptable performance or diminishing trends should be identified for maintenance or repair before a malfunction or inappropriate diagnosis occurs.

The user should determine the best method for recording and archiving the baseline and periodic checks. In most cases the choice is hard copy.

It is important to maintain good consistent records for inspections that may arise, as well as to detect system performance trends.

System Setup

The user should tailor the tests to their particular needs. It is certainly not necessary to make all checks with all probes. A representative example, with the probes used most often by the customer, should be adequate in judging system performance trends.

Use a gray scale phantom as the scan object for the tests. Commercial phantoms are supplied with its own operator manual. Be familiar with proper phantom operating procedures prior to use for quality assurance evaluations.

1. Adjust image monitor. Brightness and contrast should be set to the normal viewing of a good gray scale image.
2. Check all recording devices for proper duplication of image monitor. Ensure that what is seen is what is recorded.
3. Annotate non-displayed image processing controls.
4. Set TGC slide pots to center (detent) position.
5. Place focal zone marker(s) in area of interest for an optimum image.

Test Procedures

The following are recommended Quality Assurance tests. A brief description of the test, the benefit it provides and steps to accomplish the test are supplied.

The importance of recording scan parameters and consistent record keeping cannot be stressed enough. Reproducibility to monitor system trends is the key to quality assurance evaluations.

Using the system's dual image display format is often very convenient and saves recording media.

Axial distance measurements

Description Axial measurements are the distance measurements obtained along the sound beam. See Figure 18-1 for more information.

Benefit The accurate measurement of the size, depth and volume of a structure is a critical factor in determining a proper diagnosis. Most imaging systems use depth markers and/or electronic calipers for this purpose.

Method Axial distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths or fields of view can be tested.

Procedure To measure axial distance:

1. Scan a test phantom with precisely-spaced vertical pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.
2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.
3. Scan the vertical pins in zoom or at different depth/scale factors.
4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.
5. Document the measurements for reference and future comparison.

Contact a Service Engineer if vertical measurements differ by more than 1.50% of the actual distance.

Lateral distance measurements

Description Lateral measurements are distance measurements obtained perpendicular to the axis of the sound beam. See Figure 18-1 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 18-1 for more information.

Axial resolution is affected by the transmitting section of the system and the probe.

Benefit In clinical imaging, poor axial resolution displays small structures lying close together as a single dot. This may lead to improper interpretation of the ultrasound image.

Procedure To measure Axial resolution:

1. Scan a test phantom with precisely-spaced vertical pin targets.
2. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.
3. Press **Freeze** to stop image acquisition.
4. Perform a standard distance measurement of the pin vertical thickness at different points in the image. Record all images for archiving.
5. Scan the vertical pins in zoom or at different depth/scale factors.
6. Press **Freeze** to stop image acquisition; repeat the vertical thickness measurements of the pins and record the images for archiving.
7. Document the measurements for reference and future comparison.

Axial resolution should remain stable over time. Contact a Service Engineer if any changes are observed.

Lateral resolution

Description Lateral resolution is the minimum reflector separation between two closely spaced objects to produce discrete reflections perpendicular to the axis of the sound beam. It can also be monitored by checking the horizontal size of known pin targets. See Figure 18-1 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 18-1 for more information.

Penetration can be affected by the system's:

- Transmitter/receiver
- Degree of probe focusing
- Attenuation of the medium
- Depth and shape of reflecting object
- Electromagnetic interference from local surroundings.

Benefit Weak reflecting echoes are commonly produced from the internal structure of organs. Definition of this tissue texture is important in the interpretation of the ultrasound findings.

Method Scan a phantom to see how echoes begin to fade as depth is increased. The maximum depth of penetration is the point at which homogeneous material in the phantom begins to lose brightness.

Procedure To measure penetration:

1. Set the front panel TGC slide pots to their center (detent) position.
2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.
3. Scan a test phantom along the vertical pin targets to typical depths for the probe being used.
4. Perform a standard distance measurement from the top of the image displayed to the point at which homogeneous material in the phantom begins to lose brightness.
5. Document the depth measurement for reference and future comparison.

Contact a Service Engineer if the depth of penetration shifts more than one centimeter (1cm) when using the same probe and same system settings.

Functional resolution

Description Functional resolution is an imaging system's ability to detect and display the size, shape, and depth of an anechoic structure, as opposed to a pin target. See Figure 18-1 for more information.

The very best possible image is somewhat less important than reproducibility and stability over time. Routine tests at the same settings should produce the same results.

Benefit The data obtained will give a relative indication of the smallest structure the system is capable of resolving at a given depth.

Procedure To measure functional resolution:

1. Set the front panel TGC slide pots to their center (detent) position.
2. Gain and acoustic output can be adjusted as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with a vertical row of anechoic cyst targets to typical depths for the probe being used.
4. Evaluate the cysts at various depths for a good (round) shape, well-defined borders and no fill in. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide optimal cystic clearing.
5. Document all results for future reference and comparison.

Contact a Service Engineer if a greatly distorted image is obtained.

Contrast resolution

Description Contrast resolution is the ability of an imaging system to detect and display the shape and echogenic characteristics of a structure. See Figure 18-1 for more information.

Specific values measured are less important than stability over time. Routine tests at the same settings should produce the same results.

Benefit A correct diagnosis is dependent upon an imaging system's ability to differentiate between a cystic or solid structure versus echo patterns from normal surrounding tissue.

Method A phantom with echogenic targets of different sizes and depths should be used.

Procedure To measure contrast resolution:

1. Set the front panel TGC slide pots to their center (detent) position. Set dynamic range to 54 db.
2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with echogenic targets at the depths available.
4. Evaluate the echogenic targets for contrast between each other and between the surrounding phantom material. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide an optimal scan image.
5. Document all results for future reference and comparison.

Contact a Service Engineer if the echogenic characteristics or shapes of the targets appear distorted.

Gray Scale photography

Description Poor photography will cause loss of low level echoes and the lack of contrast between large amplitude echoes. See Figure 18-1 for more information.

Benefit When photographic controls and film processors are properly adjusted, weak echoes, as well as strong echoes, are accurately recorded on film.

Procedure

1. Adjust the camera according to the manufacturer's instructions until the hard copy and video display are equal.
2. Scan the phantom and it's echogenic contrast targets.
3. Make a hard copy photograph of the display and compare it to the image on the video monitor for contrast and weak echo display.
4. Document all results for future reference and comparison.

Contact a Service Engineer if camera cannot duplicate what is on the image monitor.

NOTE: Optimization of brightness/contrast controls on the display monitor is imperative in order to make sure that the hardcopy and monitor look alike.

The display monitor is adjusted first. The hardcopy camera or printer is adjusted to match the display monitor.

Setting up a Record Keeping System

Preparation

The following is needed:

- Quality Assurance binder.
- Hard copy or electronic file of images.
- Quality Assurance Checklists.
- Display the following information while testing quality assurance:
  - Acoustic Output
  - Gain
  - Depth
  - Probe
  - Dynamic Range
  - Set up new patient to be the name of the test.
- Annotate the following:
  - Any control where its value is **NOT** displayed.
  - Significant phantom information.

Record Keeping

Complete the following:

1. Fill out the Ultrasound Quality Assurance Checklist for each probe, as scheduled.
2. Make a hard copy or archive the image.
3. Compare images to baseline images and acceptable values.
4. Evaluate trends over previous test periods.
5. File hard copy or electronic file of images and checklist in Quality Assurance binder.

Ultrasound Quality Assurance Checklist

Table 18-8: Ultrasound Quality Assurance Checklist (Part 1)

Performed By		Date
System		Serial Number
Probe Type	Probe Model	Serial Number
Phantom Model	Serial Number	Room Temperature
Acoustic Output	Gain	Focal Zone
Gray Map	TGC	Depth
Monitor Setting		
Peripheral Settings		
Other Image Processing Control Settings		

Table 18-9: (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.

The following supplies/accessories have been verified to be compatible with the system:

Peripherals

Table 18-10: Peripherals and Accessories

Accessory	Units
Sony B/W Printer Model UP-D897	Each
Sony Digital Color Printer UP-D23MD	Each
HP 460/HP K550 Color Printers	Each
Linksys Wireless LAN Adapter	Each
USB HUB (HE 702A)	Each
Video Adapter (Tview Micro)	Each
USB Memory (Kingston 512MB)	Each
Measure Transfer Kit	Each
Network Adapter FA511	Each

Console

Table 18-11: Console Accessories

Accessory	Units
Footswitch model FSU2001	Each
Battery Pack model SH-250	Each

LOGIQ Book XP Series Probes

Table 18-12: Probes and Accessories

Accessory	Units
3C-RS	Each
8C-RS	Each
E8C-RS	Each
i12L-RS	Each
8L-RS	Each
3S-RS	Each
i739-RS	Each
T739-RS	Each

Gel

Table 18-13: Gel

Accessory	Units
Thermasonic Gel Warmer	Holds three plastic bottles (250ml or 8 oz)
Aquasonic 100 Scan Gel	5 liter jug
	250 ml plastic bottles (12/ case)
Scan Ultrasound Gel	8 oz plastic bottles (12/ case)
	1 gallon plastic jug
	Four 1-gallon plastic jugs

Disinfectant

Table 18-14: Disinfectant

Accessory	Units
Cidex Activated Dialdehyde	16/1 quart bottles
	4/1 gallon bottles
	2/2.5 gallon bottles

Ultrasound Probe and Cord Sheath Sets

Table 18-15: Probe and Cord Sheath Sets

Accessory	Units
Sterile Ultrasound Probe Sheath Set	20 Per Set
Sterile Ultrasound Cord Sheath Set	20 Per Set
Sanitary Rectal/Vaginal Probe Cover	20 Per Set
Sterile Combination Probe and Cord Cover Set	12 Per Set
Sterile Ultrasound Probe Sheath Set for Wide (2.5 and 3.5) Aperture Sector Probes	20 Per Set

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