Technical Publications

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Rev. 2

CE 0459

LOGIQ 5 Basic User Manual

Operating Documentation

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Regulatory Requirements

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

0459

This manual is a reference for the LOGIQ 5. It applies to all versions of the R2.x.x software for the LOGIQ 5 ultrasound systems.

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Revision History

Table i-1: Reason for Change

REV	DATE	REASON FOR CHANGE
Rev. 1	March 19, 2002	Update to Initial Release
Rev. 2	March 26, 2003	R 2.x.x Update

Table i-2: List of Effective Pages

PAGE NUMBER	REVISION NUMBER	PAGE NUMBER	REVISION NUMBER
Title Page	Rev. 2	9-1 thru 9-104	Rev. 2
Revision History i-3 and i-4	Rev. 2	10-1 thru 10-90	Rev. 2
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5-1 thru 5-86	Rev. 2	17-1 thru 17-44	Rev. 2
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7-1 thru 7-94	Rev. 2	Index 1 thru 8	Rev. 2
8-1 thru 8-22	Rev. 2		

Please verify that you are using the latest revision of this document. Information pertaining to this document is maintained on GPC (GE Medical Systems Global Product Configuration). 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, Equipment is Class I, Type B with BF or CF Applied Parts.
- According to CISPR 11, this is Group 1, Class A ISM Equipment.
- According to IEC 60529, the footswitch rate IPx8 is suitable for use in surgical rooms.

This product complies with the regulatory requirement of the following:

- Council Directive 93/42/EEC concerning medical devices:

  the CE 0459 label affixed to the product testifies compliance to the Directive.

  The location of the CE marking is shown on Figure 2-3 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

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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 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/UD3 Acoustic Output Display Standard (1998).

Original Documentation

The original document was written in English.

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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 5 system.

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

Documentation

LOGIQ 5 documentation consists of three manuals:

- The Basic User Manual (TRANSLATED) and Online Help (ENGLISH ONLY) provides information needed by the user to operate the system safely. It describes the basic functions of the system, safety features, operating modes, measurements/calculations, probes, and user care and maintenance.
- The Advanced Reference Manual (ENGLISH ONLY) contains data tables, such as OB and Acoustic Output tables.
- 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 LOGIQ 5 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 5 is intended for use by a qualified physician for ultrasound evaluation. Specific clinical applications and exam types include:

- Fetal
- Abdominal
- Pediatric
- Small Organ (breast, testes, thyroid)
- Neonatal Cephalic
- Adult Cephalic
- Cardiac (adult and pediatric)
- Peripheral Vascular
- Musculo-skeletal Conventional and Superficial
- Urology (including prostate)
- Transesophageal
- Transrectal
- Transvaginal
- Intraoperative (abdominal, thoracic, vascular and neurological)

Contraindication

The LOGIQ 5 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 Medical Systems-Ultrasound

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

INTERNET http://www.gemedicalsystems.com

USA

GE Medical Systems TEL: (1) 800-437-1171
Ultrasound Service Engineering FAX: (1) 414-647-4090
4855 W. Electric Avenue
Milwaukee, WI 53219

Clinical Questions

For information in the United States, Canada, Mexico and parts of the Caribbean, call the Customer Answer Center
TEL: (1) 800-682-5327 or (1) 262-524-5698

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

Service Questions

For service in the United States, call GE CARES

TEL: (1) 800-437-1171

In other locations, contact your local Service Representative.

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.

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.

Contacting GE Medical Systems-Ultrasound (continued)

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How This Book is Organized

Manual Content

The LOGIQ 5 Basic User Manual is organized to provide the information needed to perform exams. Detailed information is also provided for more thorough studies.

- **Getting started**. These sections give an overview of the system to help the operator start scanning.
    - *Introduction*. Information concerning indications/ contraindications for use, whom to contact and how the documentation is organized.
    - *Safety*. Important information concerning the safe operation of the LOGIQ 5 system.
    - *Preparing the System for Use*. How to prepare the system for use and a map of the control layout.
    - *Preparing for an Exam*. How to enter patient information, select an exam category, and application preset.
- **Image optimization**. These sections detail how to improve image, trace, or spectral information.
    - *Optimizing the Image*. How to adjust and optimize the image in various modes.
    - *Scanning and Display Functions.* Information concerning Zoom, Freeze, Cine, Annotation, and iLinq features.

Manual Content (continued)

- **Measurements and Reports**. Shows how to do general and exam-category-specific measurements and calculations.
  - *General Measurements and Calculations*. Emphasis on basic measurements for each mode.
  - *Abdomen*.
  - *Small Parts*.
  - *OB/GYN*.
  - *Cardiology*.
  - *Vascular*.
  - *Urology*.
  - *Pediatric*.
- **Report Generation**. Shows how to personalize the reporting package.
- **Recording Images**. Data management.
- **Customizing Your System**. Shows how to customize the system for your institution, exams, imaging, networking, and annotation presets.
- **Probes and Biopsy**. Provides intended uses, specifications, care and maintenance, and biopsy capability instructions for each probe.
- **User Maintenance**. Provides information concerning system specifications, error messages, user diagnostics, quality assurance, system care and assistance.

Manual Format

Information has been arranged and provided to help you find information easily and quickly.

Finding information

Tables of Contents	Find topics in the main table of contents. Located at the beginning of the book.
Tabs	Chapter tabs are provided.
Headers/Footers	The section name and page number appear on the outer corners of every page.
References	When referencing external articles, page references are noted.
Index	Extensive tool that presents ideas, topics, terms, titles, headings, and cross references. Also, use it to find all entries of a like topic throughout the manual. Located at the end of the book.

Text References

Notes	Notes are set in *italics.*
	ndicates precautions or prudent use recommendations that should be used in the operation of the ultrasound system.
References	References to other chapters appear in *italics*.
	Various icons highlight safety issues. See ‘Safety Precautions’ for more information.
Hints	Scanning hints help you to save time to optimize the image.

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.

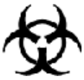
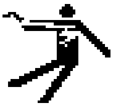
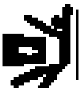
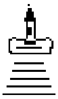
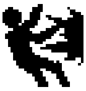
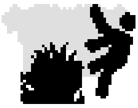
DANGER	Indicates that a specific hazard is known to exist which through inappropriate conditions or actions will cause: • Severe or fatal personal injury • Substantial property damage.
WARNING	Indicates that a specific hazard is known to exist which through inappropriate conditions or actions may cause: • 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 Hazards

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 • Connections to back panel	
	• Console, accessories or optional storage devices that can fall on patient, user, or others. • Collision with persons or objects may result in injury while maneuvering or during system transport. • Injury to user from moving the console.	• Moving • Using brakes • Transporting	
	• 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.

⚠ CAUTION

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

⚠ WARNING

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 or 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.

△ CAUTION

Allowing the machine to transmit acoustic output with the probe not in use (or in its holder) can cause the transducer to build up heat. Always turn off acoustic output or freeze the image when not in use. The system’s acoustic output remains transmitting when the user controls are being used.

Related Hazards (continued)

Mechanical hazards

The use of damaged probes or improper use and manipulation of intracavity probes can result in injury or increased risk of infection. Inspect probes often for sharp, pointed, or rough surface damage that could cause injury or tear protective barriers. Never use excessive force when manipulating intracavity probes. Become familiar with all instructions and precautions provided with special purpose probes.

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.

Electical Hazard

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

CAUTION

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

CAUTION

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

CAUTION

Do not use with Defibrillator.

This equipment does not have a defibrillator approved applied part.

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

WARNING

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

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

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

WARNING

Only approved and recommended peripherals and accessories should be used.

All peripherals and accessories must be securely mounted to the LOGIQ 5.

DANGER

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

Explosion Hazard

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

Electical Hazard

To avoid injury:

- Do not remove protective covers. No user serviceable parts are inside. Refer servicing to qualified service personnel.
- To assure adequate grounding, connect the attachment plug to a reliable (hospital grade) grounding outlet (having equalization conductor ⏚).
- Never use any adaptor or converter of a three-prong-to-two-prong type to connect with a mains power plug. The protective earth connection will loosen.
- Do not place liquids on or above the console. Spilled liquid may contact live parts and increase the risk of shock.
- Plug any peripherals into the LOGIQ 5 AC power outlet.

Related Hazards (continued)

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, See 'Before the system arrives' for more information.

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.

CAUTION

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

CAUTION

Allowing the machine to transmit acoustic output with the probe not in use (or in its holder) can cause the transducer to build up heat. Always turn off acoustic output or freeze the image when not in use. The system's acoustic output remains transmitting when the user controls are being used.

The system is equipped with an Auto Freeze feature which disables acoustic output and freezes the image when the machine is not in use.

Related Hazards (continued)

△ CAUTION

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

△ CAUTION

Never put any device onto the monitor.

△ CAUTION

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

△ CAUTION

Do not unpack the LOGIQ 5. This must be performed by qualified service personnel only.

△ CAUTION

Do not use the LOGIQ 5 Ultrasound system ECG wave for diagnosis and monitoring.

Device Labels

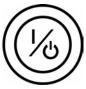
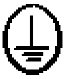
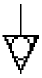
Label Icon Description

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 2-4 for location information.
Type/Class Label	Used to indicate the degree of safety or protection.	
IP Code (IPX8)	Indicates the degree of protection provided by the enclosure per IEC60 529. Can be used in operating room environment.	Footswitch
🯅	Type BF Applied Part (man in the box) symbol is in accordance with IEC 878-02-03.	Probe and PCG marked Type BF
♥	Type CF Applied Part (heart in the box) symbol is in accordance with IEC 878-02-03.	ECG marked Type CF
⚠	"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.	Various
⚡	"CAUTION" - Dangerous voltage" (the lightning flash with arrowhead) is used to indicate electric shock hazards.	Inside of console
○	"Mains OFF" indicates the power off position of the mains power breaker.	See Figure 3-16 for location information.
⏽	"Mains ON" indicates the power on position of the mains power breaker.	See Figure 3-16 for location information.

Table 2-2: Label Icons

Label/Icon	Purpose/Meaning	Location
	“ON” indicates the power on position of the power switch. **CAUTION:** This Power Switch **DOES NOT ISOLATE** Mains Supply. “Standby” indicates the power standby position of the power switch. **CAUTION:** This Power Switch **DOES NOT ISOLATE** Mains Supply.	See Figure 3-11 for location information.
	“Protective Earth” indicates the protective earth (grounding) terminal.	Internal
	“Equipotentiality” indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.	Rear of console

Label Icon Description (continued)

Classifications	Type of protection against electric shock Class I Equipment (*1) Degree of protection against electric shock Type BF Applied part (*2) (for PCG, Probes marked with BF symbol) Type CF Applied part (*3) (for ECG marked with CF symbol) Continuous Operation System is Ordinary Equipment (IPX0) Footswitch is IPX8

1. Class I Equipment

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

2. Type BF Applied Part

TYPE B 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

3. Type CF Applied Part

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

Table 2-4: 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 (Electromagnetic Compatibility) (continued)

NOTE: *Do not use devices which intentionally transmit RF Signals (cellular phones, transceivers, or radio controlled products) in the vicinity of the equipment as it may cause performance outside the published specifications. Keep the power to these type devices turned off when near this equipment.*

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

EMC Performance

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

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

The product must be installed as stipulated in 4.2, Notice upon Installation of Product.

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

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

EMC Performance (continued)

CAUTION

Do not use devices which intentionally transmit RF signals (cellular phones, transceivers, or radio controlled products) in the vicinity of this equipment as it may cause performance outside the published specifications. Keep the power to these type devices turned off when near this equipment.

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

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

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

Table 2-5: 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 13 can be hooked up to the product without compromising its EMC performance.

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

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

   Modification of the product includes changes in:

   a. Cables (length, material, wiring, etc.)
   b. System installation/layout
   c. System configuration/components
   d. Securing system parts (cover open/close, cover screwing)
3. Operate the system with all covers closed. If a cover is opened for some reason, be sure to shut it before starting/ resuming operation.
4. Operating the system with any cover open may affect EMC performance.

Peripheral Update for EC countries

The following is intended to provide the users in EC countries with updated information concerning the connection of the LOGIQ 5 to image recording and other devices or communication networks.

The LOGIQ 5 has been verified for overall safety, compatibility and compliance with the following on-board image recording devices:

- Sony UP 895 MDW B&W Video Printer
- Mitsubishi P91E B&W Printer
- Sony UP2850P Color Video Printer
- Sony UP21MD Color Video Printer
- Sony UP51MD Color Video Printer
- Mitsubishi CP900E Color Video Printer
- Sony SVO9500MD Video Cassette Reorder

The LOGIQ 5 has also been verified for compatibility, and compliance for connection to a local area network (LAN) via the rear panel Ethernet connection, provided the LAN components are IEC/EN 60950 compliant. See ‘Assistance’ for more information.

Connection may also be made to a CE Marked and IEC/EN 60950 compliant modem using one of the serial ports at the rear panel.

The LOGIQ 5 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.

Peripheral Update for EC countries (continued)

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

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

General precautions for installing an alternate off-board, remote device or a network would include:

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

⚠ CAUTION

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.

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

Emission Type	Compliance	Electromagnetic Environment
CISPR 11 RF Emissions	Group 1 Class A	This system uses RF energy only for its internal function. Therefore, RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. It 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.

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	Test Level	Compliance	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: ((•))
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.			

Patient Environmental Devices

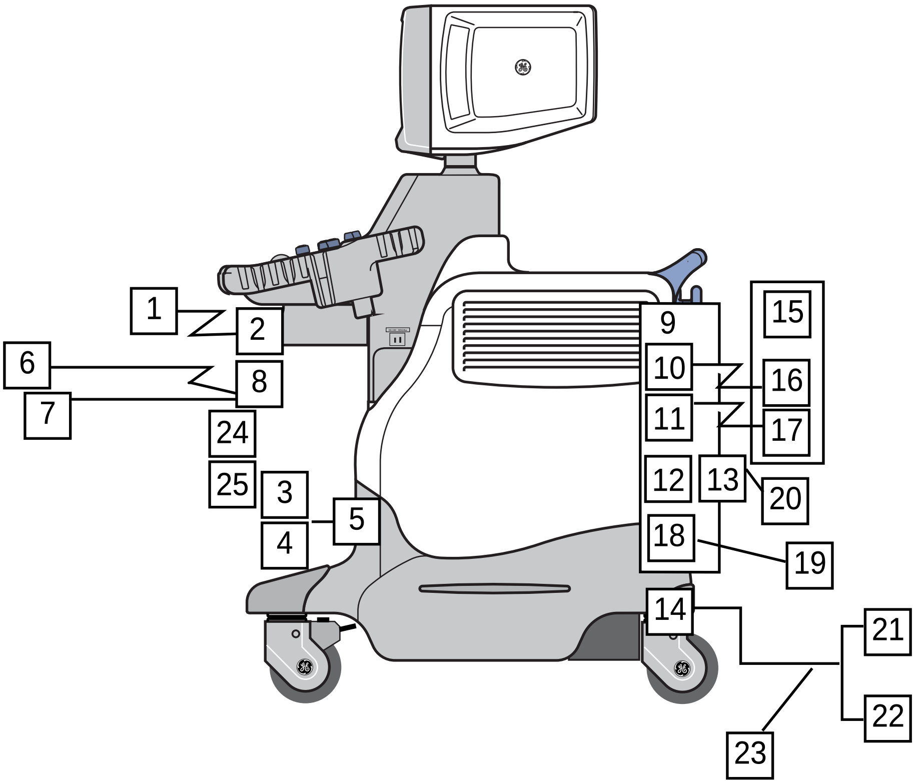

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Figure 2-1. Patient Environmental Devices

Patient Environmental Devices (continued)

1. Peripheral Device (Signals I/O Port, Power In)
2. Front Panel (Signal I/O Port, Power Out)
3. Non-Imaging Probes
4. Imaging Probes
5. Probe Port
6. ECG Cable
7. PCG Sensor
8. Physio-Signal Input Panel
9. Rear Panel
10. Signals I/O Port
11. Power Out
12. Signals I/O Port
13. Footswitch Connector
14. Power In
15. Peripheral Devices
16. Signals I/O Port
17. Power In
18. InSite Modem (Signal I/O Port)
19. Power Telephone Line
20. Footswitch
21. Power Line (AC~)
22. Ground Line
23. Power Cable with Protective Earth
24. MO Drive
25. CD-RW

Acceptable Devices

The devices shown in Figure 2-1 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’ for more information.

Unapproved Devices

△ CAUTION

The unapproved devices shall be used out of patient environment.

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

Any device connected to the LOGIQ 5 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 Dispaly 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. 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.

The TI and MI is displayed at all times. The MI display starts at a value of 0.0 and increments in steps of 0.1 while the TI display starts at a value of 0.4 and increments in steps of 0.1 (values less than 0.4 are displyaed as < 0.4). Display precision is ± 0.1, and accuracy is ± 50%.

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 of the Optimizing the Image chapter 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 5 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.

Warning Label Locations

Console Labels

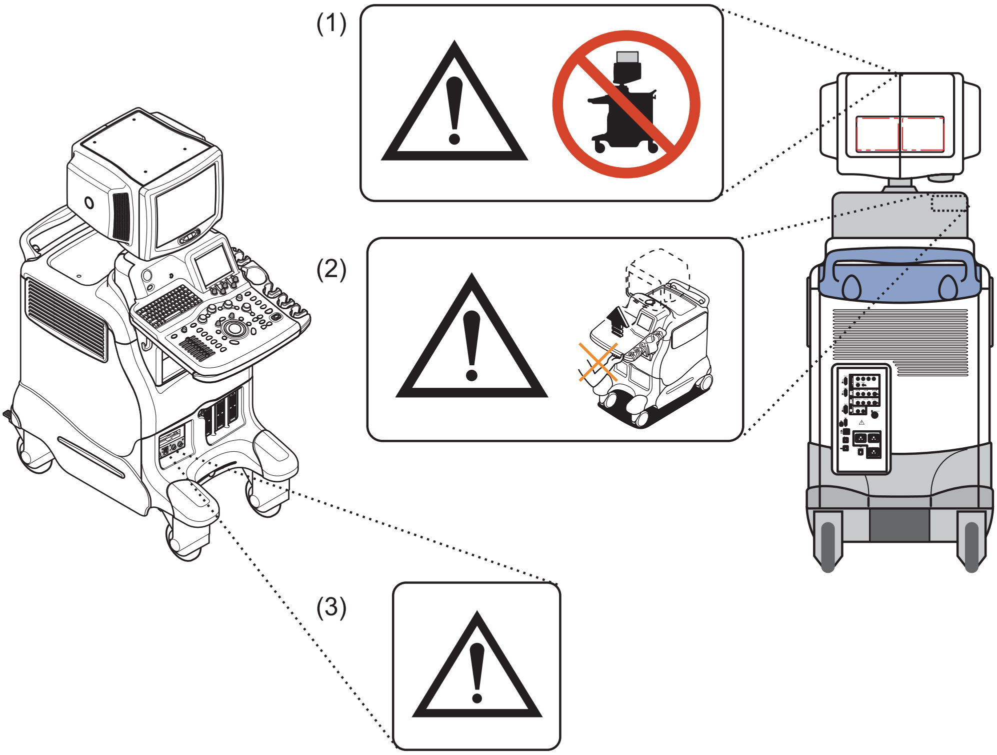


Figure 2-2. Label Location (a)

1. Caution for Possible Injury: “Never put any device onto the Monitor.
2. Caution for Hazardous movement (attached inside of OP rear cover).
3. Defibrillator Label: “Do not use with Defibrillator” (attached on optional ECG).

Console Labels (continued)

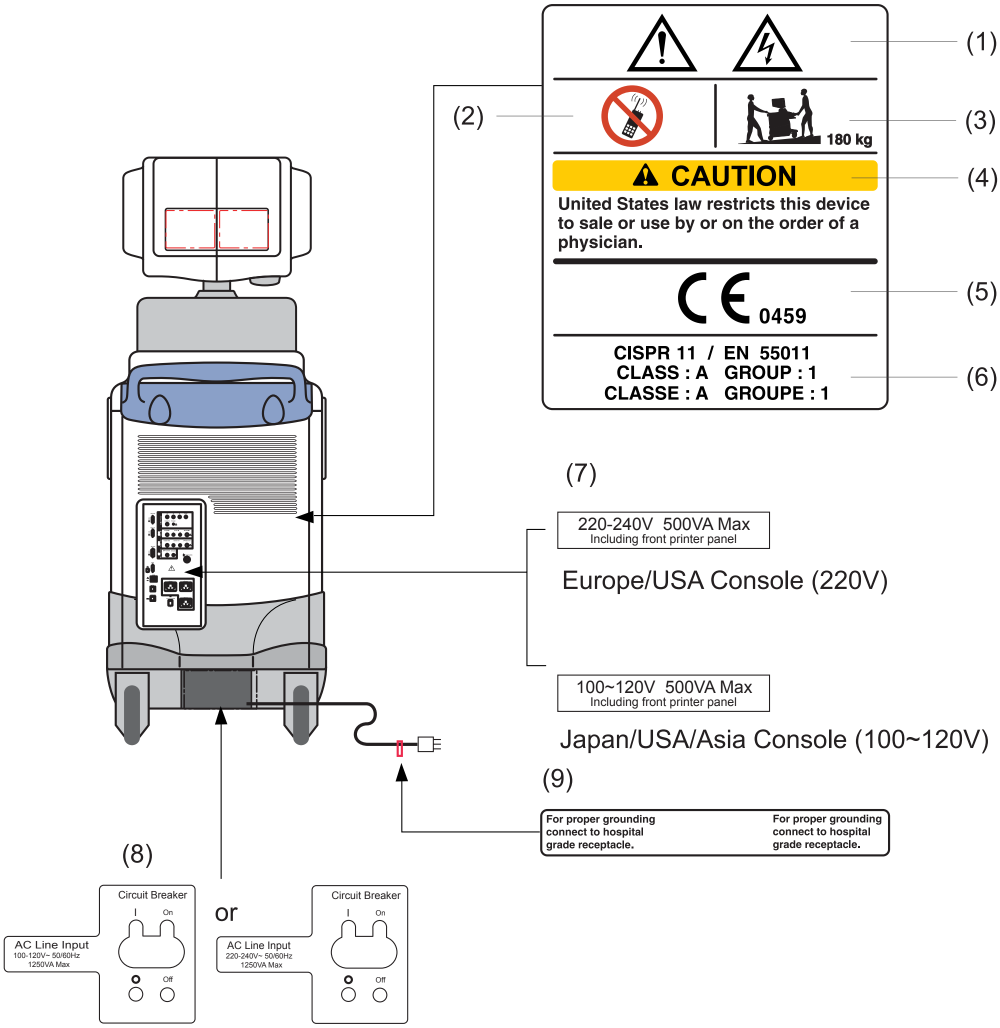

(1)
(2)
(3)
180 kg
(4)
CAUTION
United States law restricts this device to sale or use by or on the order of a physician.
(5)
0459
(6)
CISPR 11 / EN 55011
CLASS : A GROUP : 1
CLASSE : A GROUPE : 1
(7)
220-240V 500VA Max
Including front printer panel
Europe/USA Console (220V)
100~120V 500VA Max
Including front printer panel
Japan/USA/Asia Console (100~120V)
(9)
For proper grounding connect to hospital grade receptacle.
For proper grounding connect to hospital grade receptacle.
(8)
Circuit Breaker
On
Off
AC Line Input
100-120V~ 50/60Hz
1250VA Max
or
Circuit Breaker
On
Off
AC Line Input
220-240V~ 50/60Hz
1250VA Max

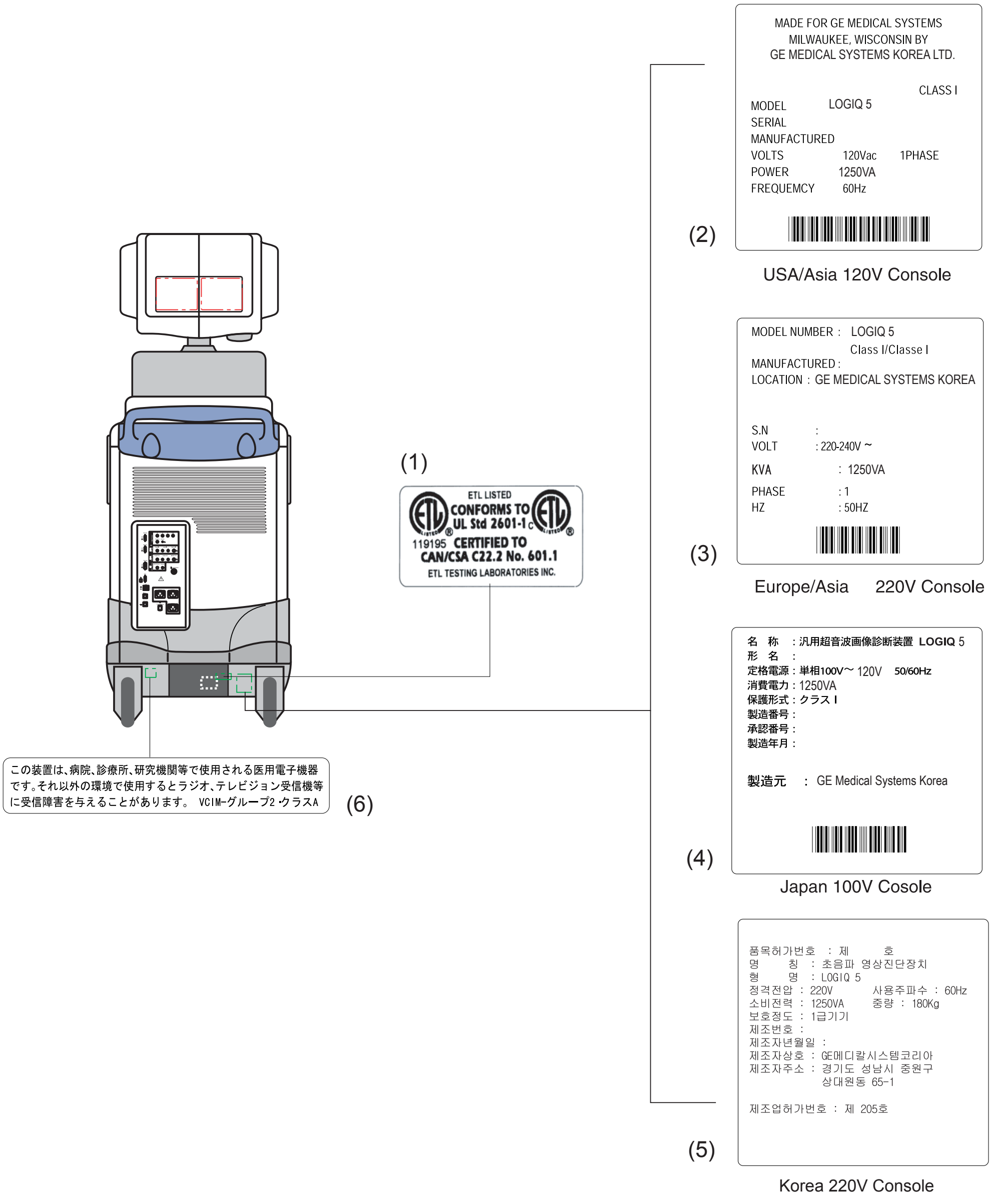
Figure 2-3. Label Location (b)

Console Labels (continued)

Table 2-8: Label Location Explanations

1. Possible shock hazard. Do not remove covers or panels. No user serviceable parts are inside. Refer servicing to qualified service personnel.
2. Do not use the following devices near this equipment: cellular phone, radio receiver, mobile radio transimitter, 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.
3. The equipment weighs approximately 180 kg (397 lbs). To avoid possible injury and equipment damage when transporting from one area of use to another:
   - Be sure the pathway is clear.
   - Limit movement to a slow careful walk.
   - Use two or more persons to move the equipment on inclines or long distance.
4. Prescription Device (For U.S.A. Only)
5. The CE Mark of Conformity indicates this equipment conforms with the Council Directive 93/42/EEC.
6. CISPR **CAUTION**: The LOGIQ 5 conforms to the CISPR11, Group 1, Class A of the international standard for Electromagnetic disturbance characteristics.
7. Voltage Range (Indication label)
8. Circuit Breaker location and rating
9. Signal ground point label **CAUTION**: This is only for “FUNCTIONAL GROUNDING”, NOT “PROTECTIVE EARTH”.

Console Labels (continued)



(2)

MADE FOR GE MEDICAL SYSTEMS
MILWAUKEE, WISCONSIN BY
GE MEDICAL SYSTEMS KOREA LTD.

CLASS I
MODEL LOGIQ 5
SERIAL
MANUFACTURED
VOLTS 120Vac 1PHASE
POWER 1250VA
FREQUEMCY 60Hz

USA/Asia 120V Console

(3)

MODEL NUMBER : LOGIQ 5
Class I/Classe I
MANUFACTURED :
LOCATION : GE MEDICAL SYSTEMS KOREA

S.N :
VOLT : 220-240V ~
KVA : 1250VA
PHASE : 1
HZ : 50HZ

Europe/Asia 220V Console

(4)

名　称　：汎用超音波画像診断装置 LOGIQ 5
形　名　：
定格電源：単相100V～120V 50/60Hz
消費電力：1250VA
保護形式：クラス I
製造番号：
承認番号：
製造年月：

製造元 ： GE Medical Systems Korea

Japan 100V Cosole

(5)

품목허가번호 : 제 호
명 칭 : 초음파 영상진단장치
형 명 : LOGIQ 5
정격전압 : 220V 사용주파수 : 60Hz
소비전력 : 1250VA 중량 : 180Kg
보호정도 : 1급기기
제조번호 :
제조자년월일 :
제조자상호 : GE메디칼시스템코리아
제조자주소 : 경기도 성남시 중원구
상대원동 65-1

제조업허가번호 : 제 205호

Korea 220V Console

(1)

ETL LISTED
CONFORMS TO
UL Std 2601-1
119195 CERTIFIED TO
CAN/CSA C22.2 No. 601.1
ETL TESTING LABORATORIES INC.

(6)

この装置は、病院、診療所、研究機関等で使用される医用電子機器です。それ以外の環境で使用するとラジオ、テレビジョン受信機等に受信障害を与えることがあります。 VCIM-グループ2 ·クラスA

Figure 2-4. ETL and Identification/Rating Plate Label Location (c)

Console Labels (continued)

1. ETL Label: NRTL Listing and Certification Mark is used to designate conformance to nationally recognized product safety standards.
2. Identification and Rating Plate–USA/Asia 120V Console.
3. Identification and Rating Plate–Europe/Asia/Latin America 220V Console.
4. Identification and Rating Plate–Japan 120V Console.
5. Identification and Rating Plate–Korea 220V Console.

Chapter 3

Preparing the System for Use

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

Site Requirements

Introduction

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

Do not attempt to install the system alone. General Electric, Affiliate, or Distributor Field Engineers and Application Specialists will install and setup the system. See 'Contact Information' for more information.

The LOGIQ 5 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' for more information.

Maintain a clean environment. Turn off the system circuit breaker before cleaning the unit. See 'Cleaning the system' 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. This equipment can be used in residential areas only under the supervision of physicians or qualified technicians.

Ensure that the following is provided for the new system:

- A separate power outlet with a 5 amp circuit breaker for 120 VAC for 120V area, 8 amp circuit breaker for 220-240VAC for 220/240V area or 15 amp circuit breaker for 100 VAC for Japan.
- Take precautions to ensure that the console is protected from electromagnetic interference.

  Precautions include:

  - Operate the console at least 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 (<16hrs.)**
Temperature	10° - 35°C 50° - 95°F	-10° - 60°C 14° - 140°F	-40° - 60°C -40° - 140°F
Humidity	30 - 85% non-condensing	30 - 90% non-condensing	30 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

WARNING

To ensure UPS battery operation, DO NOT turn off the breaker switch or disconnect the system power cord from the AC outlet, except for maintenance or during a portable exam.

Console Overview

Console graphics

The following are illustrations of the console:

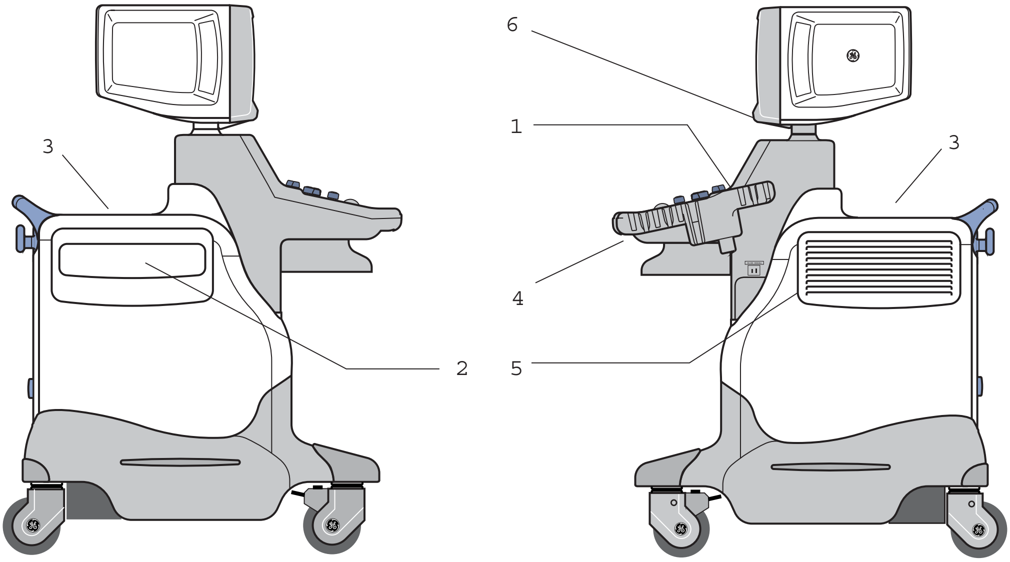


Figure 3-1. LOGIQ 5 System (right and left side views)

1. Probe and Gel Bottle Holder
2. Storage area of Peripheral Device
3. Storage area of Peripheral Device
4. Release lever to raise and lower Monitor and Control Panel
5. Side Pocket
6. Task Light

CAUTION

DO NOT place probes or the footswitch into either the side pocket or the peripheral device's storage area.

Console graphics (continued)

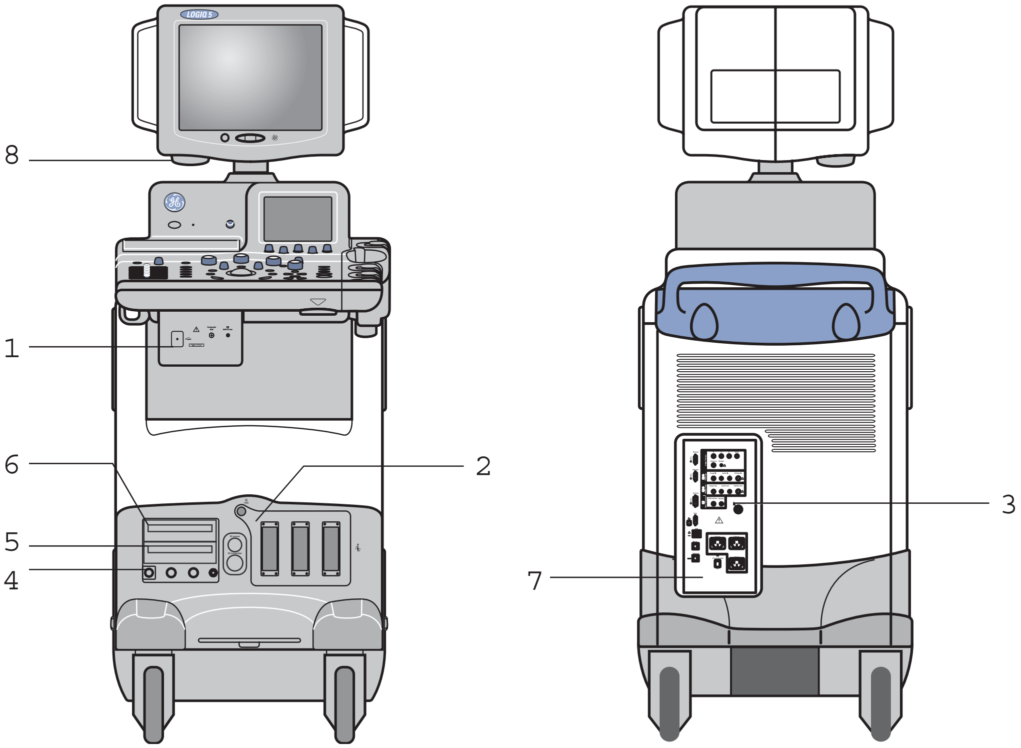


Figure 3-2. LOGIQ 5 System (front and back views)

1. Optional B/W Video Page Printer
2. Probe Ports with optional CWD Probe Port, when available
3. Footswitch connector
4. Optional Physiological Input Panel
5. MOD
6. CD ROM
7. Rear Panel
8. Task Lamp

External drives (CD-RW and/or MO)

The external CD-RW drive (Standard) and MO drive (Option) are located next to the probe port.

They can be used to perform software upgrades, image archiving and service diagnostics.

△ CAUTION

Make sure that the CD-RW Disk tray and/or MO Disk are securely placed in each device during system operation. Mechanical damage may occur if other objects hit the tray or MO disk.

Storage areas

Several convenient storage areas are provided within the console as shown in the figure below. Use them to store gel, options, probe cables, accessories, etc.

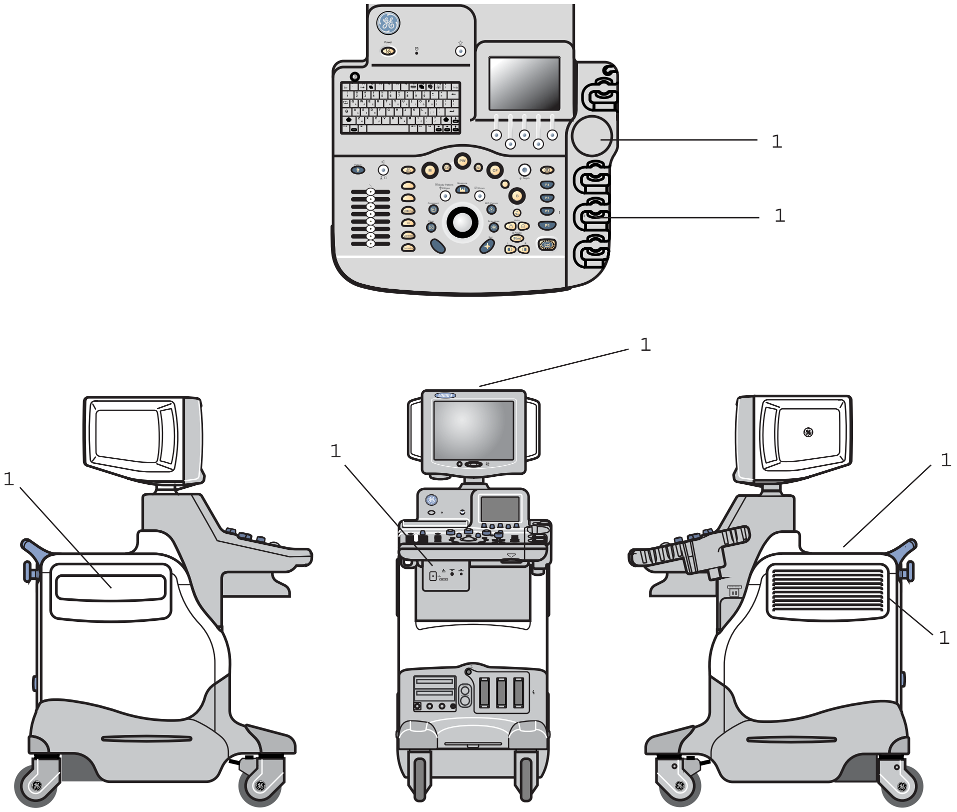


Figure 3-3. Storage Areas

1. Storage Areas

CAUTION

DO NOT place probes or the footswitch into either the side pocket or the peripheral device’s storage area.

Task Lamp

The task lamp is used to illuminate the keyboard.

CAUTION

The task lamp may overheat. Take proper precautions to avoid touching the task lamp.

Contact your local Service Representative when the task lamp bulb needs to be replaced.

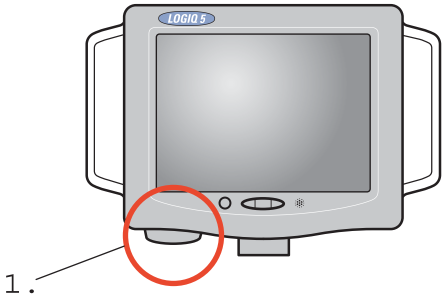


Figure 3-4. Task Lamp

1. Task lamp

Peripheral/Accessory Connection

Peripheral/Accessory Connector Panel

LOGIQ 5 peripherals and accessories can be properly connected using the rear connector panel located behind the rear door. Only the B/W Printer can be connected to the front accessory panel.

Located on the rear panel are video input and output, audio input and output, camera rec/expose, Insite, Ethernet, power and control connections for VCR, printer and service tools. See Figure 3-5 for more specifics.

⚠ CAUTION

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

Signal ground lines are Not Isolated.

⚠ CAUTION

Use only approved probes, peripherals or accessories.

Be sure to plug the power supply cable of the peripherals to the connector panel of the system to avoid unexpected electrical shock.

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

Peripheral/Accessory Connector Panel (continued)

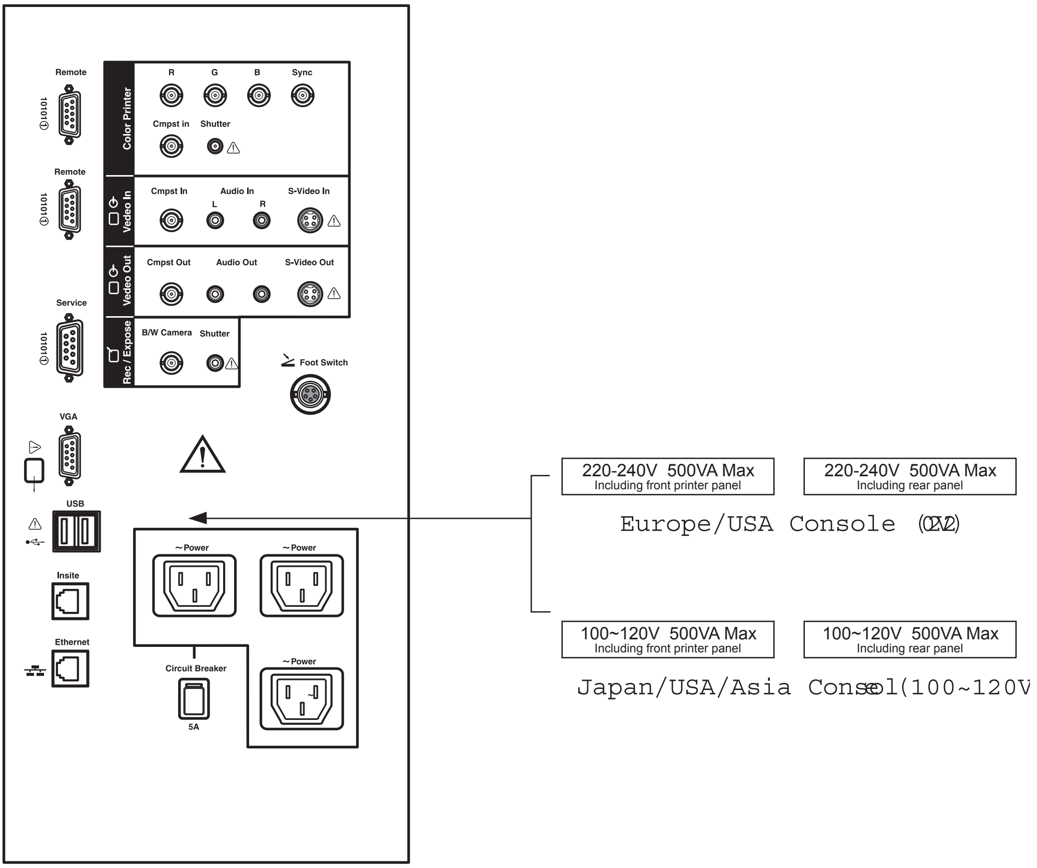

Remote
10101
Color Printer
R
G
B
Sync
Cmpst in
Shutter
Remote
10101
Vedeo In
Cmpst In
Audio In
L
R
S-Video In
Vedeo Out
Cmpst Out
Audio Out
S-Video Out
Service
10101
Rec / Expose
B/W Camera
Shutter
Foot Switch
VGA
USB
Insite
Ethernet
~Power
~Power
Circuit Breaker
5A
~Power
220-240V 500VA Max
Including front printer panel
220-240V 500VA Max
Including rear panel
Europe/USA Console (220V)
100~120V 500VA Max
Including front printer panel
100~120V 500VA Max
Including rear panel
Japan/USA/Asia Console(100~120V

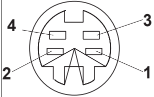
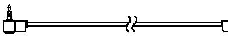
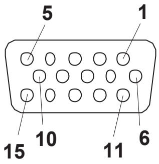
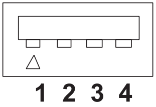
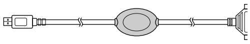
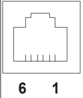
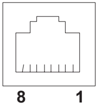
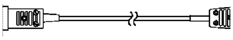
Figure 3-5. Peirpheral/Accessory Connector Panel

CAUTION

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.

Peripheral/Accessory Connector Panel (continued)

Table 3-2: Peripheral/Accessory Connector Panel Descriptions

No.	Item	Type of connector		Required Cable
1.	S-Video Out	S-Terminal, 4-pin		
2.	Composite Color/ BW			
3.	Audio In/Out	RCA		
4.	S-Video In			
5.	Camera Color/ Camera B/W			
6.	VGA	Shrinked D-Sub, 15-pin		
7.	Service	USB(A)		
8.	VCR 1	USB(A)		
9.	VCR 2	USB(A)		
10.	For Future use			
11.	Insite	RJ-11 Modular, 6-pin		
12.	Ethernet	RJ-45 Modular, 8-pin		
13.	Power	IEC Couplers		

Footswitch (Option)

Use only the recommended optional multifunctional footswitch.

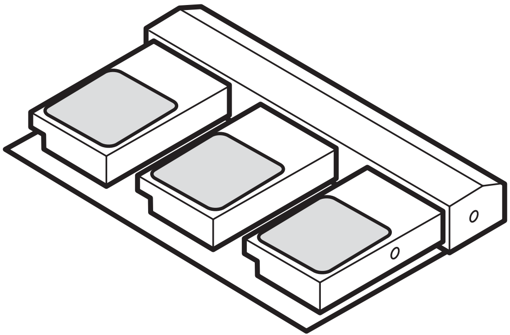


Figure 3-6. Footswitch

The footswitch may be used as select keys, video recording, etc.

The three switches have different function assignments depending on the current application.

The footswitch connection is located below the operator control panel.

CAUTION

DO NOT place or store the footswitch in the side pocket or the Peripheral Device storage area on the system. This is to prevent the possibility of the footswitch falling and damaging itself.

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. Press the Power on/Standby switch and turn off the circuit breaker to power off. See ‘Power Off’ for more information.
2. Unplug the power cord.
3. All cables from off-board peripheral devices (IIE camera, external printer, VCR, etc.) must be disconnected from the console.
4. Disconnect the footswitch from the console.
5. Ensure that no loose items are left on the console.
6. Wind the power cable around the cable hook below the rear handle or wrap the cord in a bundle and store it behind the rear storage panel.

⚠ CAUTION

Please ensure that the peripheral devices, which are installed in the storage areas, are secured with the supplied straps.

Before moving the system (continued)

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

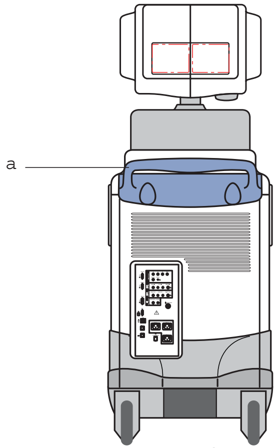


Figure 3-7. Location of rear handle

a. Handle

7. Connect all probes to be used while off site. Ensure that probe cables are out of the way from the wheels and not protruding beyond the console.

NOTE: *If more than three (3) probes are intended to be used, store the additional probes securely.*

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

CAUTION **DO NOT** place probes or the footswitch into either the side pocket or the peripheral device's storage area when moving the system. These are not storage spaces for probes or the footswitch.

10. Adjust the monitor and control panel to its lowest position possible by using the release lever located underneath the control panel.
11. Unlock the wheels.

When moving the system

1. Always use the rear handle grips to move the system.
2. Take extra care when moving the system long distances and on inclines. Ask for help if necessary.

   Avoid ramps that are steeper than ten degrees to avoid tipping over the system.

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

Utilize additional care and personnel when moving on steep incline (>5°) or loading into a vehicle for transport.

CAUTION

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

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

CAUTION

The system weighs approximately 180 kg (397 lbs). To avoid possible injury and equipment damage:

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

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’ for more information.), also perform the following:

1. Only use vehicles that are designed for transport of the LOGIQ 5 system.
2. Load and unload the system to a vehicle parked on a level surface.
3. Ensure that the transporting vehicle can handle the weight of the system plus the passengers.
4. Ensure that the load capacity of the lift (a minimum of 180 kg [397 lbs] is recommended) is capable of handling the weight of the system.
5. Ensure that the lift is in good working order.
6. Secure the system while it is on the lift so that it cannot roll. Use either wood chocks, restraining straps, or other similar types of constraints. Do not attempt to hold it in place by hand.

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

WARNING

Never ride on the lift with the system. A person's weight coupled with the weight of the system may exceed the load capacity of the lift.

7. Employ two to three persons to load and unload safely from a vehicle.

Transporting the System (continued)

8. Load the unit aboard the vehicle carefully and over its center of gravity. Keep the unit still and upright.

NOTE: Do not lay the unit down.

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

Wheels

Examine the wheels frequently for any obvious defects that could cause them to break or bind.

Front wheels

Swivel and brake lock.

Back wheels

Swivel, swivel lock and brake lock.

Setting the lock

The pedal is located in the front wheels of the unit and enables the user to control the movement of the wheels.

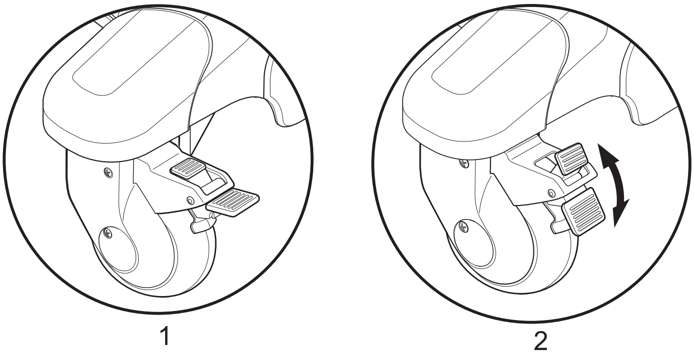


Figure 3-8. Front Pedal

1. Unlock
2. Lock

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. Ensure that the power switch is turned off.
3. Unwrap the power cable. Make sure to allow sufficient slack in the cable so that the plug is not pulled out of the wall if the system is moved slightly.
4. Attach the power plug to the system and secure it in place by using the retaining clamp.

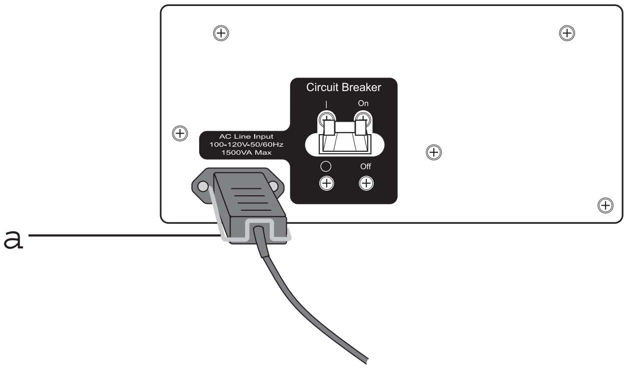


Figure 3-9. Power Plug

a. Retaining clamp for power plug

CAUTION

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

5. Push the power plug securely into the wall outlet.

CAUTION

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

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

Connecting and Using the System (continued)

WARNING

To avoid risk of fire, the system power must be supplied from a separate, properly rated outlet. See ‘Before the system arrives’ 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.

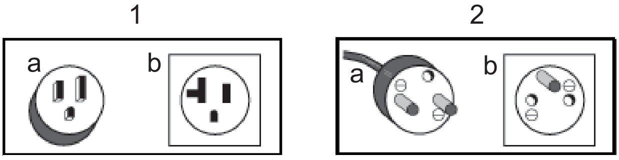


Figure 3-10. Example Plug and Outlet Configurations

1. 100-120 VAC, 1200 VA

   Plug and Outlet Configuration
2. 220-240 VAC, 1200 VA

   Plug and Outlet Configuration

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 3-3: 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	

Power On/Standby

CAUTION

Press the ***Power On/Standby*** switch to turn the power on. The circuit breaker must also be in the on position. For circuit breaker location, see Figure 3-16.

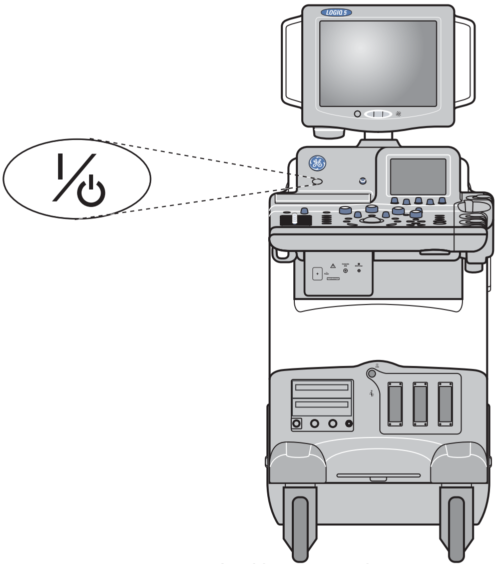


Figure 3-11. Power On/Standby Switch Location

Power Up Sequence

The system is initialized. During this time:

- System diagnostics run. Its status is reflected on the monitor by the graphic in Figure 3-12.

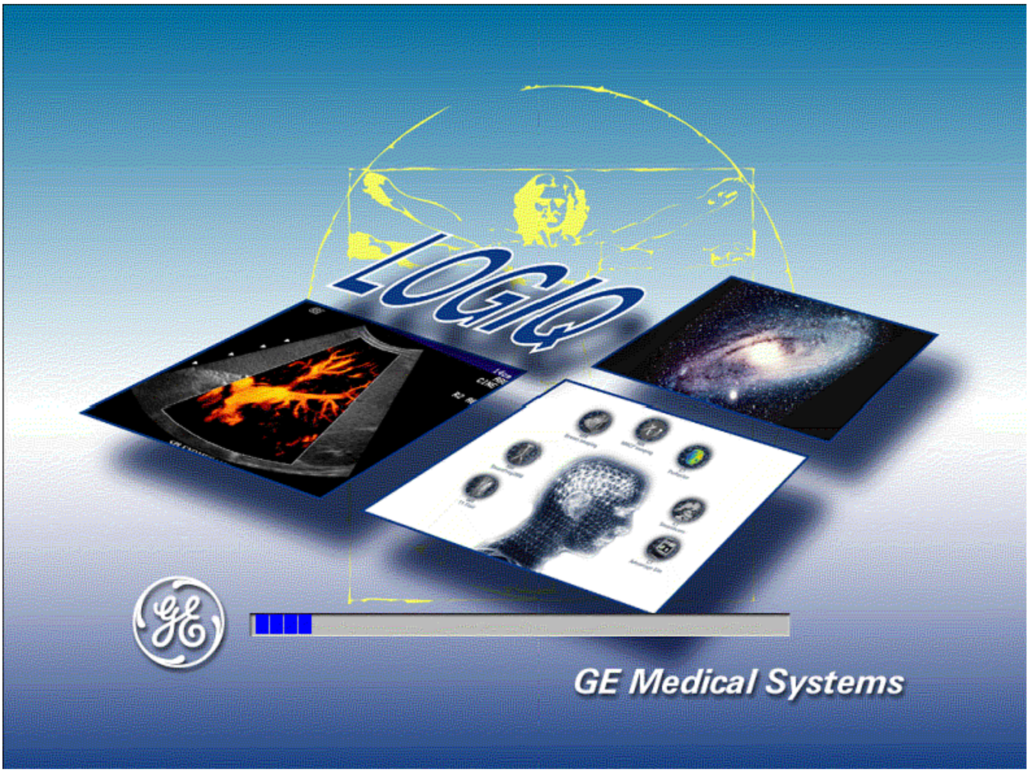


Figure 3-12. Power Up Graphic Sequence

HINTS If problems occur, freeze the image and take a picture for reference. This will help if there is a need to call for service.

- Probes are initialized for immediate operation.

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

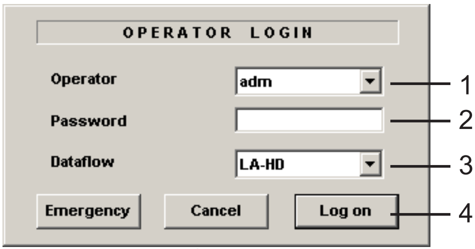
- Peripheral devices are activated on power up.

After initialization is complete, all lighted buttons on the Control Panel light and the default B-Mode screen or Patient screen (no probes are connected) is displayed in the monitor display.

Password Protection

Login Personal IDs and associated passwords can be preset in the LOGIQ 7.

If IDs and passwords have been entered and the Use Auto Logon is off, the Operator Login Window appears, requesting for an ID and password when Power up sequence is completed or when its needed.



OPERATOR LOGIN

Operator: adm

Password:

Dataflow: LA-HD

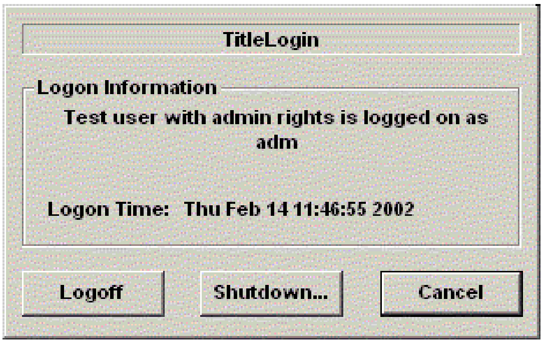
Figure 3-13. Operator Login Window

1. Operator: Select the Operator.
2. Password: Enter Operator’s password.
3. Dataflow: Select Database (for example, Local Archive, DICOM, etc.)
4. Select type of Logon or Cancel.
    - Emergency: Data stored only for the duration of the current examination.
    - Logon: Standard logon
    - Cancel: Cancel logon

If the correct ID and Password are entered, the system displays the Patient screen.

Password Protection (continued)

Logoff When the user enters the system by login, at the end of the exam the system displays the SYSTEM-EXIT window. Select "Logoff" to logoff the system.


TitleLogin
Logon Information

Test user with admin rights is logged on as adm

Logon Time: Thu Feb 14 11:46:55 2002

Logoff
Shutdown...
Cancel

Figure 3-14. System Exit Window

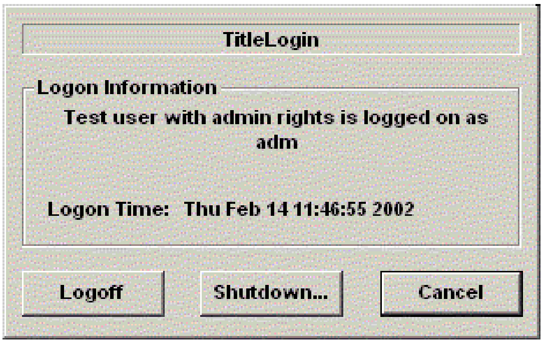
Standby Mode

To place the system in standby mode:

1. Press the **Power On/Standby** switch at the front of the system once.
2. The System-Exit window is displayed.
3. Using the **Trackball** or ***Tab*** key, select Shutdown.

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

   The shutdown process takes a few seconds to complete.



TitleLogin

Logon Information

Test user with admin rights is logged on as adm

Logon Time: Thu Feb 14 11:46:55 2002

Figure 3-15. System-Exit Window

4. Disconnect the probes.

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

NOTE: *If daily maintenance is to be performed, turn off the circuit breaker in the back of the system to power off.*

Power Off

To power off the system:

1. Press the **Power On/Standby** switch at the front of the system once.
2. The System-Exit window is displayed.
3. Using the **Trackball** or ***Tab*** key, select Shutdown.

   The shutdown process takes a few seconds and is completed when the control panel illumination is turned off.
4. Disconnect the probes.

   Clean or disinfect all probes as necessary. Store them in their shipping cases to avoid damage.
5. Turn off the Main Circuit Breaker at the rear of the system to power off the system.

CAUTION

DO NOT turn off the circuit breaker before the Power on/ Standby switch LED is off.

Data may be lost or system software damaged if the circuit breaker is turned off before the Power on/Standby LED is off.

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

Circuit breaker

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

If a power overload occurs:

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

The Circuit Breaker switch should stay in the **On** position; **DO NOT** hold the switch in the **On** position. If the Circuit Breaker switch remains **On**, follow the Power On procedure previously described.

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

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

DO NOT attempt to use the system.

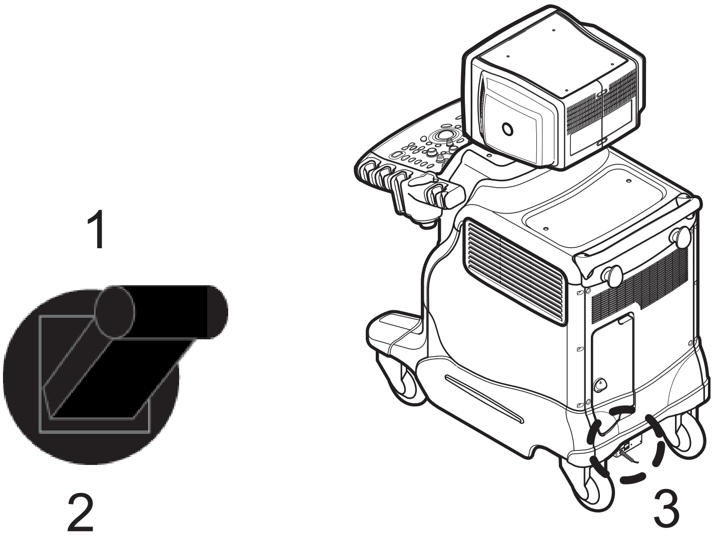


Figure 3-16. Location of Circuit Breaker

1. Circuit Breaker On Position
2. Circuit Breaker Off Position
3. Circuit Breaker location

Adjusting the Display Monitor

Rotate, tilt, raise and lower the monitor

The monitor position can be adjusted for easy viewing.

- The monitor can be rotated around its central pivot point.
- The monitor can be tilted for the optimum viewing angle.
- The monitor and console panel can be raised or lowered for the best viewing height.

The monitor position can be adjusted for easy viewing.

NOTE: *When moving the LOGIQ 5, lower the monitor and console panel to its lowest possible position to improve stability.*

CAUTION

Be careful when lowering the monitor and control panel that it does not collide with the peripheral device sitting on the top of the console. Use caution and slowly lower the monitor and control panel.

DO NOT place objects on the monitor.

Brightness and Contrast

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

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

Brightness and Contrast (continued)

To adjust the brightness:

1. Press the Toggle button on the display monitor twice.
2. Press the Adjustment (+) button to increase brightness. Press the Adjustment (-) button to decrease brightness.

   The amount of brightness is shown on a slide bar on the screen.

To adjust the contrast:

1. Press the Toggle button on the display monitor once.
2. Press the Adjustment (+) button to increase contrast. Press the Adjustment (-) button to decrease contrast.

   The amount of contrast is shown on a slide bar on the screen.

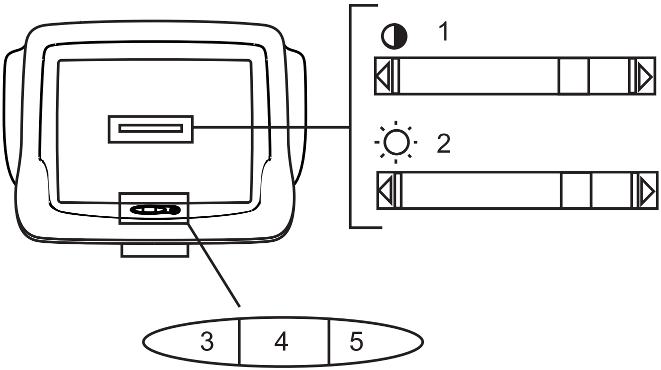


Figure 3-17. Brightness and Contrast

1. Contrast Indicator
2. Brightness Indicator
3. Brightness/Contrast Toggle Button
4. Brightness/Contrast Adjustment (-) Button
5. Brightness/Contrast Adjustment (+) Button

Brightness and Contrast (continued)

Record any changes to the final brightness and contrast settings and leave this information with the system. Generally speaking, do not change the controls once they have been set. Once set, the display then becomes the reference for the hard copy device(s).

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

Manual Degauss

Degaussing refers to the process of removing magnetic-field effects from the monitor. Operation of the monitor within a magnetic field may adversely effect color purity. Degaussing can be used to correct this problem. The monitor automatically degausses at power on.

To activate the manual degauss:

1. Press and hold the monitor adjustment button for a minute. The monitor adjustment menu appears.
2. Move to the Degauss menu and press the monitor adjustment button (+). The monitor is degaussed.

NOTE: Monitor degaussing (demagnetizing) is done automatically when the system is turned on.

Speakers

Stereo audio, provided by speakers located on the sides of the display monitor, is standard for:

- Audio Doppler operation (left side is blood flow away/right side is blood flow toward)
- Audio playback of videotaped scan sessions
- Audio error notification.

Probes

Introduction

Only use approved probes.

All imaging probes can be plugged into any of the probe ports.

Refer to the *Probes* chapter.

Selecting a probe

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

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

Connecting the Probe

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

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.
4. Turn the connector locking handle counterclockwise.
5. Align the connector with the probe port and carefully push into place.
6. Turn the connector locking handle clockwise to secure the probe connector.
7. Carefully position the probe cord so it is free to move and is not resting on the floor.

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 disconnection a probe.

Connecting the Pencil Probe (P2D and P6D)

When using a pencil probe, it is necessary to attach a probe adapter to the system.

To attach a probe adapter and connect a pencil probe:

Turn the locking handle counterclockwise to unlock.

Align the connector of the adapter with the probe port and carefully push into place.

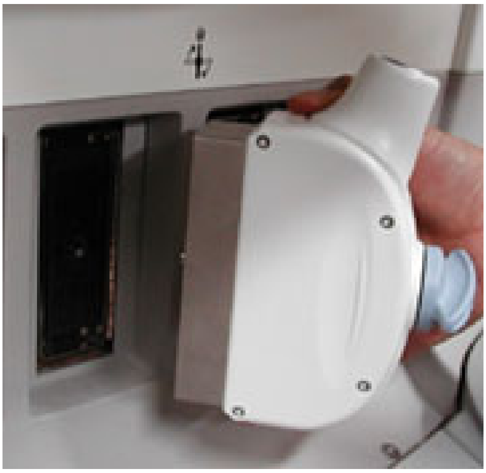


Figure 3-18. Align the connector with the probe port

Turn the connector locking handle clockwise to the full vertical position to lock in place.

Connecting the Pencil Probe (P2D and P6D) (continued)

Insert the probe connector into the adapter until you hear the locking click. Carefully position the probe cord so it is free to move and is not resting on the floor.

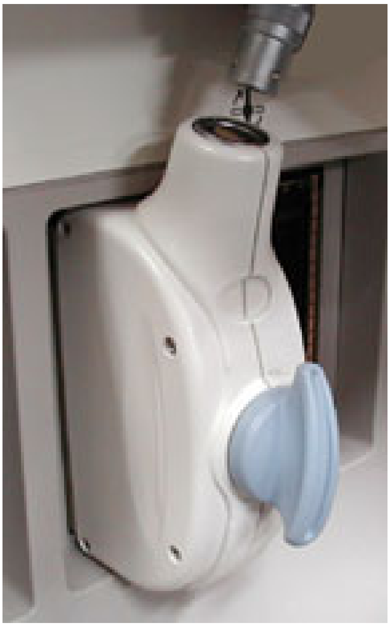


Figure 3-19. Insert the probe connector to the adapter

WARNING

When connecting the probe adapter to the system, first verify the direction of the connector. The connector portion of the adapter must be properly oriented to the system before locking the probe adapter. The probe adapter should only be connected when the connector portion of the adapter is properly aligned mechanically with the system.

WARNING

Serious injury and equipment damage may result if the probe adapter is improperly connected to the system by applying excessive force. Carefully align the probe connector to the system and push it firmly into place. Turn the locking handle clockwise to secure the probe connector to the system.

Cable Handling

Take the following precautions with probe cables:

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

Activating the Probe

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

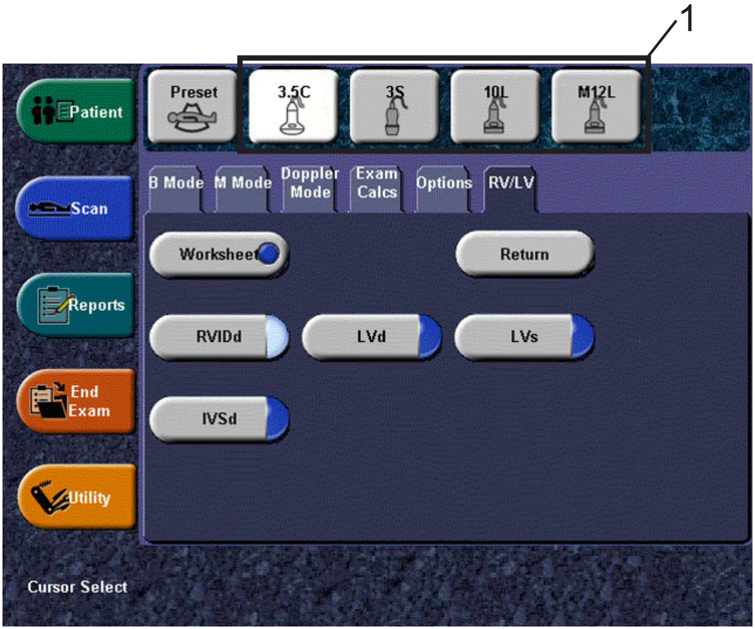

1
Patient
Scan
Reports
End Exam
Utility
Cursor Select
Preset
3.5C
3S
10L
M12L
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
RV/LV
Worksheet
Return
RVIDd
LVd
LVs
IVSd

Figure 3-20. Probe Indicators

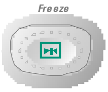
1. Probe Indicators

The probe activates in the currently-selected operating mode. The probe's default settings for the mode and selected exam are used automatically.

Deactivating the Probe

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

To deactivate a probe:



1. 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 selected as the active probe.

- Move the probe locking handle counterclockwise.
- 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.

Disconnecting the Pencil Probe (P2D and P6D)

Pull out the probe connector carefully.

Ensure the probe cable is free.

Be sure that the probe head is clean before placing the probe in its case.

Move the adapter locking handle counterclockwise into the horizontal position.

Carefully slide the adapter away from the probe port.

Store the adapter in its case.

Transporting Probes

Secure the probe in its holder for moving short distances.

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

Storing the Probe

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

- 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.

⚠ CAUTION

DO NOT store probes in either the side pocket or the peripheral device’s storage area on the system. To avoid damage, store the probe in its carrying case.

Operator Controls

Control Panel Map

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

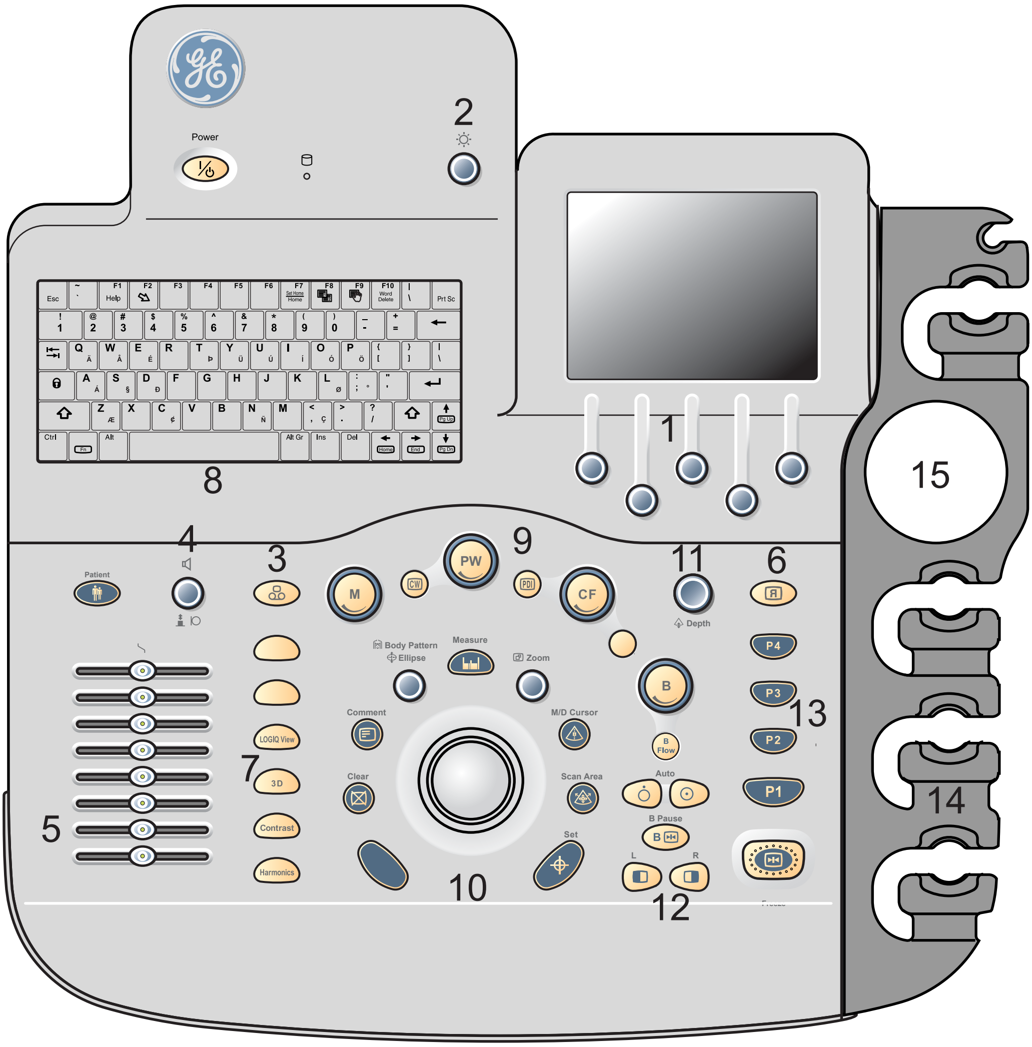

Power
2
1
8
15
4
3
9
11
6
Patient
PW
M
CW
PDI
CF
Depth
P4
P3
P2
P1
13
14
Body Pattern
Ellipse
Measure
Zoom
B
Comment
M/D Cursor
B Flow
LOGIQ View
7
3D
Contrast
Harmonics
5
Clear
Scan Area
Auto
B Pause
Set
L
R
10
12
Esc
Help
Prt Sc
Ctrl
Alt
Alt Gr
Ins
Del

Figure 3-21. Control Panel

Control Panel Map (continued)

1. Touch panel and controls
2. Touch Panel Brightness Control
3. Video
4. Audio On/Off and Volume
5. TGC
6. Reverse
7. Additional Feature Keys
8. Keyboard
9. Mode/Gain Keys
10. Imaging/Measurement Keys
11. Depth
12. Imaging Feature Keys
13. Freeze and Print Keys
14. Probe and Cord Holder
15. Gel Holder

Key Illumination

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

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

Table 3-4: Key Illumination

Backlight Capability	Availability
OFF	Function is not available
ON (Normal-intensity)	Function is available
ON (High-intensity)	Activated/ON
Blinking	User input is requested

Keyboard

The standard alphanumeric keyboard has some special functions.

Esc	Exit current display screen.
Help (F1 Key)	Enter Online help / user manual.
Word Delete (F10 Key)	Erase word associated with comment cursor.
Arrow (F2 Key)	Annotation arrow.
Grab Last (F9 Key)	Activate the last selected data for edit.
Home/Set Home (F7 Key)	Move annotation cursor to home position; shift+key to set current annotation cursor position as the new home position.
Text1/Text2 (F8 Key)	Switch between user text annotation overlays.
User Define Function	(This feature is not available at this time).

Touch Panel

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

Exam Function Controls

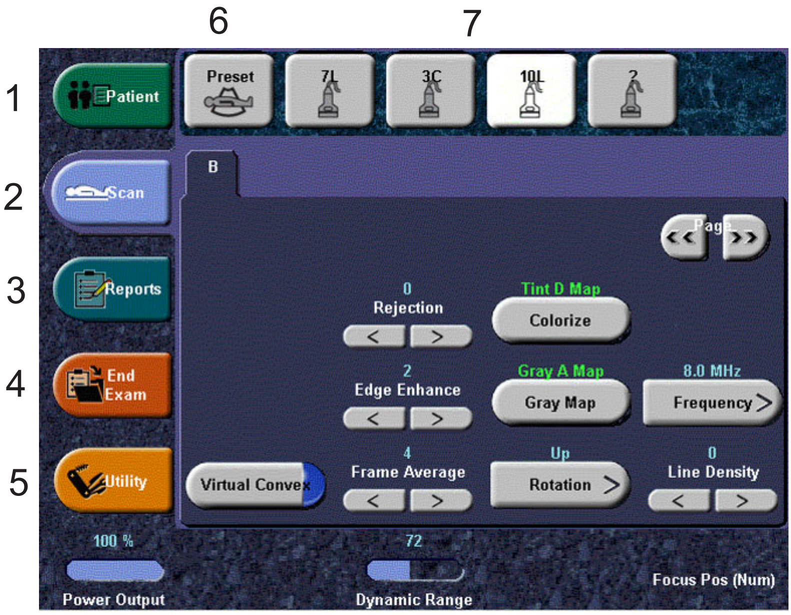

6
7
1
2
3
4
5
Patient
Scan
Reports
End Exam
Utility
Preset
7L
3C
10L
?
B
Page
<<
>>
0
Rejection
Tint D Map
Colorize
2
Edge Enhance
Gray A Map
Gray Map
8.0 MHz
Frequency
Virtual Convex
4
Frame Average
Up
Rotation
0
Line Density
100 %
Power Output
72
Dynamic Range
Focus Pos (Num)

Figure 3-22. Exam Function Controls

1. Patient: Enter Patient screen
2. Scan: Enter scanning mode screen
3. Reports: Activates default report and Touch Panel of report choices.
4. End Exam: Activates Image Management and Touch Panel with end of exam options.
5. Utility: Activates the configuration system.
6. Preset: Select the application to use.
7. Probe Indicator: Indicates and selects the probes.

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

At the bottom of the Touch Panel, there are five combination rotary dials/push buttons. The functionality of these rotaries changes, depending upon the currently displayed menu. Press the button to switch between controls (as with Focus Position/ Number), or rotate the dial to adjust the value.

Mode/Function Specific Controls

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

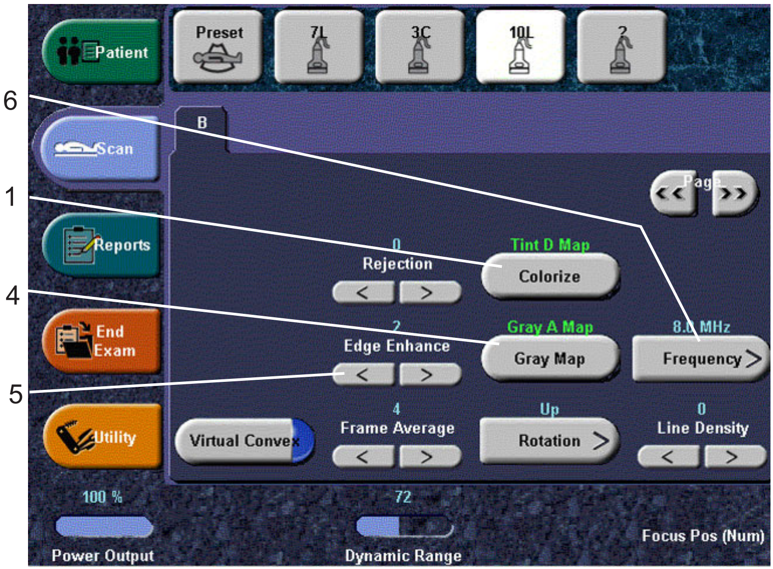

6
1
4
5
Patient
Scan
Reports
End Exam
Utility
Preset
7L
3C
10L
?
B
Page
0
Rejection
Tint D Map
Colorize
2
Edge Enhance
Gray A Map
Gray Map
8.0 MHz
Frequency
Virtual Convex
4
Frame Average
Up
Rotation
0
Line Density
100 %
Power Output
72
Dynamic Range
Focus Pos (Num)

Figure 3-23. Mode/Function Specific Controls

1. Toggle keys are used when the choices are on/off.
2. Select functions are used where the available functions are listed on the key (not shown).
3. Two-Button functions are used when there are two choices that do not include on/off (not shown).
4. Progress/Select keys are used for controls that have three or more choices. When this key is selected, a pop-up menu appears with the available choices.
5. Progression keys are used to assess the impact of the control on the image progressively.
6. Sub-menu keys are used to bring up an additional menu.

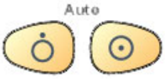
Mode, Display and Record

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.

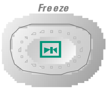


- The Auto keys are used to:
  - initiate an auto optimization
  - turn off the auto mode.

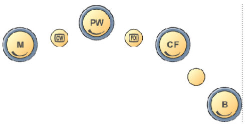
- Depth controls the image display depth.

- 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).



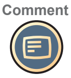
- The Freeze key is used to stop the acquisition of ultrasound data and freeze the image in system memory. Pressing ***Freeze*** a second time continues live image data acquisition.



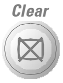
- To activate a specific mode, press the appropriate mode key. Gain knobs control the gain of the displayed echoes during B-Mode scanning. Each mode has its own gain control via the larger gray knob surrounding the mode key.

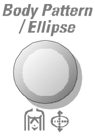
Measurement and Annotation

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



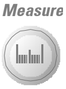
- The Comment key enables the image text editor and displays the annotation library Touch Panel.





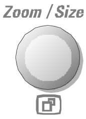
- The Clear key is generally used to erase or exit functions such as annotations/comments, measurements and zoom. Pressing the Clear key again returns the system to the basic mode top menu.
- The Body Pattern/Ellipse control has a dual purpose:
  - When the Body Pattern/Ellipse control is pressed, it enables the Body Pattern Touch Panel and displays the default pattern on the screen.
  - When the Body Pattern/Ellipse control is adjusted, it is used to activate the ellipse measurement function after the first distance measurement has been set and the second caliper is activated.

    Press Set to fix the measurement after the ellipse adjustment is complete. The measurement is then displayed in the measurement result window.

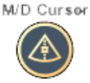


- The Measure key is used in all types of basic measurements. It also becomes the “mouse” arrow for making selections along with the Set key (to fix or finish a selection). When the Measure key is pressed, the measurement Touch Panel is displayed.

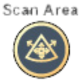
Measurement and Annotation (continued)



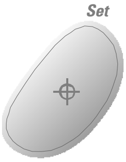
- The **Zoom** control has a dual purpose:
    - When the Zoom control is pressed, it activates the zoom function.
    - When the Zoom control is adjusted, it is used to control the zoom size with the zoom function in real-time or it rotates the probe position indicator when in the body pattern function.



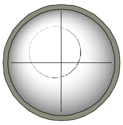
- The M/D Cursor key enables Trackball control of the M-Mode or Doppler cursor line (not angle correction) or the CFM window in real-time Color Flow Mode.



- 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.



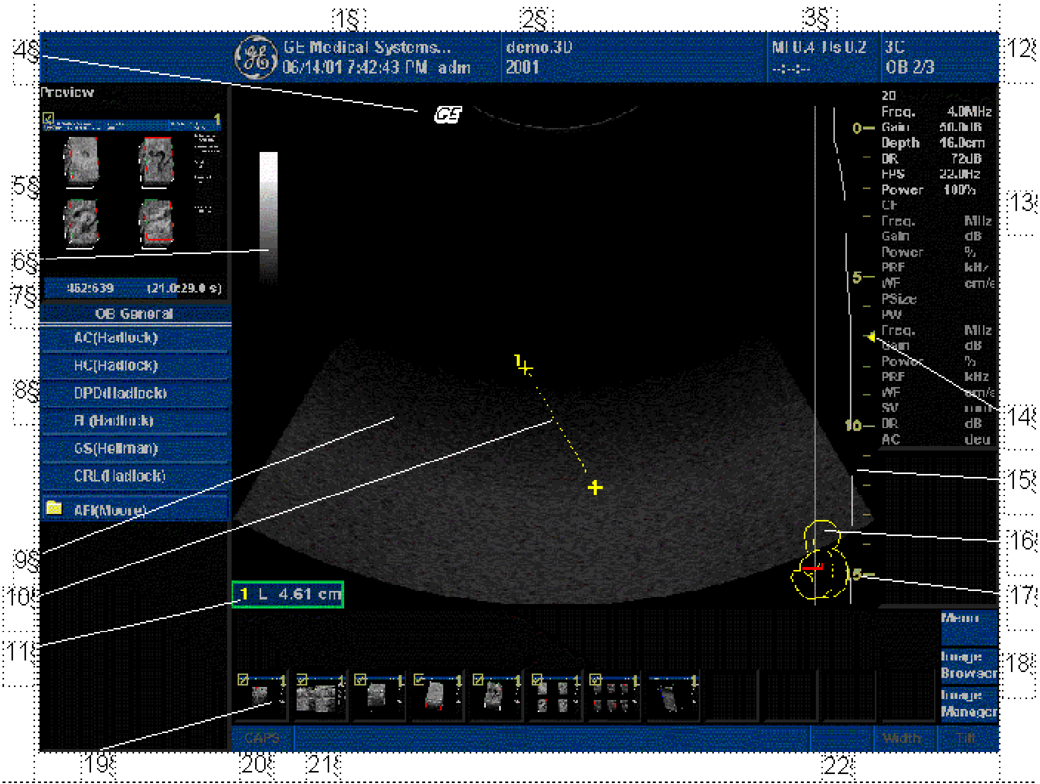
- The Set key is used for various functions, but is generally used to fix or finish an operation (e.g. to fix a measurement caliper).



- 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


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
GE Medical Systems...
06/14/01 7:42:43 PM adm
demo.3D
2001
MI 0.4 TIs 0.2
-:-:-
3C
OB 2/3
Preview
462:639 (21.0:29.0 s)
OB General
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
GS(Hellman)
CRL(Hadlock)
AFI(Moore)
1 L 4.61 cm
Menu
Image Browser
Image Manager
CAPS
Width
Tilt

2D
Freq. 4.0MHz
Gain 50.0dB
Depth 16.0cm
DR 72dB
FPS 22.0Hz
Power 100%
CF
Freq. MHz
Gain dB
Power %
PRF kHz
WF cm/s
PSize
PW
Freq. MHz
Gain dB
Power %
PRF kHz
WF cm/s
SV mm
DR dB
AC deg

Figure 3-24. Monitor Display Tour

1. Institution/Hospital Name, Date, Time, Operator Identification.
2. Patient Name, Patient Identification.
3. Power Output Readout, System Status (real-time or frozen)
12. Probe Identifier. Exam Study.
13. Imaging Parameters by Mode.
14. Focal Zone. The focal zone mark changes into a bowtie mark when one of the following is activated: Coded Excitation, B Flow, CHA (Phase Inversion) and CHI (Harmonics).

4. GE Symbol: Probe Orientation Marker. Coincides with a probe orientation marking on the probe.
5. Image Preview.
6. Gray/Color Bar.
7. Cine Gauge.
8. Measurement Summary Window. To display the Worksheet, move the Trackball to “Worksheet” and press Set. The Worksheet is displayed. To hide the Measurement Summary Window, move the Trackball to the top-left icon and press Set. The Measurement Summary Window is minimized and displays only the title line. Press Set again to maximize the display.
9. Image.
10. Measurement.
11. Results Window. To move the Result Window to a different location, move the Trackball to the top-right icon in the Result Window and press Set. The Result Window then moves freely with the Trackball. Press Set again to anchor the new location. To hide the Measurement Result Window, move the Trackball to the top-left icon and press Set. The Measurement Result Window is minimized and displays only the icons. Press Set again to maximize the display.
15. TGC.
16. Body Pattern.
17. Depth Scale.
18. Image Management Menu: Menu, Delete, and Image Manager.
19. Image Clipboard.
20. Caps Lock: On/Off.
21. System Messages Display.
22. 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:

- Exam category
- Patient name
- Patient ID
- Exam Information

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

△ CAUTION

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

Beginning a New Patient

Pressing the ***Patient*** Touch Panel key displays the Patient Screen on the monitor. This screen is also accessible from the **Patient** key on the control panel.

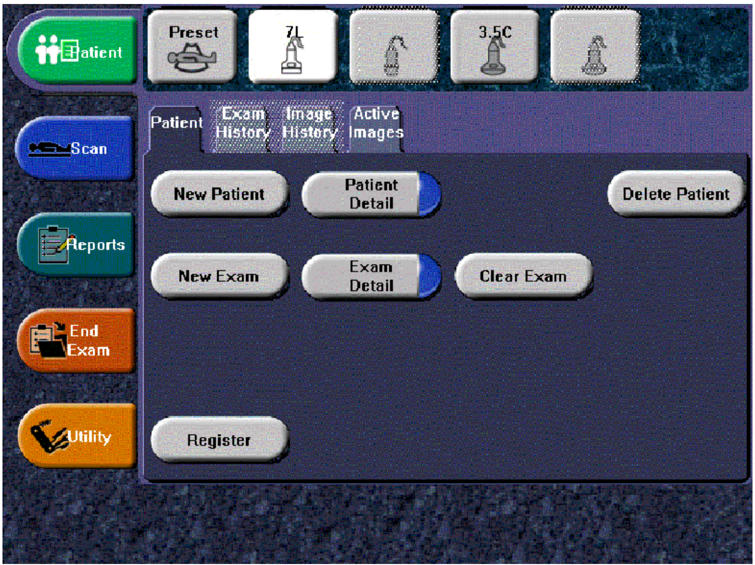
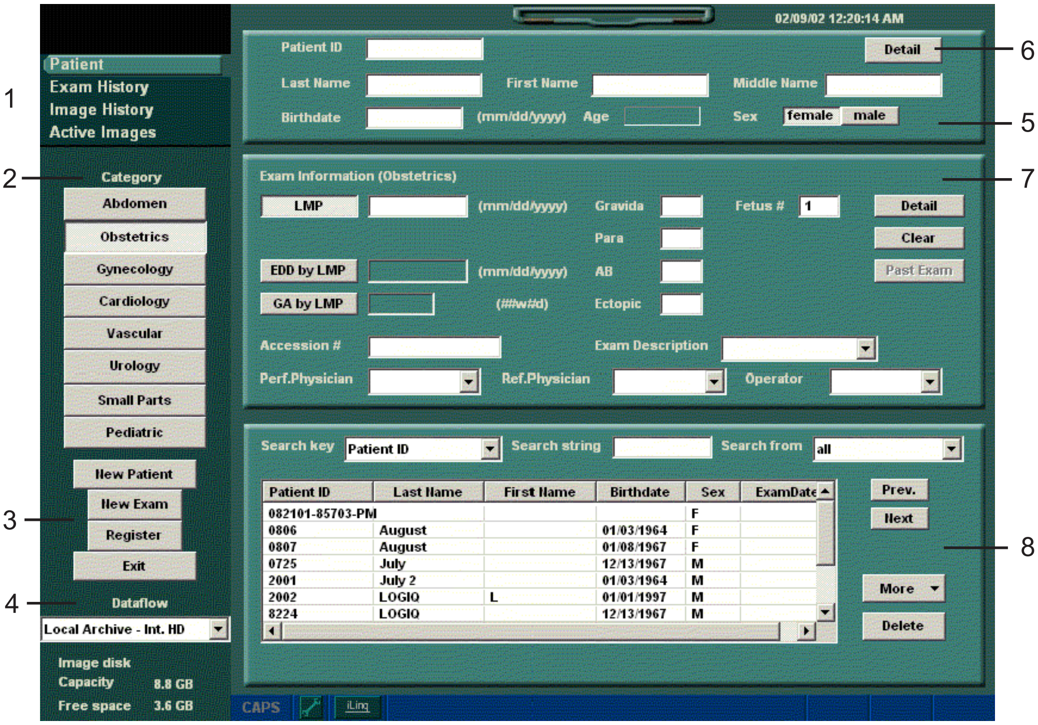

Patient
Preset
7L
3.5C
Scan
Reports
End Exam
Utility
Patient
Exam History
Image History
Active Images
New Patient
Patient Detail
Delete Patient
New Exam
Exam Detail
Clear Exam
Register

Figure 4-1. Patient Touch Panel

New Patient should be selected at the beginning of each new patient exam. Pressing **New Patient** automatically erases all patient data, annotations, measurements, calculations and worksheets of the last exam. Images are not automatically erased. A warning message appears regarding images being erased or saved.

Patient Screen


Patient
Exam History
Image History
Active Images
Category
Abdomen
Obstetrics
Gynecology
Cardiology
Vascular
Urology
Small Parts
Pediatric
New Patient
New Exam
Register
Exit
Dataflow
Patient ID
Detail
Last Name
First Name
Middle Name
Birthdate
(mm/dd/yyyy)
Age
Sex
female
male
Exam Information (Obstetrics)
LMP
(mm/dd/yyyy)
Gravida
Fetus #
Detail
Para
Clear
EDD by LMP
(mm/dd/yyyy)
AB
Past Exam
GA by LMP
(##w#d)
Ectopic
Accession #
Exam Description
Perf.Physician
Ref.Physician
Operator
Search key
Search string
Search from
Prev.
Next
More
Delete
CAPS
iLinq
1
2
3
4
5
6
7
8

02/09/02 12:20:14 AM

Fetus # 1

Dataflow: Local Archive - Int. HD

Image disk
Capacity 8.8 GB
Free space 3.6 GB

Search key: Patient ID
Search from: all

Patient ID	Last Name	First Name	Birthdate	Sex	ExamDate
082101-85703-PM				F	
0806	August		01/03/1964	F	
0807	August		01/08/1967	F	
0725	July		12/13/1967	M	
2001	July 2		01/03/1964	M	
2002	LOGIQ	L	01/01/1997	M	
8224	LOGIQ		12/13/1967	M	

Figure 4-2. Patient Screen (Category: OB)

Patient Screen (continued)

Enter Patient Data with the alphanumeric keyboard.

To navigate through the Patient Entry menu, use the ***Tab*** key or **Trackball** and **Set** to move and fix the cursor.

Figure 4-2 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.

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

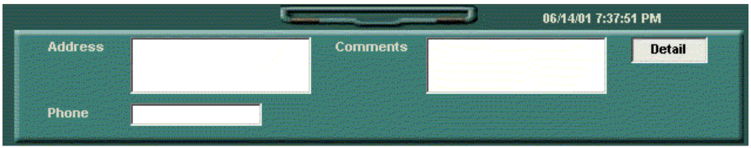


Figure 4-3. Detail Window

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)

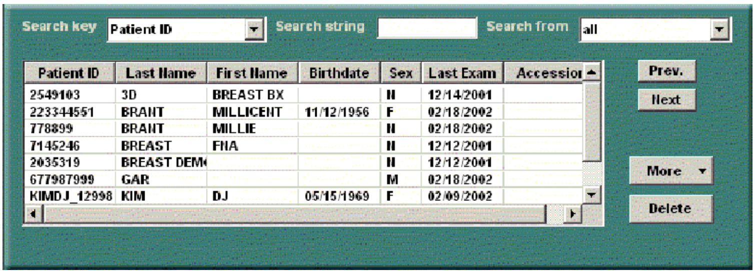
7. Exam Information
    - Shows the Current/Active Exam information. Information pertinent to the selected exam category appears in the window. All possible information needs to be entered.
    - Detail–Select the Detail box to activate/deactivate the exam details. Exam details include Indications, Comments, 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.
    - Search key–select search item from Patient ID, Last Name, First Name, Birthdate, Sex and Last Exam date (future).
    - Search string–enter appropriate information.
    - Search from–select appropriate database.
    - 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 ***Scan*** on the Touch Panel. The patient information is displayed on the title bar.

Changing Patient Information or an Exam

If patient information needs to be edited, pressing ***Patient*** on either the Touch Panel or control panel enables the Patient Screen for modifying information.

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

1. Display the Patient screen by pressing ***Patient*** on either the Touch Panel or 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 (one of Patient Data: ID, First Name, Last Name, Birthdate, Sex or Exam Date)
    - Enter search string (for example, initial letter of Patient Name)
    - Select the database in the “Search from” box. There are two choices, searching the entire database list or searching the list currently displayed.



Search key: Patient ID

Search from: all

Patient ID	Last Name	First Name	Birthdate	Sex	Last Exam	Accessio
2549103	3D	BREAST BX		N	12/14/2001	
223344551	BRANT	MILLICENT	11/12/1956	F	02/18/2002	
778899	BRANT	MILLIE		N	02/18/2002	
7145246	BREAST	FNA		N	12/12/2001	
2035319	BREAST DEM			N	12/12/2001	
677987999	GAR			M	02/18/2002	
KIMDJ_12998	KIM	DJ	05/15/1969	F	02/09/2002	

Figure 4-4. Patient Search Key

3. The selected patient data and exam information is displayed.

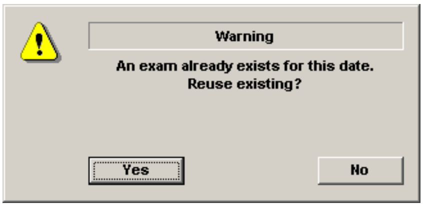
    If patient information needs to be edited or the exam category changed, use the New Exam feature. Pressing ***New Exam*** allows modification of the Patient Screen without erasing accumulated patient images, measurements, annotations, calculations and worksheets.

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.

   Warning

   An exam already exists for this date.
   Reuse existing?

   Figure 4-5. Dialog Box

   Select “Yes“ to reuse the existing data.

   Select “No” to create a new exam for the patient.
6. To display the patient information on the title bar, press ***Scan*** on the Touch Panel, the ***Esc*** key or the **B-Mode** key. Select the Preset and appropriate probe Touch Panel keys, if necessary.

Selecting an Exam Calcs and a probe

Selecting an Exam Calcs

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

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

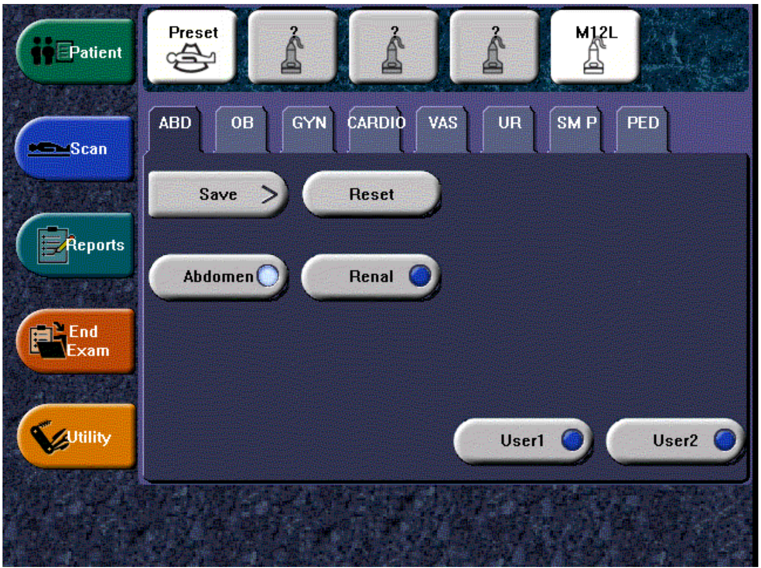

Patient
Scan
Reports
End Exam
Utility
Preset
?
?
?
M12L
ABD
OB
GYN
CARDIO
VAS
UR
SM P
PED
Save >
Reset
Abdomen
Renal
User1
User2

Figure 4-6. Abdomen Preset Selection Touch Panel

Use these parameters as a starting point for the exam.

Selecting a probe

Select the appropriate probe from probe indicator. Some probes are used in more than one exam category. The system has pre-programmed applications for probe use.

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

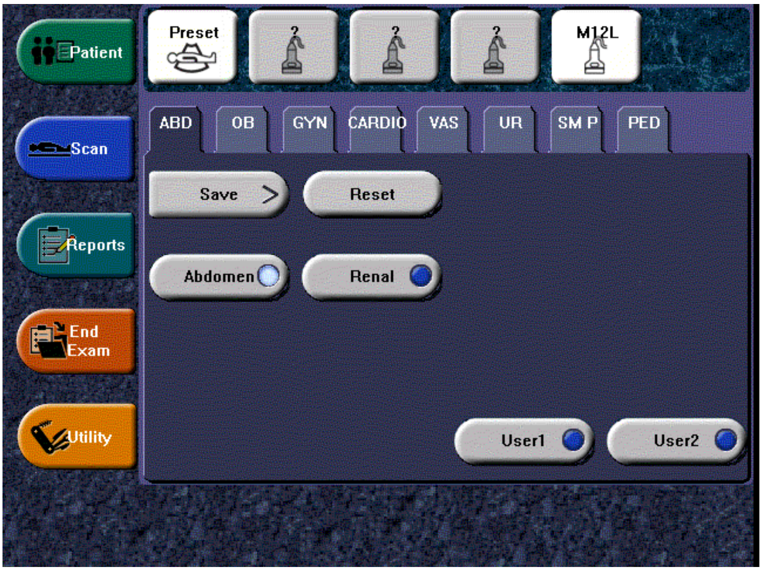

Patient
Scan
Reports
End Exam
Utility
Preset
?
?
?
M12L
ABD
OB
GYN
CARDIO
VAS
UR
SM P
PED
Save
Reset
Abdomen
Renal
User1
User2

Figure 4-7. Probe Indicators (Example)

Chapter 5

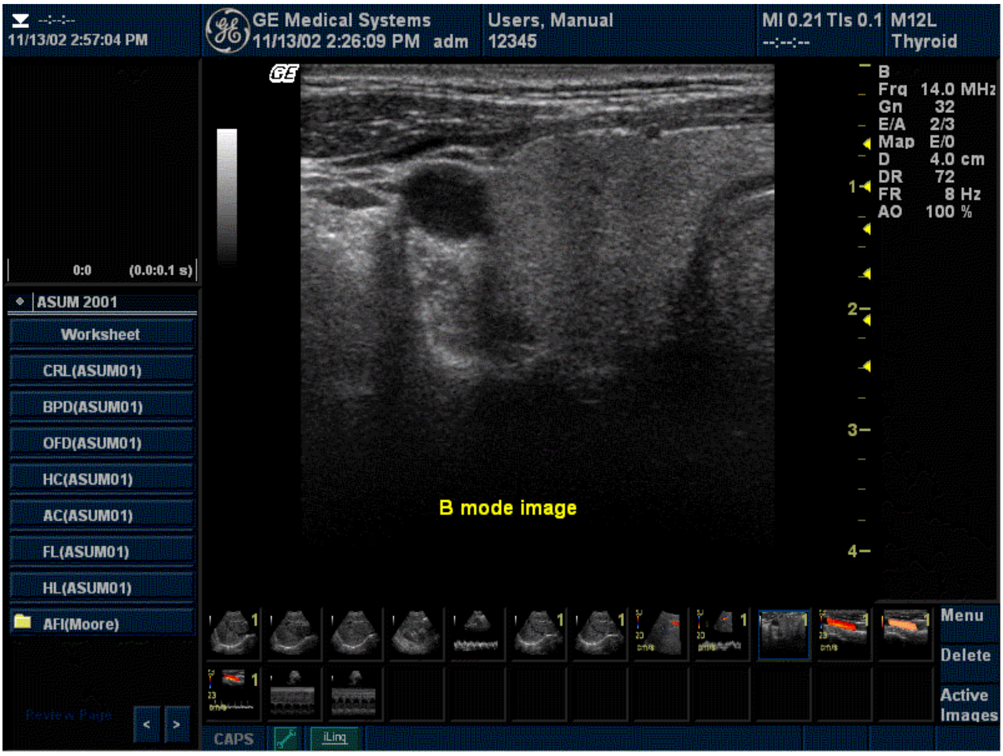
Optimizing the Image

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

Optimizing B-Mode

Intended Uses

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


--:--:--
11/13/02 2:57:04 PM
GE Medical Systems
11/13/02 2:26:09 PM adm
Users, Manual
12345
MI 0.21 TIs 0.1
--:--:--
M12L
Thyroid
0:0
(0.0:0.1 s)
ASUM 2001
Worksheet
CRL(ASUM01)
BPD(ASUM01)
OFD(ASUM01)
HC(ASUM01)
AC(ASUM01)
FL(ASUM01)
HL(ASUM01)
AFI(Moore)
B mode image
1
2
3
4
Menu
Delete
Active Images
CAPS
iLinq

B
Frq 14.0 MHz
Gn 32
E/A 2/3
Map E/0
D 4.0 cm
DR 72
FR 8 Hz
AO 100 %

Figure 5-1. B-Mode Display

Typical B-Mode Exam Protocol

A typical examination using B-Mode might proceed

Table 5-1: Typical B-Mode Exam

Step	Instructions
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. Add important data to the image: annotations and measurements. Record results: print hard copies, CINE review/optimize image capture, and VCR recording.
3.	Complete the study by collecting all the data.

B-Mode Touch Panel

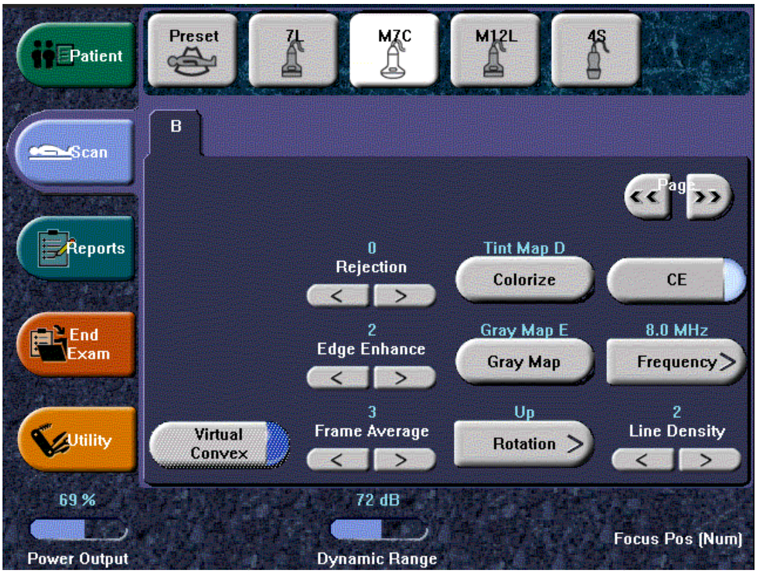

Patient
Scan
Reports
End Exam
Utility
Preset
7L
M7C
M12L
4S
B
Page
0
Rejection
Tint Map D
Colorize
CE
2
Edge Enhance
Gray Map E
Gray Map
8.0 MHz
Frequency
Virtual Convex
3
Frame Average
Up
Rotation
2
Line Density
69 %
Power Output
72 dB
Dynamic Range
Focus Pos (Num)

Figure 5-2. B-Mode Touch Panel Page 1

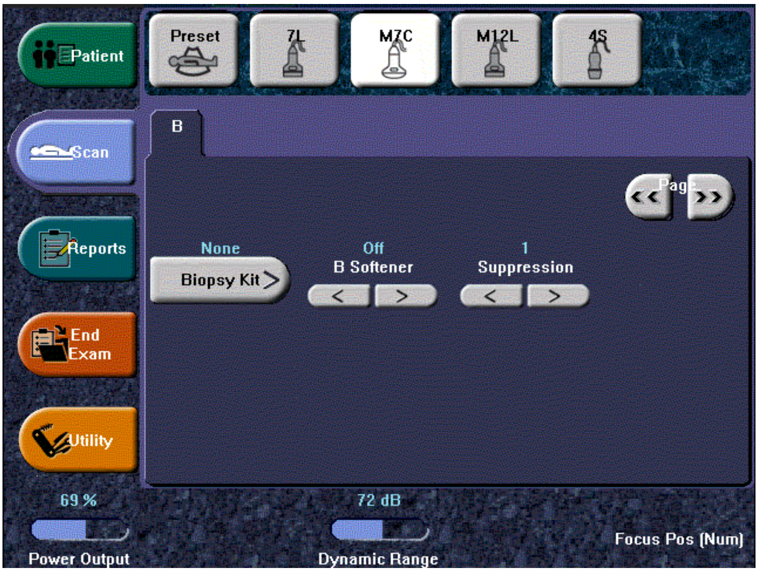

Patient
Scan
Reports
End Exam
Utility
Preset
7L
M7C
M12L
4S
B
Page
None
Biopsy Kit
Off
B Softener
1
Suppression
69 %
Power Output
72 dB
Dynamic Range
Focus Pos (Num)

Figure 5-3. B-Mode Touch Panel Page 2

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.

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

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.

TGC. Adjust TGC and keep Gain at a lower setting.

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. If there is flicker, decrease the resolution and increase the frame averaging. As a last resort, decrease the number of focal zones.

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**, focus, and edge enhance. 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: *B-Mode gain is independent of M-Mode and Doppler and Color Flow Gain. Changing the gain while in M-Mode does not affect the B-Mode image gain.*

To decrease/increase Gain, adjust dial to the left/right.

Values

Gain displays on the monitor in G (dB). Gain increments by 1 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 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

Eight focal zones over twelve focal positions. In B Flow only one focus zone. 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 or while CINE is playing a CINE Loop. Auto in Doppler Mode optimizes the spectral data. Auto adjusts the Velocity Scale/PRF, baseline shift, dynamic range, gray maps, 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 map and dynamic range; however, the velocity scale, baseline, and angle is still optimized.
Adjusting	To activate, press the left **Auto** control.
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.

B Flow

Description

B Flow is intended to provide a more intuitive representation of non-quantitative hemodynamics in vascular structures. B Flow is available on the 10L probe.

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

Activating

To activate/deactivate B Flow, press B Flow. Doppler Mode is available while in B Flow; however, M-Mode and Color Flow/PDI Modes are not available. See Chapter 17 for probe availability.

Using B Flow

To optimize the image:

Table 5-2: B Flow Instructions

Step	Instructions
1.	Adjust the gain, optimize the image for frame rate/resolution via Line Density, adjust the focal zone, zoom the image, colorize the image, adjust the field of view via Scan Area, select Auto.

Scanning Hints

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

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

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

B Flow (continued)

Benefits	B Flow is less angle-independent, no velocity-aliasing artifacts, and provides better resolution when compared with Color Doppler Mode, and displays a full field of view. B Flow is therefore a more realistic (intuitive) representation of flow information, allowing you to view both high and low velocity flow at the same time.
Affect on other controls	When you activate B Flow, the image remembers the imaging parameters set while in B-Mode. When you optimize the frame rate via Line Density, you compromise the resolution and when you optimize the resolution, you compromise the frame rate. B Flow is not available in 3DView.
Bioeffects	When you select B Flow, the PRF increases. Adjusting the following controls may affect the Power Output: Focal Zone Position, Depth, Zoom, Line Density, Scan Area, Frequency, or angle steer. Observe the output display for possible effects.

Coded Harmonic Imaging (CHI)

Description	Harmonic imaging utilizes Digitally Encoded Ultrasound (DEU). Coded Harmonics enhances near field resolution for improved small parts imaging as well as far field penetration.
Adjusting	To activate Coded Harmonic imaging,
	Press **Harmonics**.
NOTE:	*Multi frequency is not active when the image is frozen.*
Values	On/Off. See Chapter 17 for probe availability. `CHI' 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	Coded Harmonics diminishes low frequency high amplitude noise and improves imaging technically difficult patients. Coded Harmonics may be especially beneficial when imaging isoechoic lesions in shallow-depth anatomy in the breast, liver, and hard-to-visualize fetal anatomy. Coded 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 Coded 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. Harmonic frequencies are currently available via 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.

Virtual Convex

Description	On Linear and Sector probes, Virtual Convex provides a larger field of view in the far field.
NOTE:	*Color Flow can be steered when in straight fire, but not in Virtual Convex.*
Adjusting	To activate/deactivate Virtual Convex, select ***Virtual Convex***.
Values	On/Off.
Benefits	Virtual Convex can be especially helpful in Obstetrics. 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.

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 and 90 degrees and 270 degrees rotate). You can choose to deactivate the TGC curve on the image.
Adjusting	To decrease/increase TGC, move slide pot to the left/right.
NOTE:	*On some systems, active slide pots backlight. 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** and move the **Trackball**.
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 heartbeat.
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.

Angle Steer

Description	You can steer the B-Mode, B-Mode Doppler, M-Mode, or B-Mode Color Flow sector angle to get more information without moving the probe.
Adjusting	To steer the angle to the left/right, press **Scan Area**, then move the **Trackball** to the left/right.
Values	Varies, depending on the probe.
Benefits	Allows you to move a reduced sector angle laterally, without moving the probe. Beneficial in GYN. And it allows you to vary the angle so the scan is not perpendicular to the direction of the flow.
Bioeffects	Steering 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, press Rotate. Linear probes do not rotate.
Values	The image rotates in 180 degrees left/right. Rotation settings vary by probe and application. Rotation 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.

⚠ CAUTION	When reading a rotated 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 on the display and on the Touch Panel. 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, or VCR playback 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	Frame rate is useful in fetal heartbeat, adult cardiac applications and in clinical Radiology applications requiring 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	Frame rate will change the vector density and frame rate.
Bioeffects	Activating color flow frame rate/high resolution 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 adjacent to the image. Move the **Trackball** to select the map. The image reflects the map as you scroll through the selections. Press **Set** to select.
Values	Gray maps gradually change from least contrasty (Map A) to most contrasty (Map R). 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.
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.

Map	Description
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.
O	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.
P	Assigns a lesser amount of gray scale pixel values to weak reflectors in the image than Map M. Useful when imaging abdomen and liver.
Q	Assigns a lesser amount of gray scale pixel values to weak reflectors in the image than Map R. Useful when imaging thyroid and abdomen.
R	Assigns a lesser amount of gray scale pixel values to weak reflectors in the image than Map C. Useful when imaging thyroid and abdomen.

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 Touch Panel.
Values	0-5, with 5=high. The current value displays on the Touch Panel. 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.

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, but not VCR images.

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

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

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

The gray bar displays while Colorize is activated.

Adjusting

To activate Colorize,

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

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 Touch Panel.
Values	0-5, with 0 = Off and 5 = High. The current value displays on the Touch Panel. 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, CINE, or VCR. Edge Enhance operates in realtime only; not in Freeze or CINE.

Rotation (Updown Invert)

Description	You can flip the image up/down.
Adjusting	To flip the image vertically, press Rotation (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.

⚠ CAUTION	When reading a 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	0-5
Benefits	Allows for the elimination from the display of low level echoes caused by noise.

LOGIQView

Description

LOGIQView provides the ability to construct and view a static 2D image which is wider than the field of view of a given transducer. This feature allows viewing and measurements of anatomy that is larger than what would fit in a single image. Examples include scanning of vascular structures and connective tissues in the arms and legs.

LOGIQView constructs the extended image from individual image frames as the operator slides the transducer along the surface of the skin in the direction of the scan plane. The quality of the resulting image is somewhat user-dependent and requires some additional skill and practice to develop proper technique and become fully proficient.

LOGIQView is not available for the following:

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

Benefits

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

Clinical Use

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

Using LOGIQView

To perform an exam using LOGIQView,

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

HINTS

When you scan, scan slowly and in a uniform motion lengthwise, end-to-end (with or against the probe orientation marker). LOGIQView acquires images via leading edge vectors (and does not acquire slices, as in CINE). The image is being stored as you perform the scan and you can watch the LOGIQView as it is being acquired.

LOGIQView (continued)

4. To restart the scan, press ‘L’ again.
5. To complete the scan, press ‘R’ or Freeze (or allow the scan to auto complete. The LOGIQView is then displayed, scaled to fit entirely on the screen.
6. Perform measurements and record images.

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

Uniform Motion

The quality and usefulness of LOGIQView images is affected by transducer motion. Incorrect technique can contribute to image distortion.

Guidance and precautions for uniform motion:

- Continuous contact is required throughout the length of the extended image. DO NOT lift the transducer from the skin surface.
- Always keep the transducer perpendicular to the skin surface. DO NOT rock the transducer.
- Keep the motion within the same scan plane, if possible. DO NOT slide the transducer laterally.
- Lateral turning (change in direction to follow anatomical structure) can be accommodated with slower motion. DO NOT make abrupt changes in direction.
- The system accommodates a reasonable range of motion velocity. DO NOT make abrupt changes in speed of motion. Deeper scans generally require reduced speed.

Bioeffects

Activating LOGIQView has no affect upon Acoustic Output values.

Optimizing M-Mode

Intended Use

M-Mode is intended to provide a display format and measurement capability that represents tissue displacement (motion) occurring over time along a single vector.

Introduction

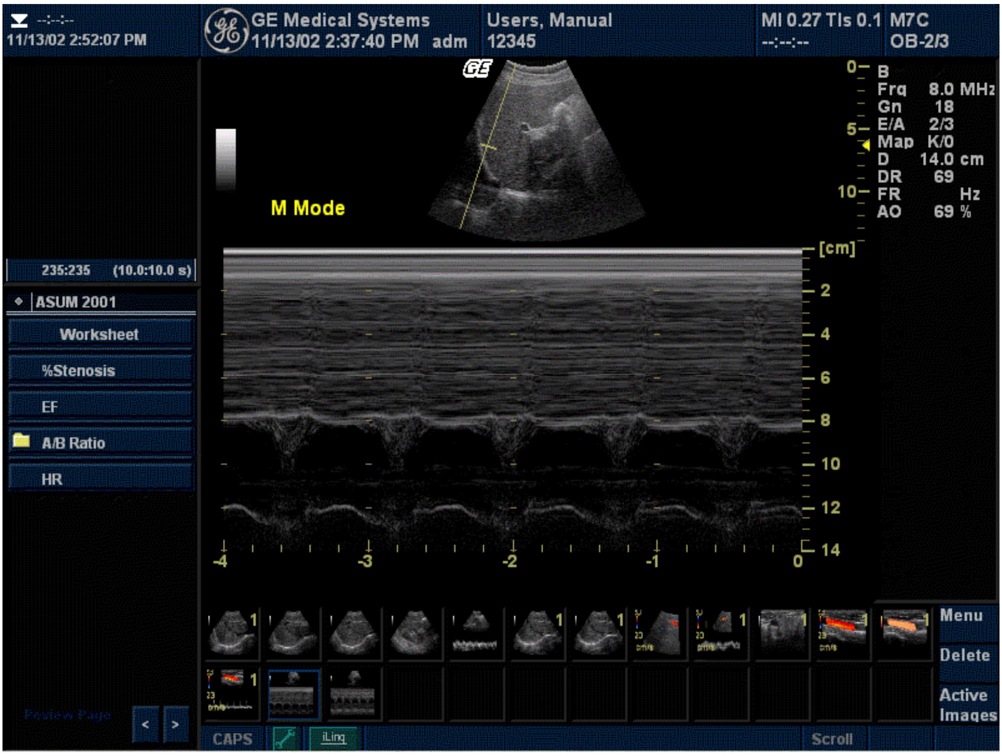
M-Mode is used to determine patterns of motion for objects within the ultrasound beam. The most common use is for viewing motion patterns of the heart.

Typical exam protocol

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

1. Get a good B-Mode image. 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



GE Medical Systems
11/13/02 2:37:40 PM adm
Users, Manual
12345
MI 0.27 TIs 0.1 M7C
OB-2/3
11/13/02 2:52:07 PM
235:235 (10.0:10.0 s)

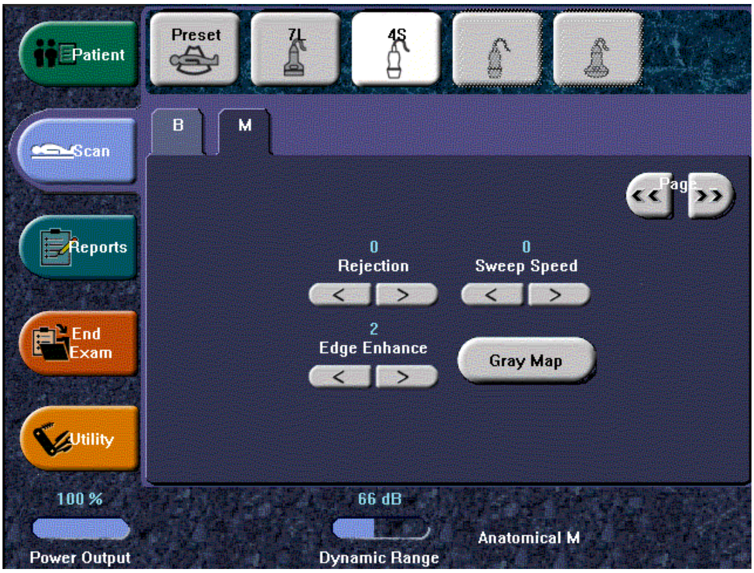
B
Frq 8.0 MHz
Gn 18
E/A 2/3
Map K/0
D 14.0 cm
DR 69
FR Hz
AO 69 %

M Mode
ASUM 2001
Worksheet
%Stenosis
EF
A/B Ratio
HR
[cm]
2
4
6
8
10
12
14
0
5
10
-4
-3
-2
-1
0
Menu
Delete
Active Images
Review Page
CAPS
iLinq
Scroll

Figure 5-4. M-Mode Display

M-Mode Display	Description, Format, Values (For Future Vadliation)
M-Mode Gain	Displays Overall M-Mode Gain as ##dB.
Depth Scale Indicator	Image depth, in cm.
Time Scale	Eight speeds: 16, 12, 8, 6, 4, 3, 2, 1. Major marker = 1 second.
M-Mode Cursor	Displays where the M-Mode Cursor is positioned.

M-Mode Touch Panel


Patient
Scan
Reports
End Exam
Utility
Preset
7L
4S
B
M
Page
<<
>>
<
>
Gray Map

Rejection 0

Sweep Speed 0

Edge Enhance 2

Power Output 100 %

Dynamic Range 66 dB

Anatomical M

Figure 5-5. M-Mode Touch Panel

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.

M/D Cursor

Description	Displays the M-Mode cursor on the B-Mode image.
Adjusting	To activate/deactivate the M-Mode cursor, press **M/D Cursor**. **Trackball** to position M-Mode cursor.
Values	On/Off.
Benefits	Lets you position the cursor before you go into M-Mode so that you can make optimum use of the larger B-Mode image.

B Pause

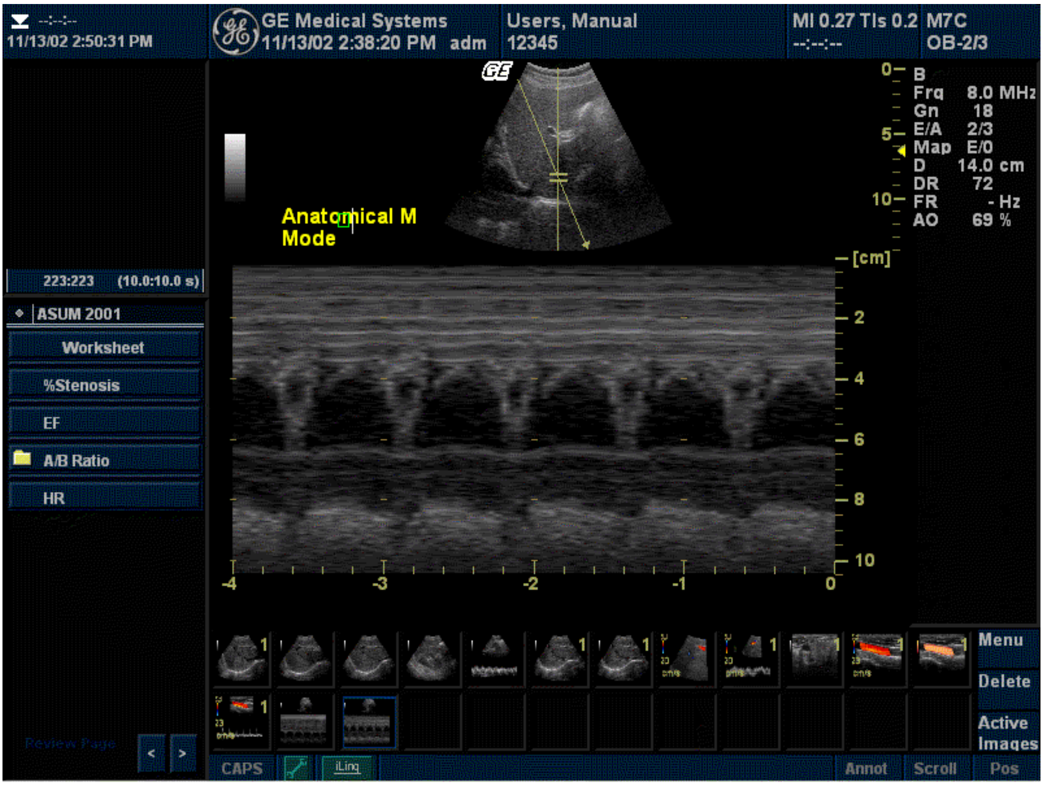
Description	Toggles between simultaneous and update presentation while viewing Spectral Doppler.
Adjusting	To activate, press **B Pause** to toggle between simultaneous and update. The M-Mode trace does not restart each time the image is updated; however, a black bar may appear.
Values	On/Off.
Benefits	Update increases the Spectral Doppler display quality.
Bioeffects	Activating Update may change the TI and/or MI. Observe the output display for possible effects.

Sweep Speed

Description	Changes the speed at which the timeline is swept. Available in M-Mode, M Color Flow Mode, and Doppler Mode.
Adjusting	To increase/decrease, select ***Sweep Speed***.
Values	M-Mode: 16, 12, 8, 6, 4, 3, 2, and 1 second sweeps across the display. Doppler Mode: 12, 8, 6, 5, 4, 3, 2, and 1 second sweeps. Values vary by probe and application. 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.

Anatomical M-Mode

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



11/13/02 2:50:31 PM

GE Medical Systems
11/13/02 2:38:20 PM adm

Users, Manual
12345

MI 0.27 TIs 0.2 M7C
OB-2/3

B
Frq 8.0 MHz
Gn 18
E/A 2/3
Map E/0
D 14.0 cm
DR 72
FR - Hz
AO 69 %

223:223 (10.0:10.0 s)

Anatomical M Mode
[cm]
0
5
10
2
4
6
8
10
-4
-3
-2
-1
0
ASUM 2001
Worksheet
%Stenosis
EF
A/B Ratio
HR
Review Page
<
>
Menu
Delete
Active Images
CAPS
iLinq
Annot
Scroll
Pos

Figure 5-6. Anatomical M Mode

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

Anatomical M-Mode (continued)

Adjusting	Use the Touch Panel control and Trackball to position the M cursor over the required area of the B-Mode image. • Turn the Touch Panel control left or right to move the M cursor to the desired area. • Move the Trackball left/right to move the cursor line left/right. • Move the Trackball up/down to move the M cursor up/down.
Values	On/Off.
Benefits	Color Flow Mode and Color M-Mode are Doppler Modes intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode or M-Mode image.
Bioeffects	Changing the Sweep Speed, Packet Size, Frame Rate/ Resolution, Zoom, PRF, and ROI size may change the TI and/or MI. Observe the output display for possible effects.

Optimizing M Color Flow

M Color Flow Mode

Description	M Color Flow is used for fetal cardiac applications. Color Flow overlays color on the M-Mode image using velocity and variance color maps. The Color Flow wedge overlays the B-Mode image and M-Mode timeline. The Color Flow maps available in M-Mode are the same as in Color Flow Mode. The size and position of the Color Flow window in B-Mode determines the size and position of the Color Flow window in M-Mode. All M-Mode measurements are available with M Color Flow active: depth, distance along a straight line, % stenosis, volume, trace, circumference, enclosed area, distance, time, slope, and heart rate.
Activating	To activate M Color Flow Mode, press M (M-Mode). Then press CF (Color Flow) - or - press CF, then press M. To toggle between M Color Flow controls and Color Flow controls, press the appropriate Touch Panel Mode tab.
Values	On/Off.
Benefits	Color Flow Mode and Color M-Mode are Doppler Modes intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode or M-Mode image.

M Color Flow Mode (continued)

Bioeffects

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

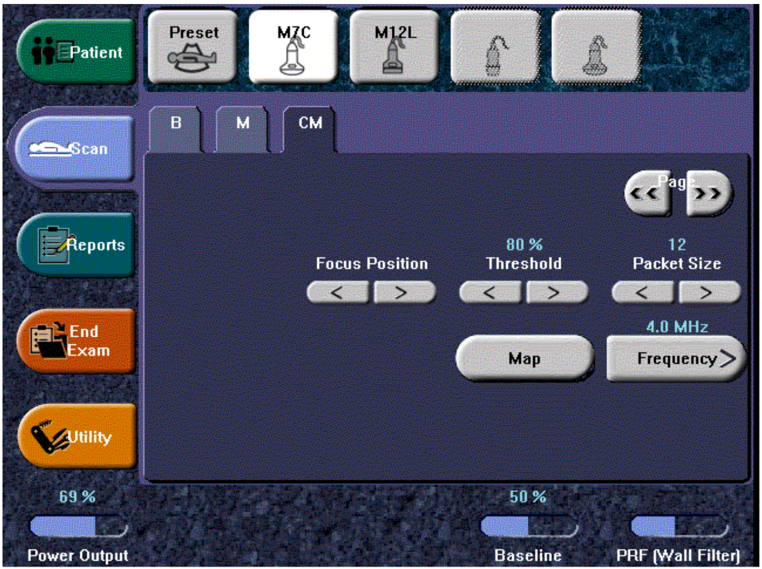

Patient
Preset
M7C
M12L
Scan
B
M
CM
Page
Reports
End Exam
Utility
Focus Position
80 %
Threshold
12
Packet Size
4.0 MHz
Map
Frequency
69 %
Power Output
50 %
Baseline
PRF (Wall Filter)

Figure 5-7. M Color Flow, Page 1

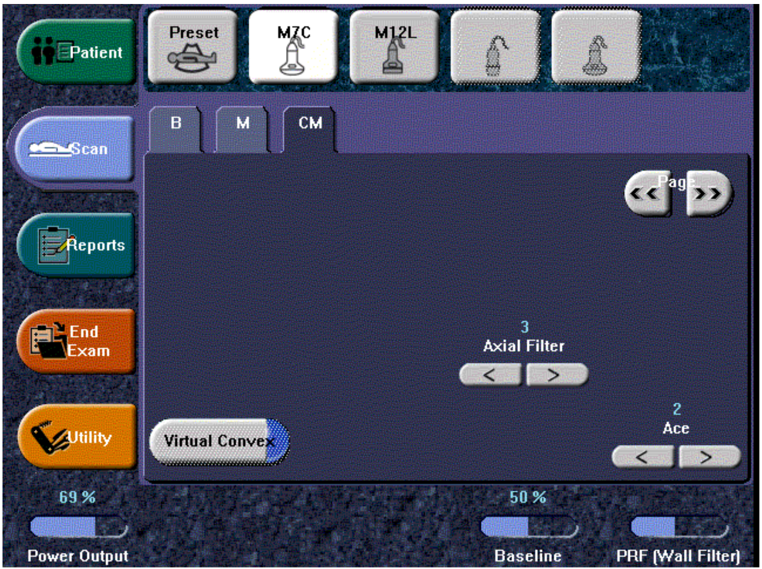

Patient
Preset
M7C
M12L
Scan
B
M
CM
Page
Reports
End Exam
Utility
3
Axial Filter
Virtual Convex
2
Ace
69 %
Power Output
50 %
Baseline
PRF (Wall Filter)

Figure 5-8. M Color Flow, Page 2

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

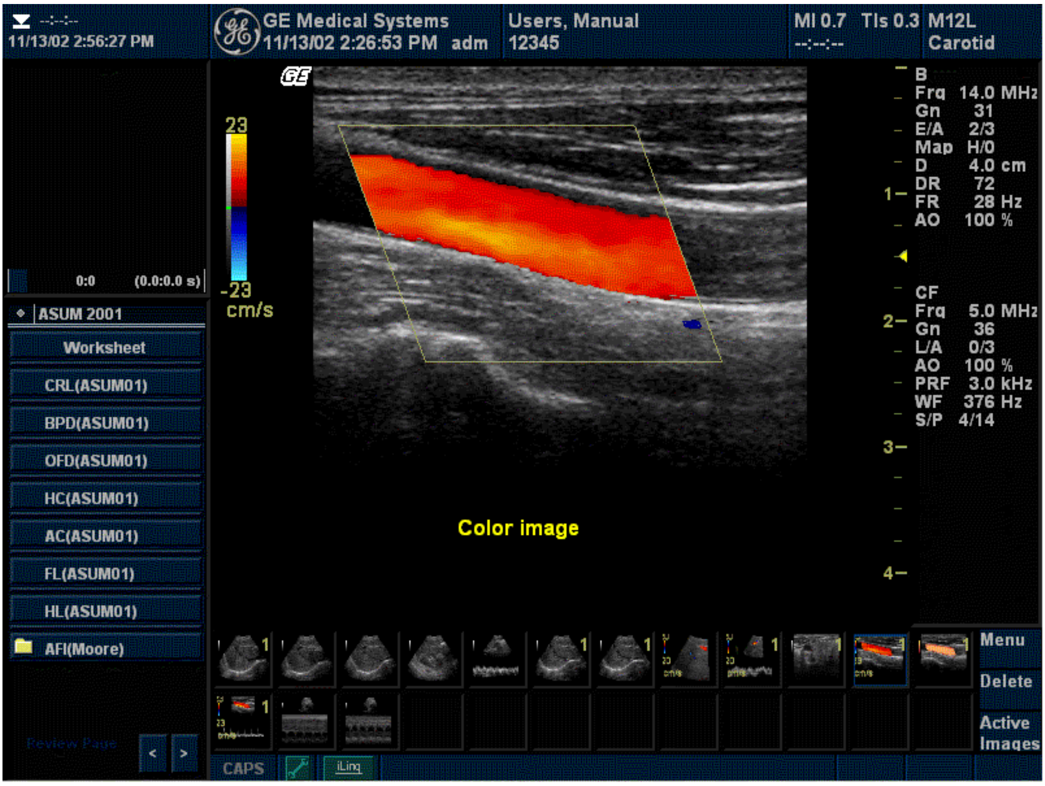
A typical examination using Color Flow Mode,

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.



11/13/02 2:56:27 PM
GE Medical Systems
11/13/02 2:26:53 PM adm
Users, Manual
12345
MI 0.7 TIs 0.3 M12L
Carotid

B
Frq 14.0 MHz
Gn 31
E/A 2/3
Map H/0
D 4.0 cm
DR 72
FR 28 Hz
AO 100 %

CF
Frq 5.0 MHz
Gn 36
L/A 0/3
AO 100 %
PRF 3.0 kHz
WF 376 Hz
S/P 4/14

0:0
(0.0:0.0 s)
ASUM 2001
Worksheet
CRL(ASUM01)
BPD(ASUM01)
OFD(ASUM01)
HC(ASUM01)
AC(ASUM01)
FL(ASUM01)
HL(ASUM01)
AFI(Moore)
23
-23
cm/s
Color image
1
2
3
4
Menu
Delete
Active Images
CAPS
iLinq

Figure 5-9. Color Flow Mode Display

Uses

Color Flow is useful to see flow in a broad area. Color Flow allows visualization of flow in the whole image, 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, press **CF**.

Activating Power Doppler Imaging (PDI)

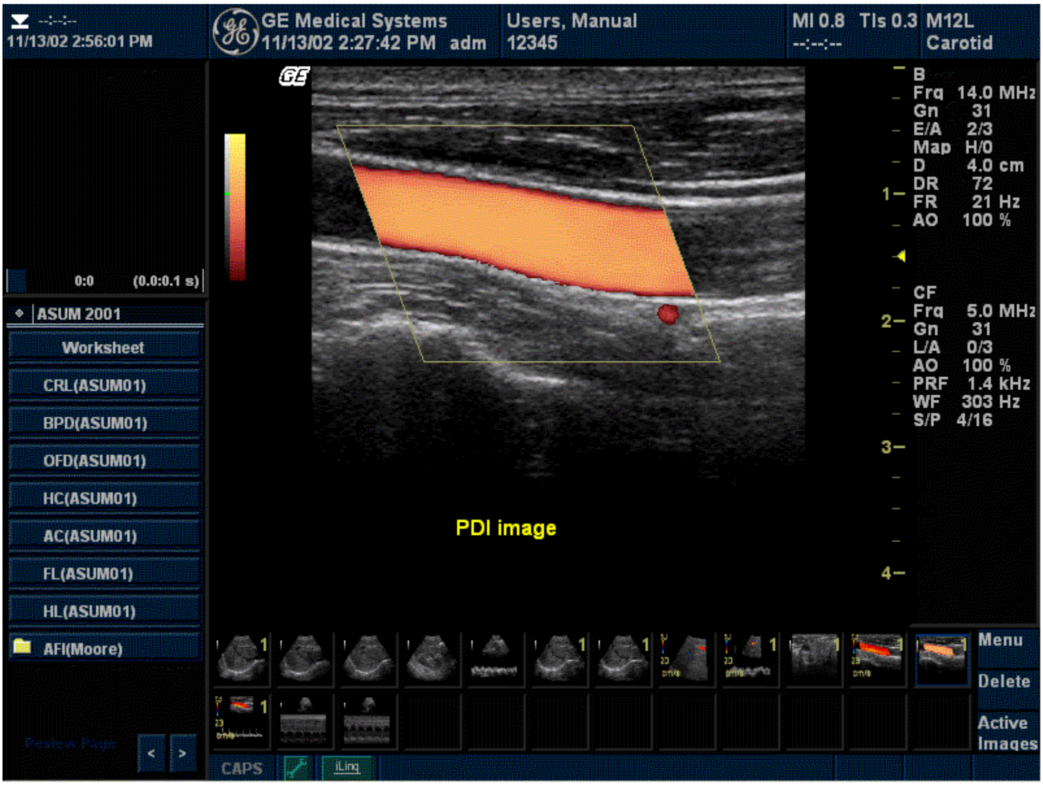
To activate PDI,

1. 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.

Uses

Power Doppler Imaging 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 blood cells that are moving, regardless of their velocity. Because it does not map velocity, it is not subject to the aliasing.

Color Flow and Power Doppler Displays



11/13/02 2:56:01 PM

GE Medical Systems
11/13/02 2:27:42 PM adm

Users, Manual
12345

MI 0.8 TIs 0.3 M12L
Carotid

B
Frq 14.0 MHz
Gn 31
E/A 2/3
Map H/0
D 4.0 cm
DR 72
FR 21 Hz
AO 100 %

CF
Frq 5.0 MHz
Gn 31
L/A 0/3
AO 100 %
PRF 1.4 kHz
WF 303 Hz
S/P 4/16

0:0
(0.0:0.1 s)
ASUM 2001
Worksheet
CRL(ASUM01)
BPD(ASUM01)
OFD(ASUM01)
HC(ASUM01)
AC(ASUM01)
FL(ASUM01)
HL(ASUM01)
AFI(Moore)
PDI image
1
2
3
4
Menu
Delete
Active Images
CAPS
iLinq

Figure 5-10. Power Doppler Imaging Display

Item	Description
1	Color Flow Region of Interest (ROI)
2	Color Flow Parameters: Frequency, Gain, Power Output, PRF, Wall Filter, and Packet Size
3	Color Flow Bar

Item	Description
1	Color Flow Region of Interest (ROI)
2	Color Flow Parameters: Frequency, Gain, Power Output, PRF, Wall Filter, and Packet Size
3	Color Flow Bar

Color Flow 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, select a different frame rate setting, or reduce the packet size.

Wall Filter. Affects low flow sensitivity versus motion artifact.

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

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

Ace. Ace versus normal affects motion artifact control.

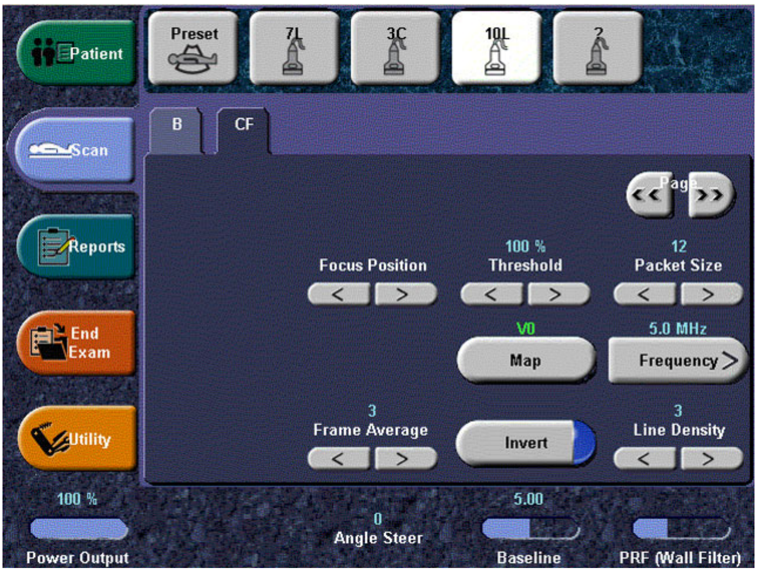
Packet Size. Affects the amount of color Doppler sensitivity versus frame rate.

Scan Area. Increases/decreases size of color window.

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

Auto Optimize. Optimizes the Color Flow ROI by adjusting the Color Flow or PDI maps and thresholds and PDI compression curves. AUTO improves overall color sensitivity, especially in low-flow states. This improves the color performance while reducing optimization time.

Color Flow Mode Touch Panel


Patient
Scan
Reports
End Exam
Utility
Preset
7L
3C
10L
2
B
CF
Page
Map
Frequency
Invert
Angle Steer

Focus Position

100 % Threshold

12 Packet Size

V0 Map

5.0 MHz Frequency

3 Frame Average

3 Line Density

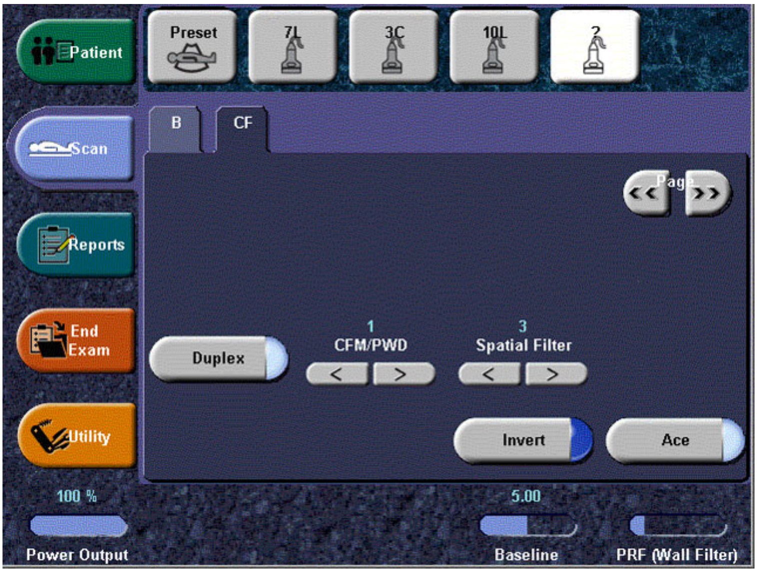
100 % Power Output

0 Angle Steer

5.00 Baseline

PRF (Wall Filter)

Figure 5-11. Color Flow Mode Touch Panel, Page 1


Patient
Scan
Reports
End Exam
Utility
Preset
7L
3C
10L
2
B
CF
Page
Duplex
Invert
Ace

1 CFM/PWD

3 Spatial Filter

100 % Power Output

5.00 Baseline

PRF (Wall Filter)

Figure 5-12. Color Flow Mode Touch Panel, Page 2

PDI (Power Doppler Imaging) Mode Touch Panel

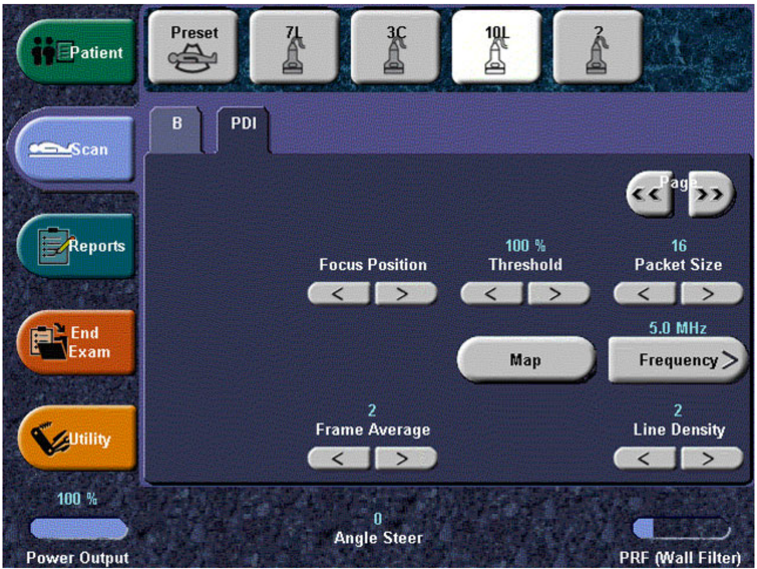

Patient
Preset
7L
3C
10L
?
Scan
B
PDI
Reports
Page
End Exam
Utility
Focus Position
100 %
Threshold
16
Packet Size
5.0 MHz
Map
Frequency
2
Frame Average
2
Line Density
100 %
Power Output
0
Angle Steer
PRF (Wall Filter)

Figure 5-13. PDI Mode Touch Panel, Page 1

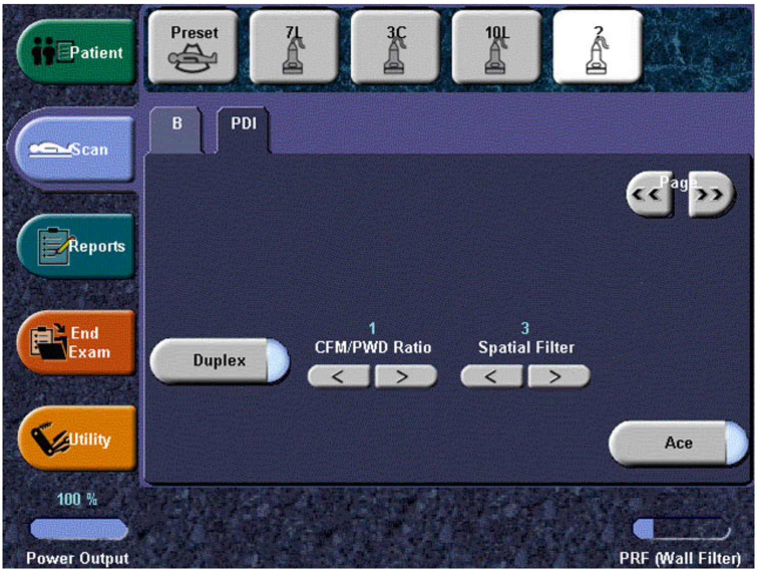

Patient
Preset
7L
3C
10L
?
Scan
B
PDI
Reports
Page
End Exam
Utility
Duplex
1
CFM/PWD Ratio
3
Spatial Filter
Ace
100 %
Power Output
PRF (Wall Filter)

Figure 5-14. PDI Mode Touch Panel, Page 2

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	Raises/lowers the PRF on the color bar.
Adjusting	To raise/lower the velocity scale, press PRF/Wall Filter until you reach PRF, then adjust PRF left/right.
Values	Velocity range 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 in order to hide unusable motion. 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*** left/right.
Values	Values vary, depending upon probe, application, and packet size. The wall filter is shown graphically on the color bar and is displayed numerically on the monitor (cm/s). 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.

Scan Area

Description	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 20 degrees to 120 degrees in 1 degree to 2 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.
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)*** .
	In Triplex, both Color Flow and Doppler Mode velocity scales are inverted.
Values	Invert and non-Invert. Values vary by probe and application.
	Invert values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Allows you to view blood flow according to your personal preference.

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*** left/right, 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.

Angle Steer and Fine Angle Steer

Description	You can slant the B-Mode or Color Flow linear image left or right to get more information without moving the probe.
Adjusting	To slant the linear image to the left/right, adjust **Angle Steer**. Press ***Angle Steer*** to access ***Fine Angle Steer***.
Values	Linear probes can be steered left, center, or right up to a maximum of 20 degrees, depending on the probe. Angle Steer 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. Fine Angle Steer steers the Doppler cursor left/right 30 degrees in one degree increments.
Benefits	Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Vascular applications.
Bioeffects	Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

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, press ***Line Density*** Touch Panel key.
Values	The current frame rate is shown on the Touch Panel. Frame Rate/Resolution values vary by: Probe, Exam Category, Exam Calcs, New Patient, and Frequency. Settings are returned to factory or user preset value when you change any of the above.
Benefits	Frame rate is useful in fetal heartbeat, adult cardiac applications and in clinical Radiology applications requiring 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	Frame rate changes the vector density and frame rate.
Bioeffects	Activating color flow frame rate/high resolution may change the TI and/or MI. Observe the output display for possible effects.

Map

Description	Brings out the tissue behind the color map.
Adjusting	Press **Duplex** to adjust.
Values	On/Off. Variance Maps (VV). Provides a measure of turbulence (stenosis). Adds green to velocity maps. Symmetric Velocity Imaging Map. Map V3 shows both positive and negative velocities using the same colors.
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, press ***Threshold*** left/right.
Values	The settings cycle through various values: 10%-100% of the gray scale. High values display more color; low values displays more B-Mode gray scale data. The Color Threshold level is displayed on the Touch Panel. Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Limits color flow overlay to low level echoes inside vessel walls. Helps minimize color `bleeding' outside vessel walls.

Frame Average

Description	Averages color frames.
Adjusting	To smooth temporal averaging, select ***Frame Average*** left/right. The selected value displays on the Touch Panel.
Values	0-7, with 7=color capture; in PDI, 0-9, with 9=color capture. Frame Average 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	Higher frame averaging keeps the color displayed longer for increased flow visualization (decreased frame rate) while lower frame averaging provides greater flow dynamics (pulsing from increased frame rate).
Affect on other controls	Trades off between frame rate and color quality. As the color quality increases, the frame rate may decrease and as the frame rate increases, the color image quality decreases.

Transparency Map

Description	Brings out the tissue behind the color map.
Adjusting	Select ***Transparency Map*** to adjust
Values	0-4
Benefits	Helps demonstrate the tissues behind the color.

Spatial Filter

Description	Smooths out the color, makes it look less pixely.
Adjusting	Select ***Spatial Filter*** to adjust.
Values	0-5
Benefits	Smooths the image.

Duplex

Description	Duplex On: simultaneous B-Mode + Color Flow Mode. Duplex Off: Toggle live B-Mode and Color Flow Mode via B-Pause.
Adjusting	Select ***Duplex*** to adjust.
Values	On/Off
Benefits	Allows the user to have both PW and B-Mode active at the same time.

Ace

Description	Activates/deactivates Adaptive Color Enhancement (Ace), a motion artifact elimination process.
Adjusting	To adjust, select the next page and then select ***Ace***. The Ace Touch Panel key is lit.
Values	0-4. 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	Ace: Beneficial when imaging slow flow states, especially with abdominal and OB applications.

Packet Size

Description	Controls the number of samples gathered for a single color flow vector.
Adjusting	To increase/decrease the packet size, select ***Packet Size*** left/right.
Values	Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient. Values are displayed on the monitor display as PSize.
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 tissue 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.
Adjusting	To activate/deactivate PDI, press **PDI**.
Values	On/Off. Ten power (P0-P6 and P8-P10) and one Directional PDI map (P7) is available.
Benefits	Because PDI does not map velocity, it does not display aliasing.
Affect on other controls	When PDI is activated, the following controls are adjusted: Focus Number may be up to four focal zones. PRF is set to a lower setting. Color Map is set to a power map. FR/RES is adjusted. Wall Filter is set to a lower setting. Threshold is set to 100%. Frame Averaging is adjusted. Packet Size is set to 16.

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.

Directional Power Doppler

You can select the P7 Directional Power Doppler map while in PDI.

NOTE: *If you store a PDI image and recall it, you can still switch to the Directional Power Doppler map and vice versa. However, an image stored as non-directional then switched to directional just adds direction to a non-directional map and vice versa.*

HINTS

If the image is aliasing, increase the PRF and reduce the Wall Filter.

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 probes, 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 and worksheet.
4. Engage the probe to be used by lifting it out of its holder.
5. Locate the anatomy to be examined. Get a good B Mode image. Refer to *B-Mode* section of this chapter for more information.
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. 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.
10. Press **Freeze** to hold the trace in memory and stop imaging. Activate CINE Timeline, as necessary. See “Activating CINE” on page 1-5 for more information.
11. Perform measurements and calculations, as necessary. Refer to the Measurements and Calculations chapter for more information.

Typical exam protocol (continued)

12. Record results by pressing **P1** - **P4**, depending on the setup of your recording devices.
13. Press **Freeze** to resume imaging.
14. Repeat the above procedure until all relevant flow sites have been examined.
15. Replace the probe in its respective holder.

Activating CW/PW Doppler Mode

To activate CW or PW Doppler Mode, press CW or 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.

Use	Doppler is used to examine blood flow information in the vessels of the legs, arms, abdomen, neck, and heart.
To exit	PW Doppler Mode, press PW; CW Doppler Mode, press CW.

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 in the vessels of the legs, arms, abdomen, neck, and heart.
To Exit	PW Doppler Mode, press CF, then PW.

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 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.

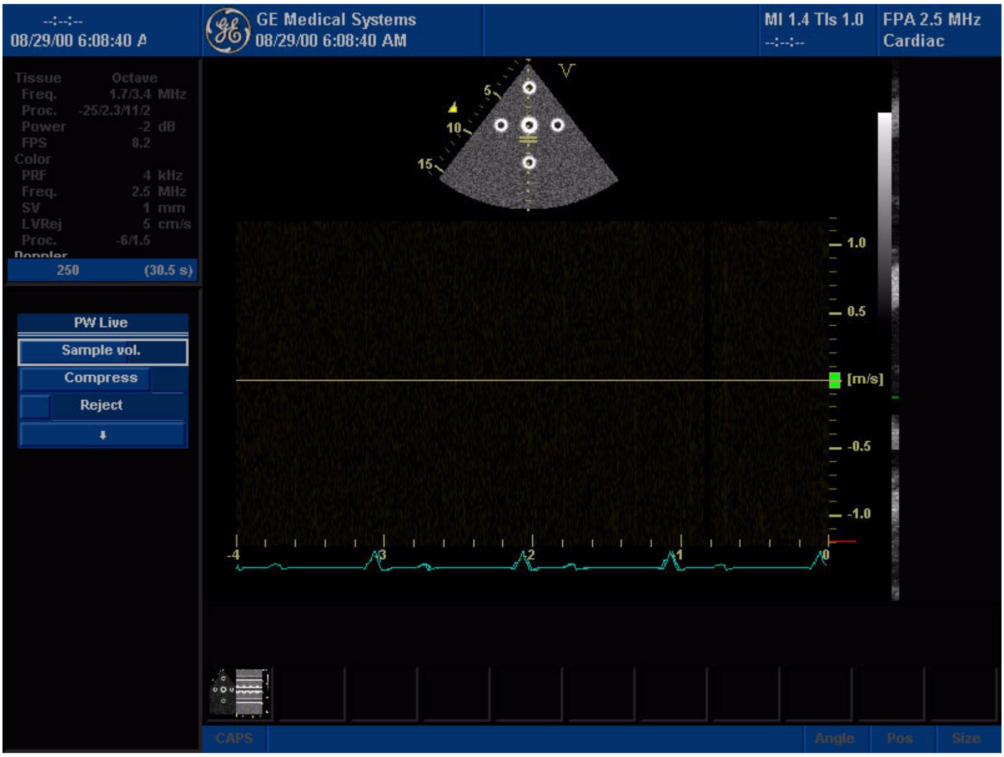
This chapter includes:

- 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



Tissue Octave
Freq. 1.7/3.4 MHz
Proc. -25/2.3/11/2
Power -2 dB
FPS 8.2
Color
PRF 4 kHz
Freq. 2.5 MHz
SV 1 mm
LVRej 5 cm/s
Proc. -6/1.5

--:--:--
08/29/00 6:08:40 A
GE Medical Systems
08/29/00 6:08:40 AM
MI 1.4 TIs 1.0
--:--:--
FPA 2.5 MHz
Cardiac
Doppler
250
(30.5 s)
PW Live
Sample vol.
Compress
Reject
5
10
15
V
1.0
0.5
[m/s]
-0.5
-1.0
-4
3
2
1
0
CAPS
Angle
Pos
Size

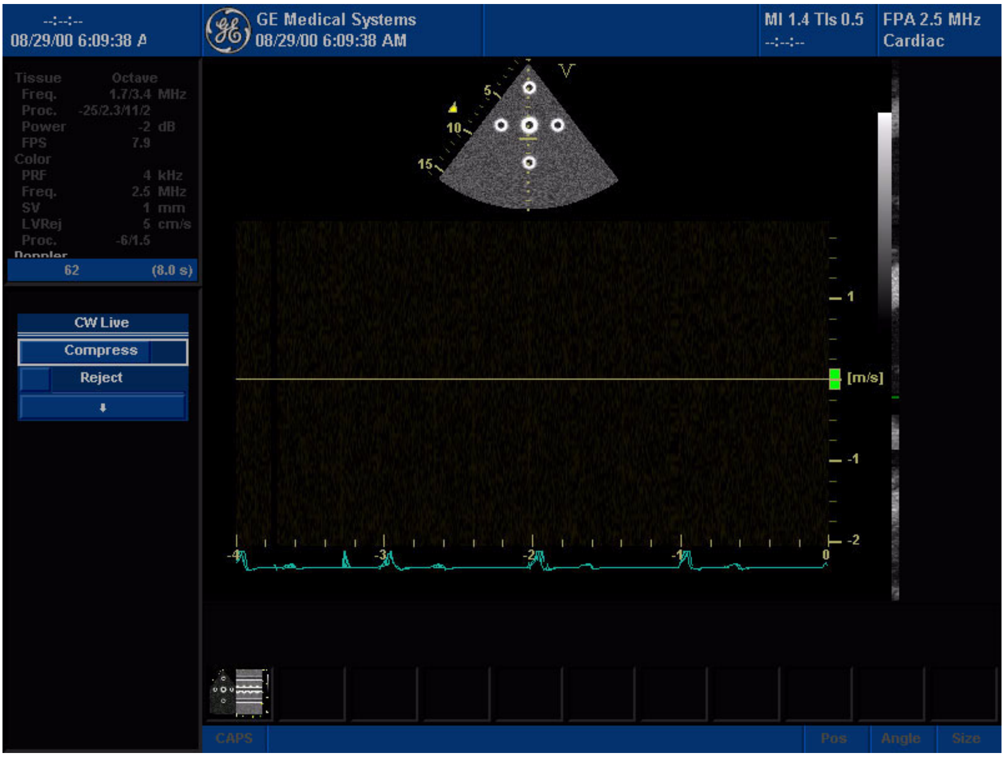
Figure 5-15. Doppler Mode Display

Table 5-3: 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 asGN 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 Angledisplays 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 5-3: 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	Eight speeds: 12, 8, 6, 5, 4, 3, 2, and 1 second sweeps.
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).



--:--:--
08/29/00 6:09:38 A

GE Medical Systems
08/29/00 6:09:38 AM

MI 1.4 TIs 0.5
--:--:--

FPA 2.5 MHz
Cardiac

Tissue Octave
Freq. 1.7/3.4 MHz
Proc. -25/2.3/11/2
Power -2 dB
FPS 7.9
Color
PRF 4 kHz
Freq. 2.5 MHz
SV 1 mm
LVRej 5 cm/s
Proc. -6/1.5
Doppler
62 (8.0 s)

Figure 5-16. CW Display (Actual Image Not Yet Available)

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 Touch Panel

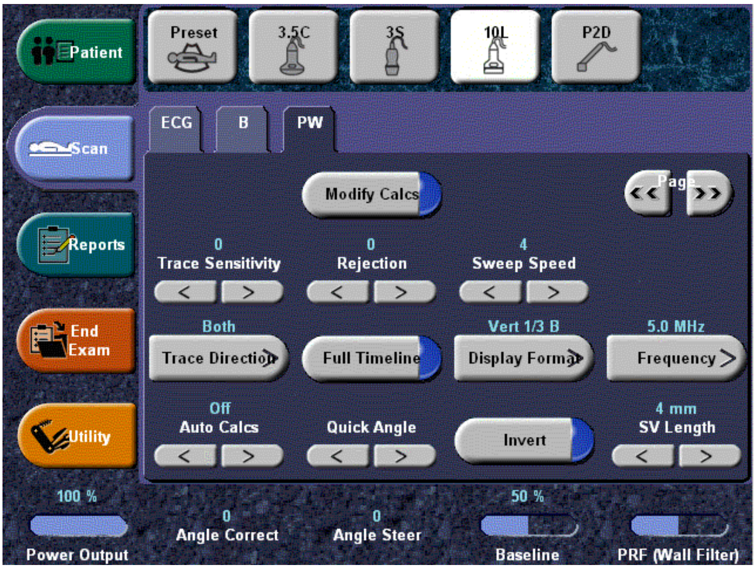

Patient
Preset
3.5C
3S
10L
P2D
Scan
ECG
B
PW
Modify Calcs
Page
Reports
0
Trace Sensitivity
0
Rejection
4
Sweep Speed
End Exam
Both
Trace Direction
Full Timeline
Vert 1/3 B
Display Format
5.0 MHz
Frequency
Utility
Off
Auto Calcs
Quick Angle
Invert
4 mm
SV Length
100 %
Power Output
0
Angle Correct
0
Angle Steer
50 %
Baseline
PRF (Wall Filter)

Figure 5-17. PW Mode Touch Panel, Page 1

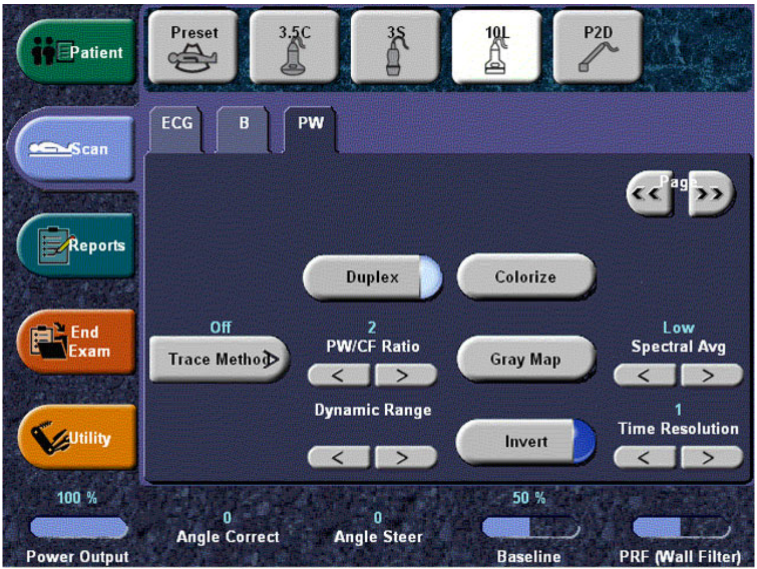

Patient
Preset
3.5C
3S
10L
P2D
Scan
ECG
B
PW
Page
Reports
Duplex
Colorize
End Exam
Off
Trace Method
2
PW/CF Ratio
Gray Map
Low
Spectral Avg
Utility
Dynamic Range
Invert
1
Time Resolution
100 %
Power Output
0
Angle Correct
0
Angle Steer
50 %
Baseline
PRF (Wall Filter)

Figure 5-18. PW Mode Touch Panel, Page 2

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 Touch Panel. 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 Touch Panel (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.

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 O), you cannot see the angle correct indicator.*
Adjusting	Flow toward the probe is mapped above the baseline and right speaker (as you are facing the system). To adjust the angle relative to the probe face, adjust ***Angle Correct*** to the left/right. The velocity scale changes when you adjust angle correct.
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 45-65 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 Correct

Description	Quickly adjusts the angle by 60 degrees.
Adjusting	To quickly adjust the angle 60 degrees, press ***Quick Angle***.
Values	0 degrees 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 Touch Panel (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 Touch Panel and the monitor. Wall Filter values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient.
Benefits	Gets rid of excess, unnecessary information. Cleans out low level noise above and below the baseline so you don't see or hear it on the spectrum.
Affect on other controls	Wall filter may be changed by changes to the velocity scale.

Baseline

Description	Adjusts the baseline to accommodate faster or slower blood flows to eliminate aliasing.
Adjusting	Baseline adjusts the point in the spectrum where the velocity trace is at zero. The default baseline is at the midpoint of the spectrum. To shift the baseline, adjust ***Baseline*** on the Touch Panel. The baseline displays as a solid line running across the spectrum. The baseline is raised and lowered in equal increments, depending on the current Doppler scale factor. The control does not wrap when the maximum baseline shift (in either direction) has been reached.
Values	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. Adjust SV Length on the Touch Panel to adjust sample volume gate size. The M/D Cursor key backlights.
Values	On/Off. If blood flow velocities cannot be presented, the message PRF unavailable. Change Vel Scale" appears.
Benefits	Lets you position the cursor before you go into Doppler Mode so that you can make optimum use of the larger B-Mode image.
Affect on other controls	If the M-Mode cursor is on, clicking SV Gate or Angle Correct changes the cursor to a Doppler Mode cursor.

Angle Steer

Description	You can slant the B-Mode or B-Mode Color Flow linear image left/ right to get more information without moving the probe; or you can steer Spectral Doppler independently from Color Flow in smaller angle steps (Fine Angle Steer Mode).
Adjusting	To slant the linear image to the left/right, adjust **Angle Steer** left/ right.
Values	Linear probes can be steered left, center, or right up to a maximum of 30 degrees, depending on the probe. Angle Steer 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	Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Peripheral Vascular to image carotids.
Bioeffects	Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

Audio Volume

Description	Controls audio output.
Adjusting	To adjust the audio, adjust **Volume** left/right. The volume defaults to the last Doppler audio volume setting.
⚠ CAUTION	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, with positive flow toward the probe through the right speaker; negative flow away from the probe through the left speaker.
NOTE:	*This description assumes you are facing the system.*
Benefits	An audio representation of the flow within a vessel can be used to evaluate proper probe angle and position.

Invert

Description	Vertically inverts the spectral trace without affecting the baseline position.
Adjusting	To invert the spectral trace, press ***Invert***. The plus (+) and minus (-) signs on the velocity scale reverse when the spectrum is inverted. Positive velocities display below the baseline and to the left speaker (as you face the system).
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.
Affect on other controls	The polarity of Doppler Audio is also reversed.

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 Touch Panel. Each click cycles you to the next setting. To increase/decrease, press ***Dynamic Range***.
Values	The settings cycle in 4 dB steps from 20 dB to 40 dB. The current value displays on the Touch Panel. 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 the amount of gray scale. You decrease the dynamic range to clean out the spectrum to determine if the broadening is actual or not. You increase the dynamic range to fill in the spectrum, according to your personal preference.
Affect on other controls	Dynamic range operates only in realtime, not in freeze, CINE, CINE Timeline, or VCR playback and affects Doppler gain.

Spectral Trace (Trace Method)

Description	Traces the average mean and peak velocities in realtime images and spectral broadening in frozen images.
Adjusting	Select the spectral trace method from ***Trace Method***. To activate the Spectral Trace Touch Panel, press 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	SELECT TRACE lets you indicate whether cardiac cycle detection, and therefore cardiac cycle identification, should use peak timeline data above, below, or above and below (composite) the baseline.
Benefits	Broadening may indicate turbulence.

Trace Sensitivity

Description	Adjust the trace to follow the waveform for signal strength.
Adjusting	Press the left or right arrow key to select value.
Values	From 0 to 40.
Benefits	If the signal is very faint, changing the Trace Sensitivity will allow the system to lock onto that signal strength.

PW/CF Ratio

PW/CF Ratio	The PW/CF Ratio control adjusts the ratio between Spectral Doppler and Color Flow.
Adjusting	Press ***PW/CF Ratio*** to adjust.
Values	1:1, 1:2, and 1:4.

Duplex

Description	Duplex On: simultaneous B-Mode + PW Mode. Duplex Off: toggle live B-Mode + PW Mode via B Pause.
Adjusting	Press ***Duplex***.
Values	On/Off.
Benefits	Allows you to have both B-Mode and PW Doppler Mode active at the same time.

Trace Direction

Description	Specifies trace direction.
Adjusting	Press ***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	Press ***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	Press ***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	Press ***Time Resolution***.
Values	1-3
Benefits	Time Resolution = 3 (high) smooths the Timeline; Time Resolution =1 (low) increases the time resolution (image not as smooth).

Modify Auto Calcs

Description	Activates the menu to select which calculations are automatically calculated.
Adjusting	Press ***Modify Auto Calcs*** to activate Modify Auto Calcs Touch Panel.
Benefits	Provides flexibility.

Continuous Wave Doppler (CWD)

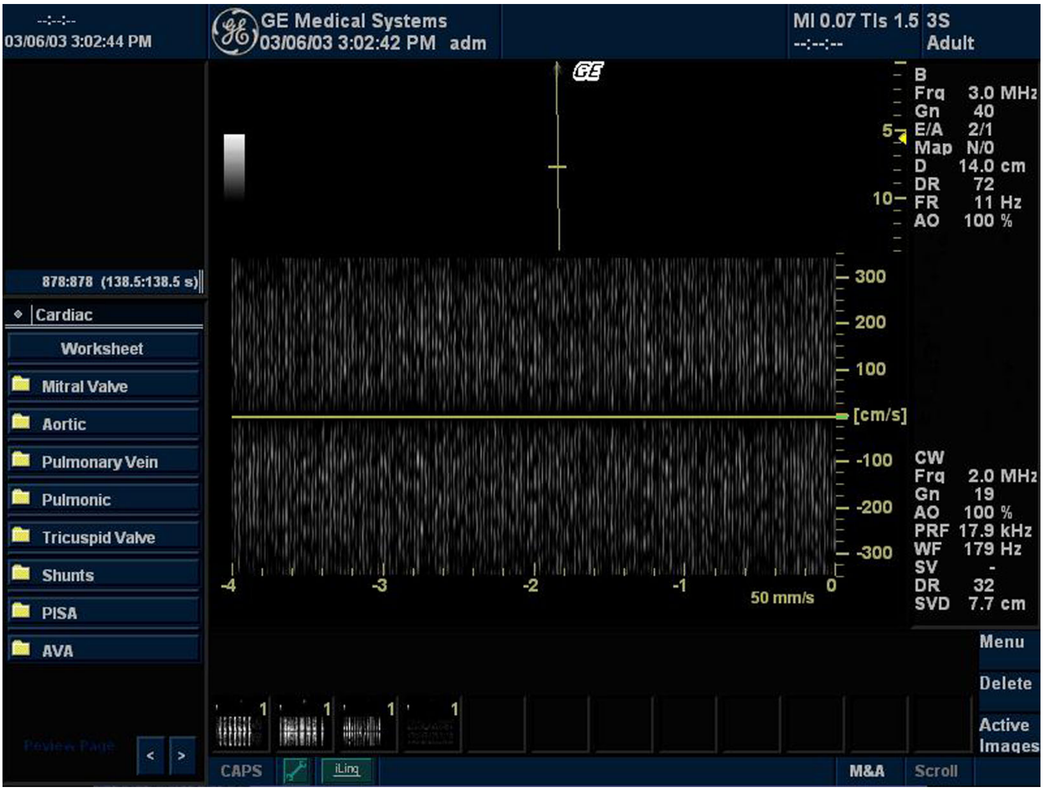
Allows examination of blood flow data all along the Doppler Mode cursor rather than from any specific depth. Gather samples along the entire Doppler beam for rapid scanning of the heart. Range gated CW allows information to be gathered at higher velocities.

There are two CW Doppler operating modes: Steerable and Non-Imaging.

Steerable

Allows viewing of the B-Mode image to position the Doppler cursor to the area of interest while viewing the Doppler spectrum (shown below in the B-Mode image) and listening to the Doppler Audio signal.

Works with Sector probes.



GE Medical Systems 03/06/03 3:02:42 PM adm

MI 0.07 TIs 1.5 3S Adult

B
Frq 3.0 MHz
Gn 40
E/A 2/1
Map N/0
D 14.0 cm
DR 72
FR 11 Hz
AO 100 %

CW
Frq 2.0 MHz
Gn 19
AO 100 %
PRF 17.9 kHz
WF 179 Hz
SV -
DR 32
SVD 7.7 cm

--:--:--
03/06/03 3:02:44 PM
878:878 (138.5:138.5 s)
Cardiac
Worksheet
Mitral Valve
Aortic
Pulmonary Vein
Pulmonic
Tricuspid Valve
Shunts
PISA
AVA
Preview Page
<
>
--:--:--
5
10
300
200
100
[cm/s]
-100
-200
-300
-4
-3
-2
-1
0
50 mm/s
1
1
1
1
Menu
Delete
Active Images
CAPS
iLinq
M&A
Scroll

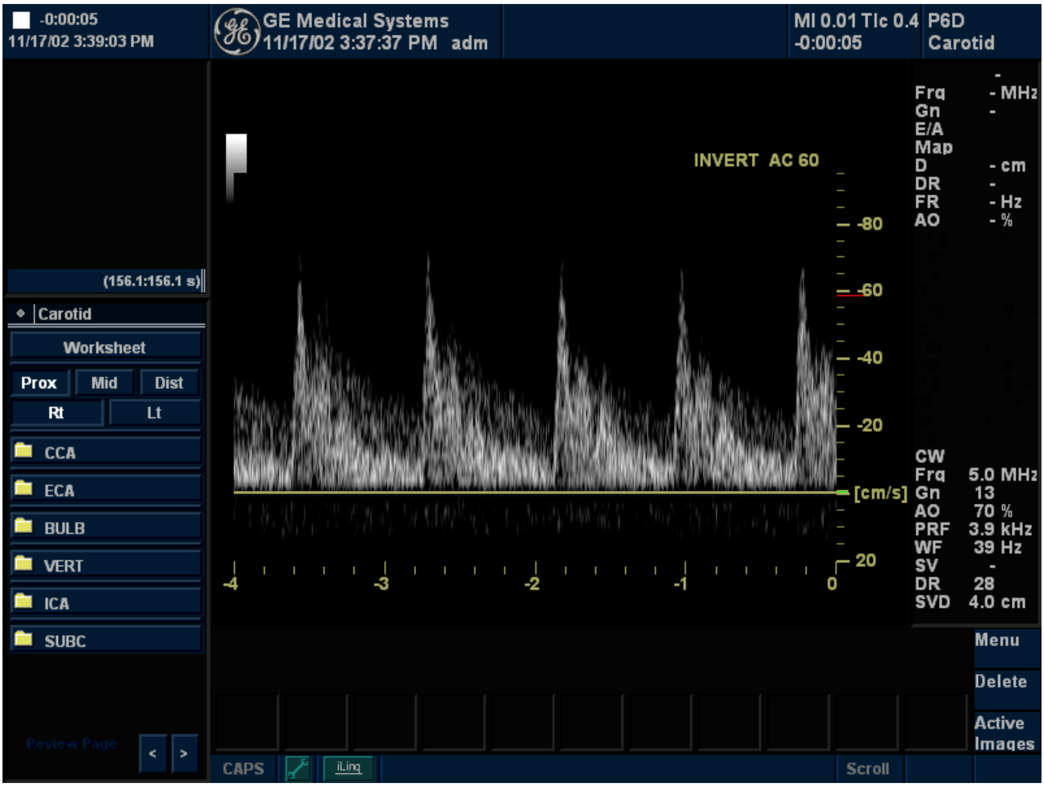
Figure 5-19. CWD Screen

Non-Imaging

Provides only Doppler Spectrum and Audio for ascending/ descending aortic arch, other hard-to-get-to spaces or higher velocities.

Requires a single CWD probe and probe adapter.

Works with the P2D and P6D probes.


-0:00:05
11/17/02 3:39:03 PM
GE Medical Systems
11/17/02 3:37:37 PM adm
MI 0.01 TIc 0.4
-0:00:05
P6D
Carotid
(156.1:156.1 s)
Carotid
Worksheet
Prox
Mid
Dist
Rt
Lt
CCA
ECA
BULB
VERT
ICA
SUBC
Review Page
<
>
INVERT AC 60
-80
-60
-40
-20
[cm/s]
20
-4
-3
-2
-1
0
Menu
Delete
Active Images
CAPS
iLinq
Scroll

Frq - MHz
Gn -
E/A
Map
D - cm
DR -
FR - Hz
AO - %

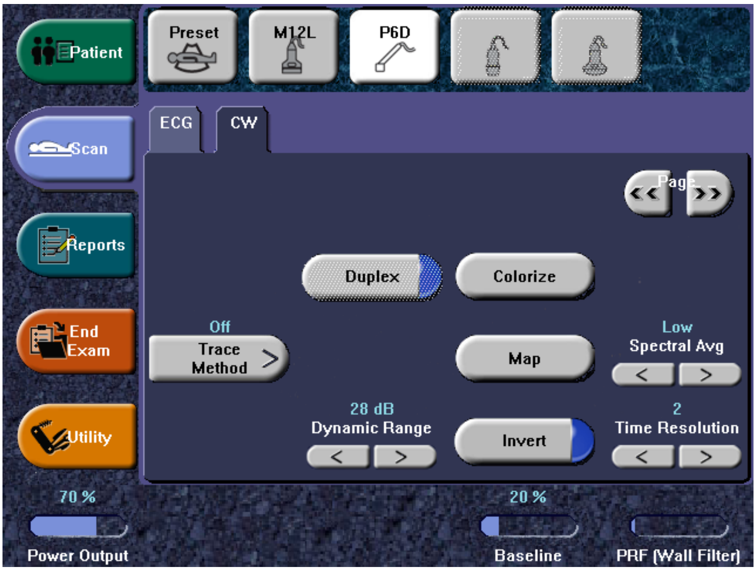
CW
Frq 5.0 MHz
Gn 13
AO 70 %
PRF 3.9 kHz
WF 39 Hz
SV -
DR 28
SVD 4.0 cm

Figure 5-20. Non Imaging CWD Screen

Activating CW Doppler

To activate CW Doppler Mode, press **CW**.

The Doppler spectrum displays along with the B-Mode image. (Steerable CW Doppler, **NOT** Non-Imaging CW Doppler). The cursor changes to a Doppler cursor.


Patient
Scan
Reports
End Exam
Utility
Preset
M12L
P6D
ECG
CW
Page
Duplex
Colorize
Map
Invert

Off
Trace Method

Low
Spectral Avg

28 dB
Dynamic Range

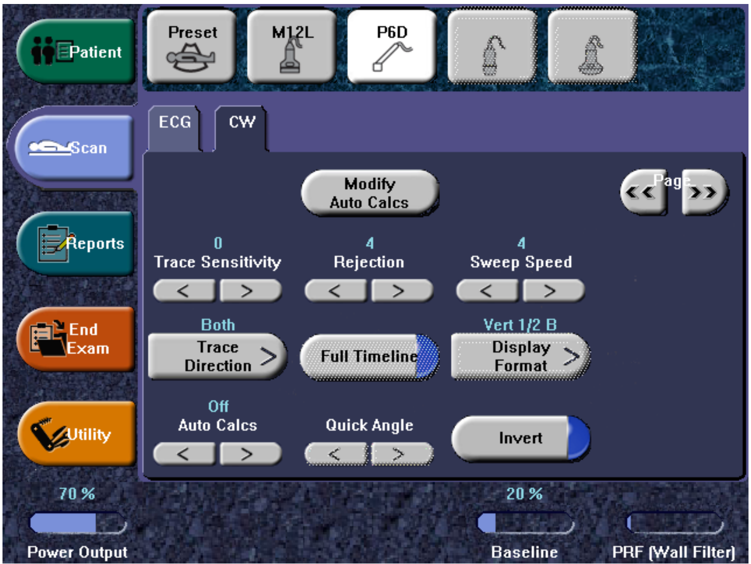
2
Time Resolution

70 %
Power Output

20 %
Baseline

PRF (Wall Filter)

Figure 5-21. CWD Mode Touch Panel, Page 1


Patient
Scan
Reports
End Exam
Utility
Preset
M12L
P6D
ECG
CW
Page
Modify Auto Calcs
Full Timeline
Invert
Quick Angle

0
Trace Sensitivity

4
Rejection

4
Sweep Speed

Both
Trace Direction

Vert 1/2 B
Display Format

Off
Auto Calcs

70 %
Power Output

20 %
Baseline

PRF (Wall Filter)

Figure 5-22. CWD Mode Touch Panel, Page 2

Exiting CW Doppler

CW Doppler Mode, press **CW**.

Using 3D

Overview

WARNING

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

There are two 3D Packages:

Table 5-4: 3D Package Options

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

3D Acquisition

Acquiring a 3D Scan

To acquire a 3D scan,

1. Optimize the B-Mode image. Ensure even gel coverage.
2. Press the 3D 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.

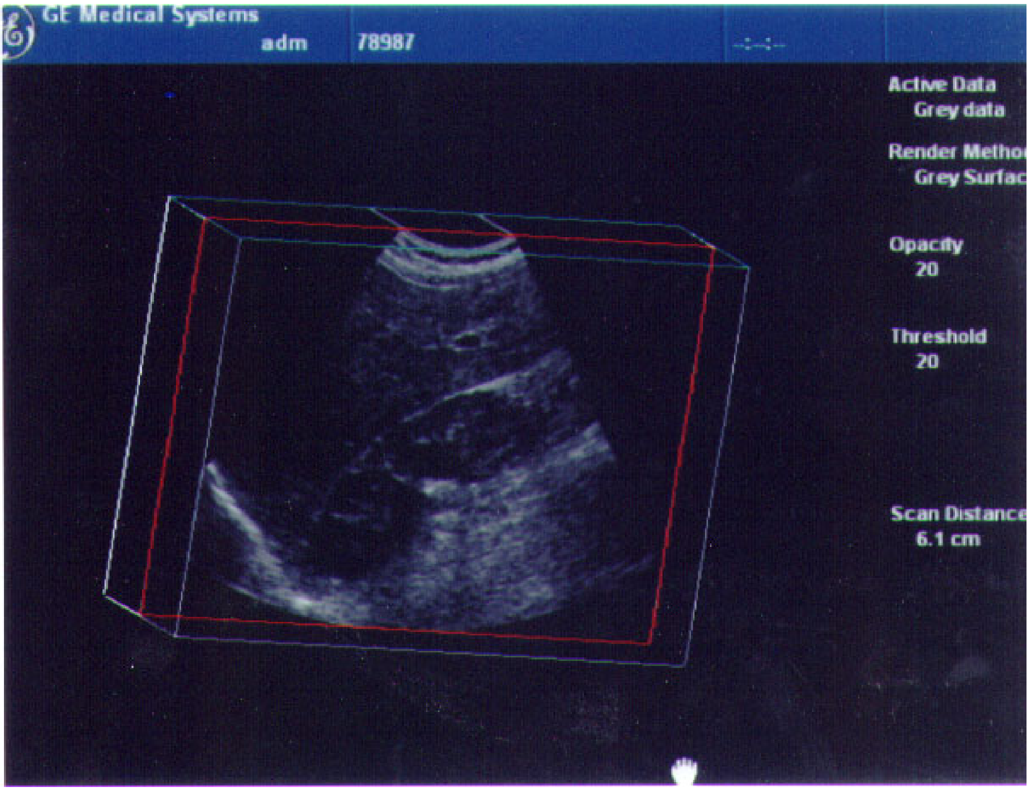
Manipulating the Volume of Interest

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.



Active Data
Grey data

Render Metho
Grey Surfac

Opacity
20

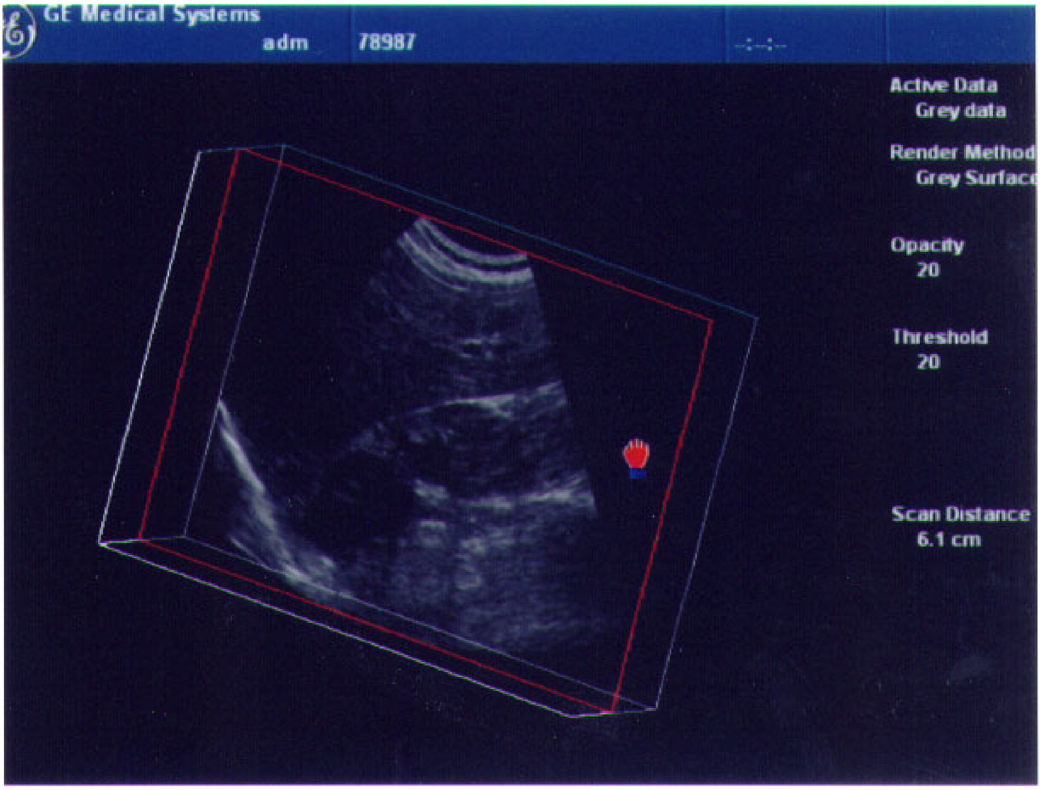
Threshold
20

Scan Distance
6.1 cm

Figure 5-23. 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.



Active Data
Grey data

Render Method
Grey Surface

Opacity
20

Threshold
20

Scan Distance
6.1 cm

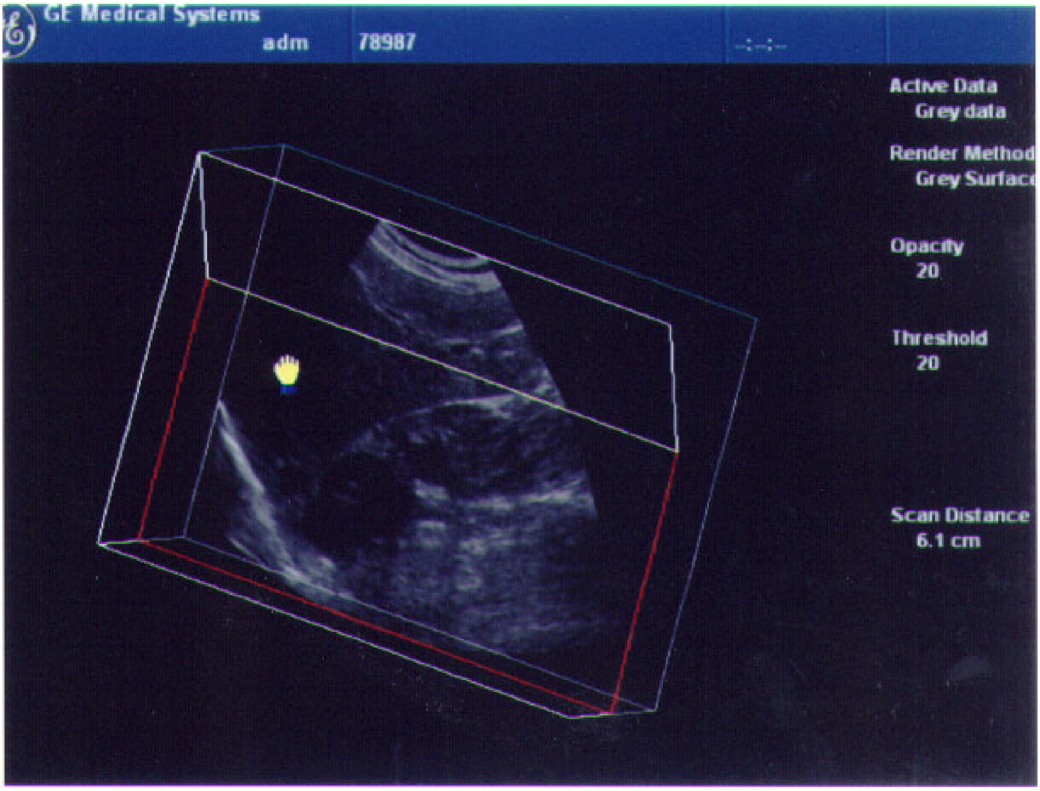
Figure 5-24. Moving through a 3D Volume of Interest (Red Hand)

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.



Active Data
Grey data

Render Method
Grey Surfac

Opacity
20

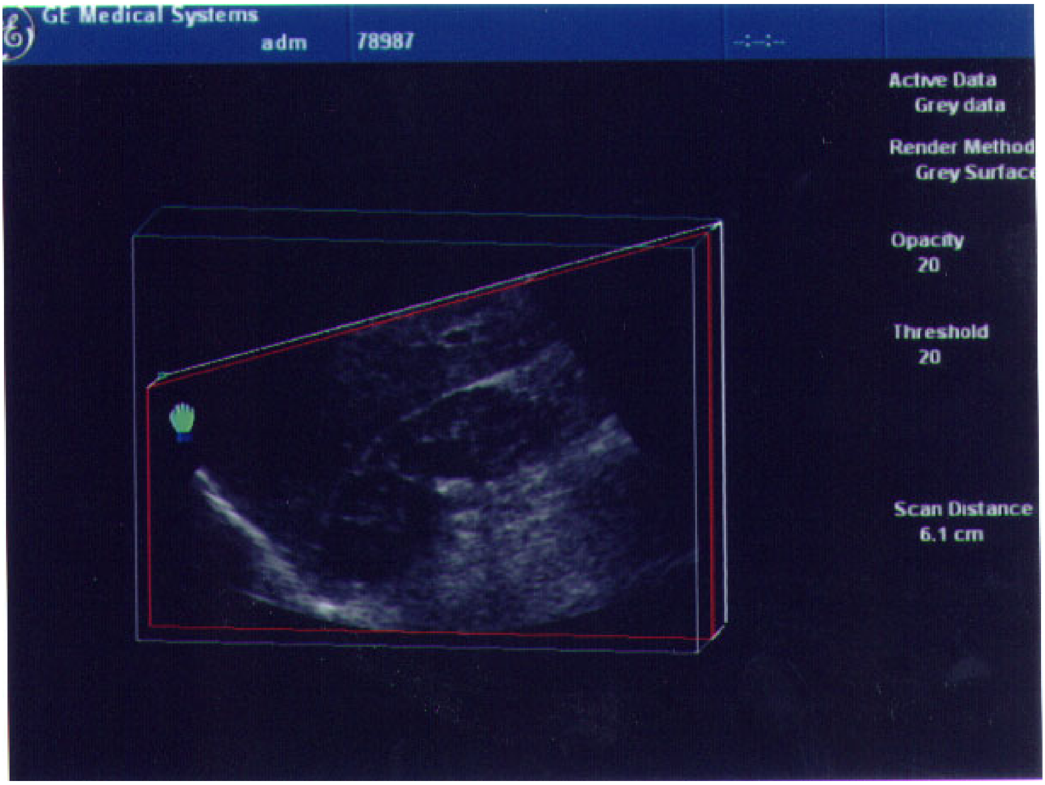
Threshold
20

Scan Distance
6.1 cm

Figure 5-25. 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.



Active Data
Grey data

Render Method
Grey Surfac

Opacity
20

Threshold
20

Scan Distance
6.1 cm

Figure 5-26. Manipulating a Corner of the 3D Volume of Interest (Green Hand)

3D Acquisition Parameter Description

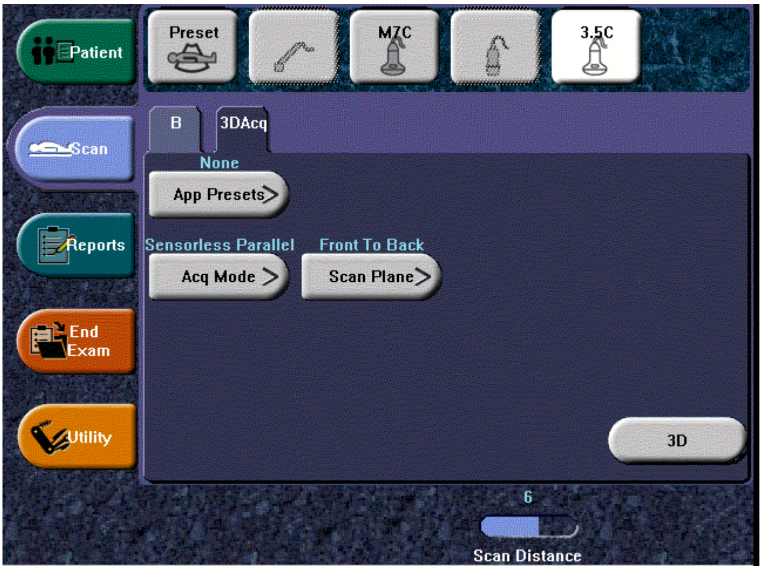

Patient
Scan
Reports
End Exam
Utility
Preset
M7C
3.5C
B
3DAcq
None
App Presets
Sensorless Parallel
Acq Mode
Front To Back
Scan Plane
3D
6
Scan Distance

Figure 5-27. 3D Acquisition

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

3D Parameter	Description
Application Presets	Selections: None, OB - Baby Face, Vascular **None**. No application preset applied. **OB - Baby Face.** After having scanned in this mode, certain rendering parameters are set automatically. The gray surface mode is activated and the texture mode is switched off. The gray surface mode values for opacity and threshold are set automatically according to the datasets histogram. **Vascular**. Available only with Advanced 3D or Tru 3D package. After having scanned in this mode, certain rendering parameters are set automatically. The color image is rendered in the texture mode. The values for opacity and threshold of the texture mode are set automatically according to the datasets histogram. The B-Mode image is rendered in the gray surface mode. Opacity and threshold values are defined according to the histogram.

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

3D Parameter	Description
Acquisition Mode	Selections: Sensorless Parallel, Sensorless Sweep, With Sensor **Sensorless Parallel**. In this mode the probe must be moved during 3D data acquisition without angling it. You should scan the object you want to render in 2-4 seconds. The speed at which you scan should be constant. No sensor is mounted on the probe. • Since the time for post-processing depends on the acquired number of frames, it is recommended that you check the frame rate. Low frame rates result in fewer acquired frames for the 3D dataset which results in intensive post-processing (interpolation). Therefore, low frame rate = long post-processing. **Sensorless Sweep**. In this mode the probe must be moved to a position where you can clearly see a middle cut of the object you want to scan and render. Tilt the probe to about 30 degrees until the object you want to scan disappears. Start the acquisition and tilt the probe over a distance of around 60 degrees until the object disappears again. The entire scan time should be around 2-4 seconds. During the sweep, the probe may not be moved parallel, just tilted. No sensor is mounted on the probe. Before starting an acquisition, take care that the transmitter is positioned correctly during data acquisition and that the transmitter cannot move. The transmitter has to be placed in such an orientation that the probe with the receiver attached is always in the forward hemisphere of the transmitter during scanning. If the distance between the receiver and the transmitter exceeds 70 cm, a beep tone signals that the data acquisition has been interrupted. The patient MAY NOT move during the acquisition.
Scan Plane	Selections: Front to Back, Side to Side **Front to Back**. After having scanned in this mode, the rendered dataset is shown in a frontal view. For acquiring a fetal face in sagittal cuts, use this mode. **Side to Side**. After having scanned in this mode, the rendered dataset is shown from a side view. For acquiring a fetal face in coronal cuts, use this mode.
3D	Starts the rendering process.
Scan Distance	Adjusts the distance covered during the scan. Depending on the real width of a scan acquired during a sensorless 3D acquisition, the volume of interest's width can be enlarged or reduced. You can adapt the form of a fetal face if the baby's head looks oval instead of round. The assumed default width of a parallel scan is 6 cm; of a fan scan 60 degrees.

Easy 3D

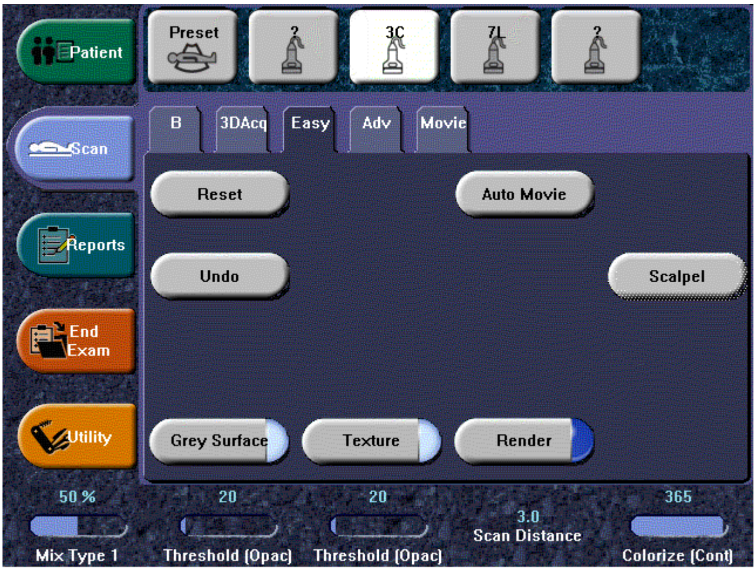

Patient
Preset
?
3C
7L
?
Scan
B
3DAcq
Easy
Adv
Movie
Reset
Auto Movie
Reports
Undo
Scalpel
End Exam
Utility
Grey Surface
Texture
Render
50 %
20
20
365
3.0
Scan Distance
Mix Type 1
Threshold (Opac)
Threshold (Opac)
Colorize (Cont)

Figure 5-28. Easy 3D

Descriptions and instructions for using Easy 3D follow:

Table 5-6: Easy 3D Description and Instructions for Use

3D Parameter	Description
Reset	Resets the 3D volume of interest back to its original orientation.
Undo	Undoes any manipulation you have done to your 3D dataset.
Auto Movie	Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated.
Scalpel	Structures, for example a part of the placenta hiding the view to a fetal face, can be cut out in a rendered image. All visible structures can be cut out. The option of ‘erase inside’ deletes all structures inside the marked region. The option of ‘erase outside’ deletes all structures outside the marked region. The region in the rendered image is marked with the right Set key. To define the contour of the region, press the right Set key for each vertex. To close the contour, double click the right Set key. As long as a contour is not closed, it can be traced back with the left Set key. The cut out process can be undone by the Undo Last function. As soon as the Apply button is pressed, a new dataset is generated.
Gray Surface	Activates the gray surface rendering mode. It leads to a transparent appearance of the object, generated by displaying only a surrounding shell of structures.

Table 5-6: Easy 3D Description and Instructions for Use

3D Parameter	Description
Texture	Activates the texture or photorealistic rendering mode. It creates a photorealistic appearance of the object. The shading depends on the orientation of the surface of the object. If both Texture and Gray Surface mode are switched on, the mixture percentage of both modes can be defined.
Render	Changes between the rendered image view and the view of a volume of interest. The volume of interest shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. The volume of interest can be manipulated as described above.
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.

Advanced 3D

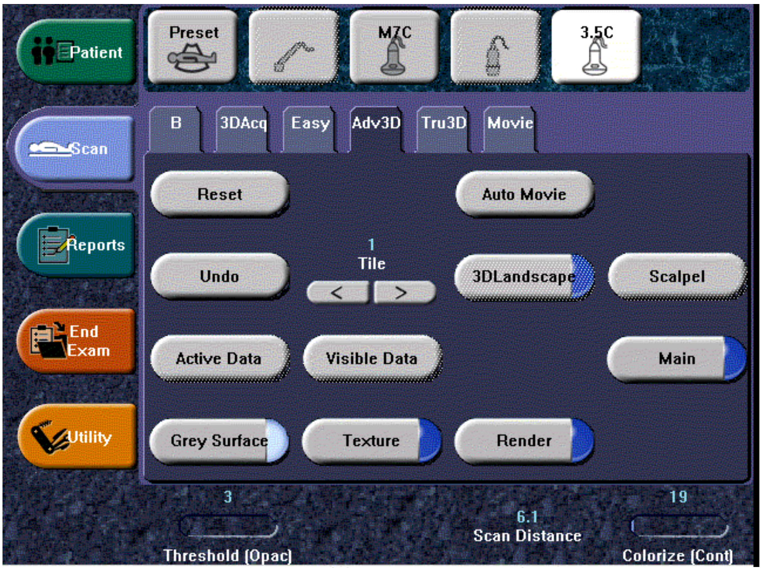

Patient
Scan
Reports
End Exam
Utility
Preset
M7C
3.5C
B
3DAcq
Easy
Adv3D
Tru3D
Movie
Reset
Auto Movie
1
Tile
<
>
Undo
3DLandscape
Scalpel
Active Data
Visible Data
Main
Grey Surface
Texture
Render
3
Threshold (Opac)
6.1
Scan Distance
19
Colorize (Cont)

Figure 5-29. Advanced 3D

Descriptions and instructions for using Advanced 3D follow:

Table 5-7: Advanced 3D Description and Instructions for Use

3D Parameter	Description
Tile	The display can be divided into 1, 2, 4, or 6 windows. Switching to a lower number of windows keeps the images from left to right.
3D Landscape	Shows a combination of 2D slices and a 3D rendered image. After a color acquisition you can combine the 2D B-Mode image slices with a 3D rendered color image. This mode allows stepping through the B-Mode images along a vessel structure. The 2D slice can be moved with the right Set key. The Trackball symbol has to be positioned inside the 2D plane.
Active Data	Manipulations of rendering parameters only have an effect on the data defined as Active Data. After having selected Active Data, a list of data is displayed, Gray Data, Red, Blue. Choose the data to be manipulated.
Visible Data	After selecting Visible Data, a list of data is displayed, Gray Data, Red, Blue. Choose the data you want to display. For example, if only color data is chosen, the B-Mode image is switched off in the rendered image and only vessel structures are displayed.
Main	Three orthogonal cuts (with colored frames) of the acquired volume of interest are shown after pressing Main. The volume of interest shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. On the left top of the image window a complete volume of interest is displayed. It shows the position of the three orthogonal planes in the VOI. A green point displayed in each plane defines the point of intersection of the three planes. This point can be set to different positions in the planes by a double pressing the right Set key. A plane can be moved parallel in the VOI by pressing the right Set key on the position of the green point and moving the Trackball up and down inside the plane.

Movie 3D

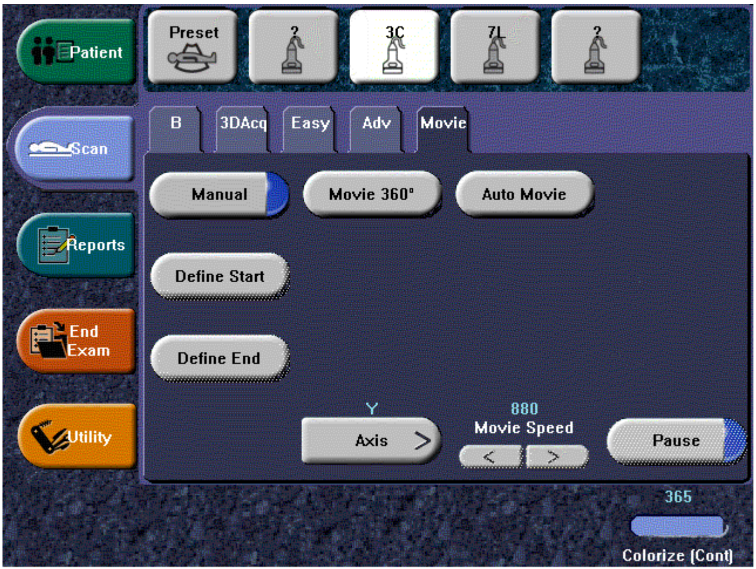

Patient
Scan
Reports
End Exam
Utility
Preset
?
3C
7L
?
B
3DAcq
Easy
Adv
Movie
Manual
Movie 360°
Auto Movie
Define Start
Define End
Y
Axis
880
Movie Speed
Pause
365
Colorize (Cont)

Figure 5-30. Movie 3D

Descriptions and instructions for using Movie 3D follow

Table 5-8: Movie 3D Descriptions and Instructions for Use

3D Parameter	Description
Manual	An animated rotation of the rendered image can be calculated and displayed by this function. Using this function, you first need to define the start and end position of the rotation. To define this, move the VOI to the start position, the press Define Start. Move the VOI to the end position and press Define End.
Movie 360 Degrees	The calculation and display of a complete rotation around the axis, defined by the Axis button, starts in steps of 15 degrees.
Auto Movie	Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated.
Axis	All rotations (Auto Move and Movie 360) are calculated as rotations around the specified axis (X, Y, or Z).
Movie Speed	You can adjust the speed of any 3D rotation.
Pause	Stops and restarts the rotation. As soon as Pause is pressed, the different rotation steps can be displayed by moving the Trackball.

Chapter 6

Scanning/Display Functions

Describes additional ways in which to adjust the image. In addition, describes 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, adjust Zoom until the reference zoom image is removed.

Freezing an Image

Introduction

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

You can also freeze the image during VCR playback.

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 and the real-time icon is removed from the monitor (real-time icon: --|--|--)

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.

Post processing

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

- Map
- Zoom
- Rotation
- Reverse
- Rejection
- Compression
- B Softener
- Focus Width
- Gain

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

- Angle Correct
- Invert
- CF
- Threshold
- Packet Size
- ACE
- Dynamic Range

NOTE: *Color cannot be added to a black and white image that has been frozen.*

Auto Optimize. Optimizes the B-Mode image, Color Flow ROI, 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.

Timeline data is continually stored at four times the display width of timeline data (and updates the corresponding B-Mode images).

You can view CINE as a continuous loop via CINE Loop or manually review CINE images frame by frame via the Trackball.

Data in CINE is available until new data is acquired. CINE is stored on the system's memory and can be archived as well.

CINE is useful for focusing on images during a specific part of the heart cycle or to view short segments of a scan session.

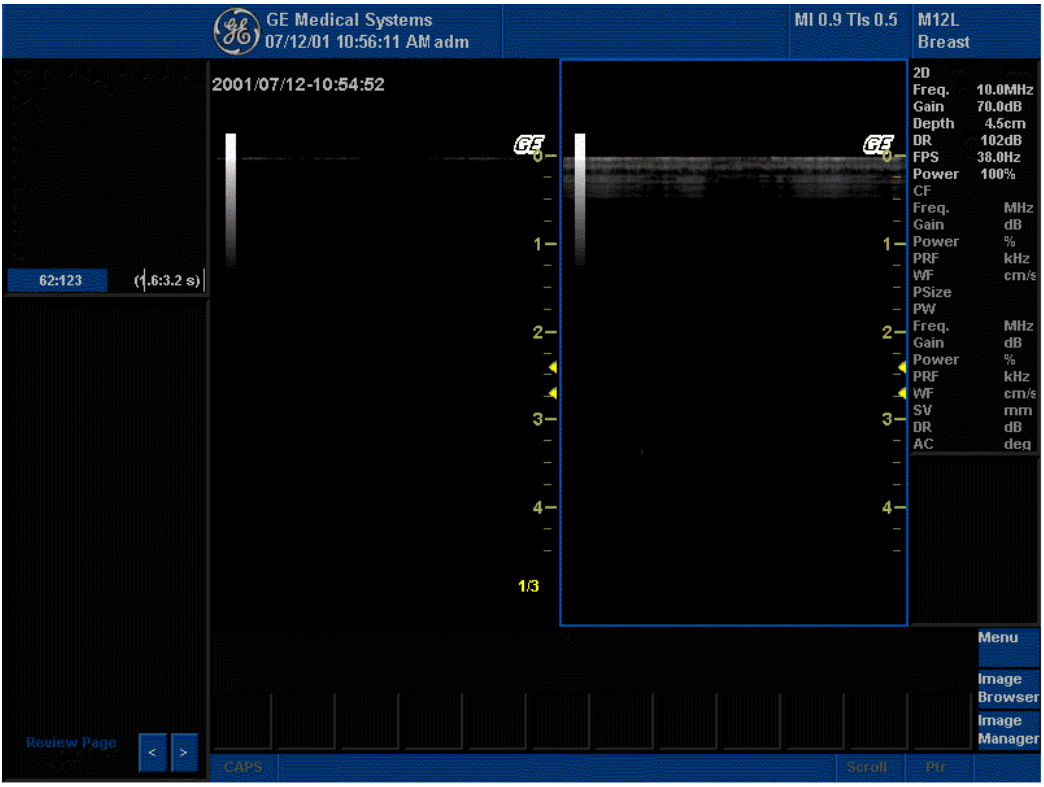
Activating CINE

To activate CINE,

1. Press Freeze.
2. Move the Trackball.

CINE 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).



GE Medical Systems
07/12/01 10:56:11 AM adm
MI 0.9 TIs 0.5
M12L
Breast

62:123 (1.6:3.2 s)

2001/07/12-10:54:52

2D
Freq. 10.0MHz
Gain 70.0dB
Depth 4.5cm
DR 102dB
FPS 38.0Hz
Power 100%
CF
Freq. MHz
Gain dB
Power %
PRF kHz
WF cm/s
PSize
PW
Freq. MHz
Gain dB
Power %
PRF kHz
WF cm/s
SV mm
DR dB
AC deg

0
1
2
3
4
1/3
Menu
Image Browser
Image Manager
Review Page
<
>
CAPS
Scroll
Ptr

Figure 6-1. CINE Display

Using CINE

The following Touch Panel appears:

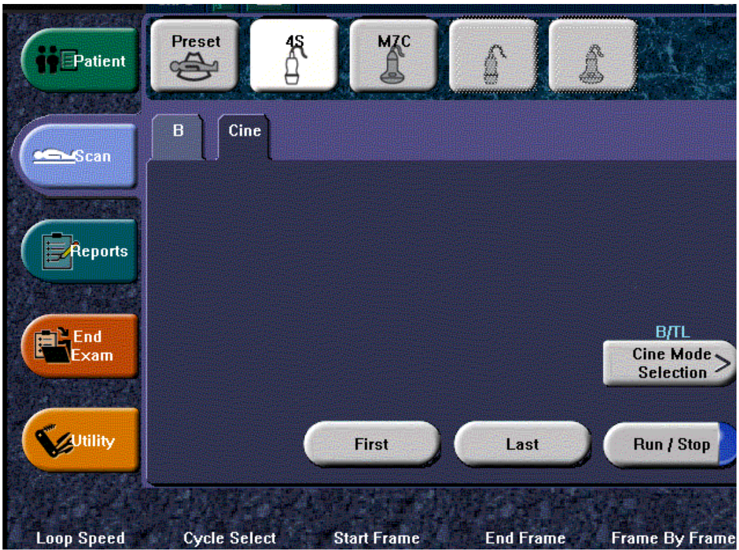

Patient
Scan
Reports
End Exam
Utility
Preset
4S
M7C
B
Cine
B/TL
Cine Mode Selection
First
Last
Run / Stop
Loop Speed
Cycle Select
Start Frame
End Frame
Frame By Frame

Figure 6-2. CINE Touch Panel

Adjusting CINE Loop Speed

Rotate the Loop Speed control at the bottom of the Touch Panel.

Disconnecting B-Mode CINE from Timeline CINE

Select B-Mode or Timeline CINE.

Annotating an Image

Introduction

The annotation function provides the capability to type the comments of free text and/or insert the pre-defined comments from the comment library. It also provides the user with arrow markers to point to parts of the image.

Pressing the **Comment** key or any keys on the alphanumeric keyboard initiates the annotation mode. This assigns the trackball function to controlling the cursor and displays the annotation library on the Touch Panel menu.

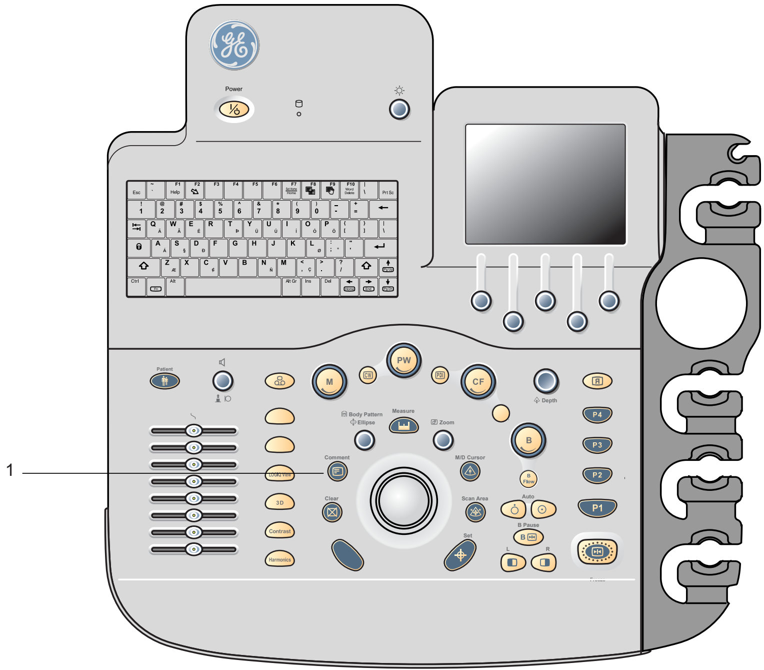

Power
1
Patient
PW
M
CF
Depth
Body Pattern
Ellipse
Measure
Zoom
Comment
M/D Cursor
B
B Flow
Clear
Scan Area
Auto
B Pause
Set
L
R
LOGIQ View
3D
Contrast
Harmonics
P4
P3
P2
P1

Figure 6-3. Comment Key on the Front Panel

1. Comment Key

Introduction (continued)

In annotation mode, text can be added by using the Touch Panel Menu library or by typing the alphanumeric keyboard.

Annotations can be erased by changing modes, powering down, or when ***Clear*** or ***New Patient*** are pressed.

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

Pressing the ***F7 (Cursor Home)*** key returns to the user specified position or factory default position.

A new cursor home position is established by placing the cursor in the desired position and pressing ***Shift+Home.***

Annotation Mode is activated by pressing the ***Comment*** key. Annotation 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 annotation mode was exited.

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

The factory default color for annotations 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 annotation or text group is selected, the color turns to green. Once the annotation 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 annotations and arrow marks, press the ***Clear*** key twice immediately after entering the annotation mode.

To end the Comment/Library Annotation function, press ***Set***.

To move by words or by text group, press the ***Tab*** key.

Adding Comments to an Image

Annotation Retention

Annotations 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: Annotations 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 ***F2 (Arrow)*** key on the keyboard. When the pointer comes up, it is a GREEN color, indicating it is active and can be moved.

- Move the pointer using the ***Trackball*** to any place on the screen. The pointer head direction can be controlled by how the trackball is moved.
- To readjust the length and thickness of the pointer, use the **Arrow Resize** rotary control. The default for the pointer size can be preset.
- Press **Set** to fix the place of the pointer and direction of the pointer head. The GREEN color turns to YELLOW (or the default color if changed).
- To delete all arrow marks, Press the ***Clear*** key right after pressing the ***F2 (Arrow)*** key.

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

Text Overlays

There are 2 layers of the text in annotations, which can be selected by toggling the ***F8 (Text1/Text2)*** key on the keyboard. Text1 is the default choice.

By using this function, users can perform a HIDE TEXT/SHOW TEXT, allowing the users to save or printing an image without clearing the typed text.

Annotating an image using the library

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

Select the desired library fields from the Touch Panel.

Annotation Library on Touch Panel

To reduce the amount of time spent annotating an image, store frequently-used annotations in the Annotation Library. As many as 6 libraries are available per study. One of the selected libraries is designated as the default and its entries shall be displayed on the Touch Panel when the annotation mode is entered for that study.

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

To program your system with specific annotations, See ‘Annotations Libraries Presets’ for more information.

Annotating an image with typed words

- Press **Comment** and type the comments where the cursor is currently located (the display's home position) or use the **Trackball**/***Arrow*** keys to place the annotation cursor in the desired location before typing.
- Press ***Return*** to move to the next line.

NOTE: *Annotations 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 Figure 16-28 for more information.*

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

Annotations appear on all prints, photos, and VCR recordings.

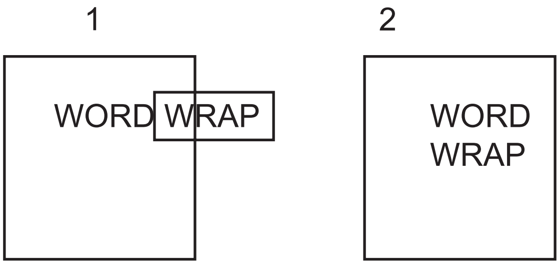


Figure 6-4. Next Line Word Wrap

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 annotations already on the screen and place them in different locations.

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

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 annotation after backspacing over all incorrect letters.

To delete previous character(s):

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

To move through the text a word at a time:

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

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

To activate the last text group typed or selected from the Library:

- Press ***F9 (Grab Word)*** key. The selected annotation will be highlighted.
- To increase/decrease the area of the highlighted selection use HIGHLIGHT rotary.

NOTE: To select all text groups, Press Shift + F9 (Grab Word) key.

To cancel the last action:

- Press **Undo** key.

Body Patterns

An additional way to annotate the image display is with body patterns. Body patterns are a simple graphic of a portion of the anatomy that is frequently scanned. The body pattern and probe marker can serve as a reference for a patient and probe positioning when images are archived or scanned.

To activate body patterns, press the ***Body Pattern/Ellipse*** control. A maximum of 6 body pattern packages are displayed on the Touch Panel according to exam category and preset. Refer to Figure 6-5.

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' for more information.

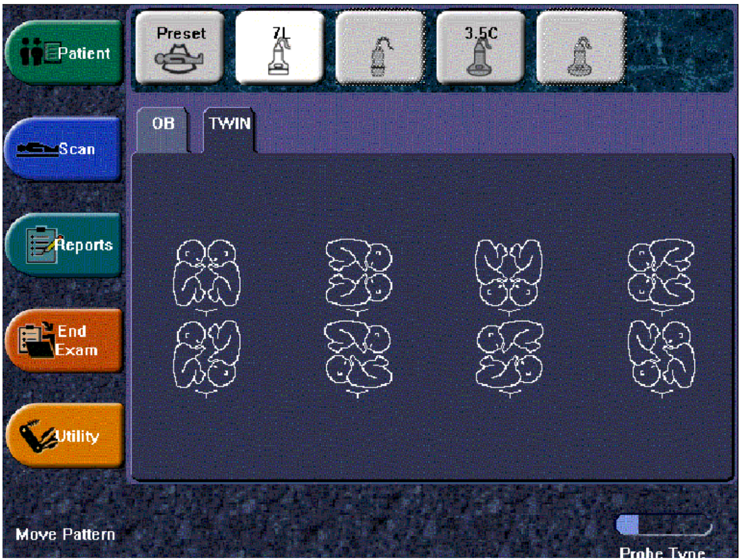


Figure 6-5. Touch Panel displays of Body Pattern

Body Patterns (continued)

Select the desired body pattern on the Touch Panel. The selected body pattern is displayed on the monitor.

Press the **Move Pattern** control on the Touch Panel 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 ***Body Pattern/ Ellipse*** control.

The probe mark type is selectable by rotating the **Probe Type** control on the Touch Panel. There are different choices available with one being a blank selection.

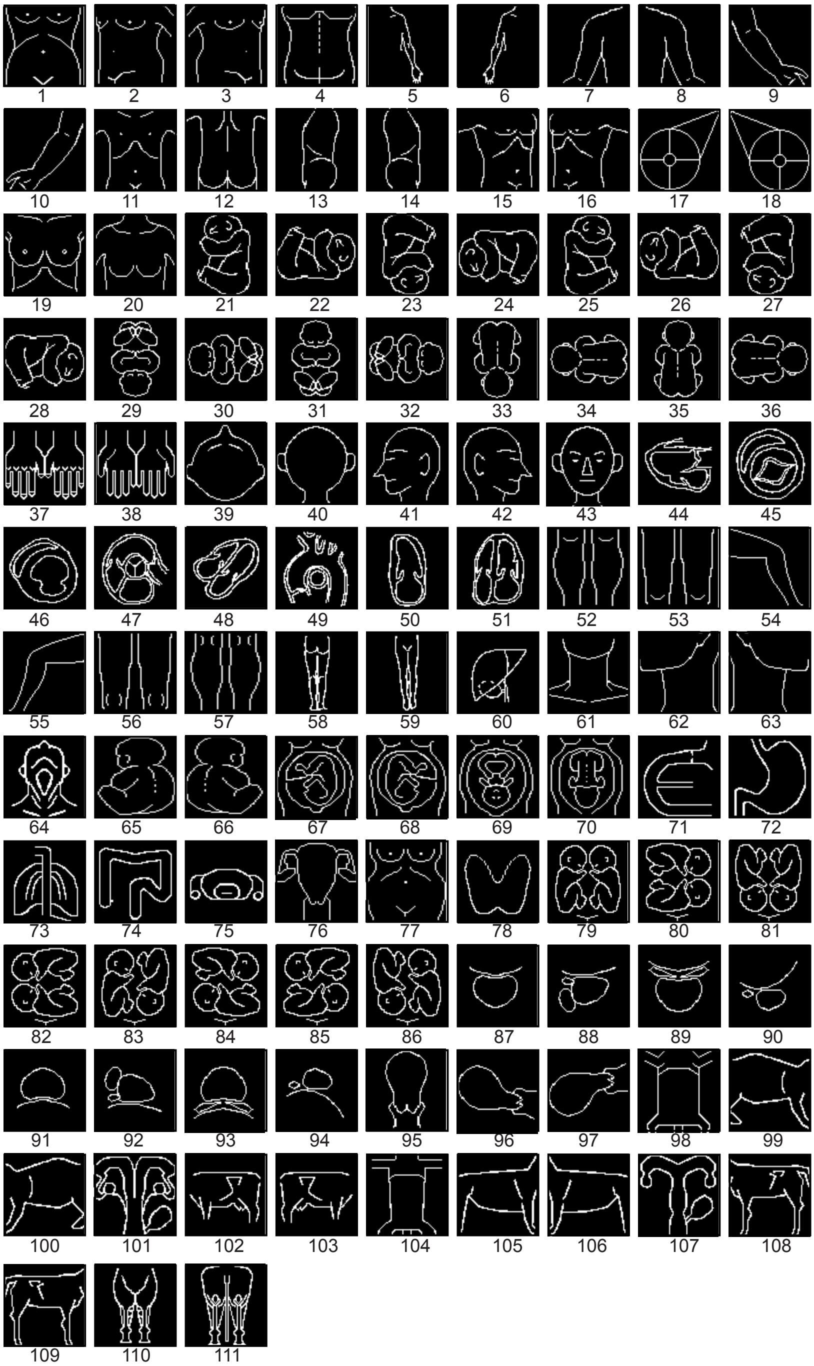
To select the active side in dual B-Mode, use the **Active Side** rotary control at the bottom of the Touch Panel.

To display the patient position at the corner on the body pattern, use the **Patient Position** rotary control at the bottom of the Touch Panel. There are 4 selections available: SP, PP, LP, and UP.

Press the ***Body Pattern/Ellipse*** control to erase the body pattern. The pattern is erased and the system exits the body pattern mode.

Press ***Set*** on the keyboard or **Scan** on the Touch Panel to exit without erasing the body pattern.

Body Patterns (continued)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21
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102
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105
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107
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109
110
111

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
98. vet-cat1
99. vet-cat2
100. vet-cat3
101. vet-cow1
102. vet-cow2
103. vet-cow3
104. vet-dog1
105. vet-dog2
106. vet-dog3
107. vet-horse1
108. vet-horse2
109. vet-horse3
110. vet-horse4
111. vet-horse5

Using iLinq

iLinq

iLinq is your direct link with GE Online Service Engineer and Applications Support.

Using iLinq

The iLinq Home Page displays the following information:

- Your most recent mail message is displayed, along with the number of unread mail messages in the queue for you to read.
- Link Buttons along the left side of the screen give you direct access to the following points of contact: Contact GE, Applications, Get Mail Messages, Help, or Close.

To access iLinq, select the iLinq icon at the bottom of the monitor display with the pointer cursor.

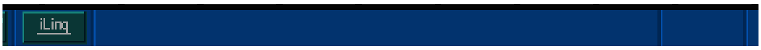


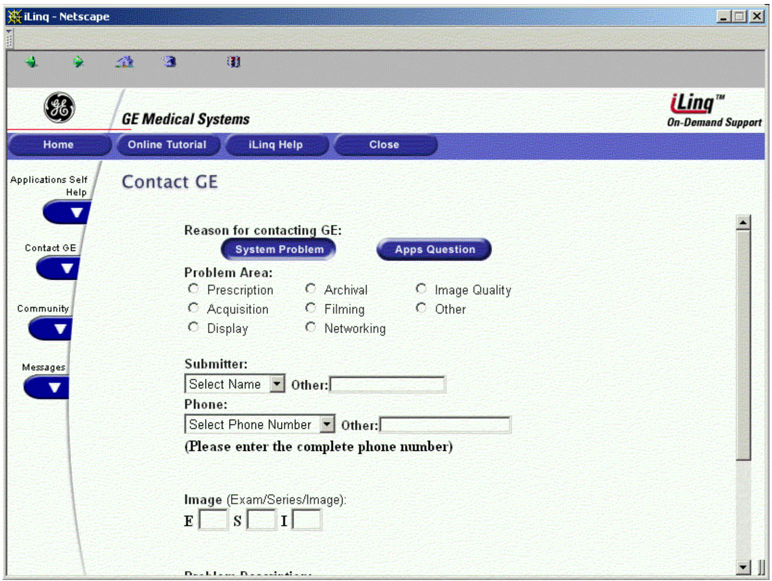
Figure 6-7. iLinq Icon

iLinq Home Page

From this screen you can access other iLinqs by pressing the buttons on the left side of the display. To contact GE to report a problem or to get GE telephone numbers, press the ***Contact GE*** key.

Contact GE Home Page

Press the key on the top of the page to specify whether you want to report a system problem (press ***System Problem***) or to ask an Application question (press ***Apps Question***). Fill in the page with the appropriate information, then press ***Send to GE*** at the bottom of the page.


iLinq - Netscape
GE Medical Systems
iLinq™
On-Demand Support
Home
Online Tutorial
iLinq Help
Close
Applications Self Help
Contact GE
Community
Messages

Contact GE

Reason for contacting GE:

System Problem | Apps Question

Problem Area:

○ Prescription ○ Archival ○ Image Quality
○ Acquisition ○ Filming ○ Other
○ Display ○ Networking

Submitter: Select Name Other:

Phone: Select Phone Number Other:

(Please enter the complete phone number)

Image (Exam/Series/Image):

E S I

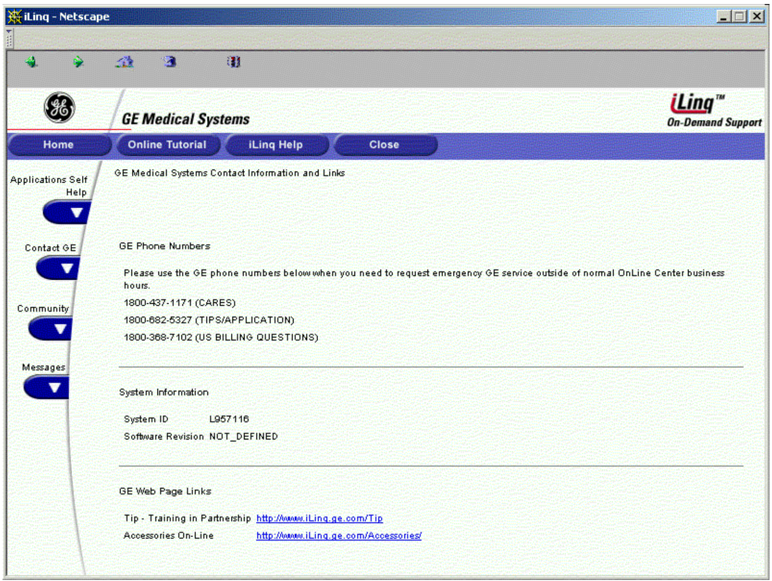
Figure 6-8. iLinq Contact GE Home Page

NOTE: Submitter and Phone Number information is recognized via the System Information located on the Contact GE page.

When you send information to GE, iLinq also sends relevant information, such as images, exam information and system logs, directly to the OnLine Center database.

GE Telephone Support Information Page

To view a list of US and Canada GE telephone numbers for GE CARES, Applications, and Accessories or to view your Ultrasound system information, or to link to other GE web sites, press the ***GE Phone Numbers*** link from the Contact GE page.


iLinq - Netscape
GE Medical Systems
iLinq™
On-Demand Support
Home
Online Tutorial
iLinq Help
Close
Applications Self Help
Contact GE
Community
Messages

GE Medical Systems Contact Information and Links

GE Phone Numbers

Please use the GE phone numbers below when you need to request emergency GE service outside of normal OnLine Center business hours.

1800-437-1171 (CARES)
1800-682-5327 (TIPS/APPLICATION)
1800-368-7102 (US BILLING QUESTIONS)

System Information

System ID L957116
Software Revision NOT_DEFINED

GE Web Page Links

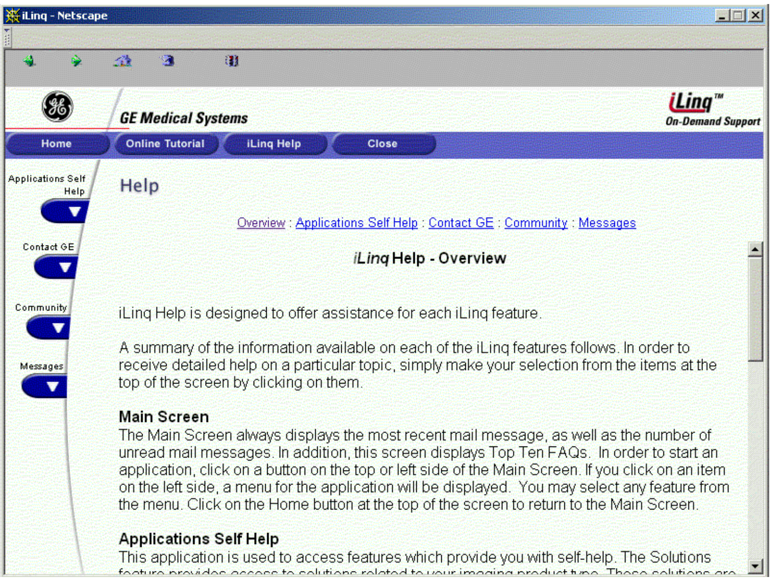
Tip - Training in Partnership http://www.iLing.ge.com/Tip
Accessories On-Line http://www.iLing.ge.com/Accessories/

Figure 6-9. iLinq GE Information/Links Page

You are able to Contact GE via the Ultrasound system’s internal modem connection. It may take a short amount of time for this connection to be made. Please be patient.

iLinq Online Help

To get additional information about how to use iLinq, press the Help link at the left side of any iLinq screen:


iLinq - Netscape
GE Medical Systems
iLinq™
On-Demand Support
Home
Online Tutorial
iLinq Help
Close
Applications Self Help
Contact GE
Community
Messages

Help

Overview : Applications Self Help : Contact GE : Community : Messages

iLinq Help - Overview

iLinq Help is designed to offer assistance for each iLinq feature.

A summary of the information available on each of the iLinq features follows. In order to receive detailed help on a particular topic, simply make your selection from the items at the top of the screen by clicking on them.

Main Screen
The Main Screen always displays the most recent mail message, as well as the number of unread mail messages. In addition, this screen displays Top Ten FAQs. In order to start an application, click on a button on the top or left side of the Main Screen. If you click on an item on the left side, a menu for the application will be displayed. You may select any feature from the menu. Click on the Home button at the top of the screen to return to the Main Screen.

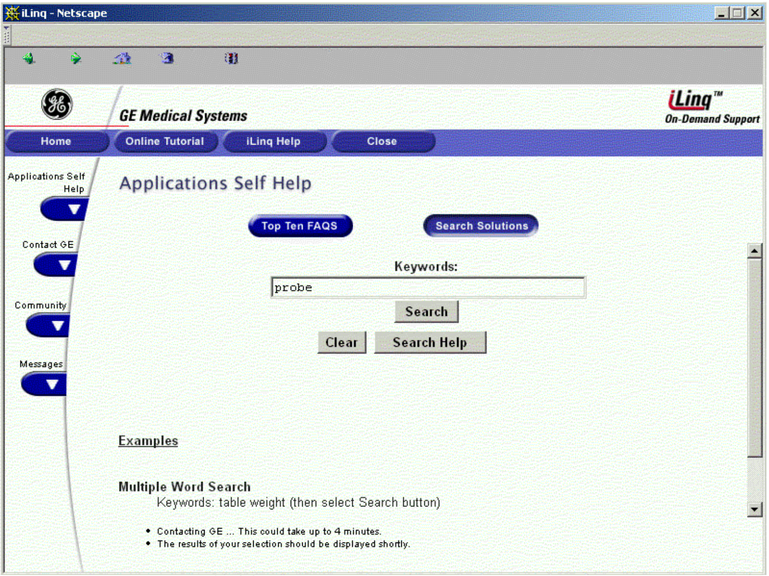
Applications Self Help
This application is used to access features which provide you with self-help. The Solutions feature provides access to solutions related to your imaging product type. These solutions are

Figure 6-10. iLinq Help Page

To return to the iLinq Home Page, press the ***Main Screen*** link.

Applications Home Page

To get GE Application support, press the ***Applications*** link at the left side of the iLinq Home Page:


iLinq - Netscape
GE Medical Systems
iLinq™
On-Demand Support
Home
Online Tutorial
iLinq Help
Close
Applications Self Help
Contact GE
Community
Messages
Applications Self Help
Top Ten FAQS
Search Solutions
Search
Clear
Search Help
Examples

Keywords: probe

Multiple Word Search

Keywords: table weight (then select Search button)

- Contacting GE ... This could take up to 4 minutes.
- The results of your selection should be displayed shortly.

Figure 6-11. iLinq Applications Home Page

The first Applications page lets you search the Frequently Asked Question database, based on the keyword(s) you type in the Keywords box. After you type in the topic to search for, press the ***Search*** key.

To perform a new search, press ***Clear***, then type in the keyword(s) for the new search.

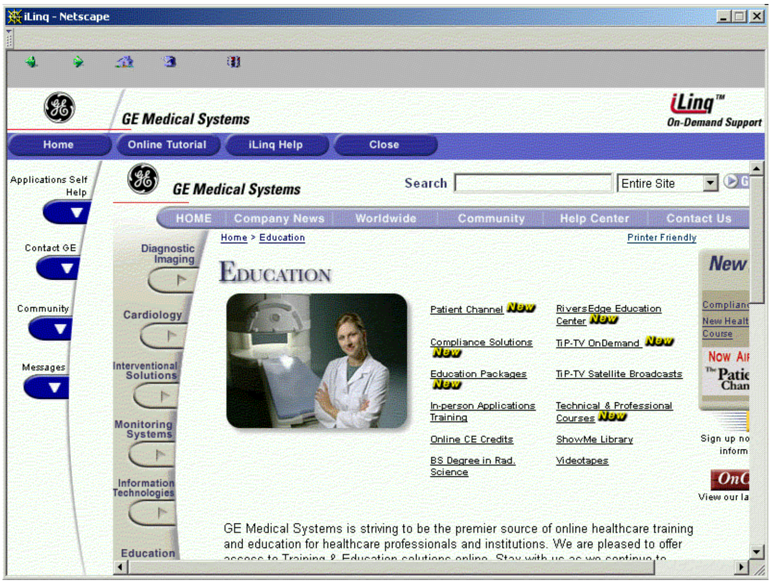
Applications Top 10 Solutions Page

To view the ten most-asked-for solutions, press the ***Top 10 Solutions*** key at the top of the page:

You can also link to the GE TiP-TV and GE Accessories web pages from this page.

GE TiP-TV Page

Here is the GE TiP web page:

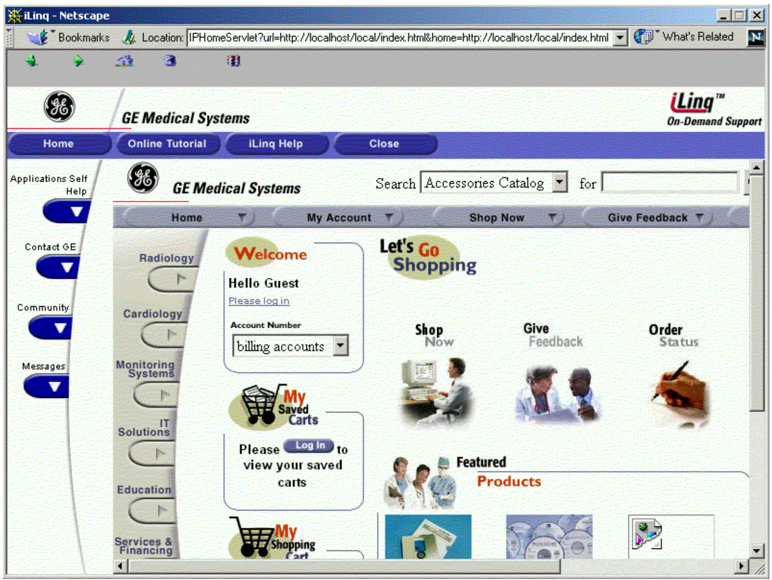

iLinq - Netscape
GE Medical Systems
iLinq™
On-Demand Support
Home
Online Tutorial
iLinq Help
Close
Applications Self Help
Contact GE
Community
Messages
GE Medical Systems
Search
Entire Site
HOME
Company News
Worldwide
Community
Help Center
Contact Us
Diagnostic Imaging
Cardiology
Interventional Solutions
Monitoring Systems
Information Technologies
Education
Home > Education
Printer Friendly
EDUCATION
Patient Channel New
RiversEdge Education Center New
Compliance Solutions New
TiP-TV OnDemand New
Education Packages New
TiP-TV Satellite Broadcasts
In-person Applications Training
Technical & Professional Courses New
Online CE Credits
ShowMe Library
BS Degree in Rad. Science
Videotapes
New
Complian
New Healt
Course
Now Air
Patie
Chan
Sign up no
inform
OnC
View our la

GE Medical Systems is striving to be the premier source of online healthcare training and education for healthcare professionals and institutions. We are pleased to offer access to Training & Education solutions online. Stay with us as we continue to

Figure 6-12. iLinq TiP-TV Page

GE Accessories Page

Here is the GE Accessories web page:



iLinq - Netscape

Location: IPHomeServlet?url=http://localhost/local/index.html&home=http://localhost/local/index.html

Search Accessories Catalog for

Hello Guest

Please log in

Account Number billing accounts

Please Log In to view your saved carts

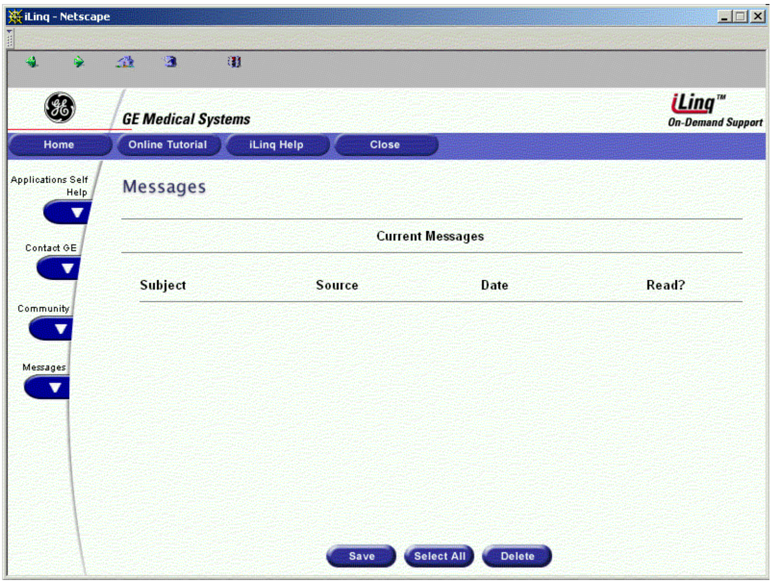
Bookmarks
What's Related
GE Medical Systems
iLinq™
On-Demand Support
Home
Online Tutorial
iLinq Help
Close
Applications Self Help
Contact GE
Community
Messages
GE Medical Systems
Home
My Account
Shop Now
Give Feedback
Radiology
Cardiology
Monitoring Systems
IT Solutions
Education
Services & Financing
Welcome
My Saved Carts
My Shopping Cart
Let's Go Shopping
Shop Now
Give Feedback
Order Status
Featured Products

Figure 6-13. iLinq GE Applications Page

To return to the iLinq Home Page, press the ***Main Screen*** link.

Get Mail Messages Page

To view GE email correspondence, press the ***Get Mail Messages*** link at the left side of the iLinq Home Page:


iLinq - Netscape
GE Medical Systems
iLinq™
On-Demand Support
Home
Online Tutorial
iLinq Help
Close
Applications Self Help
Contact GE
Community
Messages
Save
Select All
Delete

Messages

Current Messages

Subject	Source	Date	Read?

Figure 6-14. iLinq Get Mail Messages Home Page

Current email messages are displayed at the bottom of the page. To save an email message, press the ***Save*** key at the bottom of the page. To select all messages at one time, press the ***Select All*** key at the bottom of the page. To delete an email message (or all email messages if you have selected all of the email mesages), press the ***Delete*** key at the bottom of the page.

Saved Mail Messages Page

To review a saved email message, press the ***Saved Mail*** link at the left side of the page, then select the email message to view it at the bottom of the page.

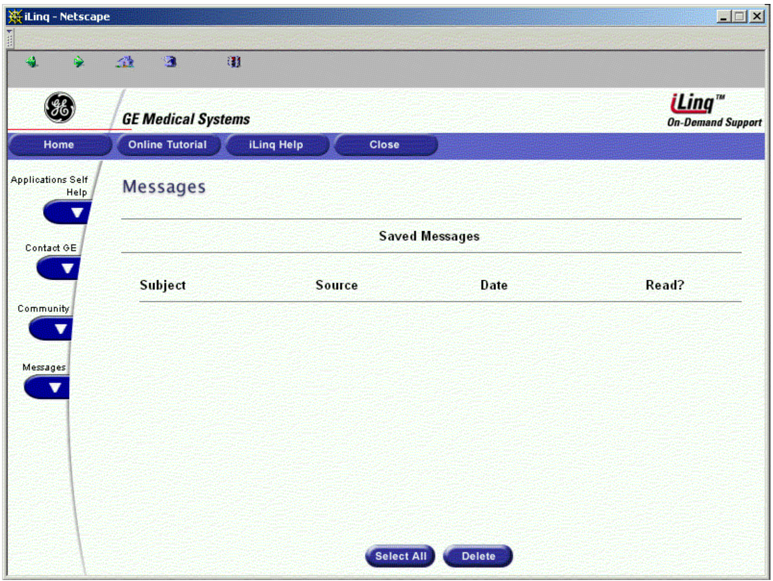

iLinq - Netscape
GE Medical Systems
iLinq™
On-Demand Support
Home
Online Tutorial
iLinq Help
Close
Applications Self Help
Contact GE
Community
Messages
Messages
Saved Messages
Subject
Source
Date
Read?
Select All
Delete

Figure 6-15. iLinq Saved Mail Page

Email notification displays on the left side of the page. To view this email, press the ***Get New Mail*** link.

Electronic Documentation

Documentation Distribution

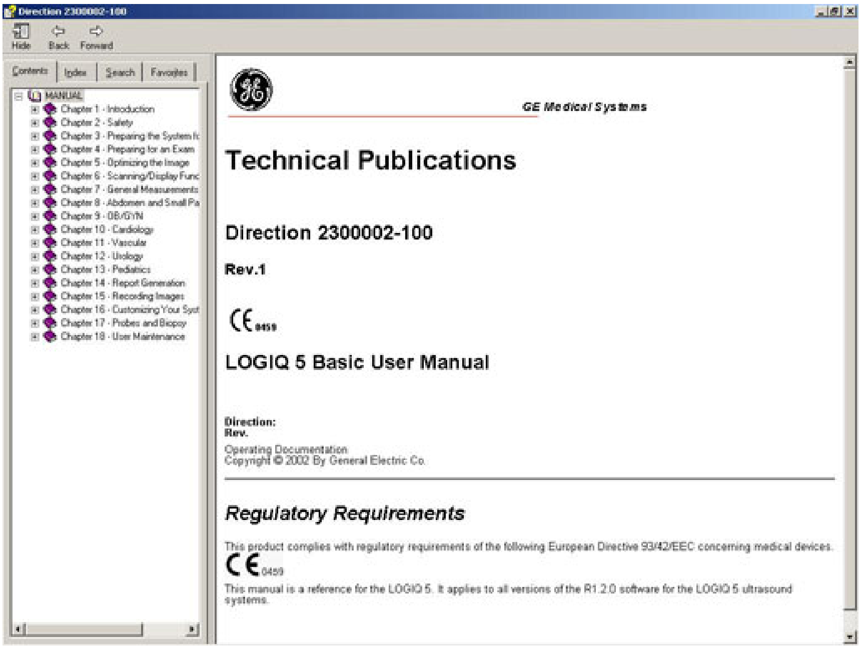
Documentation is being provided via:

- Clinical Release Notes (supplied on paper)
- Quick Guide (supplied on paper)
- 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
  - 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.


Direction 2300002-100
Hide
Back
Forward
Contents
Index
Search
Favorites
MANUAL
Chapter 1 - Introduction
Chapter 2 - Safety
Chapter 3 - Preparing the System fc
Chapter 4 - Preparing for an Exam
Chapter 5 - Optimizing the Image
Chapter 6 - Scanning/Display Func
Chapter 7 - General Measurements
Chapter 8 - Abdomen and Small Pa
Chapter 9 - OB/GYN
Chapter 10 - Cardiology
Chapter 11 - Vascular
Chapter 12 - Urology
Chapter 13 - Pediatrics
Chapter 14 - Report Generation
Chapter 15 - Recording Images
Chapter 16 - Customizing Your Syst
Chapter 17 - Probes and Biopsy
Chapter 18 - User Maintenance
GE Medical Systems

Technical Publications

Direction 2300002-100

Rev.1

LOGIQ 5 Basic User Manual

Direction:
Rev.

Operating Documentation
Copyright © 2002 By General Electric Co.

Regulatory Requirements

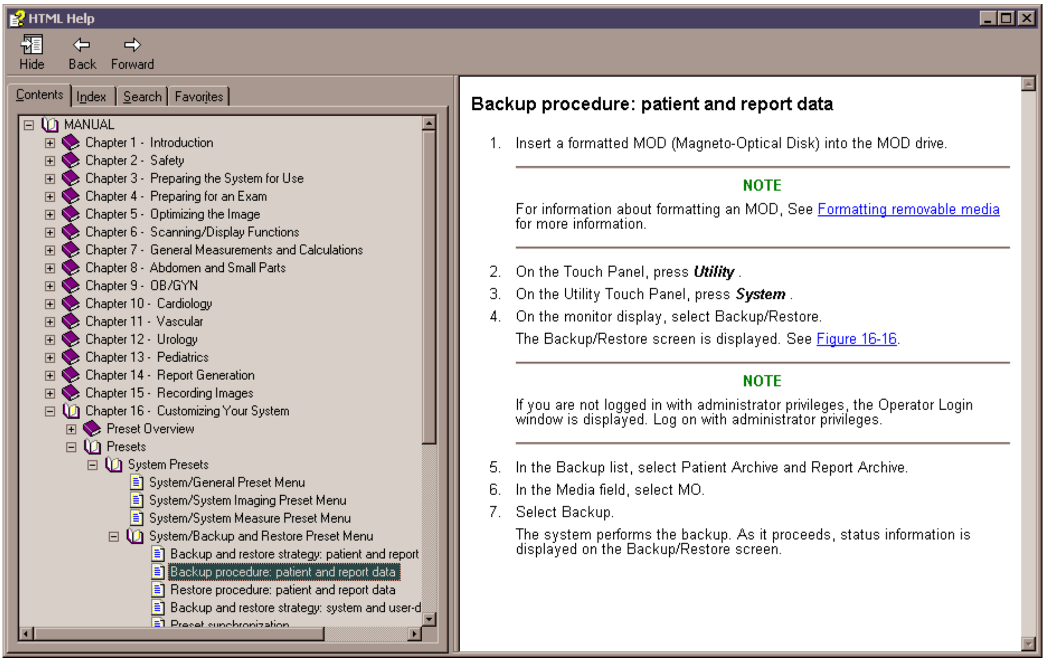
This product complies with regulatory requirements of the following European Directive 93/42/EEC concerning medical devices.

This manual is a reference for the LOGIQ 5. It applies to all versions of the R1.2.0 software for the LOGIQ 5 ultrasound systems.

Figure 6-16. 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.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
MANUAL
Chapter 1 - Introduction
Chapter 2 - Safety
Chapter 3 - Preparing the System for Use
Chapter 4 - Preparing for an Exam
Chapter 5 - Optimizing the Image
Chapter 6 - Scanning/Display Functions
Chapter 7 - General Measurements and Calculations
Chapter 8 - Abdomen and Small Parts
Chapter 9 - OB/GYN
Chapter 10 - Cardiology
Chapter 11 - Vascular
Chapter 12 - Urology
Chapter 13 - Pediatrics
Chapter 14 - Report Generation
Chapter 15 - Recording Images
Chapter 16 - Customizing Your System
Preset Overview
Presets
System Presets
System/General Preset Menu
System/System Imaging Preset Menu
System/System Measure Preset Menu
System/Backup and Restore Preset Menu
Backup and restore strategy: patient and report
Backup procedure: patient and report data
Restore procedure: patient and report data
Backup and restore strategy: system and user-d
Preset synchronization

Backup procedure: patient and report data

1. Insert a formatted MOD (Magneto-Optical Disk) into the MOD drive.

NOTE

For information about formatting an MOD, See Formatting removable media for more information.

2. On the Touch Panel, press ***Utility*** .
3. On the Utility Touch Panel, press ***System*** .
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed. See Figure 16-16.

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 MO.
7. Select Backup.

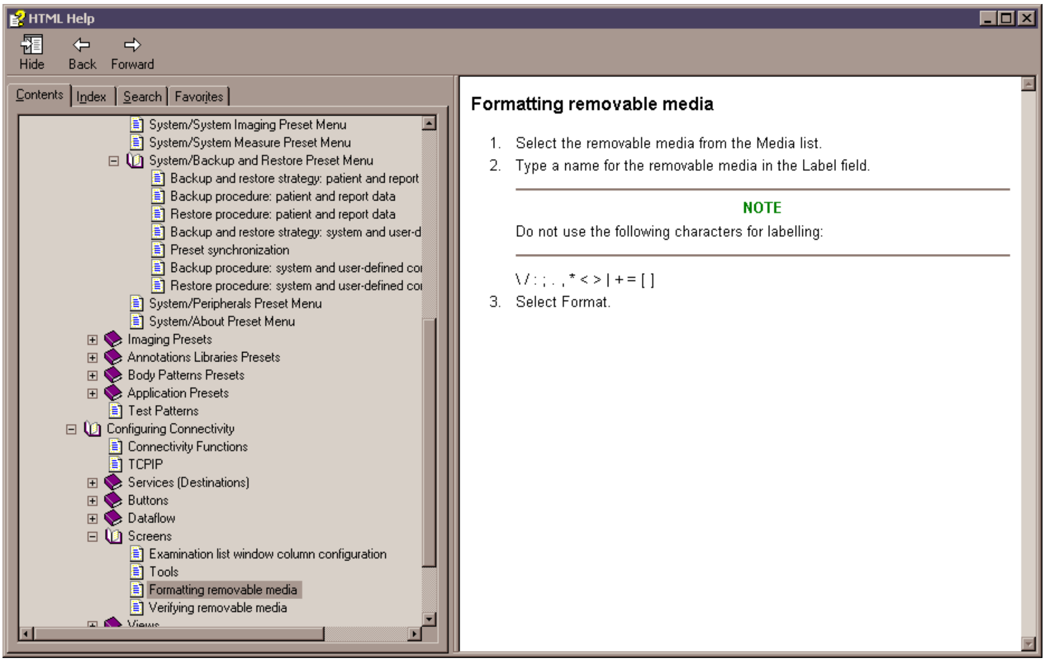
   The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.

Figure 6-17. 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.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
System/System Imaging Preset Menu
System/System Measure Preset Menu
System/Backup and Restore Preset Menu
Backup and restore strategy: patient and report
Backup procedure: patient and report data
Restore procedure: patient and report data
Backup and restore strategy: system and user-d
Preset synchronization
Backup procedure: system and user-defined co
Restore procedure: system and user-defined co
System/Peripherals Preset Menu
System/About Preset Menu
Imaging Presets
Annotations Libraries Presets
Body Patterns Presets
Application Presets
Test Patterns
Configuring Connectivity
Connectivity Functions
TCPIP
Services (Destinations)
Buttons
Dataflow
Screens
Examination list window column configuration
Tools
Formatting removable media
Verifying removable 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:

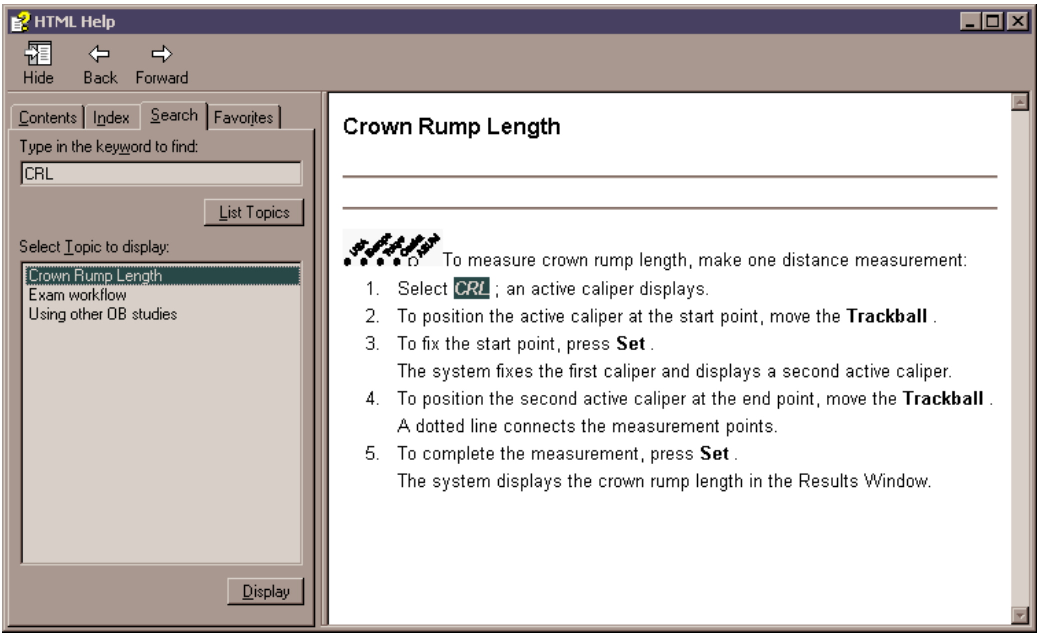
\ / : ; . , * < > | + = [ ]

3. Select Format.

Figure 6-18. 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.



Type in the keyword to find: CRL

Select Topic to display:

- Crown Rump Length
- Exam workflow
- Using other OB studies

Crown Rump Length

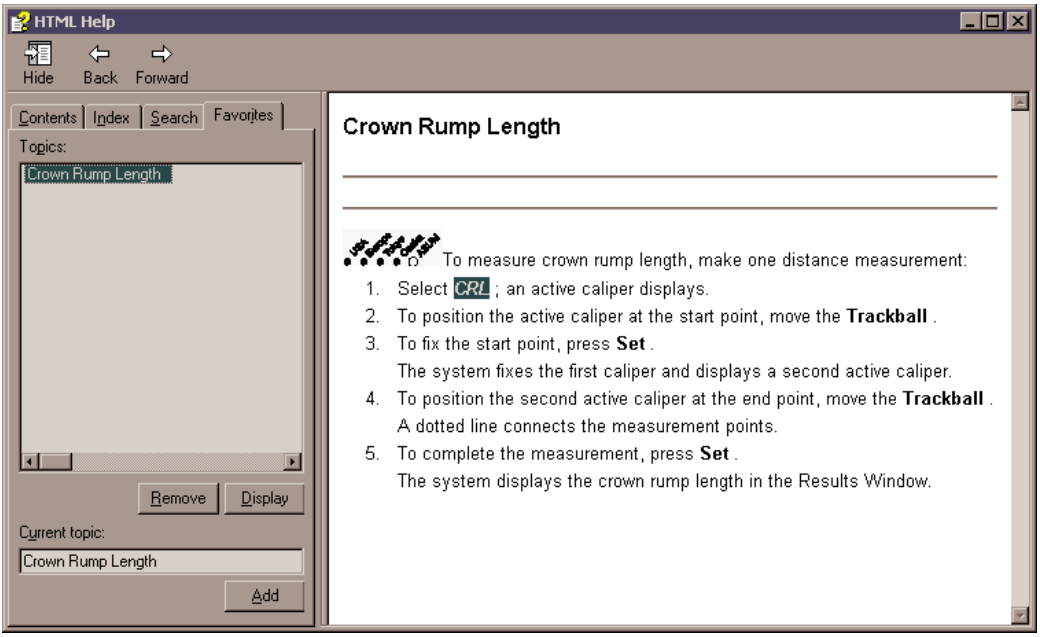
To measure crown rump length, make one distance measurement:

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.

Figure 6-19. 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.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
Topics:
Crown Rump Length
Remove
Display
Current topic:
Crown Rump Length
Add

Crown Rump Length

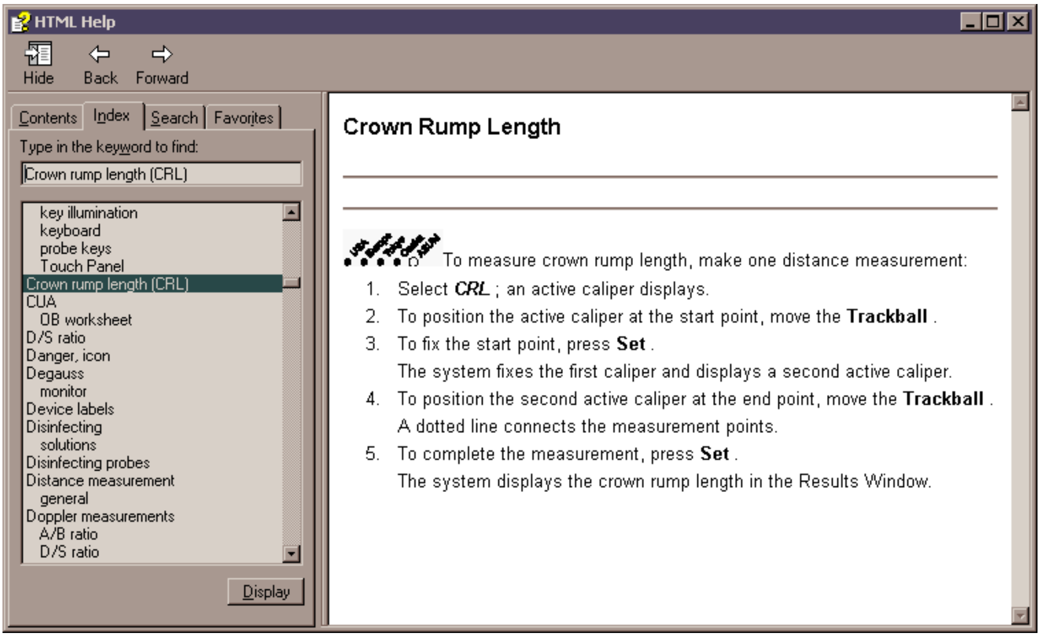
To measure crown rump length, make one distance measurement:

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.

Figure 6-20. 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.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
key illumination
keyboard
probe keys
Touch Panel
Crown rump length (CRL)
CUA
OB worksheet
D/S ratio
Danger, icon
Degauss
monitor
Device labels
Disinfecting
solutions
Disinfecting probes
Distance measurement
general
Doppler measurements
A/B ratio
D/S ratio
Display

Type in the keyword to find: Crown rump length (CRL)

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.

Figure 6-21. Index

Other Help Features

To hide the left side of the screen, press the Hide icon at the upper, left-hand portion of the screen. To view the left side of the screen again, press the Show icon at the upper, left-hand portion of the screen.

To size the Help window, position and hold down the cursor at the corner of the screen while moving the Trackball.

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

Exiting Online Help

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

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).

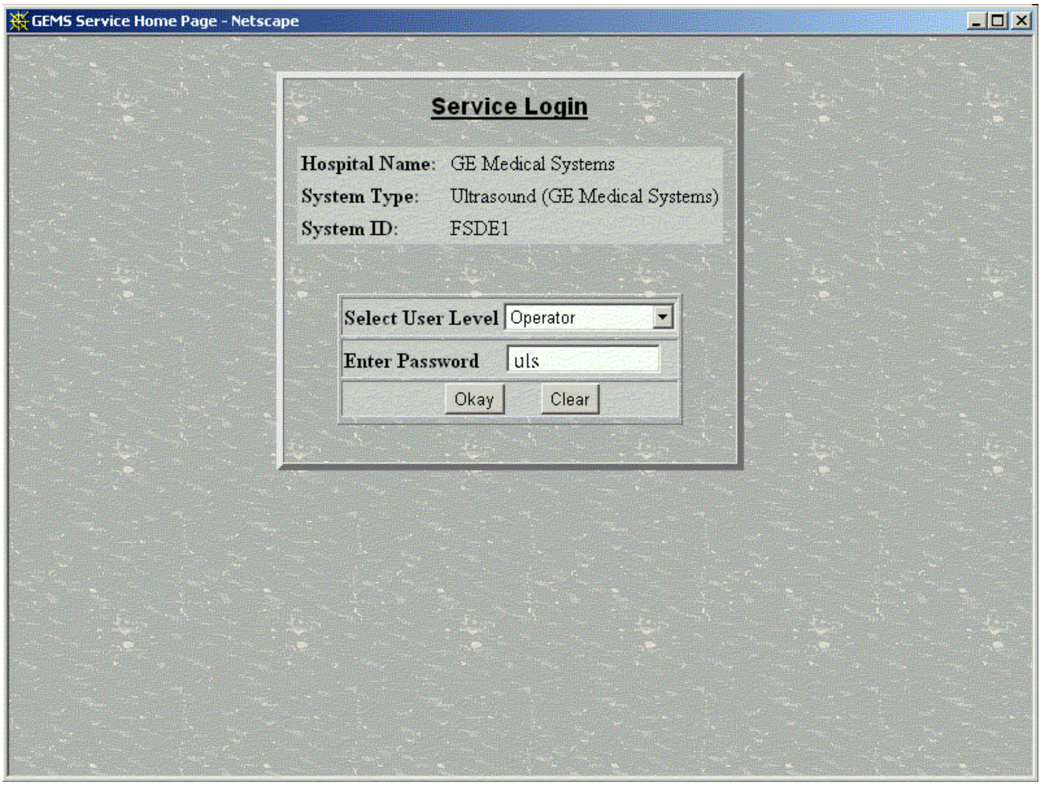
To close the window, click on the ‘X’ in the upper, right-hand corner of the browser window.

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.*

Accessing Documentation on the Ultrasound Scanner Via the CD-ROM

To access documentation via the CD-ROM,

1. Press the Wrench icon at the bottom of the display. Wait until the logon screen appears.
2. Logon as ‘Operator’ next to Select User Level. Enter the following password: ‘uls’. Press Okay.



Service Login

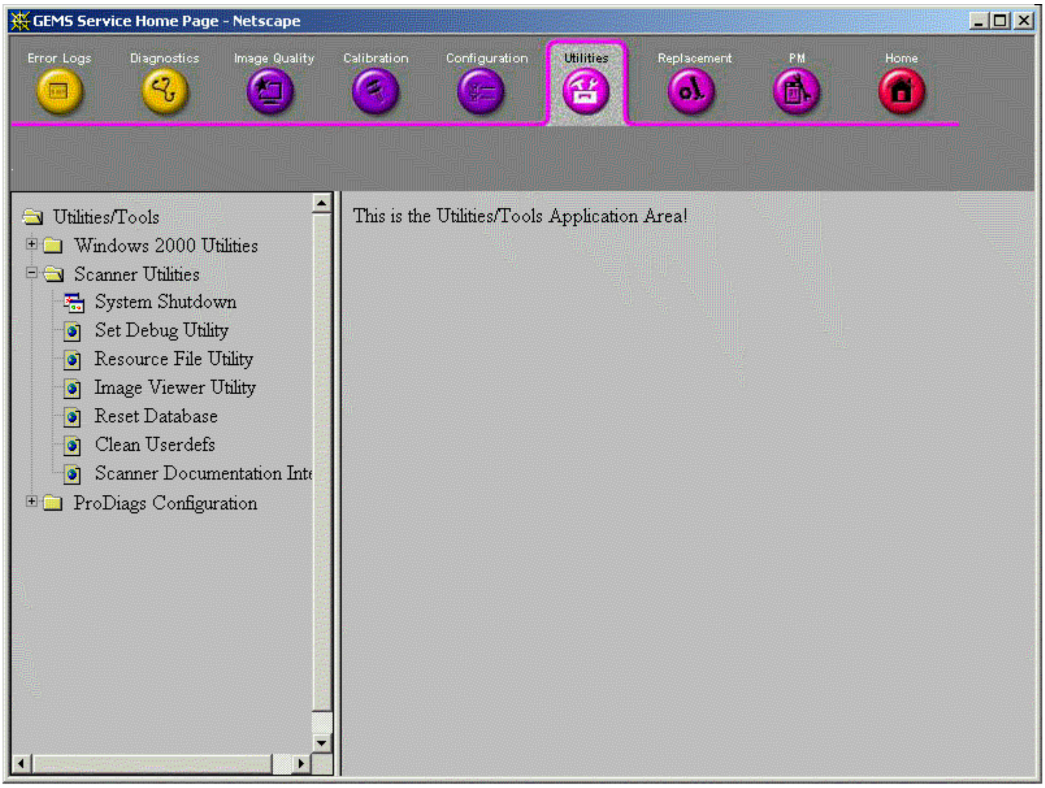
Hospital Name: GE Medical Systems
System Type: Ultrasound (GE Medical Systems)
System ID: FSDE1

Select User Level Operator
Enter Password uls

Figure 6-22. Operator Service Browser Login

Accessing Documentation on the Ultrasound Scanner Via the CD-ROM (continued)

3. Press Utilities.


GEMS Service Home Page - Netscape
Error Logs
Diagnostics
Image Quality
Calibration
Configuration
Utilities
Replacement
PM
Home
Utilities/Tools
Windows 2000 Utilities
Scanner Utilities
System Shutdown
Set Debug Utility
Resource File Utility
Image Viewer Utility
Reset Database
Clean Userdefs
Scanner Documentation Inte
ProDiags Configuration

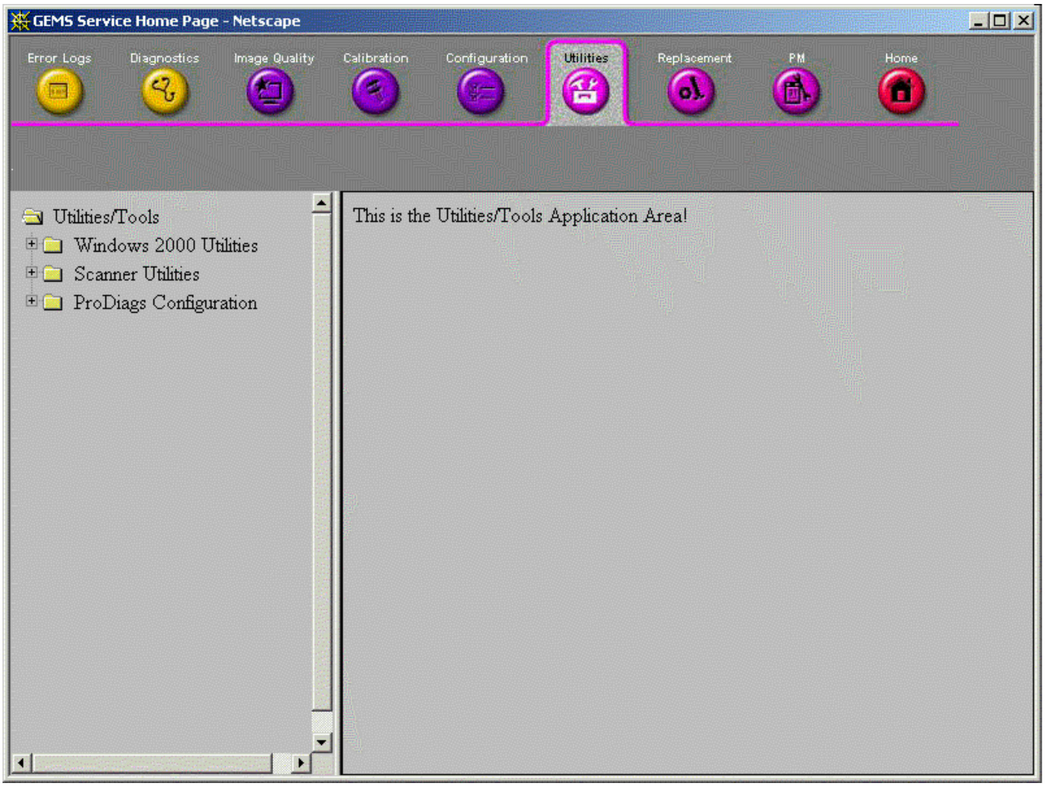
This is the Utilities/Tools Application Area!

Figure 6-23. Service Browser Home Page

4. Insert the CD-ROM.

Accessing Documentation on the Ultrasound Scanner Via the CD-ROM (continued)

5. Select Scanner Utilities.


GEMS Service Home Page - Netscape
Error Logs
Diagnostics
Image Quality
Calibration
Configuration
Utilities
Replacement
PM
Home
Utilities/Tools
Windows 2000 Utilities
Scanner Utilities
ProDiags Configuration

This is the Utilities/Tools Application Area!

Figure 6-24. Scanner Utility Page

6. Select Scanner Documentation Interface.
7. Scroll to find the document and double click on it to open it.

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

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

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

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.

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

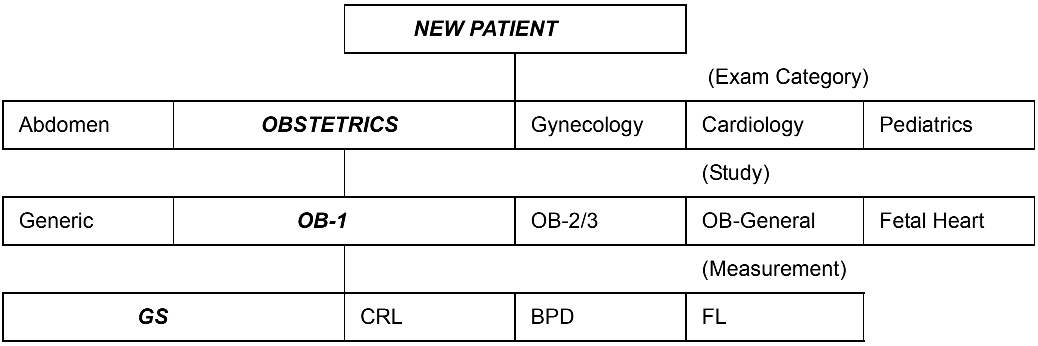
Exam workflow

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

- **Exam Category** – the highest level of an ultrasound exam. Categories include the following:
  - Abdomen
  - Obstetrics
  - Gynecology
  - Cardiology
  - Vascular
  - Urology
  - Small Parts
  - Pediatrics
- **Study** – a logical grouping of measurements. 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.


NEW PATIENT
(Exam Category)
Abdomen
OBSTETRICS
Gynecology
Cardiology
Pediatrics
(Study)
Generic
OB-1
OB-2/3
OB-General
Fetal Heart
(Measurement)
GS
CRL
BPD
FL

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

Location of Measurement Controls

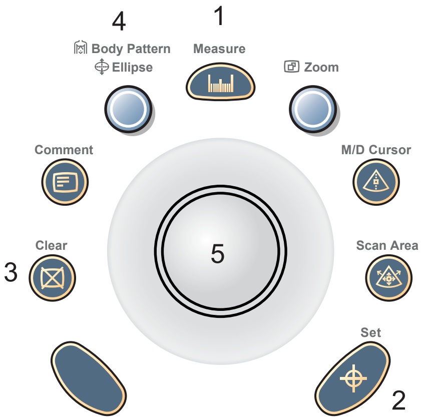


Figure 7-1. Locating Measurement Controls

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, activates the area/ellipse measurement function. During the ellipse adjustment, use to increase or decrease the size of the ellipse.
5. **Trackball**. Moves the measurement calipers, selects the measurement on the Summary Window, or selects items on the Touch Panel.

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.

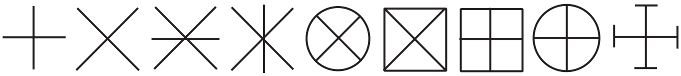


Figure 7-2. Fixed Caliper Symbols

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, CINE, or VCR playback. After you select an exam category, the available calculations are displayed on the Touch Panel.

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").

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 category

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

1. To display studies for the current category, press **Measure**.
2. On the Touch Panel, select ***Exam Calcs***.
3. On the Touch Panel, select ***Exam Category***.

   The system lists exam categories.
4. Select the category that has the calculation you want to make.

   The system displays the Touch Panel for the selected exam category.
5. Select the study and the desired measurement.
6. After you complete the measurement, to return to the original exam category, repeat steps 1–4.

NOTE: *The measure **WILL NOT** appear on the original exam category.*

Specifying measurement and display options

The Options tab allows you to specify the following measurement and display options:

- Whether to display the Results Window and Summary Window
- The cursor size
- The number of heart rate cycles to use to calculate heart rate
- Where to position the Results Window on the monitor display
- Choose whether the Doppler waveform is automatically or manually traced.

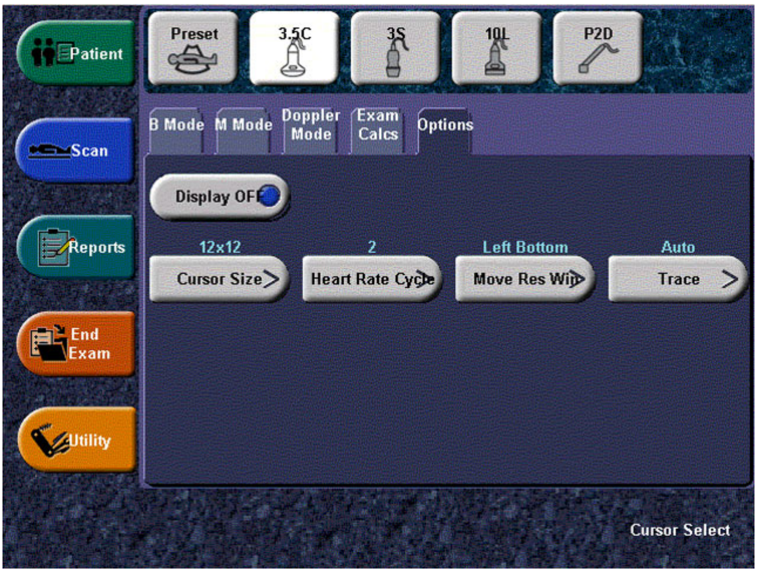

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Display OFF
12x12
Cursor Size
2
Heart Rate Cycle
Left Bottom
Move Res Win
Auto
Trace
Cursor Select

Figure 7-3. Measurement and Display Options

Specifying measurement and display options (continued)

Displaying the Results and Summary Windows

Typically, the Results Window and Summary Window are shown on the monitor display. If you want, you can remove them from the display. To remove them, select the ***Options*** tab, and then select ***Display Off***. To re-display them, select ***Display Off***.

NOTE: Display Off removes both the Results Window and Summary Window from the monitor display.

Selecting cursor size

To select the cursor size, select the ***Options*** tab, and then select ***Cursor Size***. The system displays the following choices:

- 12 x 12
- 9 x 9

Select the size you want.

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, select the ***Options*** 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.

Moving the Results Window

You may want to change where the Results Window is positioned on the monitor display. To move the Results Window, select the ***Options*** tab, then select ***Move Res Win***. The system displays the following choices:

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

Select the position you want.

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 Touch Panel.

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

When you receive your LOGIQ 5 system, the studies and measurements are organized for typical work flows. If you want, you can change this set up. You can specify which studies are in each exam category, and which measurements and calculations are in each study. You can change the measurements that are available on the Touch Panel. The LOGIQ 5 allows you to quickly and easily set up your system so that you can work most efficiently.

This section describes how to:

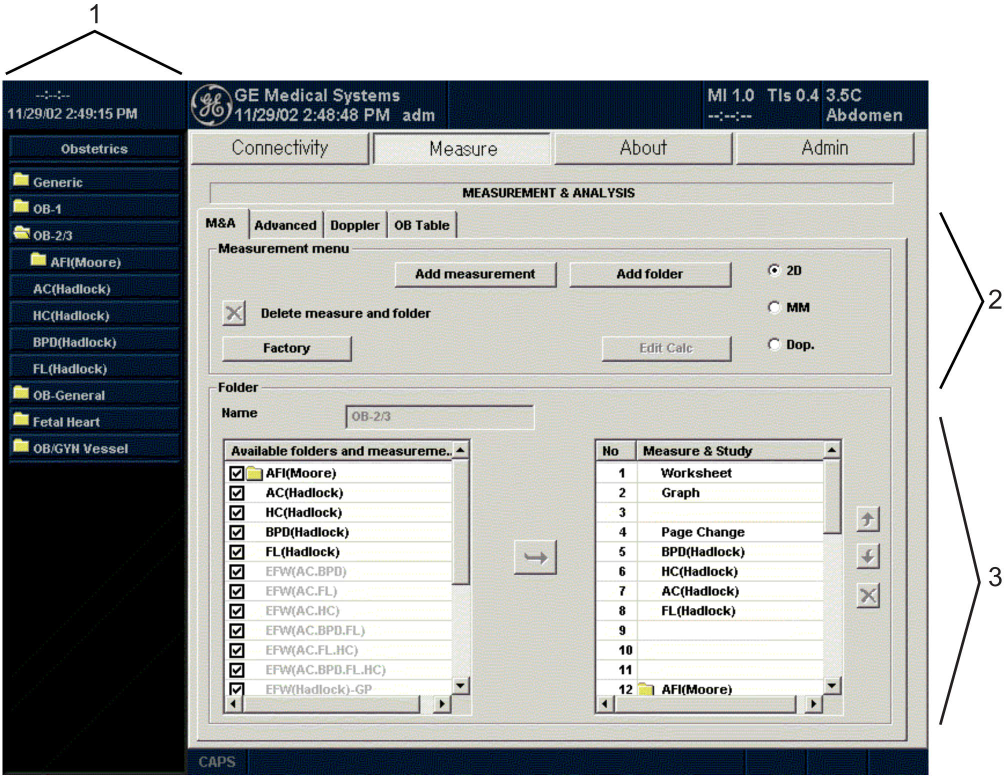
- Change a study to include different measurements
- Add a new study or measurement
- Remove a study from an exam category
- Change measurement parameters
- Create a measurement formula to correctly handle unit conversions
- Edit user-defined calculations
- Define application-specific measurement parameters
- Specify the default manual calc measurements for a selected study or folder

Starting Study and Measurement SetUp

You make changes to studies and measurements in the Measurement & Analysis screen. To open the screen:

1. On the Touch Panel, select ***Utility***.
2. On the Touch Panel, select ***Measure***.
3. On the monitor display, select the *M & A* tab.

   The system displays the Measurement & Analysis screen on the monitor display.


1
2
3
--:--:--
11/29/02 2:49:15 PM
Obstetrics
Generic
OB-1
OB-2/3
AFI(Moore)
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
OB-General
Fetal Heart
OB/GYN Vessel
GE Medical Systems
11/29/02 2:48:48 PM adm
MI 1.0 TIs 0.4 3.5C
--:--:-- Abdomen
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder
CAPS

● 2D
○ MM
○ Dop.

Name: OB-2/3

Available folders and measureme..
☑ AFI(Moore)
☑ AC(Hadlock)
☑ HC(Hadlock)
☑ BPD(Hadlock)
☑ FL(Hadlock)
☑ EFW(AC.BPD)
☑ EFW(AC.FL)
☑ EFW(AC.HC)
☑ EFW(AC.BPD.FL)
☑ EFW(AC.FL.HC)
☑ EFW(AC.BPD.FL.HC)
☑ EFW(Hadlock)-GP

No	Measure & Study
1	Worksheet
2	Graph
3	
4	Page Change
5	BPD(Hadlock)
6	HC(Hadlock)
7	AC(Hadlock)
8	FL(Hadlock)
9	
10	
11	
12	AFI(Moore)

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.

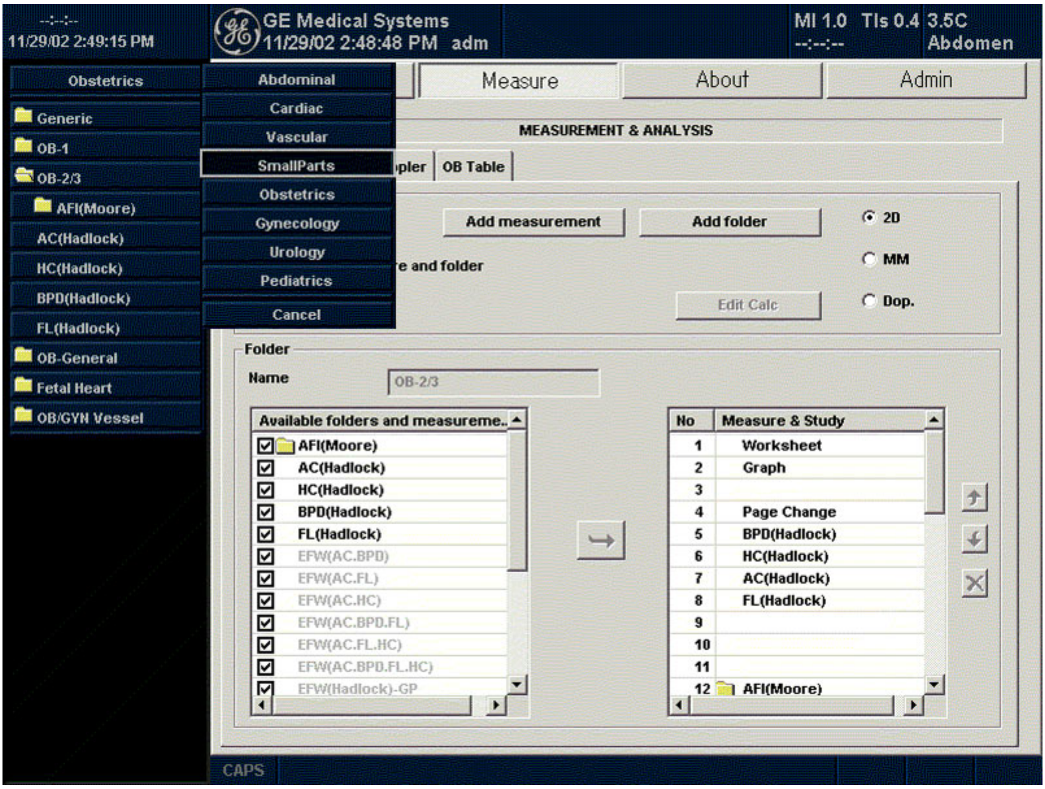
Selecting an exam category

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.



--:--:--
11/29/02 2:49:15 PM
GE Medical Systems
11/29/02 2:48:48 PM adm
MI 1.0 TIs 0.4 3.5C
--:--:-- Abdomen
Obstetrics
Generic
OB-1
OB-2/3
AFI(Moore)
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
OB-General
Fetal Heart
OB/GYN Vessel
Abdominal
Cardiac
Vascular
SmallParts
Obstetrics
Gynecology
Urology
Pediatrics
Cancel
Measure
About
Admin
MEASUREMENT & ANALYSIS
pler
OB Table
Add measurement
Add folder
e and folder
Edit Calc
2D
MM
Dop.
Folder
Name
OB-2/3
Available folders and measureme..
AFI(Moore)
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
EFW(AC.BPD)
EFW(AC.FL)
EFW(AC.HC)
EFW(AC.BPD.FL)
EFW(AC.FL.HC)
EFW(AC.BPD.FL.HC)
EFW(Hadlock)-GP
No
Measure & Study
1 Worksheet
2 Graph
3
4 Page Change
5 BPD(Hadlock)
6 HC(Hadlock)
7 AC(Hadlock)
8 FL(Hadlock)
9
10
11
12 AFI(Moore)
CAPS

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.

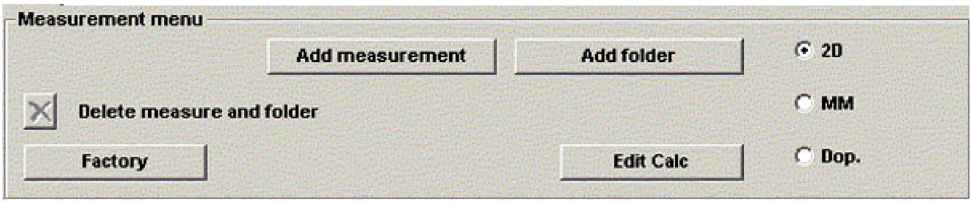
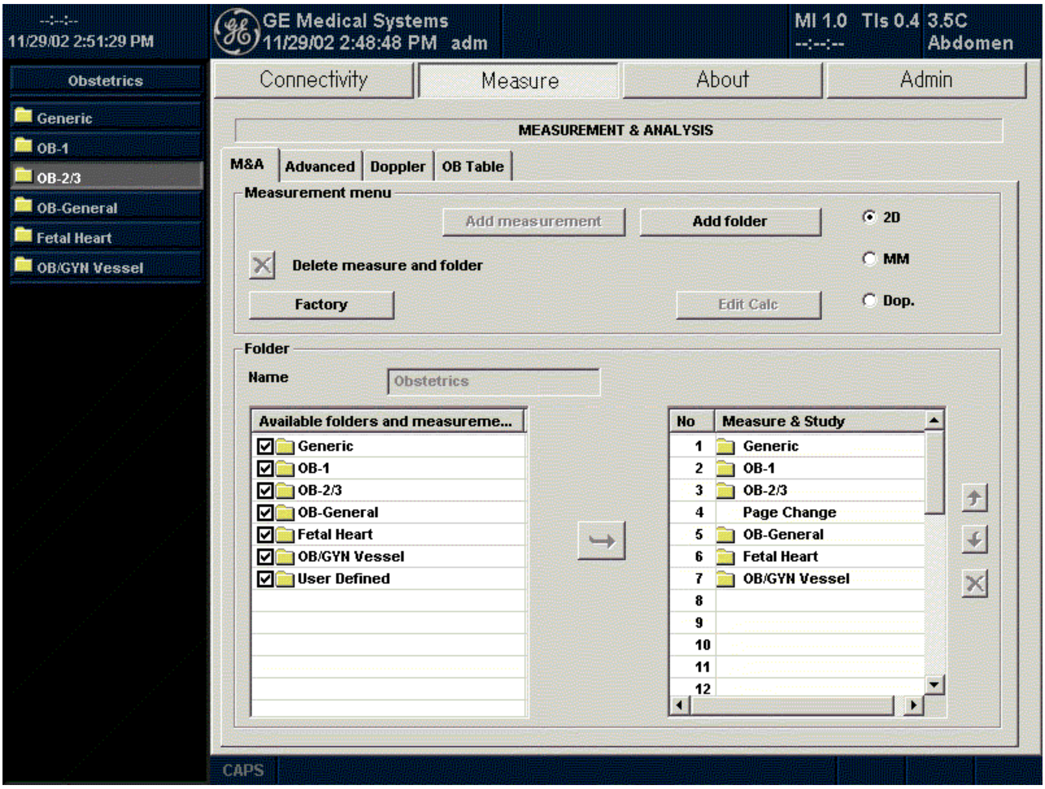

Measurement menu
Add measurement
Add folder
● 2D
☒ Delete measure and folder
○ MM
Factory
Edit Calc
○ Dop.

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 Touch Panel. The illustration below shows the highest level of the Obstetrics exam category, with the OB studies listed.


--:--:--
11/29/02 2:51:29 PM
GE Medical Systems
11/29/02 2:48:48 PM adm
MI 1.0 TIs 0.4 3.5C
--:--:--
Abdomen
Obstetrics
Generic
OB-1
OB-2/3
OB-General
Fetal Heart
OB/GYN Vessel
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
● 2D
○ MM
○ Dop.
Folder
CAPS

Name: Obstetrics

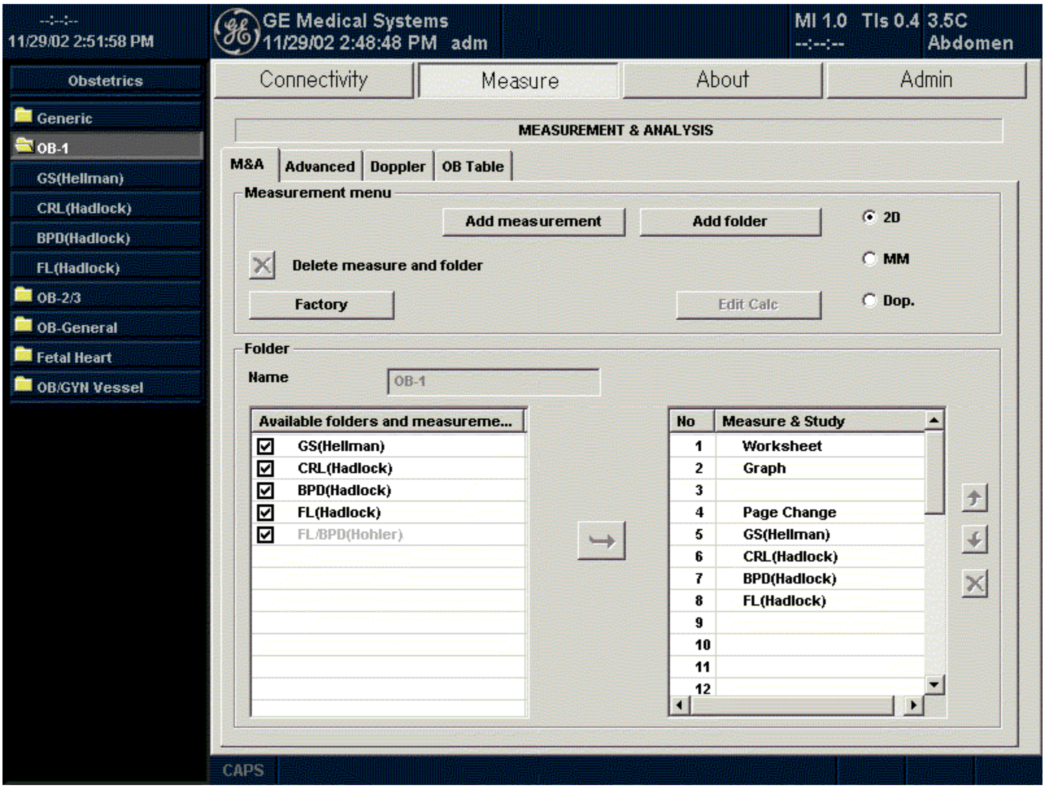
Available folders and measureme...
☑ Generic
☑ OB-1
☑ OB-2/3
☑ OB-General
☑ Fetal Heart
☑ OB/GYN Vessel
☑ User Defined

No	Measure & Study
1	Generic
2	OB-1
3	OB-2/3
4	Page Change
5	OB-General
6	Fetal Heart
7	OB/GYN Vessel
8	
9	
10	
11	
12	

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.


--:--:--
11/29/02 2:51:58 PM
GE Medical Systems
11/29/02 2:48:48 PM adm
MI 1.0 TIs 0.4 3.5C
--:--:--
Abdomen
Obstetrics
Generic
OB-1
GS(Hellman)
CRL(Hadlock)
BPD(Hadlock)
FL(Hadlock)
OB-2/3
OB-General
Fetal Heart
OB/GYN Vessel
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
● 2D
○ MM
○ Dop.
Folder
CAPS

Name: OB-1

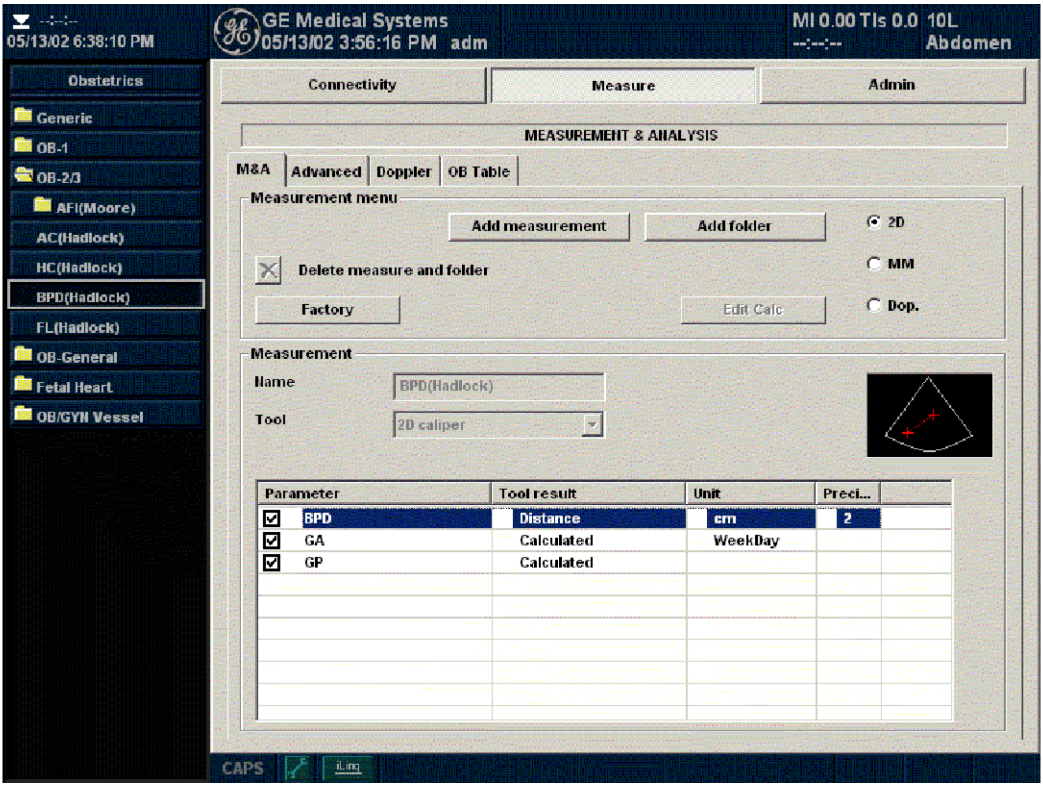
Available folders and measureme...
☑ GS(Hellman)
☑ CRL(Hadlock)
☑ BPD(Hadlock)
☑ FL(Hadlock)
☑ FL/BPD(Hohler)

No	Measure & Study
1	Worksheet
2	Graph
3	
4	Page Change
5	GS(Hellman)
6	CRL(Hadlock)
7	BPD(Hadlock)
8	FL(Hadlock)
9	
10	
11	
12	

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

Selecting a study or measurement (continued)

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


--:--:--
05/13/02 6:38:10 PM
GE Medical Systems
05/13/02 3:56:16 PM adm
MI 0.00 TIs 0.0 10L
--:--:-- Abdomen
Obstetrics
Generic
OB-1
OB-2/3
AFI(Moore)
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
OB-General
Fetal Heart
OB/GYN Vessel
Connectivity
Measure
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Measurement
CAPS
iLing

● 2D
○ MM
○ Dop.

Name: BPD(Hadlock)

Tool: 2D caliper

	Parameter	Tool result	Unit	Preci...
☑	BPD	Distance	cm	2
☑	GA	Calculated	WeekDay	
☑	GP	Calculated		

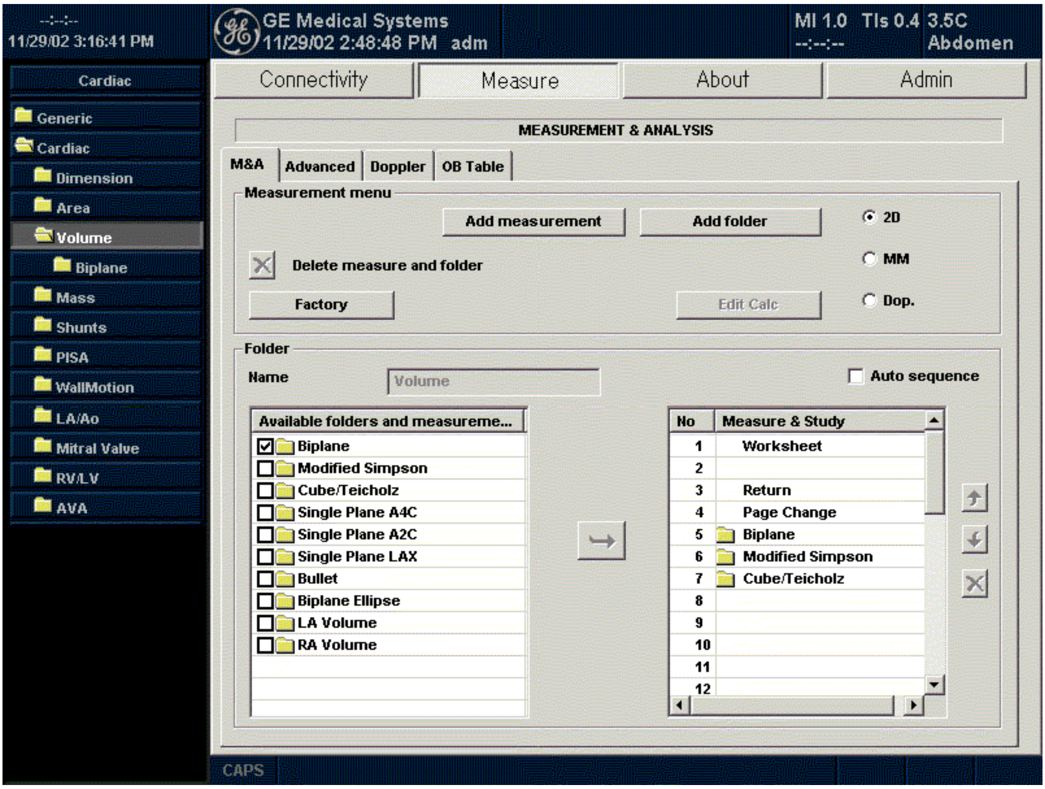
Figure 7-9. Selection Menu: BPD Measurement

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.+*


--:--:--
11/29/02 3:16:41 PM
GE Medical Systems
11/29/02 2:48:48 PM adm
MI 1.0 TIs 0.4 3.5C
--:--:-- Abdomen
Cardiac
Generic
Cardiac
Dimension
Area
Volume
Biplane
Mass
Shunts
PISA
WallMotion
LA/Ao
Mitral Valve
RV/LV
AVA
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder
CAPS

● 2D
○ MM
○ Dop.

Name: Volume

☐ Auto sequence

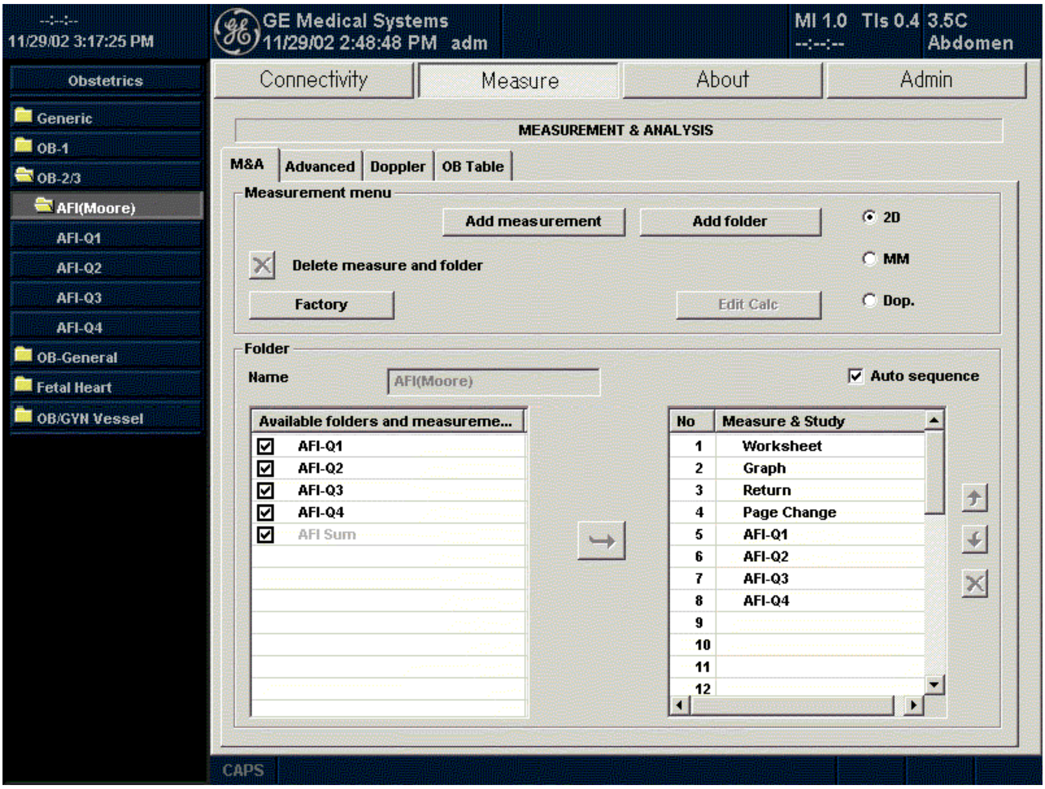
Available folders and measureme...
☑ Biplane
☐ Modified Simpson
☐ Cube/Teicholz
☐ Single Plane A4C
☐ Single Plane A2C
☐ Single Plane LAX
☐ Bullet
☐ Biplane Ellipse
☐ LA Volume
☐ RA Volume

No	Measure & Study
1	Worksheet
2	
3	Return
4	Page Change
5	Biplane
6	Modified Simpson
7	Cube/Teicholz
8	
9	
10	
11	
12	

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.


--:--:--
11/29/02 3:17:25 PM
GE Medical Systems
11/29/02 2:48:48 PM adm
MI 1.0 TIs 0.4 3.5C
--:--:-- Abdomen
Obstetrics
Generic
OB-1
OB-2/3
AFI(Moore)
AFI-Q1
AFI-Q2
AFI-Q3
AFI-Q4
OB-General
Fetal Heart
OB/GYN Vessel
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder
CAPS

● 2D
○ MM
○ Dop.

Name: AFI(Moore)

☑ Auto sequence

Available folders and measureme...	
☑	AFI-Q1
☑	AFI-Q2
☑	AFI-Q3
☑	AFI-Q4
☑	AFI Sum

No	Measure & Study
1	Worksheet
2	Graph
3	Return
4	Page Change
5	AFI-Q1
6	AFI-Q2
7	AFI-Q3
8	AFI-Q4
9	
10	
11	
12	

Figure 7-11. AFI Folder

Specifying Which Measurements Go in a Study or Folder

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

- **Available folders and measurements.** The left list contains all possible folders and measurements for the selected study or folder.
- **Measure & Study.** The right list has all folders and measurements currently selected for the study or folder. These are selected from the Available folders and measurements list. These are the folders and measurements you see when you are scanning and choose an exam category. This also defines where the folder or measurement is located on the Touch Panel, based on the number in this list.

Specifying Which Measurements Go in a Study or Folder (continued)

To add an item to the Measure & Study list:

1. In the Measure & Study list, move the **Trackball** to highlight where you want to put the item, and press **Set**.

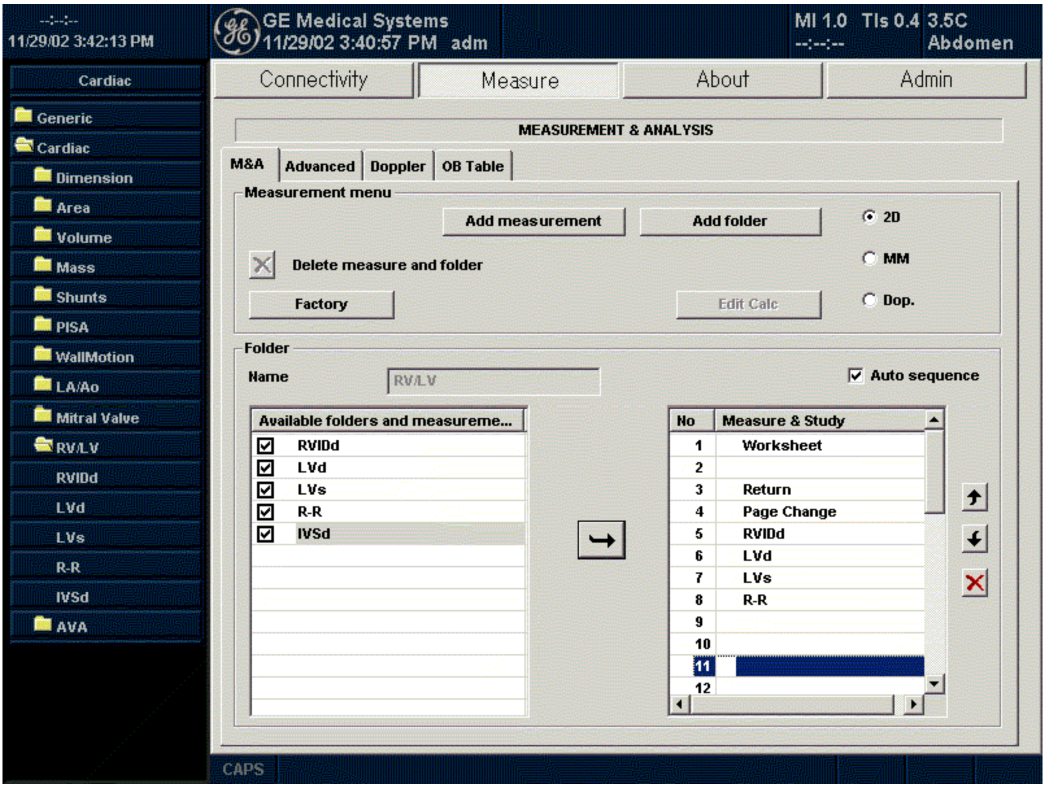
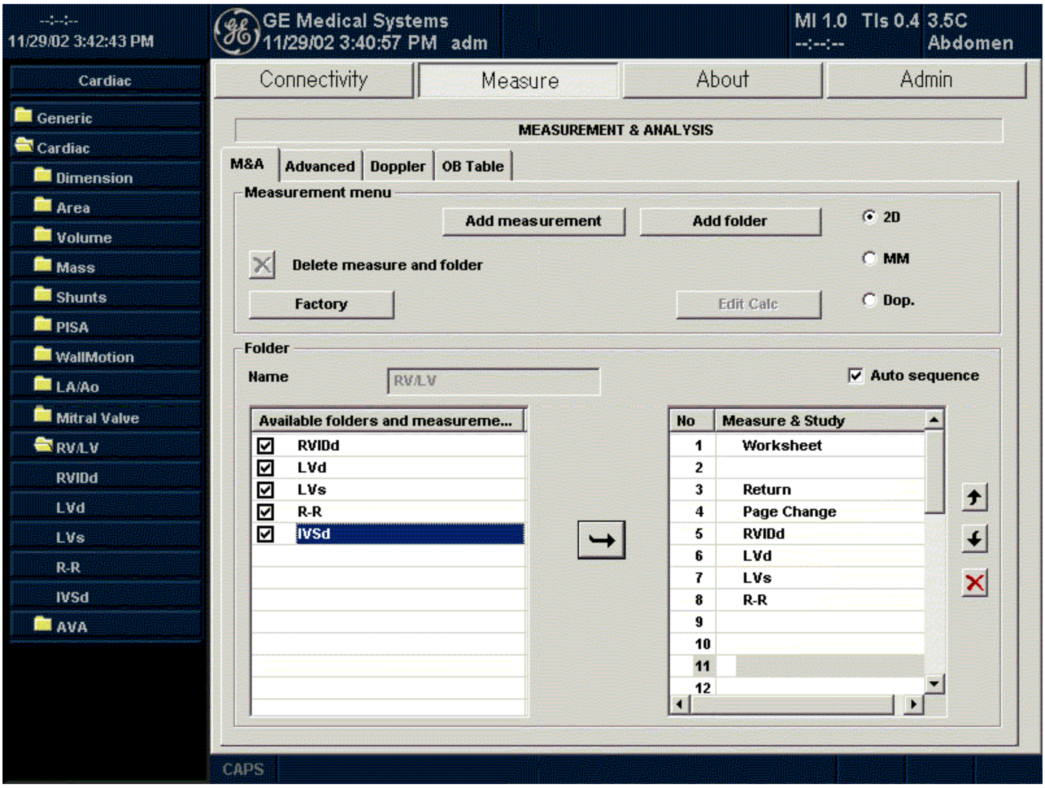

--:--:--
11/29/02 3:42:13 PM
GE Medical Systems
11/29/02 3:40:57 PM adm
MI 1.0 TIs 0.4 3.5C
--:--:-- Abdomen
Cardiac
Generic
Cardiac
Dimension
Area
Volume
Mass
Shunts
PISA
WallMotion
LA/Ao
Mitral Valve
RV/LV
RVIDd
LVd
LVs
R-R
IVSd
AVA
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
● 2D
○ MM
○ Dop.
Delete measure and folder
Factory
Edit Calc
Folder
Name
RV/LV
☑ Auto sequence
Available folders and measureme...
☑ RVIDd
☑ LVd
☑ LVs
☑ R-R
☑ IVSd
No
Measure & Study
1 Worksheet
2
3 Return
4 Page Change
5 RVIDd
6 LVd
7 LVs
8 R-R
9
10
11
12
CAPS

Figure 7-12. Measure & Study list: Select position

Specifying Which Measurements Go in a Study or Folder (continued)

2. Move the **Trackball** to highlight an item in the Available folders and measurements list, and press **Set**.


--:--:--
11/29/02 3:42:43 PM
GE Medical Systems
11/29/02 3:40:57 PM adm
MI 1.0 TIs 0.4 3.5C
--:--:--
Abdomen
Cardiac
Generic
Cardiac
Dimension
Area
Volume
Mass
Shunts
PISA
WallMotion
LA/Ao
Mitral Valve
RV/LV
RVIDd
LVd
LVs
R-R
IVSd
AVA
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
CAPS

● 2D
○ MM
○ Dop.

Folder

Name: RV/LV

☑ Auto sequence

Available folders and measureme...
☑ RVIDd
☑ LVd
☑ LVs
☑ R-R
☑ IVSd

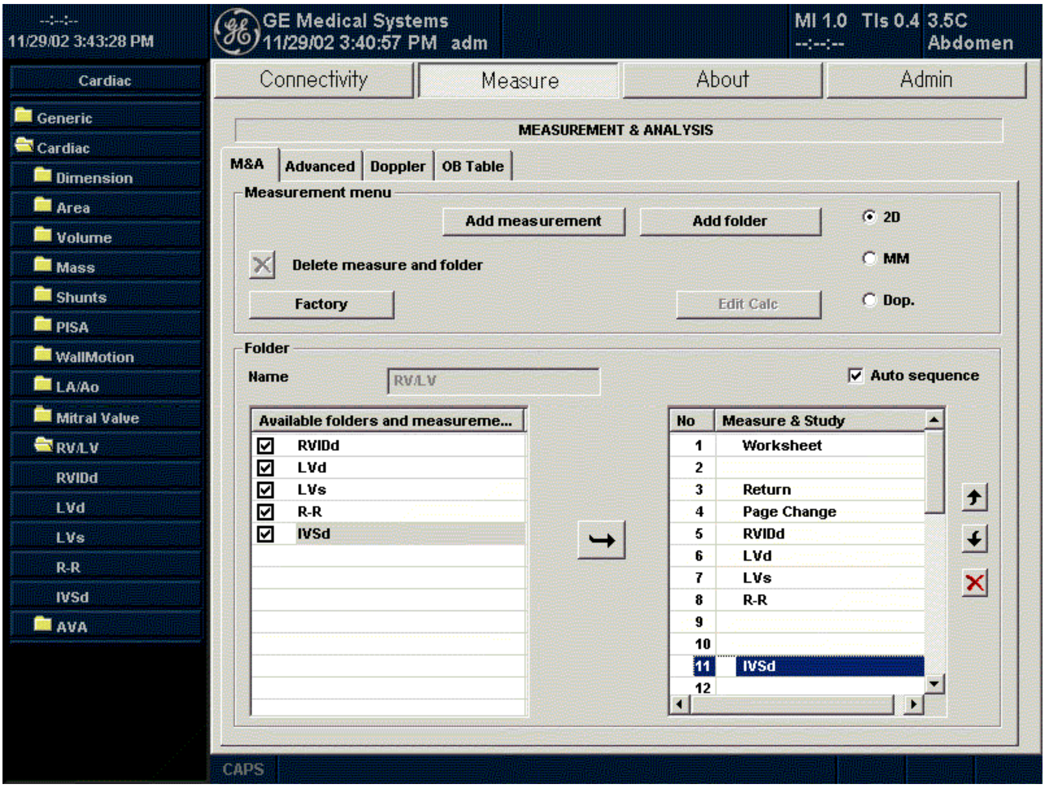
No	Measure & Study
1	Worksheet
2	
3	Return
4	Page Change
5	RVIDd
6	LVd
7	LVs
8	R-R
9	
10	
11	
12	

Figure 7-13. Available folders and measurements list: Select item

Specifying Which Measurements Go in a Study or Folder (continued)

3. Select the arrow between the lists.The item is copied to the Measure & Study list.

   The selected item is now displayed in the Touch Panel and the Summary Window. See the Touch Panel in Figure 7-15.


--:--:--
11/29/02 3:43:28 PM
GE Medical Systems
11/29/02 3:40:57 PM adm
MI 1.0 TIs 0.4 3.5C
--:--:--
Abdomen
Cardiac
Generic
Cardiac
Dimension
Area
Volume
Mass
Shunts
PISA
WallMotion
LA/Ao
Mitral Valve
RV/LV
RVIDd
LVd
LVs
R-R
IVSd
AVA
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder
CAPS

● 2D
○ MM
○ Dop.

Name: RV/LV

☑ Auto sequence

Available folders and measureme...
☑ RVIDd
☑ LVd
☑ LVs
☑ R-R
☑ IVSd

No	Measure & Study
1	Worksheet
2	
3	Return
4	Page Change
5	RVIDd
6	LVd
7	LVs
8	R-R
9	
10	
11	IVSd
12	

Figure 7-14. Measure & Study list: New item added

Specifying Which Measurements Go in a Study or Folder (continued)

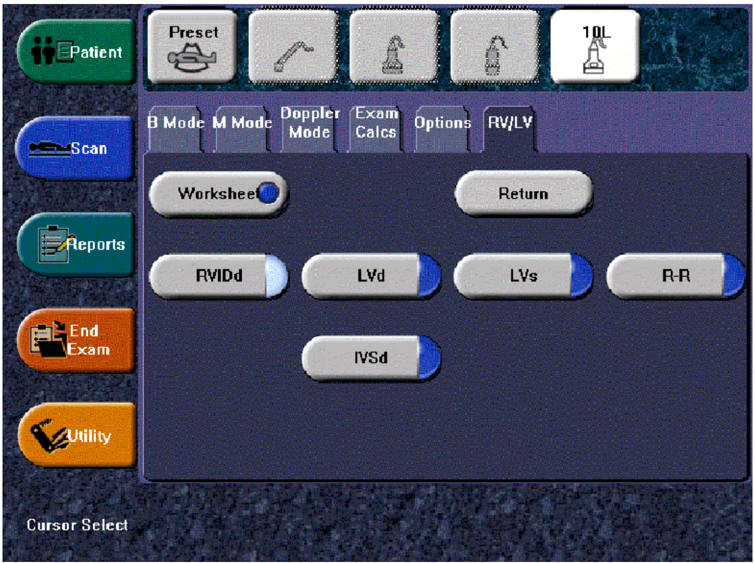

Patient
Scan
Reports
End Exam
Utility
Cursor Select
Preset
10L
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
RV/LV
Worksheet
Return
RVIDd
LVd
LVs
R-R
IVSd

Figure 7-15. Touch Panel for RV/LV Cardiac folder: IVSd measurement added

NOTE: *If an item is already in the Measure & Study list, the system does not allow you to add it again. To move an item within the Measure & Study list, See 'Moving items in the Touch Panel' for more information..*

Specifying Which Measurements Go in a Study or Folder (continued)

Touch Panel positions

Each Touch Panel has 16 positions, four across and four down. The items in the first row across are numbered 1–4, in the second row 5–8, and so on. See Figure 7-16 and Figure 7-17. These figures show the OB/GYN Vessel Touch Panel and the Measurement & Analysis screen for the OB/GYN Vessel. The numbers are shown in the Measure & Study list in the Measurement & Analysis screen. For example, the second row in the Touch Panel shows Prox, Aorta, Umbilical, and Placenta. In the Measurement & Analysis screen, the Measure & Study list shows these as number 5–8.

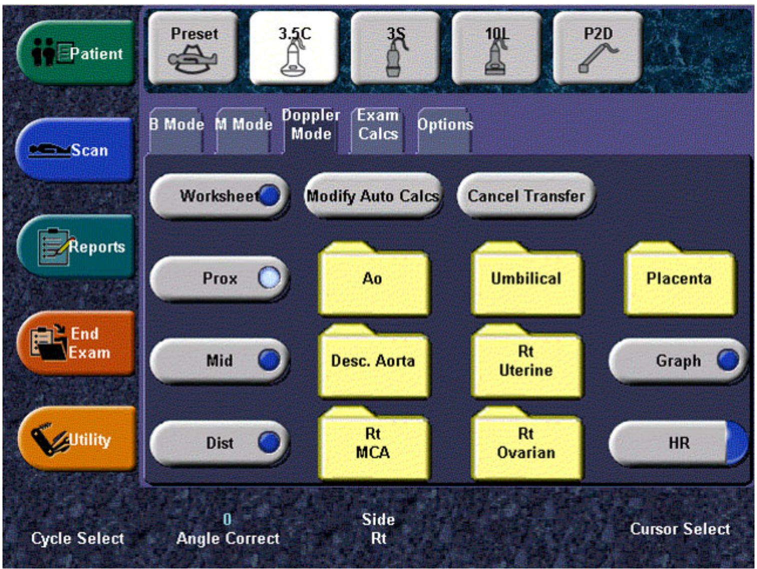
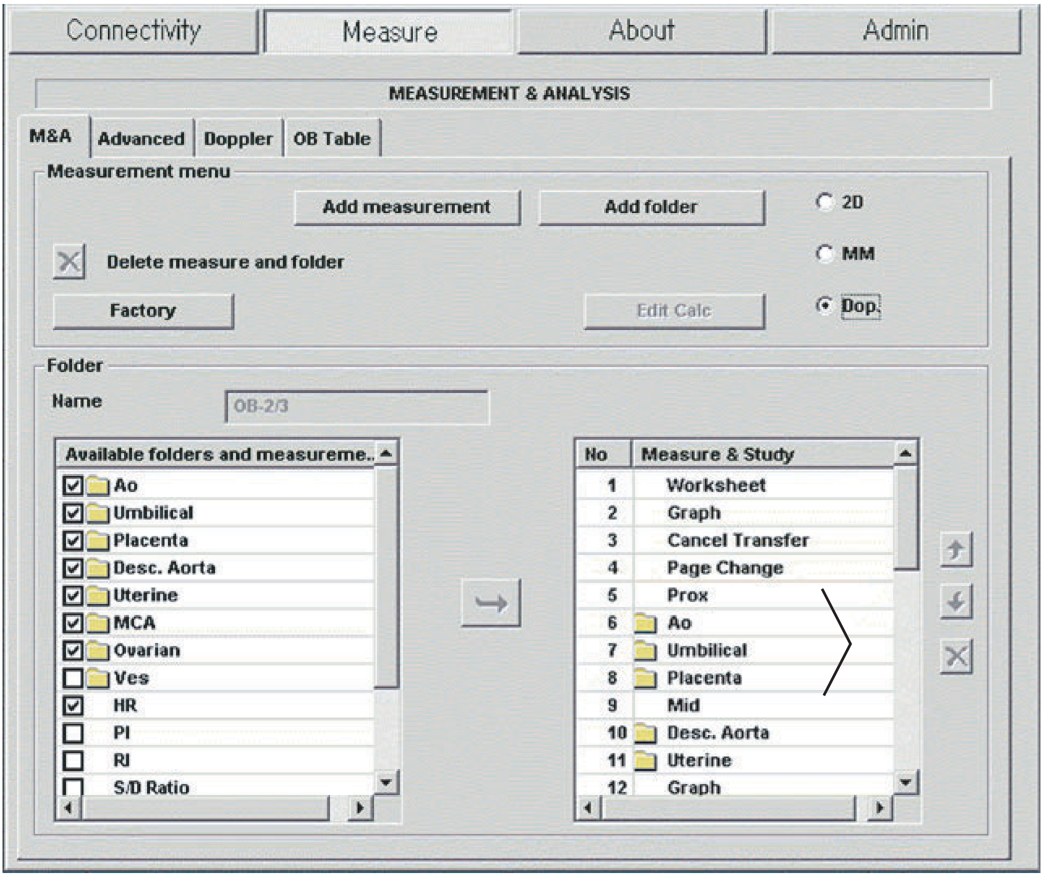

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Modify Auto Calcs
Cancel Transfer
Prox
Ao
Umbilical
Placenta
Mid
Desc. Aorta
Rt Uterine
Graph
Dist
Rt MCA
Rt Ovarian
HR
Cycle Select
0
Angle Correct
Side
Rt
Cursor Select

Figure 7-16. Touch Panel for OB-GYN Vessel study

Touch Panel positions (continued)


Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder

○ 2D
○ MM
● Dop.

Name: OB-2/3

	Available folders and measureme..
☑	Ao
☑	Umbilical
☑	Placenta
☑	Desc. Aorta
☑	Uterine
☑	MCA
☑	Ovarian
☐	Ves
☑	HR
☐	PI
☐	RI
☐	S/D Ratio

No	Measure & Study
1	Worksheet
2	Graph
3	Cancel Transfer
4	Page Change
5	Prox
6	Ao
7	Umbilical
8	Placenta
9	Mid
10	Desc. Aorta
11	Uterine
12	Graph

Figure 7-17. Measurement & Analysis: OB/GYN Vessel

Moving items in the Touch Panel

To move items that are in the Touch Panel, you move them in the Measure & Study list.

1. Move the **Trackball** to highlight an item in the Measure & Study list.
2. Select the up or down arrow.

   The item is displayed at the selected position in the Touch Panel.

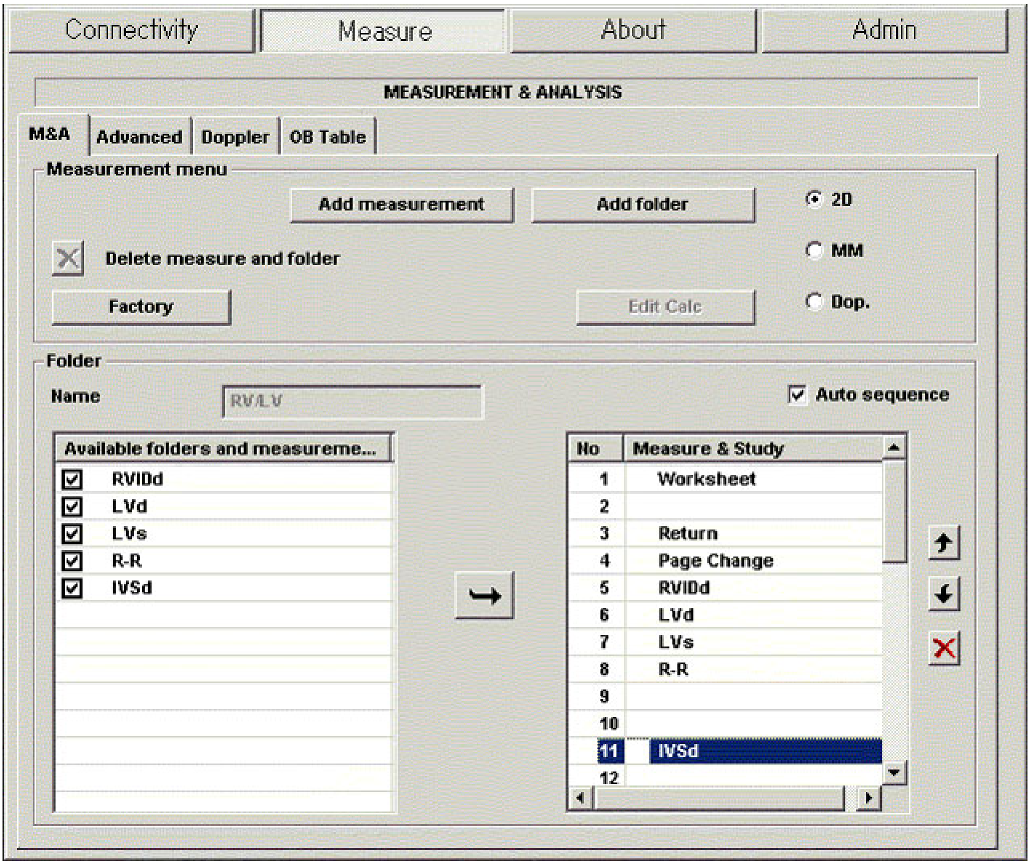
NOTE: Some items cannot be moved. For example, Worksheet Display and Page Change are in the same place on each Touch Panel.

Removing items from the Touch Panel

To remove items from the Touch Panel, you remove them from the Measure & Study list.

1. Move the **Trackball** to highlight the item in the Measure & Study list and press **Set**.
2. Select the X to the right of the list.

   The system removes the item from the Measure & Study list and from the Touch Panel. The item is still listed in the Available folders and measurements list.


Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder

● 2D
○ MM
○ Dop.

Name: RV/LV

☑ Auto sequence

Available folders and measureme...
☑ RVIDd
☑ LVd
☑ LVs
☑ R-R
☑ IVSd

No	Measure & Study
1	Worksheet
2	
3	Return
4	Page Change
5	RVIDd
6	LVd
7	LVs
8	R-R
9	
10	
11	IVSd
12	

Figure 7-18. Measurement & Analysis: Remove item from Touch Panel

Removing items from the Touch Panel (continued)

To remove an item from the Selection menu:

1. Move the **Trackball** to the item in the Available folders and measurements list.
2. To clear the check box for the item, move the **Trackball** to the check box and press **Set**.

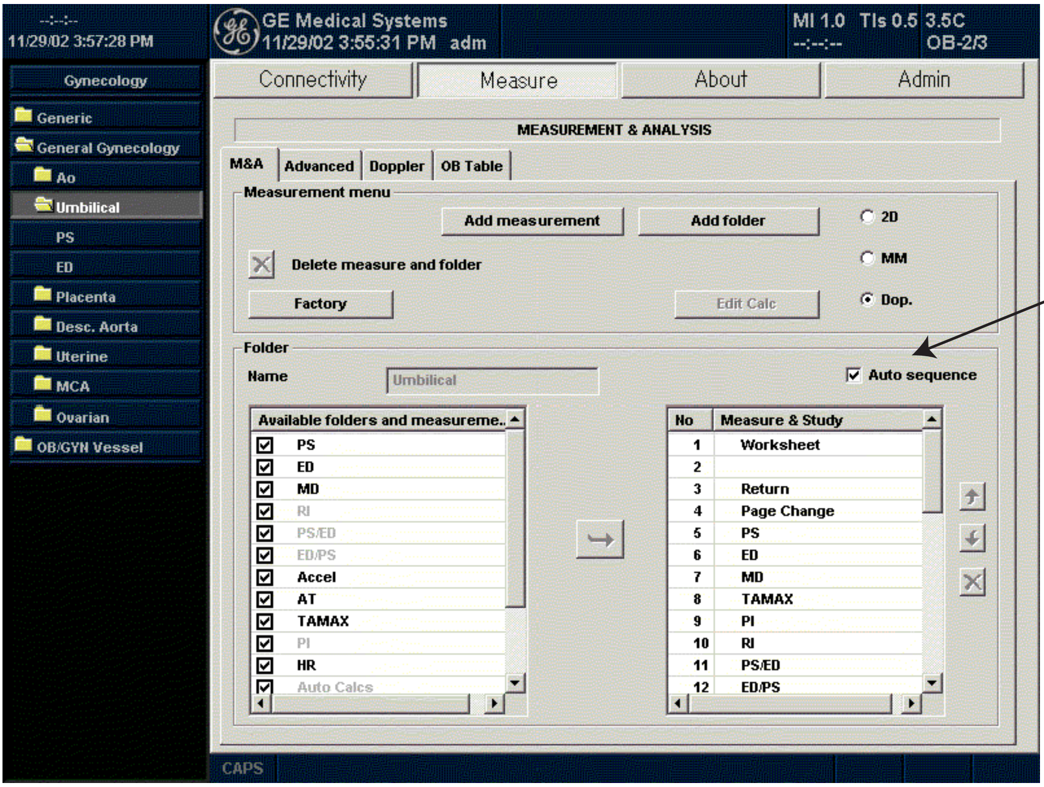
   The system removes the item from the Selection menu, the Measure & Study list, and from the Touch Panel. It is also not listed in the Summary Window.

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.


--:--:--
11/29/02 3:57:28 PM
GE Medical Systems
11/29/02 3:55:31 PM adm
MI 1.0 TIs 0.5 3.5C
--:--:-- OB-2/3
Gynecology
Generic
General Gynecology
Ao
Umbilical
PS
ED
Placenta
Desc. Aorta
Uterine
MCA
Ovarian
OB/GYN Vessel
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
CAPS

○ 2D
○ MM
● Dop.

Folder

Name: Umbilical

☑ Auto sequence

	Available folders and measureme..
☑	PS
☑	ED
☑	MD
☑	RI
☑	PS/ED
☑	ED/PS
☑	Accel
☑	AT
☑	TAMAX
☑	PI
☑	HR
☑	Auto Calcs

No	Measure & Study
1	Worksheet
2	
3	Return
4	Page Change
5	PS
6	ED
7	MD
8	TAMAX
9	PI
10	RI
11	PS/ED
12	ED/PS

Figure 7-19. Measurement & Analysis screen: 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:

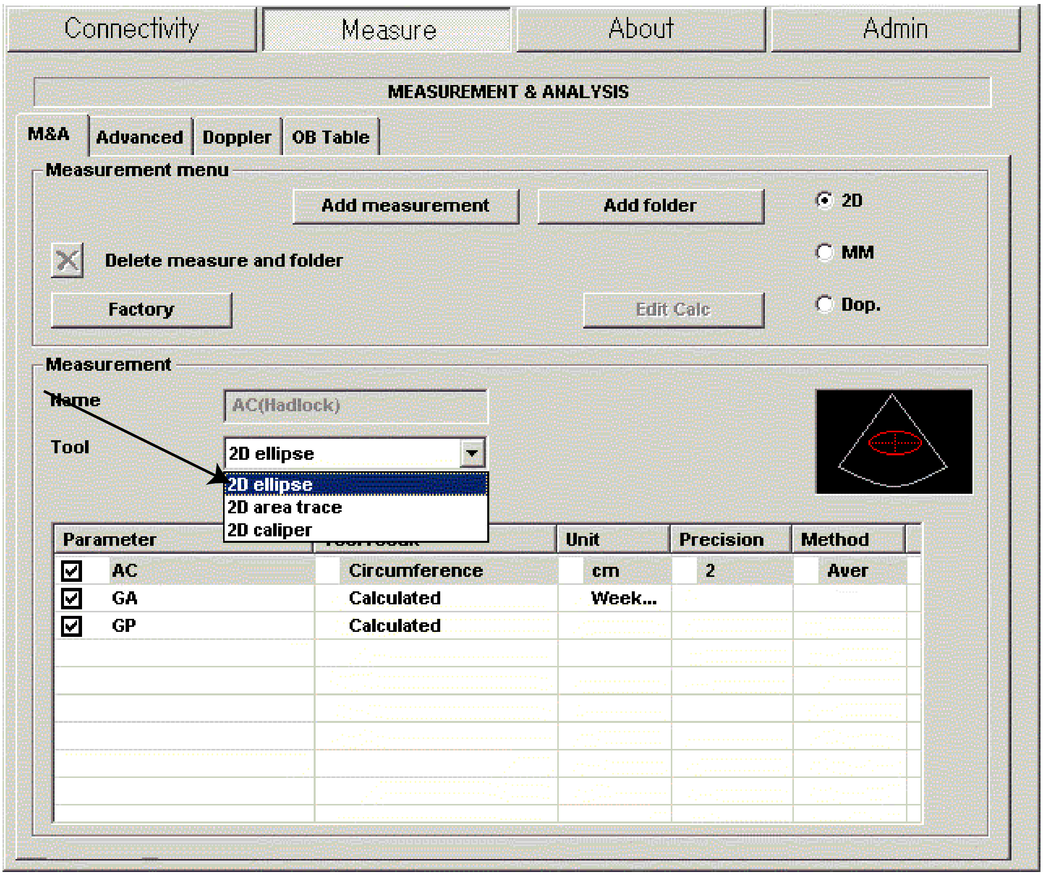
  In the Measurement section of the Measurement & Analysis screen, select the desired tool from the Tool list. See Figure 7-20. Select the arrow to display the drop-down list.

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 Figure 7-20, ellipse is selected and the diagram shows an ellipse.*

Changing Measurements (continued)


Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Measurement
2D ellipse
2D area trace
2D caliper

● 2D
○ MM
○ Dop.

Name: AC(Hadlock)

Tool: 2D ellipse

Parameter		Unit	Precision	Method
☑ AC	Circumference	cm	2	Aver
☑ GA	Calculated	Week...		
☑ GP	Calculated			

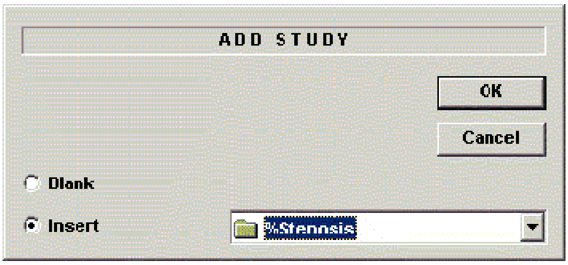
Figure 7-20. Measurement & Analysis screen: Change measurements

Adding Folders and Measurements

Adding a folder

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

1. In the Selection menu, select the study or folder where you want to add the folder.
2. In the Measurement menu section, select Add folder.
    - If you select Blank, the system adds a folder with a name such as USERDEFS1. It is listed in the Selection menu. See Figure 7-22.
    - 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 can not edit this folder.



○ Blank

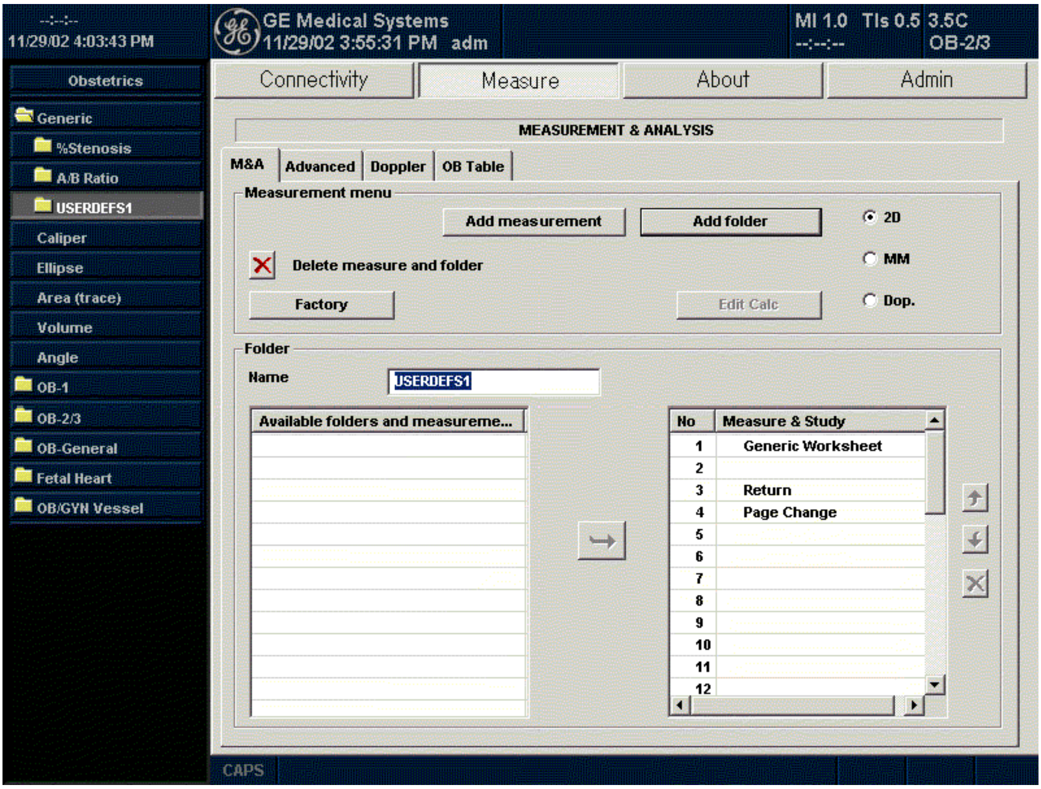
● Insert %Stenosis

Figure 7-21. 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’ for more information.

Adding a folder (continued)



--:--:--
11/29/02 4:03:43 PM
GE Medical Systems
11/29/02 3:55:31 PM adm
MI 1.0 TIs 0.5 3.5C
--:--:-- OB-2/3
Obstetrics
Generic
%Stenosis
A/B Ratio
USERDEFS1
Caliper
Ellipse
Area (trace)
Volume
Angle
OB-1
OB-2/3
OB-General
Fetal Heart
OB/GYN Vessel
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder
Available folders and measureme...
CAPS

● 2D
○ MM
○ Dop.

Name: USERDEFS1

No	Measure & Study
1	Generic Worksheet
2	
3	Return
4	Page Change
5	
6	
7	
8	
9	
10	
11	
12	

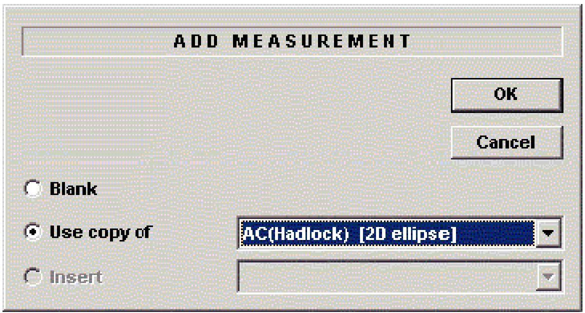
Figure 7-22. Measurement & Analysis: Add folder

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. See Figure 7-24.



AC(Hadlock) [2D ellipse]

Figure 7-23. Add Measurement window

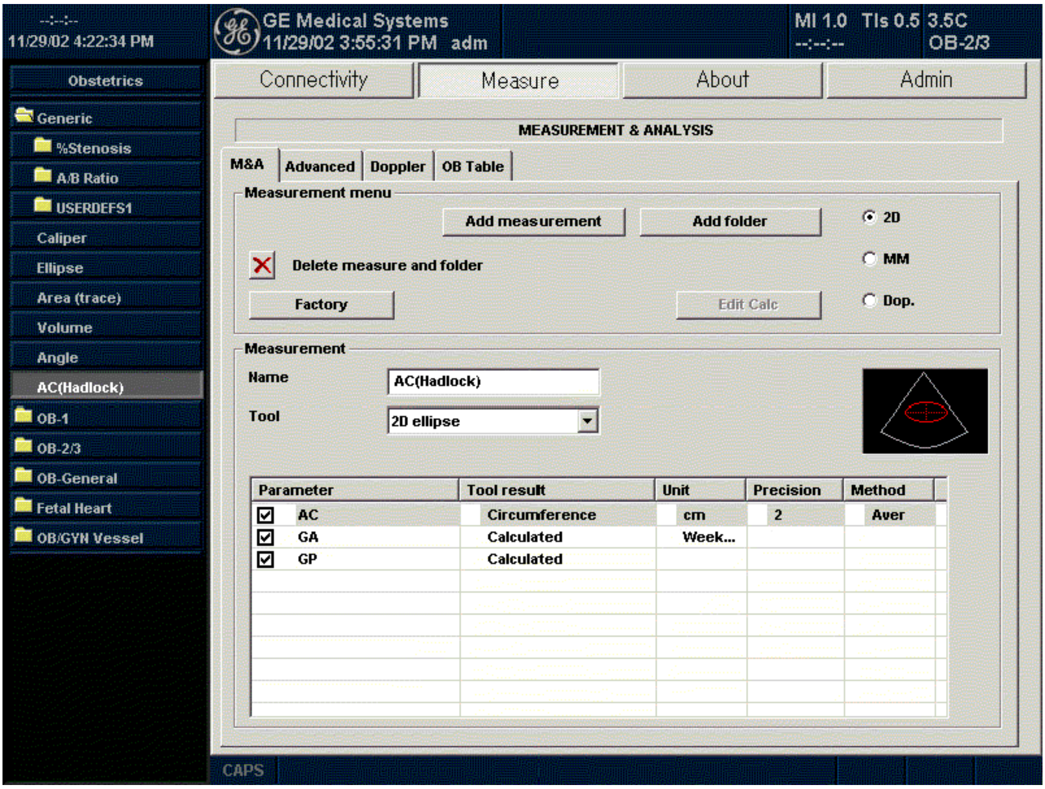
3. Do one of the following:
   - If you want to create this measurement from a copy of an existing measurement, select Use copy of, and then select a measurement from the list. The list includes all measurements defined for the current exam category and selected mode.

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

   - If you want to use an exsiting 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 can not edt 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 USERDEFM3.
    - If you created a measurement from a copy of an existing measurement, the system lists the measurement and its parameters in the Measurement section.
5. When you create a new measurement, the measurement name is automatically highlighted. Type a name for the new measurement. You can change the name of a measurement you created from a copy.


--:--:--
11/29/02 4:22:34 PM
GE Medical Systems
11/29/02 3:55:31 PM adm
MI 1.0 TIs 0.5 3.5C
--:--:-- OB-2/3
Obstetrics
Generic
%Stenosis
A/B Ratio
USERDEFS1
Caliper
Ellipse
Area (trace)
Volume
Angle
AC(Hadlock)
OB-1
OB-2/3
OB-General
Fetal Heart
OB/GYN Vessel
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
CAPS

● 2D ○ MM ○ Dop.

Measurement

Name: AC(Hadlock)

Tool: 2D ellipse

Parameter	Tool result	Unit	Precision	Method
☑ AC	Circumference	cm	2	Aver
☑ GA	Calculated	Week...		
☑ GP	Calculated			

Figure 7-24. 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’ for more information.

Changing or adding measurement parameters

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

Changing measurement parameters

To change a measurement parameter:

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

For a description of other measurement changes, See ‘Changing Measurements’ 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.*

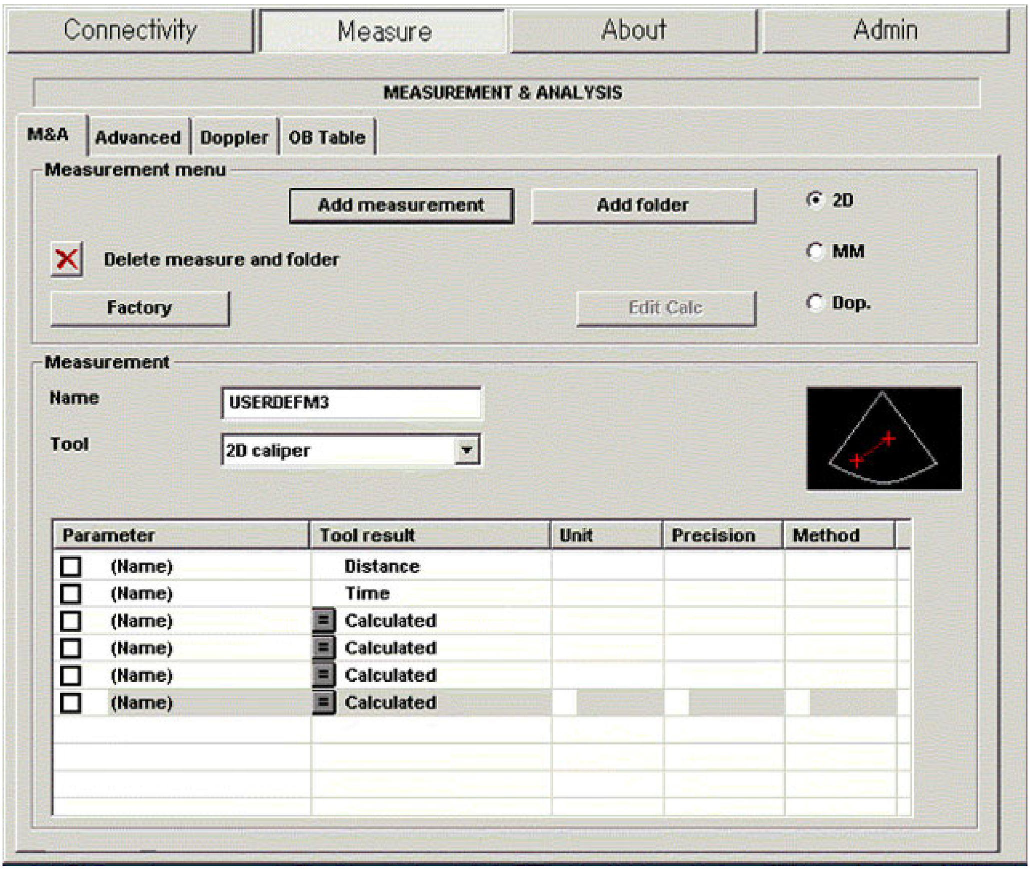
3. If necessary, check Fetus (OB only), Location (Loc), or Side:
   - Fetus: If this is an OB measurement, check this box. (Default ON).
   - Location: If this measurement includes a Prox, Mid, or Dist location, check this box.
   - Side: If this measurement includes a Left or Right side, check this 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).


Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
MM
Dop.

● 2D

Measurement

Name: USERDEFM3

Tool: 2D caliper

Parameter	Tool result	Unit	Precision	Method
☐ (Name)	Distance			
☐ (Name)	Time			
☐ (Name)	Calculated			
☐ (Name)	Calculated			
☐ (Name)	Calculated			
☐ (Name)	Calculated			

Figure 7-25. Adding a Parameter

Changing or adding measurement parameters (continued)

Adding measurement parameters (continued)

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

   The Edit Formula window is displayed.

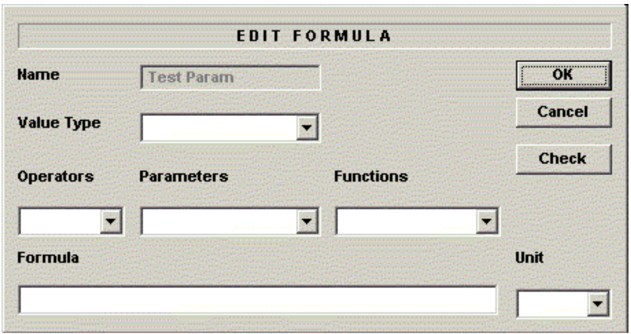


Figure 7-26. Edit Formula

7. To create a formula:
   a. In the Value Type field, select a value.
   b. Do one of the following:
   - Type a formula in the Formula field.
   - Select formula components from the Operators, Parameters, and Functions drop-down lists. When you select a component, the system displays it in the Formula field.
8. To test the formula, select Check.

   If there are no problems, the system displays “Syntax OK!”.

   If there are any problems with the formula, the system displays an Error message in place of the Formula field label.
9. When the formula is correct, select OK to save it.

   The Edit Formula window closes. The formula is displayed in the Tool result field.

Changing or adding measurement parameters (continued)

Formula Unit Conversion

When you create a formula, the system changes the calculation result into an output unit as defined in the following table.

Table 7-2: Formula Unit Conversion

Unit		Conversion (coefficient value)
Time		
	s	x1
	ms	x1,000
	min	x0.0167
	h	x0.00027778
Ratio		
	%	x100
Frequency		
	bpm or BPM	x1.0
Angle		
	rad	x1.0
	deg	x57.2958
	grad	x63.6620
Distance		
	cm	x100
	m	x1
	dm	x10
	mm	x1,000
	inch	x39.37
	feet	x39.37
	pixels	x1
Velocity		

Table 7-2: Formula Unit Conversion

Unit		**Conversion (coefficient value)**
	m/s	x1
	dm/s	x10
	cm/s	x100
	mm/s	x1,000
	inch/s	x39.37
Acceleration		
	m/s2	x1
	dm/s2	x10
	cm/s2	x100
	mm/s2	x1,000
	inch/s2	x39.37
Area		
	m2 or m^2	x1
	dm2	x100
	cm2 or cm^2	x10,000
	mm2 or mm^2	x1,000,000
	inch2	x1550
Volume		
	m3	x1
	dm3	x1,000
	cm3	x1,000,000
	l	x1,000
	dl	x10,000
	cl	x100,000
	ml	x1,000,000
	gallon	x264,178
	quart	x1056.71
Volume Flow		

Table 7-2: Formula Unit Conversion

Unit		Conversion (coefficient value)
	m3/s	x1
	dm3/s	x1,000
	cm3/s	x1,000,000
	l/s	x1,000
	dl/s	x10,000
	cl/s	x100,000
	ml/s	x1,000,000
	m3/min	x60
	dm3/min	x60,000
	cm3/min	x60,000,000
	l/min or L/min	x60,000
	dl/min	x600,000
	cl/min	6,000,000
	ml/min	x60,000,000
	ml/m2	x1,000,000
Pressure		
	mmHg	x1
	Pa	x133.322
	kPa	x0.133322
	bar	x0.00133322
Pressure/Time		
	mmHg/s	x1
Mass		
	kg	x1
	g	x1,000
	ounce	x35.273962
	pound	x2.2046226
Others		
	mmHG	x100

Changing or adding measurement parameters (continued)

Formula Unit Conversion (continued)

For example, when a Volume formula is created:

Vol [ml or cm3] = 0.523598*{D1}*{D2}*{D3}

(D1, D2, and D3 indicate a measurement result.)

In this case, the measurement (D1, D2, and D3) is a distance measurement, so the measured data is a meter [m] unit according to the above table.

To change into a milliliter, the system multiplies each measurement value by 100. As a result, it multiplies a formula by 1,000,000.

The standard unit of volume is a cube meter, so the system multiplies the result by 1,000,000.

The system multiplies the calculation result by the coefficient and converts it. To get a correct result, when you define the formula, you must convert the coefficient itself, such as the coefficient of 10^.

For example, if you want to define the following formula:

efg[g] = 10^(1.5662-0.0108*{P1}+0.0468*{P2}+0.171*{D1}+0.00034*{P1}*{P1}-0.003685*{P2}*{D1})

D1[cm]: Distance

P1[cm]: Perimeter

P2[cm]: Perimeter

Changing or adding measurement parameters (continued)

Formula Unit Conversion (continued)

The system defines the standard value of each measurement as a meter [m]. If the unit of each measurement value of this formula is defined as centimeter [cm], you must define the formula as follows:

efw[g] = 10^(1.5662-0.0108*{P1}*100 + 0.0468*{P2}*100 + 0.171*{D1}*100 + 0.00034*{P1}*{P1}*100*100 - 0.003685*{P2}*{D1}*100*100)

(This converts each measurement value to a centimeter [cm], since the system standard unit is a meter [m].)

The output unit of this formula is a gram. Since the standard unit of the system is defined as a kilogram [kg], the system multiplies the output by 1,000.

Because the output of this formula is defined as a gram, it is necessary to define the formula as follows.

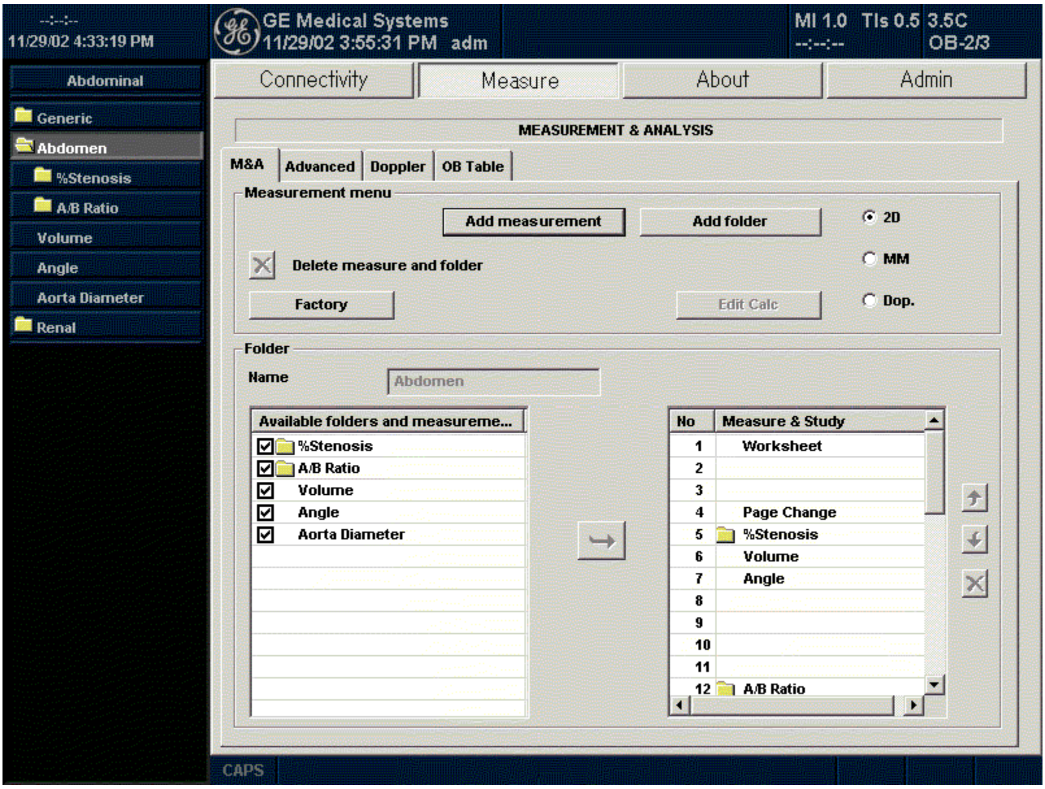
efw[g] = 10^(1.5662-0.0108*{P1}*100 + 0.0468*{P2}*100 + 0.171*{D1}*100 + 0.00034*{P1}*{P1}*100*100 - 0.003685*{P2}*{D1}*100*100)/1,000

As shown, you can obtain an exact calculation result.

Editing Calculations

To modify user-defined calculations:

In the Measurement menu section, selection Edit Calc.


--:--:--
11/29/02 4:33:19 PM
GE Medical Systems
11/29/02 3:55:31 PM adm
MI 1.0 TIs 0.5 3.5C
--:--:-- OB-2/3
Abdominal
Generic
Abdomen
%Stenosis
A/B Ratio
Volume
Angle
Aorta Diameter
Renal
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
● 2D
○ MM
○ Dop.
Delete measure and folder
Factory
Edit Calc
Folder
CAPS

Name: Abdomen

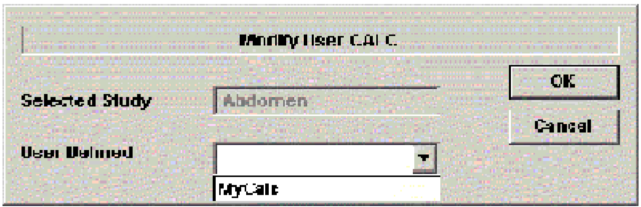
Available folders and measureme...
☑ %Stenosis
☑ A/B Ratio
☑ Volume
☑ Angle
☑ Aorta Diameter

No	Measure & Study
1	Worksheet
2	
3	
4	Page Change
5	%Stenosis
6	Volume
7	Angle
8	
9	
10	
11	
12	A/B Ratio

Figure 7-27. Edit Calc

Editing Calculations (continued)

The Modify User CALC window is displayed.



Modify User CALC

Selected Study: Abdomen

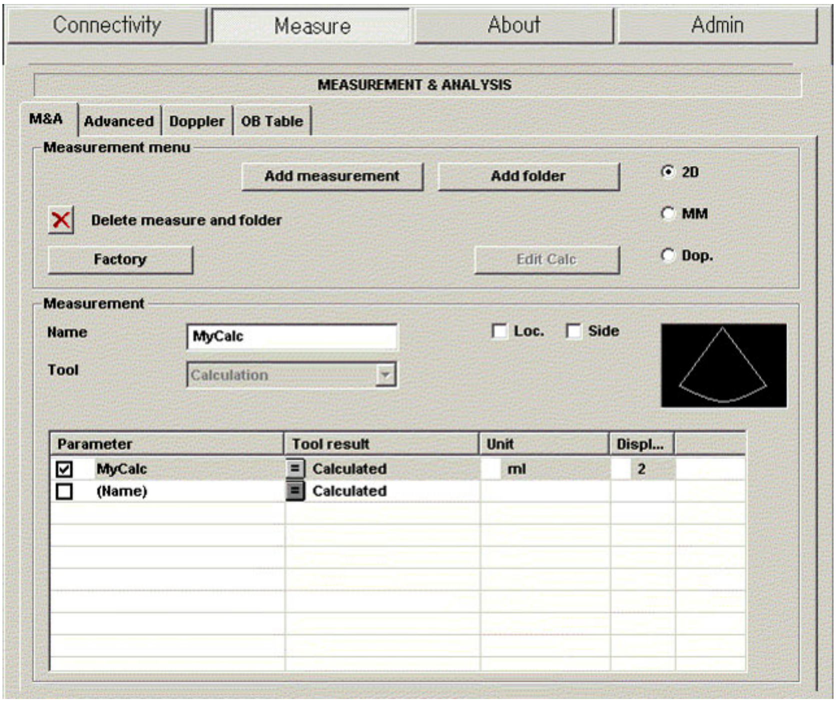
User Defined: MyCalc

Figure 7-28. Modify User CALC window

In the User Defined list, select the calculation that you want modified, then select OK.

Editing Calculations (continued)

The Measure tab for user-defined calculations is displayed.


Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Measurement

● 2D
○ MM
○ Dop.

Name: MyCalc

Tool: Calculation

☐ Loc. ☐ Side

Parameter	Tool result	Unit	Displ...
☑ MyCalc	Calculated	ml	2
☐ (Name)	Calculated		

Figure 7-29. Measurement & Analysis M&A tab

Deleting a Folder or Measurement

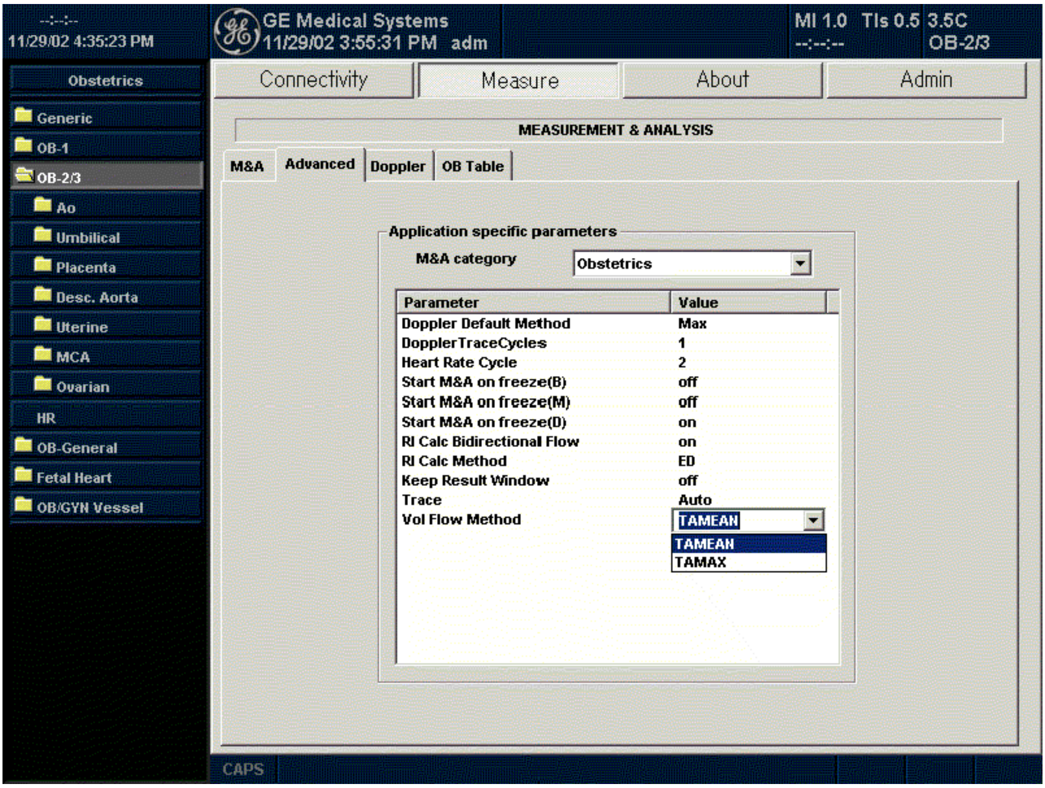
NOTE: You can only delete user-defined folders or measurements. You cannot delete default system folders or measurements.

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. On the Touch Panel, select ***Utility***.
2. On the Touch Panel, select ***Measure***.
3. On the monitor display, select the Advanced tab.


--:--:--
11/29/02 4:35:23 PM
GE Medical Systems
11/29/02 3:55:31 PM adm
MI 1.0 TIs 0.5 3.5C
--:--:-- OB-2/3
Obstetrics
Generic
OB-1
OB-2/3
Ao
Umbilical
Placenta
Desc. Aorta
Uterine
MCA
Ovarian
HR
OB-General
Fetal Heart
OB/GYN Vessel
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Application specific parameters
TAMEAN
TAMAX
CAPS

M&A category: Obstetrics

Parameter	Value
Doppler Default Method	Max
DopplerTraceCycles	1
Heart Rate Cycle	2
Start M&A on freeze(B)	off
Start M&A on freeze(M)	off
Start M&A on freeze(D)	on
RI Calc Bidirectional Flow	on
RI Calc Method	ED
Keep Result Window	off
Trace	Auto
Vol Flow Method	TAMEAN

Figure 7-30. 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)

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

   The Parameters list displays parameters for the selected category.

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

   - Doppler Default Method: Aveg., Max, Min or Last
   - Doppler Trace Cycles: 1, 2, 3, 4 or 5
   - Heart Rate Cycle: 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 (future)
   - Start M&A on a Freeze (B, M or D): Off, On or Caliper

     Off: Select measurement manually on Freeze.

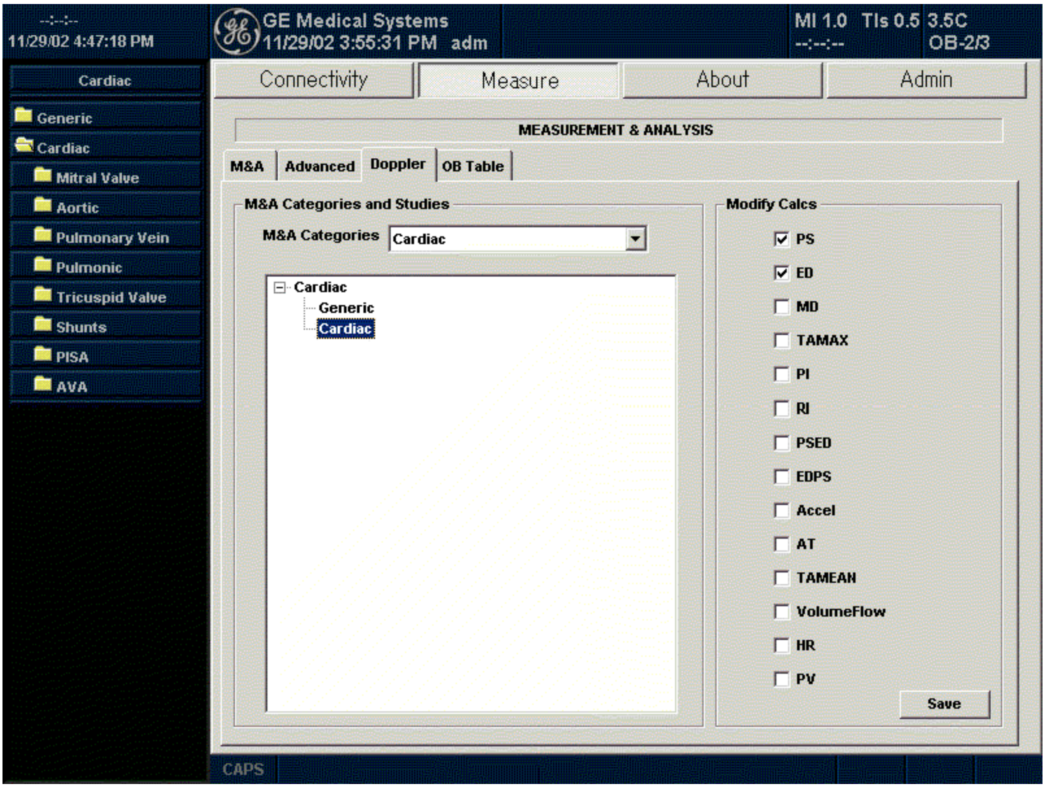
     On: Measurement menu appears automatically on Freeze.

     Caliper: Measurement menu and caliper appear automatically on Freeze.
   - RI Calc Bidirectional Flow: On or Off
   - RI Calc Method: MD or ED
   - Keep Result Window: On or Off
   - Trace: Auto or Manual
   - VOL Flow Method: TAMEAN or TAMAX

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. On the Touch Panel, select ***Utility***.
2. On the Touch Panel, select ***Measure***.
3. On the monitor display, select the Doppler tab.


--:--:--
11/29/02 4:47:18 PM
GE Medical Systems
11/29/02 3:55:31 PM adm
MI 1.0 TIs 0.5 3.5C
--:--:-- OB-2/3
Cardiac
Generic
Cardiac
Mitral Valve
Aortic
Pulmonary Vein
Pulmonic
Tricuspid Valve
Shunts
PISA
AVA
Connectivity
Measure
About
Admin
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
M&A Categories and Studies
Cardiac
Generic
Cardiac
Modify Calcs
Save
CAPS

M&A Categories: Cardiac

☑ PS
☑ ED
☐ MD
☐ TAMAX
☐ PI
☐ RI
☐ PSED
☐ EDPS
☐ Accel
☐ AT
☐ TAMEAN
☐ VolumeFlow
☐ HR
☐ PV

Figure 7-31. M&A Doppler Preset Menu

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

Manual Calcs Presets (continued)

4. 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.
5. In the hierarchical view, select a study or folder.
6. 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.
7. To save the changes, select the Save button.

Mode Measurements

B-Mode Measurements

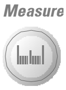
Two basic measurements can be made in B-Mode.

- Distance
- Circumference and Area (Ellipse or Trace Method)

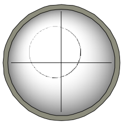
NOTE: The following instructions assume that you first scan the patient and then press ***Freeze****.*

Distance measurement

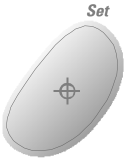
To make a distance measurement:



- Press **Measure** once; an active caliper displays

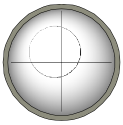


- To position the active caliper at the start point, move the **Trackball**.



- To fix the start point, press **Set**.

  The system fixes the first caliper and displays a second active caliper.



- To position the second active caliper at the end point, move the **Trackball**.

  A dotted line connects the measurement points.

- To complete the measurement, press **Set**.

  The system displays the distance value in the Results Window.

Distance measurement (continued)

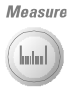
The following hints can help you to perform distance measurements:

HINTS

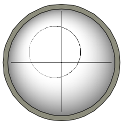
- Before you complete a measurement:
  - To toggle between active calipers, press **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate previously fixed calipers, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

Circumference and area (ellipse) measurement

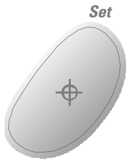
You can use an ellipse to measure circumference and area. To measure with an ellipse:



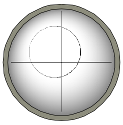
- Press **Measure** once; an active caliper displays.



- To position the active caliper, move the **Trackball**.

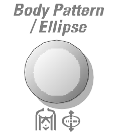


- To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper

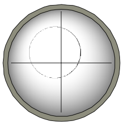


- To position the second caliper, move the **Trackball**.

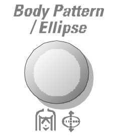
Circumference and area (ellipse) measurement (continued)



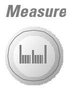
- Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.



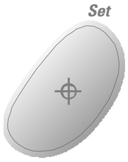
- To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.



- To increase the size, adjust the **Ellipse** control in a clockwise direction. To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.



- To toggle between active calipers, press **Measure**.



- To complete the measurement, press **Set**. The system displays the circumference and area in the Results Window.

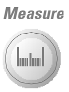
HINTS

Before you complete the ellipse measurement:

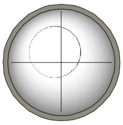
- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Circumference and area (trace) measurement

To trace the circumference of a portion of the anatomy and calculate its area:

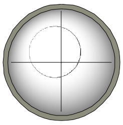


- Press **Measure** twice; a trace caliper displays.



- To position the trace caliper at the start point, move the **Trackball**.

- To fix the trace start point, press **Set**. The trace caliper changes to an active caliper.



- To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.

- 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.

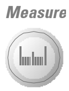
- Velocity
- TAMAX, TAMIN, and TAMEAN (Manual or Auto Trace)
- Two Velocities with the Slope and Time Interval between them
- Time Interval

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

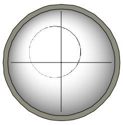
1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the Doppler Mode part of the display.
3. Press **Freeze**.

Velocity

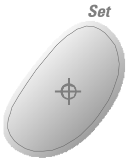
To measure velocity:



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



- To position the caliper at the desired measurement point, move the **Trackball**.



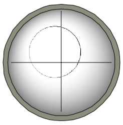
- To complete the measurement, press **Set**. The system displays the velocity measurement in the Results Window.

TAMAX and TAMEAN (manual) [TAMIN is not available at this time.]

The value measured depends upon a preset selection in the... The three selections available are: Peak (TAMAX), Floor (TAMIN), and Mean (TAMEAN).

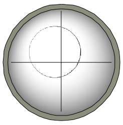
To do a manual trace of TAMAX, TAMIN or TAMEAN:

- Press **Measure** twice; a trace caliper displays.



- To position the caliper at the trace start point, move the **Trackball**.

- To fix the start point, press **Set**.



- To trace the maximum values of the desired portion of the spectrum, move the **Trackball**.

  NOTE: To edit the trace line, move the **Trackball.**

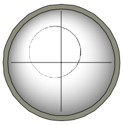
- To complete the measurement, press **Set**. The system displays the measurement values in the Results Window.

TAMAX and TAMEAN (auto trace) [TAMIN is not available at this time.]

The value measured depends upon a preset selection in the... The three selections available are: Peak (TAMAX), Floor (TAMIN), and Mean (TAMEAN).

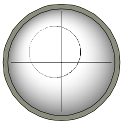
To auto trace TAMAX, TAMIN, or TAMEAN:

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



- To position the caliper at the trace start point in the Doppler spectrum, move the **Trackball**.

- To fix the start point, press **Set**.

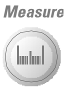


- To position the vertical caliper at the end point, move the **Trackball**.

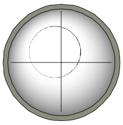
- To complete the measurement, press **Set**. The system automatically fixes both calipers and traces the maximum value between the two points. The system displays this value in the Results Window.

Slope and time interval

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

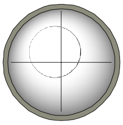


- Press **Measure** three times; an active caliper with vertical and horizontal dotted lines displays.



- To position the caliper at the start point, move the **Trackball**.

- To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.

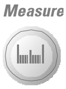


- To position the second caliper at the end point, move the **Trackball**.

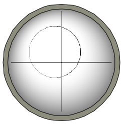
- To complete the measurement, press **Set**. The system displays the two peak end point velocities, the time interval, and the slope in the Results Window.

Time interval

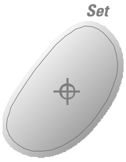
To measure a horizontal time interval:



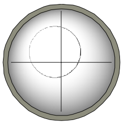
- Press **Measure** four times; an active caliper with a vertical dotted line displays.



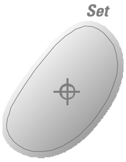
- To position the active caliper at the start point, move the **Trackball**.



- To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.



- To position the second caliper at the end point, move the **Trackball**.



- 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:

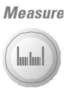
- Tissue Depth (Distance)
- Time Interval
- Time Interval and Slope

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

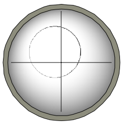
1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the M-Mode part of the display.
3. Press **Freeze**.

Tissue depth

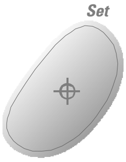
Tissue depth measurement in M-Mode functions the same as distance measurement in B-Mode. It measures the vertical distance between calipers.



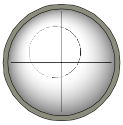
Press Measure once; an active caliper with a vertical and horizontal dotted line displays.



To position the active caliper at the most anterior point you want to measure, move the Trackball.



To fix the start point, press Set.
The system fixes the first caliper and displays a second active caliper.

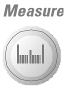


To position the second caliper at the most posterior point you want to measure, move the Trackball.

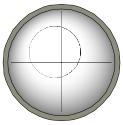
To complete the measurement, press **Set**.
The system displays the vertical distance between the two points in the Results Window.

Time interval

To measure a horizontal time interval:

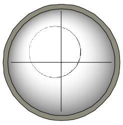


- Press **Measure** twice; an active caliper with a vertical dotted line displays.



- To position the caliper at the start point, move the **Trackball**.

- To fix the first caliper, press **Set**. The system fixes the first caliper and displays a second active caliper.

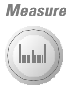


- To position the second caliper at the end point, move the **Trackball**.

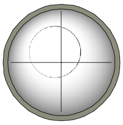
- To complete the measurement, press **Set**. The system displays the time interval between the two calipers in the Results Window.

Time and slope

To measure time and slope between two points:

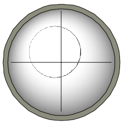


Press Measure three times; an active caliper with a vertical and horizontal dotted line displays.



To position the active caliper at the start point, move the Trackball.

To fix the start point, press Set.
The system fixes the first caliper and displays a second active caliper.



To position the second caliper at the end point, move the Trackball.

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 the ***Worksheet Display*** key on the Touch Panel.

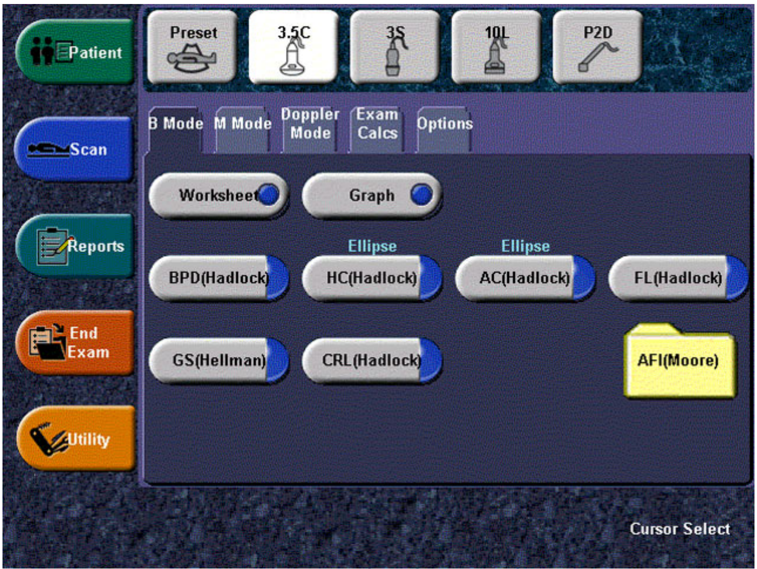
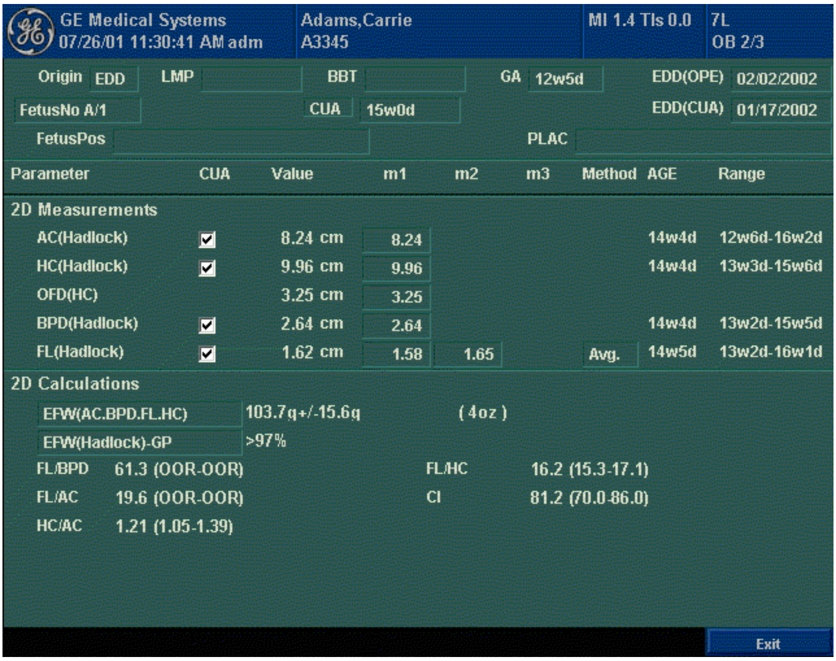

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Graph
Ellipse
Ellipse
BPD(Hadlock)
HC(Hadlock)
AC(Hadlock)
FL(Hadlock)
GS(Hellman)
CRL(Hadlock)
AFI(Moore)
Cursor Select

Figure 7-32. OB-General Study

To view a worksheet (continued)

The system displays the worksheet for the current study.



GE Medical Systems
07/26/01 11:30:41 AM adm
Adams,Carrie
A3345
MI 1.4 TIs 0.0
7L
OB 2/3

Origin EDD
LMP
BBT
GA 12w5d
EDD(OPE) 02/02/2002
FetusNo A/1
CUA 15w0d
EDD(CUA) 01/17/2002
FetusPos
PLAC

Parameter	CUA	Value	m1	m2	m3	Method	AGE	Range
2D Measurements								
AC(Hadlock)	☑	8.24 cm	8.24				14w4d	12w6d-16w2d
HC(Hadlock)	☑	9.96 cm	9.96				14w4d	13w3d-15w6d
OFD(HC)		3.25 cm	3.25					
BPD(Hadlock)	☑	2.64 cm	2.64				14w4d	13w2d-15w5d
FL(Hadlock)	☑	1.62 cm	1.58	1.65		Avg.	14w5d	13w2d-16w1d

2D Calculations

EFW(AC.BPD.FL.HC) 103.7g+/-15.6g (4oz)
EFW(Hadlock)-GP >97%

FL/BPD	61.3 (OOR-OOR)	FL/HC	16.2 (15.3-17.1)
FL/AC	19.6 (OOR-OOR)	CI	81.2 (70.0-86.0)
HC/AC	1.21 (1.05-1.39)		

Figure 7-33. OB Worksheet

To return to scanning, do one of the following:

- Select the ***Worksheet Display*** key.
- Press ***Esc***.
- Select the *Exit* button.

To view a worksheet (continued)

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

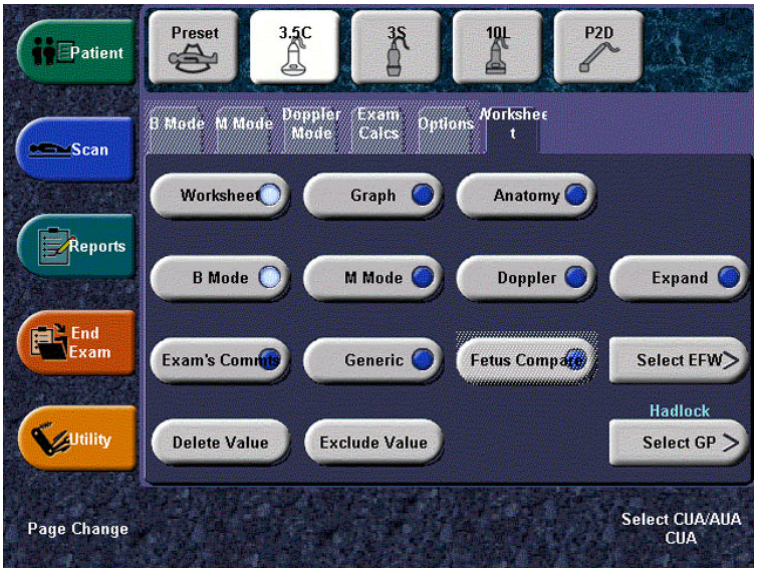

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Worksheet
Graph
Anatomy
B Mode
M Mode
Doppler
Expand
Exam's Comnts
Generic
Fetus Compare
Select EFW
Hadlock
Select GP
Delete Value
Exclude Value
Page Change
Select CUA/AUA
CUA

Figure 7-34. Worksheet Display Touch Panel: OB Study

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 Worksheet***.

If a worksheet has more data on a second page, to view the next page, adjust the **Page Change** knob.

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 Touch Panel, select ***Exam Calcs***.
3. On the Touch Panel, select the ***Generic*** folder.

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

B-Mode Measurements

In B-Mode, the Generic study includes the following measurements:

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

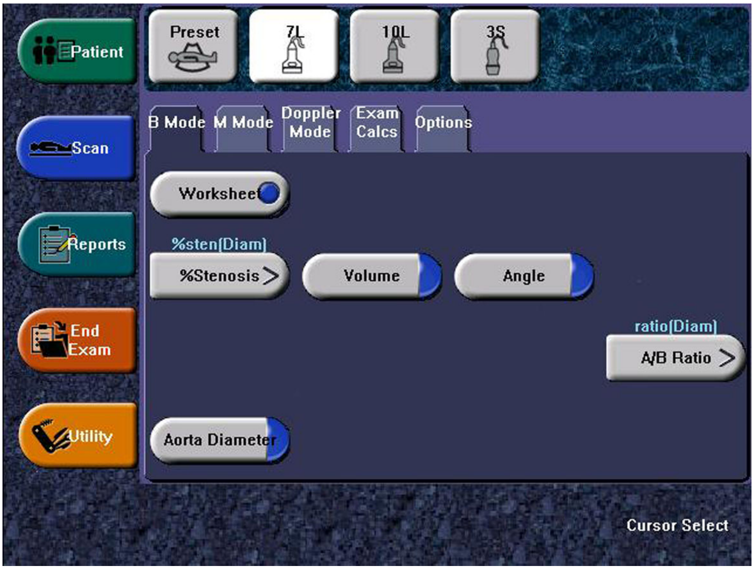

Patient
Scan
Reports
End Exam
Utility
Preset
7L
10L
3S
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
%sten(Diam)
%Stenosis >
Volume
Angle
ratio(Diam)
A/B Ratio >
Aorta Diameter
Cursor Select

Figure 7-35. 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.

Diameter

NOTE: *When you use diameter to calculate the %stenosis, always take the measurement from a cross-sectional view of the vessel.*

To calculate percent stenosis by diameter:

1. From the Generic Touch Panel, select ***% Stenosis***.
2. Select ***%sten(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the inner area of the blood vessel.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the outer area of the blood vessel.

   The system displays each distance measurement and the % Stenosis in the Results Window.

For details on how to make a distance measurement, See ‘Distance measurement’ for more information..

NOTE: *For the diameter calculation, do NOT take a distance measurement from a longitudinal view. This may lead to an inaccurate assessment of % stenosis.*

% Stenosis (continued)

Area To calculate percent stenosis by area:

1. From the Generic Touch Panel, select ***% Stenosis***.
2. Select ***%sten(Area)***.

   The system displays a trace caliper.
3. Make a trace measurement of the inner area of the blood vessel.

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

   The system displays a second trace caliper.

4. Make a trace measurement of the outer area of the blood vessel.

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

See ‘Circumference and area (trace) measurement’ 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’ for more information..

For details on how to make an ellipse measurement, See ‘Circumference and area (ellipse) measurement’ 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.

To make a volume calculation using three distances:

1. Make three distance measurements.

   NOTE: *Three distances should 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. Select ***Volume***.
2. Make one ellipse measurement.
3. 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. Select ***Volume***.
2. Make one distance measurement and one ellipse measurement.
3. 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 7-3: 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)

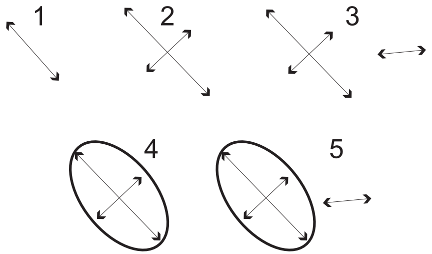


Figure 7-36. Volume Calculation Examples

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 Touch Panel, 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** knob.*

A/B Ratio

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

Diameter To calculate A/B ratio by diameter:

1. From the Generic Touch Panel, select ***A/B Ratio***.
2. Select ***ratio(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the first velocity.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the second velocity.

   The system displays each distance measurement and the A/B ratio in the Results Window.

NOTE: The first caliper is the A velocity. The second caliper is the B velocity.

For details on how to make a distance measurement, See ‘Distance measurement’ for more information..

Area To calculate A/B ratio by area:

1. From the Generic Touch Panel, select ***A/B Ratio***.
2. Select ***ratio(Area)***.

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

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

   The system displays a second trace caliper.
4. Make a trace measurement of the B velocity.

   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’ for more information..

M-Mode Measurements

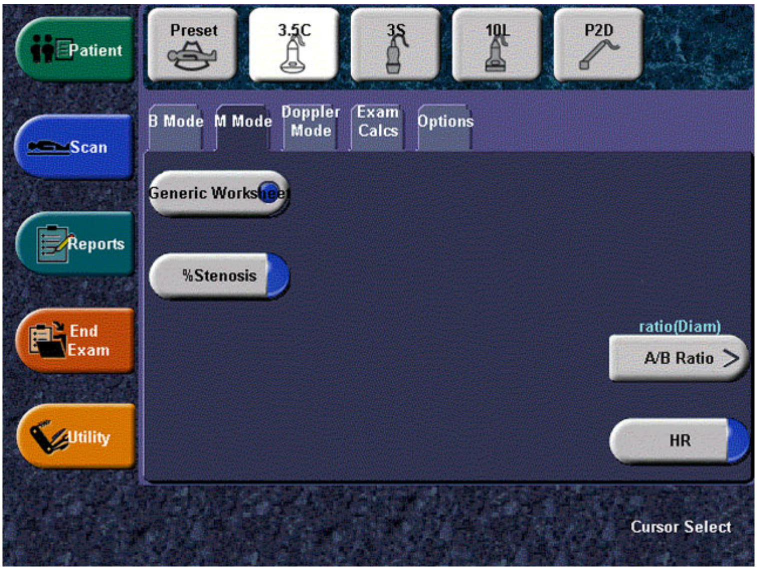

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic Worksheet
%Stenosis
ratio(Diam)
A/B Ratio
HR
Cursor Select

Figure 7-37. M-Mode Generic Study

% Stenosis

See '% Stenosis' for more information.

A/B Ratio

See 'A/B Ratio' for more information.

Heart Rate

To calculate the heart rate:

1. From the Generic Touch Panel, 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 second or third cycle, move the **Trackball**.

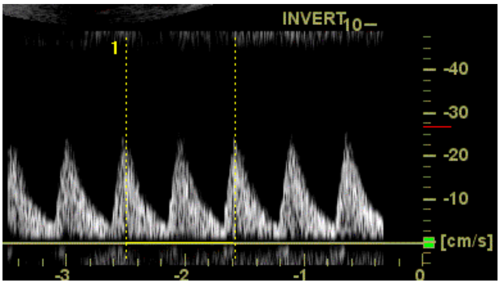


Figure 7-38. Two Heart Beat Reference

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' for more information.*

Doppler Mode Measurements

In Doppler Mode, the Generic study 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)
- HR (Heart Rate)

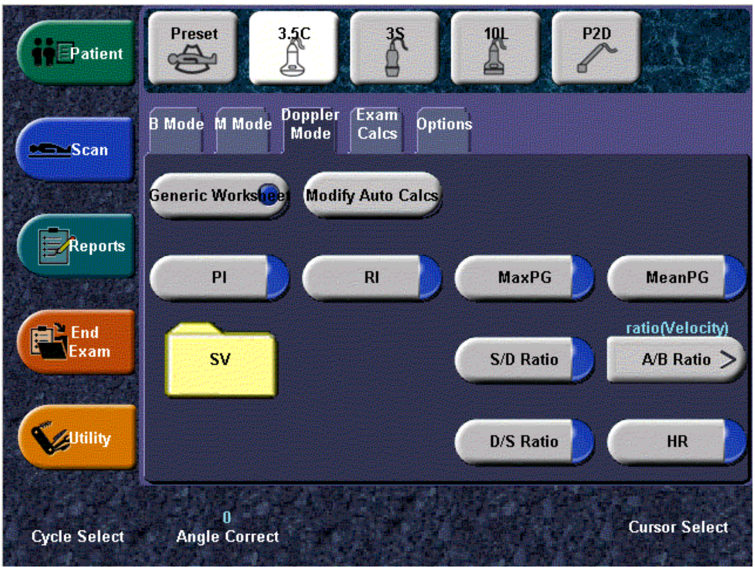

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic Worksheet
Modify Auto Calcs
PI
RI
MaxPG
MeanPG
SV
ratio(Velocity)
S/D Ratio
A/B Ratio
D/S Ratio
HR
Cycle Select
0
Angle Correct
Cursor Select

Figure 7-39. Doppler Mode Generic Study

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

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

Pulsatility Index (PI)

1. From the Doppler Generic Touch Panel, select ***PI***.

   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 V_{max} $V_{min,}$ V_d TAMAX, and PI in the Results Window.

Resistive Index (RI)

1. From the Doppler Generic Touch Panel, select ***RI***.

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

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

   The system displays V_{max} $V_{min,}$ and RI in the Results Window.

S/D or D/S Ratio

To calculate the Peak Systole/End Diastole ratio or End Diastole/Peak Systole ratio:

1. Select ***S/D*** or ***D/S***.

   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 S/D or D/S ratio in the Results Window.

A/B Ratio

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

Velocity To measure 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.

Time To measure AB 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 the A/B ratio in the Results Window.

A/B Ratio (continued)

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 Touch Panel, 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 Touch Panel, 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 Touch Panel.

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’ for more information. or select any of the following measurements.

SV Diam (Stroke Volume Diameter)

To measure SV Diam:

1. From the Doppler Generic Touch Panel, select the SV folder.
2. Select SV Diam.

SV TAMEAN (Stroke Volume TAMEAN)

To measure SV TAMEAN:

1. From the Doppler Generic Touch Panel, select the SV folder.
2. Select SV TAMEAN.

CO HR (Cardiac Output Heart Rate)

To measure CO HR:

1. From the Doppler Generic Touch Panel, select the SV folder.
2. Select CO HR.

Helpful hints

HINTS

The following hints can help when making a measurement

- If you press ***P1*** while making a measurement, the system completes the measurement and sends the data to the worksheet (unless the VCR is assigned to the ***P1*** key).
- 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’ for more information.

Any measurement can be repeated by selecting that measurement again from the Touch Panel Menu.

Abdomen

Introduction

Abdominal measurements offer a few different types of measurement studies:

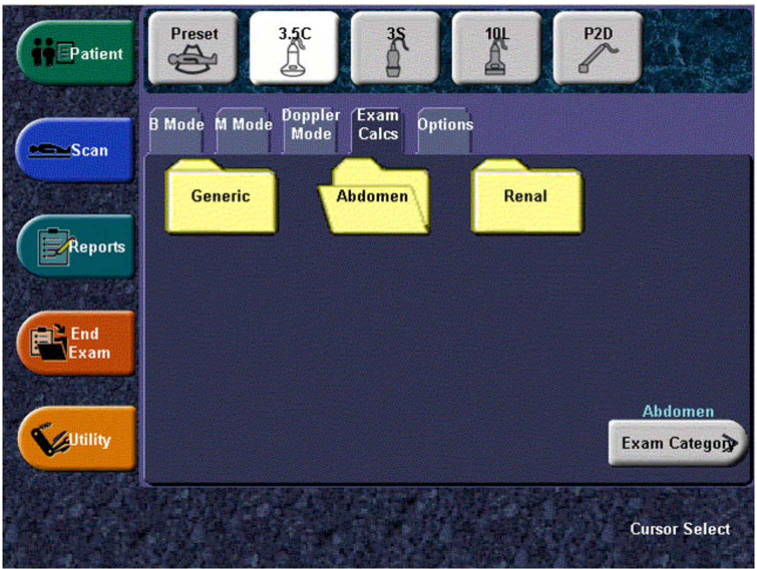

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic
Abdomen
Renal
Abdomen
Exam Category
Cursor Select

Figure 8-1. Abdomen Exam Category Touch Panel

- Generic–Common to all applications. See ‘Generic Measurements’ for more information.
- Abdomen
- Renal Artery

1. Press ***Exam Calcs***.

   The Vascular exam category allows you to choose from the displayed studies.
2. To select another study, press 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
- A/B Ratio

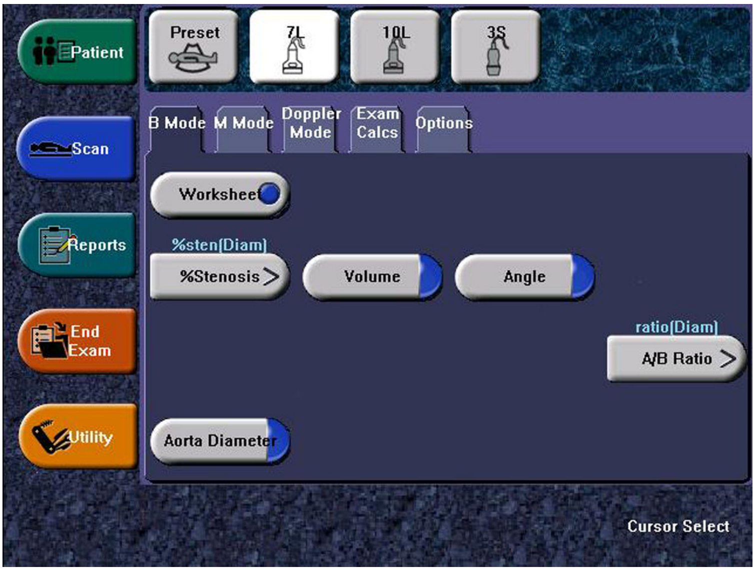

Patient
Preset
7L
10L
3S
Scan
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Reports
Worksheet
%sten(Diam)
%Stenosis
Volume
Angle
End Exam
ratio(Diam)
A/B Ratio
Utility
Aorta Diameter
Cursor Select

Figure 8-2. Generic Calculations B-Mode Touch Panel

See ‘B-Mode Measurements’ for more information.

Splenic length, width, and height

These measurements are found in the Abdomen Exam Calcs tab. Each of these is a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

To measure splenic length, width, or height:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Splenic*** folder, then select ***Splenic L***, ***Splenic W***, or ***Splenic 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.
4. To make the second and third distance measurement, repeat steps 2–3.

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

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 Artery Exam Calcs tab. To measure renal length, make one distance measurement:

1. Select **Renal Length**; 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 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

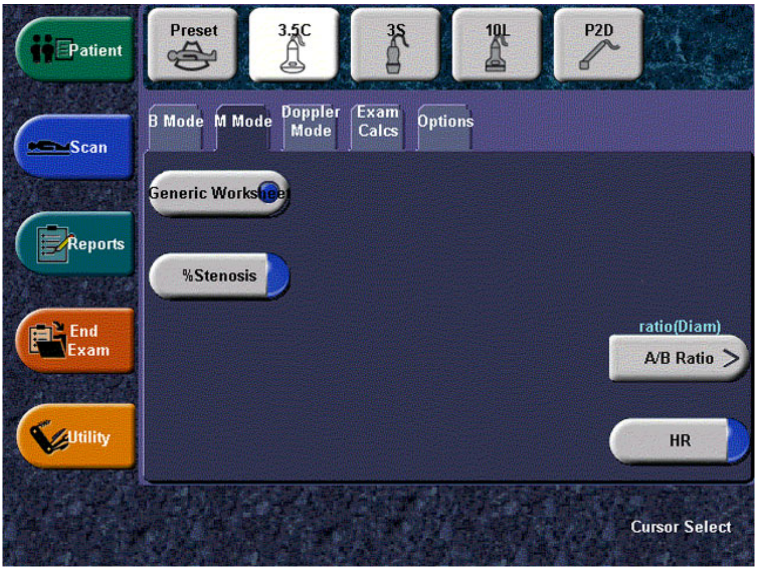

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic Worksheet
%Stenosis
ratio(Diam)
A/B Ratio
HR
Cursor Select

Figure 8-3. Abdomnal Calculations M-Mode Touch Panel

See ‘M-Mode Measurements’ 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

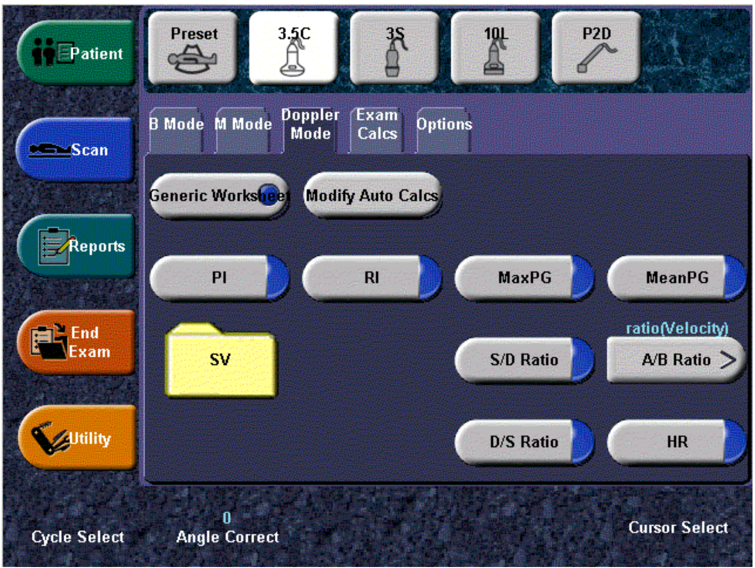

Patient
Preset
3.5C
3S
10L
P2D
Scan
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic Worksheet
Modify Auto Calcs
Reports
PI
RI
MaxPG
MeanPG
End Exam
ratio(Velocity)
SV
S/D Ratio
A/B Ratio
Utility
D/S Ratio
HR
0
Cycle Select
Angle Correct
Cursor Select

Figure 8-4. Doppler Mode Touch Panel: Abdominal Calculations

See ‘Doppler Mode Measurements’ for more information.

Abdomen and Renal Artery 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. Refer to Figure 8-5 and Figure 8-6 for the Abdomen and Renal Artery Exam Calcs, respectively.

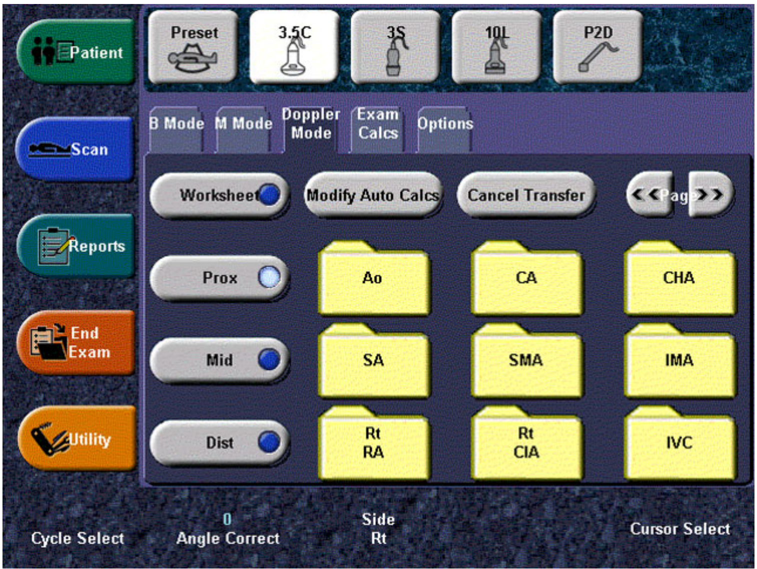

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Modify Auto Calcs
Cancel Transfer
<< Page >>
Prox
Mid
Dist
Ao
CA
CHA
SA
SMA
IMA
Rt RA
Rt CIA
IVC
Cycle Select
0
Angle Correct
Side
Rt
Cursor Select

Figure 8-5. Abdomen Exam Calcs Folder (Doppler Mode) in Abdomen exam category

Abdomen and Renal Artery Exam Calcs (continued)

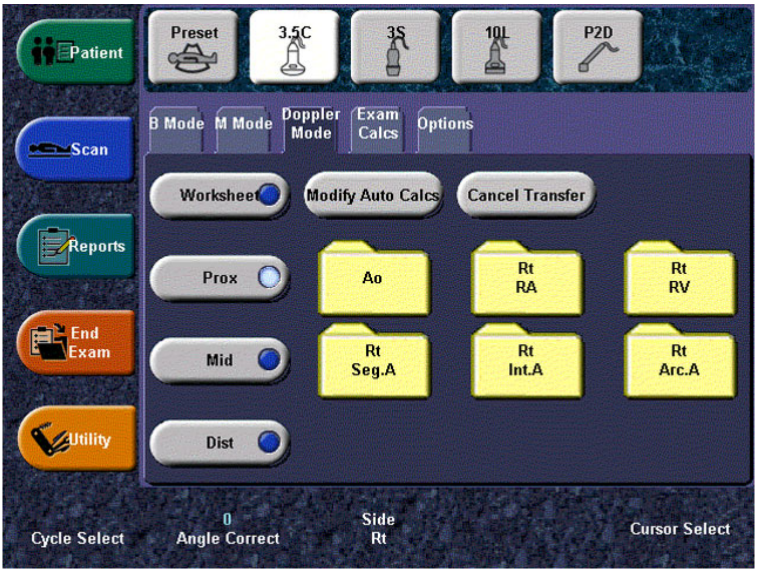

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Modify Auto Calcs
Cancel Transfer
Prox
Mid
Dist
Ao
Rt RA
Rt RV
Rt Seg.A
Rt Int.A
Rt Arc.A
Cycle Select
0
Angle Correct
Side
Rt
Cursor Select

Figure 8-6. Renal Exam Calcs (Doppler Mode)

2. Press Show All.

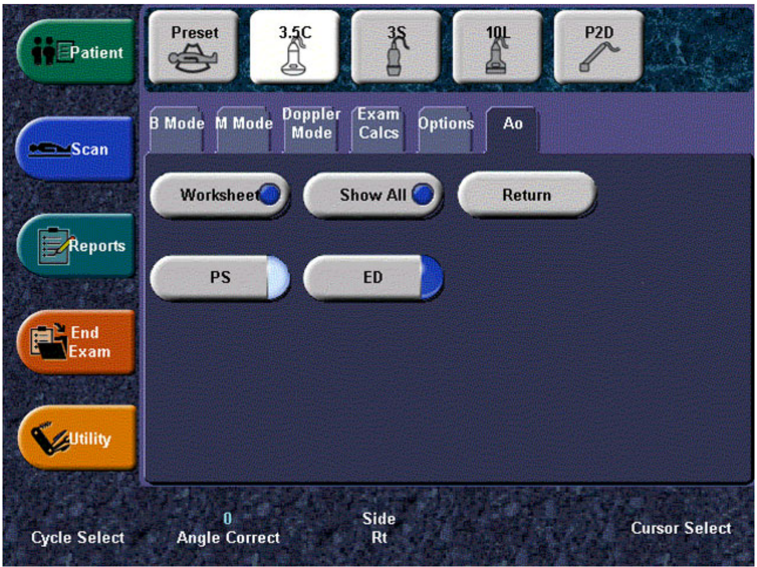

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Ao
Worksheet
Show All
Return
PS
ED
Cycle Select
0
Angle Correct
Side
Rt
Cursor Select

Figure 8-7. Aorta folder

Abdomen and Renal Artery Exam Calcs (continued)

The system displays all possible measurements.

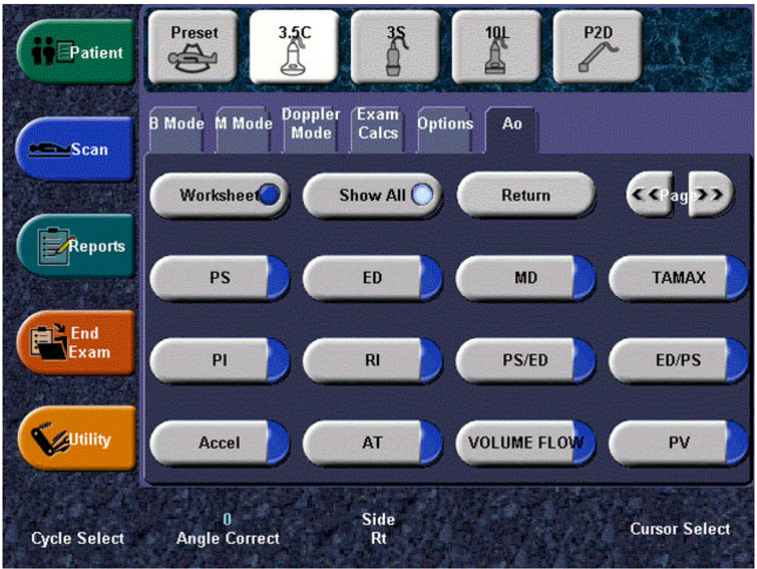

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Ao
Worksheet
Show All
Return
<<Page>>
PS
ED
MD
TAMAX
PI
RI
PS/ED
ED/PS
Accel
AT
VOLUME FLOW
PV
Cycle Select
0
Angle Correct
Side
Rt
Cursor Select

Figure 8-8. 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 Artery 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 Artery Exam Calcs (continued)

Heart Rate

To calculate the heart rate:

1. Select ***Heart Rate***.

   The system displays an active caliper and a vertical dotted line.
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 second or third cycle, move the **Trackball**.

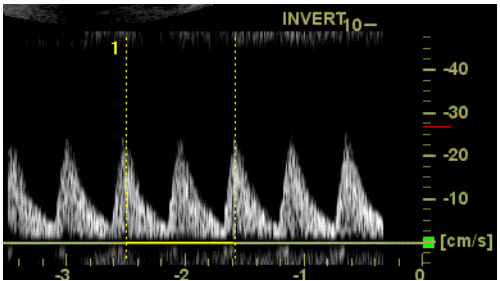


Figure 8-9. Two Heart Beat Reference

5. To complete the measurement and transfer the calculation to the worksheet, press **Set**.

Abdomen and Renal Artery Exam Calcs (continued)

Peak Systole (PS), End Diastole (ED), or Mid Diastole (MD)

To calculate the peak systole, end diastole, or mid 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 mid diastole in the Results Window.

Pulsatility Index (PI)

1. Select ***PI***.

   The system displays a trace caliper and a vertical dotted line.

2. To position the caliper at the beginning of the waveform (PS), move the **Trackball**.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.

4. To trace the waveform from PS to ED, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays peak systole, mid diastole, end diastole, TAMAX, and the PI in the Results Window.

Abdomen and Renal Artery Exam Calcs (continued)

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.

Resistive Index (RI)

1. 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.

Abdomen and Renal Artery Exam Calcs (continued)

TAMAX

1. Select ***TAMAX***.

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

   The system displays a second active caliper.
4. To trace the waveform, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays VTI, Time, and TAMAX in the Results Window.

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

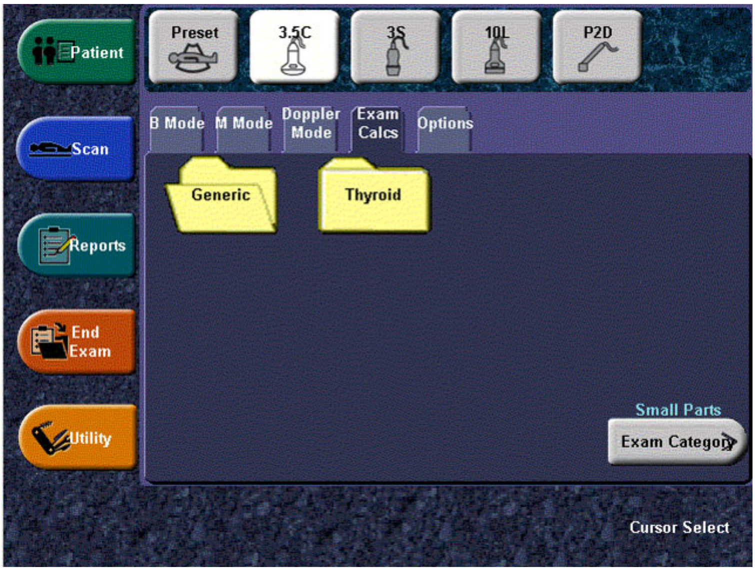

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic
Thyroid
Small Parts
Exam Category
Cursor Select

Figure 8-10. Small Parts Exam Category Touch Panel

Generic Measurements

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

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

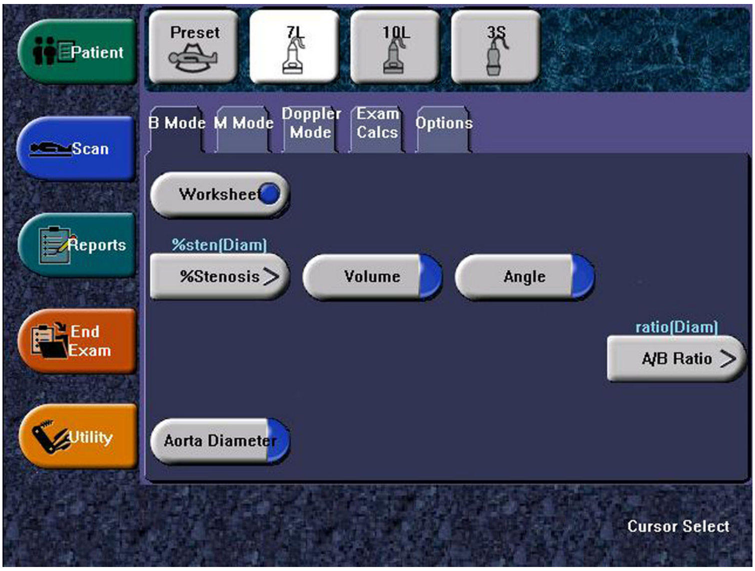

Patient
Scan
Reports
End Exam
Utility
Preset
7L
10L
3S
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
%sten(Diam)
%Stenosis
Volume
Angle
ratio(Diam)
A/B Ratio
Aorta Diameter
Cursor Select

Figure 8-11. Generic Calculations B-Mode Touch Panel

See ‘B-Mode Measurements’ for more information.

Thyroid length, width, and height

Each of these is a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the 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 ***Thyroid L***, ***Thyroid W***, or ***Thyroid H***.

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

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

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

      The system displays the distance value in the Results Window.
5. 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

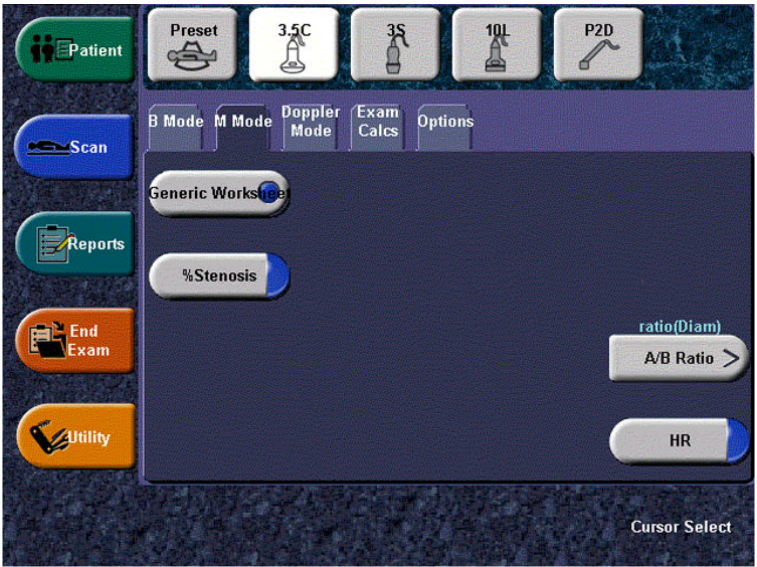

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic Worksheet
%Stenosis
ratio(Diam)
A/B Ratio
HR
Cursor Select

Figure 8-12. Abdomnal Calculations M-Mode Touch Panel

See ‘M-Mode Measurements’ for more information.

Doppler Mode Measurements

In Doppler Mode, the Exam Calcs tabs include 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)
- Heart Rate

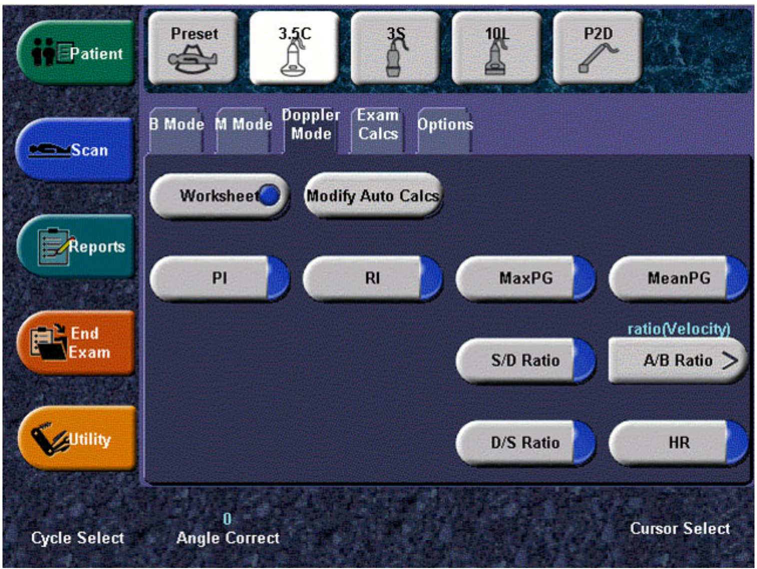

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Modify Auto Calcs
PI
RI
MaxPG
MeanPG
ratio(Velocity)
S/D Ratio
A/B Ratio
D/S Ratio
HR
Cycle Select
0
Angle Correct
Cursor Select

Figure 8-13. Doppler Mode Touch Panel: Abdominal Calculations

See ‘Doppler Mode Measurements’ 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.

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 5 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.

⚠ CAUTION

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 keyboard or on the Touch Panel, press ***Patient***.

   The Patient Data Entry screen is displayed.
2. On the Patient Data Entry screen or on the Touch Panel, 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’ 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’ for more information.*

To Start an Obstetrics Exam (continued)

Table 9-1: Obstetric fields

Field	Description
LMP	Last Menstrual Period; enter the date that the patient started her last menstrual period, 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 /.
BBT	Basal Body Temperature.
EDD by LMP	Estimated Delivery Date by LMP; the system fills in the date after you enter the LMP.
GA by LMP	Gestational Age by LMP; the system fills in the age after you enter the LMP.
Gravida	Number of pregnancies.
Para	Number of births.
AB	Number of abortions.
Ectopic	Number of ectopic pregnancies.
Fetus #	Number of fetuses; default is 1. Can be 1-4.
Accession #	Exam number used with hospital information system (DICOM). This is a tracking number from the worklist.
Exam Description	Describe the type of exam.
Perf Physician	The physician who performs the exam. Choose from the list or type the name.
Ref. Physician	The physician who requested the exam. Choose from the list or type the name.
Operator	The person (not a physician) who performs the scan. Choose from the list.

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

Table 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*** or ***Patient***.
   - On the Touch Panel, select ***Scan***.
   - On the Control Panel, press the B-Mode key.

   The system displays the Scan screen.
2. To choose the appropriate probe, select the probe icon on the Touch Panel.
3. On the Control Panel, press ***Measure***.

   The default Obstetrics study is displayed on the Touch Panel. Figure 9-1 shows the OB-General study.

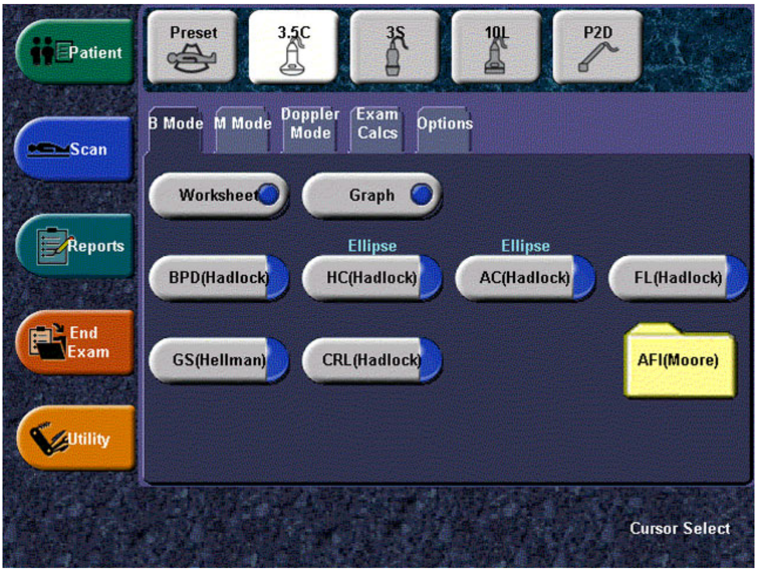

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Graph
Ellipse
Ellipse
BPD(Hadlock)
HC(Hadlock)
AC(Hadlock)
FL(Hadlock)
GS(Hellman)
CRL(Hadlock)
AFI(Moore)
Cursor Select

Figure 9-1. OB-General Study

To choose a study

1. To change the study, on the Touch Panel, select ***Study***.

   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, press the study folder on the Touch Panel.

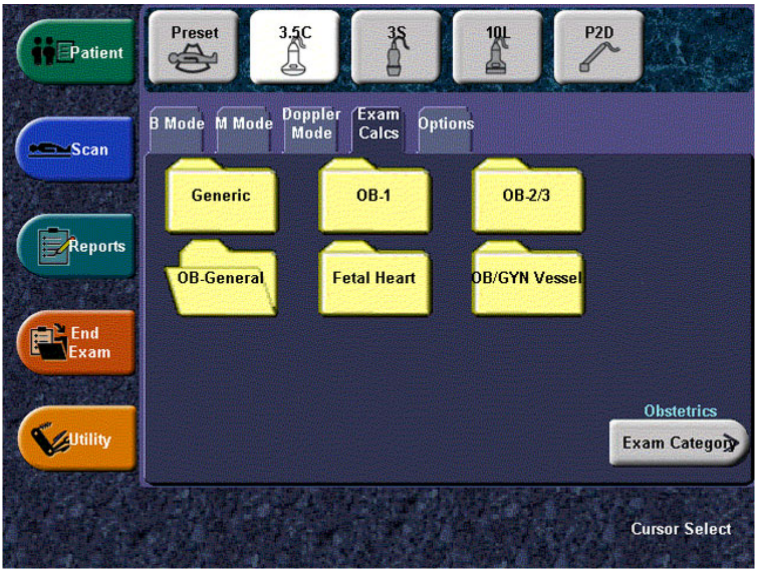

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic
OB-1
OB-2/3
OB-General
Fetal Heart
OB/GYN Vessel
Obstetrics
Exam Category
Cursor Select

Figure 9-2. OB Study Touch Panel

NOTE: *The folders you see on the Touch Panel 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.

Abdominal Circumference (AC)

USA	Europe	Tokyo	Osaka	ASUM
●	●	●	○	○

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 above the key.
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 in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - 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 above the key.
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 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.

Abdominal Circumference (AC) (continued)

Two distances

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***AC*** until *Trace* is displayed above the key.
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.
    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**.

A/B Ratio

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

Diameter

To calculate A/B ratio by diameter:

1. Select ***A/B Ratio***.
2. Select ***ratio(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the first velocity.
   1. To position the active caliper at the start point, move the **Trackball**.
   2. To fix the start point, press **Set**.

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

      A dotted line connects the measurement points.
   4. 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 second velocity, repeat steps a–d.

   The system displays each distance measurement and the A/B ratio in the Results Window.

A/B Ratio (continued)

Area To calculate A/B ratio by area:

1. Select ***A/B Ratio***.
2. Select ***ratio(Area)***.

   The system displays a trace caliper.
3. Make a trace measurement of the A velocity:
   a. To position the trace caliper at the start point, move the **Trackball**.
   b. To fix the trace start point, press **Set**.

      The trace caliper changes to an active caliper.
   c. To trace the measurement area, move the **Trackball**.

      A dotted line shows the traced area.

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

   d. To complete the measurement, press **Set**.

      After the first measurement, the system displays a second trace caliper.
4. To make a trace measurement of the B velocity, repeat steps a–d.

   The system displays the two area measurements and the A/B ratio in the Results Window.

Amniotic Fluid Index (AFI)

USA Europe Tokyo Osaka ASUM
● ● ● ● ●

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 appropraite AFI quadrant Touch Panel key to toggle between caliper and circle.*

1. Select ***AFI***.

   The first distance measurement, AFI-Q1, is already selected.
2. Make a standard distance measurement for the first quadrant:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

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

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

      The system displays the distance value in the Results Window.
3. When the measurement of the first quadrant is completed, unfreeze and move to the second quadrant.
4. After you obtain the image, press **Freeze** and then **Measure**.

   The system prompts you to continue with the AFI measurements.

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 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 Touch Panel.

Angle

This function measures the angle between two intersecting planes.

1. 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.

Antero-Postero Trunk Diameter & Transverse Trunk Diameter (APTD-TTD)

USA	Europe	Tokyo	Osaka	ASUM
○	○	●	○	○

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)

USA ○ Europe ○ Tokyo ● Osaka ○ ASUM ○

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.

Biparietal Diameter

USA	Europe	Tokyo	Osaka	ASUM
●	●	●	●	○

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

USA	Europe	Tokyo	Osaka	ASUM
●	●	●	●	○

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.

Cardio-Thoracic Area Ratio (CTAR)

USA	Europe	Tokyo	Osaka	ASUM
○	○	○	●	○

To calculate cardio-thoracic area ratio, you make two ellipse measurements.

1. Select ***CTAR***; an active caliper displays.
2. Make an ellipse measurement of the cardiac area:
    a. To position the active caliper, move the **Trackball**.
    b. To fix the start point, press **Set**.

       The system fixes the first caliper and displays a second active caliper.
    c. To position the second caliper, move the **Trackball**.
    d. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
    - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
    - To increase the size, adjust the **Ellipse** control in a clockwise direction.
    - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
    - To toggle between active calipers, 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)

USA	Europe	Tokyo	Osaka	ASUM
○	○	●	●	○

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.

Femur Length

USA	Europe	Tokyo	Osaka	ASUM
●	●	●	●	○

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.

Fetal Trunk Area (FTA)

USA ○ Europe ○ Tokyo ○ Osaka ● ASUM ○

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 in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - 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 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.

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.
    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

USA Europe Tokyo Osaka ASUM
○ ● ○ ○ ○

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.

Gestational Sac

● USA ● Europe ● Tokyo ● Osaka ○ ASUM

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)

USA	Europe	Tokyo	Osaka	ASUM
●	●	○	○	○

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 above the key.
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 in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - 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 above the key.
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 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.

Head Circumference (HC) (continued)

Two distances

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***HC*** until *Trace* is displayed above the key.
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.
    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**.

Heart Rate

To calculate the heart rate:

1. Select ***Heart Rate***.

   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 second or third cycle, move the **Trackball**.

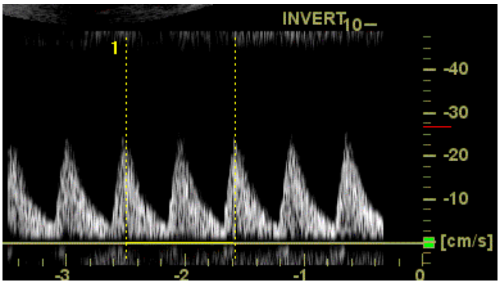


Figure 9-3. Two Heart Beat Reference

5. To complete the measurement press **Set**.

Humerus Length

USA Europe Tokyo Osaka ASUM
○ ● ○ ● ○

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)

USA Europe Tokyo Osaka ASUM
○ ○ ● ○ ○

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

USA	Europe	Tokyo	Osaka	ASUM
○	●	○	○	○

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.

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. 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:
   1. To position the active caliper at the start point, move the **Trackball**.
   2. To fix the start point, press **Set**.

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

      A dotted line connects the measurement points.
   4. 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 outer area of the blood vessel, repeat steps a–d.

   The system displays the % Stenosis in the Results Window.

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. 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:
   a. To position the trace caliper at the start point, move the **Trackball**.
   b. To fix the trace start point, press **Set**.

      The trace caliper changes to an active caliper.
   c. To trace the measurement area, move the **Trackball** around the anatomy.

      A dotted line shows the traced area.

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

   d. To complete the measurement, press **Set**.

      The system displays a second trace caliper.
4. To make a trace measurement of the outer area of the blood vessel, repeat steps a–d.

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

Transverse Abdominal Diameter

USA Europe Tokyo Osaka ASUM
○ ● ○ ○ ○

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

USA Europe Tokyo Osaka ASUM
○ ● ○ ○ ○

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

USA Europe Tokyo Osaka ASUM
○ ● ○ ○ ○

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

USA	Europe	Tokyo	Osaka	ASUM
○	●	○	○	○

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

USA	Europe	Tokyo	Osaka	ASUM
○	●	○	○	○

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

The system can make a volume calculation from any of the following measurements:

- One distance
- Two distances
- Three distances

To make a volume calculation using one or two distances:

1. Select ***Volume***.
2. Make one or two distance measurements:
    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 next distance measurement.
3. Do one of the following:
    - To complete the volume calculation with one distance measurement, select ***Volume***.
    - To complete the volume calculation with two distance measurements, repeat steps a–d, then select ***Volume***.
4. Press **Clear**.

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

Volume (continued)

To make a volume calculation using three distances:

NOTE: *Three distances should 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.*

1. Select ***Volume***; 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 and displays an active caliper.
3. To make the second and third distance measurements, repeat steps a–d.

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

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.

NOTE: *Always take the measurement from a cross-sectional view of the vessel.*

1. Select ***% Stenosis***.

   The system displays an active caliper.
2. Make a distance measurement of the inner area of the blood vessel:
   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.
3. To make a distance measurement of the outer area of the blood vessel, repeat steps a–d.

   The system displays each distance measurement and the % Stenosis in the Results Window.

NOTE: *For the diameter calculation, do NOT take a distance measurement from a longitudinal view. This may lead to an inaccurate assessment of % stenosis.*

A/B Ratio

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

Diameter To calculate A/B ratio by diameter:

1. Select ***A/B Ratio***.
2. Select ***ratio(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the first velocity.
   1. To position the active caliper at the start point, move the **Trackball**.
   2. To fix the start point, press **Set**.

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

      A dotted line connects the measurement points.
   4. 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 second velocity, repeat steps a–d.

A/B Ratio (continued)

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 the 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:

1. From the Generic Touch Panel, select ***Heart Rate***.

   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 second or third cycle, move the **Trackball**.

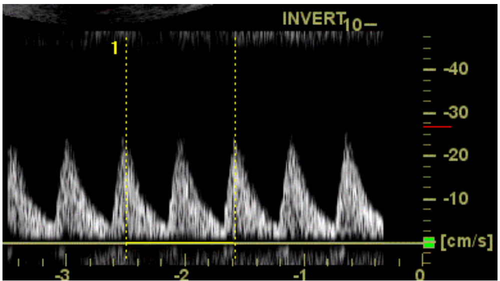


Figure 9-4. Two Heart Beat Reference

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 the Basic User Manual, General Measurements and Calculation.*

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)
- Mid 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 Touch Panel.

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.

To calculate the heart rate:

1. Select ***Heart Rate***.

   The system displays an active caliper and a vertical dotted line.
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 second or third cycle, move the **Trackball**.

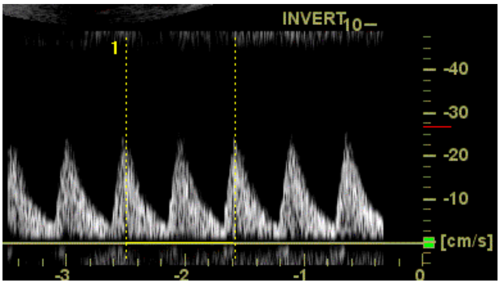


Figure 9-5. Two Heart Beat Reference

5. To complete the measurement and transfer the calculation to the worksheet, press **Set**.

Peak Systole (PS), End Diastole (ED), or Mid Diastole (MD)

To calculate the peak systole, end diastole, or mid 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 mid diastole in the Results Window.

Pulsatility Index (PI)

1. Select ***PI***.

   The system displays a trace caliper and a vertical dotted line.
2. To position the caliper at the beginning of the waveform (PS), move the **Trackball**.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. To trace the waveform from PS to ED, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays peak systole, mid diastole, end diastole, TAMAX, and the PI 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.

Resistive Index (RI)

1. 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.

TAMAX

1. Select ***TAMAX***.

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

   The system displays a second active caliper.
4. To trace the waveform, move the **Trackball**.
5. To complete the measurement, press **Set**.

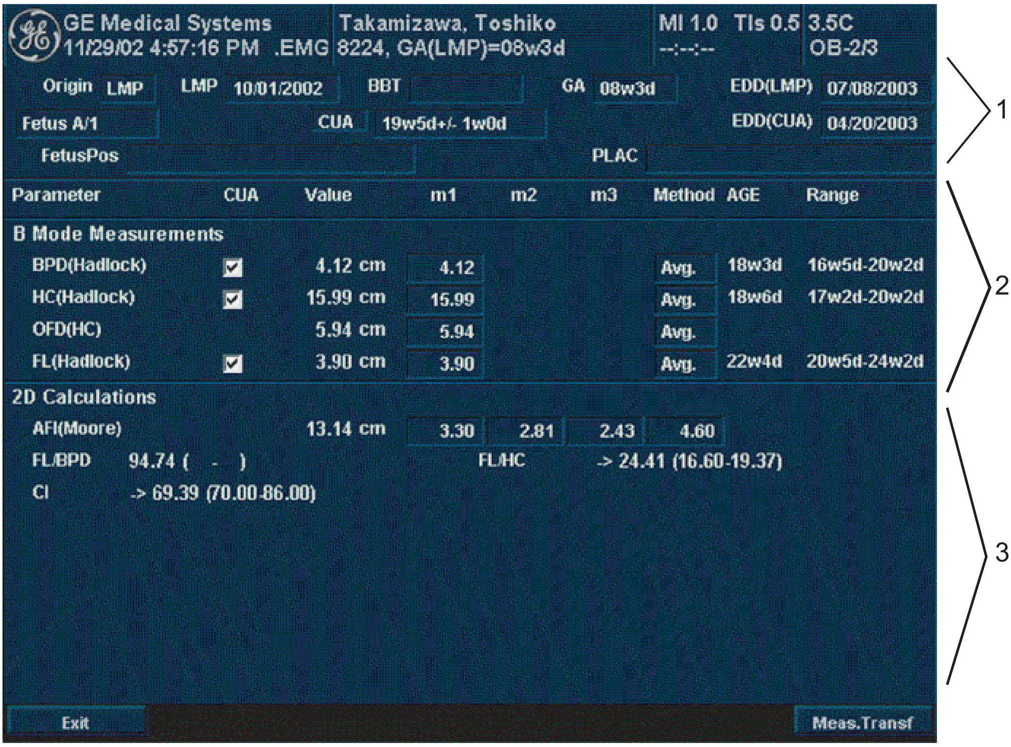
   The system displays VTI, Time, and TAMAX in the Results Window.

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***.



GE Medical Systems
11/29/02 4:57:16 PM .EMG
Takamizawa, Toshiko
8224, GA(LMP)=08w3d
MI 1.0 TIs 0.5
--:--:--
3.5C
OB-2/3

Origin LMP
LMP 10/01/2002
BBT
GA 08w3d
EDD(LMP) 07/08/2003
Fetus A/1
CUA 19w5d+/- 1w0d
EDD(CUA) 04/20/2003
FetusPos
PLAC

Parameter	CUA	Value	m1	m2	m3	Method	AGE	Range
B Mode Measurements								
BPD(Hadlock)	☑	4.12 cm	4.12			Avg.	18w3d	16w5d-20w2d
HC(Hadlock)	☑	15.99 cm	15.99			Avg.	18w6d	17w2d-20w2d
OFD(HC)		5.94 cm	5.94			Avg.		
FL(Hadlock)	☑	3.90 cm	3.90			Avg.	22w4d	20w5d-24w2d
2D Calculations								
AFI(Moore)		13.14 cm	3.30	2.81	2.43	4.60		

FL/BPD 94.74 (-)
FL/HC -> 24.41 (16.60-19.37)
CI -> 69.39 (70.00-86.00)

Figure 9-6. 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** knob to select 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** knob.

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:

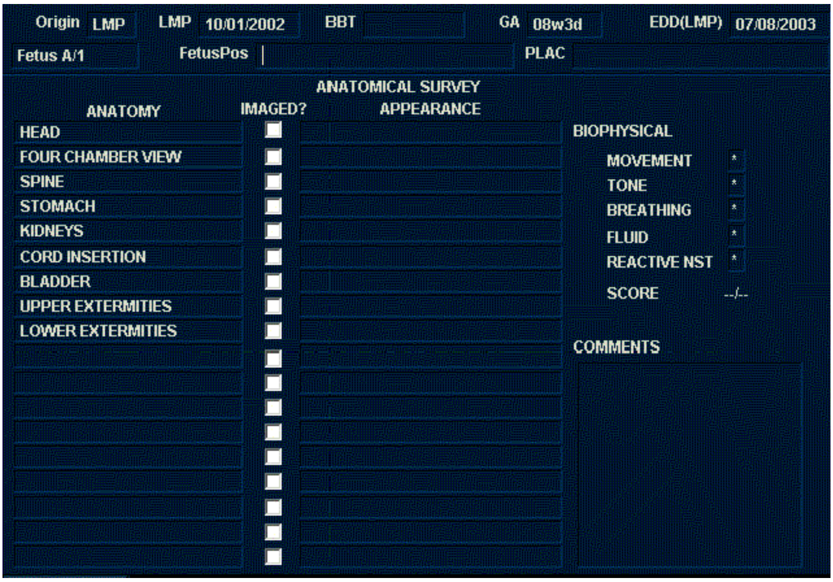
- The measurement is out of the normal range based on the gestational age that is calculated from the LMP. The system determines OOR from the ultrasound age compared to the gestational age. The gestational age is calculated from the last menstrual period or the estimated delivery date.
- The measurement 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’ for more information.

Anatomical Survey

Overview

The Anatomical Survey page provides a checklist that indicates which anatomy was imaged and its appearance.



Origin LMP
LMP 10/01/2002
BBT
GA 08w3d
EDD(LMP) 07/08/2003
Fetus A/1
FetusPos
PLAC

ANATOMICAL SURVEY

ANATOMY	IMAGED?	APPEARANCE
HEAD	☐	
FOUR CHAMBER VIEW	☐	
SPINE	☐	
STOMACH	☐	
KIDNEYS	☐	
CORD INSERTION	☐	
BLADDER	☐	
UPPER EXTERMITIES	☐	
LOWER EXTERMITIES	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	

BIOPHYSICAL

MOVEMENT	*
TONE	*
BREATHING	*
FLUID	*
REACTIVE NST	*
SCORE	--/--

COMMENTS

Figure 9-7. Anatomical Survey

Editing

- To activate the Anatomical Survey, select ***Anatomy*** on the OB Worksheet Touch Panel.

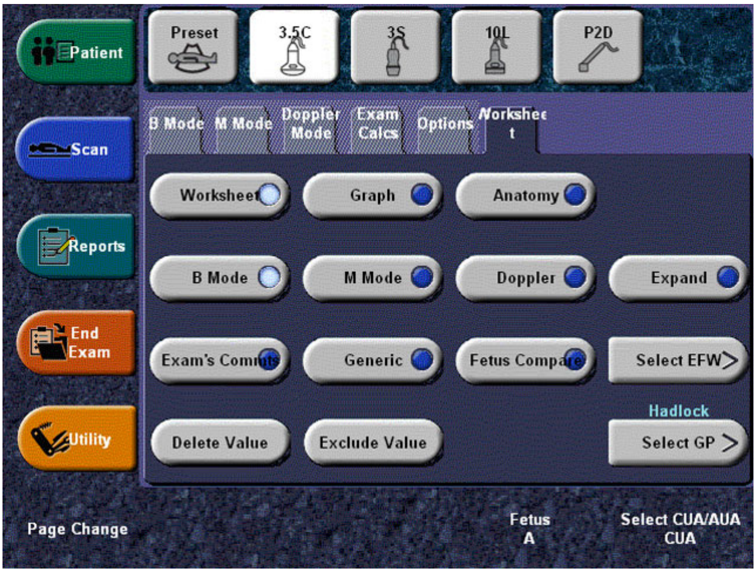

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Worksheet
Graph
Anatomy
B Mode
M Mode
Doppler
Expand
Exam's Comnts
Generic
Fetus Compare
Select EFW
Hadlock
Delete Value
Exclude Value
Select GP
Page Change
Fetus A
Select CUA/AUA CUA

Figure 9-8. OB Worksheet Touch Panel

- Fill the required field.

Table 9-3: Anatomical Survey

Field	Description
Fetus Pos	Indicate the fetal position within the uterus.
PLAC	Identify the location of the placenta.
ANATOMY	Enter the following information for each part of the anatomy imaged: 1. Imaged? : Check the box that you did image this part of the anatomy. 2. Appearance : If you checked the Imaged? box, indicate whether the appearance was normal or abnormal.
	You can add the required anatomy up to 9 additional anatomy. Move the Trackball to the blank field. Enter the anatomy name.

Table 9-3: Anatomical Survey

Field	Description
BIOPHYSICAL	The score is _ of 10 possible total points, depending upon the number of parameters entered. Enter the following information to assess the fetus's biophysical well-being.
Movement	Type 0, 1 or 2
Tone	Type 0, 1 or 2
Breathing	Type 0, 1 or 2
Fluid	Type 0, 1 or 2
Reactive NST (Reactive non-stress test)	Type 0, 1 or 2
COMMENTS	Free text

Select Exit to return to the Scan screen.

Select Worksheet to return to the Worksheet or Graph to enter the OB Graph screen on the Touch Panel.

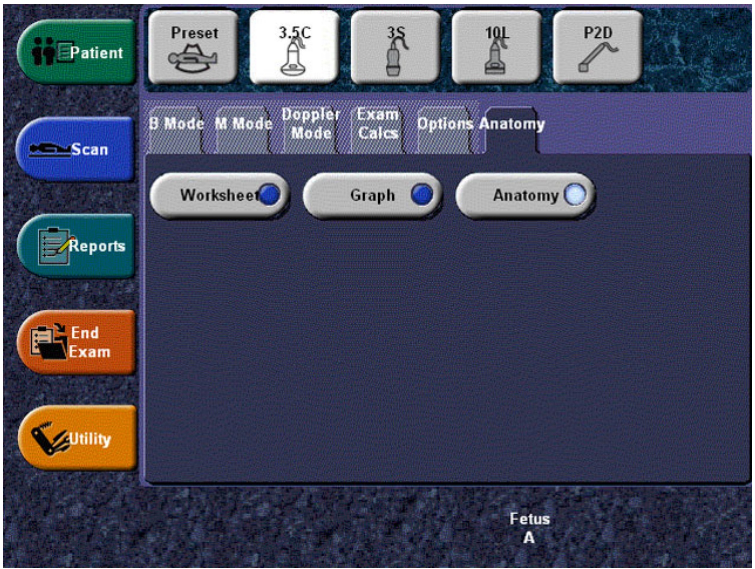

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Anatomy
Worksheet
Graph
Anatomy
Fetus A

Figure 9-9. Anatomical Survey Touch Panel

NOTE: *The contents input on the Anatomical Survey page are returned to the factory default settings after starting a new patient.*

OB Graphs

Overview

OB Graphs allow you to assess fetal growth compared to a normal growth curve. When a patient has completed two or more ultrasound exams, you can also use the graphs to look at fetal trending. For multi-gestational patients you can plot all fetuses and compare the growth on the graphs.

The LOGIQ 5 provides the following two basic types of graphs:

- **Fetal Growth Curve graphs** – show one measurement per graph. These graphs show the normal growth curve, positive and negative standard deviations or applicable percentiles, and ultrasound age of the fetus using the current measurement. For multi-gestational pregnancies, you can view all fetuses. If previous exam data is available, the graph can show fetal trending.
- **Fetal Growth Bar graph** – shows the ultrasound age and the gestational age based on patient data. Plots all measurements on one graph.

To View OB Graphs

To view OB graphs:

1. Press **Measure**.
2. Select ***Graph Display***.

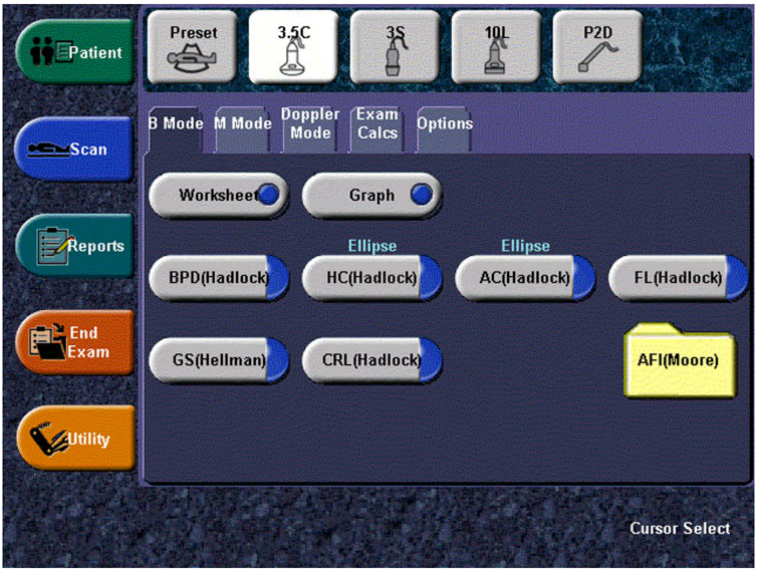

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Graph
Ellipse
Ellipse
BPD(Hadlock)
HC(Hadlock)
AC(Hadlock)
FL(Hadlock)
GS(Hellman)
CRL(Hadlock)
AFI(Moore)
Cursor Select

Figure 9-10. B-Mode OB Measurement Touch Panel

To View OB Graphs (continued)

After you select ***Graph Display***, the system displays the OB Graph keys on the Touch Panel.

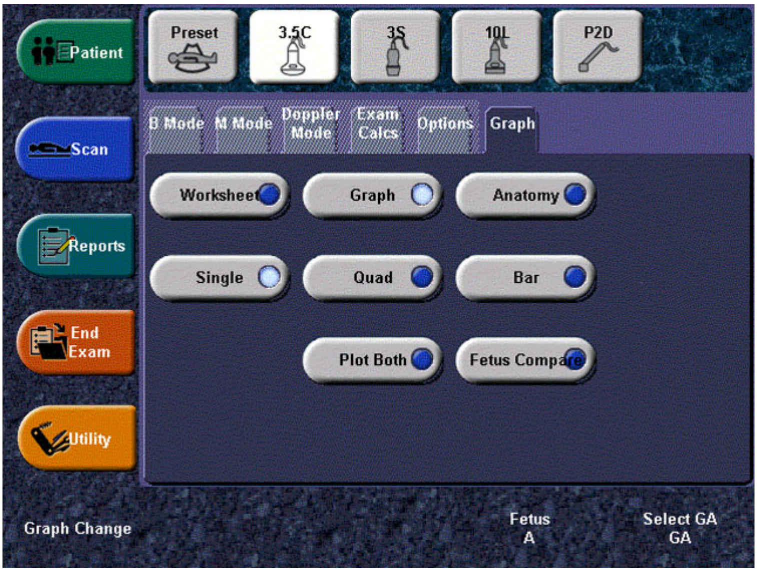
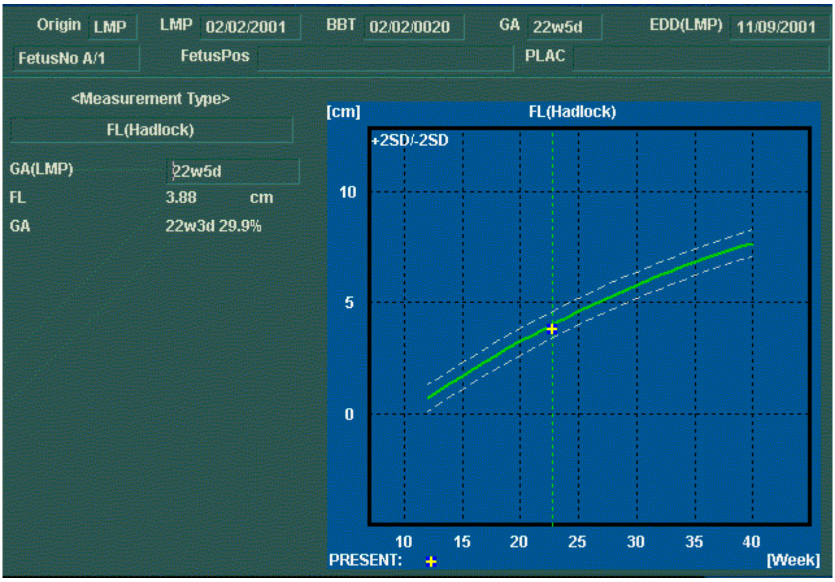

Patient
Preset
3.5C
3S
10L
P2D
Scan
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Graph
Worksheet
Graph
Anatomy
Reports
Single
Quad
Bar
End Exam
Plot Both
Fetus Compare
Utility
Graph Change
Fetus
A
Select GA
GA

Figure 9-11. OB Graph keys on Touch Panel

To View OB Graphs (continued)

The monitor display shows the Fetal Growth Curve Graph.



Origin LMP
LMP 02/02/2001
BBT 02/02/0020
GA 22w5d
EDD(LMP) 11/09/2001
FetusNo A/1
FetusPos
PLAC

<Measurement Type>
FL(Hadlock)

GA(LMP)	22w5d	
FL	3.88	cm
GA	22w3d 29.9%	

[cm]
FL(Hadlock)
+2SD/-2SD
10
5
0
10
15
20
25
30
35
40
PRESENT: +
[Week]

Figure 9-12. 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** knob.

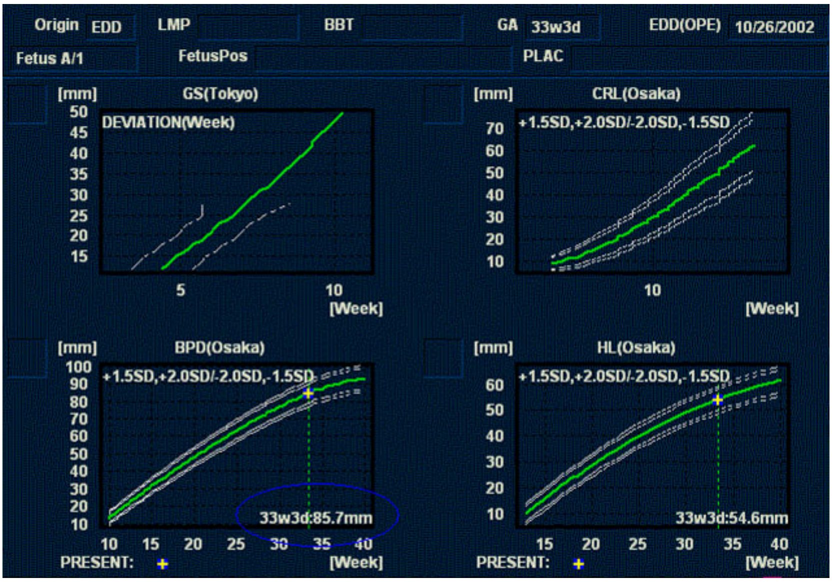
To select the age to use

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** knob. 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***.



Origin EDD
LMP
BBT
GA 33w3d
EDD(OPE) 10/26/2002
Fetus A/1
FetusPos
PLAC

33w3d:85.7mm
33w3d:54.6mm

[mm]
GS(Tokyo)
DEVIATION(Week)
50
45
40
35
30
25
20
15
5
10
[Week]
[mm]
CRL(Osaka)
+1.5SD,+2.0SD/-2.0SD,-1.5SD
70
60
50
40
30
20
10
10
[Week]
[mm]
BPD(Osaka)
+1.5SD,+2.0SD/-2.0SD,-1.5SD
100
90
80
70
60
50
40
30
20
10
10
15
20
25
30
35
40
PRESENT:
[Week]
[mm]
HL(Osaka)
+1.5SD,+2.0SD/-2.0SD,-1.5SD
60
50
40
30
20
10
15
20
25
30
35
40
PRESENT:
[Week]

Figure 9-13. 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** knob.

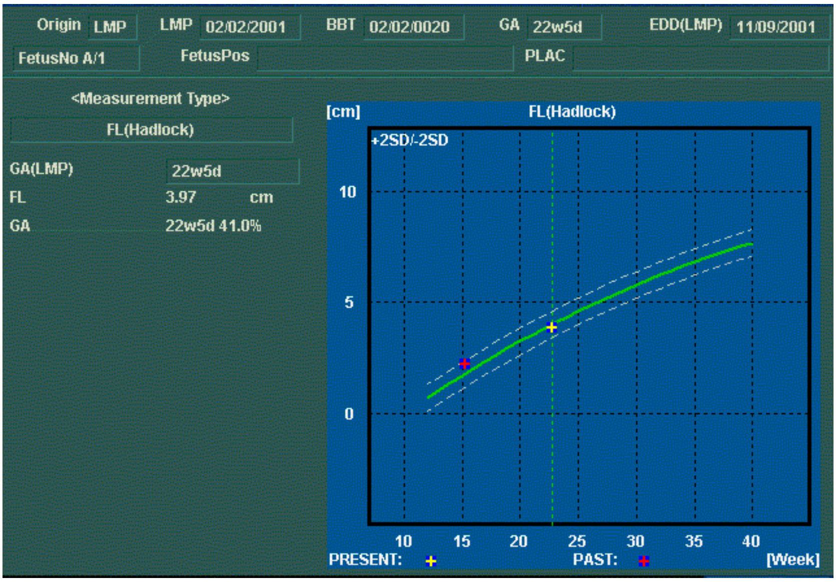
The order of a quad graph view can be saved by selecting **Save**.

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.



Origin LMP
LMP 02/02/2001
BBT 02/02/0020
GA 22w5d
EDD(LMP) 11/09/2001
FetusNo A/1
FetusPos
PLAC

<Measurement Type>
FL(Hadlock)

GA(LMP) 22w5d
FL 3.97 cm
GA 22w5d 41.0%

Figure 9-14. 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)

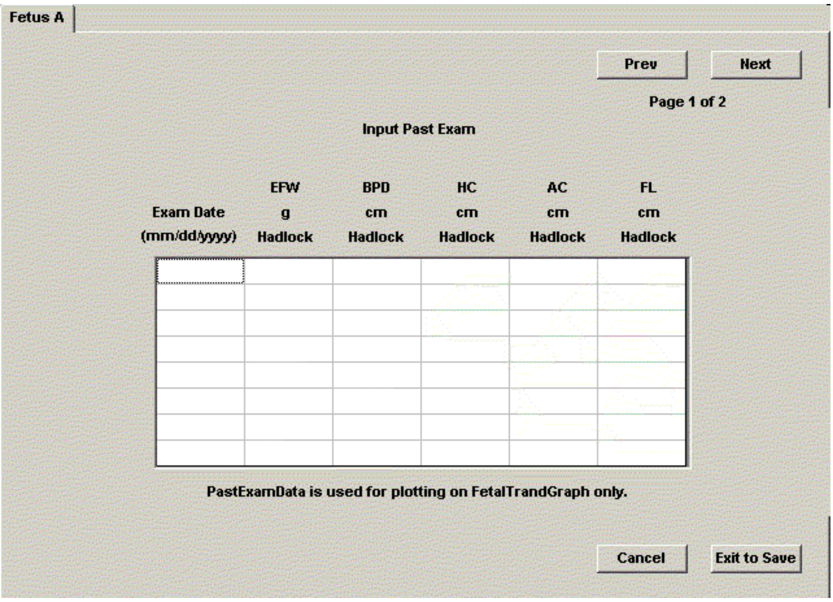
To manually enter past exam data

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 9-15.
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.

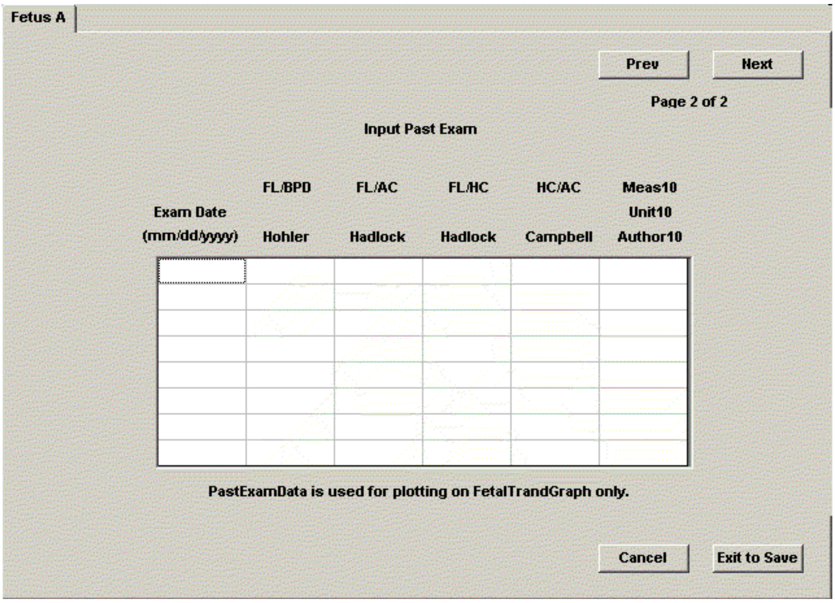


Exam Date (mm/dd/yyyy)	EFW g Hadlock	BPD cm Hadlock	HC cm Hadlock	AC cm Hadlock	FL cm Hadlock

PastExamData is used for plotting on FetalTrandGraph only.

Figure 9-15. Input Past Exam screen, page 1

Fetal Trending (continued)


Fetus A
Prev
Next
Cancel
Exit to Save

Page 2 of 2

Input Past Exam

Exam Date (mm/dd/yyyy)	FL/BPD Hohler	FL/AC Hadlock	FL/HC Hadlock	HC/AC Campbell	Meas10 Unit10 Author10

PastExamData is used for plotting on FetalTrandGraph only.

Figure 9-16. 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:

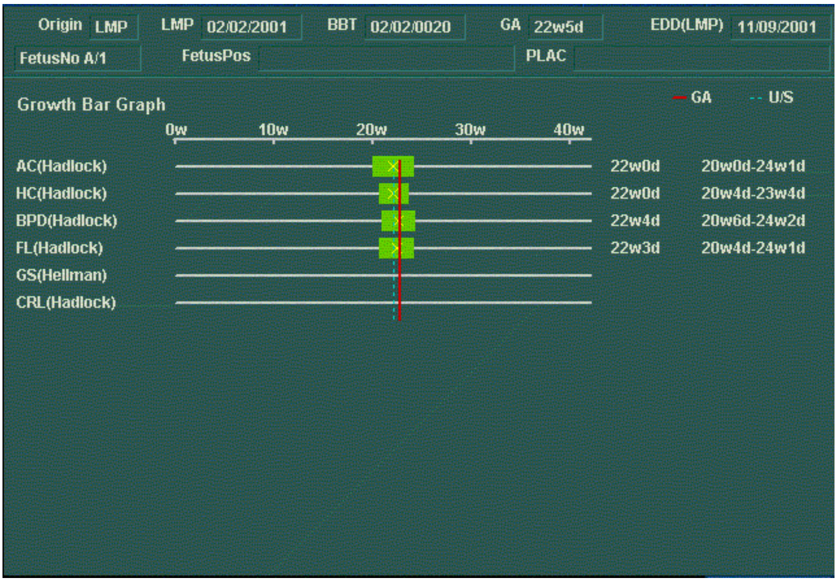
- On the graph display, select Exit.
- On the Touch Panel, select ***Graph Display***.

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***.



Origin LMP
LMP 02/02/2001
BBT 02/02/0020
GA 22w5d
EDD(LMP) 11/09/2001
FetusNo A/1
FetusPos
PLAC

Growth Bar Graph

AC(Hadlock)	22w0d	20w0d-24w1d
HC(Hadlock)	22w0d	20w4d-23w4d
BPD(Hadlock)	22w4d	20w6d-24w2d
FL(Hadlock)	22w3d	20w4d-24w1d
GS(Hellman)		
CRL(Hadlock)		

Figure 9-17. 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 5 system includes measurements for the following studies: USA, Europe, Tokyo, Osaka, and ASUM. The following figures show the OB Touch Panel 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.

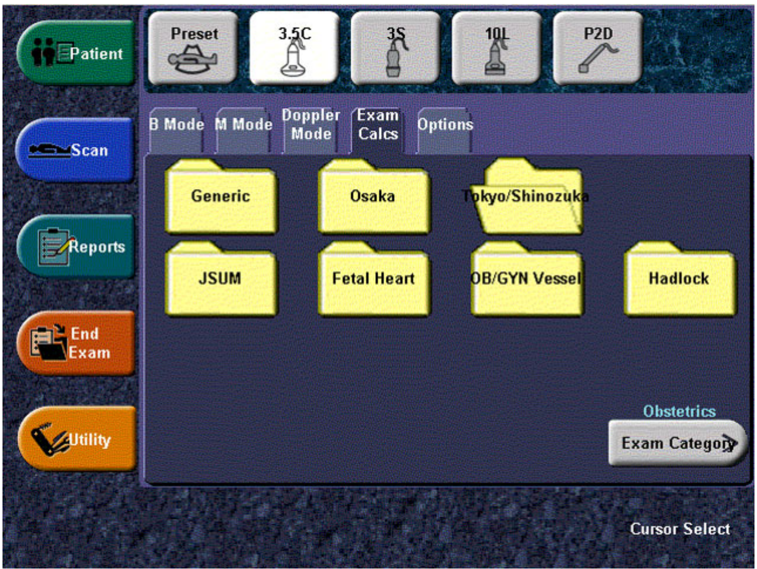

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic
Osaka
Tokyo/Shinozuka
JSUM
Fetal Heart
OB/GYN Vessel
Hadlock
Obstetrics
Exam Category
Cursor Select

Figure 9-18. OB Touch Panel: 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)

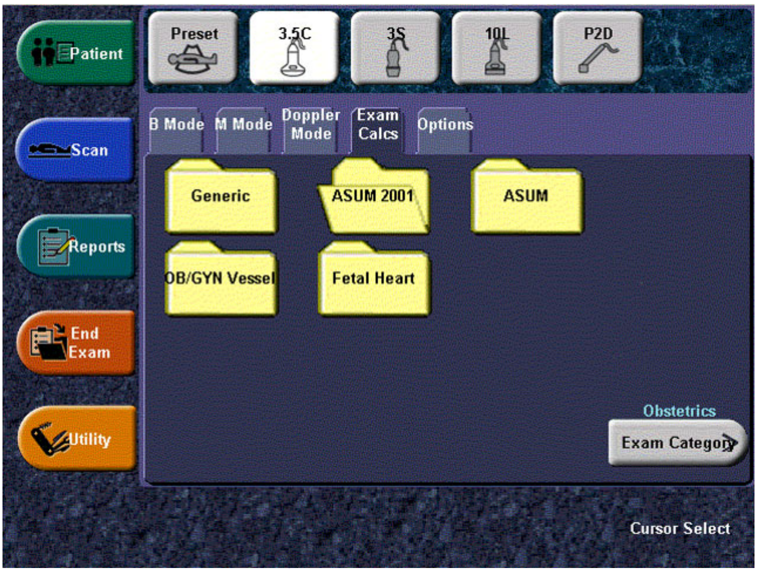

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic
ASUM 2001
ASUM
OB/GYN Vessel
Fetal Heart
Obstetrics
Exam Category
Cursor Select

Figure 9-19. OB Touch Panel: 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 5 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.

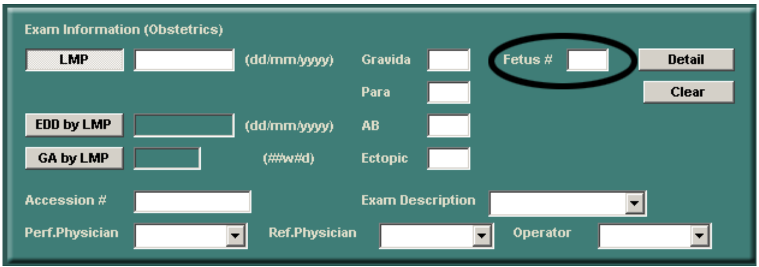

Exam Information (Obstetrics)
LMP
(dd/mm/yyyy)
Gravida
Fetus #
Detail
Para
Clear
EDD by LMP
(dd/mm/yyyy)
AB
GA by LMP
(##w#d)
Ectopic
Accession #
Exam Description
Perf.Physician
Ref.Physician
Operator

Figure 9-20. 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.

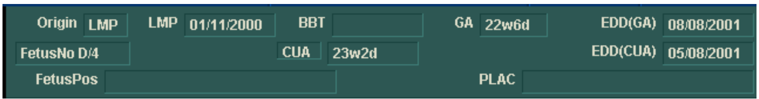
   The number is highlighted.
2. Type the correct number and press **Set**.

   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.



Origin LMP
LMP 01/11/2000
BBT
GA 22w6d
EDD(GA) 08/08/2001
FetusNo D/4
CUA 23w2d
EDD(CUA) 05/08/2001
FetusPos
PLAC

Figure 9-21. 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** knob.
- Move the **Trackball** to the Summary Window and select the fetus.

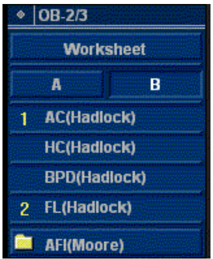


Figure 9-22. Summary Window: Multiple fetus

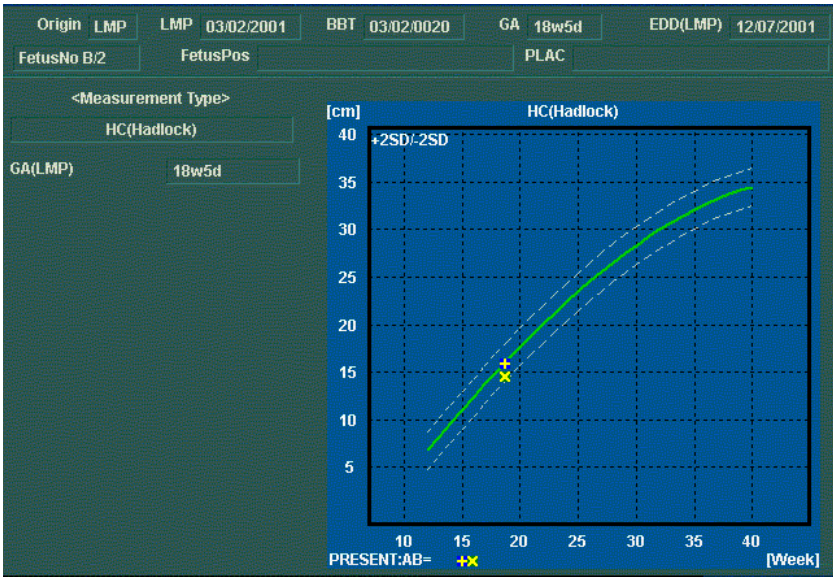
You can change between fetuses at any time during the exam.

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** knob.
  - 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***.



Origin LMP
LMP 03/02/2001
BBT 03/02/0020
GA 18w5d
EDD(LMP) 12/07/2001
FetusNo B/2
FetusPos
PLAC

<Measurement Type>
HC(Hadlock)
GA(LMP) 18w5d

Figure 9-23. 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***.

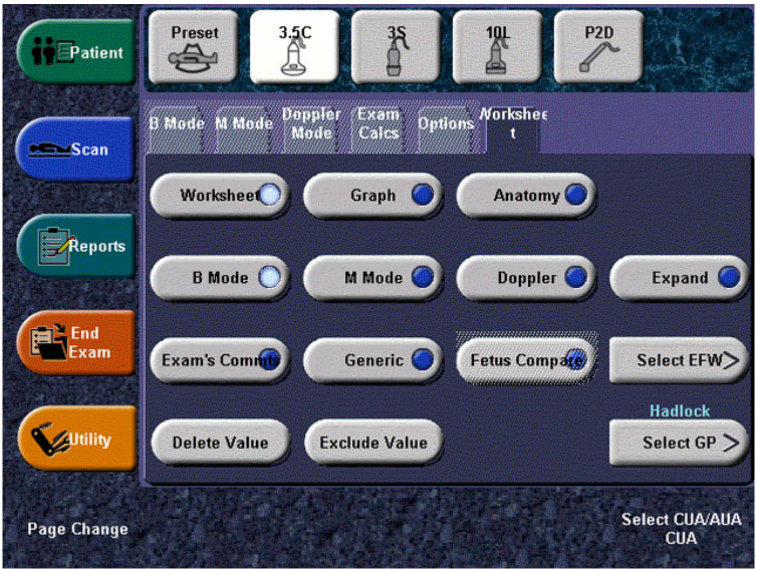
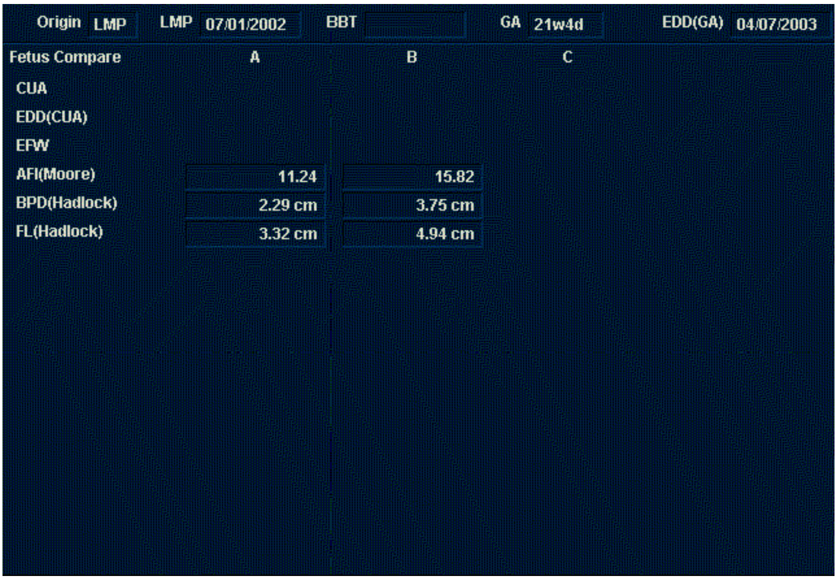

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Worksheet
Graph
Anatomy
B Mode
M Mode
Doppler
Expand
Exam's Comments
Generic
Fetus Compare
Select EFW
Hadlock
Delete Value
Exclude Value
Select GP
Page Change
Select CUA/AUA
CUA

Figure 9-24. OB Worksheet Display Touch Panel

To compare multiple fetus data on a worksheet (continued)

When you select ***Fetus Compare***, the system lists the measurement results for each fetus on the Worksheet.



Origin LMP
LMP 07/01/2002
BBT
GA 21w4d
EDD(GA) 04/07/2003

Fetus Compare	A	B	C
CUA			
EDD(CUA)			
EFW			
AFI(Moore)	11.24	15.82	
BPD(Hadlock)	2.29 cm	3.75 cm	
FL(Hadlock)	3.32 cm	4.94 cm	

Figure 9-25. Worksheet Display with Fetus Compare

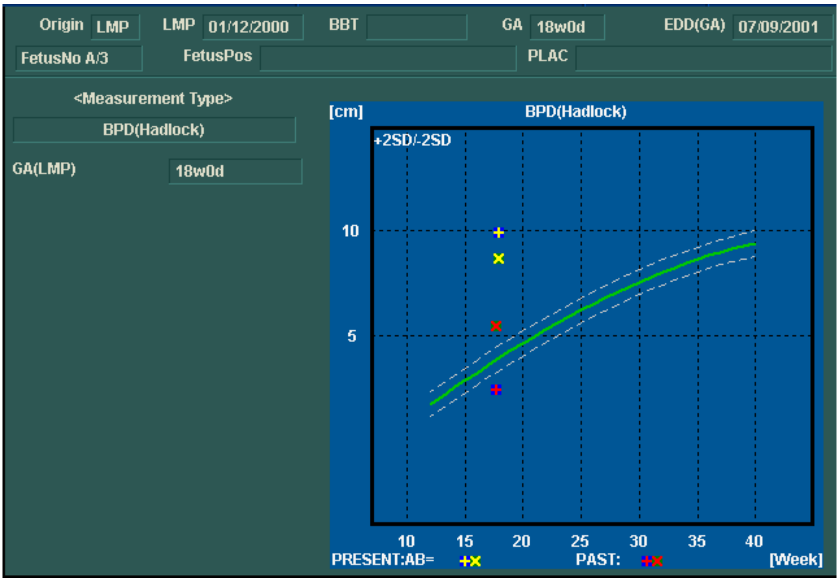
To Show Fetal Trending for Multiple Fetuses

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.



Origin LMP
LMP 01/12/2000
BBT
GA 18w0d
EDD(GA) 07/09/2001
FetusNo A/3
FetusPos
PLAC

<Measurement Type>
BPD(Hadlock)
GA(LMP) 18w0d

Figure 9-26. Multigestation Fetal Growth Curve Graph

The symbol key for fetal trending and multiple fetuses is shown at the bottom of the graph.

OB Table Editor

You can add user programmable OB tables to the system.

OB Table Settings Menu

You add OB Tables in the Measurement & Analysis menu. To open the menu:

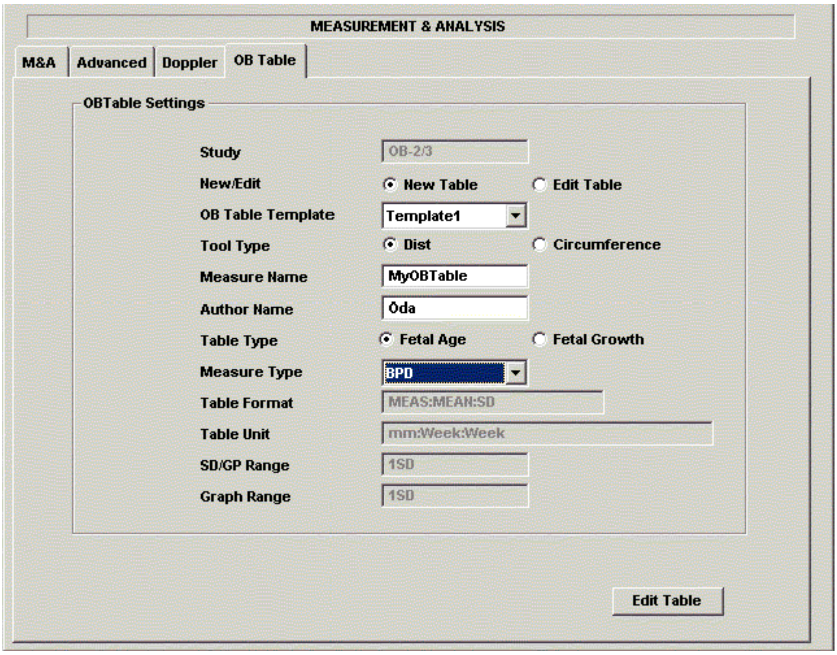
1. On the Touch Panel, select ***Utility***, then select ***M&A***.
2. Check the Exam Category on the far left of the monitor screen. Make sure that Obstetrics is selected.

   If it is not selected, select Obstetrics and continue selecting the folders until the appropriate area is selected as to where this new OB Table will be entered. For example, select Obstetrics, then select OB-2/3. If there are further folders within OB-2/3, select that appropriate folder.

OB Table Settings Menu (continued)

3. On the monitor display, select the OB Table tab.

   The system displays the OB Table settings menu.


MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
OBTable Settings
Edit Table

Study: OB-2/3

New/Edit: ● New Table ○ Edit Table

OB Table Template: Template1

Tool Type: ● Dist ○ Circumference

Measure Name: MyOBTable

Author Name: Oda

Table Type: ● Fetal Age ○ Fetal Growth

Measure Type: BPD

Table Format: MEAS:MEAN:SD

Table Unit: mm:Week:Week

SD/GP Range: 1SD

Graph Range: 1SD

Figure 9-27. OB Table settings

OB Table Settings Menu (continued)

4. The OB Table settings menu lists OB Table parameters. Specify the following parameter values as appropriate:
    - **Study**: Shows the study to which this measurement table belongs.
    - **New/Edit**: To create a new OB table, select New Table. To edit an existing user-programmable OB table, select Edit Table.

NOTE: *You cannot edit the system's OB Tables.*

- **OB Table Template**: To create a new OB table, select the Template (1 - 7) which you want to use as the basis of the user programmable OB Table. See 'OB Table Templates' for more information.

  To edit an existing user OB table, select the desired OB table to edit.
- **Tool Type**: Select the type of measurement: Distance or Circumference.
- **Measure Name**: Type the name of measurement that will display on the Touch Panel.
- **Author Name**: Type the author's name.
- **Table Type**: If necessary, select the Table Type: Fetal Age or Fetal Growth.
- **Measure Type**: Select a measurement type that can be used to calculate EFW, for example BPD.

NOTE: *Measure Type is used only when calculating EFW.*

NOTE: *The following items are display only: Table Format, Table Unit, SD/GP Range, and Graph Range. The system determines these values automatically, based on the type of OB table you are creating.*

5. After specifying all parameter values, move the **Trackball** to *Edit Table* and press **Set**.

   The system displays the Edit Menu.

NOTE: *If any of the OB table parameters are not correct, the Edit Menu is not displayed.*

OB Table Templates

Tool Type:

- Distance: 2D Caliper
- Circumference: 2D Ellipse, 2D Trace, 2D Caliper

Template 1

Table 9-4: Template 1 (based on Hadlock)

Template 1: SD Range Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	Week	Week
	Table Range	1SD		
	Graph Range	1SD		
Measurement Result	Value [cm]			
	GA [#w#d]			
	Min [#w#d]			
	Max [#w#d]			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	Week	mm	Week
	Others are same as above			

Template 2

Table 9-5: Template 2 (based on Tokyo)

Template 2: SD Range Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	Day	Day
	Table Range	1SD		
	Graph Range	1SD		
Measurement Result	Value [cm]			
	GA [#w#d]			
	SD: day(+/-)			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	Day	mm	Day
	Others are same as above			

Template 3

Table 9-6: Template 3 (based on Osaka)

Template 3: SD Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	Day	mm
	Table Range	1SD		
	Graph Range	1SD		
Measurement Result	Value [cm]			
	GA [#w#d]			
	SD: sd=(mv-pv)/sd			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	Day	mm	Day
	Others are same as above			

Template 4

Table 9-7: Template 4 (based on several European tables)

Template 4: 5%-95% Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	WeekDay	mm
	Table Range	5%:95%		
	Graph Range	5%:95%		
Measurement Result	Value [cm]			
	GA [#w#d]			
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	WeekDay	mm	Day
	Table Range	5%:95%		
	Graph Range	5%:95%		

Template 5

Table 9-8: Template 5 (based on several European tables)

Template 5: 5% - 95% Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	WeekDay	mm
	Table Range	1SD		
	Graph Range	5%:95%		
Measurement Result	Value [cm]			
	GA [#w#d]			
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,			
Fetal Growth Table	Table Format	AGE	MEAN	MAX
	Table Unit	WeekDay	mm	mm
	Table Range	1SD		
	Graph Range	5%:95%		

Template 6

Table 9-9: Template 6 (based on several European tables)

Template 6: 10% - 90% Table					
Fetal Age Table	Table Format	MEAS	MIN	MEAN	SD
	Table Unit	mm	WeekDay	WeekDay	WeekDay
	Table Range	10%-90%			
	Graph Range	10%-90%			
Measurement Result	Value [cm]				
	GA [#w#d]				
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,				
Fetal Growth Table	Table Format	AGE	MIN	MEAN	SD
	Table Unit	WeekDay	mm	mm	mm
	Table Range	10%-90%			
	Graph Range	10%-90%			

Template 7

Table 9-10: Template 7 (Based on several european tables)

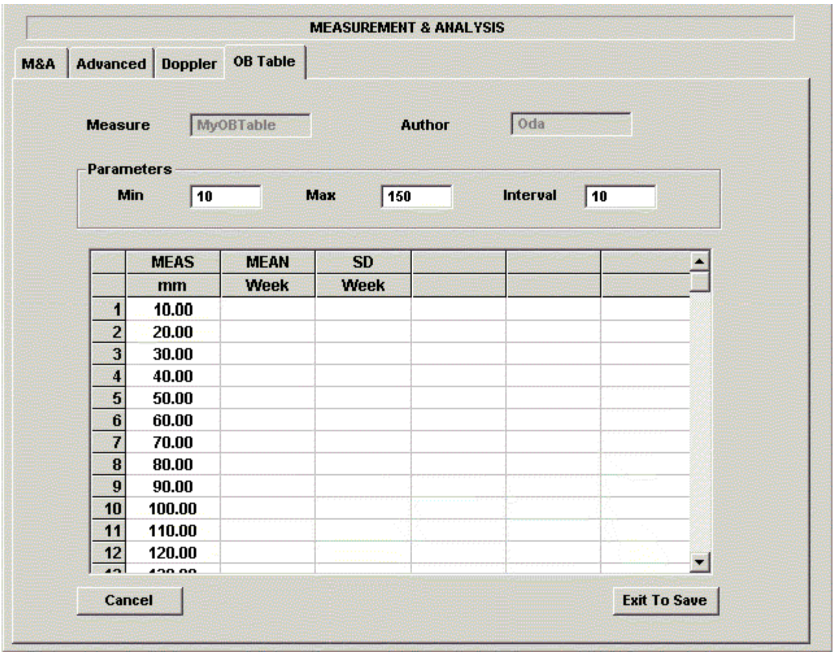
Template 7: 10% - 90% Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	WeekDay	mm
	Table Range	1SD		
	Graph Range	10%:90%		
Measurement Result	Value [cm]			
	GA [#w#d]			
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,			
Fetal Growth Table	Table Format	AGE	MEAN	MAX
	Table Unit	WeekDay	mm	mm
	Table Range	1SD		
	Graph Range	10%:90%		

OB Table Edit Menu

The data you enter in the OB Table Edit Menu depends on whether the table type is Fetal Age or Fetal Growth.

Fetal Age Table

If you are creating or editing a Fetal Age table, the OB Table Edit Menu is as follows:


MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Cancel
Exit To Save

Measure: MyOBTable

Author: Oda

Parameters

Min: 10

Max: 150

Interval: 10

	MEAS	MEAN	SD			
	mm	Week	Week			
1	10.00					
2	20.00					
3	30.00					
4	40.00					
5	50.00					
6	60.00					
7	70.00					
8	80.00					
9	90.00					
10	100.00					
11	110.00					
12	120.00					

Figure 9-28. OB Table Edit Menu: Fetal Age Table

Fetal Age Table (continued)

Complete the field

1. Input value to Min, Max and Interval of the Parameters field.

   The system automatically fills in the MEAS column.

   Input value to the columns of MEAN and SD.

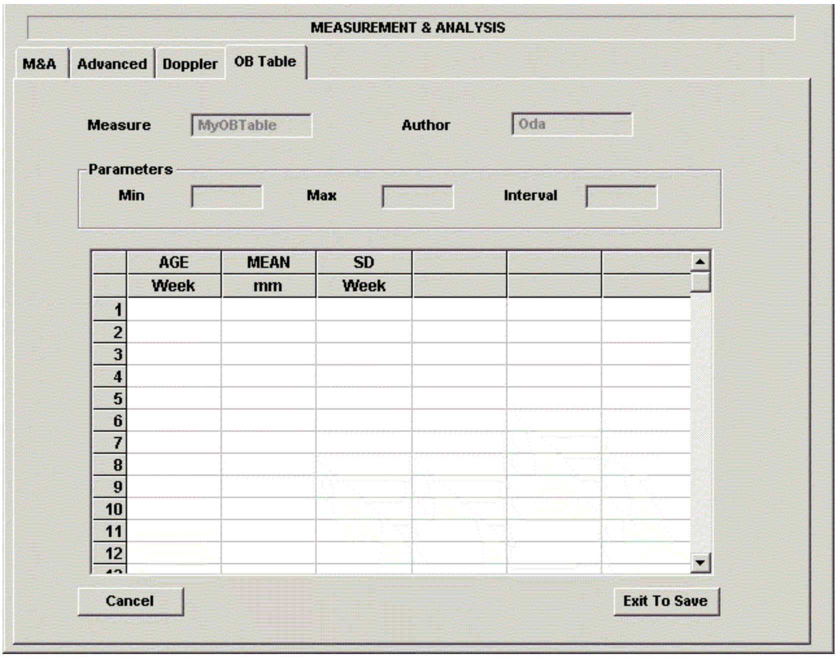
NOTE: To move between the fields in the table, use the up, down, left, and right arrow keys.

NOTE: You must enter a minimum of two rows of data. Any lines with a blank cell are not saved.

To save the Table Data, move the **Trackball** to Exit to Save and press **Set**. If you want cancel this table, move the **Trackball** to Cancel and press **Set**.

Fetal Growth Table

If you are creating or editing a Fetal Growth table, the OB Table Edit Menu is as follows:



Measure: MyOBTable

Author: Oda

Min:

Max:

Interval:

	AGE Week	MEAN mm	SD Week			
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Figure 9-29. OB Table Edit Menu: Fetal Growth Table

Complete the field

1. Input value to the required columns.

NOTE: *To move between the fields in the table, use the up, down, left, and right arrow keys.*

NOTE: *You must enter a minimum of two rows of data. Any lines with a blank cell are not saved.*

2. To save the Table Data, move the **Trackball** to Exit to Save and press **Set**. If you want cancel this table, move the **Trackball** to Cancel and press **Set**.

After you complete the OB table, it is now available for the selected study. To use the measurement, you must assign it to a Touch Panel.

GYN Measurements

Introduction

The Gynecology exam category includes the following three studies:

- Generic. This study is common to all exam categories. See ‘Generic Measurements’ 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’ 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*** or ***Patient***.
   - On the Touch Panel, select ***Scan***.
   - On the Control Panel, press the B-Mode key.

   The system displays the Scan screen.
2. To choose the appropriate probe, select the probe icon on the Touch Panel.
3. On the Control Panel, press ***Measure***.

   The default Gynecology study is displayed on the Touch Panel.

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

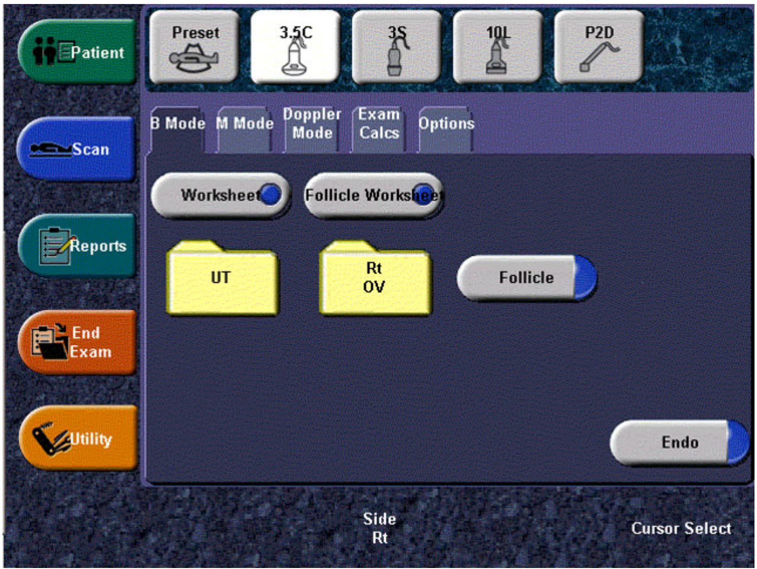

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Follicle Worksheet
UT
Rt OV
Follicle
Endo
Side Rt
Cursor Select

Figure 9-30. General Gynecology study

Follicle measurements

You can make left and right ovary follicle measurements from one, two, or three distances.

One distance

1. To select the left or right, adjust the **Side** knob.
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** knob.
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** knob.
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, the width and height are measured on the axial plane while the length is measured on the sagittal 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** knob.
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.
    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. Length is typically measured in the sagittal plane. Width and height are measured in the axial 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:
   1. To position the active caliper at the start point, move the **Trackball**.
   2. To fix the start point, press **Set**.

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

      A dotted line connects the measurement points.
   4. 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’ for more information.

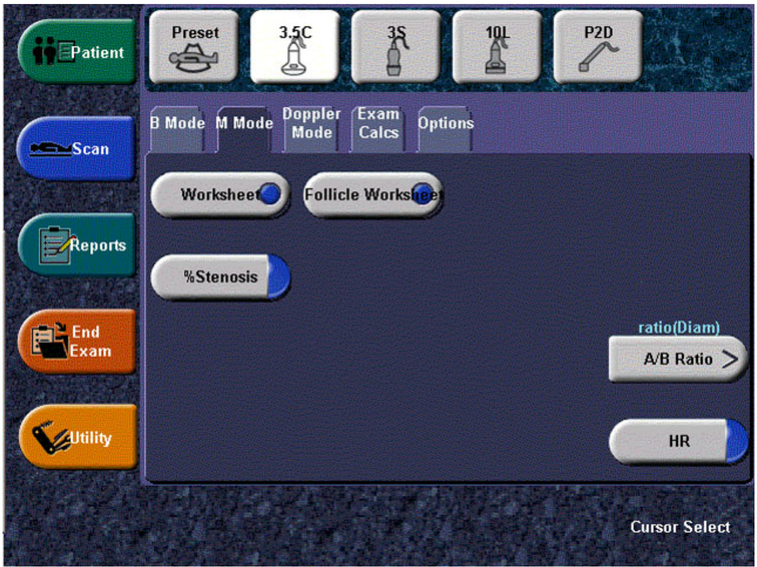

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Follicle Worksheet
%Stenosis
ratio(Diam)
A/B Ratio
HR
Cursor Select

Figure 9-31. 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, mid 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’ for more information.

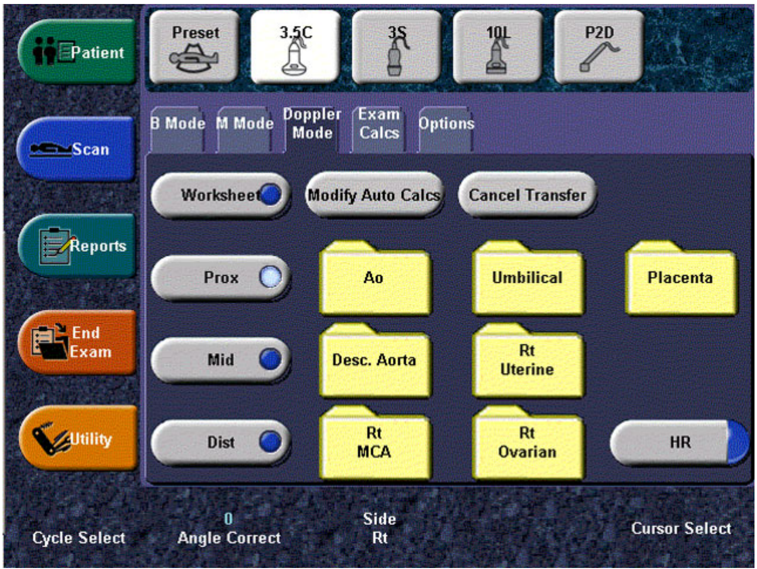

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Modify Auto Calcs
Cancel Transfer
Prox
Ao
Umbilical
Placenta
Mid
Desc. Aorta
Rt Uterine
Dist
Rt MCA
Rt Ovarian
HR
Cycle Select
0
Angle Correct
Side
Rt
Cursor Select

Figure 9-32. Doppler Mode General Gynecology study

Chapter 10

Cardiology

Describes how to perform cardiac measurements and calculations.

Cardiology Exam Preparation

Introduction

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

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ for more information.

Any measurement can be repeated by selecting that measurement again from the Touch Panel 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’ 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 Touch Panel you select the abbreviation for the measurement. Most abbreviations are made using acronyms. The following table lists acronyms used for naming cardiac measurements.

Table 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
PISA	Proximal Isovelocity Surface Area
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
T	Time
TA	Tricuspid Annulus

Table 10-1: Cardiology Abbreviations

Acronym	Name
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 Touch Panel.

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 Arch Diameter (***Ao Arch Diam***)
- Ascending Aortic Diameter (***Ao Asc***)
- Descending Aortic Diameter (***Ao Desc Diam***)
- Aorta Annulus Diameter (***Ao Annulus Diam***)
- Aorta Isthmus (***Ao Isthmus***)
- Aorta ST Junction (***Ao st junct***)

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 (***ASD 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 Mass
    - Diastolic (***LVPWd***)
    - Systolic (***LVPWs***)
- Left Ventricle Volume, Teichholz
    - Diastolic (***LVIDd***)
    - Systolic (***LVIDs***)
- Left Ventricle Volume, Cubic
    - Diastolic (***LVIDd***)
    - Systolic (***LVIDs***)
- Left Ventricle Internal Diameter
    - Diastolic (***LVIDd***)
    - Systolic (***LVIDs***)
- Left Ventricle Length
    - Diastolic (***LVLd***)
    - Systolic (***LVLs***)
- Left Ventricle Outflow Tract Diameter (***LVOT Diam***)
- Left Ventricle Posterior Wall Thickness
    - Diastolic (***LVPWd***)
    - Systolic (***LVPWs***)
- Left Ventricle Length (***LV Major***)
- Left Ventricle Width (***LV Minor***)

Left Ventricle (continued)

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 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. Left Ventricle Mass is a one distance measurement.

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

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

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

   The system displays the measurement in the Results Window.

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***)
- 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.

One trace measurement

- Mitral Valve Area by Pressure Half Time (***MVA By PHT***)
- 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, Length (***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 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***)
- Systemic Vein Diameter (***Systemic Diam***)
- Patent Ductus Arterosis Diameter (***PDA Diam***)
- Patent Foramen Ovale Diameter (***PFO Diam***)
- Ventricular Septal Defect Diameter (***VSD 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:

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 Atrium (continued)

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 Ventricle

The following are cardiac M-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 Posterior Wall Thickness
  - 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
- Left Ventricle Ejection Time (***LVET***)
- Left Ventricle Pre-Ejection Period (***LVPEP***)
- Velocity Circumferential Fiber Shortening (***Vcf***)

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 Excursion***)
- 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 (continued)

One time interval measurements

- Right Ventricle Ejection Time (***RVET***)
- Right Ventricle Pre-Ejection Period (***RVPEP***)

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.

Right Ventricle Study

The Right Ventricle study (***RV study***) automatically sequences the following measurements:

- Right Ventricle Internal Diameter (RVIDd, RVIDs))

Pulmonic Valve

The following are cardiac M-Mode Pulmonic Valve measurements:

One time interval measurements

- QRS complex to end of envelope (***Q-to-PV close***)

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.

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 (***IVSd***, ***IVSs***)

Tricuspid Valve

The following are cardiac M-Mode Tricuspid Valve measurements:

One time interval measurements

- QRS complex to end of envelope (***Q-to-TV close***)

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.

Doppler Mode Measurements

Aortic Valve

The following are cardiac Doppler Mode aortic valve measurements:

Velocity flow trace measurements

- Aortic Insufficiency Mean Pressure Gradient (***AR Trace***)
- Aortic Insufficiency Peak Pressure Gradient (***AR Vmax***)
- Aortic Insufficiency Mean Velocity (***AR Trace***)
- Aortic Insufficiency Mean Square Root Velocity (***AR Trace***)
- Aortic Insufficiency Velocity Time Integral (***AR 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***)
- Aortic Insufficiency End-Diastolic Velocity (***ARend 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 (***AR PHT***)
- Aortic Valve Ejection Time (***AVET***)
- Aortic Valve Heart Rate
- 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.

Left Ventricle (continued)

One time interval measurements

- Left Ventricle Heart Rate (***LVOT Trace***)
- Left Ventricle Ejection Time (***LVET***)

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 time interval measurement:

- Cardiac Output by Aortic Flow (***AVA Planimetry***, ***AV Trace***)

Body surface area and stroke volume measurement:

- Stroke Volume Index by Aortic Flow (***AVA Planimetry***, ***AV Trace***)

  The system calculates body surface area from the patient's height and weight.

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 (***MR Vmax***)
- Mitral Regurgitant Peak Velocity (***MR Vmax***)
- Mitral Valve Peak Velocity (***MR 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 (***PV 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***)
- 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

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 (***PR 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***)
- QRS complex to end of envelope (***Q-to-PV close***)
- Time

Pulmonic Valve (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 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***)

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***)
- Time
- IsoVolumetric Relaxation Time (***IVRT***)
- IsoVolumetric Contraction Time (***IVCT***)

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***)
- QRS complex to end of envelope (***Q-to-TV close***)

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***)

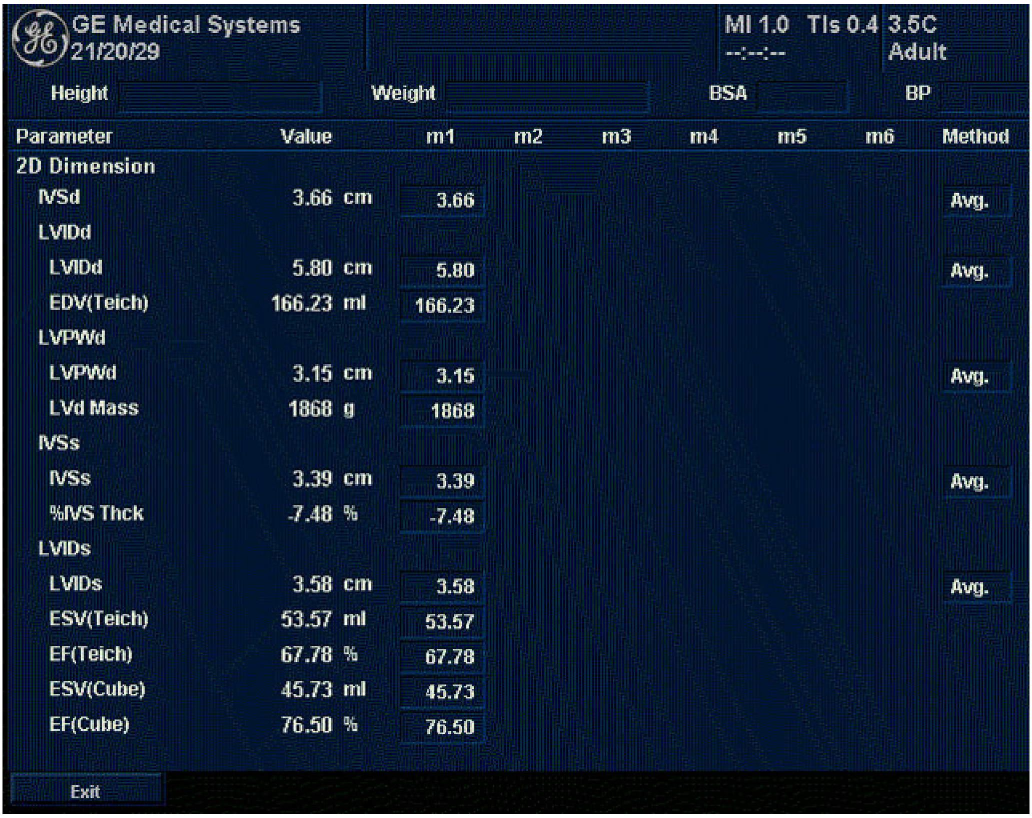
Tricuspid Valve

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 Touch Panel. 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.


GE Medical Systems
21/20/29
MI 1.0 TIs 0.4 3.5C
--:--:-- Adult

Height
Weight
BSA
BP

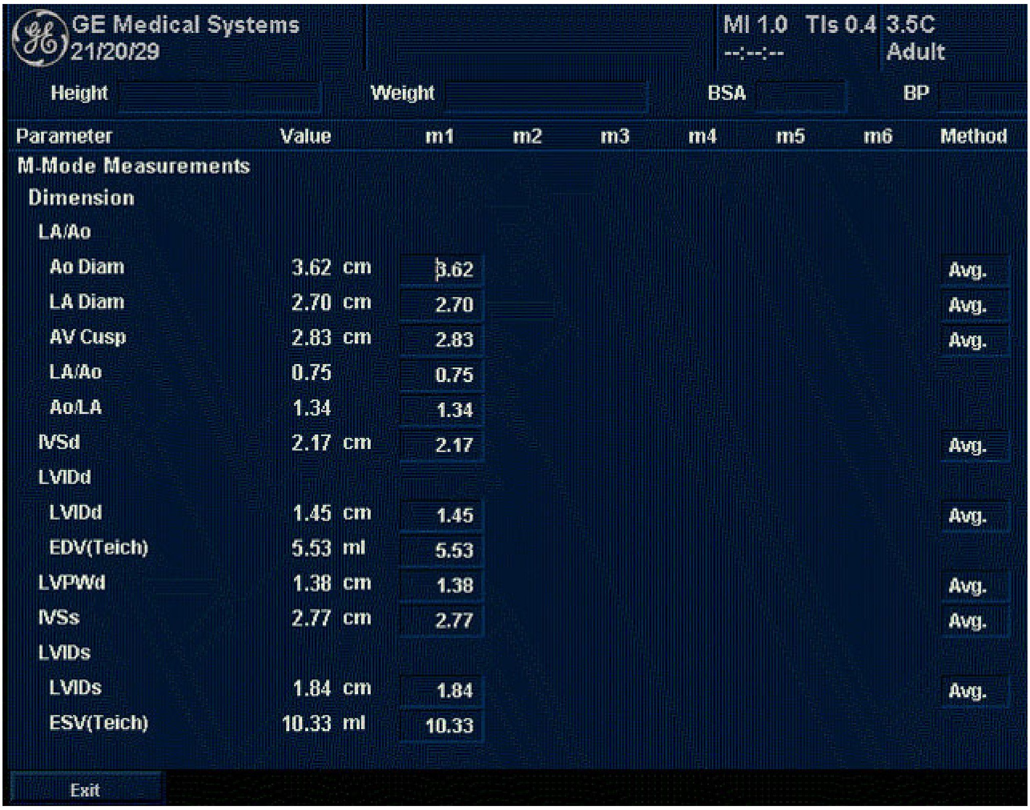
Parameter	Value	m1	m2	m3	m4	m5	m6	Method
2D Dimension								
IVSd	3.66 cm	3.66						Avg.
LVIDd								
LVIDd	5.80 cm	5.80						Avg.
EDV(Teich)	166.23 ml	166.23						
LVPWd								
LVPWd	3.15 cm	3.15						Avg.
LVd Mass	1868 g	1868						
IVSs								
IVSs	3.39 cm	3.39						Avg.
%IVS Thck	-7.48 %	-7.48						
LVIDs								
LVIDs	3.58 cm	3.58						Avg.
ESV(Teich)	53.57 ml	53.57						
EF(Teich)	67.78 %	67.78						
ESV(Cube)	45.73 ml	45.73						
EF(Cube)	76.50 %	76.50						

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, adjust the **Page Change** knob. 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***.



Height		Weight		BSA		BP	

Parameter	Value	m1	m2	m3	m4	m5	m6	Method
M-Mode Measurements								
Dimension								
LA/Ao								
Ao Diam	3.62 cm	3.62						Avg.
LA Diam	2.70 cm	2.70						Avg.
AV Cusp	2.83 cm	2.83						Avg.
LA/Ao	0.75	0.75						
Ao/LA	1.34	1.34						
IVSd	2.17 cm	2.17						Avg.
LVIDd								
LVIDd	1.45 cm	1.45						Avg.
EDV(Teich)	5.53 ml	5.53						
LVPWd	1.38 cm	1.38						Avg.
IVSs	2.77 cm	2.77						Avg.
LVIDs								
LVIDs	1.84 cm	1.84						Avg.
ESV(Teich)	10.33 ml	10.33						

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.

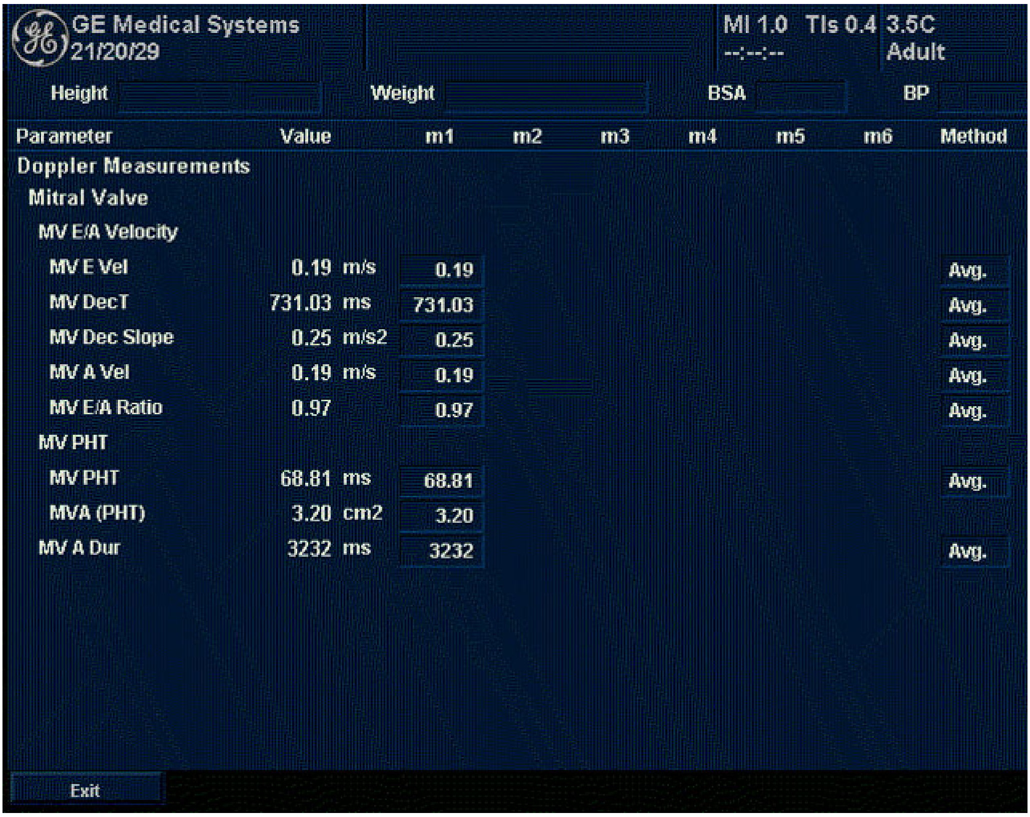
  b. Press **Set**.

  c. Move the **Trackball** to select from the list.

  d. Press **Set**.

For more information about working with worksheets, See ‘Viewing and Editing Worksheets’ for more information.

Cardiac Worksheet (continued)



GE Medical Systems
21/20/29

MI 1.0 TIs 0.4 3.5C
--:--:-- Adult

Height Weight BSA BP

Parameter	Value	m1	m2	m3	m4	m5	m6	Method
Doppler Measurements								
Mitral Valve								
MV E/A Velocity								
MV E Vel	0.19 m/s	0.19						Avg.
MV DecT	731.03 ms	731.03						Avg.
MV Dec Slope	0.25 m/s2	0.25						Avg.
MV A Vel	0.19 m/s	0.19						Avg.
MV E/A Ratio	0.97	0.97						Avg.
MV PHT								
MV PHT	68.81 ms	68.81						Avg.
MVA (PHT)	3.20 cm2	3.20						
MV A Dur	3232 ms	3232						Avg.

Figure 10-3. Cardiac Worksheet: Page 3

Setting up and Organizing Measurements and Calculations

When you receive your LOGIQ 5 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 Touch Panel. The LOGIQ 5 allows you to quickly and easily set up your system so that you can work most efficiently.

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
- Point
- Area (Trace)
- Volume
- Volume (d)
- Volume (s)
- Dist (Distance) Ratio
- Area Ratio
- Ellipse
- Open Trace
- R-R
- VF Diam (Diameter)

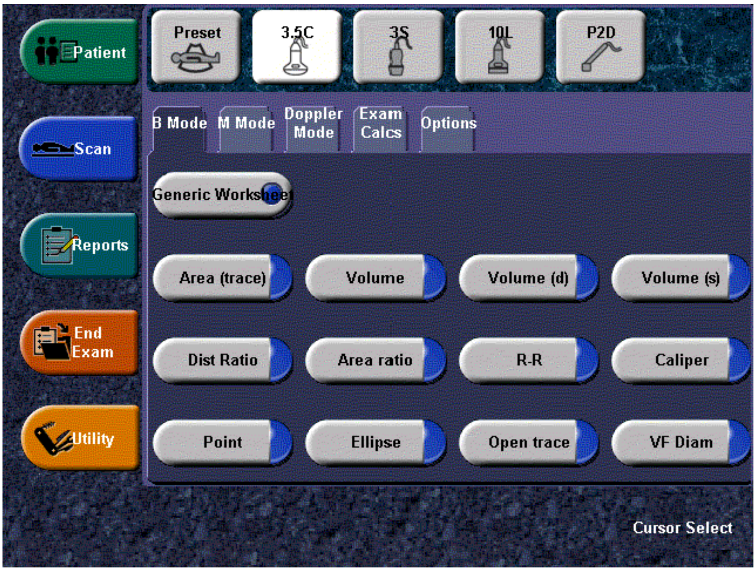

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic Worksheet
Area (trace)
Volume
Volume (d)
Volume (s)
Dist Ratio
Area ratio
R-R
Caliper
Point
Ellipse
Open trace
VF Diam
Cursor Select

Figure 10-4. Cardiology B-Mode - Generic Touch Panel

M-Mode

The Cardiology M-Mode Generic exam category includes the following measurements:

- LV Study
- LA/Ao
- RV Study
- D-E Excursion
- Depth
- Slope Caliper
- Caliper
- Area Ratio
- Ellipse
- Time
- Heart Rate

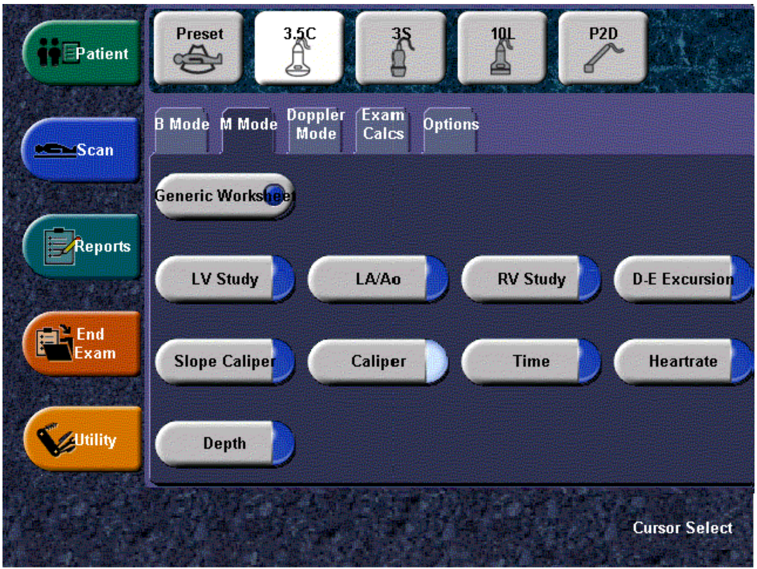

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic Worksheet
LV Study
LA/Ao
RV Study
D-E Excursion
Slope Caliper
Caliper
Time
Heartrate
Depth
Cursor Select

Figure 10-5. Cardiology M-Mode - Generic Touch Panel

Doppler Mode

The Cardiology Doppler Mode Generic exam category includes the following measurements:

- Point
- Caliper
- Manual Trace
- SD Auto Calcs
- VSD Vmax
- MV E/A Ratio
- PHT
- Time
- Heart Rate

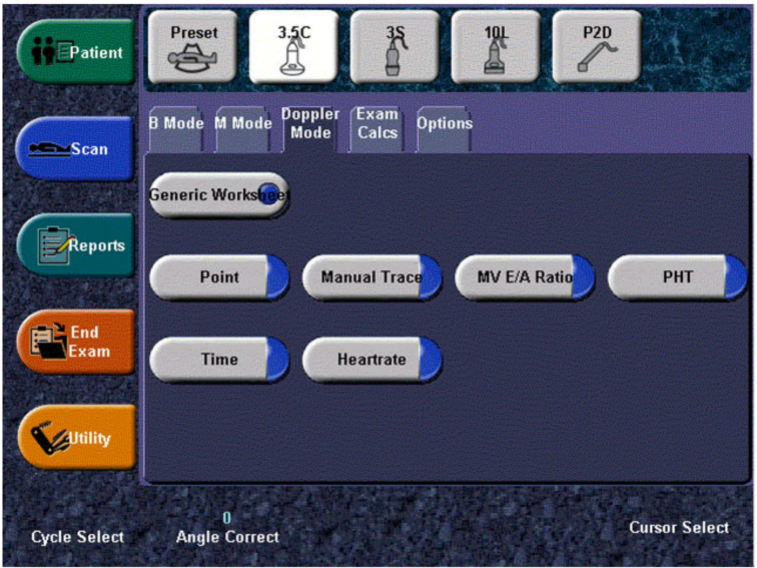

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic Worksheet
Point
Manual Trace
MV E/A Ratio
PHT
Time
Heartrate
Cycle Select
0
Angle Correct
Cursor Select

Figure 10-6. Cardiology Doppler Mode - Generic Touch Panel

ECG Option

Overview

A physiological input panel is available for the LOGIQ 5. This panel has inputs for ECG, PCG and auxiliary signals.

The physiological module consists of four channels: ECG, PCG, AUX1 and AUX2 (AUX 2 is currently not available). The two channels, AUX1 and AUX2, are both capable of handling external ECG signals from other diagnostic ECG devices. AUX2 is also capable of handling a pressure/pulse signal.

The scanned image that is displayed is synchronized with the ECG and PCG traces. In Doppler or M-Mode, the traces are synchronized to that particular mode's sweep.

Approved accessory cables provide the proper signals to the Physiological Panel.

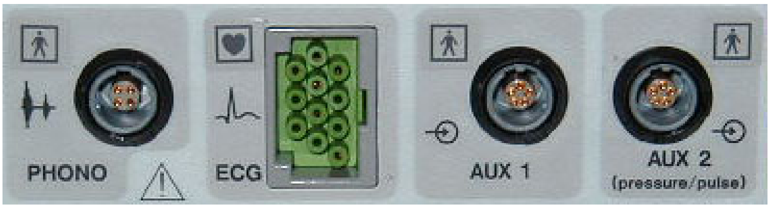


Figure 10-7. Optional Physiological Input Panel

WARNING

- Do not use with the Defibrillator.

  This equipment does not have a defibrillator approved applied part.
- Do not use the LOGIQ 5 Ultrasound system Physiological traces for diagnosis and monitoring.
- Only approved and recommended peripherals and accessories should be used.

ECG Cable

The ECG Cable is a modular cable consisting of two different cable parts:

- Single cable with a system connection at one end and a cable splitter at the other.
- A triple color-coded electrode cable to be inserted into the splitter device. Each electrode cable hooks up to the appropriate stick-on electrode by a color-coded clip type connector.

The cable splitter device has a drawing defining the color codes, names and body location.

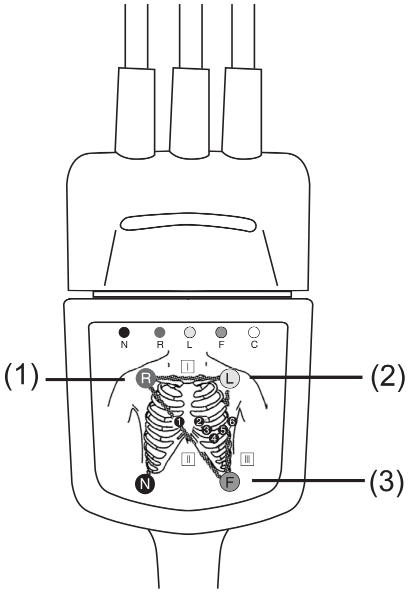


Figure 10-8. ECG Cable

R: Red

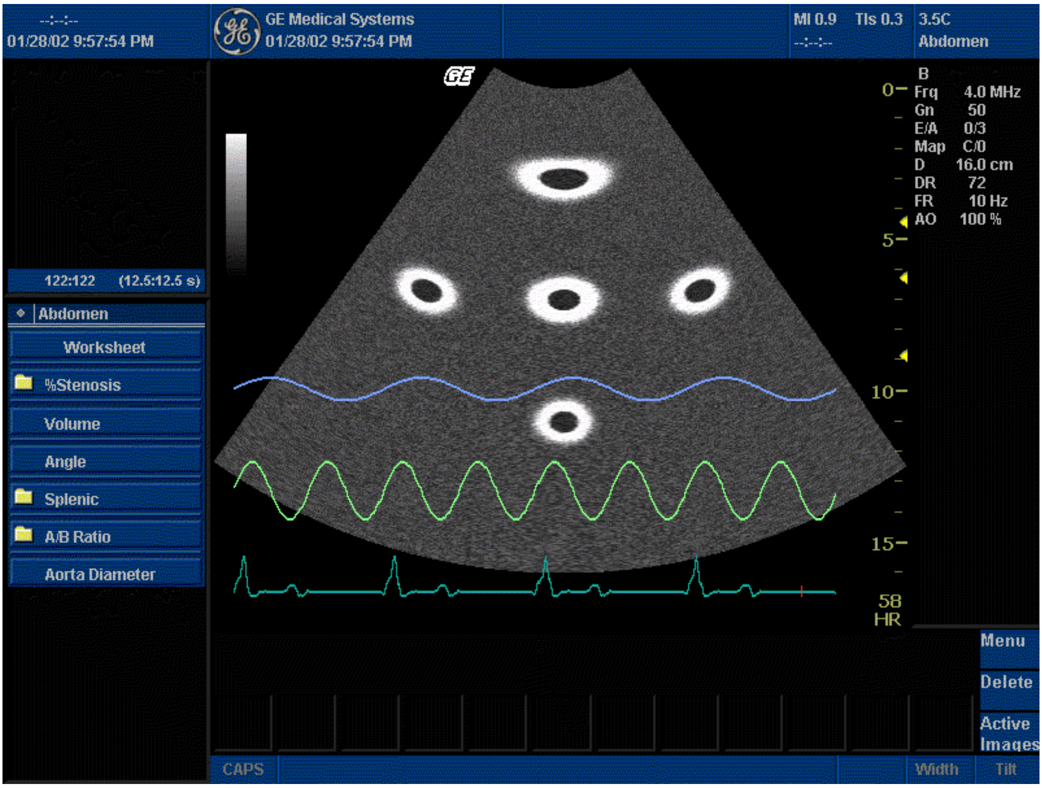
L: Yellow

F: Green

Physiological Trace Monitor Display

The scanned image is synchronized with the ECG and PCG trace. In Doppler or M-Mode, the traces are synchronized with that particular mode's sweep.

The user can control the gain, position and sweep speed of the traces using the Touch Panel controls.


--:--:--
01/28/02 9:57:54 PM
GE Medical Systems
01/28/02 9:57:54 PM
MI 0.9
TIs 0.3
--:--:--
3.5C
Abdomen
122:122
(12.5:12.5 s)
Abdomen
Worksheet
%Stenosis
Volume
Angle
Splenic
A/B Ratio
Aorta Diameter
0
5
10
15
58
HR
Menu
Delete
Active Images
CAPS
Width
Tilt

B
Frq 4.0 MHz
Gn 50
E/A 0/3
Map C/0
D 16.0 cm
DR 72
FR 10 Hz
AO 100 %

Figure 10-9. Physiological Trace Monitor Display

1. PCG
2. AUX
3. ECG
4. Auto Heart Rate Display

ECG Touch Panel

The ECG Touch Panel Menu provides for control of the physiological input signals.

Without the ECG option, the ECG Touch Panel menu is not displayed.

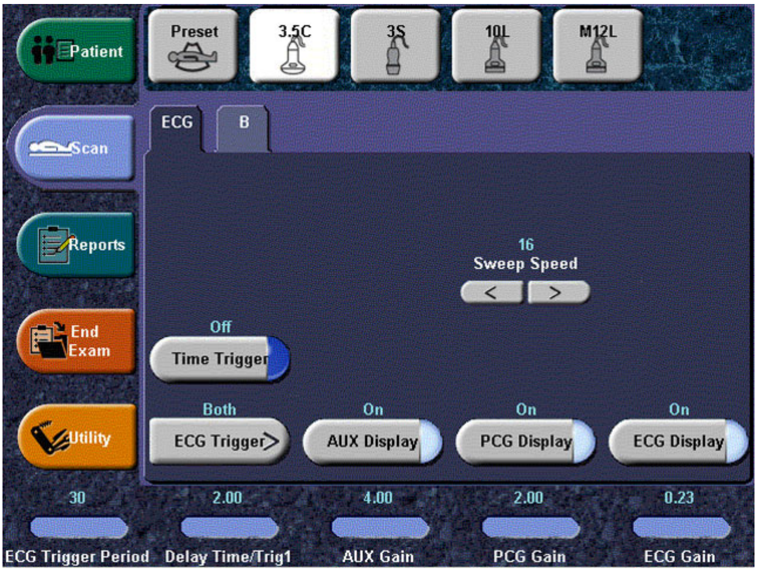

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
M12L
ECG
B
16
Sweep Speed
<
>
Off
Time Trigger
Both
ECG Trigger
On
AUX Display
On
PCG Display
On
ECG Display
30
ECG Trigger Period
2.00
Delay Time/Trig1
4.00
AUX Gain
2.00
PCG Gain
0.23
ECG Gain

Figure 10-10. ECG Touch Panel 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.

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.

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	None, Trig1, Trig2, and Both.

AUX Display

Description	Provides the ability to turn the AUX trace on for display on the monitor.
Adjusting	When the key is selected, the AUX trace toggles between on and off.
Value	On or Off

PCG Display

Description	Provides the ability to turn the PCG trace on for display on the monitor.
Adjusting	When the key is selected, the PCG trace toggles between on and off.
Value	On or Off

ECG Display

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	On or Off

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

Delay Time

Description	In ECG Trigger Mode: If only ECG Trig1 or ECG Trig2 is selected via the ECG Trigger key, the Delay Time key controls the R-Delay time of the active trigger. If both triggers are selected, the primary control is ECG Trig1, but adjusting this control switches to ECG Trig2. Once the trigger is set, the snap shot image is displayed each time the update line passes the active trigger(s). In Timer Trigger Mode: Rotating the knob changes the delay time between images.
Adjusting	Adjust the corresponding control.
Value	0.10 - 10.00

AUX Gain/Position

Description	Allows for the amplitude control of the AUX trace or allows for the vertical positioning of the AUX trace on the image display.
Adjusting	Press the knob to toggle between Gain and Position. The default is Gain.
Value	Gain: 0.01 - 4.00
	Position: 0.00 - 100.00

PCG Gain/Position

Description	Allows for the amplitude control of the PCG trace or allows for the vertical positioning of the PCG trace on the image display.
Adjusting	Press the knob to toggle between Gain and Position. The default is Gain.
Value	Gain: 0.01 - 2.00
	Position: 0.00 - 100.00

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.
Adjusting	Press the knob to toggle between Gain and Position. The default is Gain.
Value	Gain: 0.00 - 0.23
	Position: 0.00 - 100.00

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’ for more information.

Any measurement can be repeated by selecting that measurement again from the Touch Panel Menu.

Vascular Measurements

Introduction

Vascular measurements offer several different types of measurement studies:

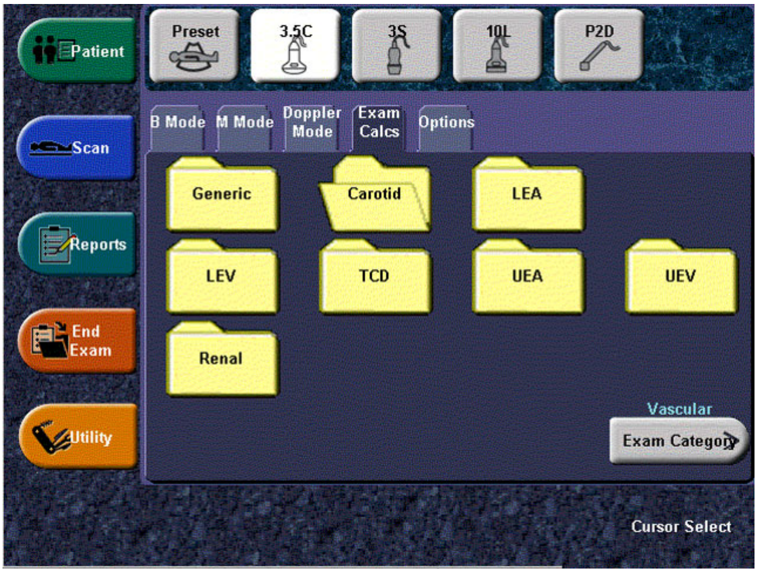

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Generic
Carotid
LEA
LEV
TCD
UEA
UEV
Renal
Vascular
Exam Category
Cursor Select

Figure 11-1. Vascular Exam Category Touch Panel

- Generic – Common to all applications. See ‘Generic Measurements’ for more information.
- Carotid
- LEA (Lower Extremity Artery)
- LEV (Lower Extremity Vein)
- TCD (Trans Cranial Doppler)
- UEA (Upper Extremity Artery)
- UEV (Upper Extremity Vein)
- Renal

Introduction (continued)

To change an exam calc:

1. Select ***Exam Calcs***.

   The Vascular exam category allows you to choose from the displayed exam calcs.

2. To select another exam calcs, press the desired exam calcs folder.

A vascular study is a group of the particular vessels. You can customize the vessel exam calcs in the configuration menu.

When you use Auto Vascular calculation, you use the vessel keys on the Touch Panel to post-assign vascular calculations. When you are not using Auto Vascular calculation, the vessel key is used for manual measurement.

B-Mode Measurements

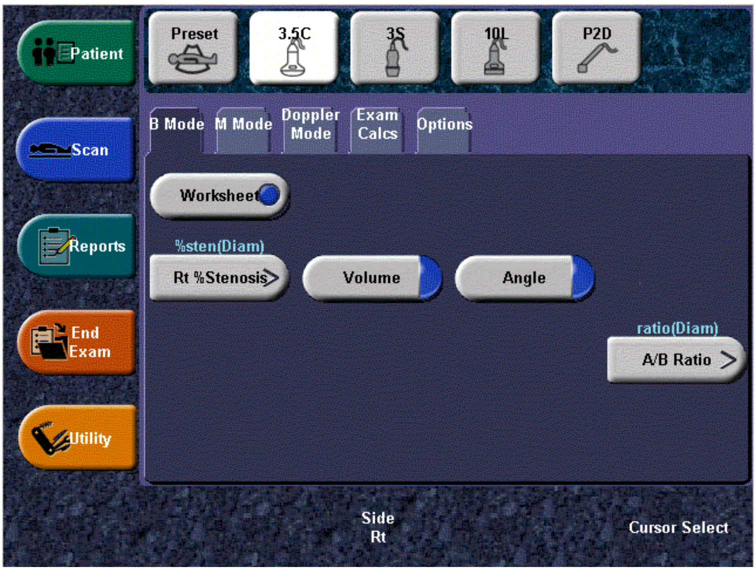

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
%sten(Diam)
Rt %Stenosis
Volume
Angle
ratio(Diam)
A/B Ratio
Side Rt
Cursor Select

Figure 11-2. B-Mode Touch Panel

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.

Diameter

NOTE: *When you use diameter to calculate the %stenosis, always take the measurement from a cross-sectional view of the vessel.*

To calculate percent stenosis by diameter:

1. From the Generic Touch Panel, select ***% Stenosis***.
2. Select ***%sten(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the inner area of the blood vessel.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the outer area of the blood vessel.

   The system displays each distance measurement and the % Stenosis in the Results Window.

For information about how to make a distance measurement, See ‘Distance measurement’ for more information.

NOTE: *For the diameter calculation, do NOT take a distance measurement from a longitudinal view. This may lead to an inaccurate assessment of % stenosis.*

% Stenosis (continued)

Area To calculate percent stenosis by area:

1. From the Generic Touch Panel, select ***% Stenosis***.
2. Select ***%sten(Area)***.

   The system displays a trace caliper.
3. Make a trace measurement of the inner area of the blood vessel.

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

   The system displays a second trace caliper.

4. Make a trace measurement of the outer area of the blood vessel.

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

See ‘Circumference and area (trace) measurement’ 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’ for more information.

For details on how to make an ellipse measurement, See ‘Circumference and area (ellipse) measurement’ 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.

To make a volume calculation using three distances:

1. Make three distance measurements.

   NOTE: Three distances should 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. Select ***Volume***.
2. Make one ellipse measurement.
3. 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. Select ***Volume***.
2. Make one distance measurement and one ellipse measurement.
3. 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 11-1: 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)

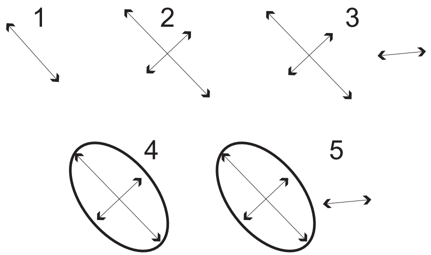


Figure 11-3. Volume Calculation Examples

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

A/B Ratio

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

Diameter To calculate A/B ratio by diameter:

1. From the Generic Touch Panel, select ***A/B Ratio***.
2. Select ***ratio(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the first velocity.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the second velocity.

   The system displays each distance measurement and the A/B ratio in the Results Window.

NOTE: The first caliper is the A velocity. The second caliper is the B velocity.

For details on how to make a distance measurement, See ‘Distance measurement’ for more information.

Area To calculate A/B ratio by area:

1. From the Generic Touch Panel, select ***A/B Ratio***.
2. Select ***ratio(Area)***.

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

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

   The system displays a second trace caliper.
4. Make a trace measurement of the B velocity.

   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’ for more information.

M-Mode Measurements

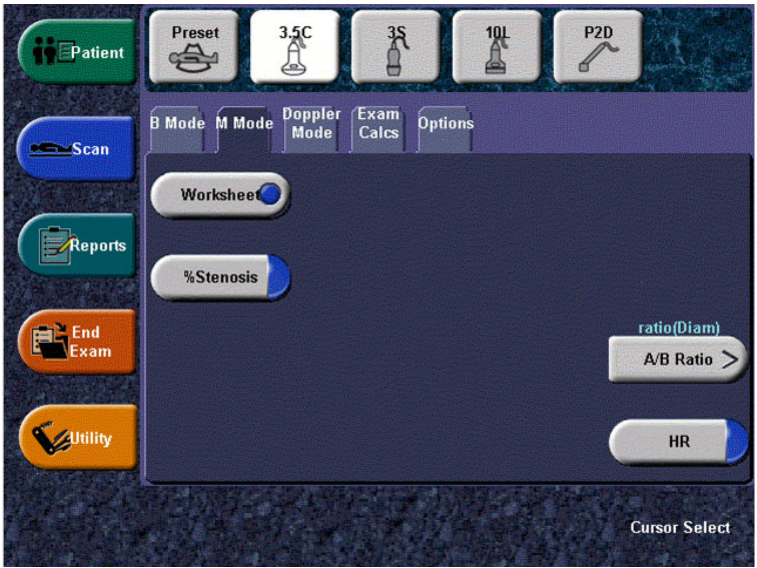

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
%Stenosis
ratio(Diam)
A/B Ratio
HR
Cursor Select

Figure 11-4. M-Mode Touch Panel

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

% Stenosis

In M-Mode, you measure % Stenosis by diameter.

NOTE: *Always take the measurement from a cross-sectional view of the vessel.*

1. Select ***% Stenosis***.

   The system displays an active caliper.

2. Make a distance measurement of the inner area of the blood vessel:

   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.

3. To make a distance measurement of the outer area of the blood vessel, repeat steps a–d.

   The system displays each distance measurement and the % Stenosis in the Results Window.

For the diameter calculation, do NOT take a distance measurement from a longitudinal view. This may lead to an inaccurate assessment of % stenosis.

A/B Ratio

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

Diameter To calculate A/B ratio by diameter:

1. Select ***A/B Ratio***.
2. Select ***ratio(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the first velocity.
   1. To position the active caliper at the start point, move the **Trackball**.
   2. To fix the start point, press **Set**.

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

      A dotted line connects the measurement points.
   4. 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 second velocity, repeat steps a–d.

   The system displays each distance measurement and the A/B ratio in the Results Window.

NOTE: The first distance measurement is the A velocity. The second distance measurement is the B velocity.

A/B Ratio (continued)

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 the 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.

Doppler Mode Measurements

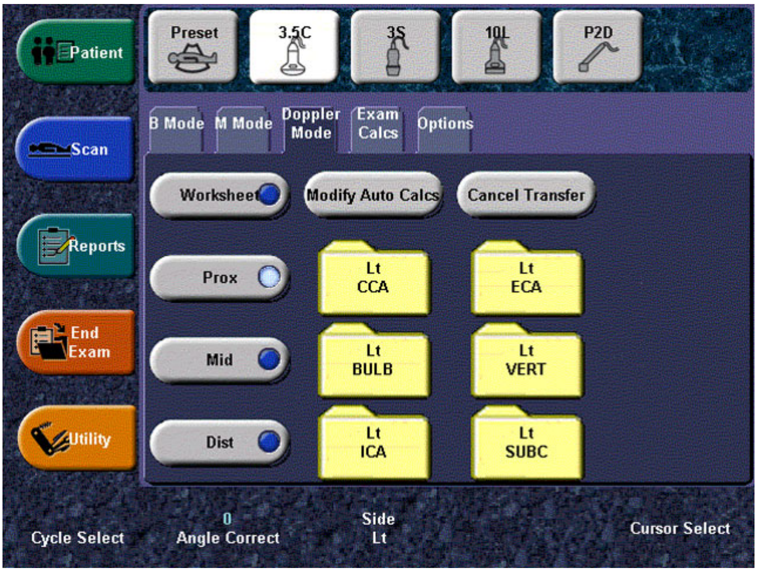

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Modify Auto Calcs
Cancel Transfer
Prox
Mid
Dist
Lt CCA
Lt ECA
Lt BULB
Lt VERT
Lt ICA
Lt SUBC
Cycle Select
0
Angle Correct
Side
Lt
Cursor Select

Figure 11-5. D-Mode Touch Panel 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***)
Side Rt/Lt	The system has measurements for the patient's right and left side. To select right or left, adjust the Touch Panel knob.
TAMAX AUTO/ MANUAL	To select Auto Doppler Trace or Manual Doppler Trace at the time you are making a measurement, adjust the Touch Panel knob. • Select AUTO – the system traces the peak velocity envelope from the begin time to the end time. • Select MANUAL – trace the waveform manually.

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 Touch Panel screen.

If you select ***PV***, all selected parameters are turned off. When you deselect ***PV***, the system returns to the previously selected calculation.

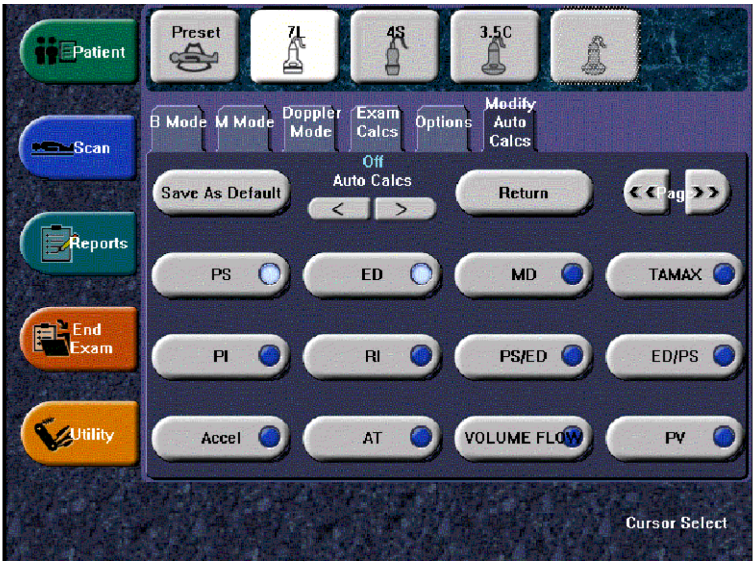

Patient
Scan
Reports
End Exam
Utility
Preset
7L
4S
3.5C
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Modify Auto Calcs
Save As Default
Off
Auto Calcs
<
>
Return
<< Page >>
PS
ED
MD
TAMAX
PI
RI
PS/ED
ED/PS
Accel
AT
VOLUME FLOW
PV
Cursor Select

Figure 11-6. Modify Auto Calculation Menu (Page1)

Naming format for vessels

When you want to measure a vessel, on the Touch Panel you select the folder for the vessel. Many vessel folders are labeled with an abbreviation. The following table lists abbreviations used for naming vascular vessels.

Table 11-2: Vascular Vessel Abbreviations

Acronym	Name
ACA	Anterior Cerebral Artery
AComA	Anterior Communicating Artery
Axill	Axillary Artery
Axill V	Axillary Vein
BA	Basilar Artery
Basil V	Basilic Vein
Brac V	Brachial Vein
CCA	Common Carotid Artery
Ceph V	Cephalic Vein
CHA	Common Hepatic Artery
Com Femoral	Common Femoral Artery
Com Iliac	Common Iliac Artery
Com Iliac A	Common Iliac Artery
Dors Pedis	Dorsalis Pedis
ECA	Exterior Carotid Artery
Ext Iliac	External Iliac Artery
ICA	Internal Carotid Artery (Transcranial Doppler)
ICA	Interior Carotid Artery (Carotid Artery)
IMA	Inferior Mesenteric Artery
Inno V	Innominate Vein
IVC	Inferior Vena Cava
MCA	Middle Cerebral Artery
Mcub V	Median Cubital Vein
Mid Hep V	Middle Hepatic Vein
MRA	Main Renal Artery

Table 11-2: Vascular Vessel Abbreviations

Acronym	Name
PCA	Posterior Cerebral Artery
PComA	Posterior Communicating Artery
SMA	Superior Mesenteric Artery
SMV	Superior Mesenteric Vein
SUBC	Subclavian Artery
SUBC V	Subclavian Vein
Sup Femoral	Superficial Femoral Artery
TCD	Transcranial Doppler
TIPS	Transjugular Intrahepatic Portosystemic Shunt
VERT	Vertebral Artery

Auto Vascular Calculation Overview

Auto Vascular Calculation enables the LOGIQ 5 to detect and identify a cardiac cycle. It allows you to assign measurements and calculations during live timeline imaging, while the image is frozen, or in CINE. Peak values are detected for venous flow.

During cardiac cycle detection, the system identifies the cardiac cycle using calipers, vertical bars, and/or highlighting of timeline data. Use of identifiers is based on measurements and calculations selected by an operator for the current application. The system may place calipers at early systolic peak, peak systole, minimum diastole and end diastole. Vertical bars may also be placed to indicate the beginning and end of the cardiac cycle. The peak and/or mean trace may be highlighted. You can edit the cardiac cycle identified by the system or select a different cardiac cycle.

You can select the calculations to be displayed in the M&A Result window during live scanning or on a frozen image. These calculations are displayed at the top of M&A Result Window located adjacent to the image. These calculations are presettable by application which means you can set up the default calculations to be displayed for each application.

Auto Vascular Calculation

Activating Auto Vascular Calculation

To activate Auto Vascular Calculation, select the **Auto Calc** Touch Panel 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.

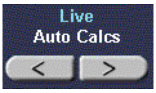


Figure 11-7. Auto Calculation Touch Panel key

Setting up Auto Vascular Calculation Parameters

- **Selecting Auto Trace**

  You can select to have a continuous auto trace of the max or mean velocities.

  - Select Max or Mean using the ***Trace Method*** Touch Panel pull-down menu.

- **Selecting Trace Detection**

  Trace Detection lets you specify the peak timeline data used for the cardiac cycle identification. Indicate whether cardiac cycle detection, and therefore cardiac cycle identification, should 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 Calc*** Touch Panel key.

     The Modify Calculation menu is displayed.

  b. Select which measurements and calculations are to be displayed in the Auto Vascular calculation window.

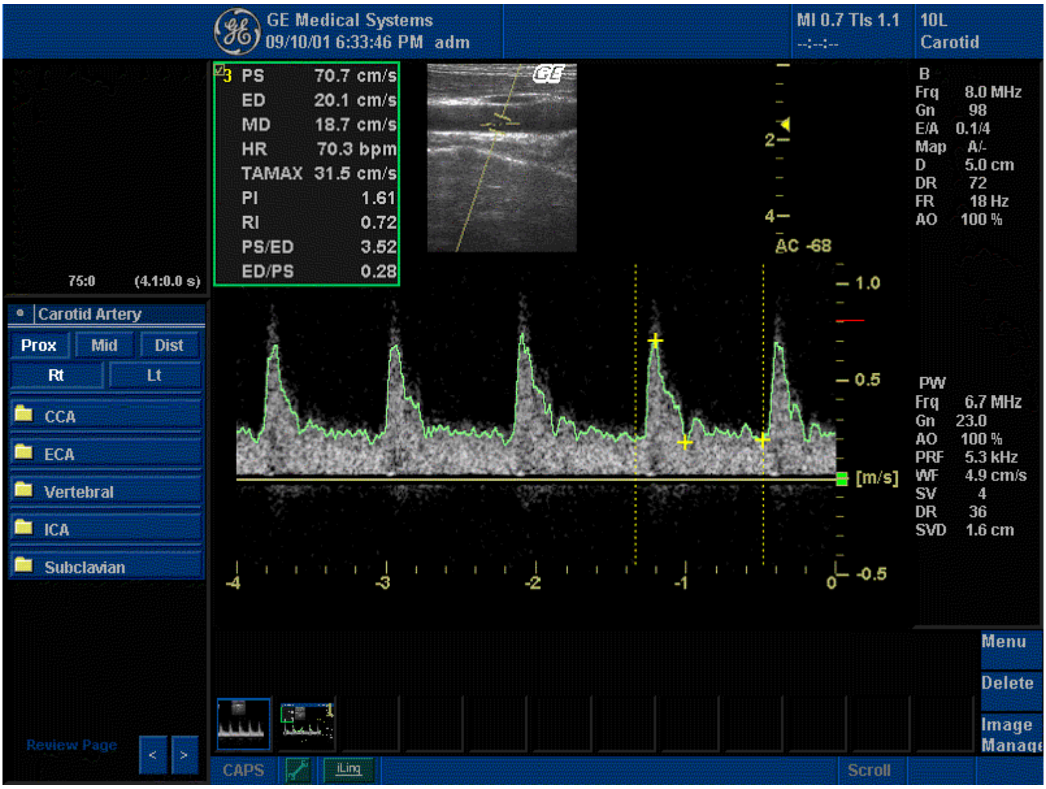
     You can select the following parameter: PS, ED, MD, HR, TAMAX, PI, RI, Accel, PS/ED, ED/PS, AT, Volume Flow, PV.

Auto Vascular Calculation (continued)

Auto Vascular Calculation Exam

1. Preset the system.
2. Perform the scan and press **Freeze**.
3. Activate Auto Vascular Calculation.

   The system performs a calculation automatically as shown in Figure 11-8.


GE Medical Systems
09/10/01 6:33:46 PM adm
MI 0.7 TIs 1.1
10L
Carotid

PS	70.7 cm/s
ED	20.1 cm/s
MD	18.7 cm/s
HR	70.3 bpm
TAMAX	31.5 cm/s
PI	1.61
RI	0.72
PS/ED	3.52
ED/PS	0.28

B
Frq 8.0 MHz
Gn 98
E/A 0.1/4
Map A/-
D 5.0 cm
DR 72
FR 18 Hz
AO 100 %

PW
Frq 6.7 MHz
Gn 23.0
AO 100 %
PRF 5.3 kHz
WF 4.9 cm/s
SV 4
DR 36
SVD 1.6 cm

75:0
(4.1:0.0 s)
Carotid Artery
Prox
Mid
Dist
Rt
Lt
CCA
ECA
Vertebral
ICA
Subclavian
Review Page
<
>
3
2
4
AC -68
1.0
0.5
[m/s]
-0.5
-4
-3
-2
-1
0
Menu
Delete
Image Manage
CAPS
iLinq
Scroll

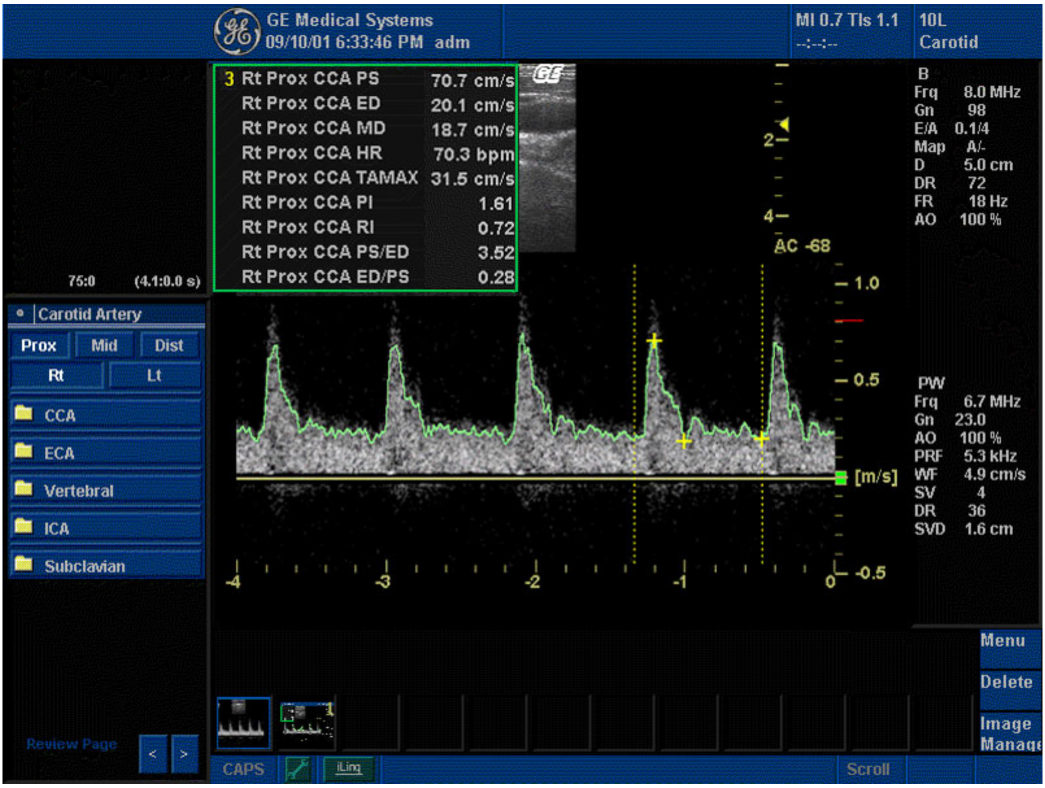
Figure 11-8. Auto Vascular Calculation

Auto Vascular Calculation Exam (continued)

The Auto Vascular calculation is assigned to particular vessel measurements.

1. Press **Measure** to display the Measurement menu.
2. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
3. Select the desired vessel name from the Touch Panel.

   Selected vessel measurements are automatically assigned with the Auto Vascular calculation. The results are then displayed in the Results Window as shown in Figure 11-9.



```
GE Medical Systems
09/10/01 6:33:46 PM  adm
MI 0.7 TIs 1.1   10L
--:--:--         Carotid
```

```
3 Rt Prox CCA PS       70.7 cm/s
  Rt Prox CCA ED       20.1 cm/s
  Rt Prox CCA MD       18.7 cm/s
  Rt Prox CCA HR       70.3 bpm
  Rt Prox CCA TAMAX    31.5 cm/s
  Rt Prox CCA PI        1.61
  Rt Prox CCA RI        0.72
  Rt Prox CCA PS/ED     3.52
  Rt Prox CCA ED/PS     0.28
```

```
B
Frq   8.0 MHz
Gn    98
E/A   0.1/4
Map   A/-
D     5.0 cm
DR    72
FR    18 Hz
AO    100 %

PW
Frq   6.7 MHz
Gn    23.0
AO    100 %
PRF   5.3 kHz
WF    4.9 cm/s
SV    4
DR    36
SVD   1.6 cm
```

75:0
(4.1:0.0 s)
Carotid Artery
Prox
Mid
Dist
Rt
Lt
CCA
ECA
Vertebral
ICA
Subclavian
Review Page
<
>
AC -68
2
4
1.0
0.5
[m/s]
-0.5
-4
-3
-2
-1
0
Menu
Delete
Image Manage
CAPS
iLinq
Scroll

Figure 11-9. Assigned Vessel

NOTE: When you want to cancel the assignment, you can use the ***Cancel Transfer*** *Touch Panel key. See 'Cancel Transfer' for more information.*

Auto Vascular Calculation (continued)

During the course of an exam, the cardiac cycle may be indicated between two yellow bars; the peak trace and the mean trace may appear in green; calculation indicators appear on the spectral trace as a caliper identifier (these vary, depending on the selected calculation in the Results Window).

The right-most, most complete cycle is typically chosen to be the selected cardiac cycle. You can select a different cardiac cycle.

To select a different cardiac cycle:

- Use the ***Cycle Select*** control to cycle to 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.*

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.

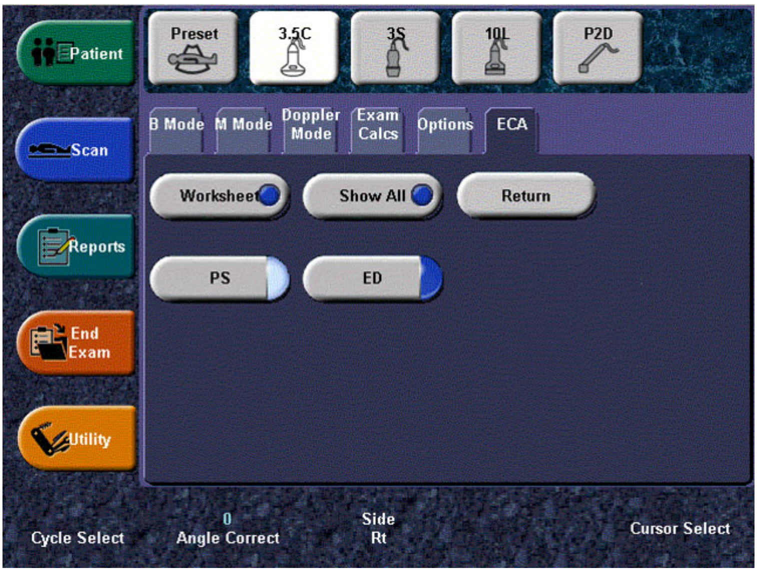

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
ECA
Worksheet
Show All
Return
PS
ED
Cycle Select
0
Angle Correct
Side
Rt
Cursor Select

Figure 11-10. Measurement Menu Example

4. Make the required measurements according to the system, or select your preferred measurements.

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.

End Diastole (ED), Mid Diastole (MD) or Peak Systole (PS),

To calculate the end diastole, mid diastole or peak systole:

1. Select ***ED***, ***MD*** or ***PS***.

   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 end diastole, mid diastole or peak systole 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.

Heart Rate

To calculate the heart rate:

1. Select ***Heart Rate***.

   The system displays an active caliper and a vertical dotted line.
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 second or third cycle, move the **Trackball**.

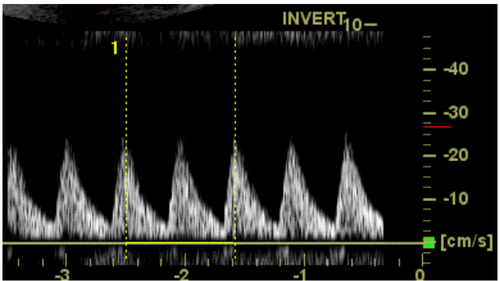


Figure 11-11. Two Heart Beat Reference

5. To complete the measurement and transfer the calculation to the worksheet, press **Set**.

Pulsatility Index (PI)

To perform a Manual Trace:

1. Select ***PI***.

   The system displays a trace caliper and a vertical dotted line.
2. To position the caliper at the beginning of the waveform (PS), move the **Trackball**.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. To trace the waveform from PS to ED, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays peak systole, mid diastole, end diastole, TAMAX, and the PI in the Results Window.

To perform a Auto Trace:

1. The system displays a trace cursor.
2. Use the Trackball to move the cursor to desired point and press Set to fix.
3. The system displays a value of PS, ED, MD, TAMAX and PI in the Result Window.

Resistive Index (RI)

1. 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.

TAMAX

To perform a Manual Trace:

1. 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.

Performing an Auto Trace

1. The system displays a trace cursor.
2. Use the **Trackball** to move the cursor to desired point and press **Set**.
3. The peak velocity envelope is auto traced and the system displays a value of VTI, Time and TAMAX in the Result Window.

Edit Trace

Regarding Auto trace functionality, the user can just move the cursors to the desired cardiac cycle and position in PS and ED.The system has ability for manual correction of Auto trace.

To edit trace:

1. Adjust the **Ellipse** rotary knob clockwise or move the Trackball over the incorrect portion of the measurement.
2. Going back to the point where trace is good.
3. Press **Set**. Then the system continues the trace to the end of the waveform.

Manual Vascular Calculation

For each vessel in Doppler mode, you can make any of the following measurements:

- Peak Systole (PS)
- End Diastole (ED)
- Mid 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***. See Figure 11-12.

   The system displays all possible vessel measurements. See Figure 11-13.
3. Select the desired measurement.

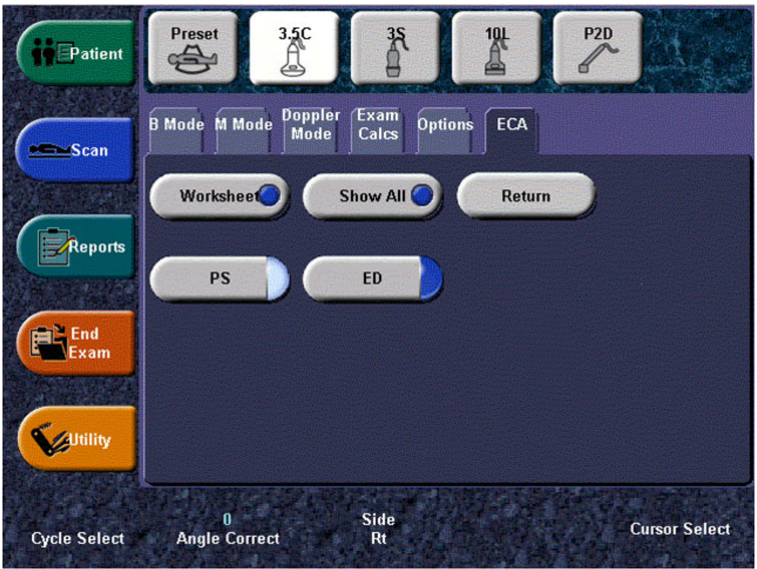

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
ECA
Worksheet
Show All
Return
PS
ED
Cycle Select
0
Angle Correct
Side
Rt
Cursor Select

Figure 11-12. ECA folder

To select vascular measurements (continued)

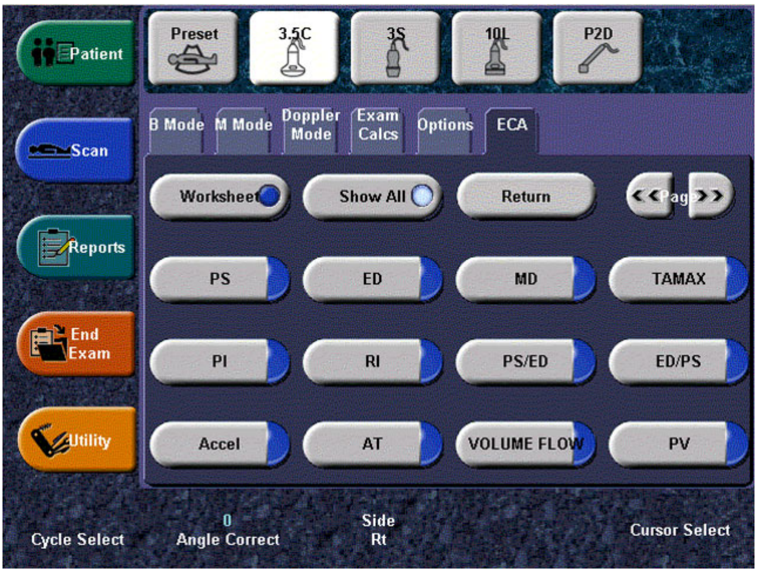

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
ECA
Worksheet
Show All
Return
<< Page >>
PS
ED
MD
TAMAX
PI
RI
PS/ED
ED/PS
Accel
AT
VOLUME FLOW
PV
Cycle Select
0
Angle Correct
Side
Rt
Cursor Select

Figure 11-13. Show All measurements

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

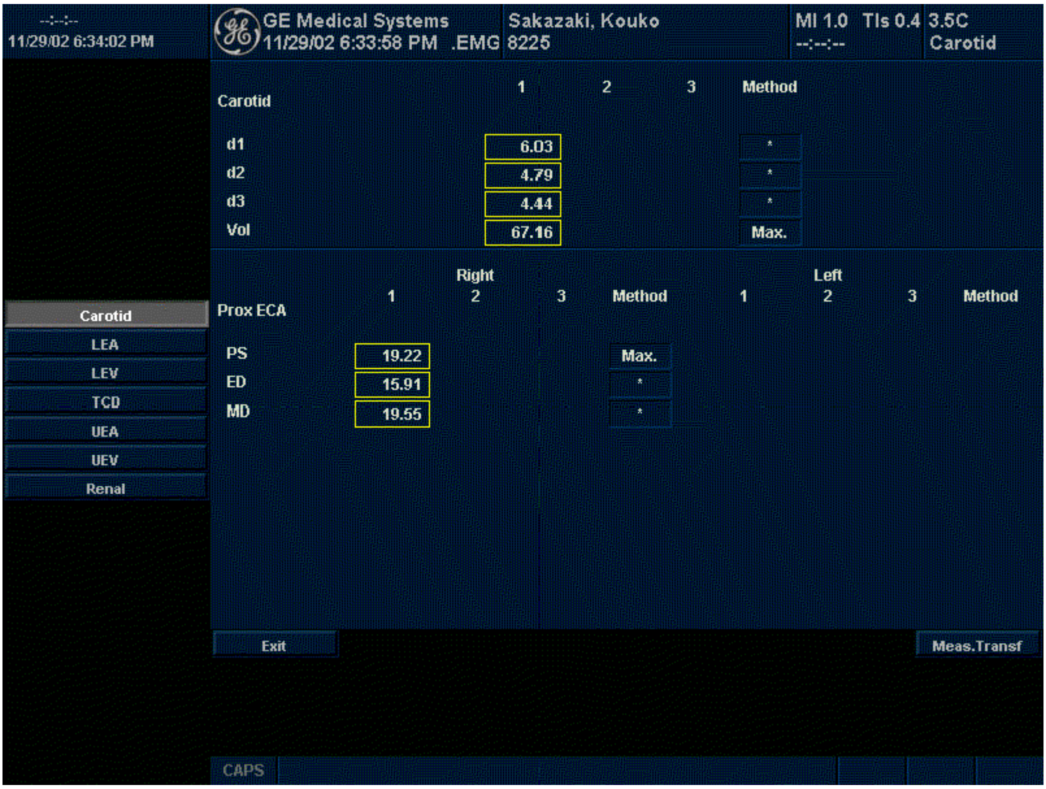
Vascular Worksheet

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.



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11/29/02 6:34:02 PM

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11/29/02 6:33:58 PM .EMG

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MI 1.0 TIs 0.4 3.5C
--:--:-- Carotid

Carotid	1	2	3	Method
d1	6.03			*
d2	4.79			*
d3	4.44			*
Vol	67.16			Max.

	Right				Left			
Prox ECA	1	2	3	Method	1	2	3	Method
PS	19.22			Max.				
ED	15.91			*				
MD	19.55			*				

Figure 11-14. 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 Touch Panel

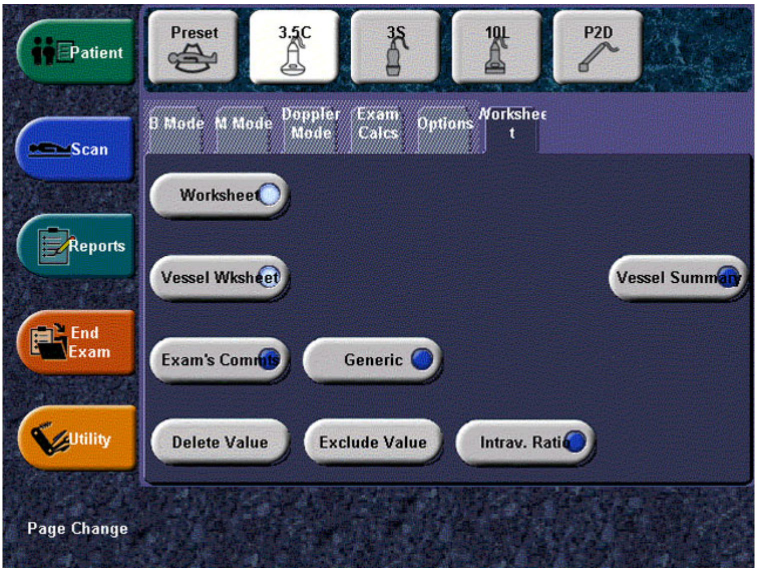

Patient
Scan
Reports
End Exam
Utility
Page Change
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
Worksheet
Vessel Wksheet
Vessel Summary
Exam's Comments
Generic
Delete Value
Exclude Value
Intrav. Ratio

Figure 11-15. Worksheet Display Touch Panel

1. **Worksheet Display**: To exit the worksheet display and return to scanning.
2. **Vessel Worksheet**: Select this key to display the Vessel Worksheet when the Vessel Summary is displayed.
3. **Vessel Summary**: Select this key to display the Vessel Summary when the Vessel Worksheet is displayed.
4. **Examiner’s Comment**: Select this key to display the Examiner’s comment window. See ‘Examiner’s Comments’ for more information.
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. **Delete Value**: Use to delete a value (each measurement value). See ‘To edit a worksheet’ for more information.
7. **Exclude Value**: Use to exclude a value from the result line. See ‘To edit a worksheet’ for more information.
8. **Intravessel Ratio**: Select this key to display the Intravessel Ratio Calculation window. See ‘Intravessel ratio’ for more information.
9. **Page Change** (knob): If a worksheet has more data, to view the next page, adjust the Page Change knob.

To edit a worksheet

To change data on a worksheet:

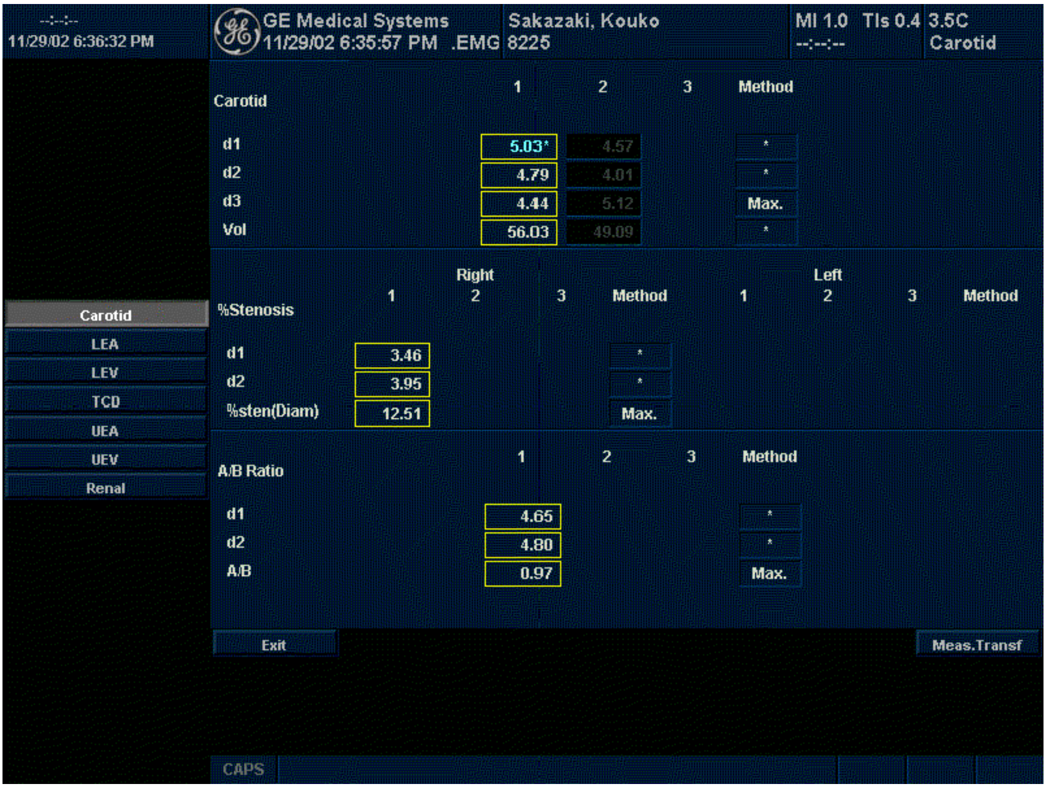
1. Select **Worksheet Display** from any page of the Vascular Calculation Touch Panel Menu.
2. To position the cursor at the field you want to change, move the **Trackball**.

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

NOTE: The resultant value is not editable.

4. 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.



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MI 1.0 TIs 0.4
--:--:--

3.5C
Carotid

Carotid	1	2	3	Method
d1	5.03*	4.57		*
d2	4.79	4.01		*
d3	4.44	5.12		Max.
Vol	56.03	49.09		*

	Right				Left			
%Stenosis	1	2	3	Method	1	2	3	Method
d1	3.46			*				
d2	3.95			*				
%sten(Diam)	12.51			Max.				

A/B Ratio	1	2	3	Method
d1	4.65			*
d2	4.80			*
A/B	0.97			Max.

Figure 11-16. Display of the edited value

NOTE: If the user move the cursor to the edited value and press ***Set*** *key once, the value is back again before 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 Touch Panel 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 set 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

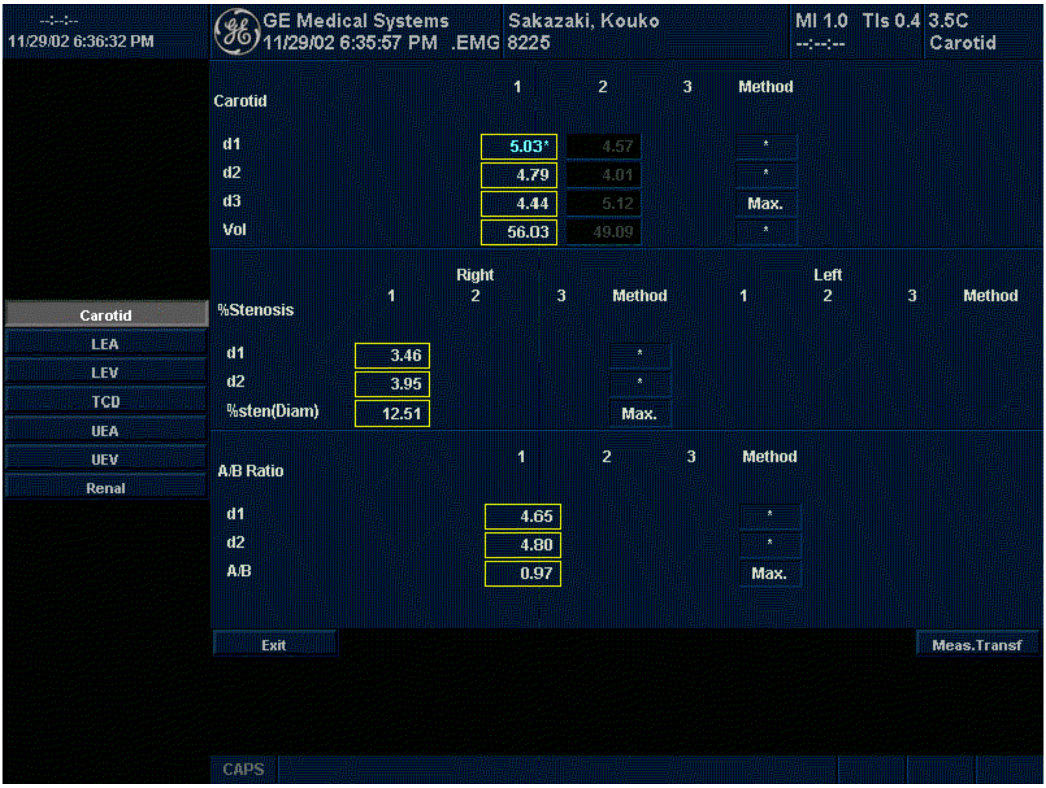
To edit a worksheet (continued)

To exclude data:

When the user selects a particular value on the Worksheet and select ***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 Touch Panel 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***.



11/29/02 6:35:57 PM .EMG

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MI 1.0 TIs 0.4 3.5C
--:--:-- Carotid

Carotid	1	2	3	Method
d1	5.03*	4.57		*
d2	4.79	4.01		*
d3	4.44	5.12		Max.
Vol	56.03	49.09		*

	Right				Left			
%Stenosis	1	2	3	Method	1	2	3	Method
d1	3.46			*				
d2	3.95			*				
%sten(Diam)	12.51			Max.				

A/B Ratio	1	2	3	Method
d1	4.65			*
d2	4.80			*
A/B	0.97			Max.

Figure 11-17. Display of the excluded value

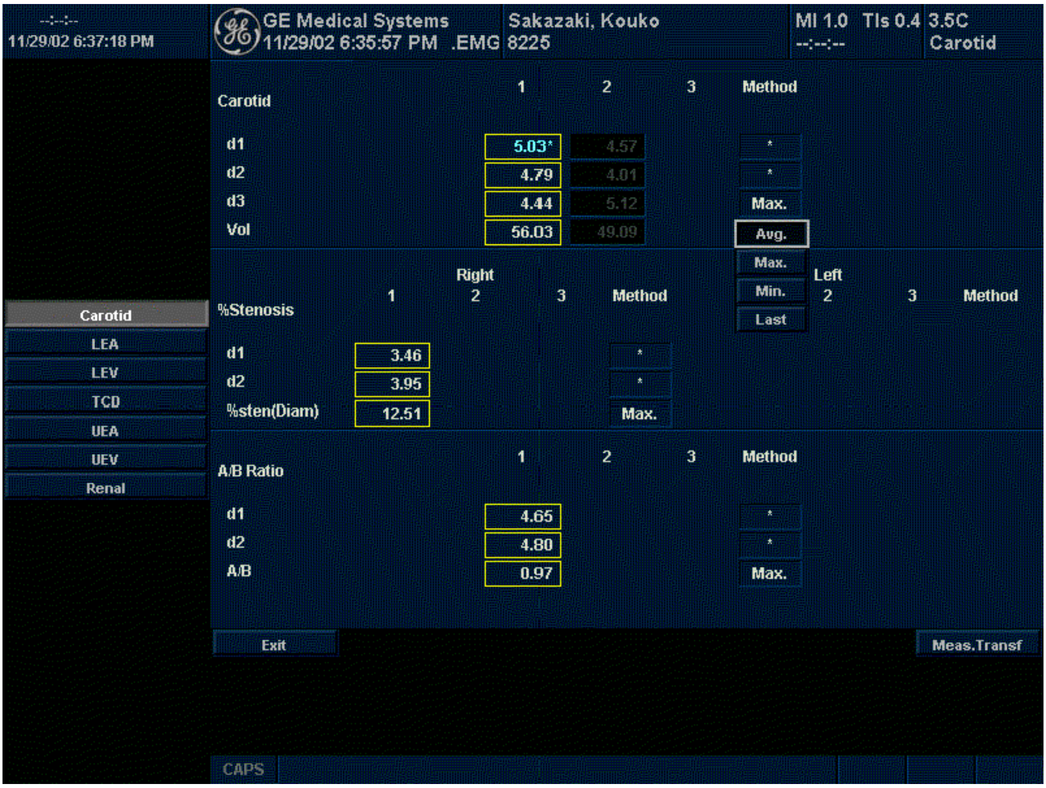
To edit a worksheet (continued)

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.



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MI 1.0 TIs 0.4
--:--:--

3.5C
Carotid

Carotid	1	2	3	Method
d1	5.03*	4.57		*
d2	4.79	4.01		*
d3	4.44	5.12		Max.
Vol	56.03	49.09		Avg.

%Stenosis	Right 1	Right 2	Right 3	Method	Left 1	Left 2	Left 3	Method
d1	3.46			*				
d2	3.95			*				
%sten(Diam)	12.51			Max.				

A/B Ratio	1	2	3	Method
d1	4.65			*
d2	4.80			*
A/B	0.97			Max.

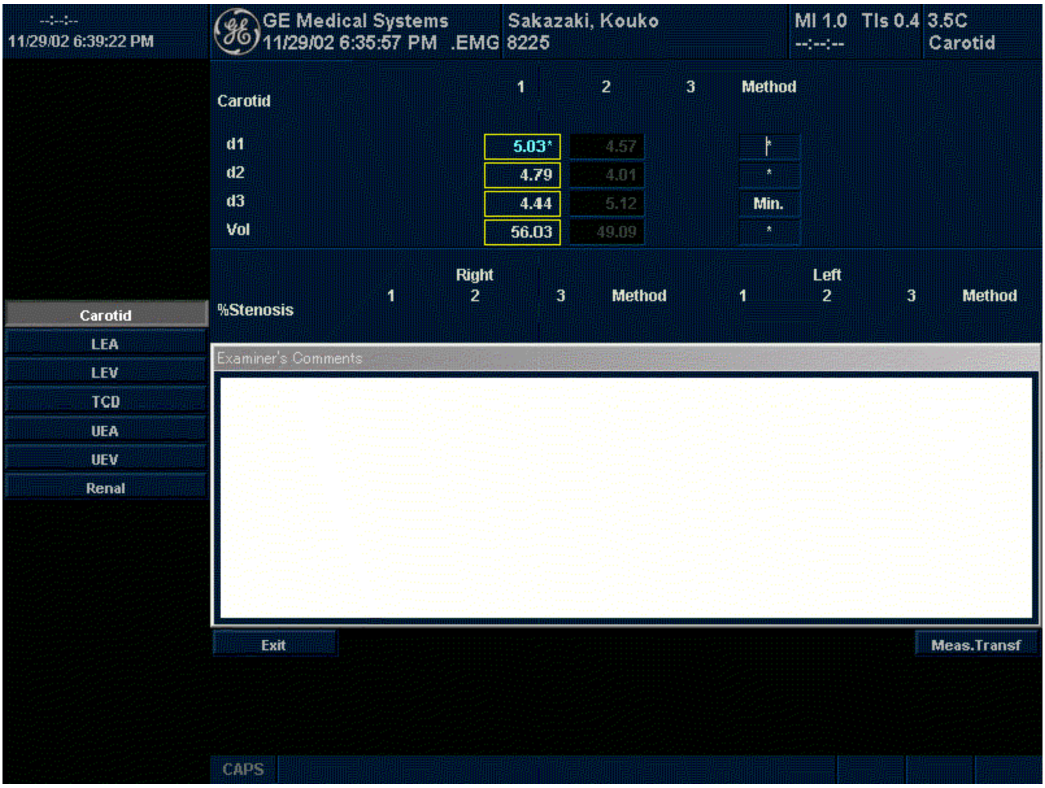
Figure 11-18. Pop-up menu of methods

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***.



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MI 1.0 TIs 0.4
--:--:--

3.5C
Carotid

Carotid	1	2	3	Method
d1	5.03*	4.57		*
d2	4.79	4.01		*
d3	4.44	5.12		Min.
Vol	56.03	49.09		*

	Right 1	2	3	Method	Left 1	2	3	Method
%Stenosis								

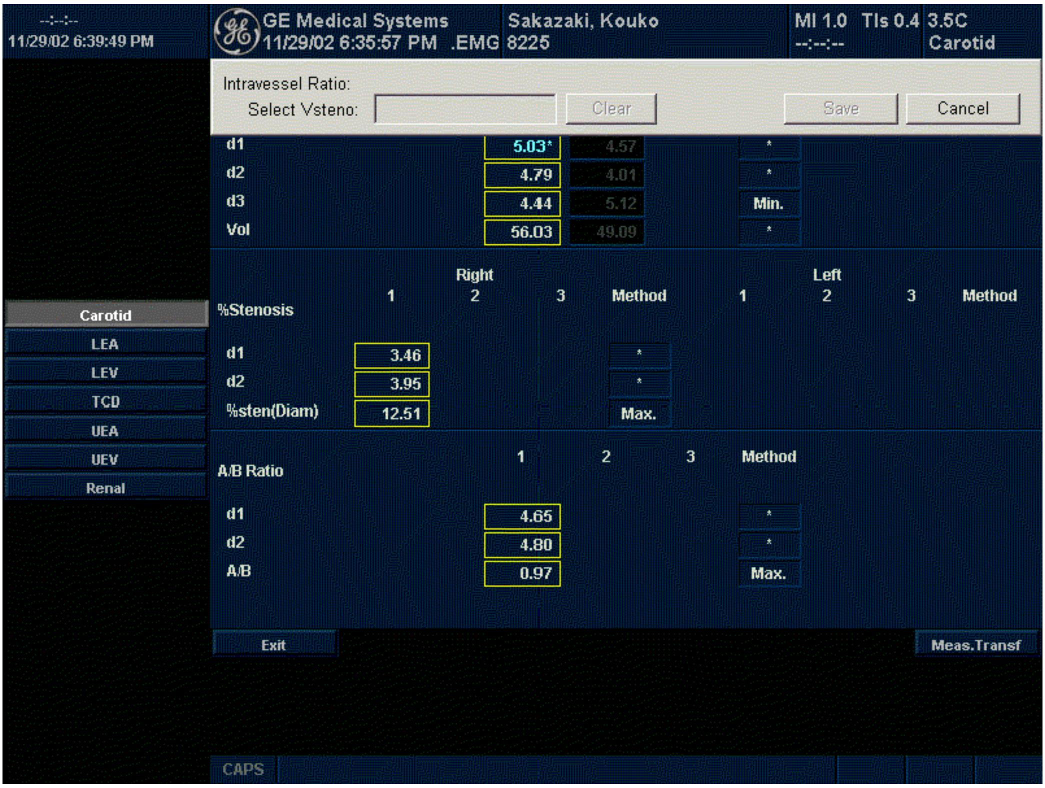
Carotid
LEA
LEV
TCD
UEA
UEV
Renal
Examiner's Comments
Exit
Meas.Transf
CAPS

Figure 11-19. 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.



--:--:--
11/29/02 6:39:49 PM
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11/29/02 6:35:57 PM .EMG
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MI 1.0 TIs 0.4
--:--:--
3.5C
Carotid
Clear
Save
Cancel
Carotid
LEA
LEV
TCD
UEA
UEV
Renal
Exit
Meas.Transf
CAPS

Intravessel Ratio:

Select Vsteno:

d1	5.03*	4.57	*
d2	4.79	4.01	*
d3	4.44	5.12	Min.
Vol	56.03	49.09	*

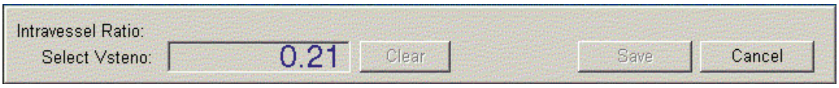
%Stenosis	Right 1	Right 2	Right 3	Method	Left 1	Left 2	Left 3	Method
d1	3.46			*				
d2	3.95			*				
%sten(Diam)	12.51			Max.				

A/B Ratio	1	2	3	Method
d1	4.65			*
d2	4.80			*
A/B	0.97			Max.

Figure 11-20. Intravessel Pop-up Window

2. Select the first velocity.

   The value is displayed in the window.



Clear
Save
Cancel

Intravessel Ratio:

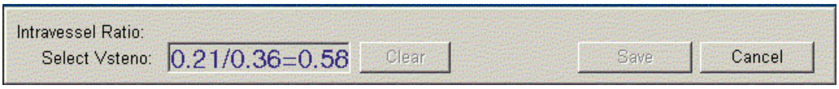
Select Vsteno: 0.21

Figure 11-21. Intravessel ratio one

Intravessel ratio (continued)

3. Select the second velocity.

   The second value and Result value are displayed in the window.



Intravessel Ratio:

Select Vsteno: 0.21/0.36=0.58

Figure 11-22. Intravessel ratio two

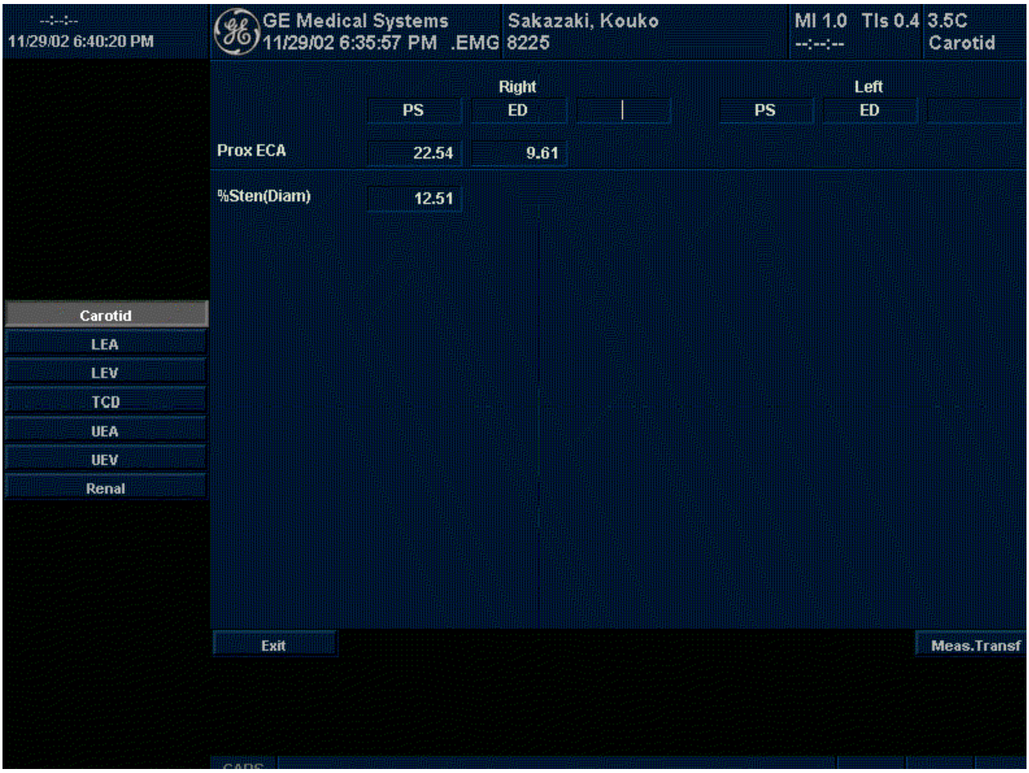
- To save the Intravessel ratio to the Vessel Summary, move the cursor to ***Save*** and press **Set**.
- To clear values, move the cursor to **Clear** and press **Set**.
- To cancel and exit Intravessel ratio, move the cursor to Cancel and press **Set**.

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 Touch Panel.



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MI 1.0 TIs 0.4
--:--:--

3.5C
Carotid

	Right			Left		
	PS	ED		PS	ED	
Prox ECA	22.54	9.61				
%Sten(Diam)	12.51					

Figure 11-23. 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 11-24. The selected parameter is displayed in every third column.

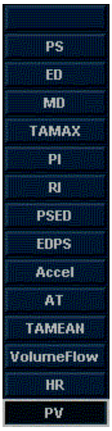


Figure 11-24. Pop-up menu

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 recorded on the VCR, printed on the B/W or color page printer, stored on a CD-RW 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.

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’ for more information.

Any measurement can be repeated by selecting that measurement again from the Touch Panel 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.

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’ for more information.
- Pediatrics.
  - This chapter describes Pediatrics B-Mode measurements.
  - The Pediatrics M-Mode measurements are common to other applications. See ‘M-Mode Measurements’ for more information.
  - The Pediatrics Doppler measurements are common to other applications. See ‘Doppler Mode Measurements’ for more information.

Pediatrics

B-Mode Measurements

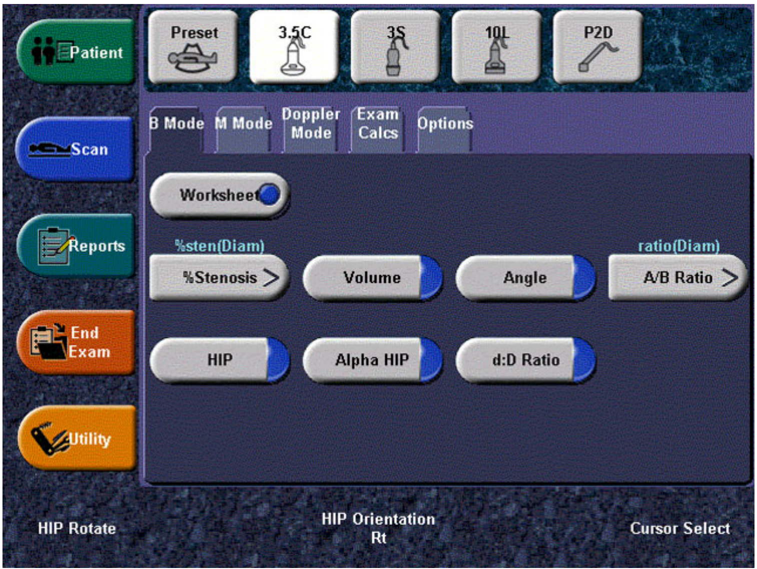

Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
3S
10L
P2D
B Mode
M Mode
Doppler Mode
Exam Calcs
Options
Worksheet
%sten(Diam)
%Stenosis
Volume
Angle
ratio(Diam)
A/B Ratio
HIP
Alpha HIP
d:D Ratio
HIP Rotate
HIP Orientation Rt
Cursor Select

Figure 13-1. Pediatrics B-Mode Measurement Touch Panel

The following generic measurements are common to other exam applications:

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

See ‘B-Mode Measurements’ 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.

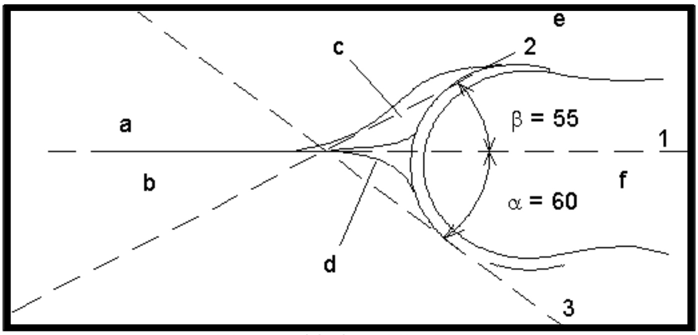


Figure 13-2. Hip Dysplasia

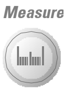
Anatomical Landmarks	
a. Ilium	d. Bony Roof
b. Iliac Bone	e. Cartilaginous acetabular roof
c. Labrum	f. Femoral Head

[1] Source: R GRAF, journal of Pediatric Orthopedics, 4: 735-740(1984)

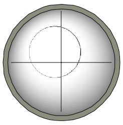
B-Mode Measurements (continued)

Hip Dysplasia Measurement (continued)

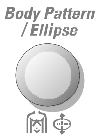
To make a Hip Dysplasia measurement:



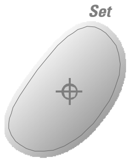
From the Touch Panel, select **HIP**.
A horizontal dotted line displays.



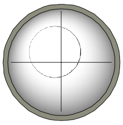
To place the baseline, move the ***Trackball***. Position the crosshairs edge at the osseous convexity of the ilium.



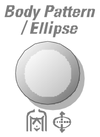
To rotate or change inclination, adjust the ***Ellipse*** control or the **Hip Orientation** knob.



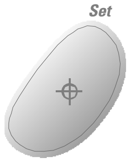
To fix the baseline, press ***Set***.
The system displays a second dotted line at an angle.



To place the line along the inclination line of the osseous convexity to labrum acetabulare, move the ***Trackball***.



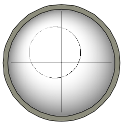
To rotate or change inclination, adjust the ***Ellipse*** control or the **Hip Orientation** knob.



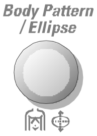
To fix the second measurement line, press ***Set***.
The system displays a third dotted line at an angle.

B-Mode Measurements (continued)

Hip Dysplasia Measurement (continued)



To place the caliper along the acetabular roof line, move the ***Trackball***.



To rotate or change inclination, adjust the ***Ellipse*** control or the **Hip Orientation** knob.

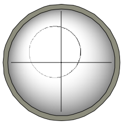
To fix the third measurement line and complete measurement, press ***Set***. The system displays the hip measurements (α and β) in the Results Window.

B-Mode Measurements (continued)

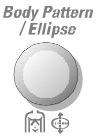
Alpha HIP

The Alpha HIP measurement measures the angle between the iliac baseline and the bony roof line. To make an Alpha HIP measurement:

From the Touch Panel, select **Alpha HIP**.
A horizontal dotted line displays.

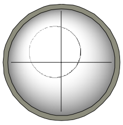


To place the baseline, move the ***Trackball***. Position the crosshairs edge at the osseous convexity of the ilium.

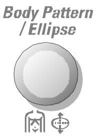


To rotate or change inclination, adjust the ***Ellipse*** control or the **Hip Orientation** knob.

To fix the baseline, press ***Set***.
The system displays a second dotted line at an angle.



To place the caliper along the acetabular roof line, move the ***Trackball***.



To rotate or change inclination, adjust the ***Ellipse*** control or the **Hip Orientation** knob.

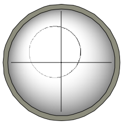
To fix the second measurement line, press ***Set***.
The system displays the alpha hip measurement (α) in the Results Window.

B-Mode Measurements (continued)

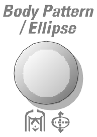
d:D Ratio Measurement

The d:D Ratio measurement measures the percentage of the femoral head coverage under the bony roof. To make this measurement:

From the Touch Panel, select **d:D Ratio**.
A horizontal dotted line displays.

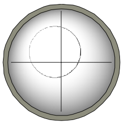


Use the ***Trackball*** to place the baseline along the ilium. Position the crosshairs edge at the osseous convexity of the ilium.

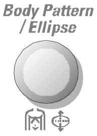


Use the ***Ellipse*** control or the **Hip Orientation** Touch Panel knob to adjust or change inclination.

Press ***Set*** to fix the baseline.



The system displays a circle representing the femoral head. Use the ***Trackball*** to position the circle.



Use the ***Ellipse*** control to size the femoral head circumference.

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

Report Generation

Describes how to generate reports.

This feature is not available at this time.

Chapter 15

Recording Images

Describes how to record images.

Connectivity

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.
- Store secondary capture for DICOM print via P2.
- Store images to the color printer via P3.
- Store images to the black and white printer via P4.
- Check the DICOM Job Spooler via F4 to verify delivery.
- 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 P1-P4 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. MOD or CD storage is recommended for image archive.

NOTE: *DICOM images are stored to MOD separately from patient data, which also needs to be backed up to a dedicated database-formatted MOD.*

- 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 (P1 through P4), see Chapter 16.

Formatting Removable Media

To format removable media, see Chapter 16.

Using the DICOM Spooler

To monitor/control DICOM jobs, press F4. You can view, resend, redirect, and delete images from the DICOM spooler by selecting a job, then specifying the action to be performed on this job.

Troubleshooting using Views

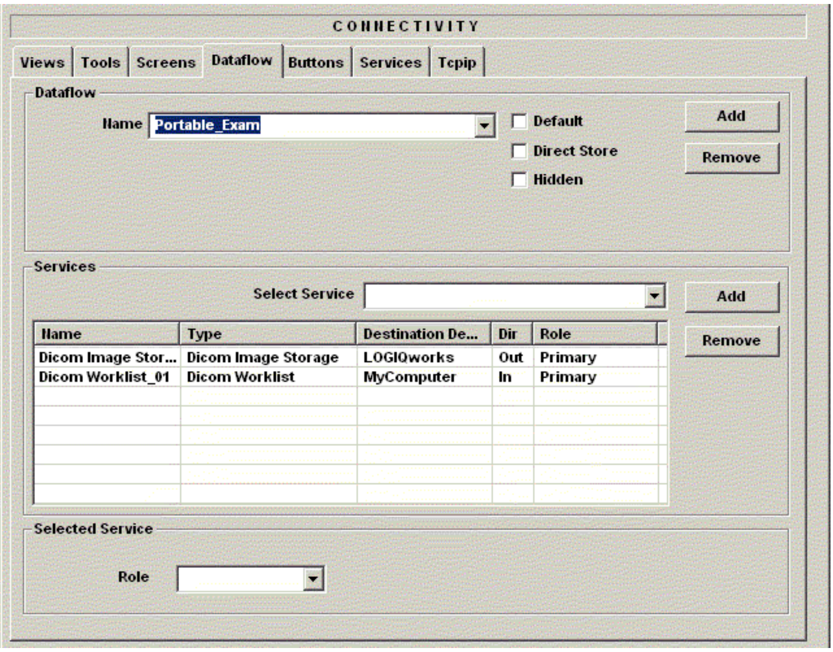
To troubleshoot connectivity on this system, see Chapter 16.

To verify that a service is connected to the network, see Chapter 16.

Portable Exams Using the DICOM Worklist Broker

Here are the steps to follow when doing a portable exam:

1. Set up a dataflow called ‘Portable Exam’. The DICOM Worklist must be set up as the primary input device. DICOM Image Store must be set up as the primary output.


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Dataflow
Add
Remove
Services
Add
Remove
Selected Service

Name: Portable_Exam

☐ Default
☐ Direct Store
☐ Hidden

Select Service:

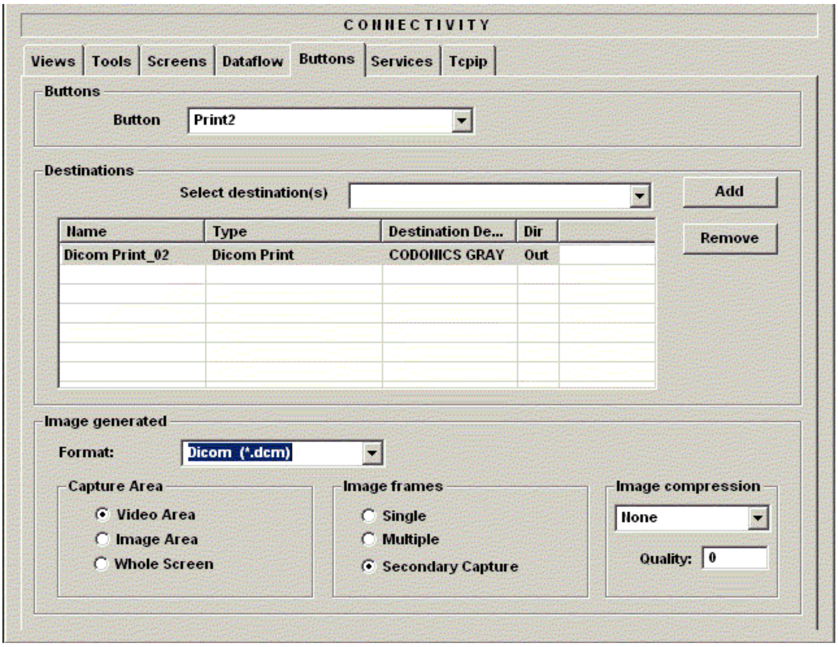
Name	Type	Destination De...	Dir	Role
Dicom Image Stor...	Dicom Image Storage	LOGIQworks	Out	Primary
Dicom Worklist_01	Dicom Worklist	MyComputer	In	Primary

Role:

Figure 15-1. Portable Exam with Worklist Dataflow Setup Example

Portable Exams Using the DICOM Worklist Broker (continued)

2. Define a print key for DICOM print.


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Add
Remove

Buttons

Button: Print2

Destinations

Select destination(s):

Name	Type	Destination De...	Dir
Dicom Print_02	Dicom Print	CODONICS GRAY	Out

Image generated

Format: Dicom (*.dcm)

Capture Area
- ● Video Area
- ○ Image Area
- ○ Whole Screen

Image frames
- ○ Single
- ○ Multiple
- ● Secondary Capture

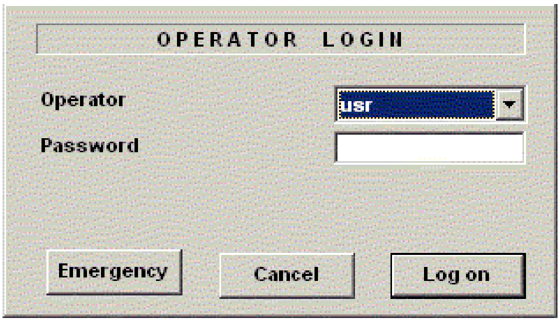
Image compression: None

Quality: 0

Figure 15-2. DICOM Print Setup Example

Portable Exams Using the DICOM Worklist Broker (continued)

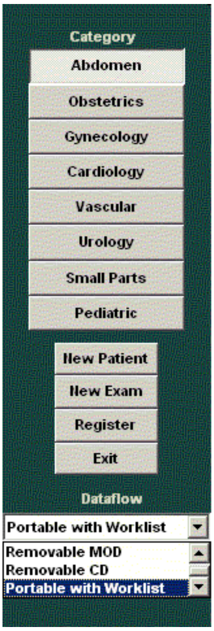
3. Login.



OPERATOR LOGIN
Operator
usr
Password
Emergency
Cancel
Log on

Figure 15-3. Login Pop-up Menu

4. On the Patient menu, select Portable with Worklist as this exam's Dataflow.

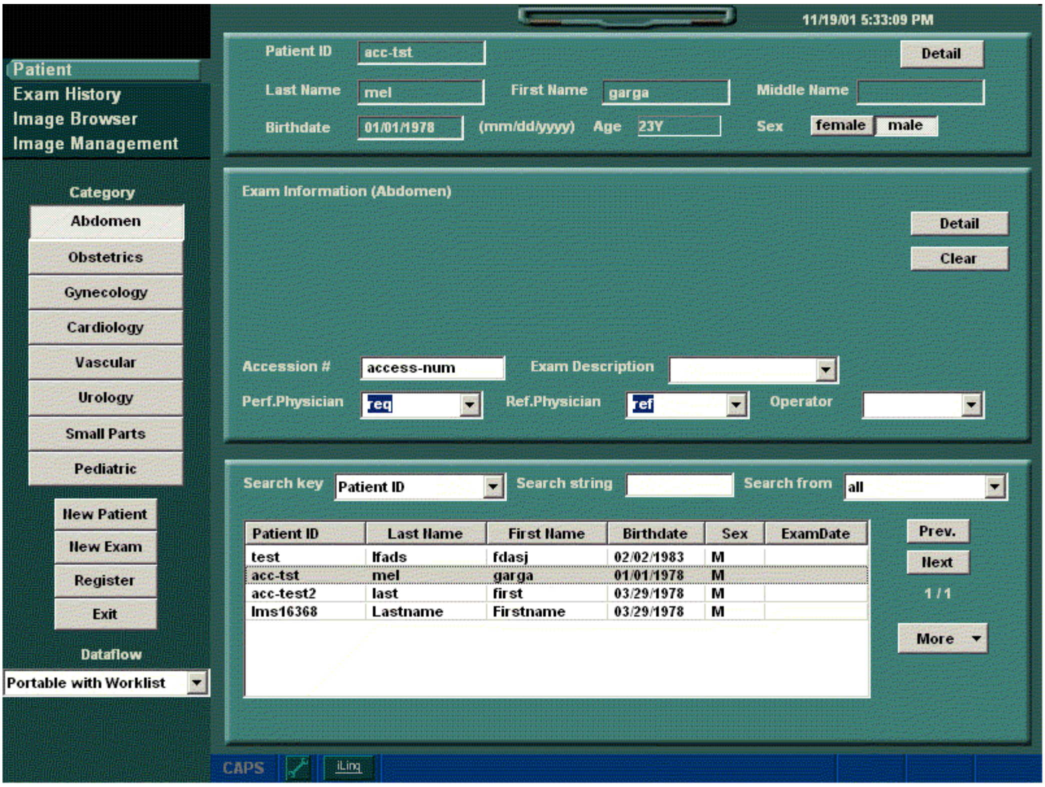


Category
Abdomen
Obstetrics
Gynecology
Cardiology
Vascular
Urology
Small Parts
Pediatric
New Patient
New Exam
Register
Exit
Dataflow
Portable with Worklist
Removable MOD
Removable CD
Portable with Worklist

Figure 15-4. Selecting the Portable Exam Dataflow on the New Patient Menu

Portable Exams Using the DICOM Worklist Broker (continued)

5. Select the portable exam patient.


11/19/01 5:33:09 PM
Patient
Exam History
Image Browser
Image Management
Category
Abdomen
Obstetrics
Gynecology
Cardiology
Vascular
Urology
Small Parts
Pediatric
New Patient
New Exam
Register
Exit
Dataflow
Detail
Detail
Clear
Prev.
Next
1 / 1
More
CAPS
iLinq

Patient ID: acc-tst
Last Name: mel
First Name: garga
Middle Name:
Birthdate: 01/01/1978 (mm/dd/yyyy)
Age: 23Y
Sex: female / male

Exam Information (Abdomen)

Accession #: access-num
Exam Description:
Perf.Physician: req
Ref.Physician: ref
Operator:

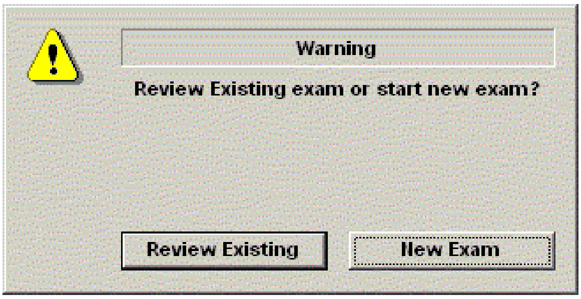
Search key: Patient ID
Search string:
Search from: all

Dataflow: Portable with Worklist

Patient ID	Last Name	First Name	Birthdate	Sex	ExamDate
test	lfads	fdasj	02/02/1983	M	
acc-tst	mel	garga	01/01/1978	M	
acc-test2	last	first	03/29/1978	M	
lms16368	Lastname	Firstname	03/29/1978	M	

Figure 15-5. Selecting the Portable Exam Patient on the New Patient Menu

6. Select the appropriate choice in the Warning message.


Review Existing
New Exam

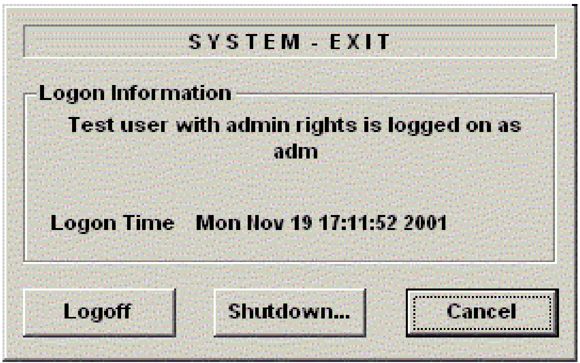
Warning

Review Existing exam or start new exam?

Figure 15-6. New Patient Query

Portable Exams Using the DICOM Worklist Broker (continued)

7. Press On/Off. Answer ‘Shutdown’ to the System - Exit pop-up message.



SYSTEM - EXIT

Logon Information

Test user with admin rights is logged on as adm

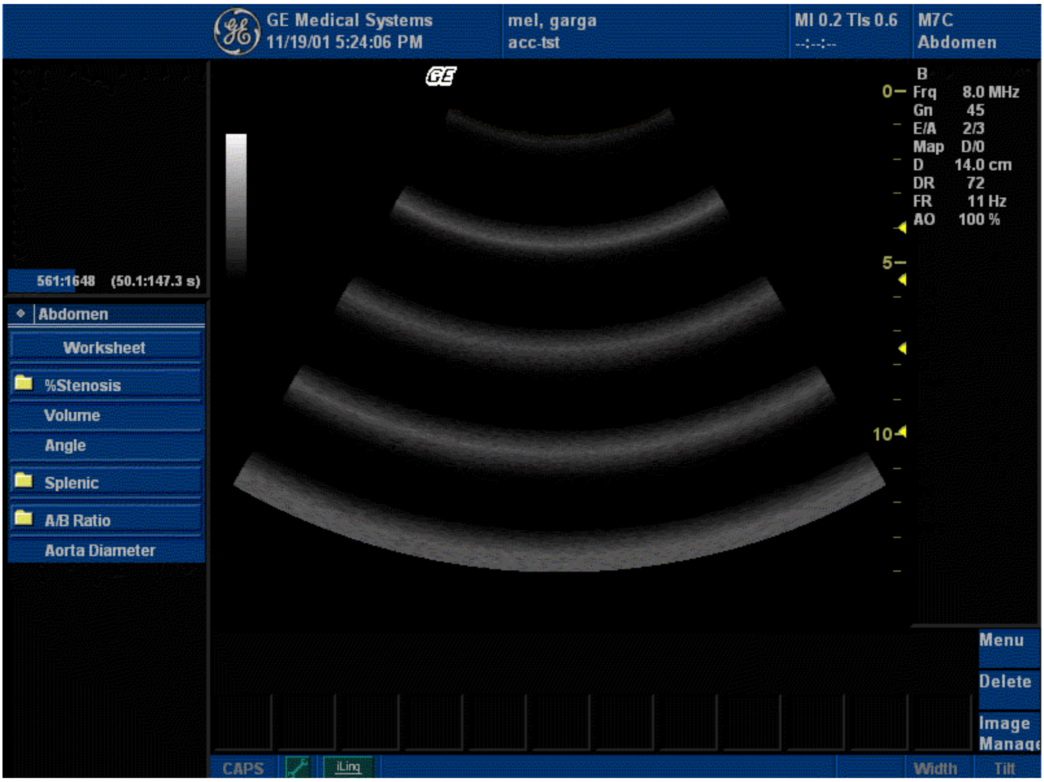
Logon Time Mon Nov 19 17:11:52 2001

Figure 15-7. System Power Down Menu

8. Transport the system according to user manual instructions to the portable exam site.

Portable Exams Using the DICOM Worklist Broker (continued)

9. Press Standby (On/Off) to power on the system. The patient's exam is displayed on the screen.



GE Medical Systems
11/19/01 5:24:06 PM
mel, garga
acc-tst
MI 0.2 TIs 0.6
M7C
Abdomen

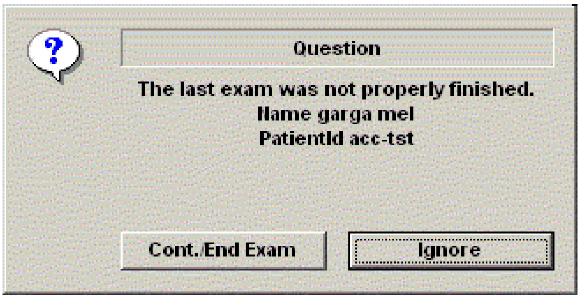
B
Frq 8.0 MHz
Gn 45
E/A 2/3
Map D/0
D 14.0 cm
DR 72
FR 11 Hz
AO 100 %

561:1648 (50.1:147.3 s)

GE
0
5
10
Abdomen
Worksheet
%Stenosis
Volume
Angle
Splenic
A/B Ratio
Aorta Diameter
Menu
Delete
Image Manage
CAPS
iLinq
Width
Tilt

Figure 15-8. Patient's Exam

10. Answer 'Cont./End Exam' to the Question pop-up message.



Question

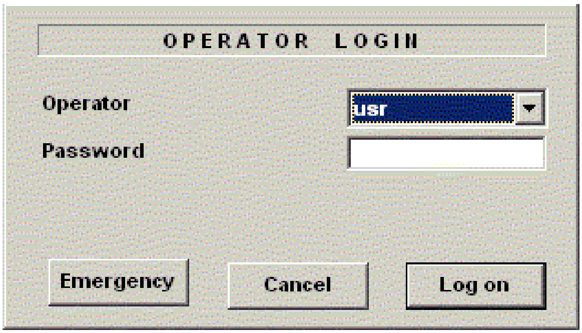
The last exam was not properly finished.
Name garga mel
PatientId acc-tst

Cont./End Exam
Ignore

Figure 15-9. Continue Current Exam Question Pop-up Menu

Portable Exams Using the DICOM Worklist Broker (continued)

11. Login.



OPERATOR LOGIN

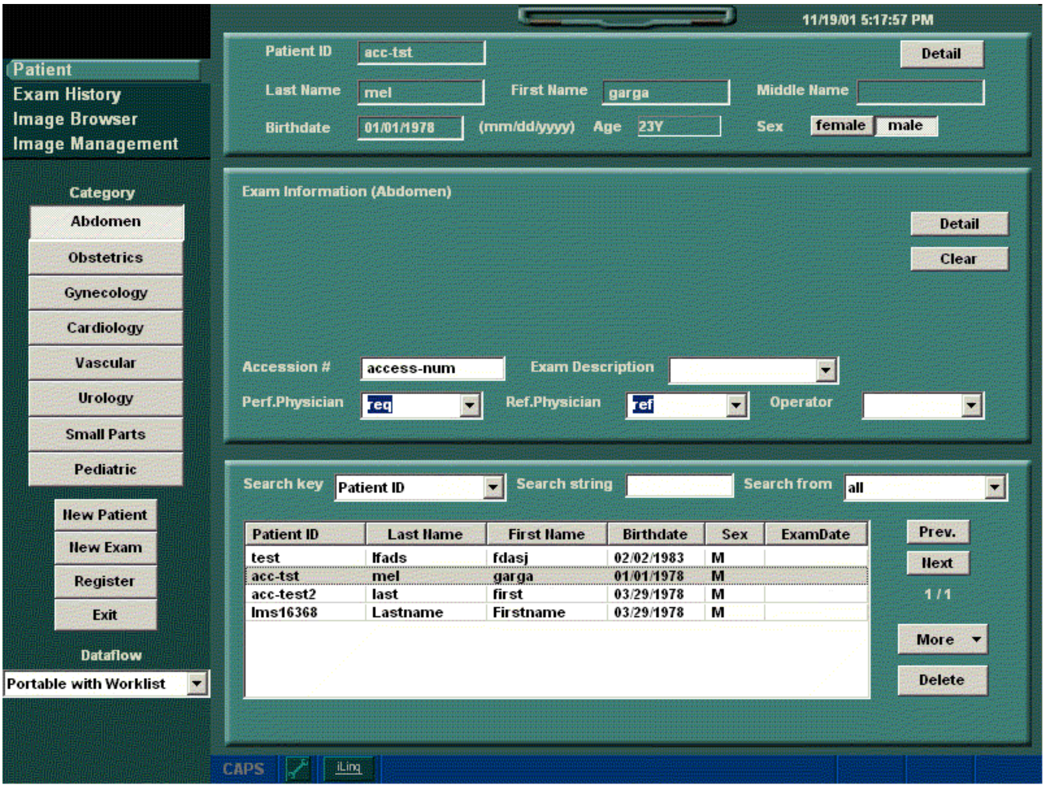
Operator: usr

Password:

Emergency
Cancel
Log on

Figure 15-10. User Login Pop-up Menu

12. Start a new exam, re-selecting the current patient for this exam.



11/19/01 5:17:57 PM

Patient ID: acc-tst

Last Name: mel

First Name: garga

Middle Name:

Birthdate: 01/01/1978 (mm/dd/yyyy)

Age: 23Y

Sex: female male

Exam Information (Abdomen)

Accession #: access-num

Exam Description:

Perf.Physician: req

Ref.Physician: ref

Operator:

Search key: Patient ID

Search string:

Search from: all

Patient ID	Last Name	First Name	Birthdate	Sex	ExamDate
test	lfads	fdasj	02/02/1983	M	
acc-tst	mel	garga	01/01/1978	M	
acc-test2	last	first	03/29/1978	M	
lms16368	Lastname	Firstname	03/29/1978	M	

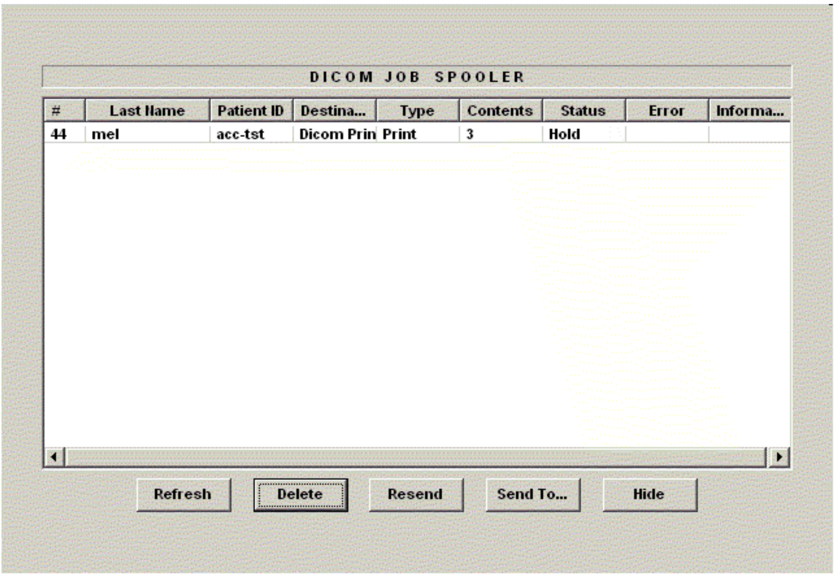
Dataflow: Portable with Worklist

Patient
Exam History
Image Browser
Image Management
Category
Abdomen
Obstetrics
Gynecology
Cardiology
Vascular
Urology
Small Parts
Pediatric
New Patient
New Exam
Register
Exit
Detail
Detail
Clear
Prev.
Next
1 / 1
More
Delete
CAPS
iLinq

Figure 15-11. Reselect Current Patient on New Patient Menu

Portable Exams Using the DICOM Worklist Broker (continued)

13. Scan the patient. To store images, press **P2** (depending on the print button you programmed). Stored images are in a ‘hold’ status. Press ***F4*** to view the DICOM Job Spooler.

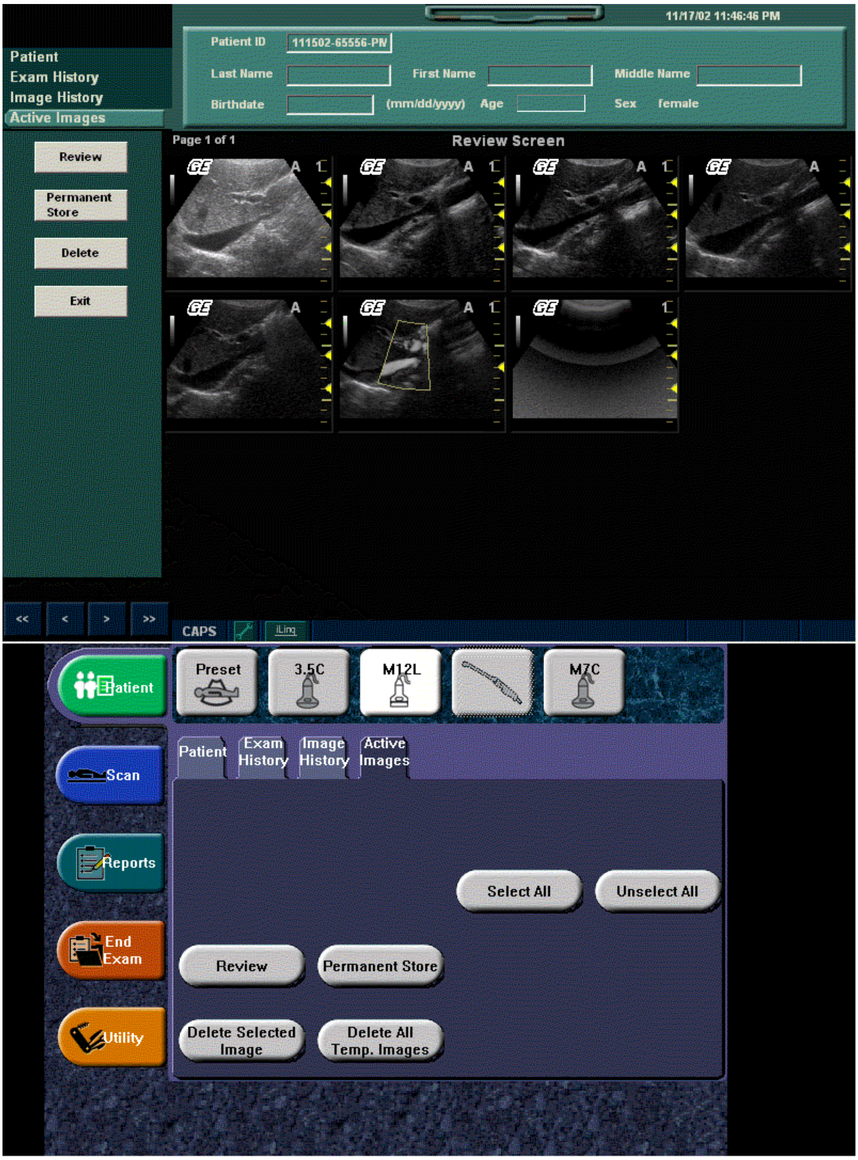

DICOM JOB SPOOLER
Refresh
Delete
Resend
Send To...
Hide

#	Last Name	Patient ID	Destina...	Type	Contents	Status	Error	Informa...
44	mel	acc-tst	Dicom Prin	Print	3	Hold		

Figure 15-12. DICOM Job Spooler Status

Portable Exams Using the DICOM Worklist Broker (continued)

14. After you have completed the portable exam scan, select the End Exam tab on the Touch Panel and store images via Permanent Store (via Image Management on the Patient menu).



11/17/02 11:46:46 PM

Patient ID 111502-65556-PN

Last Name

First Name

Middle Name

Birthdate (mm/dd/yyyy)

Age

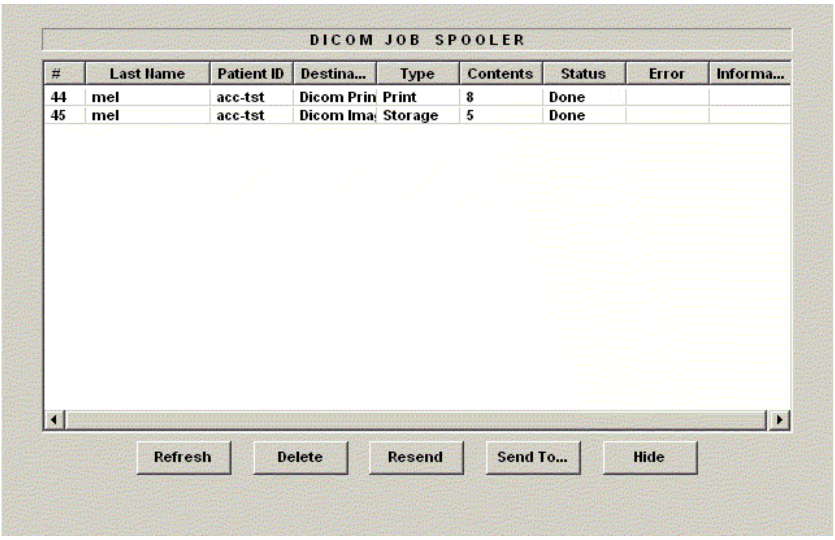
Sex female

Patient
Exam History
Image History
Active Images
Review
Permanent Store
Delete
Exit
Page 1 of 1
Review Screen
<<
<
>
>>
CAPS
iLinq
Patient
Scan
Reports
End Exam
Utility
Preset
3.5C
M12L
M7C
Patient
Exam History
Image History
Active Images
Select All
Unselect All
Review
Permanent Store
Delete Selected Image
Delete All Temp. Images

Figure 15-13. Ending a Portable Exam

Portable Exams Using the DICOM Worklist Broker (continued)

15. Press On/Off and Shutdown. When you get back to your normal work site, press Standby (On/Off) and login.
16. To resend the images stored during the portable exam, select the images and press Resend.



#	Last Name	Patient ID	Destina...	Type	Contents	Status	Error	Informa...
44	mel	acc-tst	Dicom Prin	Print	8	Done		
45	mel	acc-tst	Dicom Ima	Storage	5	Done		

Figure 15-14. Resent DICOM Portable Exam Images

NOTE: *To send CINE Loops stored during a portable exam, you need to have Multiframe on.*

NOTE: *NO exam history is available for portable exams. This means you CANNOT review images stored during portable exams on the Ultrasound system. These images were sent to the designated DICOM devices (printer, storage device, etc.).*

Image/Data Management

Clipboard

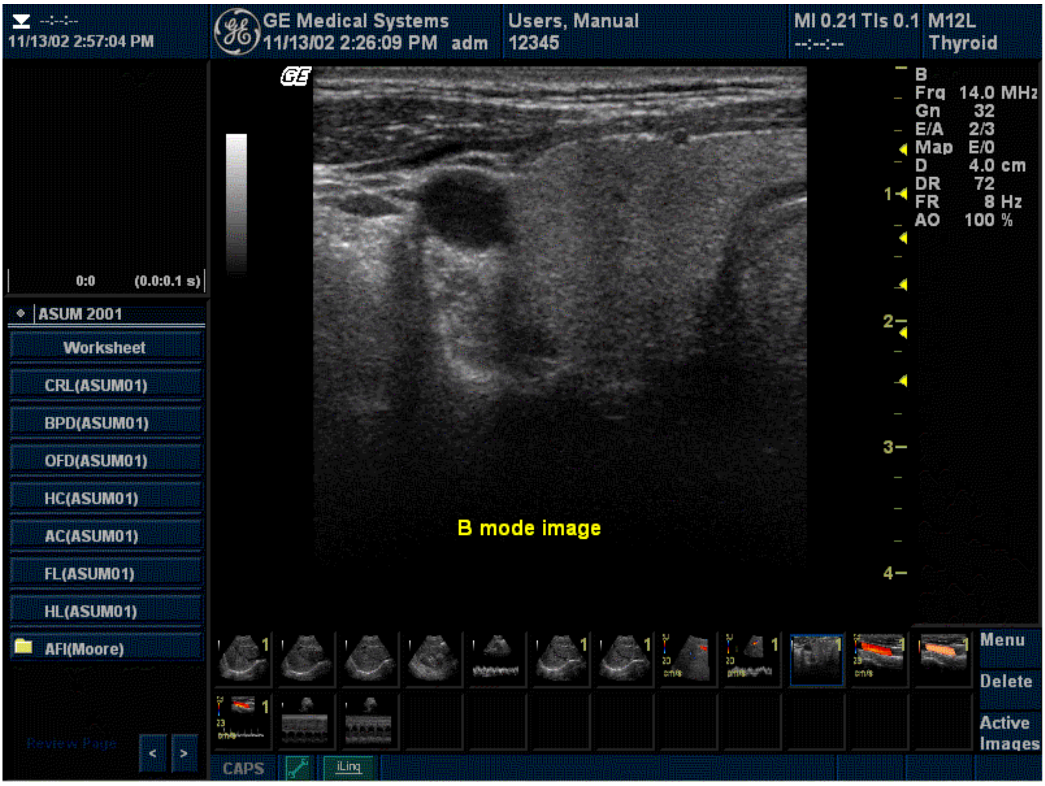
The clipboard displays thumbnail images of the acquired data for the current exam. Images from other exams are not displayed on the current patient's clipboard.

The active image is stored and placed on the clipboard when you press the print key (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.) -- the image has been removed from the system. Single images are indicated by a '1'; CINE Loops have no special identifier.

The clipboard fills from left to right, starting in the upper, left-hand corner. Once the top row is full, the second row starts to fill. Once both rows are full, the next image stored starts to fill a 'third' row (the first row disappears from the clipboard display, with the second row now becoming the first row, and the third row now becoming the second row).

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.


--:--:--
11/13/02 2:57:04 PM
GE Medical Systems
11/13/02 2:26:09 PM adm
Users, Manual
12345
MI 0.21 TIs 0.1
--:--:--
M12L
Thyroid
0:0
(0.0:0.1 s)
ASUM 2001
Worksheet
CRL(ASUM01)
BPD(ASUM01)
OFD(ASUM01)
HC(ASUM01)
AC(ASUM01)
FL(ASUM01)
HL(ASUM01)
AFI(Moore)
Review Page
<
>
B mode image
1
2
3
4
Menu
Delete
Active Images
CAPS
iLinq

B
Frq 14.0 MHz
Gn 32
E/A 2/3
Map E/0
D 4.0 cm
DR 72
FR 8 Hz
AO 100 %

Figure 15-15. Clipboard

Previewing Clipboard Images

1. Press **Set** to obtain a cursor.
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. Press **Set** to obtain a cursor.
2. Move the **Trackball** to position the pointer over the clipboard image you want to recall.
3. Press **Set** to recall the image.

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.
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.

CD-ROM Media Requirements

Only use CD-R CD-ROMs, DO NOT use CD-RW CD-ROMs. Also, the CD-R CD-ROM MUST support 16x writing speed or greater.

CD-ROM Handling Tips

To eject the CD-ROM, always press ***F3***. **DO NOT** press the eject button on the CD Drive.

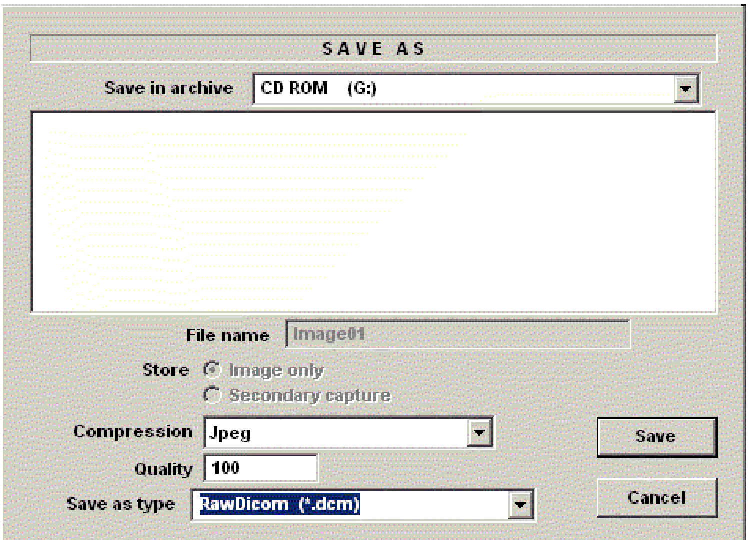
Always finalize the CD-ROM. This allows you to read the CD-ROM on any other PC.

DO NOT finalize the CD if you want to add more images to the CD.

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.



Save in archive: CD ROM (G:)

File name: Image01

Store ● Image only ○ Secondary capture

Compression: Jpeg

Quality: 100

Save as type: RawDicom (*.dcm)

Figure 15-16. 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 ***F3*** to eject the CD-ROM. Select CD Rewritable.

Save As (Saving Images to CD-ROM to View on Any PC) (continued)

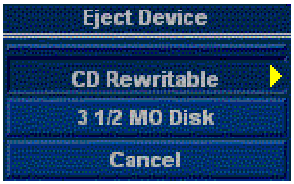


Figure 15-17. Eject Media Menu

8. Finalize the CD-ROM by selecting Yes. The CD-ROM is ejected from the system.

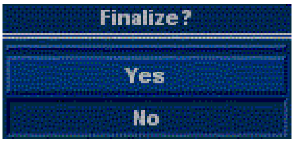


Figure 15-18. Finalize CD-ROM Menu

NOTE: If you want to add more images to the CD-ROM, select "No".

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.

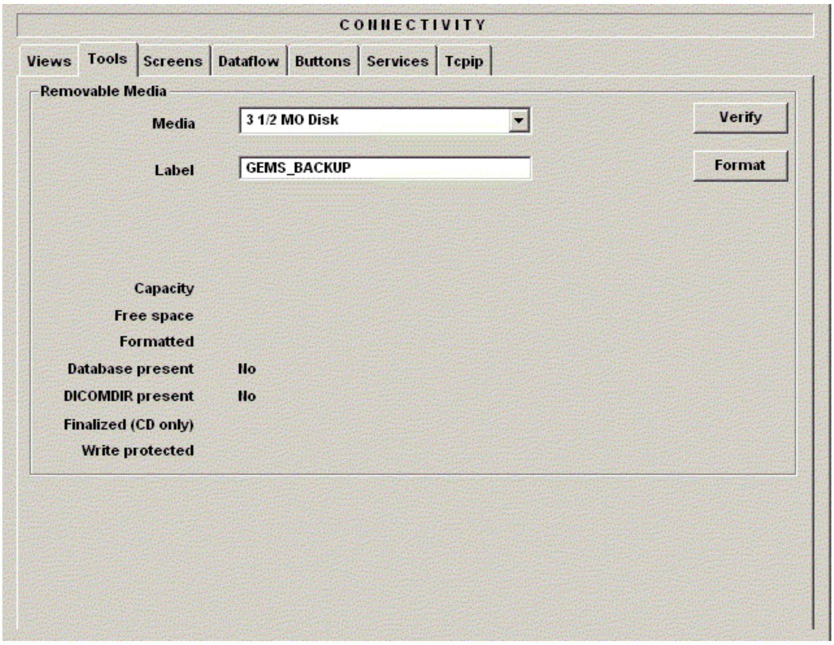
Table 15-1: Store Options

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.

Moving Images (Image Archive)

To archive images:

1. Insert the backup media. Format the backup media, CD-ROM or MOD. Select the Utility tab on the Touch Panel. 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.


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Removable Media
Verify
Format
Capacity
Free space
Formatted
Finalized (CD only)
Write protected

Media 3 1/2 MO Disk

Label GEMS_BACKUP

Database present No

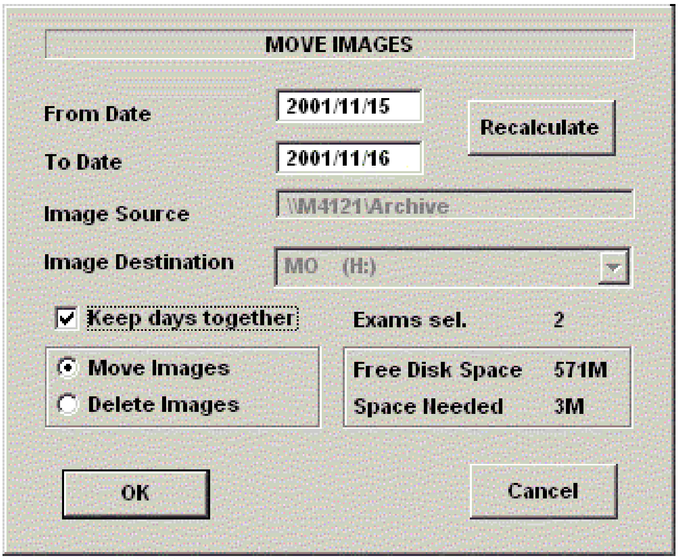
DICOMDIR present No

Figure 15-19. Format MOD/CD-ROM Screen

2. Format the MOD/CD-ROM.
3. Press Patient. Set the Dataflow to store images directly to MOD or CD-ROM - or select the Dataflow tab and select the Removable MOD or Removable CD-ROM dataflow.

Moving Images (Image Archive) (continued)

4. Press More, then select Move Images. The Move Images pop-up appears.



MOVE IMAGES

From Date 2001/11/15

To Date 2001/11/16

Image Source \\M4121\Archive

Image Destination MO (H:)

☑ Keep days together

Exams sel. 2

● Move Images

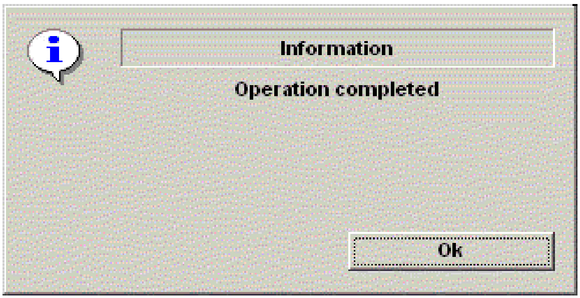
○ Delete Images

Free Disk Space 571M

Space Needed 3M

Figure 15-20. Image Archive Move Pop-up Menu

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.



Information

Operation completed

Figure 15-21. Archive Operation Complete Message

Export/Import (Moving Data Between Ultrasound Systems)

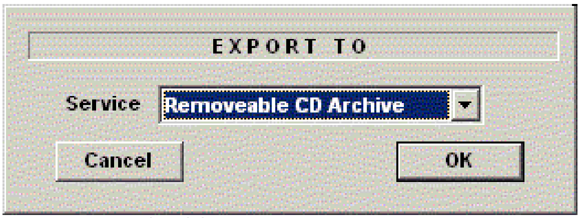
To move exams from one Ultrasound system to another, you need to export/import exam information.

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 (MOD or CD-ROM). 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 (MOD or CD-ROM) on the Export pop-up. Press OK. Then, please wait until the Patient menu is visible.



EXPORT TO

Service: Removeable CD Archive

Figure 15-22. 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:

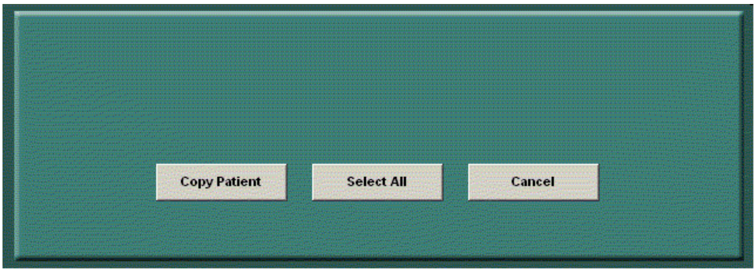


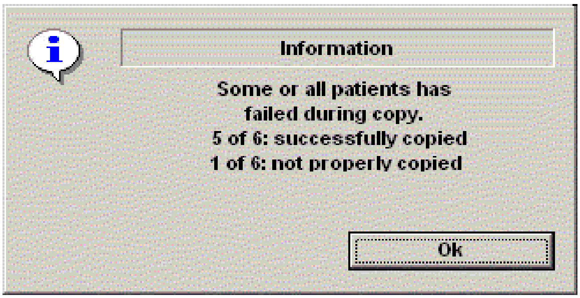
Figure 15-23. Select All/Copy Patient Menu

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.

Exporting Data (continued)

6. Informational status messages appear as the copy is taking place. A final status report pop-up message appears. Press OK.



Information

Some or all patients has
failed during copy.
5 of 6: successfully copied
1 of 6: not properly copied

Figure 15-24. Export Completion Status Message

7. Press ***F3*** to eject the media. Specify that you want to finalize the CD-ROM. However, if you want to import this data to another system, do not finalize the CD.

Importing Data

To import an exam(s) to another Ultrasound system,

1. At the other Ultrasound system, insert the MOD or CD-ROM.
2. Press Patient, press More, then Import. The Import from pop-up message appears. Press OK.

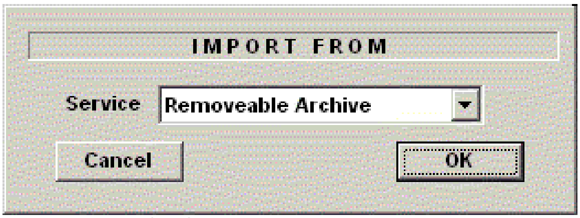


Figure 15-25. Import Pop-up Message

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 F3 to eject the media.

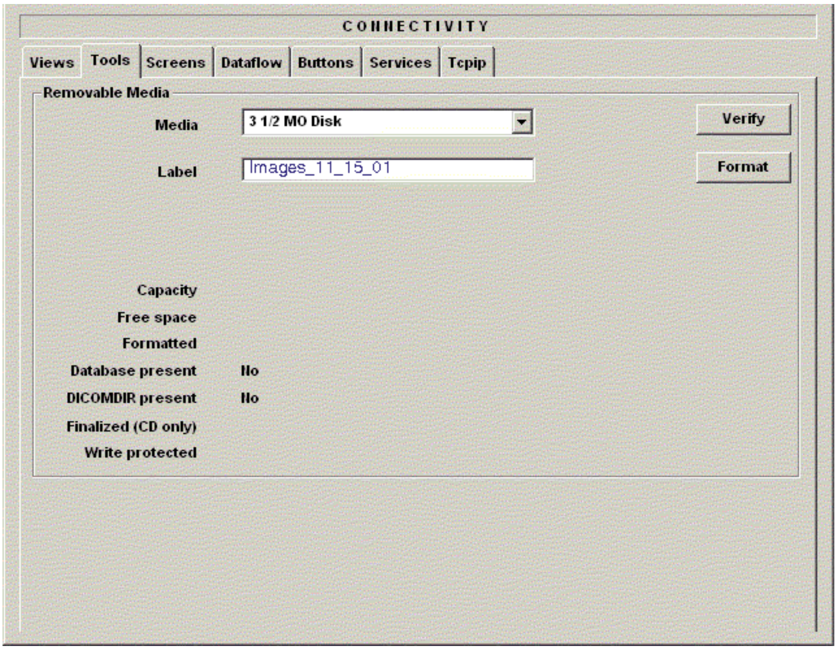
Daily Maintenance

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, CD-ROM or MOD. Select the Utility tab on the Touch Panel. Select Connectivity, then Tools. Label the media.

Patient, Report, and User-Defined Backup Protocols (continued)


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Removable Media
Verify
Format

Media: 3 1/2 MO Disk

Label: Images_11_15_01

Capacity

Free space

Formatted

Database present: No

DICOMDIR present: No

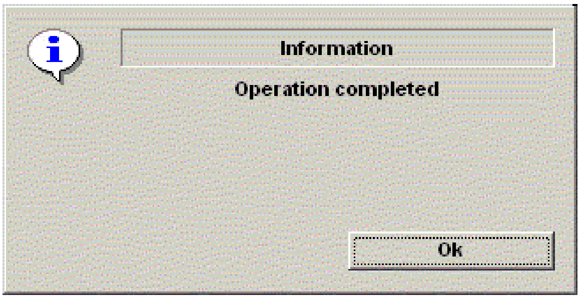
Finalized (CD only)

Write protected

Figure 15-26. Format MOD/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.



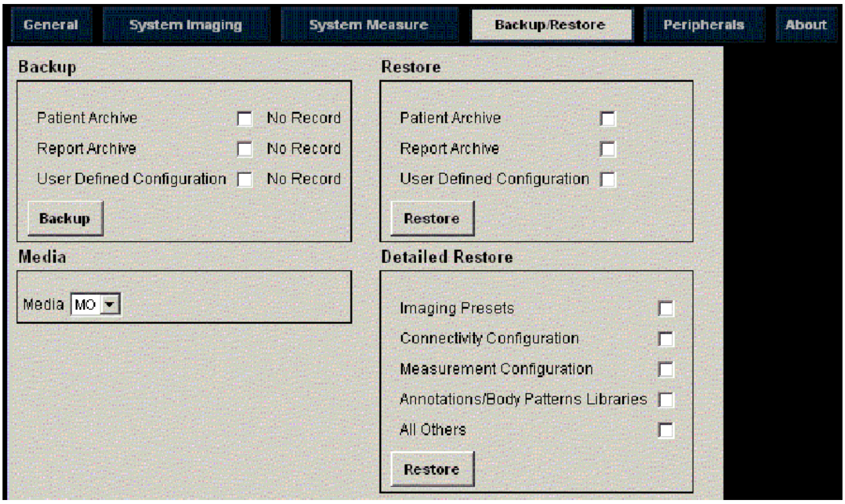
Information

Operation completed

Figure 15-27. Format Successful Pop-up Menu

3. Select the Utility tab on the Touch Panel. Select System, then Backup/Restore.
4. Select everything under Backup by placing a check mark in front of Patient Archive, Report Archive, and User Defined Configuration. Then press Backup.

Patient, Report, and User-Defined Backup Protocols (continued)

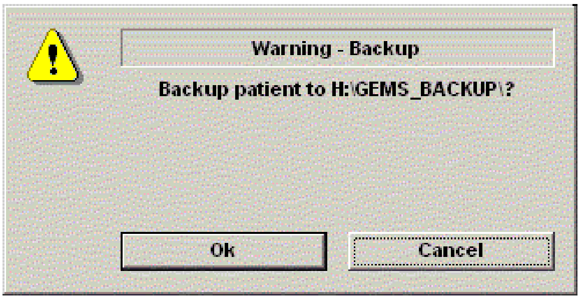

General
System Imaging
System Measure
Backup/Restore
Peripherals
About
Backup
Patient Archive ☐ No Record
Report Archive ☐ No Record
User Defined Configuration ☐ No Record
Backup
Media
Restore
Patient Archive ☐
Report Archive ☐
User Defined Configuration ☐
Restore
Detailed Restore
Imaging Presets ☐
Connectivity Configuration ☐
Measurement Configuration ☐
Annotations/Body Patterns Libraries ☐
All Others ☐
Restore

Media MO

Figure 15-28. 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.


Warning - Backup
Ok
Cancel

Backup patient to H:\GEMS_BACKUP\?

Figure 15-29. 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

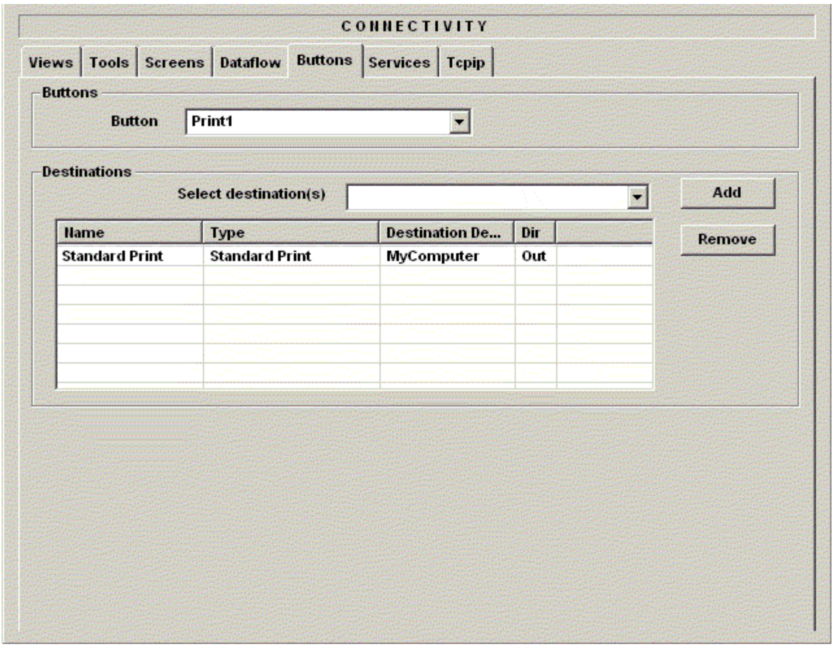
You can now connect a standard computer printer, via the USB connection (Service). We currently support the HP970 CXI or HP990 CXI standard computer printers.

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 (P1-P4) 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.


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Buttons
Destinations
Select destination(s)
Add
Remove

Button: Print1

Name	Type	Destination De...	Dir
Standard Print	Standard Print	MyComputer	Out

Figure 15-30. 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 P1-4 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 --> Setup 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.

External Printers

You can also connect an external printer through the External Printer 1/2 remote expose connections on the back of the system.

To use a remote printer, assign a print key (P1-P4) via Utility --> Connectivity --> Buttons --> Select Destinations and select External Printer 1/2 @ My Computer.

Transferring Patient Data to a PC

Transferring OB/GYN Patient Data to a PC

The LOGIQ 5 now supports the transfer of OB, GYN and Vascular patient data to a PC.

NOTE: *The LOGIQ 5 currently supports Viewpoint patient data communications software for the PC.*

Connecting the LOGIQ 5 to the PC

You need to connect a RS232C Converter and RS232C Cross Cable to the USB port to connect a serial peripheral device to the system.

△ CAUTION

Be sure to connect the converter and cable BEFORE booting the system. If not, the LOGIQ 5 does not recognize the peripheral device.

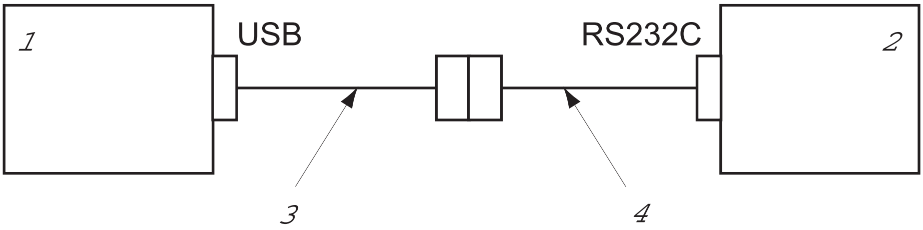


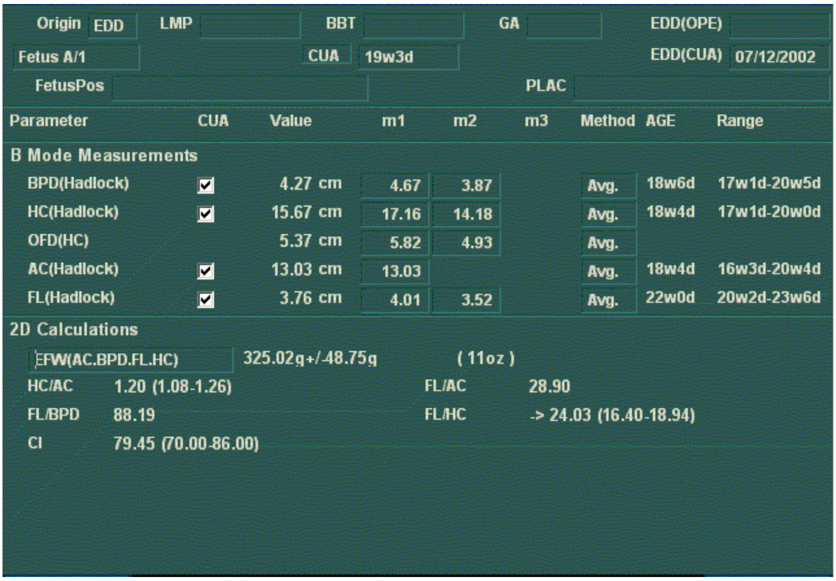
Figure 15-31. RS232C to USB Connection

1. System
2. Peripheral device
3. USB-to-RS232C converter
4. RS232C Cross Cable (female 9 pin-to-female 9-pin)

Transferring Patient Data

After you perform a scan, you can send the patient and measurement data to a PC that accepts patient data.

1. Ensure that the peripheral device is on.
2. For the current patient, on the Worksheet screen, select Meas. Transf.



Origin EDD
LMP
BBT
GA
EDD(OPE)
Fetus A/1
CUA 19w3d
EDD(CUA) 07/12/2002
FetusPos
PLAC

Parameter	CUA	Value	m1	m2	m3	Method	AGE	Range
B Mode Measurements								
BPD(Hadlock)	☑	4.27 cm	4.67	3.87		Avg.	18w6d	17w1d-20w5d
HC(Hadlock)	☑	15.67 cm	17.16	14.18		Avg.	18w4d	17w1d-20w0d
OFD(HC)		5.37 cm	5.82	4.93		Avg.		
AC(Hadlock)	☑	13.03 cm	13.03			Avg.	18w4d	16w3d-20w4d
FL(Hadlock)	☑	3.76 cm	4.01	3.52		Avg.	22w0d	20w2d-23w6d

2D Calculations

EFW(AC.BPD.FL.HC) 325.02g+/-48.75g (11oz)
HC/AC 1.20 (1.08-1.26)
FL/AC 28.90
FL/BPD 88.19
FL/HC -> 24.03 (16.40-18.94)
CI 79.45 (70.00-86.00)

Figure 15-32. Transferring OB Worksheet Data to a PC

Transferring Patient Data (continued)

3. The system transfers the data. A beep on the peripheral device indicates a successful transfer. If there is a problem with the connection or transfer, the system displays an error message.

NOTE: *If you currently do a heart rate measurement without specifying a vessel, as in the case of a fetal heart, the measurement IS NOT automatically transferred to the PC. You need to enter this measurement manually on the PC.*

NOTE: *Deleted measurements from the worksheet are still sent to the off-line reporting PC.*

VCR

Setting up the VCR

To set up the VCR,

1. Select the ***Utility*** tab on the Touch Panel.
2. Select ***System*** on the Touch Panel.

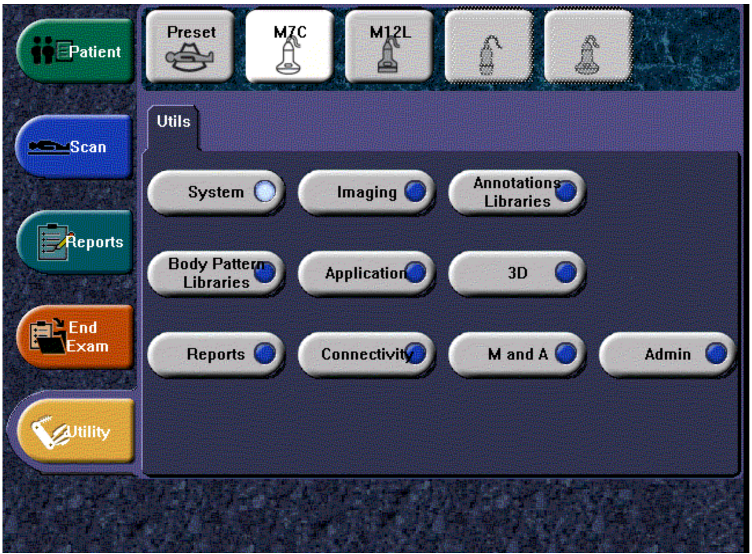
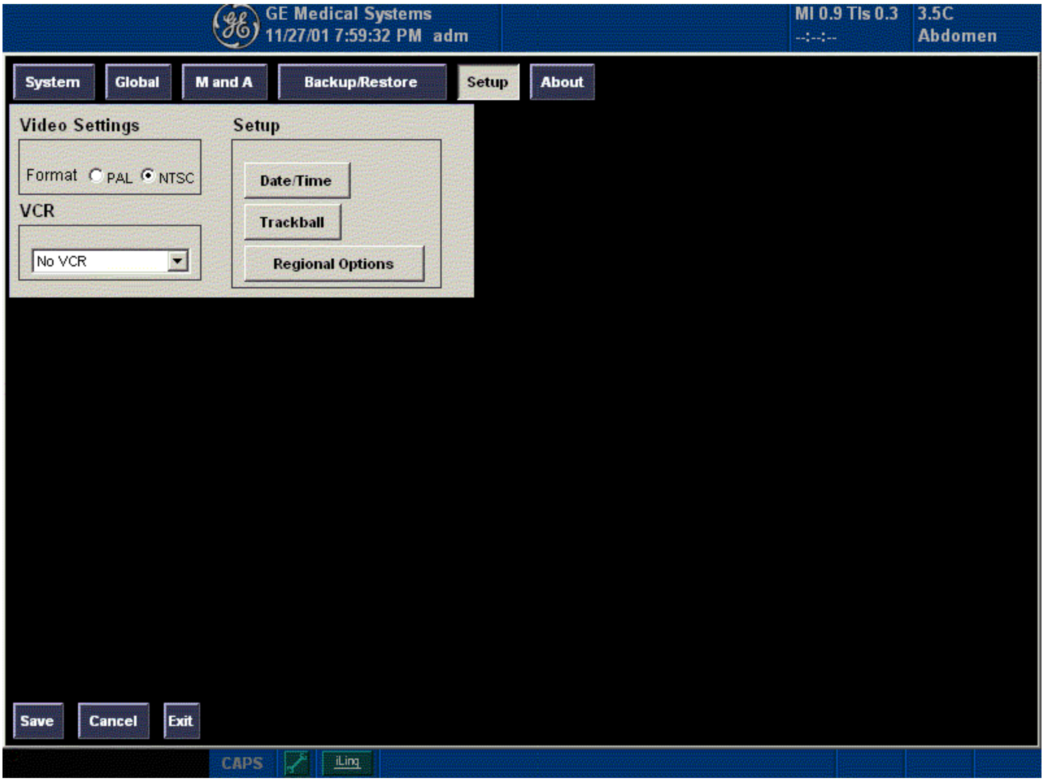

Patient
Scan
Reports
End Exam
Utility
Preset
M7C
M12L
Utils
System
Imaging
Annotations Libraries
Body Pattern Libraries
Application
3D
Reports
Connectivity
M and A
Admin

Figure 15-33. Utility Touch Panel

Setting up the VCR (continued)

3. Press **Peripherals**.


GE Medical Systems
11/27/01 7:59:32 PM adm
MI 0.9 TIs 0.3
--:--:--
3.5C
Abdomen
System
Global
M and A
Backup/Restore
Setup
About
Video Settings
Setup
Date/Time
Trackball
Regional Options
Save
Cancel
Exit
CAPS
iLinq

Format ○ PAL ● NTSC

VCR: No VCR

Figure 15-34. VCR Setup Utility Page

4. Trackball to the VCR pulldown menu, place the pointer on the down arrow and press **Set**, then move the **Trackball** to select the appropriate VCR.
5. Press **Save**, then press **Exit**.
6. Turn off the LOGIQ 5, then turn it back on.

CAUTION

Be sure to connect the converter and cable before booting up the system. If not, the LOGIQ 5 does not recognize the peripheral device.

Using the VCR

To use the VCR, press VCR on the Control Panel. The following Touch Panel appears:

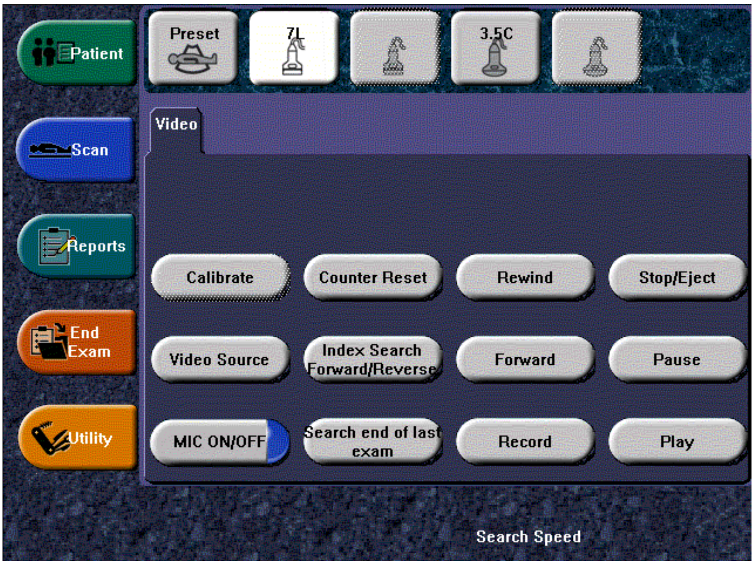

Patient
Scan
Reports
End Exam
Utility
Preset
7L
3.5C
Video
Calibrate
Counter Reset
Rewind
Stop/Eject
Video Source
Index Search Forward/Reverse
Forward
Pause
MIC ON/OFF
Search end of last exam
Record
Play
Search Speed

Figure 15-35. VCR Touch Panel

Table 15-2: VCR Functions and Appropriate Steps

VCR Function	How to Do
To record an image	1. Insert a tape into VCR. 2. Press Record. 3. Press to activate and control the microphone.
To pause recording	Press Pause.
To begin recording again	Press Record again.
To stop recording	Press Stop/Eject.
To rewind the VCR tape	Press Rewind.
To playback the tape	Press Play.
To adjust playback speed	Move the Trackball to the left/right to decrease/increase playback speed.
To move through the playback frame by frame	Adjust the Frame by Frame dial right/left.
To pause playback	Press Pause.
To begin playback again	Press Play.
To turn the microphone on/off	Press MIC ON/OFF.

Table 15-2: VCR Functions and Appropriate Steps

VCR Function	How to Do
To adjust playback audio volume	Adjust Volume left/right to lower/increase audio playback volume.
To fast forward the tape	Press Forward.
To search for a recorded sequence	Exams are marked so that you can search VCR tapes exam by exam. Press Index Search Forward/Reverse to move forward through the tape exam by exam.
To adjust search speed	Adjust Search Speed left/right to lower/increase search speed.
To search to the end of the last exam	Press Search end of last exam.
To reset the counter	Press Counter Reset.
To eject the VCR tape.	Press Stop/Eject twice.

NOTE: *The VCR counter is displayed in two places: in the video area and outside the video area. The playback counter is in the video area and the current counter is outside the video area.*

Returning to Scanning

To return to scanning, select ***Video Source*** on the Touch Panel.

Chapter 16

Customizing Your System

Describes how to create system, user, and exam presets.

Presets

Overview

Preset Menus provides the following functionality:

- System presets
- Imaging presets
- Annotation library presets
- Body Pattern library presets
- Application and User Defined presets
- Test patterns
- Connectivity Setup
- Measurement and Analysis presets
- System Administration presets

To access these functions, select the ***Utility*** tab on the Touch Panel.

Utility Touch Panel

You access preset controls via the ***Utility*** tab, located on the bottom left side of the Touch Panel.

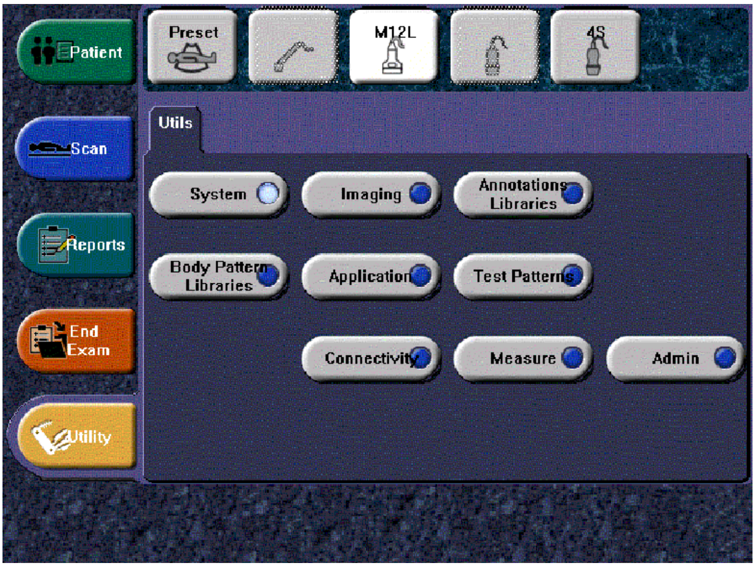

Patient
Scan
Reports
End Exam
Utility
Preset
M12L
4S
Utils
System
Imaging
Annotations Libraries
Body Pattern Libraries
Application
Test Patterns
Connectivity
Measure
Admin

Figure 16-1. Utility Touch Panel

To access, select the appropriate Touch Panel key:

- System
- Imaging
- Annotations Libraries
- Body Pattern Libraries
- Application
- Test Patterns
- Connectivity
- Measure
- Admin

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	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

- **System** – Location, Date/Time, Patient Info, Key Usage, and Utility configuration
- **System Imaging** – CINE Loop Store, Cardiac, Biopsy Guides, and Image Control and Display configuration
- **M & A** – Measurement, Cursor, and Results Window configuration
- **Backup/Restore** – Backup allows you to perform backup procedures for local patient, and image archives as well as system configuration. Restore enables you to retrieve data from a backup.
- **Setup** – Video Settings, VCR, Print and Store Options, and Setup configuration
- **About** – System software information

Changing system parameters

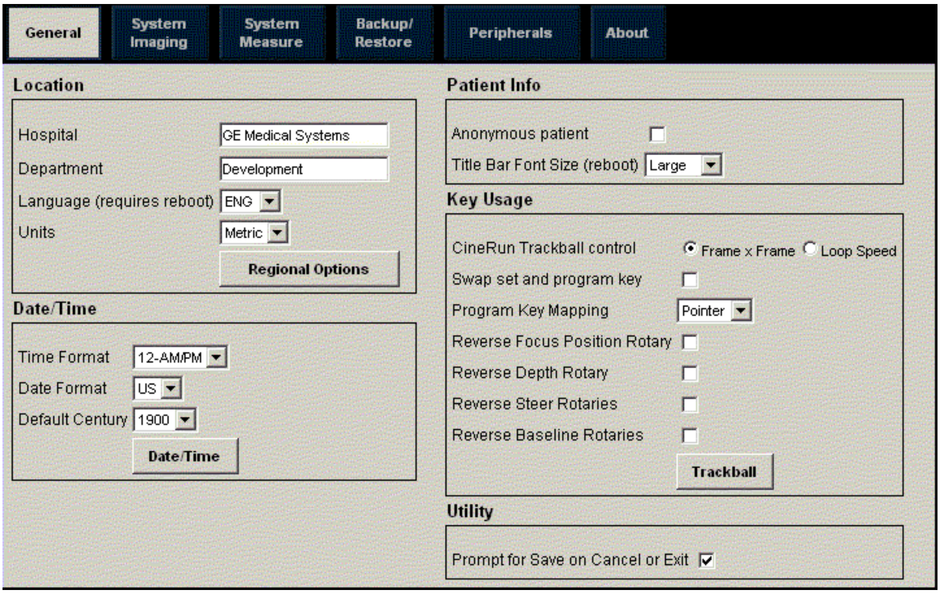
To change system parameters:

1. On the Touch Panel, select ***Utility***.
2. On the Touch Panel, select ***System***.

   The System screen is displayed. See the System screen in Figure 16-2.
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.

System/General Preset Menu

The System/General screen allows you to specify hospital name and system date and time.



Location

Hospital: GE Medical Systems
Department: Development
Language (requires reboot): ENG
Units: Metric

Date/Time

Time Format: 12-AM/PM
Date Format: US
Default Century: 1900

Patient Info

Anonymous patient ☐
Title Bar Font Size (reboot): Large

Key Usage

CineRun Trackball control: ● Frame x Frame ○ Loop Speed
Swap set and program key ☐
Program Key Mapping: Pointer
Reverse Focus Position Rotary ☐
Reverse Depth Rotary ☐
Reverse Steer Rotaries ☐
Reverse Baseline Rotaries ☐

Utility

Prompt for Save on Cancel or Exit ☑

Figure 16-2. 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 Rotary	You can change key direction for Focus Position, Depth, Steer, and Baseline.
Trackball	Field Engineer use only. Select to display the Mouse Properties window (faster, slower, snap-to default).

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.

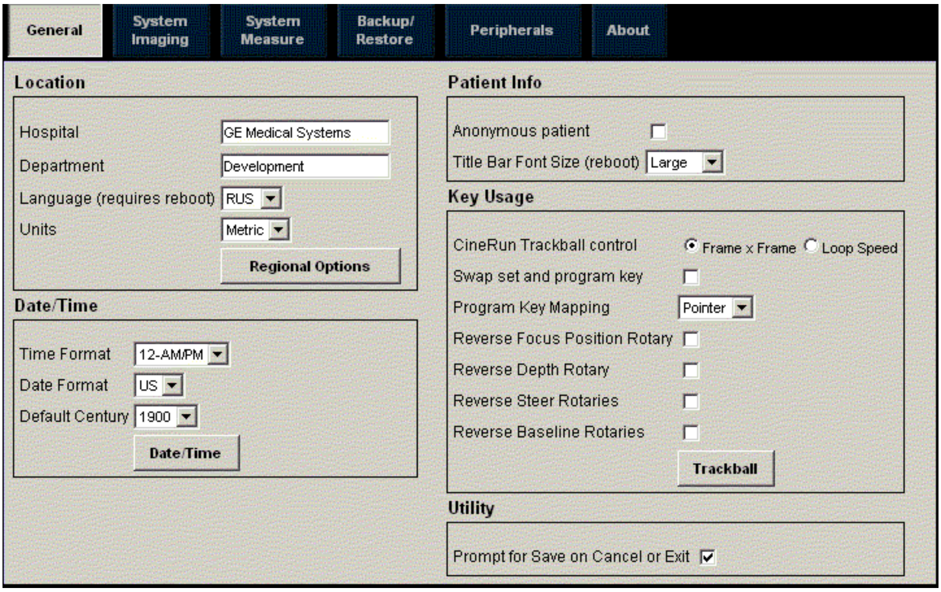
Foreign Language Keyboard Setup (Non-Russian and Greek Languages)

To set up the keyboard for non-Russian/Greek languages:

1. In the Utility --> System --> General, set the Language as desired.
2. In the Utility --> System --> Regional Settings, set the Input Locale for International English.
3. Reboot the system.
4. To type foreign characters, press and hold down the Alt GR + appropriate keyboard key.

Keyboard Setup Procedure for Russian and Greek

1. Press Utility -->System --> General --> Language and change the Language to RUS or GRK. Press Save. **DO NOT reboot the system yet.**


General
System Imaging
System Measure
Backup/ Restore
Peripherals
About
Location
Date/Time
Patient Info
Key Usage
Utility
Regional Options
Date/Time
Trackball

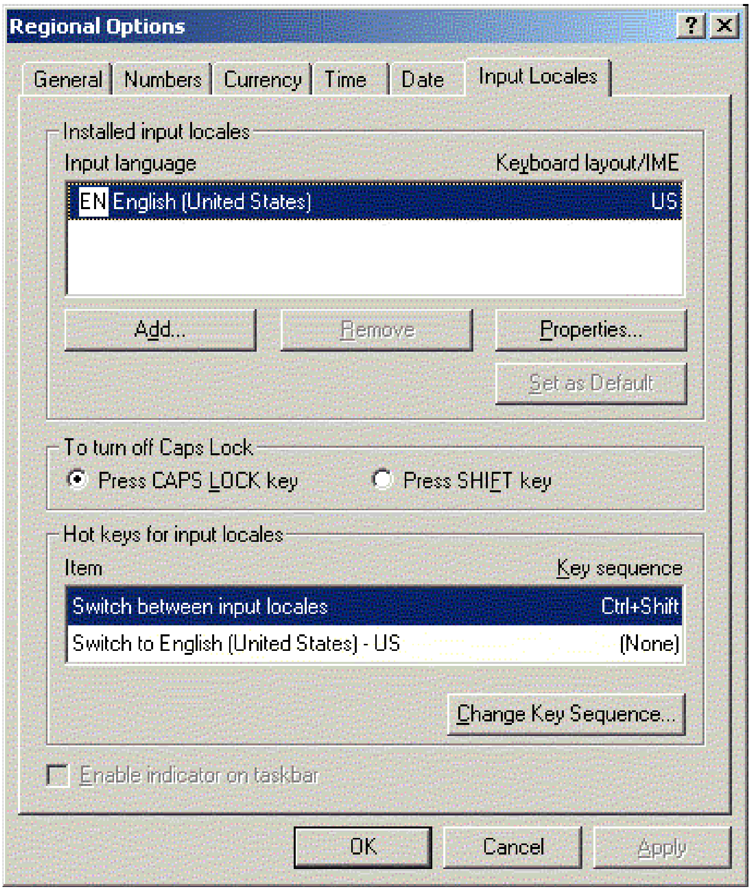
Hospital: GE Medical Systems
Department: Development
Language (requires reboot): RUS
Units: Metric
Time Format: 12-AM/PM
Date Format: US
Default Century: 1900
Anonymous patient ☐
Title Bar Font Size (reboot): Large
CineRun Trackball control: ● Frame x Frame ○ Loop Speed
Swap set and program key ☐
Program Key Mapping: Pointer
Reverse Focus Position Rotary ☐
Reverse Depth Rotary ☐
Reverse Steer Rotaries ☐
Reverse Baseline Rotaries ☐
Prompt for Save on Cancel or Exit ☑

Figure 16-3. Change the System Language

Keyboard Setup Procedure for Russian and Greek (continued)

2. On the same Utility screen, select Regional Options.

   The Regional Options menu appears. Select Input Locales. The following menu appears.


Regional Options
?
X
General
Numbers
Currency
Time
Date
Input Locales
Add...
Remove
Properties...
Set as Default
Change Key Sequence...
OK
Cancel
Apply

Installed input locales

Input language	Keyboard layout/IME
EN English (United States)	US

To turn off Caps Lock

● Press CAPS LOCK key ○ Press SHIFT key

Hot keys for input locales

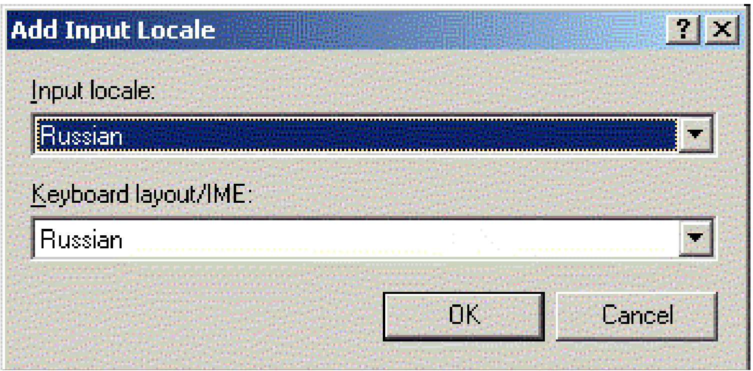
Item	Key sequence
Switch between input locales	Ctrl+Shift
Switch to English (United States) - US	(None)

☐ Enable indicator on taskbar

Figure 16-4. Input Locales Menu

Keyboard Setup Procedure for Russian and Greek (continued)

3. Press Add. The Add Input Locale menu appears. On the pull-down menu, move the Trackball until you see Russian or Greek. Press **Set** to select. Press Ok. You are returned to the Input Locales menu.



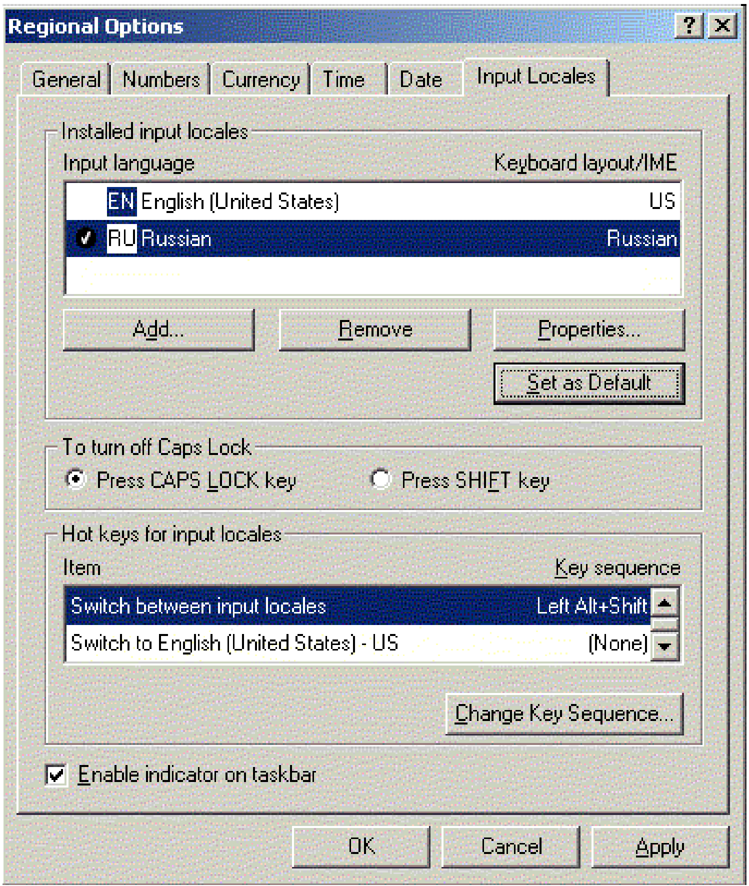
Input locale: Russian

Keyboard layout/IME: Russian

Figure 16-5. Adding Russian Input Locale

Keyboard Setup Procedure for Russian and Greek (continued)

4. Specify Russian or Greek as the default language by pressing Set as Default.



Regional Options

Installed input locales

Input language	Keyboard layout/IME
EN English (United States)	US
✓ RU Russian	Russian

To turn off Caps Lock

● Press CAPS LOCK key ○ Press SHIFT key

Hot keys for input locales

Item	Key sequence
Switch between input locales	Left Alt+Shift
Switch to English (United States) - US	(None)

☑ Enable indicator on taskbar

General
Numbers
Currency
Time
Date
Input Locales
Add...
Remove
Properties...
Set as Default
Change Key Sequence...
OK
Cancel
Apply

Figure 16-6. Set Russian to be the Default

Keyboard Setup Procedure for Russian and Greek (continued)

5. At the bottom of the Input Locales menu, you now need to specify the keys you will press to toggle between the English and the Russian or Greek keyboards. Press Change Key Sequence. The Change Key Sequence pop-up menu appears. Make sure the Enable Key Sequence box has a check mark in it. Select CTRL + SHIFT and say OK. You are returned to the Input Locales menu.

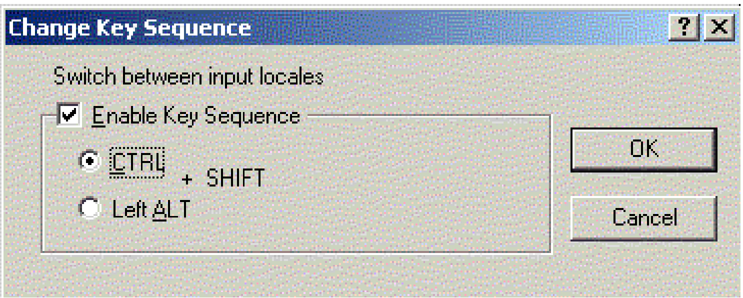
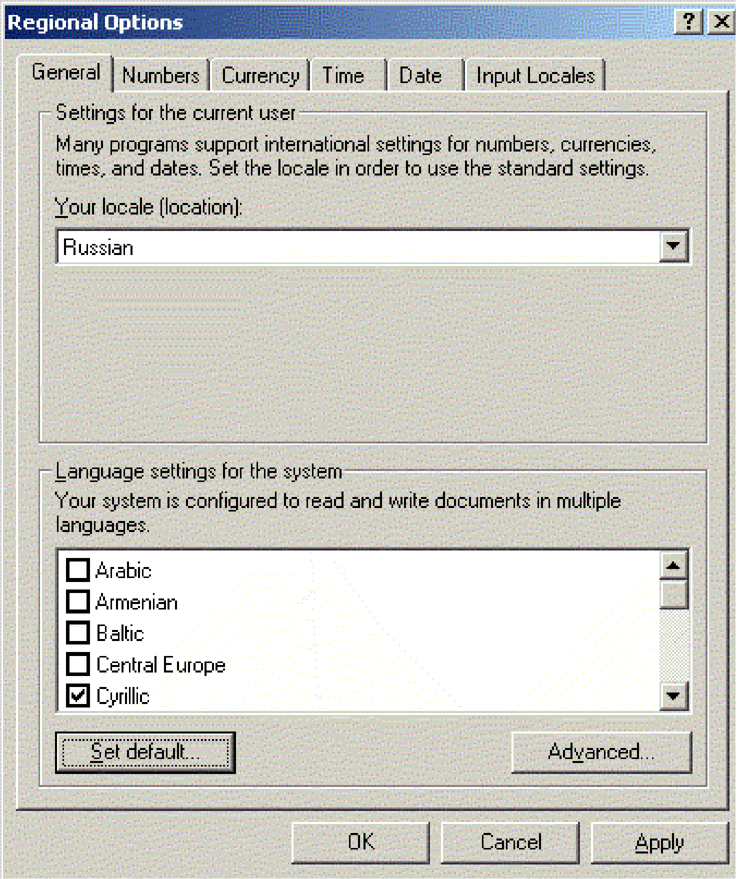

Change Key Sequence
?
X
Switch between input locales
☑ Enable Key Sequence
● CTRL
+ SHIFT
○ Left ALT
OK
Cancel

Figure 16-7. Set Keyboard Toggle Keystroke

6. Apply the changes by pressing Apply. Press OK.

Keyboard Setup Procedure for Russian and Greek (continued)

7. Press the General tab. Set Your Locale (location) to Russian or Greek.



Regional Options
General
Numbers
Currency
Time
Date
Input Locales
Set default...
Advanced...
OK
Cancel
Apply

Settings for the current user

Many programs support international settings for numbers, currencies, times, and dates. Set the locale in order to use the standard settings.

Your locale (location): Russian

Language settings for the system

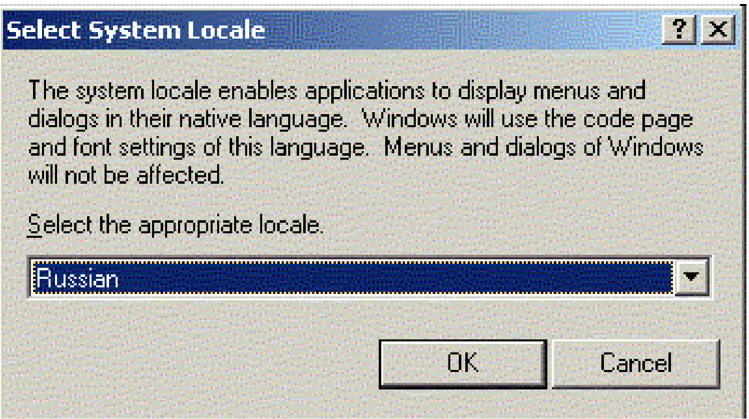
Your system is configured to read and write documents in multiple languages.

☐ Arabic
☐ Armenian
☐ Baltic
☐ Central Europe
☑ Cyrillic

Figure 16-8. Set the Locale

Keyboard Setup Procedure for Russian and Greek (continued)

8. Press Set default at the bottom of the menu to Select System Locale. Press Ok. Then Apply the changes.



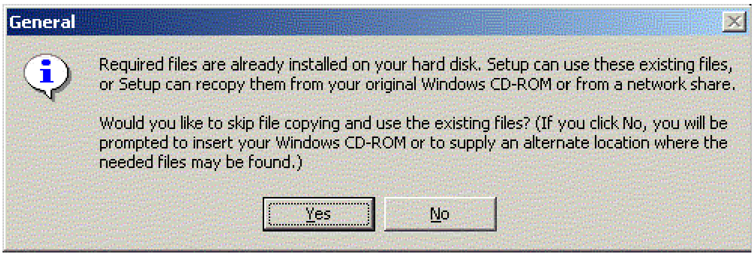
The system locale enables applications to display menus and dialogs in their native language. Windows will use the code page and font settings of this language. Menus and dialogs of Windows will not be affected.

Select the appropriate locale.

Russian

Figure 16-9. Selecting the System Locale

9. A general system pop-up message appears. Answer Yes.



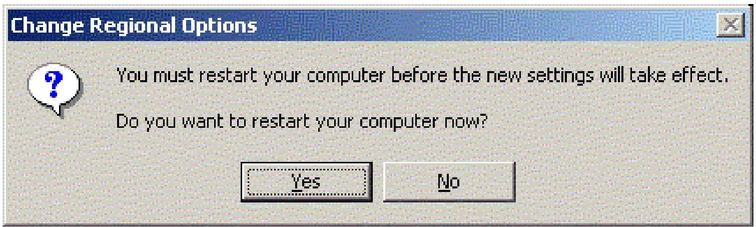
Required files are already installed on your hard disk. Setup can use these existing files, or Setup can recopy them from your original Windows CD-ROM or from a network share.

Would you like to skip file copying and use the existing files? (If you click No, you will be prompted to insert your Windows CD-ROM or to supply an alternate location where the needed files may be found.)

Figure 16-10. General Windows Pop-Up Message

Keyboard Setup Procedure for Russian and Greek (continued)

10. Restart the system when prompted: The system screens, menus, and Touch Panel display is now in Russian or Greek.



Change Regional Options

You must restart your computer before the new settings will take effect.

Do you want to restart your computer now?

Figure 16-11. Restart System Prompt

To set up Russian (or Greek), follow the procedure below EACH TIME software is reloaded on your system.

*NOTE: To have the settings take effect, you **MUST** turn off the system and turn it back on.*

To toggle between the Russian and English keyboards, press the CTRL + SHIFT keys at the same time.

Keyboard Setup Procedure for Russian and Greek (continued)

Here is an example of the Russian keyboard:

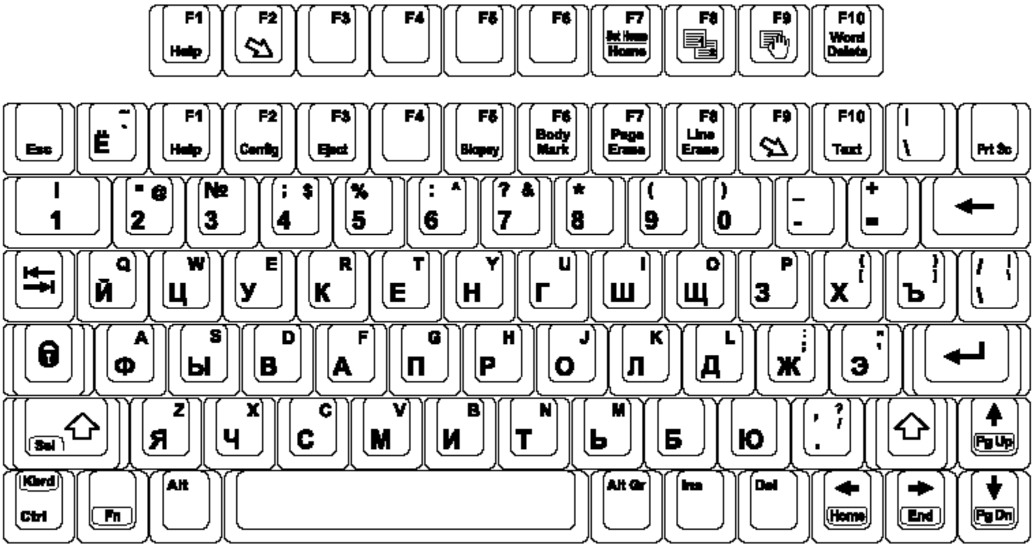


Figure 16-12. Russian Keyboard

Here is an example of the Greek keyboard:

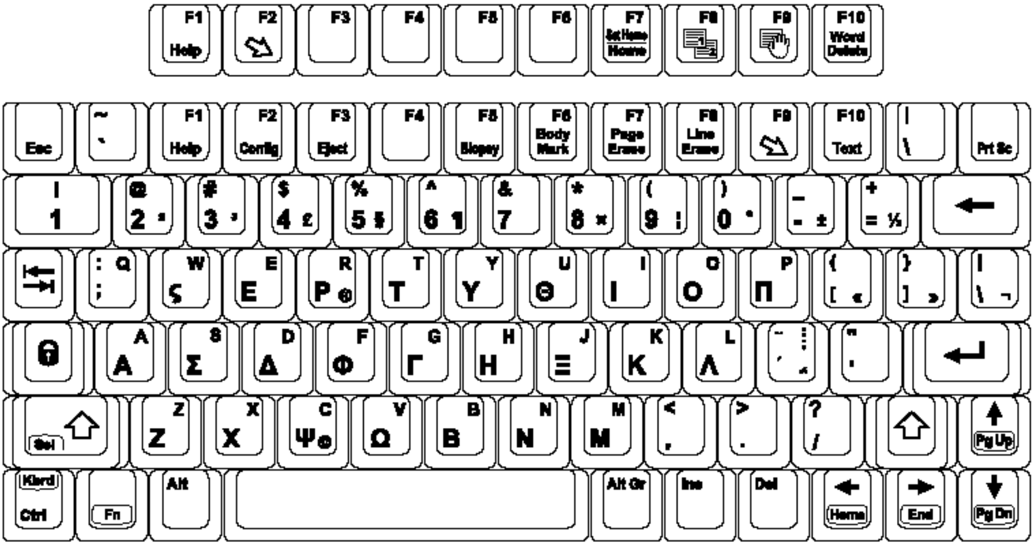
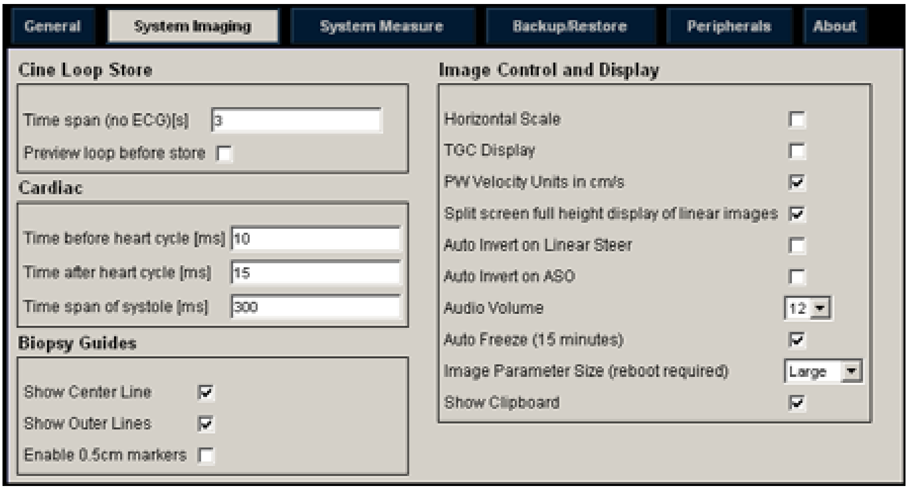


Figure 16-13. Greek Keyboard

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.



Cine Loop Store

Time span (no ECG)[s] 3

Preview loop before store ☐

Cardiac

Time before heart cycle [ms] 10

Time after heart cycle [ms] 15

Time span of systole [ms] 300

Biopsy Guides

Show Center Line ☑

Show Outer Lines ☑

Enable 0.5cm markers ☐

Image Control and Display

Horizontal Scale ☐

TGC Display ☐

PW Velocity Units in cm/s ☑

Split screen full height display of linear images ☑

Auto Invert on Linear Steer ☐

Auto Invert on ASO ☐

Audio Volume 12

Auto Freeze (15 minutes) ☑

Image Parameter Size (reboot required) Large

Show Clipboard ☑

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

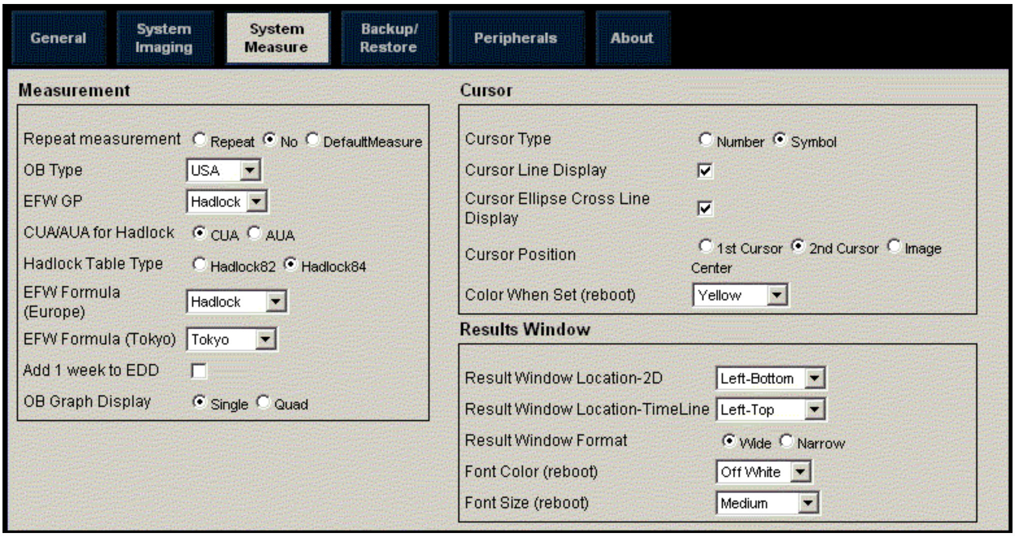
Preset Parameter	Description
Show Center Line	Displays center biopsy guideline.
Show Outer Lines	Displays outer biopsy guidelines.
Enable 0.5cm markers	Activates biopsy depth markers every 0.5cm.

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.
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.
Audio Volume	Adjusts the Doppler audio volume.
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.



Measurement

Repeat measurement ○ Repeat ● No ○ DefaultMeasure
OB Type: USA
EFW GP: Hadlock
CUA/AUA for Hadlock ● CUA ○ AUA
Hadlock Table Type ○ Hadlock82 ● Hadlock84
EFW Formula (Europe): Hadlock
EFW Formula (Tokyo): Tokyo
Add 1 week to EDD ☐
OB Graph Display ● Single ○ Quad

Cursor

Cursor Type ○ Number ● Symbol
Cursor Line Display ☑
Cursor Ellipse Cross Line Display ☑
Cursor Position ○ 1st Cursor ● 2nd Cursor ○ Image Center
Color When Set (reboot): Yellow

Results Window

Result Window Location-2D: Left-Bottom
Result Window Location-TimeLine: Left-Top
Result Window Format ● Wide ○ Narrow
Font Color (reboot): Off White
Font Size (reboot): Medium

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.
EFW GP	Select the source used to calculate EFW-GP Estimated Fetal Weight-Growth Percentile)
CUA/AUA for Hadlock	Select to use CUA (Composite Ultrasound Age) or AUA (Average Ultrasound Age) as the default
Hadlock Table Type	Select Hadlock 82 or Hadlock 84 tables
EFW Formula (Europe)	Select the source used to calculate EFW (Europe) (Estimated Fetal Weight), Shepard, Merz, Hadlock, German, Rich
EFW Formula (Tokyo)	Select the source used to calculate EFW (Tokyo) (Estimated Fetal Weight)
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.

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.

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.

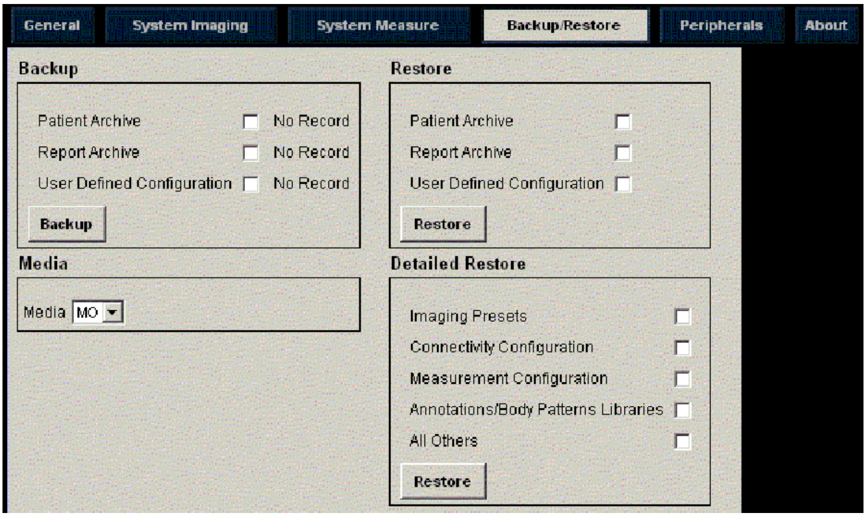

General
System Imaging
System Measure
Backup/Restore
Peripherals
About
Backup
Patient Archive ☐ No Record
Report Archive ☐ No Record
User Defined Configuration ☐ No Record
Backup
Media
Media MO
Restore
Patient Archive ☐
Report Archive ☐
User Defined Configuration ☐
Restore
Detailed Restore
Imaging Presets ☐
Connectivity Configuration ☐
Measurement Configuration ☐
Annotations/Body Patterns Libraries ☐
All Others ☐
Restore

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.
User Defined Configuration	Select to back up the user-defined configuration settings.
Backup	Select to begin the backup.

Table 16-14: Media

Preset Parameter	Description
Media	Select MO or CD.

Table 16-15: Restore

Preset Parameter	Description
Patient Archive	Select to restore patient data.
User Defined Configuration	Select to restore the user-defined configuration settings.
Restore	Select to begin the restore process for the selected configuration files.

System/Backup and Restore Preset Menu (continued)

The detailed section of this menu allows you to restore one area at a time from the user defined configuration. This allows you to selectively restore what you want to restore across multiple machines. Check the box(es) you want to restore, insert the MOD/CD-ROM, and press Restore.

Table 16-16: Detailed Restore

Preset Parameter	Description
Imaging Presets	Select to restore imaging presets.
Connectivity Configuration	Select to restore connectivity configurations.
Measurement Configuration	Select to restore measurement configurations.
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.
Restore	Select to begin the restore process for the selected configuration files.

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 Magneto-Optical Disk (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.

CAUTION

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 a formatted MOD (Magneto-Optical Disk) into the MOD drive.

NOTE: For information about formatting an MOD, See 'Formatting removable media' for more information.

2. On the Touch Panel, press ***Utility***.
3. On the Utility Touch Panel, press ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed. See Figure 16-16.

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 MO.
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 MOD.

1. Insert the Backup/Restore MOD (Magneto-Optical Disk) into the MOD drive.
2. On the Touch Panel, press ***Utility***.
3. On the Utility Touch Panel, press ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed. See Figure 16-16.

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 MOD.
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 5 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 5 system.
2. Restore user-defined configurations from the removable media to another LOGIQ 5 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 a formatted MOD (Magneto-Optical Disk) into the MOD drive.

NOTE: *For information about formatting an MOD, See 'Formatting removable media' for more information.*

2. On the Touch Panel, press ***Utility***.
3. On the Utility Touch Panel, press ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed. See Figure 16-16.

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 MO.
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, to eject the MOD, press **F3** or press the button on the MOD device.

Restore procedure: user-defined configurations

CAUTION The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct 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 MOD (Magneto-Optical Disk) with the user-defined configurations into the MOD drive
2. On the Touch Panel, press ***Utility***.
3. On the Utility Touch Panel, press ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed. See Figure 16-16.

NOTE: If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.

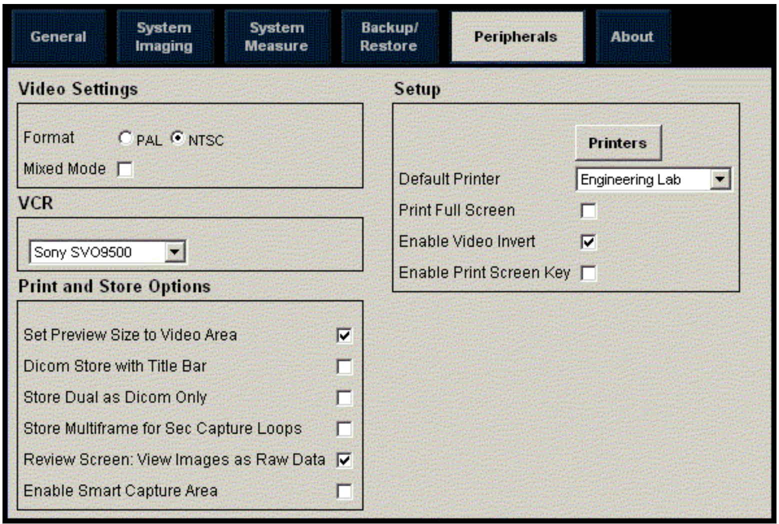
5. In the Restore list, select from the following, depending on which configurations you want to restore:
   - User Defined Configuration,

     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 MOD.
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.



Video Settings

Format ○ PAL ● NTSC

Mixed Mode ☐

VCR

Sony SVO9500

Print and Store Options

Set Preview Size to Video Area ☑

Dicom Store with Title Bar ☐

Store Dual as Dicom Only ☐

Store Multiframe for Sec Capture Loops ☐

Review Screen: View Images as Raw Data ☑

Enable Smart Capture Area ☐

Setup

Default Printer Engineering Lab

Print Full Screen ☐

Enable Video Invert ☑

Enable Print Screen Key ☐

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.

Table 16-18: VCR

Preset Parameter	Description
VCR	Select the type of VCR, or no VCR.

System/Peripherals Preset Menu (continued)

Table 16-19: 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 16-20: Setup

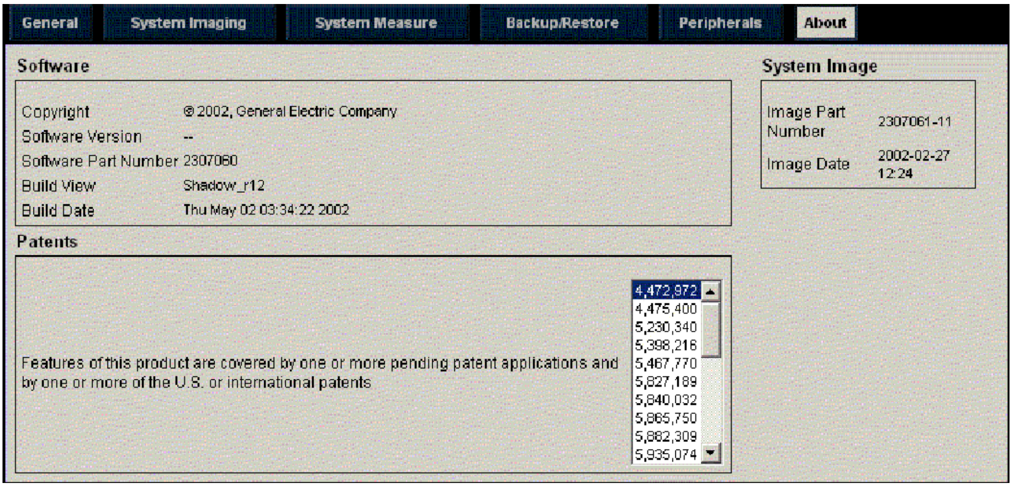
Preset Parameter	Description
Default Printer	If you have an additional standard printer set up via the USB serial port, select it here.
Printer	Press this key to add an additional standard printer via the USB serial port and to configure digital printers. This activates the Windows Add Printer wizard. 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.

Table 16-21: 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.



Software

Copyright ® 2002, General Electric Company
Software Version --
Software Part Number 2307060
Build View Shadow_r12
Build Date Thu May 02 03:34:22 2002

System Image

Image Part Number 2307061-11
Image Date 2002-02-27 12:24

Patents

Features of this product are covered by one or more pending patent applications and by one or more of the U.S. or international patents

4,472,972
4,475,400
5,230,340
5,398,216
5,467,770
5,827,189
5,840,032
5,865,750
5,882,309
5,935,074

Figure 16-18. System About Preset Menu

Table 16-22: Software

Preset Parameter	Description
Software Version	The current software version on this system.
Software Part Number	The software part number.
Build View	The software build view.
Build Date	The software build date.

Table 16-23: System Image

Preset Parameter	Description
Image Part Number	The image part number.
Image Date	The image date.

Table 16-24: 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)
- Continuous Wave Mode (CW) [LOGIQ 7 Only]
- Harmonics (HAR)
- General

Changing imaging presets

To change imaging presets:

1. On the Touch Panel, select ***Utility***.
2. On the Touch Panel, select ***Imaging***.

   The system displays the Imaging screens. 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 (for example, Abdomen and M7C). See Figure 16-19.
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.

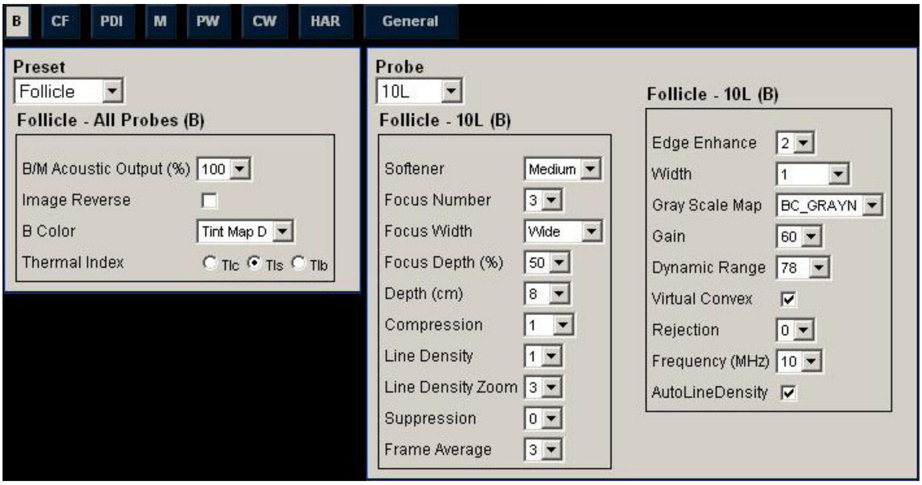
NOTE: When you Save changes to imaging parameters, the system saves changes to all modes, not just the mode currently displayed.

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 5 Imaging Presets

B-Mode



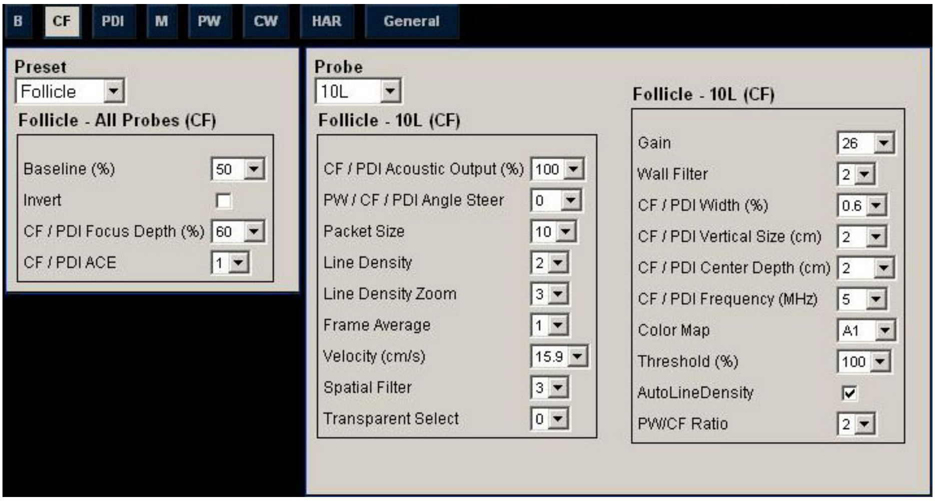
Preset
Follicle
Follicle - All Probes (B)
B/M Acoustic Output (%) 100
Image Reverse ☐
B Color Tint Map D
Thermal Index ○ TIc ● TIs ○ TIb

Probe
10L
Follicle - 10L (B)
Softener Medium
Focus Number 3
Focus Width Wide
Focus Depth (%) 50
Depth (cm) 8
Compression 1
Line Density 1
Line Density Zoom 3
Suppression 0
Frame Average 3

Follicle - 10L (B)
Edge Enhance 2
Width 1
Gray Scale Map BC_GRAYN
Gain 60
Dynamic Range 78
Virtual Convex ☑
Rejection 0
Frequency (MHz) 10
AutoLineDensity ☑

Figure 16-19. B-Mode parameters

Color Flow Mode



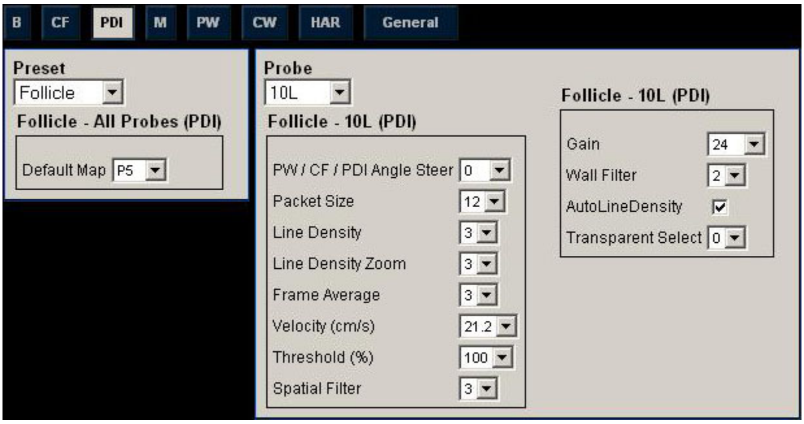
Preset
Follicle
Follicle - All Probes (CF)
Baseline (%) 50
Invert ☐
CF / PDI Focus Depth (%) 60
CF / PDI ACE 1

Probe
10L
Follicle - 10L (CF)
CF / PDI Acoustic Output (%) 100
PW / CF / PDI Angle Steer 0
Packet Size 10
Line Density 2
Line Density Zoom 3
Frame Average 1
Velocity (cm/s) 15.9
Spatial Filter 3
Transparent Select 0

Follicle - 10L (CF)
Gain 26
Wall Filter 2
CF / PDI Width (%) 0.6
CF / PDI Vertical Size (cm) 2
CF / PDI Center Depth (cm) 2
CF / PDI Frequency (MHz) 5
Color Map A1
Threshold (%) 100
AutoLineDensity ☑
PW/CF Ratio 2

Figure 16-20. Color Flow parameters

Power Doppler Imaging (PDI)



Preset
Follicle

Follicle - All Probes (PDI)
Default Map: P5

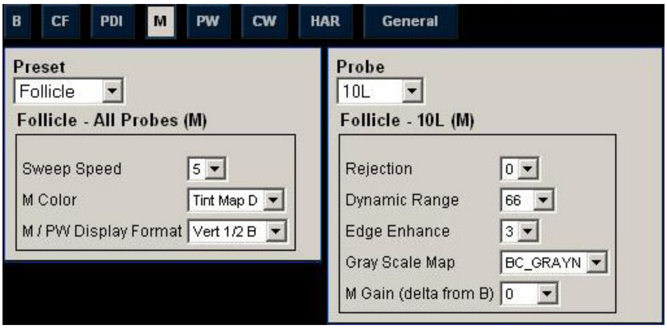
Probe
10L

Follicle - 10L (PDI)
PW / CF / PDI Angle Steer: 0
Packet Size: 12
Line Density: 3
Line Density Zoom: 3
Frame Average: 3
Velocity (cm/s): 21.2
Threshold (%): 100
Spatial Filter: 3

Follicle - 10L (PDI)
Gain: 24
Wall Filter: 2
AutoLineDensity: ☑
Transparent Select: 0

Figure 16-21. PDI parameters

M-Mode



Preset
Follicle

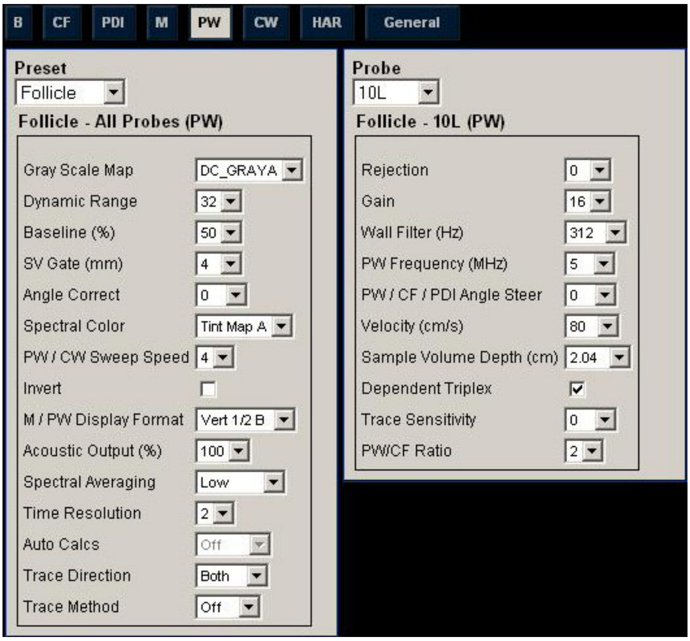
Follicle - All Probes (M)
Sweep Speed: 5
M Color: Tint Map D
M / PW Display Format: Vert 1/2 B

Probe
10L

Follicle - 10L (M)
Rejection: 0
Dynamic Range: 66
Edge Enhance: 3
Gray Scale Map: BC_GRAYN
M Gain (delta from B): 0

Figure 16-22. M-Mode parameters

Pulse Wave (PW)



Preset
Follicle
Follicle - All Probes (PW)

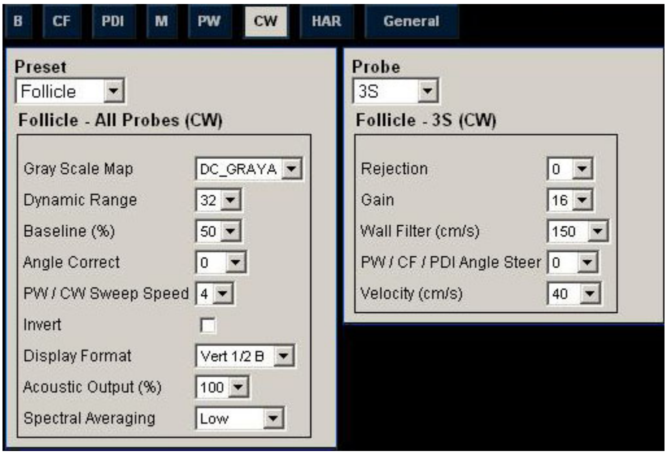
Gray Scale Map: DC_GRAYA
Dynamic Range: 32
Baseline (%): 50
SV Gate (mm): 4
Angle Correct: 0
Spectral Color: Tint Map A
PW / CW Sweep Speed: 4
Invert: ☐
M / PW Display Format: Vert 1/2 B
Acoustic Output (%): 100
Spectral Averaging: Low
Time Resolution: 2
Auto Calcs: Off
Trace Direction: Both
Trace Method: Off

Probe
10L
Follicle - 10L (PW)

Rejection: 0
Gain: 16
Wall Filter (Hz): 312
PW Frequency (MHz): 5
PW / CF / PDI Angle Steer: 0
Velocity (cm/s): 80
Sample Volume Depth (cm): 2.04
Dependent Triplex: ☑
Trace Sensitivity: 0
PW/CF Ratio: 2

Figure 16-23. PW parameters

Continuous Wave (CW)



Preset
Follicle
Follicle - All Probes (CW)

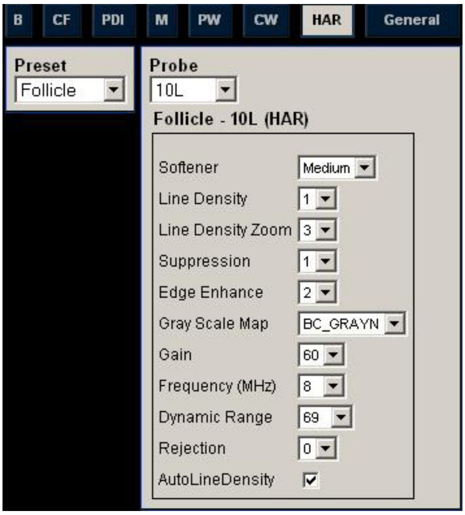
Gray Scale Map: DC_GRAYA
Dynamic Range: 32
Baseline (%): 50
Angle Correct: 0
PW / CW Sweep Speed: 4
Invert: ☐
Display Format: Vert 1/2 B
Acoustic Output (%): 100
Spectral Averaging: Low

Probe
3S
Follicle - 3S (CW)

Rejection: 0
Gain: 16
Wall Filter (cm/s): 150
PW / CF / PDI Angle Steer: 0
Velocity (cm/s): 40

Figure 16-24. CW parameters

Harmonics



Preset: Follicle

Probe: 10L

Follicle - 10L (HAR)

Softener: Medium

Line Density: 1

Line Density Zoom: 3

Suppression: 1

Edge Enhance: 2

Gray Scale Map: BC_GRAYN

Gain: 60

Frequency (MHz): 8

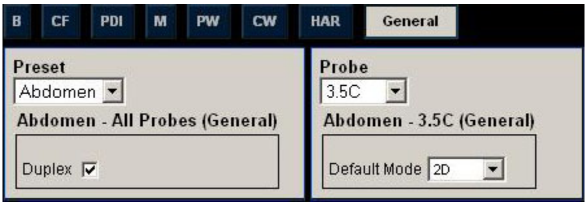
Dynamic Range: 69

Rejection: 0

AutoLineDensity: ☑

Figure 16-25. Harmonics parameters

General



Preset: Abdomen

Abdomen - All Probes (General)

Duplex ☑

Probe: 3.5C

Abdomen - 3.5C (General)

Default Mode: 2D

Figure 16-26. General parameters

Annotations Libraries Presets

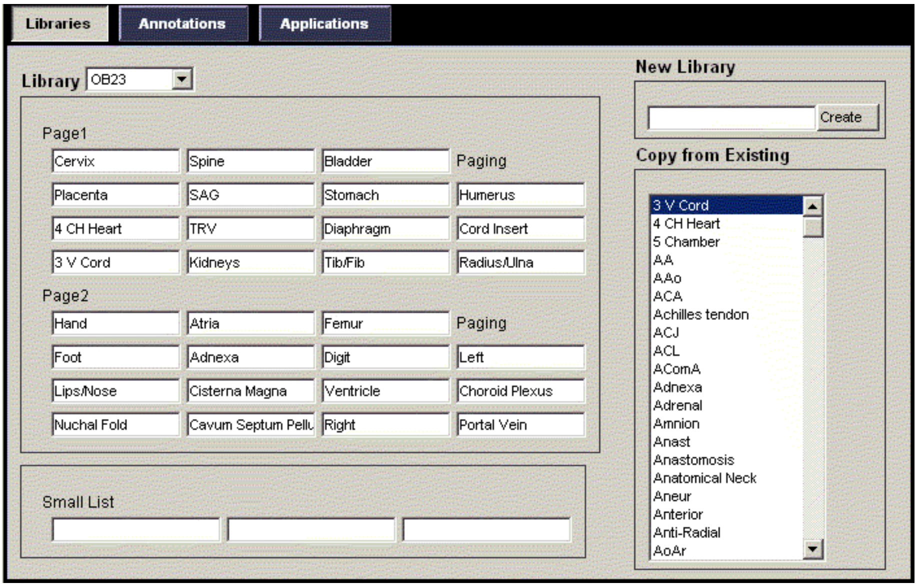
Overview

Annotation screens allow you to specify annotation text and pointer options, to define annotation libraries, and assign annotation libraries to applications.

Annotations Libraries/Libraries Preset Menu

On the Annotations *Libraries* tab, you can change and create annotation libraries. An annotation library is a list of annotations that are associated with a specific application. The annotations are listed in the library in the order in which they display on the Touch Panel. See Figure 16-27. For each library, you can define two Touch Panel displays of annotations (Page1 and Page2), with 15 annotations on each Touch Panel.

Annotations Libraries/Libraries Preset Menu (continued)


Libraries
Annotations
Applications
New Library
Create
Copy from Existing
Small List
Paging
Paging

Library OB23

Page1

Cervix	Spine	Bladder	Paging
Placenta	SAG	Stomach	Humerus
4 CH Heart	TRV	Diaphragm	Cord Insert
3 V Cord	Kidneys	Tib/Fib	Radius/Ulna

Page2

Hand	Atria	Femur	Paging
Foot	Adnexa	Digit	Left
Lips/Nose	Cisterna Magna	Ventricle	Choroid Plexus
Nuchal Fold	Cavum Septum Pellu	Right	Portal Vein

Copy from Existing:

3 V Cord
4 CH Heart
5 Chamber
AA
AAo
ACA
Achilles tendon
ACJ
ACL
AComA
Adnexa
Adrenal
Amnion
Anast
Anastomosis
Anatomical Neck
Aneur
Anterior
Anti-Radial
AoAr

Figure 16-27. Annotation Libraries Preset Menu

Annotations Libraries/Libraries Preset Menu (continued)

Table 16-25: Libraries

Preset Parameter	Description
Library	The name of the annotation library.
Page1	The first Touch Panel page of annotations for the selected library.
Page2	The second Touch Panel page of annotations for the selected library.
Small List	Fields where you define a small list.
New Library	The name of a new annotation library that you want to create.
Copy from Existing	A list of annotations you can use to create a library.

Defining Annotations

1. In the *Library* field, select the library you want.

   The system displays all annotations for the library. You can have two Touch Panel displays of annotations for each library. The annotations are listed in the order that they are shown on the Touch Panel when you use annotations.
2. To change or add an annotation, select the annotation or blank location and press **Set**, then do one of the following:
   - Type the annotation.
   - Select the annotation in the *Copy from Existing* list, and press **Set**.
3. To save the changes, select the Save button.

Creating a new annotation library

1. In the *New Library* field, type a name for the library, then select Create.

   The system creates a new library.
2. Enter annotations as described in step 2 above.
3. To save the changes, select the Save button.

Creating a small list

A small list is a list of up to three annotations attached to one annotation location on the Touch Panel. You can use a small list to group similar annotations, such as those indicating a probe location. For example, you can specify that a small list include the following annotations: Long, Transverse, and Coronal. To make annotations easier to use, you can define the small list in the same location in each annotation library.

To define a small list:

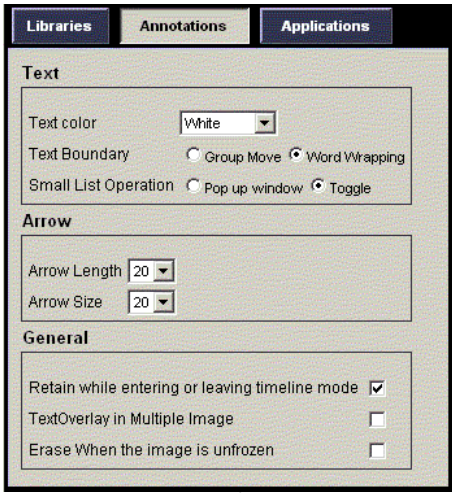
1. Move the **Trackball** to the annotation field on Page1 or Page2 where you want to create a small list, and press **Set**.
2. Move the **Trackball** to the first field in the *Small List* section, and press **Set**.
3. To enter annotations in the fields in the Small List section, select the field and press **Set**, then do one of the following:
    - Type the annotation
    - Select the annotation in the Copy from Existing list, and press **Set** twice.

    You can enter up to three annotations. When you enter an annotation in the first field of the Small List section, the selected annotation field on Page1 or Page2 changes to SMALL LIST.
4. To save the changes, select the Save button.

NOTE: The small list can be displayed as a pop-up window or as a toggle field. The Small List Operation field on the General tab allows you to specify how it is displayed.

Annotations Libraries/Annotations Preset Menu

On the Annotations tab, you specify text and pointer options.



Text

Text color: White

Text Boundary: ○ Group Move ● Word Wrapping

Small List Operation: ○ Pop up window ● Toggle

Arrow

Arrow Length: 20

Arrow Size: 20

General

Retain while entering or leaving timeline mode ☑

TextOverlay in Multiple Image ☐

Erase When the image is unfrozen ☐

Figure 16-28. Annotation/Annotations Preset Menu

Annotations Libraries/Annotations Preset Menu (continued)

Table 16-26: Text

Preset Parameter	Description
Text color	Select the color for annotation text.
Text Boundary	Select Group Move or Word Wrapping.
Small List Operation	Select whether you want small list options to display in a pop-up window or by a toggle function.

Table 16-27: Arrow

Preset Parameter	Description
Arrow Length	Select the default pointer length.
Arrow Size	Select the default pointer size.

Table 16-28: General

Preset Parameter	Description
Retain while entering or leaving timeline mode	If selected, the system keeps the annotation(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 annotations, 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 annotations when you unfreeze the image.

After you change annotation options, select *Save* to save the changes.

Annotations Libraries/Applications Preset Menu

The Annotations 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 annotations.

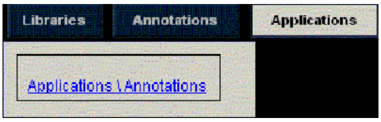
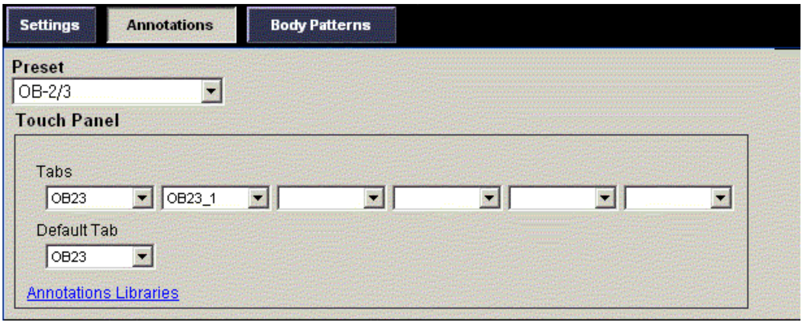

Libraries
Annotations
Applications
Applications \ Annotations

Figure 16-29. Applications/Annotations Link

The Applications/Annotations screen can be accessed through either the Annotations Libraries or Applications Touch Panel keys.


Settings
Annotations
Body Patterns
Touch Panel
Annotations Libraries

Preset: OB-2/3

Tabs: OB23, OB23_1

Default Tab: OB23

Figure 16-30. Applications/Annotations Preset Menu

Table 16-29: Applications

Preset Parameter	Description
Application	The name of the application.
Library Group Tabs	A list of libraries for the application. You can select up to six libraries.
Default Library Group	The default library that the system displays when you use annotations.

Specifying which libraries belong to an application

1. On the Applications tab, in the Application field, select the application.
2. In the Library Group Tabs fields, select the libraries for this application. You can select up to six libraries.
3. In the Default Library Group field, select the default library you want the system to display when you use annotations.

NOTE: *When you use annotations, the default library is displayed. To use other libraries for the application, press the tab for the library.*

4. To save the changes, select the Save button.

Using annotations from a library

To use annotations, press the **Comment** key on the Control Panel. Annotations are then displayed on the Touch Panel.

To select an annotation library, press the appropriate tab (in Figure 16-31, the tabs are OB23 and OB23_1).

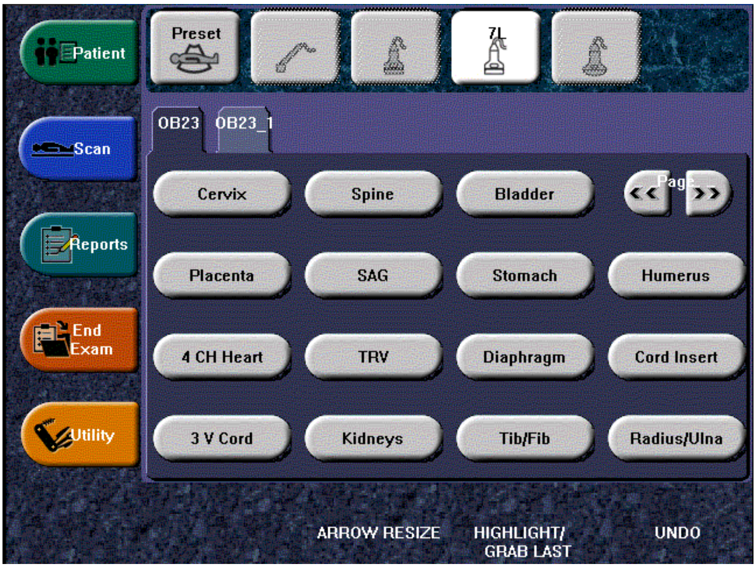

Patient
Scan
Reports
End Exam
Utility
Preset
7L
OB23
OB23_1
Cervix
Spine
Bladder
<<
Page
>>
Placenta
SAG
Stomach
Humerus
4 CH Heart
TRV
Diaphragm
Cord Insert
3 V Cord
Kidneys
Tib/Fib
Radius/Ulna
ARROW RESIZE
HIGHLIGHT/ GRAB LAST
UNDO

Figure 16-31. OB 2/3 Annotations Touch Panel

Body Patterns Presets

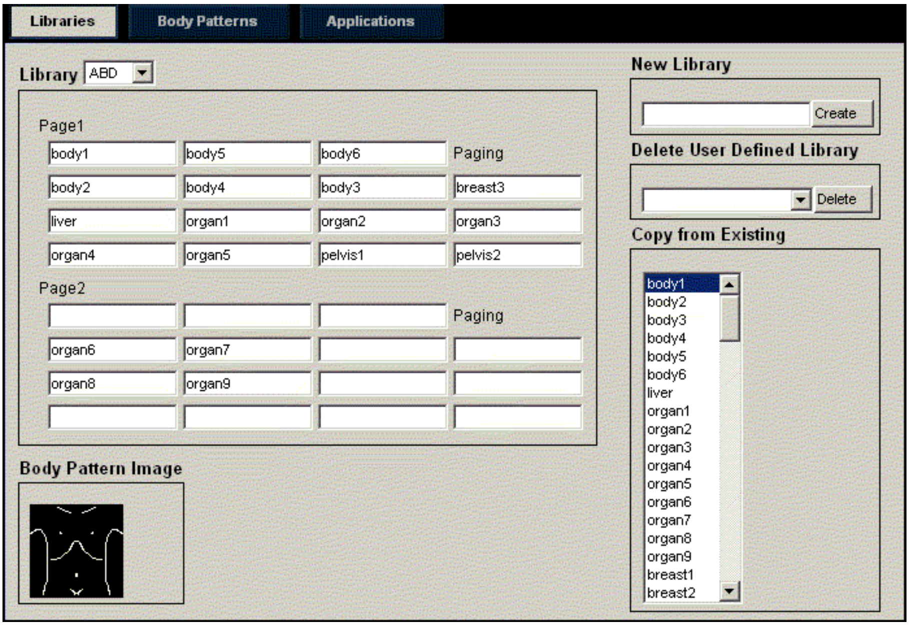
Overview

Body patterns screens allow you to specify body pattern options, to define body pattern libraries, and assign body pattern libraries.

Body Pattern Libraries/Libraries Preset Menu

On the Body Patterns Libraries tab, you can change and create body pattern libraries. A body pattern library is a list of body patterns that are associated with a specific application. The body patterns are listed in the library in the order in which they display on the Touch Panel. For each library, you can define two Touch Panel displays of body patterns (Page1 and Page2), with 15 body patterns on each Touch Panel.

Body Pattern Libraries/Libraries Preset Menu (continued)


Libraries
Body Patterns
Applications
New Library
Create
Delete User Defined Library
Delete
Copy from Existing
Body Pattern Image

Library: ABD

Page1

body1	body5	body6	Paging
body2	body4	body3	breast3
liver	organ1	organ2	organ3
organ4	organ5	pelvis1	pelvis2

Page2

			Paging
organ6	organ7		
organ8	organ9		

Copy from Existing:

body1
body2
body3
body4
body5
body6
liver
organ1
organ2
organ3
organ4
organ5
organ6
organ7
organ8
organ9
breast1
breast2

Figure 16-32. Body Patterns Libraries Preset Menu

Table 16-30: Body Patterns Libraries

Preset Parameter	Description
Library	The name of the body pattern application library.
Page1	The first Touch Panel page of body patterns for the selected library.
Page2	The second Touch Panel page of 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.
Copy from Existing	A list of body patterns you can use to create an application library.

Defining body patterns

1. In the *Library* field, select the application library you want.

   The system displays all body patterns for the library. You can have two Touch Panel displays of body patterns for each library. The body patterns are listed in the order that they are shown on the Touch Panel.

2. To change or add a body pattern, select the body pattern or blank location and press **Set**, then do one of the following:
   - Type the body pattern name.
   - Select the body pattern in the *Copy from Existing* list, and press **Set**.

NOTE: When you select a body pattern name in a Touch Panel location or in the Copy from Existing list, the system displays the pattern in the lower left corner of the screen.

3. To save the changes, select the Save button.

Creating a new body pattern library

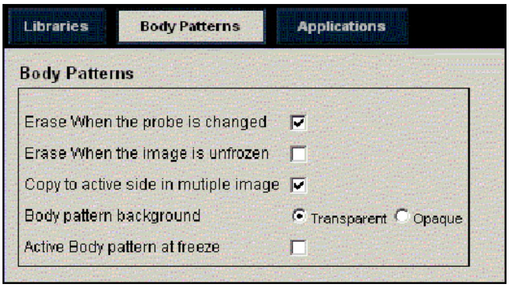
1. In the New Library field, type a name for the library, then select Create.

   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.



Body Patterns

Erase When the probe is changed ☑

Erase When the image is unfrozen ☐

Copy to active side in mutiple image ☑

Body pattern background ● Transparent ○ Opaque

Active Body pattern at freeze ☐

Figure 16-33.   Body Patterns General Preset Menu

Table 16-31: 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.
Active Body pattern at freeze	Check box to select.

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.

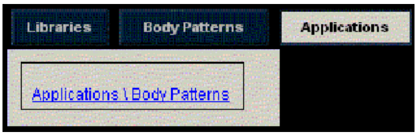
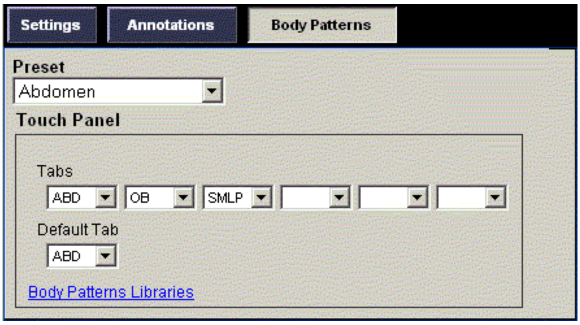

Libraries
Body Patterns
Applications
Applications \ Body Patterns

Figure 16-34.   Applications/Body Patterns Link

The Applications/Body Patterns screen can be accessed through either the Body Pattern Libraries or Applications Touch Panel keys.


Settings
Annotations
Body Patterns
Touch Panel
Tabs
Body Patterns Libraries

Preset: Abdomen

Tabs: ABD, OB, SMLP

Default Tab: ABD

Figure 16-35.   Body Patterns Applications Preset Menu

Body Pattern Libraries/Applications Preset Menu (continued)

Table 16-32: Applications

Preset Parameter	Description
Application	Defines the Body Pattern option.
Library Group Tabs	A list of body pattern applications.
Default Library Group	The default library that the system displays when you use body patterns.

Selecting body pattern application libraries

1. On the Applications tab, in the Application field, select the body pattern.
2. In the Library Group Tabs fields, select the application libraries for Body Patterns. You can select up to six libraries.
3. In the Default Library Group field, select the default application library you want the system to display when you use body patterns.

NOTE: *When you use body patterns, the default library is displayed. To use other application libraries, press the tab for the library.*

4. To save the changes, select the Save button.

Using body pattern application libraries

See the following Body Patterns Small Parts Touch Panel.

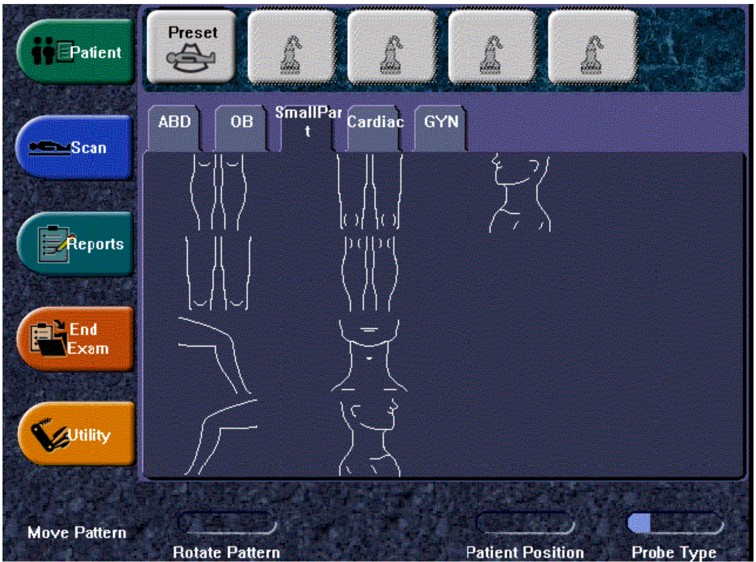

Patient
Scan
Reports
End Exam
Utility
Preset
ABD
OB
SmallPart
Cardiac
GYN
Move Pattern
Rotate Pattern
Patient Position
Probe Type

Figure 16-36. Body Patterns Small Parts Touch Panel

To select a body pattern library, select the tabs (for example, ABD or OB).

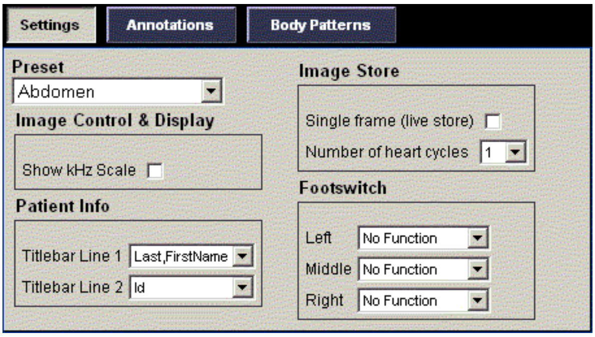
To select body patterns, use the **Ellipse/Body Pattern** control on the Control Panel.

Application Presets

Overview

Application Settings presets allow you to configure the application-specific settings (presets).

The other two tabs, Annotations and Body Patterns were described earlier in this chapter. For more details, see Figure 16-30 and Figure 16-35, respectively.



Preset
Abdomen

Image Control & Display
Show kHz Scale ☐

Patient Info
Titlebar Line 1 Last,FirstName
Titlebar Line 2 Id

Image Store
Single frame (live store) ☐
Number of heart cycles 1

Footswitch
Left No Function
Middle No Function
Right No Function

Figure 16-37. Application Settings Preset Menu

Overview (continued)

Table 16-33: 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’ for more information.

Table 16-34: Image Control & Display

Preset Parameter	Description
Show kHz scale	When selected, displays the kHz scale on the left side of the Doppler spectrum.

Table 16-35: 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 16-36: 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
Left	Configure the left footswitch pedal for the selected application. Select the functionality from the list.
Middle	Configure the middle footswitch pedal for the selected application. Select the functionality from the list.
Right	Configure the right footswitch pedal for the selected application. Select the functionality from the list.

User-Defined Application Presets

There are four user-defined application presets that can be set on the system.

To set up User-Defined Application Presets,

1. From the Touch Panel, press the ***Preset*** icon at the top of the Touch Panel. The Preset Touch Panel appears:

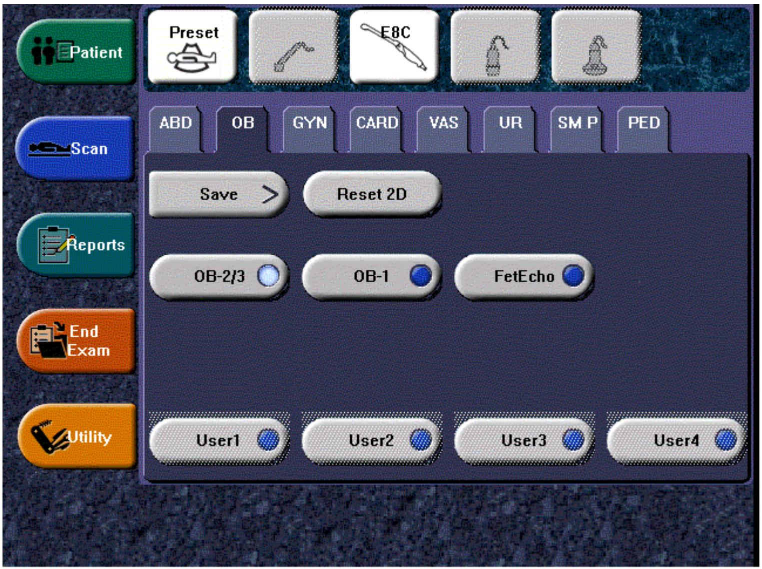

Patient
Scan
Reports
End Exam
Utility
Preset
E8C
ABD
OB
GYN
CARD
VAS
UR
SM P
PED
Save
Reset 2D
OB-2/3
OB-1
FetEcho
User1
User2
User3
User4

Figure 16-38. Preset Touch Panel

User-Defined Application Presets (continued)

2. Press ***Save***. A pop-up menu appears: The Create New Application menu appears.

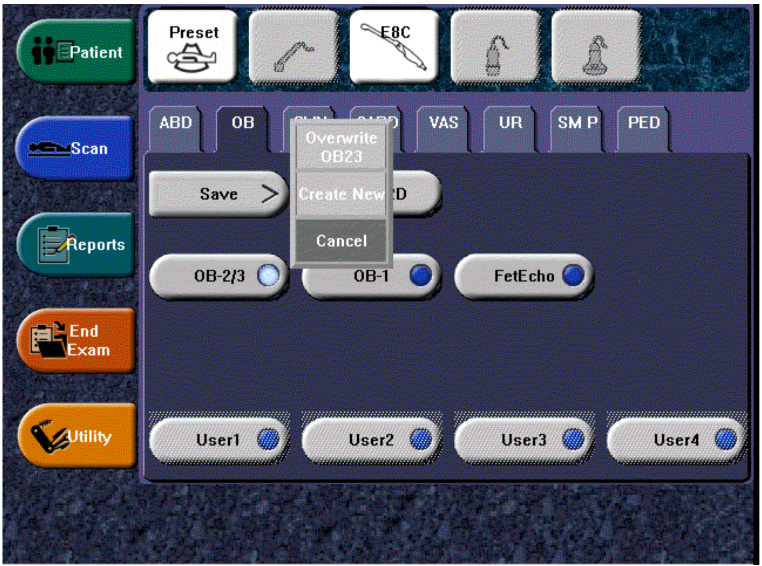

Patient
Scan
Reports
End Exam
Utility
Preset
E8C
ABD
OB
VAS
UR
SM P
PED
Save
Overwrite OB23
Create New
Cancel
OB-2/3
OB-1
FetEcho
User1
User2
User3
User4

Figure 16-39. Create New User Pop-up Menu

3. Select ***Create New***. The Create New Application menu appears.

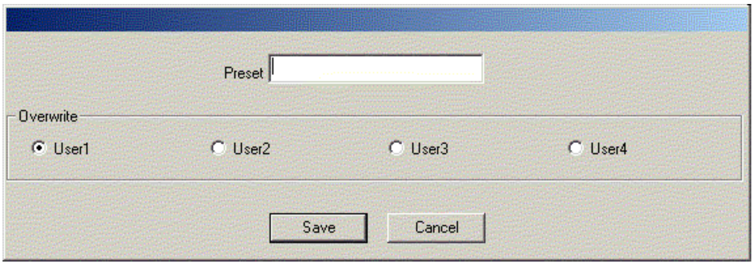

Preset
Overwrite
● User1
○ User2
○ User3
○ User4
Save
Cancel

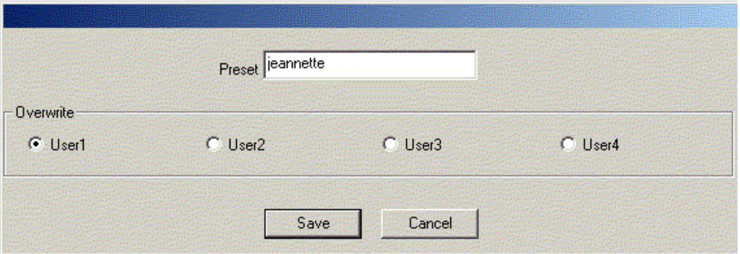
Figure 16-40. Create New User Application Menu

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)

4. Type the name of the new application. Specify which User Touch Panel 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.



Preset jeannette

Overwrite
● User1
○ User2
○ User3
○ User4
Save
Cancel

Figure 16-41. Create New User Application Menu

The new application now appears on the Touch Panel.

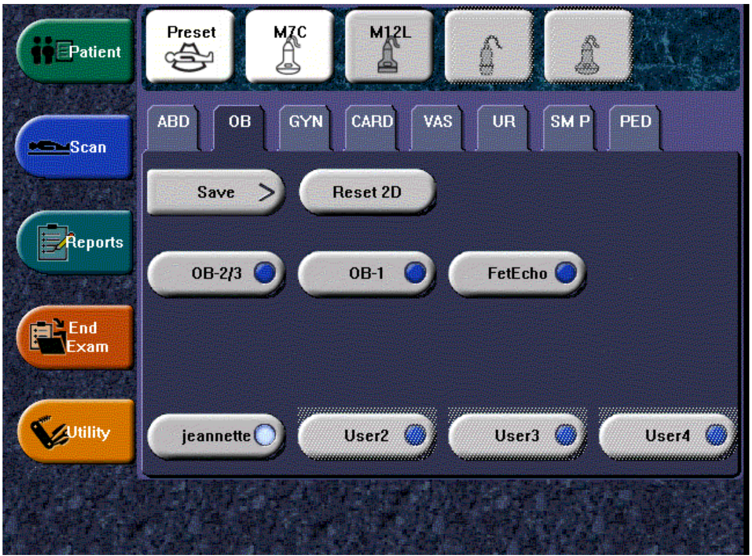

Patient
Scan
Reports
End Exam
Utility
Preset
M7C
M12L
ABD
OB
GYN
CARD
VAS
UR
SM P
PED
Save
Reset 2D
OB-2/3
OB-1
FetEcho
jeannette
User2
User3
User4

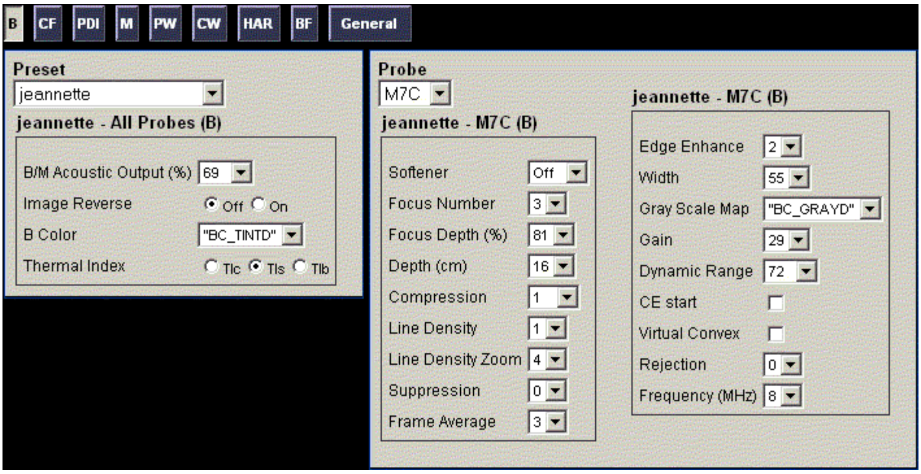
Figure 16-42. New User Application

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

User-Defined Application Presets (continued)

5. To view/edit the parameters for the user-defined preset, press Utility --> Imaging.

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



Preset

jeannette

jeannette - All Probes (B)

B/M Acoustic Output (%) 69
Image Reverse ● Off ○ On
B Color "BC_TINTD"
Thermal Index ○ TIc ● TIs ○ TIb

Probe

M7C

jeannette - M7C (B)

Softener Off
Focus Number 3
Focus Depth (%) 81
Depth (cm) 16
Compression 1
Line Density 1
Line Density Zoom 4
Suppression 0
Frame Average 3

jeannette - M7C (B)

Edge Enhance 2
Width 55
Gray Scale Map "BC_GRAYD"
Gain 29
Dynamic Range 72
CE start ☐
Virtual Convex ☐
Rejection 0
Frequency (MHz) 8

Figure 16-43. 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.*

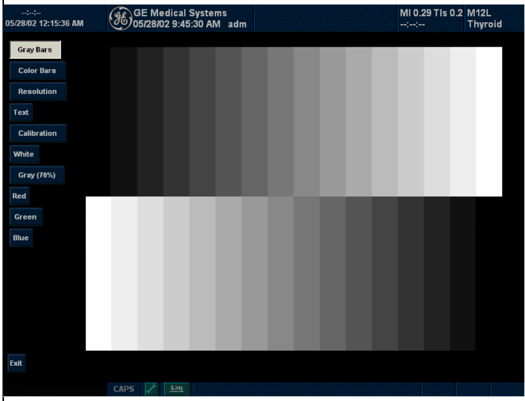
NOTE: *Currently, there is no way to delete a user-defined application.*

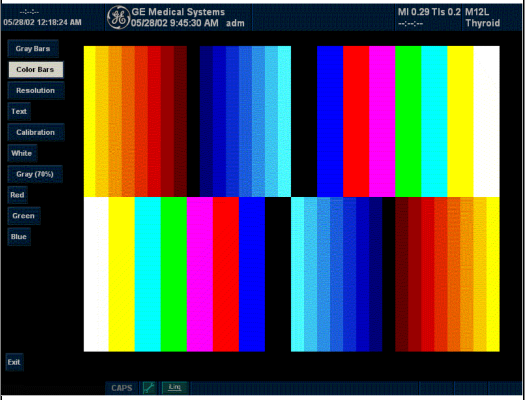
Test Patterns

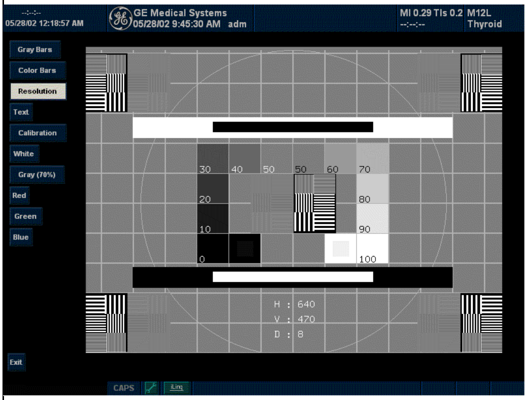
Overview

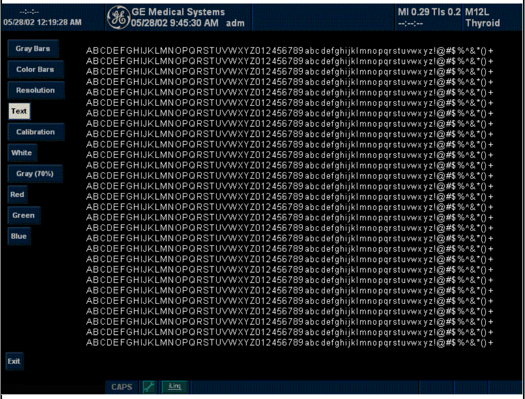
There are different test patterns available: Gray Bars, Color Bars, Resolution, Text, Monitor Calibration, White, Gray, Red, Green and Blue.

Table 16-38: Available Test Patterns


05/28/02 12:15:36 AM
GE Medical Systems
05/28/02 9:45:30 AM adm
MI 0.29 TIs 0.2 M12L
Thyroid
Gray Bars
Color Bars
Resolution
Text
Calibration
White
Gray (70%)
Red
Green
Blue
Exit
CAPS


05/28/02 12:18:24 AM
GE Medical Systems
05/28/02 9:45:30 AM adm
MI 0.29 TIs 0.2 M12L
Thyroid
Gray Bars
Color Bars
Resolution
Text
Calibration
White
Gray (70%)
Red
Green
Blue
Exit
CAPS


05/28/02 12:18:57 AM
GE Medical Systems
05/28/02 9:45:30 AM adm
MI 0.29 TIs 0.2 M12L
Thyroid
Gray Bars
Color Bars
Resolution
Text
Calibration
White
Gray (70%)
Red
Green
Blue
Exit
30
40
50
50
60
70
20
80
10
90
0
100
H : 640
V : 470
D : 8
CAPS

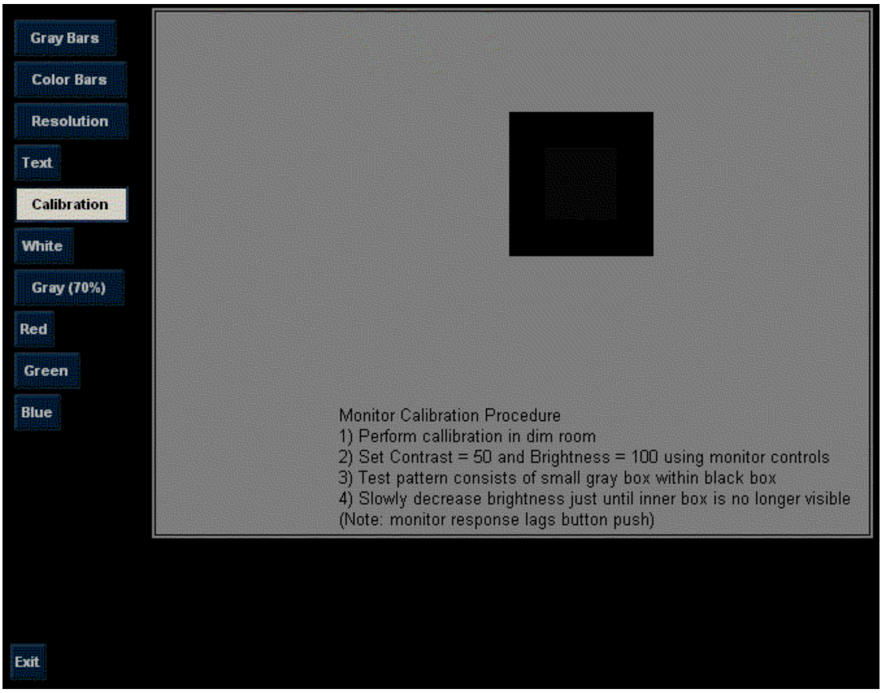

05/28/02 12:19:28 AM
GE Medical Systems
05/28/02 9:45:30 AM adm
MI 0.29 TIs 0.2 M12L
Thyroid
Gray Bars
Color Bars
Resolution
Text
Calibration
White
Gray (70%)
Red
Green
Blue
Exit
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
CAPS

Brightness Calibration

To calibrate the monitor,

1. Select Calibration from the Test Pattern Utility Touch Panel. The test pattern consists of a small box inside a larger box.

NOTE: Calibrate the monitor in a dim room.



Monitor Calibration Procedure
1) Perform callibration in dim room
2) Set Contrast = 50 and Brightness = 100 using monitor controls
3) Test pattern consists of small gray box within black box
4) Slowly decrease brightness just until inner box is no longer visible
(Note: monitor response lags button push)

Figure 16-44. 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. **Buttons**: 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

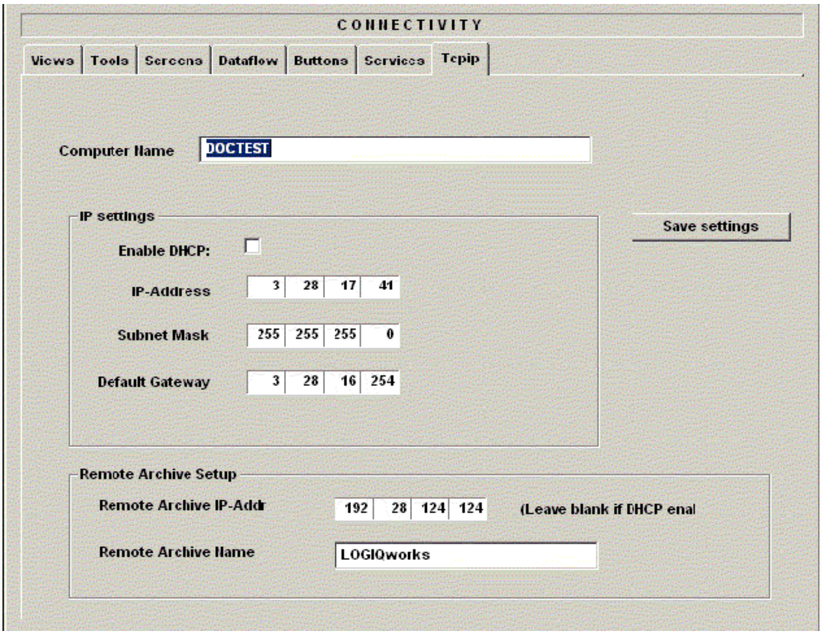
This configuration category enables users with administrative rights to set the TCPIP for the system and connected remote archive.

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)


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
IP settings
Save settings
Remote Archive Setup

Computer Name: DOCTEST

Enable DHCP: ☐

IP-Address: 3 28 17 41

Subnet Mask: 255 255 255 0

Default Gateway: 3 28 16 254

Remote Archive IP-Addr: 192 28 124 124 (Leave blank if DHCP enal

Remote Archive Name: LOGIQworks

Figure 16-45. 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

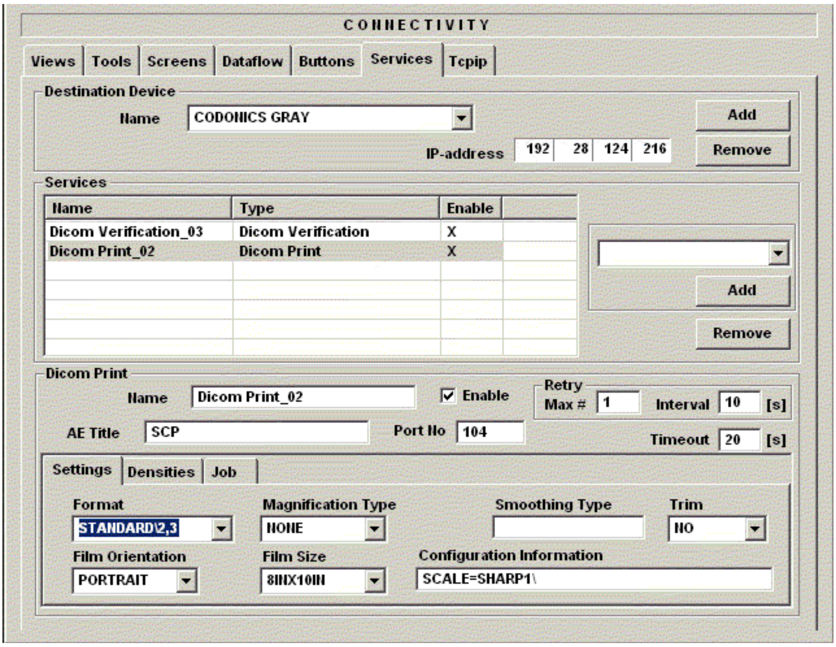
Preset Parameter	Description
Enable DHCP	DO NOT select this box to enable dynamic IP Address selection.
IP-Address	Type the IP Address of the Ultrasound system. NOTE: IP stands for Internet Protocol. Every device on the network has a unique IP address.
Subnet Mask	Type the subnet mask address. NOTE: 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.

Table 16-41: Remote Archive Setup

Preset Parameter	Description
Remote Archive IP-Addr	Type the IP Address of the remote archive device.
Remote Archive Name	Type the name of the remote archive device.

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.


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Destination Device
Add
Remove
Services
Add
Remove
Dicom Print
Settings
Densities
Job

Name: CODONICS GRAY

IP-address: 192 28 124 216

Name	Type	Enable
Dicom Verification_03	Dicom Verification	X
Dicom Print_02	Dicom Print	X

Name: Dicom Print_02

☑ Enable

AE Title: SCP

Port No: 104

Retry Max #: 1

Interval: 10 [s]

Timeout: 20 [s]

Format: STANDARD\2,3

Magnification Type: NONE

Smoothing Type:

Trim: NO

Film Orientation: PORTRAIT

Film Size: 8INX10IN

Configuration Information: SCALE=SHARP1\

Figure 16-46. Connectivity Services Preset Menu

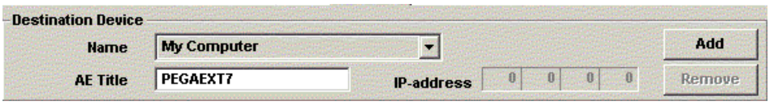
The Services screen has the following sections of information:

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



Name: My Computer

AE Title: PEGAEXT7

Figure 16-47. Destination Device

Table 16-42: 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.

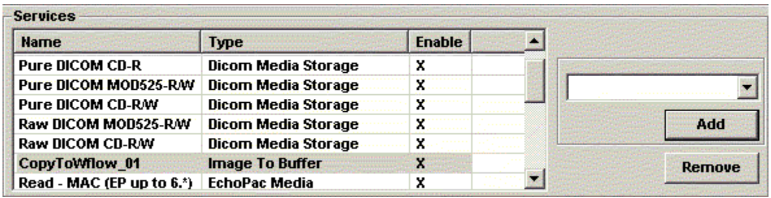
Removing a destination device

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



Services

Name	Type	Enable
Pure DICOM CD-R	Dicom Media Storage	X
Pure DICOM MOD525-R/W	Dicom Media Storage	X
Pure DICOM CD-R/W	Dicom Media Storage	X
Raw DICOM MOD525-R/W	Dicom Media Storage	X
Raw DICOM CD-R/W	Dicom Media Storage	X
CopyToWflow_01	Image To Buffer	X
Read - MAC (EP up to 6.*)	EchoPac Media	X

Figure 16-48. Services

Table 16-43: 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.

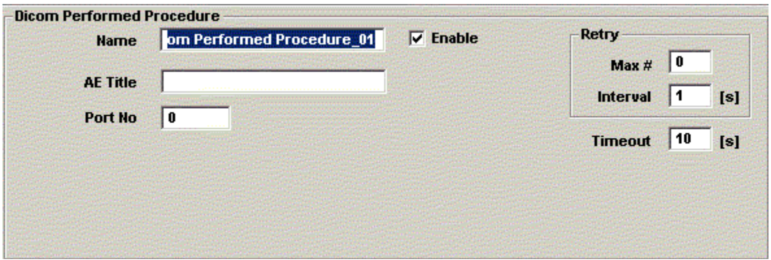
   The system adds the service to the list of services.

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


Dicom Performed Procedure

Name: om Performed Procedure_01

☑ Enable

AE Title:

Port No: 0

Retry

Max #: 0

Interval: 1 [s]

Timeout: 10 [s]

Figure 16-49. 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 16-44: 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

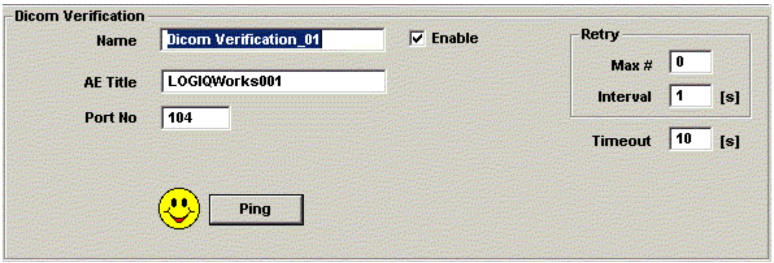
DICOM Verification

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 16-50.

   If the device is not connected, the face has a frown.



Name: Dicom Verification_01

☑ Enable

AE Title: LOGIQWorks001

Port No: 104

Max #: 0

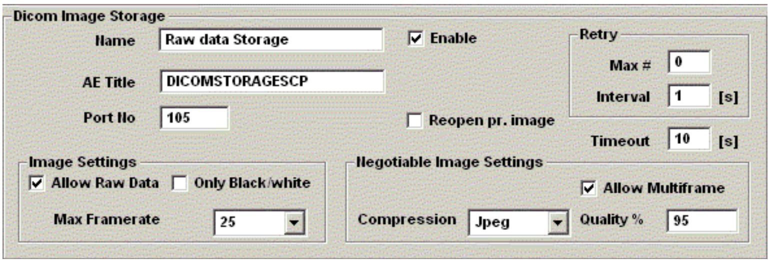
Interval: 1 [s]

Timeout: 10 [s]

Figure 16-50. DICOM Verification

DICOM Image Storage

DICOM Image Storage allows the system to send or receive ultrasound images in a format that can be interpreted by PACS.



Dicom Image Storage

Name: Raw data Storage

☑ Enable

AE Title: DICOMSTORAGESCP

Port No: 105

☐ Reopen pr. image

Retry

Max #: 0

Interval: 1 [s]

Timeout: 10 [s]

Image Settings

☑ Allow Raw Data ☐ Only Black/white

Max Framerate: 25

Negotiable Image Settings

☑ Allow Multiframe

Compression: Jpeg

Quality %: 95

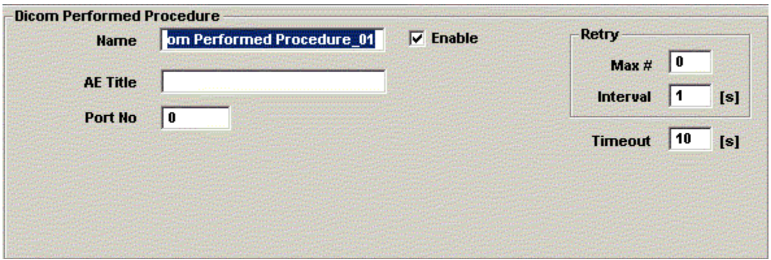
Figure 16-51. DICOM Image Storage Service Type

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.
Only Black/white	When selected, color data is not stored.
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

DICOM Performed Procedure provides an acknowledgement that a study has been performed.



Dicom Performed Procedure

Name: om Performed Procedure_01

☑ Enable

AE Title:

Port No: 0

Retry

Max #: 0

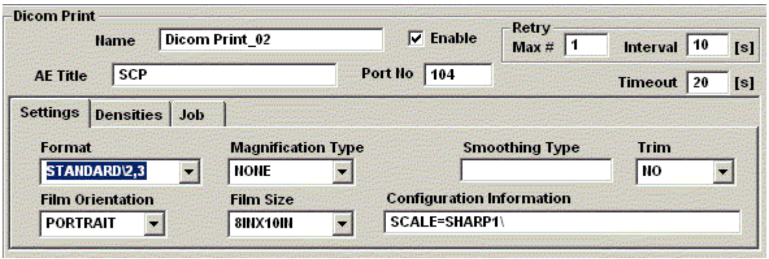
Interval: 1 [s]

Timeout: 10 [s]

Figure 16-52. DICOM Performed Procedure Service Type

DICOM Print

DICOM Print provides the ability to send or receive ultrasound image data to DICOM printers.



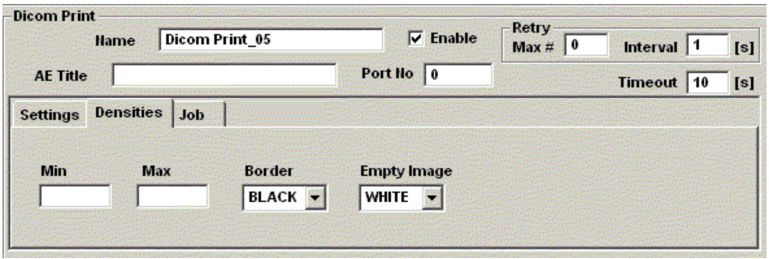
Name: Dicom Print_02
☑ Enable
Retry Max #: 1
Interval: 10 [s]
AE Title: SCP
Port No: 104
Timeout: 20 [s]
Format: STANDARD\2,3
Magnification Type: NONE
Smoothing Type:
Trim: NO
Film Orientation: PORTRAIT
Film Size: 8INX10IN
Configuration Information: SCALE=SHARP1\

Figure 16-53.   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)



Name: Dicom Print_05

☑ Enable

Retry Max # 0

Interval 1 [s]

AE Title

Port No 0

Timeout 10 [s]

Min

Max

Border: BLACK

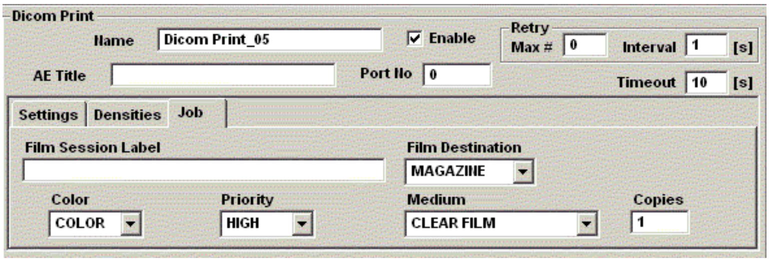
Empty Image: WHITE

Figure 16-54. 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)



Name: Dicom Print_05

☑ Enable

Retry Max #: 0

Interval: 1

AE Title:

Port No: 0

Timeout: 10

Film Session Label:

Film Destination: MAGAZINE

Color: COLOR

Priority: HIGH

Medium: CLEAR FILM

Copies: 1

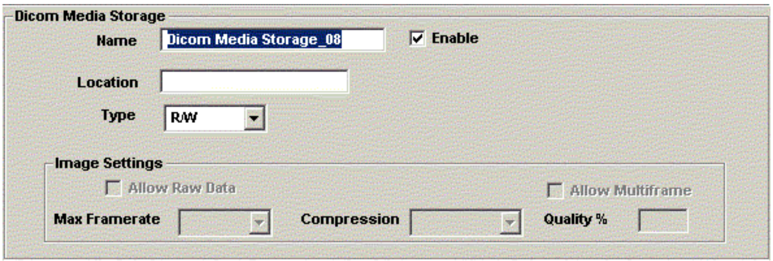
Figure 16-55. DICOM Print Service Type: Job

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 Grey.
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

DICOM Media Storage provides the ability to send or receive ultrasound cine or multiframe images in a format that can be interpreted by PACS.


Dicom Media Storage
Location
Image Settings
☐ Allow Raw Data
☐ Allow Multiframe
Max Framerate
Compression
Quality %

Name: Dicom Media Storage_08

☑ Enable

Type: R/W

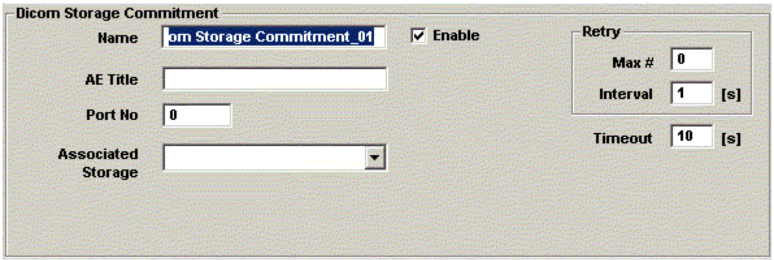
Figure 16-56. DICOM Media Storage Service Type

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

DICOM Storage Commitment provides acknowledgement from PACS that the study has been accepted into archive.



Dicom Storage Commitment

Name: om Storage Commitment_01

☑ Enable

AE Title:

Port No: 0

Associated Storage:

Retry

Max #: 0

Interval: 1 [s]

Timeout: 10 [s]

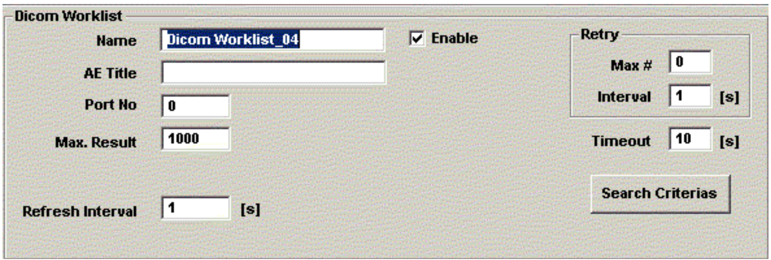
Figure 16-57. DICOM Storage Commitment Service Type

Table 16-50: DICOM Storage Commitment

Preset Parameter	Description
Associated Storage	This selection is based on the services entered by the user.

DICOM Worklist

DICOM Worklist provides a list of patients sorted by query parameters.



Dicom Worklist

Name: Dicom Worklist_04

☑ Enable

AE Title:

Port No: 0

Max. Result: 1000

Refresh Interval: 1 [s]

Retry

Max #: 0

Interval: 1 [s]

Timeout: 10 [s]

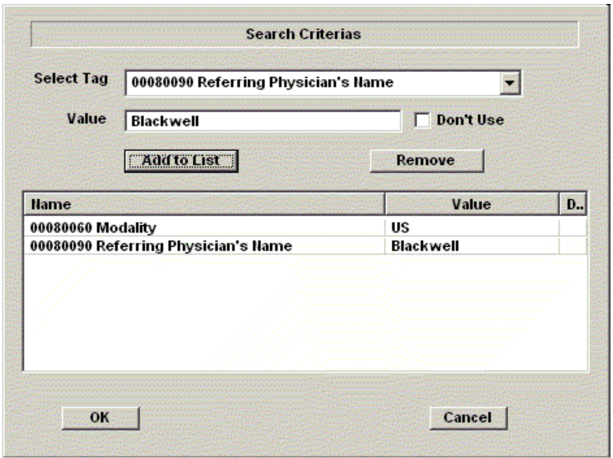
Figure 16-58. DICOM Worklist Service Type

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.
Refresh Interval	Specify, in seconds, how often you want the system to ping the worklist server to update the 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 16-59.

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.



Select Tag: 00080090 Referring Physician's Name

Value: Blackwell ☐ Don't Use

Name	Value	D..
00080060 Modality	US	
00080090 Referring Physician's Name	Blackwell	

Figure 16-59. DICOM Worklist Search Criteria

DICOM Worklist (continued)

Table 16-52: DICOM Worklist Search Criteria

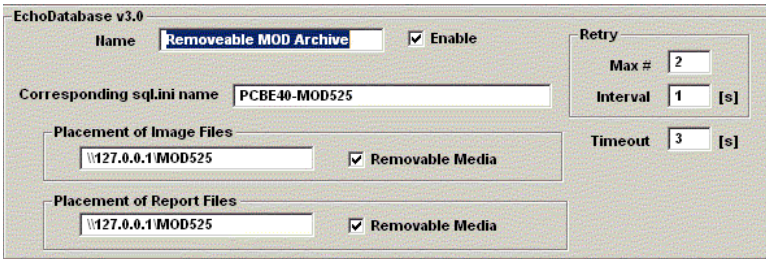
Preset Parameter	Description
Select Tag	Select the type of information that you want to define for search parameters, such as Referring Physician's Name, Pregnancy Status, Medical Alerts, or Requested Procedure Description. For a list of tags, See 'Search Criteria tags' for more information..
Value	Type 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



EchoDatabase v3.0

Name: Removeable MOD Archive ☑ Enable

Corresponding sql.ini name: PCBE40-MOD525

Placement of Image Files: \\127.0.0.1\MOD525 ☑ Removable Media

Placement of Report Files: \\127.0.0.1\MOD525 ☑ Removable Media

Retry

Max #: 2

Interval: 1 [s]

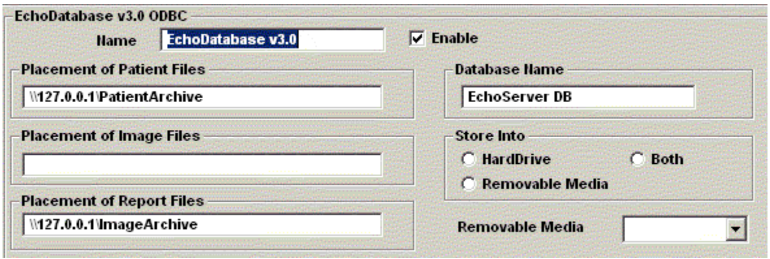
Timeout: 3 [s]

Figure 16-60. 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 (MO), select Removable Media.
Placement of Report Files	Enter the path to the report archive. If the report archive is on a removable disk (MO), select Removable Media.

Echo Database V3.0



EchoDatabase v3.0 ODBC

Name: EchoDatabase v3.0

☑ Enable

Placement of Patient Files: \\127.0.0.1\PatientArchive

Database Name: EchoServer DB

Placement of Image Files:

Store Into: ○ HardDrive ○ Both ○ Removable Media

Placement of Report Files: \\127.0.0.1\ImageArchive

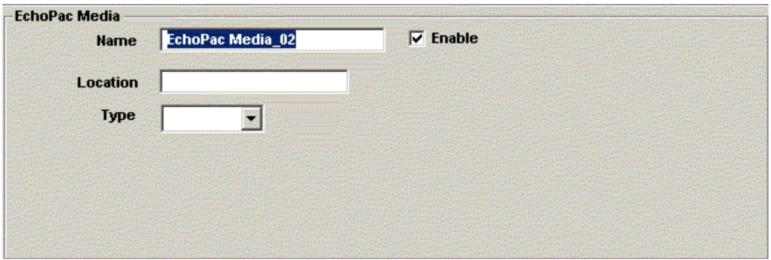
Removable Media:

Figure 16-61. 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 (MO), select Removable Media.
Placement of Image Files	Enter the path to the image archive. If the image archive is on a removable disk (MO), select Removable Media.
Placement of Report Files	Enter the path to the report archive. If the report archive is on a removable disk (MO), select Removable Media.
Database Name	The name of the database.
Store into	Select HardDrive, Removable Media, or Both.
Removable Media	Select media.

EchoPac Media


EchoPac Media

Name EchoPac Media_02 ☑ Enable

Location

Type

Figure 16-62. 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

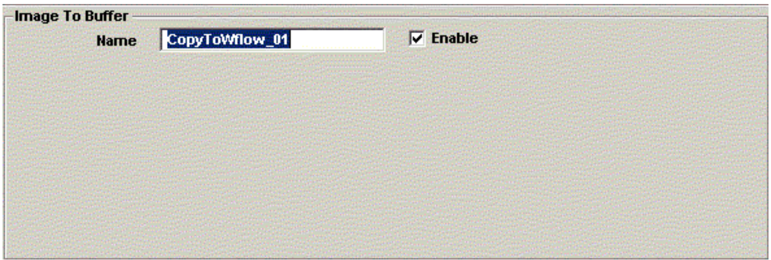
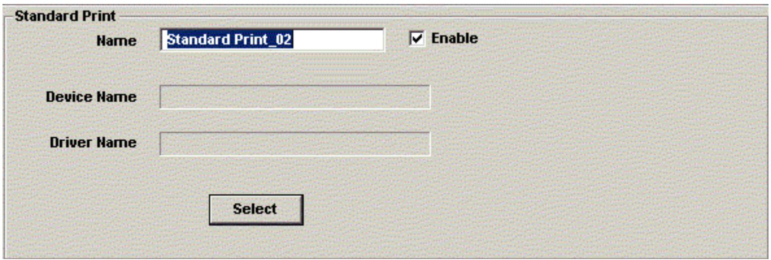


Image To Buffer

Name CopyToWflow_01 ☑ Enable

Figure 16-63. Image to Buffer Service Type

Standard Print



Name: Standard Print_02

☑ Enable

Device Name

Driver Name

Figure 16-64. Standard Print Service Type

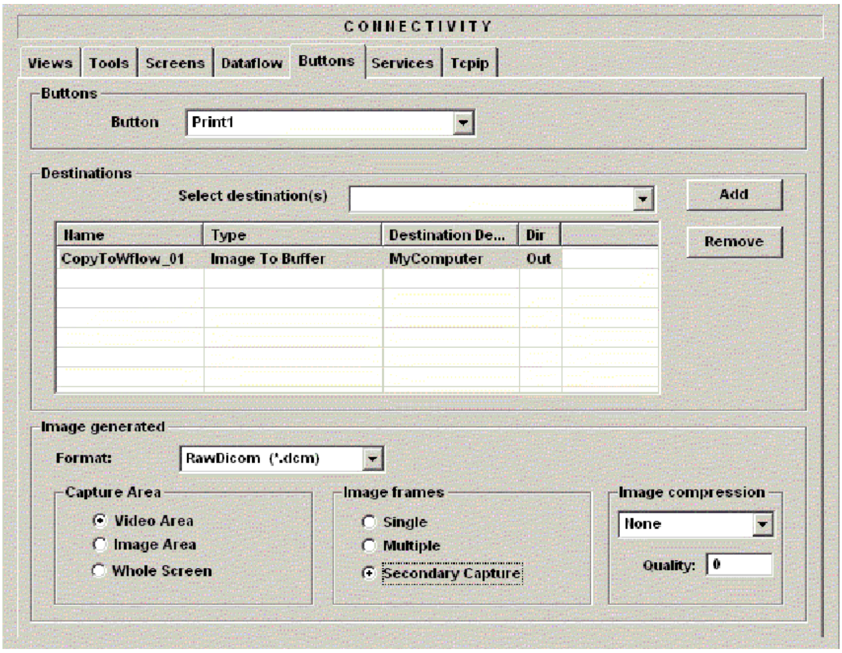
Table 16-56: Standard Print

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 P1–P4 to a device or to a dataflow.

NOTE: You can configure each print key to multiple output devices/ workflows.


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Buttons
Destinations
Add
Remove
Image generated
Capture Area
Image frames
Image compression

Button: Print1

Select destination(s):

Name	Type	Destination De...	Dir
CopyToWflow_01	Image To Buffer	MyComputer	Out

Format: RawDicom (*.dcm)

● Video Area
○ Image Area
○ Whole Screen

○ Single
○ Multiple
● Secondary Capture

None

Quality: 0

Figure 16-65. 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)’ for more information.

Capture Area Definitions

Video Area Video Area example:

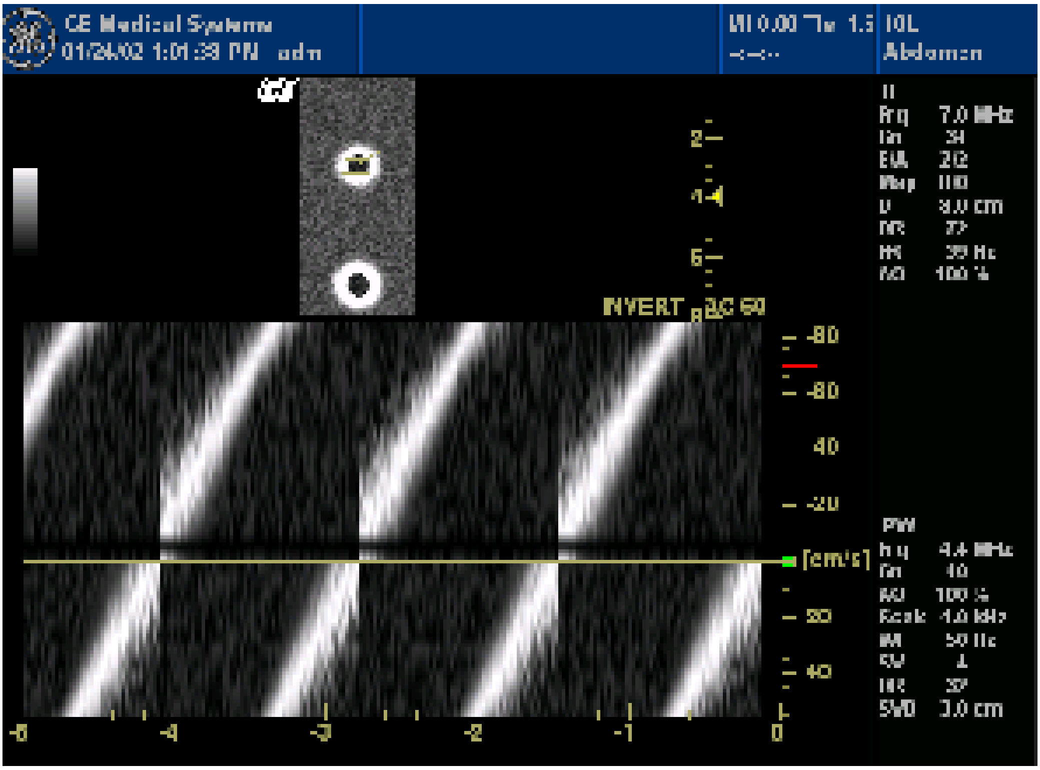

GE Medical Systems
01/24/02 1:01:38 PM adm
10L
Abdomen
INVERT
[cm/s]
PW

Figure 16-66. Video Area Capture Area

Capture Area Definitions (continued)

Image Area Image Area example:

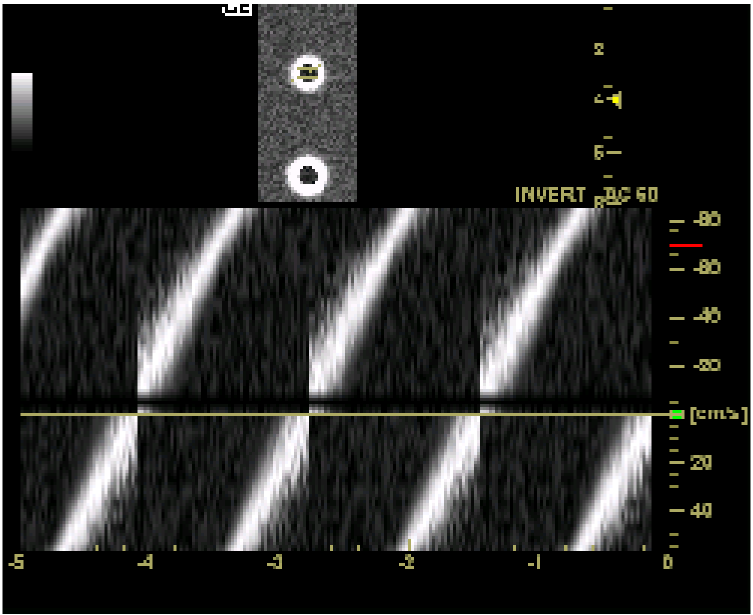

2
4
6
INVERT
BC 60
-80
-60
-40
-20
[cm/s]
20
40
-5
-4
-3
-2
-1
0

Figure 16-67. Image Area Capture Area

Capture Area Definitions (continued)

Whole Screen Whole Screen example:

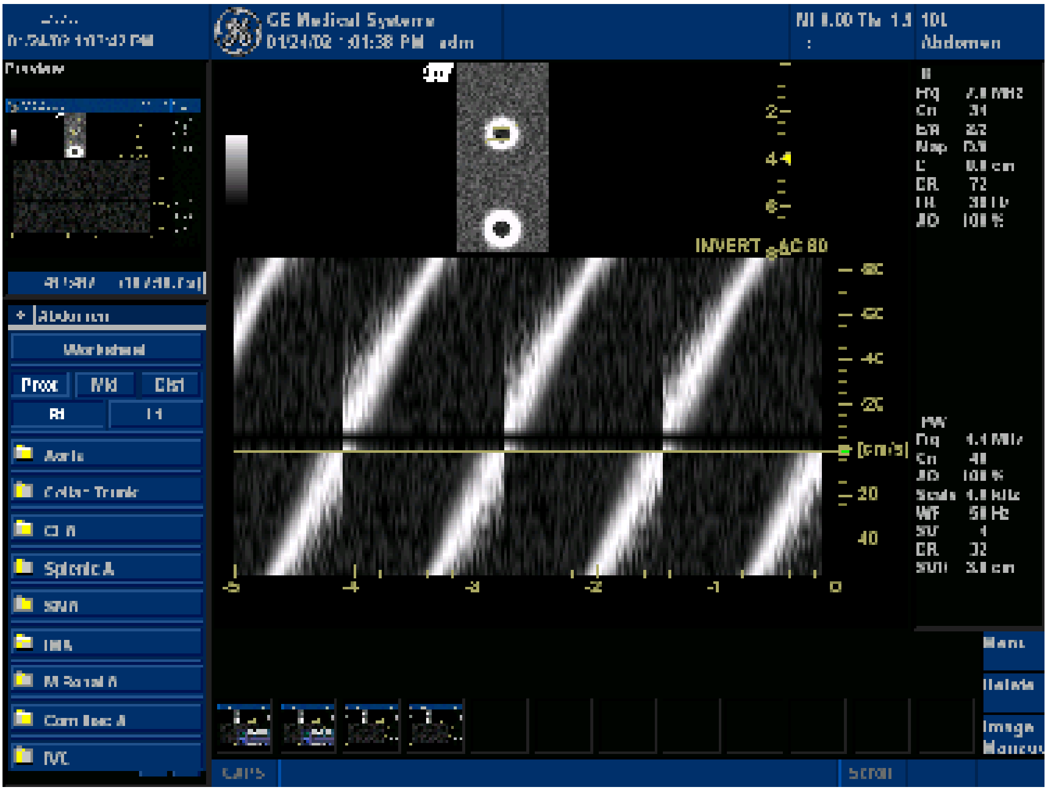

GE Medical Systems
01/24/02 01:38 PM adm
Abdomen
Worksheet
Prox
Mid
Dist
RI
Aorta
Celiac Trunk
Splenic A
IVC
INVERT
[cm/s]
PW

Figure 16-68. 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)' for more information.

1. In the Button field, select Print1, Print2, Print3, or Print4.
2. In the Destinations section, select a service from the Select destination(s) list (see Figure 16-65).
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)' for more information.

Removing a service from a Print key

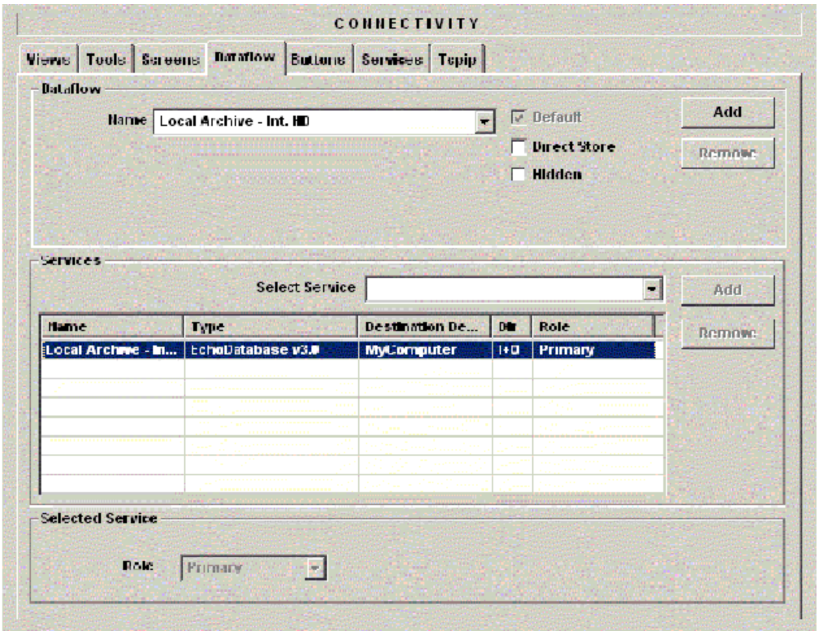
1. In the Button field, select the print key you want to remove a service from.
2. In the destinations list, move the **Trackball** to the service you want to remove.
3. Press **Set** to highlight the service.
4. In the Destinations section, select Remove.

   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.*


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Dataflow
Add
Remove
Services
Add
Remove
Selected Service

Name: Local Archive - Int. HD

☑ Default

☐ Direct Store

☐ Hidden

Select Service:

Name	Type	Destination De...	Dir	Role
Local Archive - In...	EchoDatabase v3.0	MyComputer	I+O	Primary

Role: Primary

Figure 16-69. 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.
Direct Search	Select whether to search through all patients or today's patients only.
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)' 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)

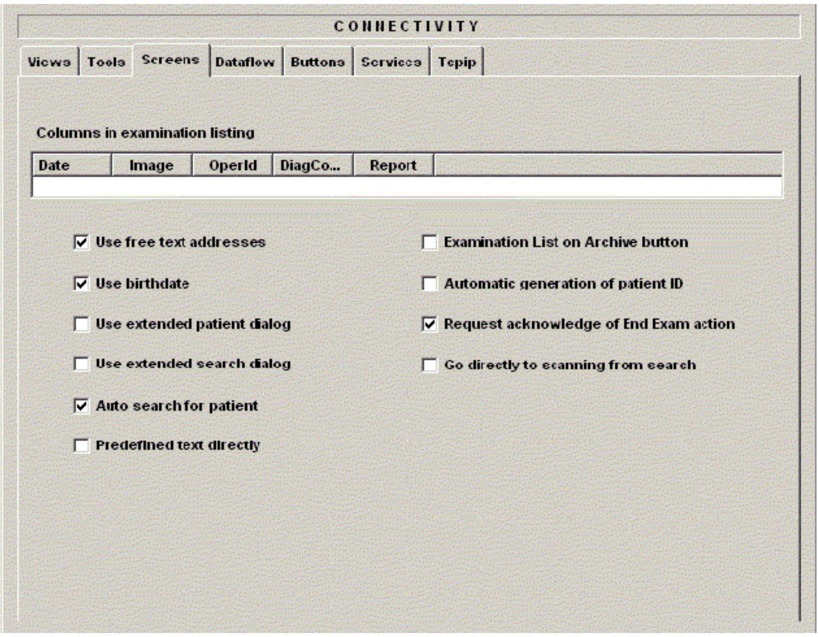
The following table lists dataflows that are pre-configured with the ultrasound system.

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.



Columns in examination listing

Date	Image	OperId	DiagCo...	Report

☑ Use free text addresses

☑ Use birthdate

☐ Use extended patient dialog

☐ Use extended search dialog

☑ Auto search for patient

☐ Predefined text directly

☐ Examination List on Archive button

☐ Automatic generation of patient ID

☑ Request acknowledge of End Exam action

☐ Go directly to scanning from search

Figure 16-70. 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.

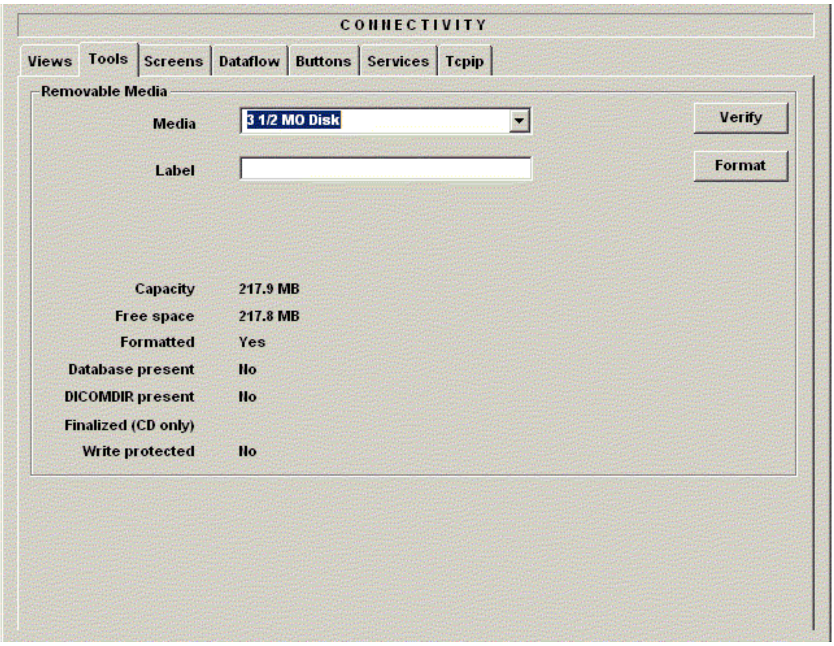
1. Move the **Trackball** to highlight a column.
2. Press **Set.**

   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)


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Removable Media
Verify
Format

Media: 3 1/2 MO Disk

Label:

Capacity: 217.9 MB

Free space: 217.8 MB

Formatted: Yes

Database present: No

DICOMDIR present: No

Finalized (CD only):

Write protected: No

Figure 16-71. 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.

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

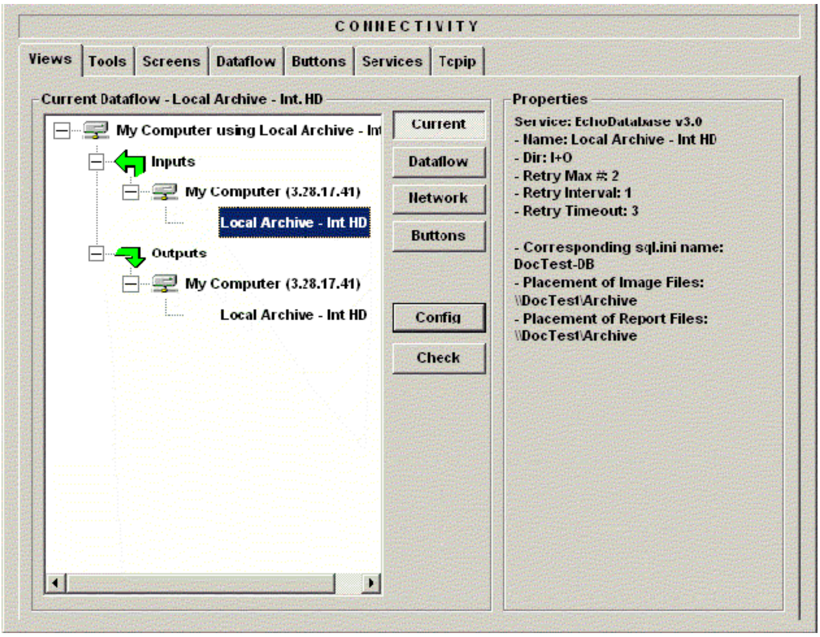
1. Select the removable media from the Media list.
2. Select Verify.

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.


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Current Dataflow - Local Archive - Int. HD
My Computer using Local Archive - Int
Inputs
My Computer (3.28.17.41)
Local Archive - Int HD
Outputs
My Computer (3.28.17.41)
Local Archive - Int HD
Current
Dataflow
Network
Buttons
Config
Check
Properties

Service: EchoDatabase v3.0
- Name: Local Archive - Int HD
- Dir: I+O
- Retry Max #: 2
- Retry Interval: 1
- Retry Timeout: 3

- Corresponding sql.ini name:
DocTest-DB
- Placement of Image Files:
\\DocTest\Archive
- Placement of Report Files:
\\DocTest\Archive

Figure 16-72. 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.

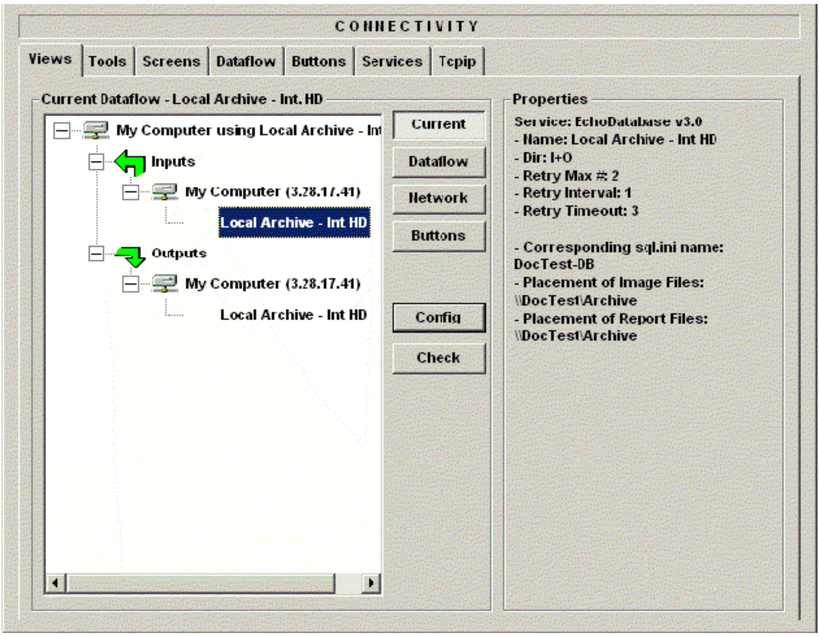
A dataflow is a set of services. When you select one of the configured dataflows, the ultrasound system is automatically set up according to the services associated with the selected dataflow. For information about editing dataflows, See ‘Dataflow’ for more information.

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)


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Current Dataflow - Local Archive - Int. HD
My Computer using Local Archive - Int
Inputs
My Computer (3.28.17.41)
Local Archive - Int HD
Outputs
My Computer (3.28.17.41)
Local Archive - Int HD
Current
Dataflow
Network
Buttons
Config
Check
Properties

Service: EchoDatabase v3.0
- Name: Local Archive - Int HD
- Dir: I+O
- Retry Max #: 2
- Retry Interval: 1
- Retry Timeout: 3

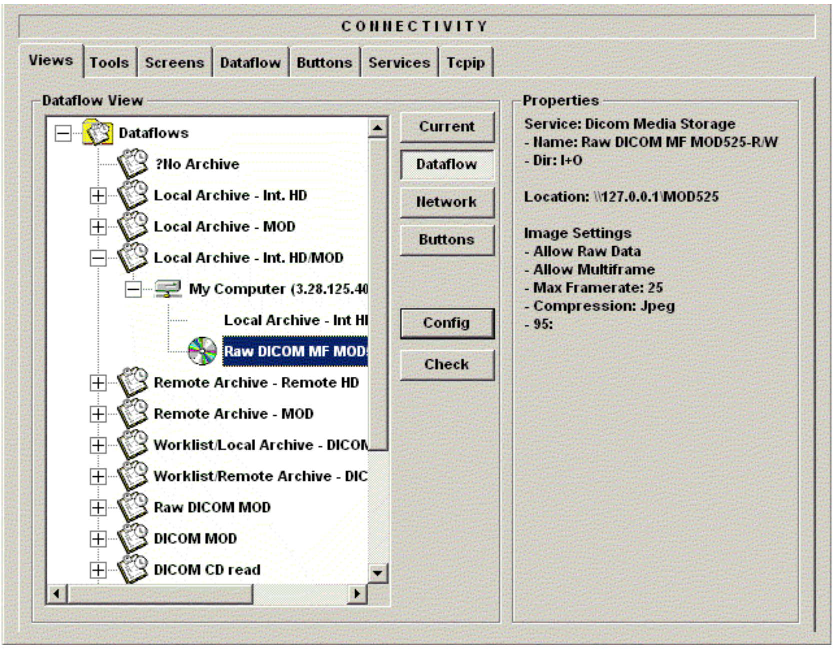
- Corresponding sql.ini name: DocTest-DB
- Placement of Image Files: \\DocTest\Archive
- Placement of Report Files: \\DocTest\Archive

Figure 16-73. 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)


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Dataflow View
Dataflows
?No Archive
Local Archive - Int. HD
Local Archive - MOD
Local Archive - Int. HD/MOD
My Computer (3.28.125.40
Local Archive - Int HI
Raw DICOM MF MOD
Remote Archive - Remote HD
Remote Archive - MOD
Worklist/Local Archive - DICOM
Worklist/Remote Archive - DIC
Raw DICOM MOD
DICOM MOD
DICOM CD read
Current
Dataflow
Network
Buttons
Config
Check
Properties

Service: Dicom Media Storage
- Name: Raw DICOM MF MOD525-R/W
- Dir: I+O

Location: \\127.0.0.1\MOD525

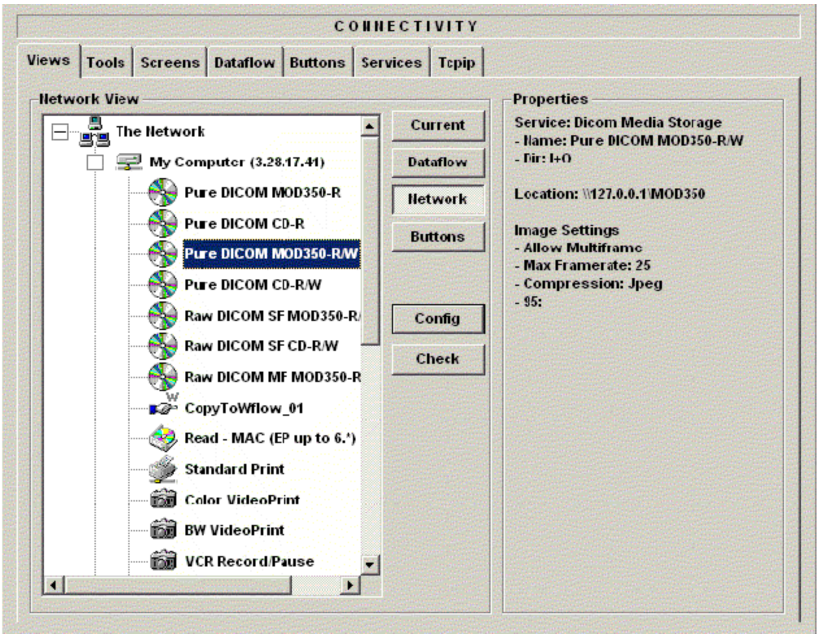
Image Settings
- Allow Raw Data
- Allow Multiframe
- Max Framerate: 25
- Compression: Jpeg
- 95:

Figure 16-74. 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)


CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Network View
Current
Dataflow
Network
Buttons
Config
Check
Properties

The Network
My Computer (3.28.17.41)
Pure DICOM MOD350-R
Pure DICOM CD-R
Pure DICOM MOD350-R/W
Pure DICOM CD-R/W
Raw DICOM SF MOD350-R/
Raw DICOM SF CD-R/W
Raw DICOM MF MOD350-R
CopyToWflow_01
Read - MAC (EP up to 6.')
Standard Print
Color VideoPrint
BW VideoPrint
VCR Record/Pause

Service: Dicom Media Storage
- Name: Pure DICOM MOD350-R/W
- Dir: I+O

Location: \\127.0.0.1\MOD350

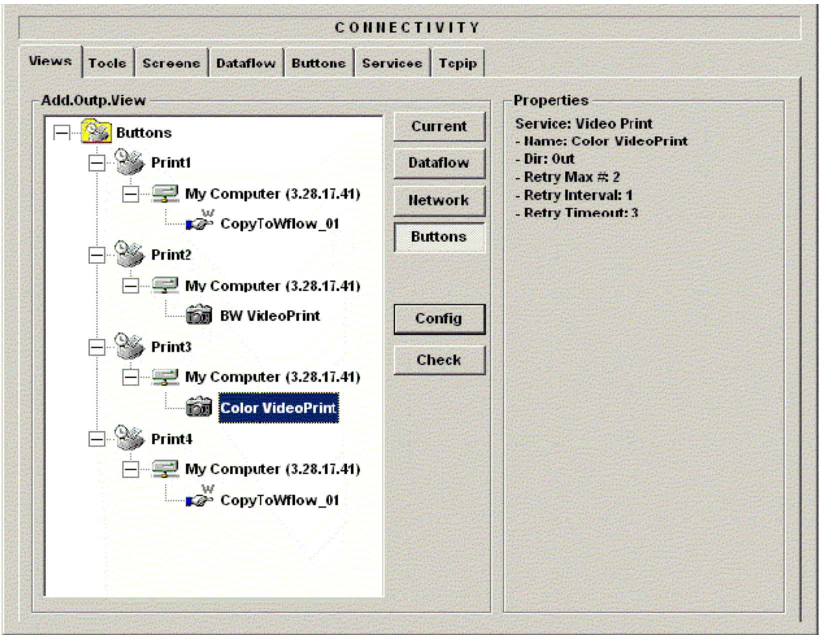
Image Settings
- Allow Multiframe
- Max Framerate: 25
- Compression: Jpeg
- 95:

Figure 16-75. 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)



CONNECTIVITY
Views
Tools
Screens
Dataflow
Buttons
Services
Tcpip
Add.Outp.View
Buttons
Print1
My Computer (3.28.17.41)
CopyToWflow_01
Print2
My Computer (3.28.17.41)
BW VideoPrint
Print3
My Computer (3.28.17.41)
Color VideoPrint
Print4
My Computer (3.28.17.41)
CopyToWflow_01
Current
Dataflow
Network
Buttons
Config
Check
Properties

Service: Video Print
- Name: Color VideoPrint
- Dir: Out
- Retry Max #: 2
- Retry Interval: 1
- Retry Timeout: 3

Figure 16-76. 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.

M and A

Please refer to Chapter 7, General Measurements and Calculations for more information on setting up M&A Presets.

System Administration

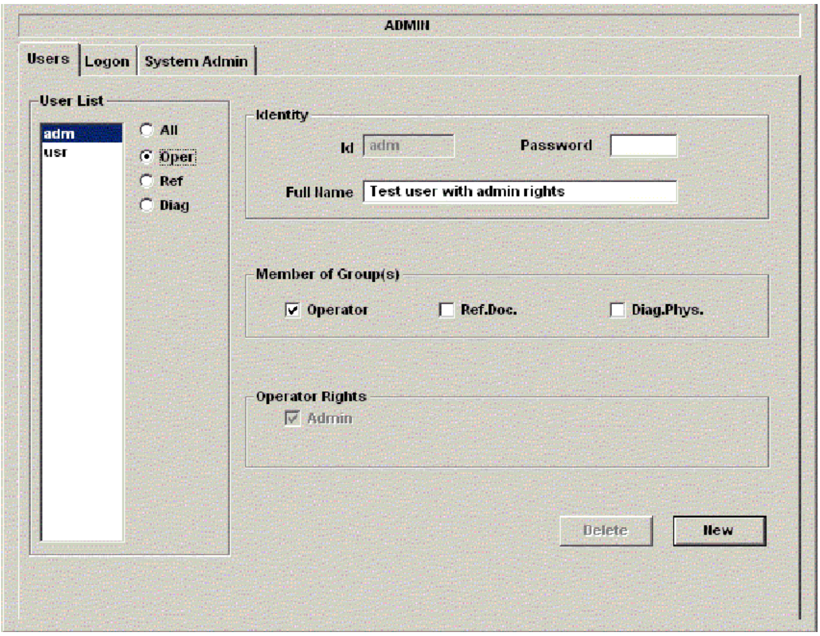
Overview

The Admin screen has the following three 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.

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).


ADMIN
Users
Logon
System Admin
User List
Identity
Password
Member of Group(s)
Operator Rights
Delete
New

User List: adm, usr

○ All
● Oper
○ Ref
○ Diag

Id: adm

Full Name: Test user with admin rights

☑ Operator ☐ Ref.Doc. ☐ Diag.Phys.

☑ Admin

Figure 16-77. Administrative Users 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.

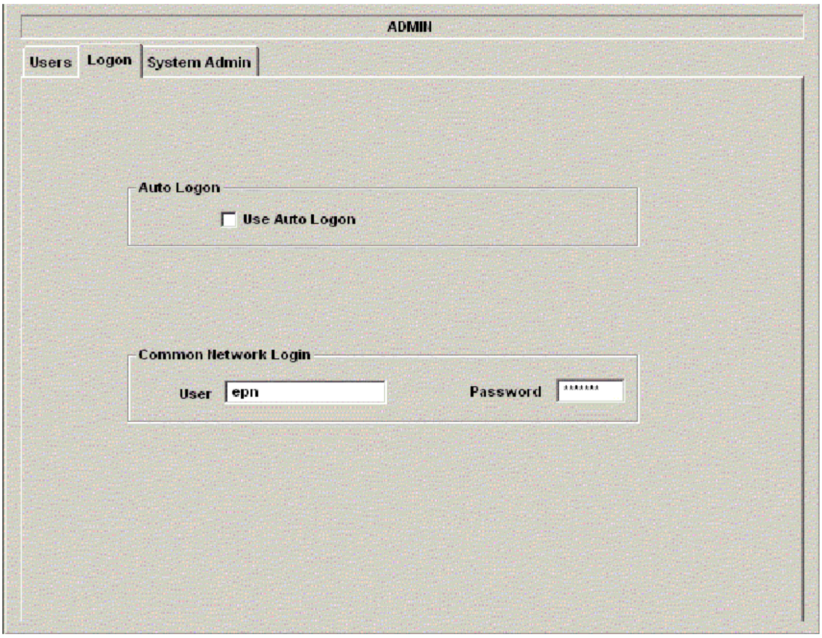
Deleting a user

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.


ADMIN
Users
Logon
System Admin
Auto Logon
☐ Use Auto Logon
Common Network Login

User epn

Password ******

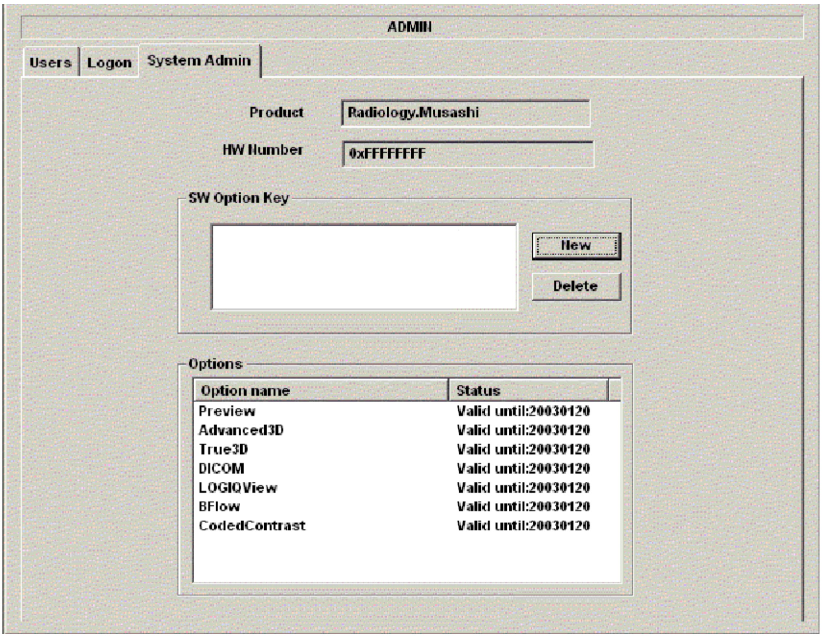
Figure 16-78. Administrative Logon Preset Menu

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

System Admin

The System Admin screen has information about any options implemented for the system.



Product: Radiology.Musashi
HW Number: 0xFFFFFFFF

Option name	Status
Preview	Valid until:20030120
Advanced3D	Valid until:20030120
True3D	Valid until:20030120
DICOM	Valid until:20030120
LOGIQView	Valid until:20030120
BFlow	Valid until:20030120
CodedContrast	Valid until:20030120

Figure 16-79. 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.
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.

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.

Cables have been designed to:

- Connect to system with appropriate cable length
- Stand up to typical wear by cleaning and disinfectant agents, contact with approved gel, etc.

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.

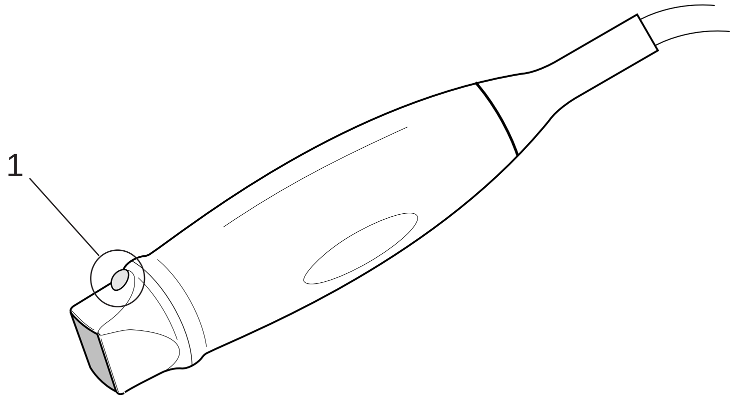


Figure 17-1. Orientation Marking on Probe

1. Orientation Mark

Labeling

Each probe is labeled with the following information:

- Seller's name and manufacturer
- Operating frequency
- 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)

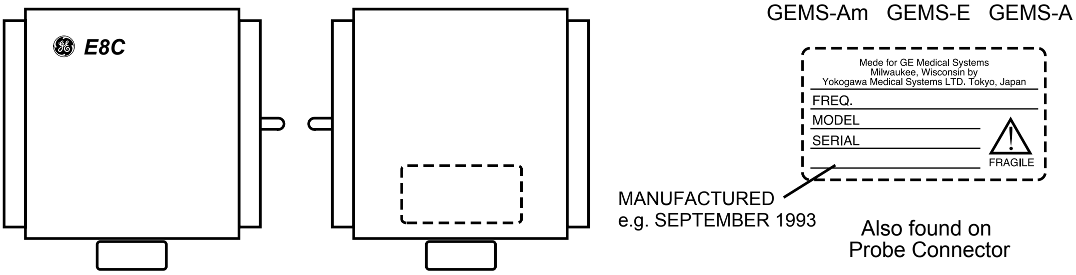

E8C
GEMS-Am GEMS-E GEMS-A
Mede for GE Medical Systems
Milwaukee, Wisconsin by
Yokogawa Medical Systems LTD. Tokyo, Japan
FREQ.
MODEL
SERIAL
FRAGILE
MANUFACTURED
e.g. SEPTEMBER 1993
Also found on
Probe Connector

Figure 17-2. Probe Adapter Label

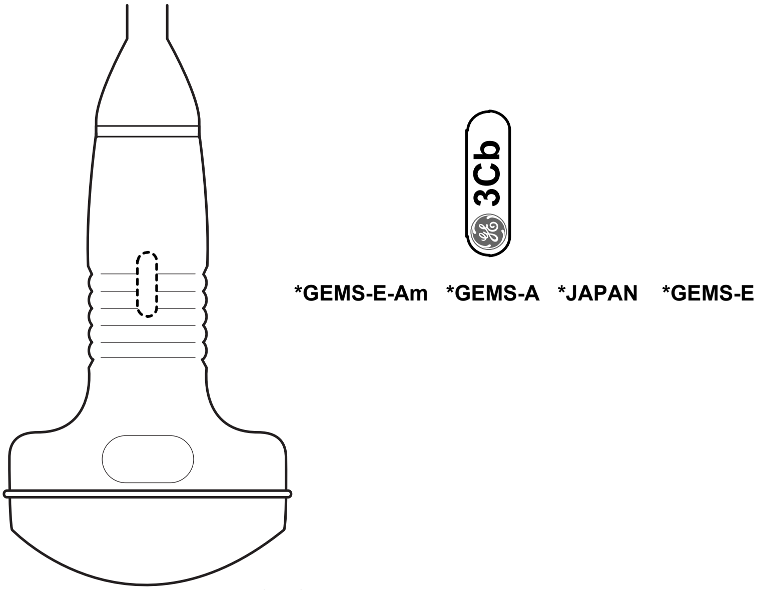

3Cb
*GEMS-E-Am
*GEMS-A
*JAPAN
*GEMS-E

Figure 17-3. Probe Handle Labels

Labeling (continued)

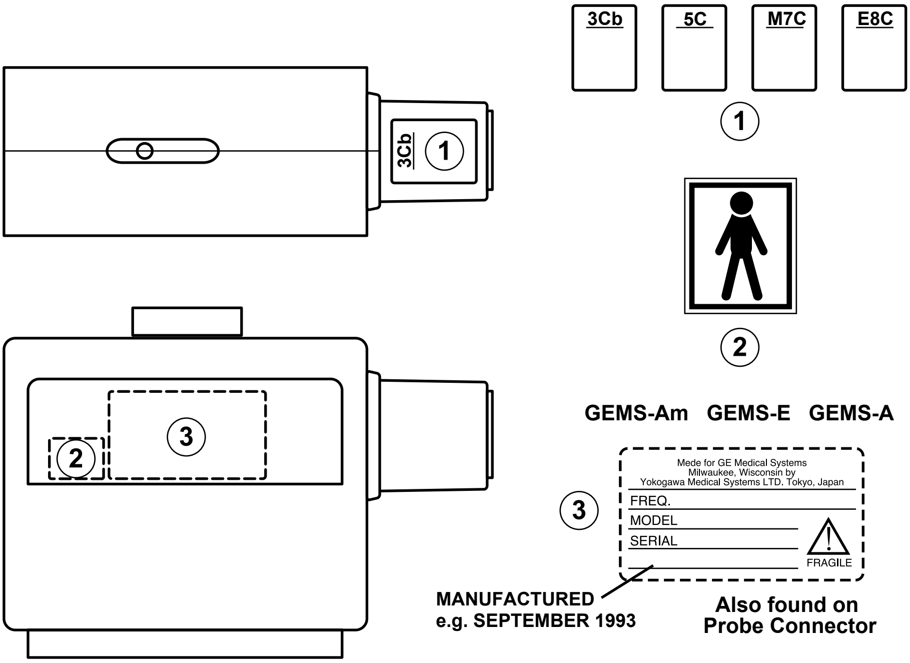
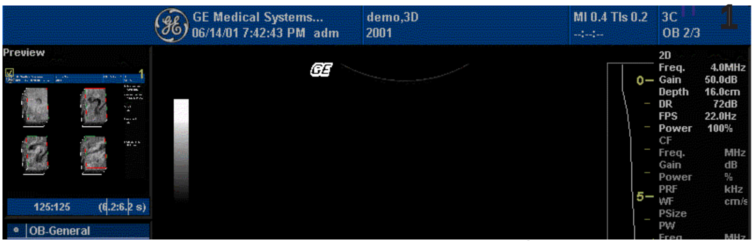

3Cb
5C
M7C
E8C
1
3Cb
1
2
3
2
GEMS-Am GEMS-E GEMS-A
Mede for GE Medical Systems
Milwaukee, Wisconsin by
Yokogawa Medical Systems LTD. Tokyo, Japan
FREQ.
MODEL
SERIAL
FRAGILE
3
MANUFACTURED
e.g. SEPTEMBER 1993
Also found on
Probe Connector

Figure 17-4. Probe Connector Labels



GE Medical Systems...
06/14/01 7:42:43 PM adm
demo,3D
2001
MI 0.4 TIs 0.2
--:--:--
3C
OB 2/3

Preview
125:125 (6.2:6.2 s)
OB-General

2D
Freq. 4.0MHz
Gain 50.0dB
Depth 16.0cm
DR 72dB
FPS 22.0Hz
Power 100%
CF
Freq. MHz
Gain dB
Power %
PRF kHz
WF cm/s
PSize
PW

Figure 17-5. Displayed Probe Information

1. Probe Information Location

LOGIQ 5 Applications

Table 17-1: Probe Indications for Use

Probe Application	3C	3.5C	5C	E8C	7L	10L	12L	3S	8C
Abdomen	X	X	X		X	X		X	X
Small Parts	X	X	X		X	X	X		X
Periph. Vasc.		X	X		X	X			
Obstetrics	X	X	X	X		X			
Gynecology	X	X	X	X		X			
Pediatrics			X		X	X	X		X
Neonatal						X	X		X
Urology	X	X	X	X			X	X	
Surgery							X		
Cardiac									
Endocavity									
Transcranial									
Biopsy	X	X	X	X	X	X		X	

LOGIQ 5 Applications (continued)

Table 17-2: Probe Indications for Use (continued)

Probe Application	P2D	P6D	
Abdomen			
Small Parts			
Periph. Vasc.		X	
Obstetrics			
Gynecology			
Pediatrics			
Neonatal			
Urology			
Surgery			
Cardiac	X		
Endocavity			
Transcranial			
Biopsy			

LOGIQ 5 Features

Table 17-3: Probe Features

Probe Application	3C	3.5C	5C	E8C	7L	10L	12L	3S	8C
Coded Harmonics	X	X			X	X	X	X	X
B-Flow						X			
Coded Contrast		X							
LOGIQ View	X	X	X	X	X	X	X	X	X
Virtual Convex					X	X	X		
Easy 3D	X	X	X	X	X	X	X	X	X
Advanced 3D	X	X	X	X	X	X	X	X	X
Anatomical M	X	X	X	X	X	X	X	X	X
M Color Flow		X						X	X
Tru Access	X	X	X	X	X	X	X	X	X
Biopsy	X	X	X	X	X	X	X		
Non-Imaging CW									

LOGIQ 5 Features (continued)

Table 17-4: Probe Features (continued)

Probe Application	P2D	P6D	
Coded Harmonics			
B-Flow			
Coded Contrast			
LOGIQ View			
Virtual Convex			
Easy 3D			
Advanced 3D			
Anatomical M			
M Color Flow			
Tru Access			
Biopsy			
Non-Imaging CW	X	X	

Specifications

Table 17-5: System Probe Definitions

Probe Designation	Center Image Frequency [MHz]	Doppler Frequency	
		Normal	Penetration
3C	3.8	3.3	2.5
3.5C	3.5	3.3	2.0
5C	5.0	5.0	4.0
E8C	6.5	5.0	4.0
7L	5.0	5.0	4.0
10L	6.5	6.67	5.0
12L	8.8	6.67	5.0
3S	2.0	2.0	1.67
8C	7.0	6.67	5.0

Table 17-6: System Probe Definitions (CW)

Probe Designation	Frequency	
P2D	2 MHz	
P6D	5 MHz	

Probe Usage

For details on connecting, activating, deactivating, disconnecting, transporting and storing the probes, See ‘Probes’ for more information.

Care and Maintenance

Inspecting probes

Perform After Each Use Inspect the probe's lens, cable, and casing. 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 17-7: Probe Environmental Requirements

	Operational	Storage	Transport
Temperature	10° - 40° C 50° - 104° F	-10° - 60° C 14° - 140° F	-40° - 60° C -40° - 140° F
Humidity	30 - 85 % non-condensing	30 - 90% non-condensing	30 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

Probe Safety

Handling precautions

WARNING

Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. DO NOT use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

Electrical shock hazard

Electical 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 17-6. 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.
- Inspect the probe before and after each use for damage or degradation to the housing, strain relief, lens, and seal. A thorough inspection should be conducted during the cleaning process.
- **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.

Special handling instructions

Using protective sheaths

CAUTION

Protective barriers may be required to minimize disease transmission. Probe sheaths are available for use with all clinical situations where infection is a concern. Use of legally marketed, sterile probe sheaths is 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, See ‘Ultrasound Probe and Cord Sheath Sets’ for more information.

CAUTION

Devices containing latex may cause severe allergic reaction in latex sensitive individuals. Refer to FDA's March 29, 1991 Medical Alert on latex products.

CAUTION

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.

CAUTION

DO NOT use an expired probe sheath. Before using probe sheaths, verify whether the term of validity has expired.

E8C Probe Handling Precautions

If the sterilization solution comes out of the E8C probe, please follow the cautions below.

△CAUTION

Sterilant Exposure to Patient (e.g., Cidex)—Contact with a sterilant to the patient's skin or mucous membrane may cause an inflammation. If this happens, refer to the sterilant's instruction manual.

Sterilant Exposure from Probe Handle 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.

E8C Point of Contact—Refer the 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.

CAUTION

Adequate cleaning and disinfection are necessary to prevent disease transmission. It is the responsibility of the equipment user to verify and maintain the effectiveness of the infection control procedures in use. Always use sterile, legally marketed probe sheaths for intra-cavitary and intra-operative procedures.

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)

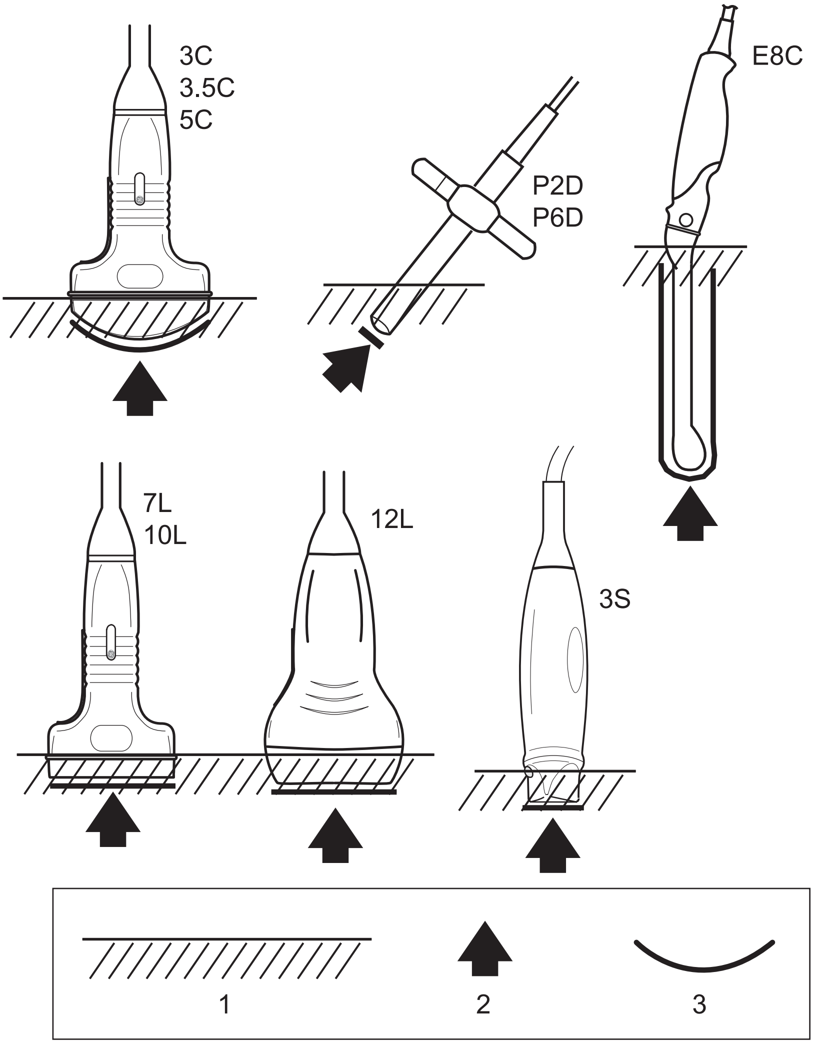

3C
3.5C
5C
P2D
P6D
E8C
7L
10L
12L
3S
1
2
3

Figure 17-6. 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.

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 probe.

Sporox II high level disinfectant has been approved for the 7L, 10L, 12L, 4S, 8C, and E8C probes.

Pera Safe high level disinfectant has been approved for the 7L, 10L, 12L, M7C, M12L, and E8C 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, and E8C probes.

Virex II 256 low level disinfectant has been approved for the 7L, 10L, 12L, M7C, M12L, and E8C probes.

△ CAUTION

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.

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.

CAUTION

CREUTZFIELD-JACOB DISEASE

Neurological use on patients with this disease must be avoided. If a probe becomes contaminated, there is no adequate disinfecting means.

Biological Hazard

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

WARNING 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.

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 17-8: Planned Maintenance Program

Do the Following	Daily	After Each Use	As Necessary
Inspect the Probes	X		
Clean the Probes		X	
Disinfect Probes		X	

Probe Discussion

Introduction

The LOGIQ 5 supports four types of probes:

- **Active Matrix Array (Convex and Linear).** Active Matrix Array probes are usually designated by the prefix/suffix"M".
- **Curved Array (Convex).** Curved Array (Convex) probes, including `micro' convex, are usually designated by the prefix/suffix "C"; the endocavity 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"; the biplane TEE probe is designated by the prefix/suffix "B"; the multi-plane TEE probe is designated by the prefix/suffix "P".
- **Continuous Wave Doppler.** Continuous Wave Doppler probes are designated by the prefix/suffix "CWD".

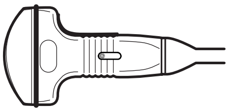
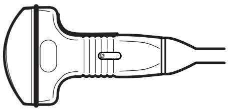
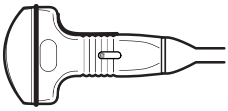
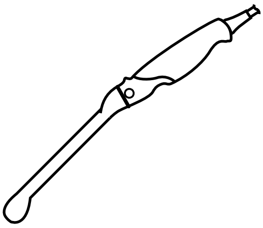
Probe Naming Conventions

Table 17-9: Probe Naming Conventions

The naming conventions to be determined	**TYPE**	
	B	Biplane TEE
	C	Convex
	CWD	Pencil CWD
	E	Endo (TR/TV)
	I	I-sharped intra-operative
	L	Linear
	M	Acvtive Matrix Array
	P	Multiplane TEE
	S	Sector
	T	T-shaped intra-Operative

LOGIQ 5 Convex Probes

Table 17-10: Curved Array (Convex) Probes

Probe	Intended Uses	Capabilities and Features	Illustration
3C	• General Purpose	• Wide field of view • Penetration • Good image uniformity • CFM/Doppler detectability • Biopsy capability • Contrast imaging capability	
3.5C	• Abdominal • OB/GYN	• Wide field of view • Small footprint • Biopsy capability	
5C	• General Purpose • Abdominal • OB/GYN	• Wide field of view • Small footprint • CFM/Doppler detectability • Biopsy capability	
8C	• Pediatrics • Neonatal	• Wide field of view • Small footprint	
E8C	• Transvaginal • Transrectal	• Wide field of view • Small headshell and probe shaft • CFM/Doppler sensitivity • Biopsy capability	

LOGIQ 5 Linear Probes

Table 17-11: Active Matrix Array (Linear) Probes

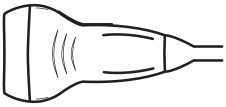
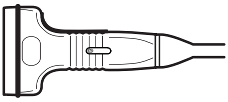
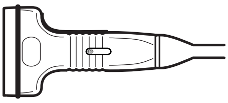
Probe	Intended Uses	Capabilities and Features	Illustration
12L	• Small Parts • Peripheral Vascular • Pediatrics • Neonatal • Surgery	• Excellent near and far field resolution • Improved contrast resolution • Improved penetration • Biopsy capability	

Table 17-12: Linear Array Probes

Probe	Intended Uses	Capabilities and Features	Illustration
7L	• Small Parts • Peripheral Vascular	• Wide field of view • Slant scan • Wideband for B-Mode resolution & homogenity • CFM Doppler sensitivity • Biopsy capability	
10L	• Small Parts • Peripheral Vascular	• Wide field of view • Slant scan • Wideband for B-Mode resolution & homogenity • CFM Doppler sensitivity • Biopsy capability	

LOGIQ 5 Sector Probes

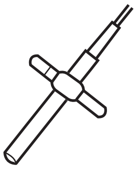
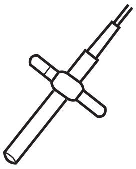
Table 17-13: Sector Probes

Probe	Intended Uses	Capabilities and Features	Illustration
3S	• Cardiology • Transcranial • Abdomen	• Small footprint • Dedicated handle design for Transcranial • Wideband for B-Mode resolution and homogenity • CFM Doppler sensitivity	

Some versions of the sector probe have an LED which is not activated with the LOGIQ 5.

CW Probes

Table 17-14: CW Probes

Probe	Intended Uses	Capabilities and Features	Illustration
P2D	CW Doppler for Cardiology and Abdomen.	• High sensitivity • T-bar support for holding • Ergonomics for scanning and cleaning	
P6D	CW Doppler for Peripheral Vascular	• High sensitivity • T-bar support for holding • Ergonomics for scanning and cleaning	

Biopsy Special Concerns

Precautions Concerning the Use of Biopsy Procedures

WARNING

Do not freeze the image during a biopsy procedure. The image must be live to avoid a positioning error.

Biopsy guidezones are intended to assist the user in determining optimal probe placement and approximate the needle path. However, actual needle movement is likely to deviate from the guideline. Always monitor the relative positions of the biopsy needle and the subject mass during the procedure.

CAUTION

The use of biopsy devices and accessories that have not been evaluated for use with this equipment may not be compatible and could result in injury.

CAUTION

The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure prior to use.

- Follow the probe cleaning and disinfection procedures and precautions to properly prepare the probe.
- Follow the manufacturer's instructions for the 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.

CAUTION

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’ for more information.

Preparing for a Biopsy

Displaying the Guidezone

Activate the Biopsy Kit by selecting it from the B-Mode Touch Panel Menu.

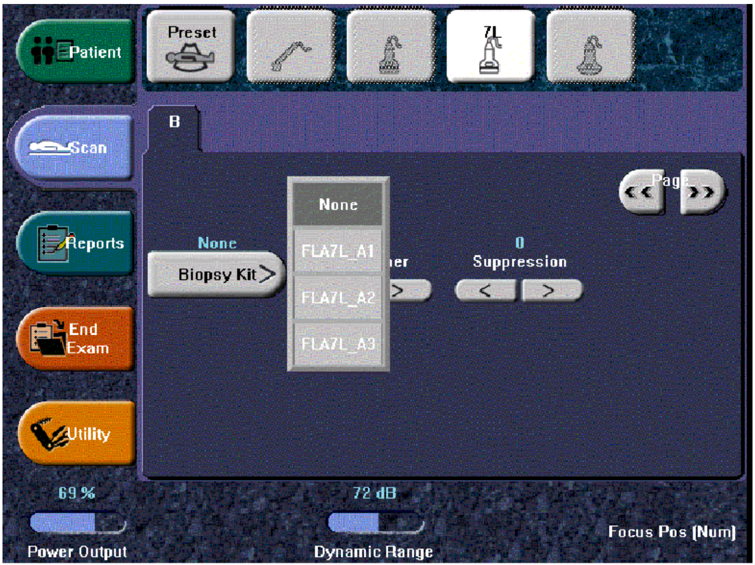
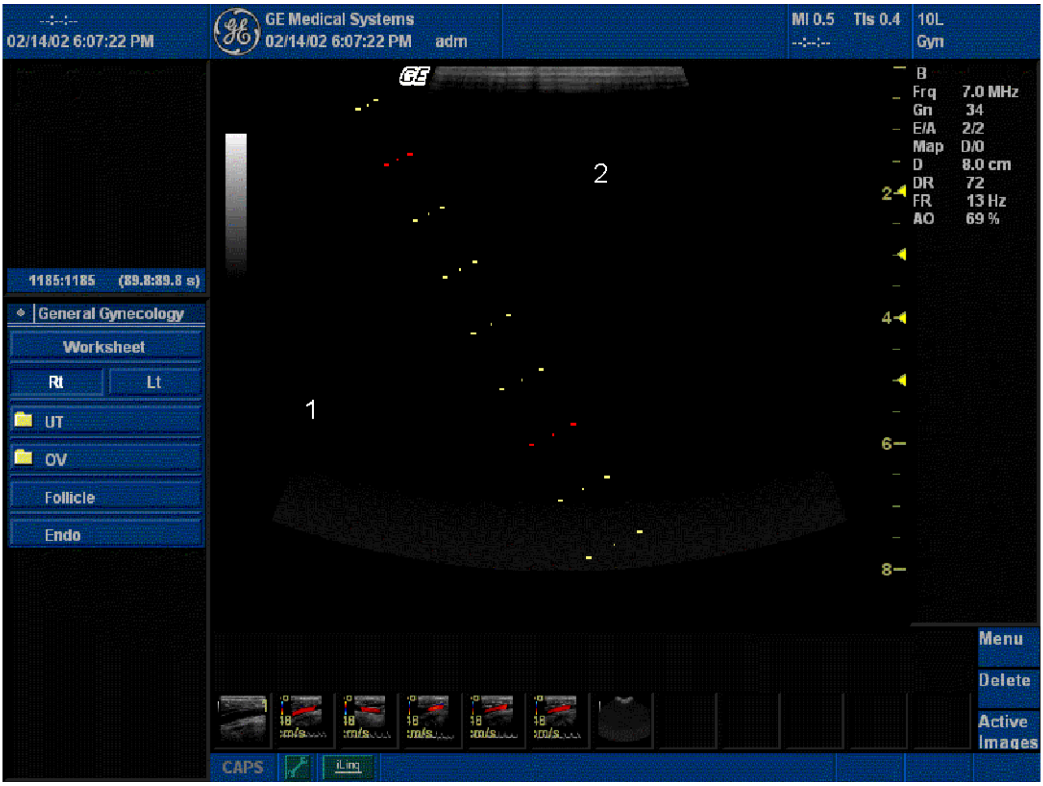

Patient
Preset
7L
Scan
B
Page
Reports
None
Biopsy Kit
None
FLA7L_A1
FLA7L_A2
FLA7L_A3
0
Suppression
End Exam
Utility
69 %
Power Output
72 dB
Dynamic Range
Focus Pos (Num)

Figure 17-7. B-Mode Touch Panel Menu

The available biopsy options appear when Biopsy Kit is selected. There are fixed and adjustable angle biopsy kits available with the LOGIQ 5 depending on the probe. Select the desired biopsy kit.

Displaying the Guidezone (continued)



02/14/02 6:07:22 PM

GE Medical Systems 02/14/02 6:07:22 PM adm

MI 0.5 TIs 0.4

10L Gyn

B
Frq 7.0 MHz
Gn 34
E/A 2/2
Map D/0
D 8.0 cm
DR 72
FR 13 Hz
AO 69 %

1185:1185 (89.8:89.8 s)

General Gynecology
Worksheet
Rt
Lt
UT
OV
Follicle
Endo
1
2
2
4
6
8
Menu
Delete
Active Images
CAPS
iLinq

Figure 17-8. Biopsy Guidezones for the 10L Probe

1. 1 cm increments
2. 5 cm increments

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 17-15: LOGIQ 5 Biopsy Guide Availability

	Fixed Angle	**Multi-Angle**		
Probe		**MBX1**	**MBX2**	**MBX3**
3C		4.0	6.0	8.0
3.5C	7.0			
5C	7.0	4.0	5.5	7.0
E8C	5.0			
7L	4.0	4.0	5.5	7.0
10L	2.0	2.0	4.0	6.0
12L		1.5	2.5	3.5

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.

⚠ CAUTION Please refer to the manufacturer's instructions included in the biopsy kit.

Fixed Needle Guide Assembly

Identify the appropriate biopsy guide bracket by matching the label on the bracket with the probe to be used.

Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

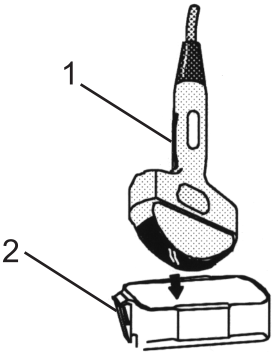


Figure 17-9. Probe/Bracket Alignment

1. Probe Orientation Mark
2. Bracket

Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.

Place an adequate amount of coupling gel on the face of the probe.

Place the proper sanitary sheath over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

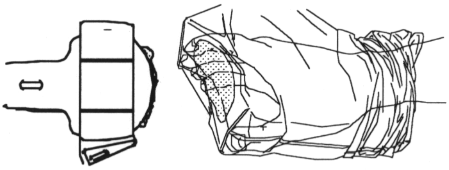


Figure 17-10. Applying Sanitary Sheath

Fixed Needle Guide Assembly (continued)

Snap the fixed or adjustable needle clip onto the biopsy guide bracket.

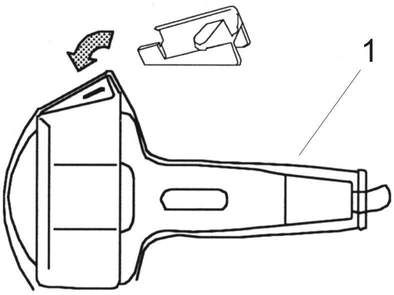


Figure 17-11. Fixed Needle Clip Attachment

1. Sheath

Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

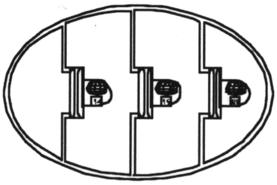


Figure 17-12. Needle Barrels

Fixed Needle Guide Assembly (continued)

Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

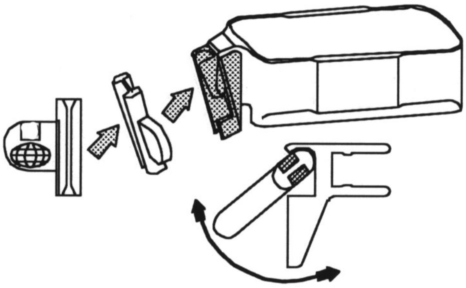


Figure 17-13. Needle Barrel Installation

CAUTION

Ensure that all guide parts are seated properly prior to perfoming a biopsy.

Multi-Angle Biopsy Guide Assembly

WARNING DO NOT attempt to use the multi-angle 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.

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.

Identify the appropriate biopsy guide bracket by matching the label on the bracket with the probe to be used.

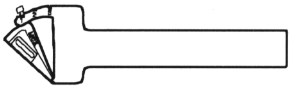


Figure 17-14. 3cb Multi-Angle Biopsy Guide Bracket

Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

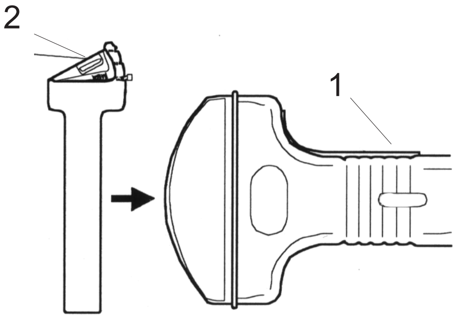


Figure 17-15. Probe/Bracket Alignment

1. Probe Orientation Mark
2. Bracket

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)

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.

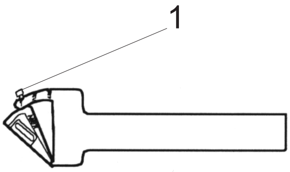


Figure 17-16. Select the angle position

1. Pull up

Push the knob down into the desired slot to secure the angle position of the needle guide attachment.

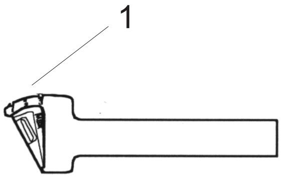


Figure 17-17. Fix the angle position

1. 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)

Place an adequate amount of coupling gel on the face of the probe.

Place the proper sanitary sheath tightly over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

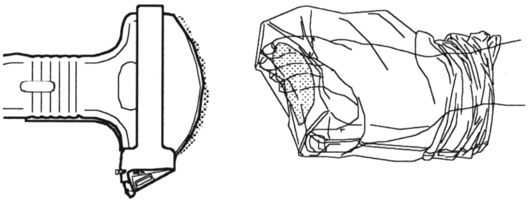


Figure 17-18. Applying Sanitary Sheath

Snap the needle clip onto the biopsy guide bracket.

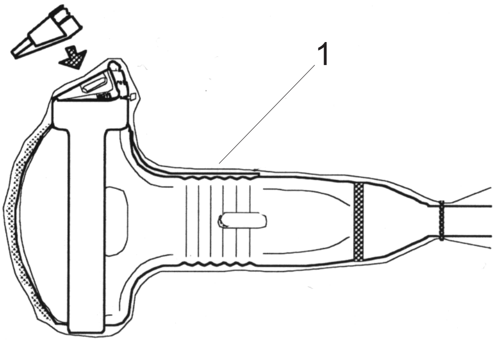


Figure 17-19. Fixing the Needle Clip Attachment

1. Sheath

Push the locking mechanism towards the bracket to secure the lock. Make sure the needle guide is firmly attached to the bracket.

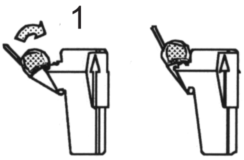


Figure 17-20. Locking the Needle Clip

Multi-Angle Biopsy Guide Assembly (continued)

Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

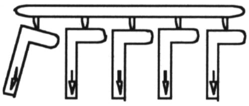


Figure 17-21. Needle Barrel Selection

Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

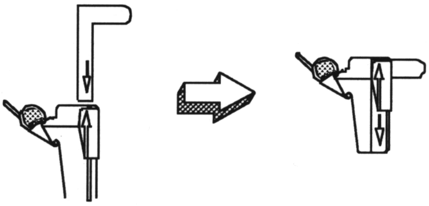


Figure 17-22. Needle Barrel Installation

CAUTION

Ensure that all guide parts are seated properly prior to perfoming a biopsy.

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.
- 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 Touch Panel. When using multi-angle guides, ensure that the proper guidezone angle is displayed.

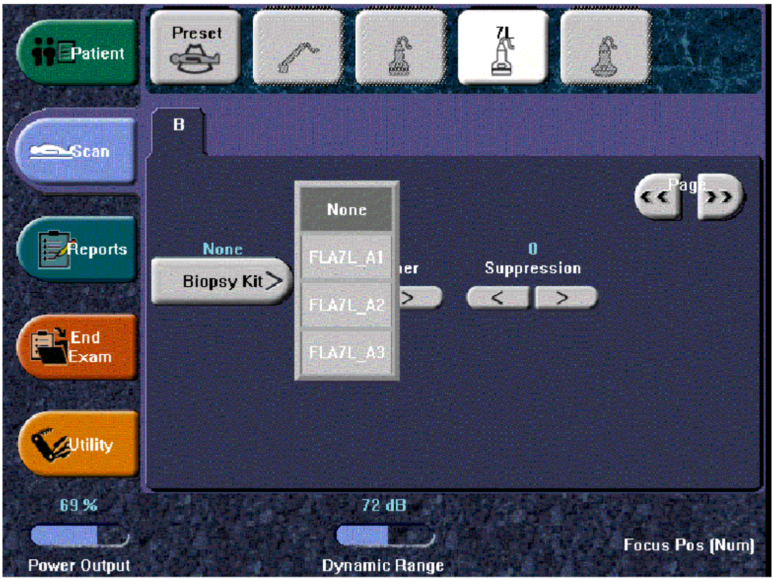

Patient
Preset
7L
Scan
B
Reports
End Exam
Utility
Page
None
Biopsy Kit
None
FLA7L_A1
FLA7L_A2
FLA7L_A3
0
Suppression
69 %
Power Output
72 dB
Dynamic Range
Focus Pos (Num)

Figure 17-23. B-Mode Touch Panel

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.

The biopsy bracket can be sterilized in a recommended disinfecting agent and reused.

E8C Probe Biopsy Guide

When the E8C probe is attached and active, the needle guide type is the TR5° (Civco disposable guide with a 5° offset angle).

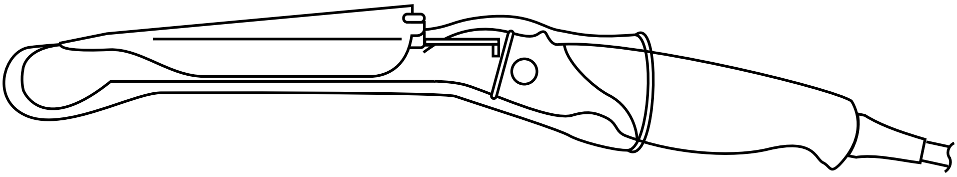


Figure 17-24. TR5° Biopsy Guide

Preparation

To prepare the E8C 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.

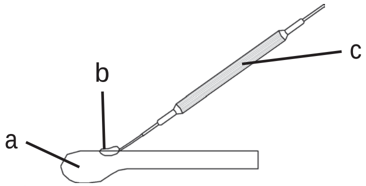


Figure 17-25. Attachment Filling Removal

   a. Probe Head
   b. Attachment
   c. Filling Removal Tool

3. Clean, then disinfect the probe.

NOTE: *Ensure that protective gloves are worn.*

Preparation (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.

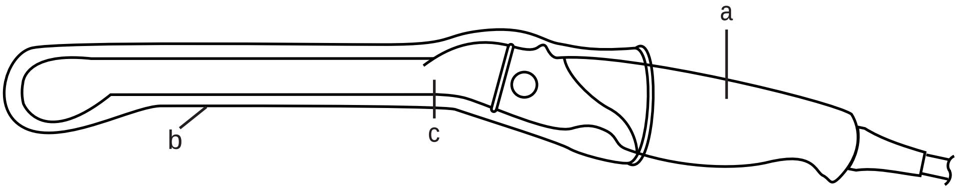


Figure 17-26. Probe with Sheath

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.

Preparation (continued)

7. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.

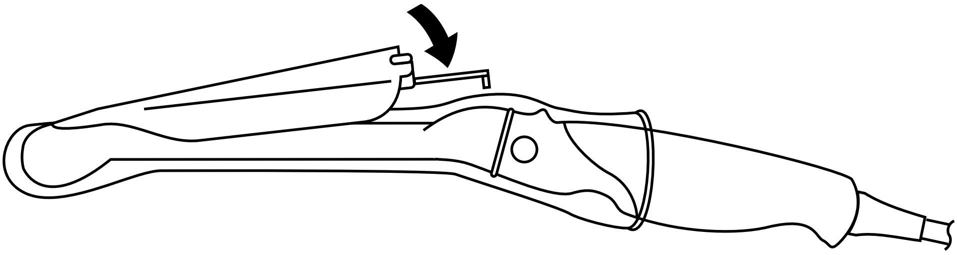


Figure 17-27. Civco Disposable Biopsy Guide 5° Angle

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.

Chapter 18

User Maintenance

This chapter supplies system data, assistance information, and system care and maintenance instructions.

System Data

LOGIQ 5 Features/Specifications

Table 18-1: Physical Attributes

Physical Attributes	
Dimensions and Weight • Height: Minimum 1350 mm (53 in). Maximum 1450 mm (56 in) • Width: 520 mm (20 in) • Depth: 990 mm (39 in) • Weight: approx. 180 kg (397 lb.) Keyboard • Keyboard width: 520 mm • Keyboard Height: 900 mm, adjustable • Full alphanumeric keyboard • Ergonomic hard key operations • Interactive Back-Lighting • Task lighting • 6.4” LCD touch panel • Integrated recording keys for remote control • User Define, User Programmable Keys Electrical Power • Voltage:100-120 Vac or 220-240 Vac • Frequency: 50/60 Hz • Power: Max. 1250 VA with built-in and on-board peripherals	Console Design • 3 Active Probe Ports • Probe connection area designed to allow free movement of legs • KBD/Monitor up-down mechanism (100mm adjustable in height) • On-board storage for peripherals: Black/white printer, color printer, VCR. • Rear Storage Cover for Peripheral Connectors and Cables • Probe Holder, removable for cleaning and washing • Gel Holder, removable for cleaning and washing • Wheels. Wheel diameter: 150 mm. Rotating flexible wheels with protective cover. Locking Mechanism for wheels. Monitor • Single 17 High-Resolution monitor Non Interlace Scan • SVGA Formats (800x600) • Tilt/Rotate Adjustable Monitor: Tilt Angle: Up 15°, Down 10°. Rotate Angle: + 90°.

LOGIQ 5 Features/Specifications (continued)

Table 18-2: System Overview

Applications

- Abdominal
- Obstetrical
- Gynecological
- Cardiac
- Musculoskeletal
- Vascular
- Urological
- Small parts and Superficial
- Breast
- Pediatric and Neonatal
- Orthopedic
- Intraoperative
- Transcranial

Scanning Methods

- Electronic Sector
- Electronic Convex
- Electronic Linear
- Steered Linear

Operating Modes

- B-Mode
- M-Mode
- M Color Flow Mode
- PW Doppler
- High PRF Doppler
- Color Flow Doppler (CFM)
- Power Doppler Imaging (PDI)

Display Modes

- Simultaneous Capability [B/D; B/CFM (PDI); B/M; B + CFM/M; Realtime Triplex Mode (B + CFM (PDI)/D); Dual B (B/B); B(b/w)/B + CFM (PDI)]
- Selectable alternating Modes [B/M; B/D; B + CFM (PDI)/M; B + CFM (PDI)/D; 3D-Mode (optional); 3D-Color Mode (optional)
- Colorized Image - Colorized B - Colorized M - Colorized D
- Time line Display [Independent Dual B/D Display; 2 Display Formats; Top/Bottom or Side/Side selectable Format; Size: Vertical 1/3, 1/2, 2/3 Horizontal 1/4, /12 after freeze; 2 Time line Methods: Scrolling or Moving Bar
- Virtual Convex
- Quad Screen Display

Transducer Types

- Sector Phased Array
- Convex Array
- Linear Array
- Pencil probe
- Active Matrix Array

Standard Features

- Standard CINE Memory
- Realtime Triplex Mode at any depth and any PRF
- Automatic Optimization (Auto Tissue Optimization, Auto Spectrum Optimization, Auto Color Optimization)
- ACE
- Virtual Convex
- Built-in patient archive with images, patient information
- Auto Doppler Calculation
- Vascular Calcs
- Cardiac Calcs
- OB Calcs
- Fetal Trending
- Multi gestational Calcs
- Gynecological Calcs
- Urological Calcs
- Renal Calcs
- Task Lamp

Options

- Additional probe port
- DICOM
- Physio Input Panel for ECG, PCG, Aux
- Footswitch
- Insite capability

Peripheral Standard

- CD-RW

Peripheral Options

- B/W Printer
- Color Printer
- S-VHS Video Cassette Recorder
- MO Drive

LOGIQ 5 Features/Specifications (continued)

Table 18-3: System Parameters

Post-Processing

- B/M-Mode (Grey Map; Rejection; Colorized B and M; Frame Averaging)
- D-Mode (Grey Map; Rejection; Colorized D)
- Color Flow (Color Map; CFM Display Threshold)

Pre-Processing

- B/M-Mode (Gain; TGC; Dynamic Range; Transmission Focus Position; Transmission Focus Number; Transmission Frequency; Edge Enhancement; Frame Rate Control; 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; Frame Rate Control; 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°, 180°
- Imaging Depth: 0-30cm [Minimum: 0-1 cm (Zoom); Maximum: 0-30 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 (Acoustic Write Zoom):
- Reference Image for Smart Zoom
- Read Zoom (available in B/ M and CFM)

Physiological Input Panel (Option)

- Physiological Input (ECG, 1 channel; PCG, 1 channel; AUX, 2 channel)
- Dual R-Trigger
- Reference Scan: Simultaneous Display of Active Image and Trigger Update Image
- Presetable ECG R Delay Time
- Presetable ECG Position
- Adjustable ECG Gain Control
- Presetable PCG Position
- Adjustable PCG Gain Control
- Presetable AUX Gain Control
- Adjustable AUX Gain Control
- Automatic Heart Rate Display

Image Archive

- Archiving Format: DICOM
- Possibly exported to other format

CINE Memory/Image Memory

- Dual Image CINE Display
- CINE Gauge and CINE Image number display
- CINE Review Loop
- Selectable CINE Sequence for CINE Review (by Start Frame and End Frame)
- Side Change in dual CINE Mode
- Measurements/Calculations & Annotations on CINE & VCR Playback Images

LOGIQ 5 Features/Specifications (continued)

Table 18-4: Measurements and Calculations

B-Mode • Distance • Circumference/ Area • 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

LOGIQ 5 Features/Specifications (continued)

Table 18-5: Probes

• 3C Convex Probe (Applications: Abdomen, OB/GYN, Urology) • 3.5C Convex Probe (Applications: Abdomen, OB/GYN, Urology) • 5C Convex Probe(Applications: Abdomen, OB/GYN, Urology) • E8C Micro Convex Endocavity -Probe (Applications: Transvaginal, Transrectal, Obstetrics, Gynecology, Urology) • 3S Phased Array Sector Probe (Applications: Cardiac, Transcranial)	• 7L Linear Probe (Applications: Vascular, Pediatrics, Small Parts) • 10L Linear Probe (Applications: Vascular, Small Parts, Musculoskeletal, Mammasonography) • 12L Linear AMA Probe (Applications: Vascular, Neonatal, Pediatrics, Small Parts) • 8C MicroConvex Probe (Application: Pediatrics, Neonatal) • P2D Pencil Probe (Applications: Cardiac) • P6D Pencil Probe (Applications: Vascular)

Table 18-6: Inputs and Outputs Signal

• Video In (Composite Color; S-Video) • Video Out (RGB; SVGA; Composite Color; Composite b/w; S-Video • Audio Stereo Out	• Audio Stereo In • Connectors [Remote for black/white Printer (2); Remote for color printer or camera; Footswitch; USB, RS232C; Ethernet; Insite-Connection; Power by peripherals (5)]

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.

CAUTION

Diagnostic errors may result from the inappropriate use of clinical calculations. Review the referenced source of the stated formula or method to become familiar with the intended uses and possible limitations of the calculation.

Calculation formulas and databases are provided as a tool to assist the user, but should not be considered an undisputed database, in making a clinical diagnosis. The user is encouraged to research the literature and judge the equipment capabilities on an ongoing basis in order to assess its utility as a clinical tool.

System Care and Maintenance

Overview

Refer to Section 10 of the LOGIQ 5 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.

CAUTION

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.

Biological Hazard

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:

- Monitor
- Operator control panel
- Footswitch
- Video Cassette Recorder (VCR)
- Video Page 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’ for more information.

System Cabinet

To clean the system cabinet:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
2. Moisten a soft, non-abrasive folded cloth.
3. Wipe down the top, front, back, and both sides of the system cabinet.

NOTE: *Do not spray any liquid directly into the unit.*

Monitor

To clean the monitor face:

Use a soft, folded cloth and a glass cleaner solution. Apply the glass cleaner to the 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). Prolonged use of such cleaners will damage the filter (anti-glare shield). Hard rubbing will also damage the filter.

NOTE: *When cleaning the monitor, make sure not to scratch the monitor.*

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.*

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.

VCR

To clean the VCR:

1. Turn off the VCR power. If possible, disconnect the power cord.
2. Wipe the external surfaces of the unit with a soft, clean, dry cloth.

NOTE: *Do not use a wet cloth or any cleaning fluid because it may enter and damage the unit.*

1. Clean the record and playback heads with a soft, non-abrasive cleaning system, according to the manufacturer's instructions.

For more information, see the VCR's Operator Manual.

Discs

To clean the discs:

- If the disc is dirty, you can clean it with a commercially available dust removal spray. Be careful not to scratch the disc when wiping it off.

NOTE: *CD type cleaner cannot be used.*

HINTS Keeping your CD-R/RW disc in an original CD-R/RW case or caddy all the time will prevent it from becoming dirty or damaged.

Trackball

1. Power off the system.
2. Place your fingers onto the notches of the Trackball retainer ring.
3. Rotate the retainer ring counterclockwise until it can be removed from the keyboard.

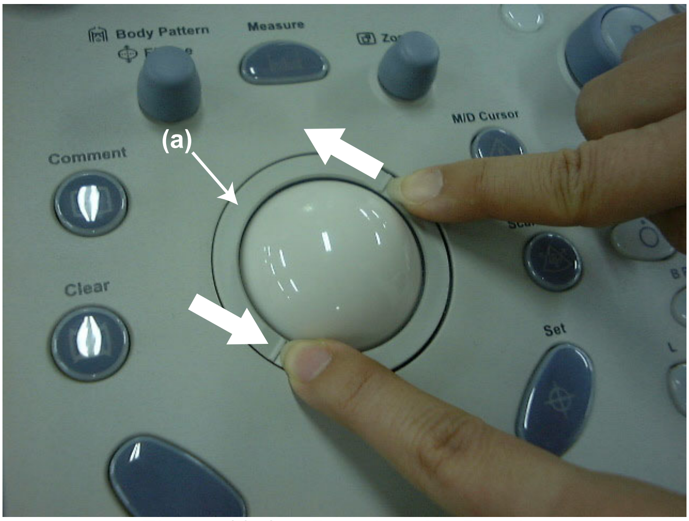


Figure 18-1. Rotating the Retainer Ring

a. Retainer Ring

Trackball (continued)

4. Lift off the inner retainer and Trackball from the keyboard.

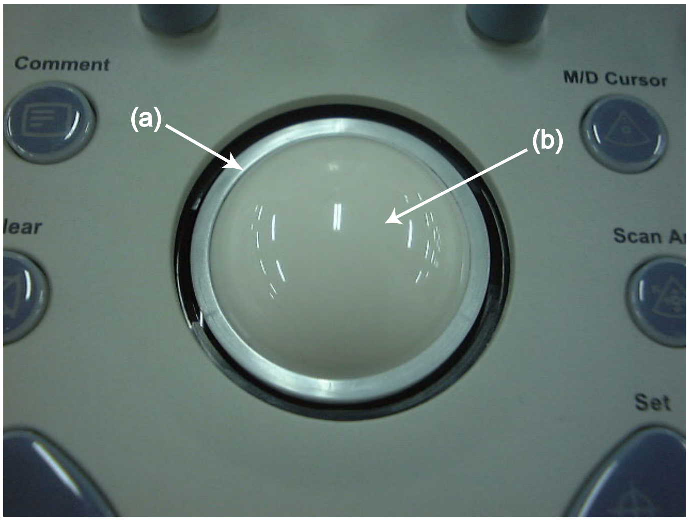


Figure 18-2. Removing Inner Retainer and Trackball

a. Inner Retainer
b. Trackball

5. Wipe off any oil or dust from the Trackball using a cleaner or dry cloth.
6. Wipe off any oil or dust from the Trackball housing using a cleaner or cotton swab.

⚠ CAUTION

When cleaning the Trackball housing, make sure not to spill or spray any liquid into the Trackball housing (Keyboard or system). Use either ethanol, isopropyl alcohol or VCR head cleaner to clean the Trackball assembly. Avoid other solvents that may damage the mechanical parts of the Trackball assembly.

Trackball (continued)

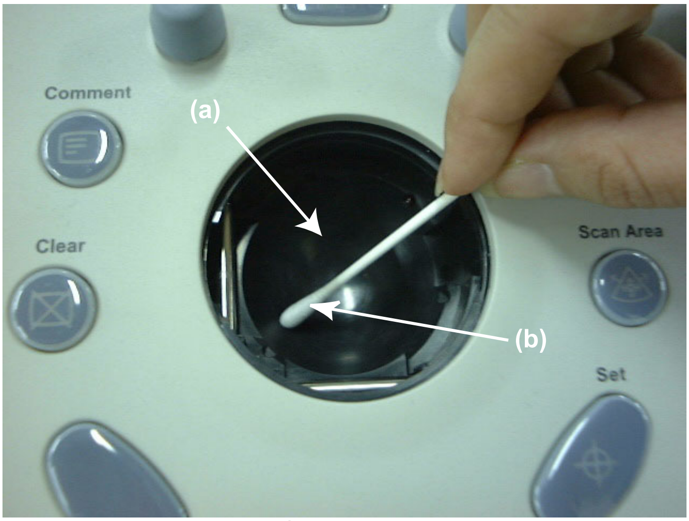

Comment
Clear
Scan Area
Set
(a)
(b)

Figure 18-3. Cleaning Trackball and Housing

a. Trackball Housing
b. Cotton Swab

Trackball (continued)

7. Wipe off any oil or dust from the two rollers using a cleaner or cotton swab.

CAUTION

When cleaning the roller, make sure not to spill or spray any liquid into the Trackball housing (keyboard or system). Use either ethanol, isopropyl alcohol or VCR head cleaner to clean the Trackball assembly. Avoid other solvents that may damage the mechanical parts of the Trackball assembly.

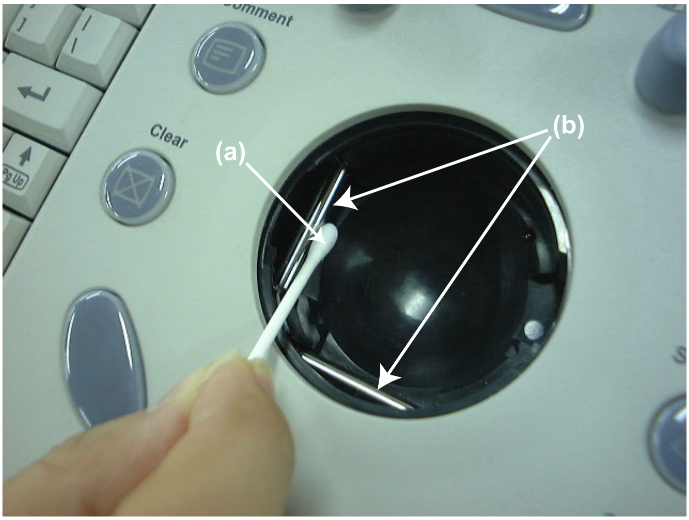


Figure 18-4. Cleaning Rollers

a. Cotton Swab
b. Rollers

Trackball (continued)

8. Insert the Trackball into the housing.
9. Place the Trackball and inner retainer into the housing with its stopper facing down. Lift off the inner retainer and Trackball from the keyboard.

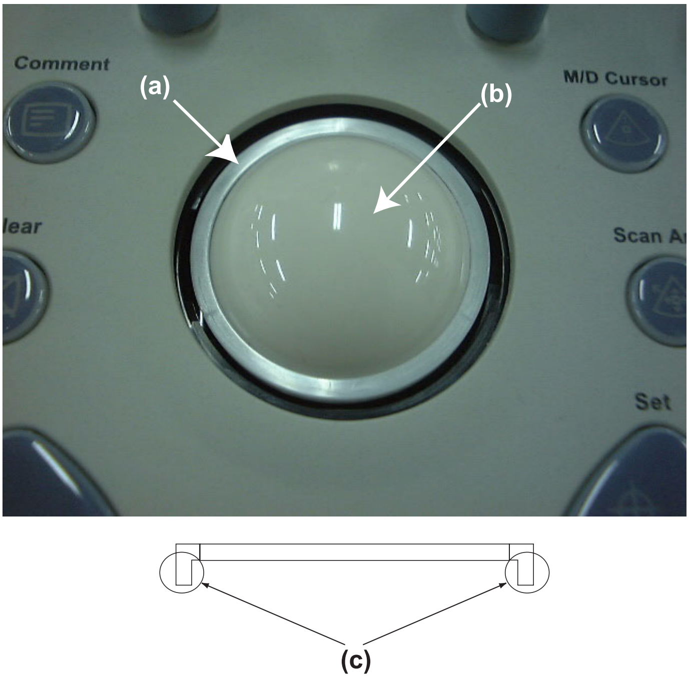


Figure 18-5. Set Inner Retainer and Trackball

a. Inner Retainer
b. Trackball
c. Stopper

Trackball (continued)

10. Install the Trackball retainer ring onto the inner retainer, then rotate it clockwise until its notches are set in the horizontal position.

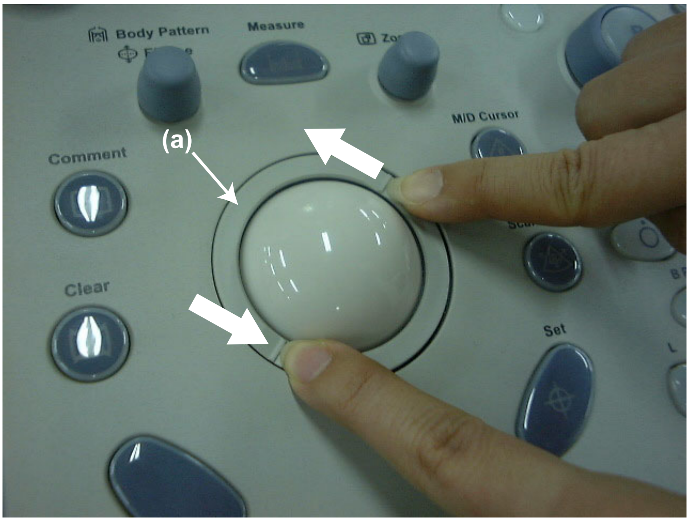

Body Pattern
Measure
Comment
(a)
M/D Cursor
Clear
Set

Figure 18-6. Rotating the Retainer Ring

a. Retainer Ring

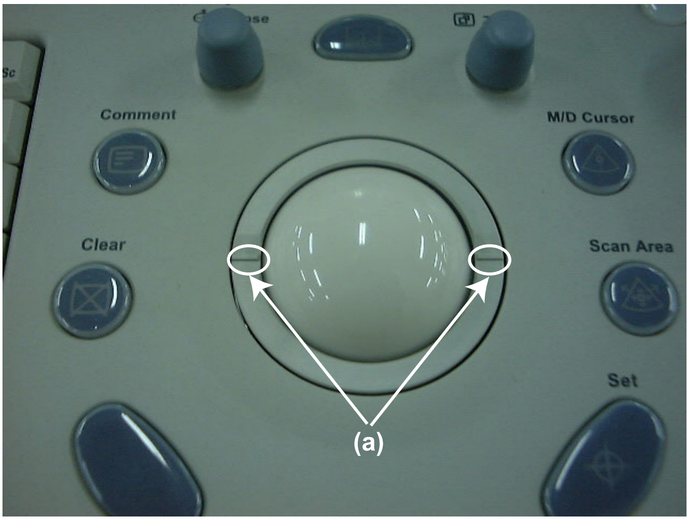

Comment
M/D Cursor
Clear
Scan Area
Set
(a)

Figure 18-7. Notches set in the horizontal position

a. Notches (Set Horizontally)

Monitor and Touch Panel

For monitor and touch screen, use a non-ammonia (just isopropyl and water) lens cleaner. These are available at most computer outlet stores. DO NOT use Windex, Screen-Clean, etc., because these contain ammonia, which will remove the anti-glare coating on the monitor.

Video Page Printer

To clean the external surface of the video page 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 Video Page 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.*

Cleaning the LOGIQ 5 air filter

Clean the system's air filters to ensure that a clogged filter does not cause the system to overheat and reduce system performance and reliability. It is recommended the filters be cleaned quarterly (once every three months).

CAUTION

Be sure to lock the wheels before cleaning the air filters to avoid injury by any unexpected movement of the system.

Locating

The LOGIQ 5 has two air filters. The front air filter is located in the front of the system and the back air filter is located behind the system.

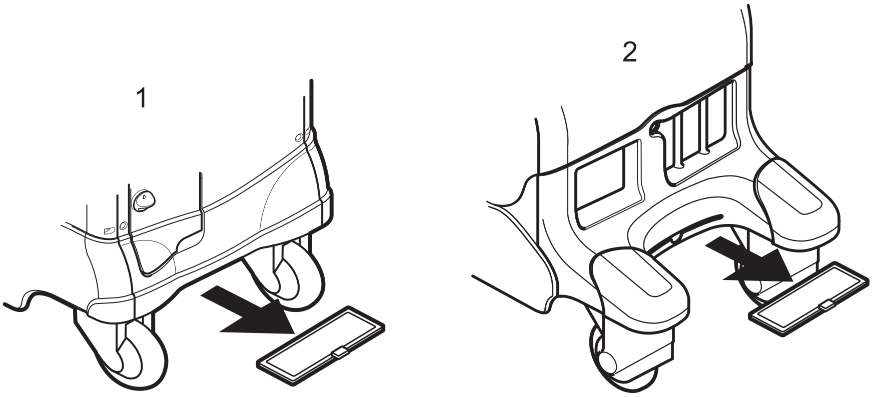


Figure 18-8. Location of Air Filters

1. Back Air Filter
2. Front Air Filter

Removing

To remove the air filters:

Pull out the front air filter from the front bottom of the system.

Pull out the back air filter from the back bottom of the system.

Cleaning the LOGIQ 5 air filter (continued)

Cleaning To clean the filter:

1. Be sure to shake the filter in an area away from the system.
2. Wash the filter in a mild soapy solution, rinse and air dry or dry with a cloth.

NOTE: Allow wet filter to dry thoroughly before installing.

Installing

1. Slide the filter back into the system.
2. Secure the filter with the Velcro tab.

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’ 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)

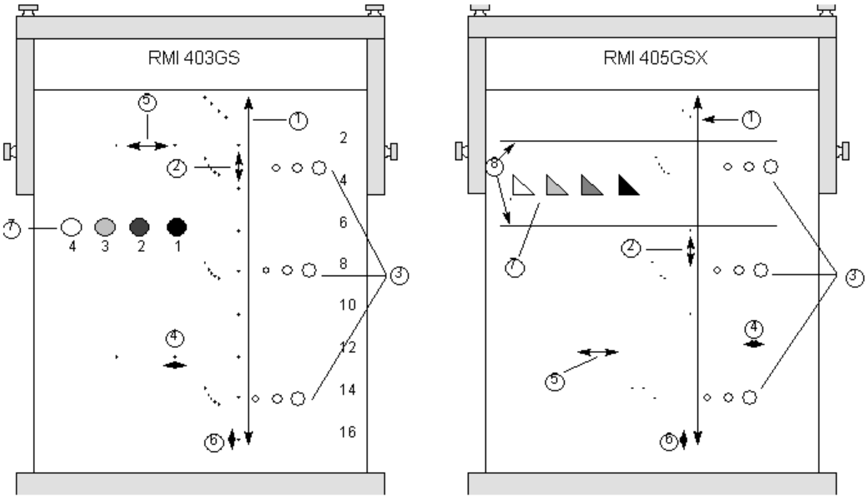

RMI 403GS
⑤
①
②
2
4
⑦
4
3
2
1
6
8
③
10
④
12
14
16
⑥
RMI 405GSX
①
⑧
⑦
②
③
④
⑤
⑥

Figure 18-9. 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. Check the B/W or Color page printer, VCR, MIC, or Laser camera.
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 18-9 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 18-9 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 18-9 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 18-9 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 18-9 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 18-9 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 18-9 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 18-9 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 (For Future Validation)

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
3.5” MO Drive	Each
Sony VCR Model SVO-9500MD/9500MDP	Each
Panasonic VCR Model AG-MD835/MD835P/ MD835E	Each
Sony B/W Printer Model UP-895MDW	Each
Mitsubishi B&W Printer Model P91W/91E/ AP9500	Each
Sony Color Printer Model UP-2950MD/2850P	Each
Sony Color Printer Model UP-21MD/21MDS	Each
Mitsubishi Color Printer Model CP-900/900UM/ 900E	Each
Sony Color Printer Model UP-50/51MD	Each

Console

Table 18-11: Console Accessories

Accessory	Units
Footswitch	Each
TV Probe Holder	Each
UPS (Battery Pack)	Each

LOGIQ 5 Probes

Table 18-12: Probes and Accessories

Accessory	Units
3C	Each
3.5C	Each
5C	Each
E8C	Each
8C	Each
7L	Each
10L	Each
12L	Each
3S	Each
P2D	Each
P6D	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

Table 18-14: Gel

Accessory	Units
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 18-15: 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 18-16: 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

Physio Accessories

Table 18-17: Patient ECG Lead Wires

Accessory	Units
Physio Input Panel	Kit
ECG Cables	Set
PCG Sensor	Each

Patient Electrodes

Table 18-18: Patient ECG Lead Wires

Accessory	Units
Adult	Box/300
Pediatric	Box/300
Adult/off center	Box/500
Pediatric/off center	Box/1000

Contact the distributor, GE affiliate or sales representative for approved peripherals.

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