Imaging Controls

You can select which controls you want to be available via the Touch Panel during a clinical scan. When you select Preset--> Application and Control Mode--> Clinical, deselect the controls you **DO NOT** want to appear while scanning in this clinical application.

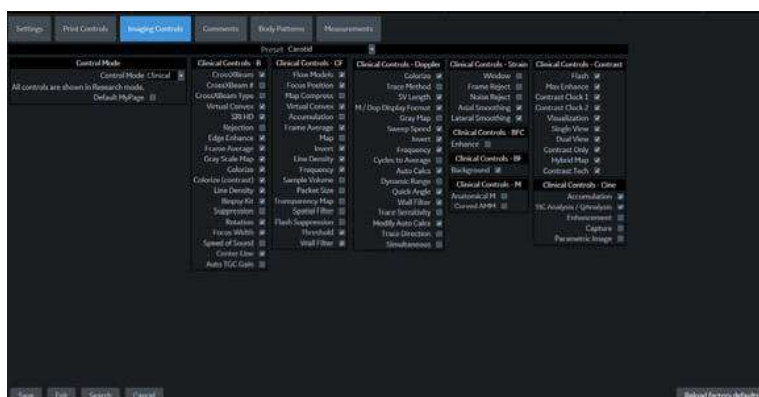*NOTE:*   *If you select Research, all controls appear.*

Figure 10-33.   Imaging Controls

Imaging Controls (continued)

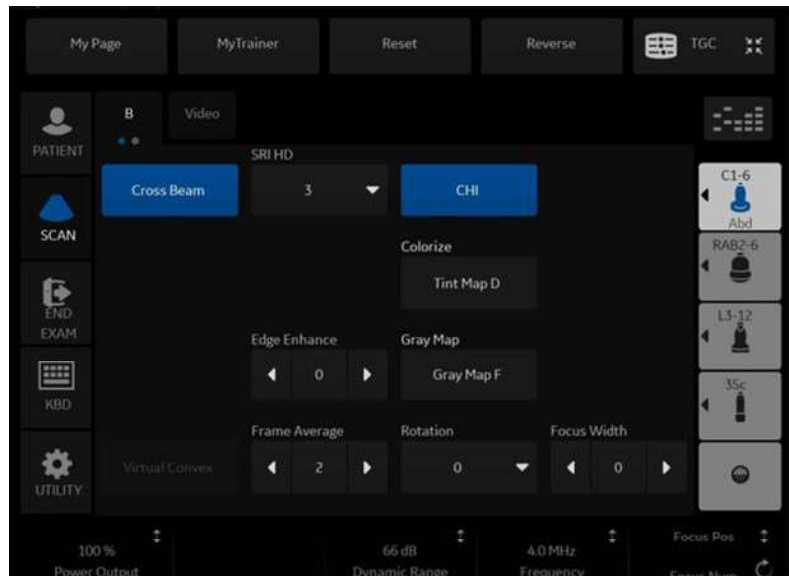Clinical vs. Research Touch Panel Example

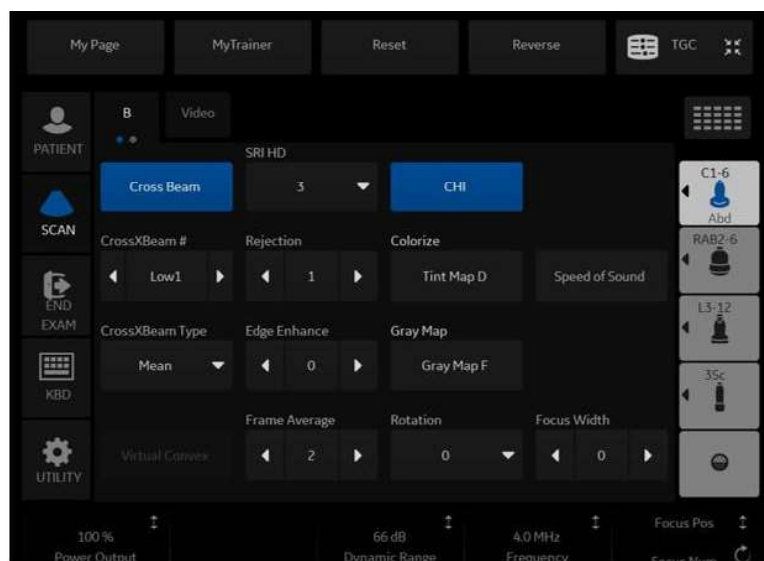Figure 10-34.   Clinical Control Mode - example

Figure 10-35.   Research Control Mode - example

Comments and Body Patterns

Comments and Body Patterns were described earlier in this chapter.

Measurements

You can set the exam category measurement and calculation package you want to appear when you select the exam category Preset.
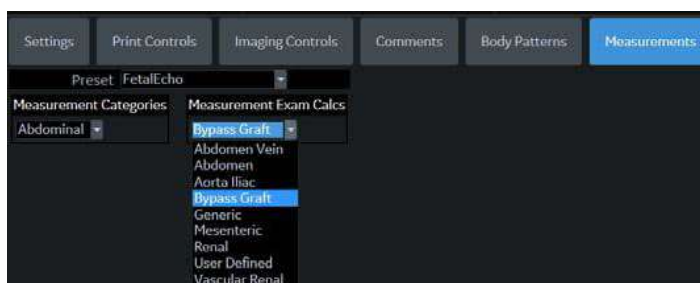

Figure 10-36.   Application Measurements Menu

User Specific

Refer to Chapter 3 "Monitor Display" for detail.

3D/4D

Overview

3D/4D presets allow you to set up application-specific settings (presets) for each 4D image acquisition type. You can define different application-specific settings for each probe. Refer to Chapter 5 for more information.

4D Presets

To set up 4D presets:

1. On the Touch Panel, select **Utility**.
2. On the Touch Panel, select **3D/4D**.

   The system displays the 4D Presets screen.
3. To select a probe, click on the plus sign (+) that appears next to the desired probe.
4. To select the application, click on the plus sign (+) that appears next to the desired application.
5. To select the acquisition type, click on the plus sign (+) that appears next to the desired application.
6. Double-click the desired application under the acquisition type. The Display tab is selected.
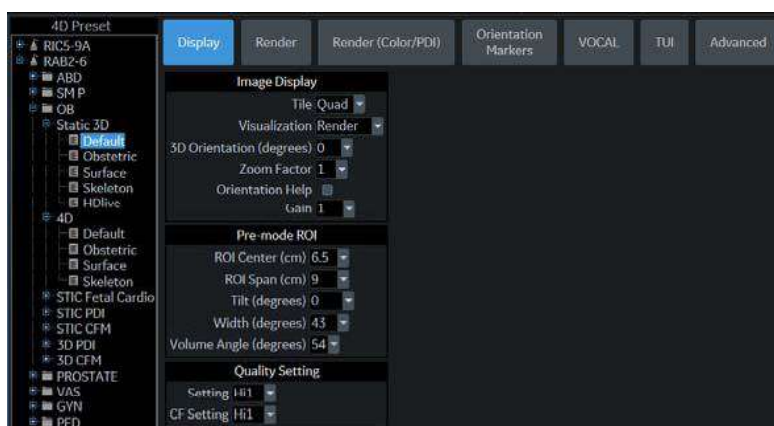
4D Presets (continued)

Figure 10-37. Display Preset Parameter

Table 10-67: Image Display

Preset Parameter	Description
Tile	Determines the number of display windows. Values include: 1 (Single), 2 (Dual), and 4 (Quad).
Visualization	Determines the method of display for working with images. Selections available: Sectional, Render, VOCAL, VCI static and TUI.
3D Orientation (degrees)	Determines the orientation of the ROI on the monitor display. Values include: 0, 90, 180, 270.
Zoom Factor	Determines the magnification factor of the zoom. Values include: 0.3 through 4.0, in .01 increments.
Orientation Help	Activate Orientation Help.
Gain	Set he desired Gain

Table 10-68: Pre-mode ROI

Preset Parameter	Description
ROI Center (cm)	Determines the vertical center of the region of interest. Values vary by probe.
ROI Span (cm)	Determines the height of the region of interest. Values vary by probe.
Tilt (degrees)	Determines the degree of tilt from the vertical center location of the ROI. Values vary by probe.
Width (degrees)	Determines the width of the ROI. Values vary by probe.
Volume Angle	Set the range of the volume sweep. Values vary by probe. Listed in degrees for curved probes, cm for linear probes.

Table 10-69:   Quality Setting

Preset Parameter	Description
Setting	Set quality setting -- balances speed with line density. Selections are Low, Mid1, Mid2, Hi1, Hi2, Max. High combines the highest density with the slowest speed. Low combines the lowest density with the highest speed.
CF Setting	Set quality setting -- balances speed with line density. Selections are Low, Mid1, Mid2, Hi1, Hi2. High combines the highest density with the slowest speed. Low combines the lowest density with the highest speed.

Render Tab

Figure 10-38.   Render tab

Table 10-70:   Render and Render for VCI Static

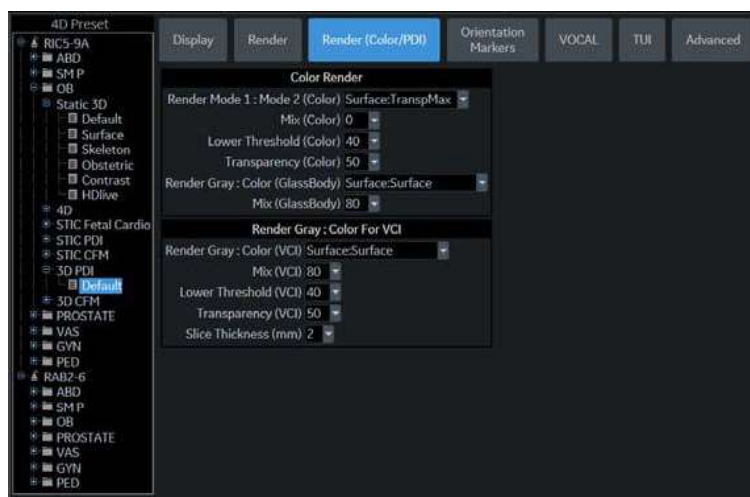| Preset Parameter	Description
Render Mode 1:Mode2 (Gray Inversion, and VCI Static)	Set render mode values. Surface Smooth, Surface Texture, Transp Max, Transp X-Ray, TransMin (Render 1) or Fetoscopic. Surface Smooth, Light, Gradient Light, Transp Max, Transp X-Ray, Transp Min (Render 2), or FetoSmooth.
Mix/Mix Inversion/eMixVCI Static (% Render Mode 2)	Set mix of Render 1 / Render 2 Mode, 0-100.
Lower Threshold	Set a lower threshold below which weaker echoes are removed, 0-255.
Transparency/ Transparency (Inversion)	Set the transparence of the image, 10/20-250. The higher the number, the more transparent the gray scale information.
Render Direction	Set the direction in which the ROI is viewed.
SonoRenderLive	Check to use SonoRenderLive.
SonoRenderLive Sensitivity	Set the SonoRenderLive sensitivity from 1-100.
[VCI Static] Slice Thickness	Set slice thickness, 3-20.

Color / PDI Render tab

Figure 10-39.   Color / PDI tab

Table 10-71:   Color / PDI Render

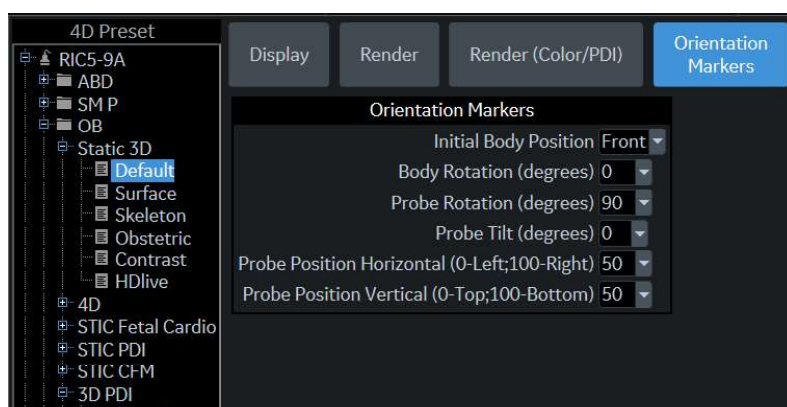| Preset Parameter	Description
Render Mode 1 : Mode 2 (Color)	Determine the render mode, selected from Render Mode 1 and Render Mode 2.
Mix (Color)	Set the percentage of Render Mode 1 to be mixed with Render Mode 2.
Lower Threshold (Color)	Set the lower threshold below which weaker echoes are removed.
Transparency (Color)	Determine the transparency of the image. The higher the number, the more transparent the gray scale information. Values: 20 to 255.
Render Gray: Color (GlassBody)	Determine the render mode, selected from Render Mode 1 and Render Mode 2.
Mix (GlassBody)	Set the percentage of Render Mode 1 to be mixed with Render Mode 2.

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Orientation Markers tab

Figure 10-40.   Orientation Markers tab

Table 10-72:   Orientation Markers

Preset Parameter	Description
Initial Body Position	Set Head, Feet, Front, or Back
Body Rotation (degrees)	Set 0, 45, 90, 135, 180, 225, 270, or 315.
Probe Rotation (degrees)	Set 0, 45, 90, 135, or 180.
Probe Tilt (degrees)	Set 0, 45, 90, 135, or 180.
Probe Position Horizontal (0-Left;100-Right)	Set 0-100.
Probe Position Vertical (0-Top;100-Bottom)	Set 0-100.

VOCAL tab

Figure 10-41.   Vocal tab

Table 10-73:   VOCAL

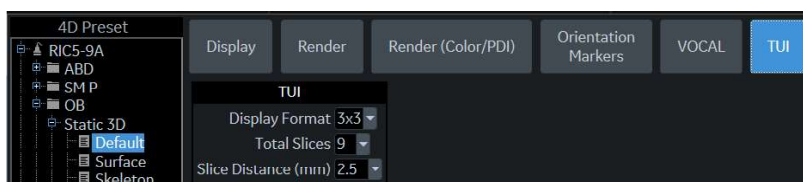| Preset Parameter	Description
Vocal Method	Set Sphere, Manual, Contour Detect, or Semi-Auto Contour Detect.
Vocal Semi-Auto-Detect type	Set Hypo, Cystic, or Hyper/Iso.
Vocal Rotation step	Set 6, 9, 15, or 30.

TUI tab

Figure 10-42.   TUI tab

Table 10-74:   TUI

Preset Parameter	Description
Display Format	Set 1x1, 1x2, 2x2, or 3x3.
Total Slices	Set 3, 5, 7, 9, 11, 13, 15, 17, or 19.
Slice Distance (mm)	Set 0.5-10 (0.1 step increments).

Advanced tab

Figure 10-43.   Advanced tab

Table 10-75:   Advanced

Preset Parameter	Description
Upper Threshold	Sets the higher threshold above which weaker echoes are removed.
Volume Calibration Shift	See a Field Service Engineer for information on this parameter.

Configuring Connectivity

Overview

You use Connectivity functionality to set up the connection and communication protocols for the ultrasound system. The following page gives an overview of each of the Connectivity functions. Each function is described in detail in the following pages.

About Wireless LAN and DICOM, see Chapter 13.

Connectivity Functions

To set up your institution's connectivity, you must login with administrator privileges.

1. **TCPIP**: allows you to configure the Internet Protocol.

2. **Device**. allows you to set up devices.

3. **Service**: allows you to configure a service (for example, DICOM services such as printers, worklist, and other services such as video print and standard print) from the list of supported services. This means that the user can configure a device with the DICOM service(s) that particular device supports.

4. **Dataflow**: allows you to adjust the settings of the selected dataflow and associated services. Selecting a dataflow customizes the ultrasound system to work according to the services associated with the selected dataflow.

5. **Button**: allows you to assign a pre-configured output service (or a set of output services) to the Print keys on the control panel.

6. **Removable Media**: enables formatting (DICOM, database, or blank formatting) and DICOM verification of removable media.

7. **Miscellaneous**: allows you to set up the patient exam menu options, print and store options, and the order of the columns in the examination list on the Patient menu.

8. **Tricefy**: allows you to archive, collaborate, and share patient images via a cloud-based image viewer.

9. **Koios**. Koios is a Breast Lesion Analysis Option. Koios is intergrated with the LOGIQ P8/P9/P10 via DICOM. Koios is configured similar to a DICOM Service. The user can accept/reject analysis results.

Configure these screens from left to right, starting with the TCPIP tab first.

NOTE: *The ultrasound system is pre-configured for many services, with default settings selected. You can change these services and settings as needed.*

⚠ CAUTION You must restart the LOGIQ P8/P9/P10 (shutdown) after making any changes to connectivity settings in the Utility menus. This includes any changes on the TCPIP or dataflow setup screens.

TCP/IP

The left side of the TCP/IP screen displays the Wired Network Configuration; the right side of the screen displays the Wireless Network Configuration.
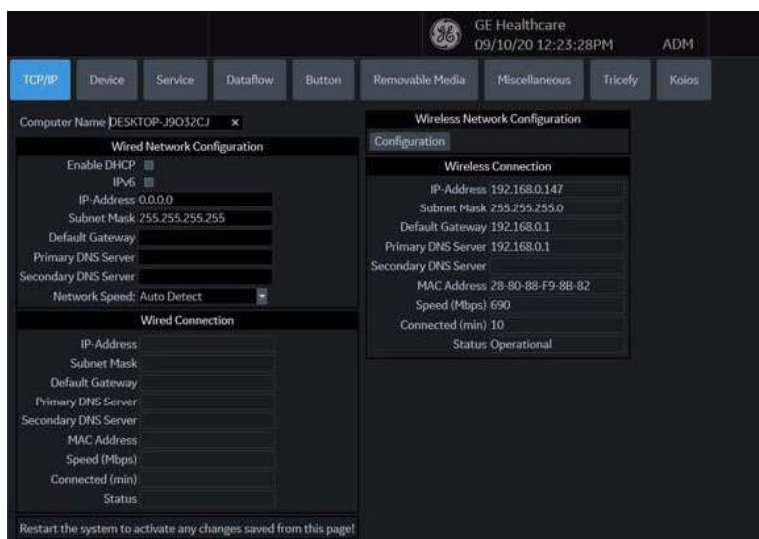

Figure 10-44.   TCP/IP Screen

The Wired Network Configuration shows what the LOGIQ P8/ P9/P10 local area network settings are configured to, while the Wired Connection section shows the actual network configuration the system is currently using and has recognized. If these two sections do not match, reboot the system and recheck the network settings.

Determine Your Network Settings

Determine the type of network settings you will use and configure:

•   IPv4 or IPv6: IPv4 is a 32-bit address, IPv6 is a 128-bit address.

•   DHCP (Dynamic Host Configuration Protocol): Enables a server to automatically configure the network settings.

•   Static IP: Manually configured network settings.

DHCP

To configure DHCP network connectivity:

1. Select the DHCP check box to enable automatic configuration of your network settings.

Figure 10-45.   DHCP Network Connectivity Menu

2. To use IPv6, check the IPv6 box. If unchecked, the system will use the default IPv4 settings.
3. Press Save at the bottom of the screen to save the automated configuration.
4. Restart the system to activate any saved changes.

Static IP

To configure Static IP network connectivity:

1. Uncheck the Enable DHCP box.
2. To use IPv4, leave the IPv6 box unchecked (IPv4 is the default Static IP configuration).

    To use IPv6, check the IPv6 box.

Figure 10-46.   IPv4 and IPv6 Static IP Connectivity Menu

3. Type the name of the Ultrasound system in the Computer Name field.
4. Enter the following information in the designated fields:
    *   IP-Address (acquire a unique static IP address from the network administrator)
    *   Subnet Mask
    *   Default Gateway (if applicable)
    *   Primary and Secondary DNS addresses (optional)

NOTE: *At least one valid DNS address is needed for Insite remote service connectivity.*

5. Press Save at the bottom of the screen.
6. Restart the system to activate any saved changes.

NOTE: *Per system design, TCP/IP settings do not get restored when restoring backups. The LOGIQ P8/P9/P10 IP address MUST BE unique.*

TCP/IP Preset Menus

Table 10-76:   Computer Name

Preset Parameter	Description
Computer Name	Type the unique name for the Ultrasound system (no spaces in name).

Table 10-77:   Wired Network Configuration

Preset Parameter	Description
Enable DHCP	Select this box to enable dynamic IP Address selection (unless you use DICOM). When DHCP is enabled, the IP Address, Subnet Mask, Default Gateway, Primary DNS Server and Secondary DNS Server fields are disabled.
IPv6	Select this box to enter IPv6 Static IP settings.
IP-Address	Enter the IP Address of the Ultrasound system. NOTE: IP stands for Internet Protocol. Every device on the network has a unique IP address.
Subnet Mask	Enter the subnet mask address. NOTE: The Subnet Mask is an IP address filter that eliminates communication/messages from network devices of no interest to your system.
Default Gateway	Enter the default gateway address (optional).
Primary DNS Server	Enter the IP address for the Primary DNS server (optional - - at least one valid DNS address is needed for Insite remote service connectivity).
Secondary DNS Server	Enter the IP address for the Secondary DNS server (optional). (Do not configure Secondary DNS server only; if only one DNS IP address is being used, enter it in the Primary DNS Server field.)
Network Speed	Select the network speed (Auto Detect, 10Mbps/Half/Full Duplex, or 100 Mbps/Half/Full Duplex, and 1000Mbps/Auto-negotiate).

Table 10-78:   Wired Connection

Preset Parameter	Description
IP-Address	The IP Address of the Ultrasound system. NOTE: IP stands for Internet Protocol. Every device on the network has a unique IP address.
Subnet Mask	The Subnet Mask is an IP address filter that eliminates communication/messages from network devices of no interest to your system.
Default Gateway	The default gateway address (optional).
MAC Address	Unique network card address.
Speed (Mbps)	Actual network speed in Megabits per second.
Connected (min)	The number of minutes the system has been connected to the network.

Table 10-78:   Wired Connection

Preset Parameter	Description
Status	Current network status. • Operational: Network adapter has been disabled, for example because of an address conflict. • Unreachable: Network adapter that is not connected. • Disconnected: For LAN adapters: network cable disconnected. For WLAN adapters: no carrier. • Connecting: Network adapter that is in the process of connecting. • Connected: Network adapter that is connected to a remote peer.

Table 10-79:   Wireless Network

Preset Parameter	Description
Configuration	Press to view or change the Wireless Networking settings. See Chapter 13 for more information.
IP-Address	The current IP address assigned to the wireless network adapter.
Subnet Mask	The current network mask assigned to the wireless network adapter.
Default Gateway	IP address of the local subnet gateway host.
MAC Address	The Ethernet address assigned to the installed wireless adapter hardware.
Speed (Mbps)	Actual network speed in Megabits per second.
Connected (min)	The number of minutes the system has been connected to the network.
Status	Current network status. • Operational: Network adapter has been disabled, for example because of an address conflict. • Unreachable: Network adapter that is not connected. • Disconnected: For LAN adapters: network cable disconnected. For WLAN adapters: no carrier. • Connecting: Network adapter that is in the process of connecting. • Connected: Network adapter that is connected to a remote peer.

Device

To add a new device,

1. Press *Add*.
2. Type the device name in the Name field.
3. Type the device's IP address in the IP Address field.

Figure 10-47.   Connectivity Device Preset Menu

Table 10-80:   Device

Preset Parameter	Description
Add/Remove	Press Add to add a new device; press Remove to delete a device.
Ping	Press Ping to confirm that a device is connected.
Properties: Name	Type the name of the device.
Properties: IP Address	Type the device's IP address. The following IP address cannot be used for device's address, these are reserved for internal use by the system: 192.168.221.1/192.168.221.2
Properties: AE Title	AE Title of the LOGIQ P8/P9/P10. NOTE: Only available for MyComputer.
Properties: Port Number	IP Port Number Used for DICOM, set by default to 104. NOTE: Only available for MyComputer.
DICOM TLS: Use DICOM TLS Encrypted Connection	Check to use DICOM TLS Encrypted Connection
DICOM Verbose Logging: Enable Dicom Verbose Logging	Check to be enable Dicom Verbose Logging
DICOM Verbose Logging: Enable Dicom Verbose Logging for (Minutes)	Coose duration for Dicom Verbose Logging

Device (continued)

To ping a device,

1. Select the device.
2. Press ***Ping***. If the smiley face smiles, then the connection has been confirmed. If the smiley face frowns, then the connection has not been made. Check the device name and IP address.

Service

For each Device that you added to the system, you need to set up the service(s) that device supports (you must be an administrator to update these screens).

The Services screen has the following sections of information:

1. **Destination Device** - lists information about destination devices. You can select from a list of currently existing devices.

2. **Service Type to Add** - lists information about services for the destination device. You can add services, select from a list of currently existing services, and remove services.

3. **Service Parameters** - lists properties for the service currently selected in the Services section. The name and parameters in this section change, depending on what service is currently selected. In the above figure, this section shows DICOM Print parameters.

Adding a service to a destination device

1. Select the service from the pull-down menu. Press **Add**.
2. Specify the properties for this service. Press **Save**.
3. Verify the service.

Removing a service

1. Select the service. Press **Remove**.
2. Press **Save**.

Changing parameters for a service

There are certain parameters that may need to be set up for each service:

Table 10-81:   Service Parameters: Common Service Parameters

Preset Parameter	Description
Name	Free text: give a descriptive name to the device.
AE Title	The Application Entity Title for the service.
Port Number	The port number of the service.
Maximum Retries	Max # – the maximum number of times to try establishing a connection to the service.
Retry Interval (sec)	Specify how often (in seconds) the system should try to establish a connection to the service.
Timeout	The amount of time after which the system will stop trying to establish a connection to the service.

Changing parameters for a service (continued)

Many service parameters are specific to each type of service. The parameters are described on the following pages:

- Standard Print
- Video Capture
- Save As
- USB Quick Save

Standard Print

Table 10-82:   Standard Print

Preset Parameter	Description
Printer	Select the printer.
Rows	Specify 1-5.
Columns	Specify 1-5.
Orientation	Specify Landscape/Portrait
Top Margin (mm)	Specify the top margin (0-51mm)
Bottom Margin (mm)	Specify the bottom margin (0-51mm)
Left Margin	Specify the left margin (0-51mm)
Right Margin	Specify the right margin (0-51mm)

Video Capture

Table 10-83:   Video Capture

Preset Parameter	Description
Type	Specify Color, BW, or DVD Record/Pause.

Save As

Table 10-84:   Save As

Preset Parameter	Description
Destination	Specify destination device, Hard Drive, USB Flash Drive.

USB Quick Save

USB Quick Save provides the ability to easily send images to a USB memory stick or Network Storage. See 'USB Quick Save' on page 15-47 for more information.

E-mail to MMS

NOTE: *You can attach up to 10 images to an e-mail.*

To use the E-mail service, the SMTP (Simple Mail Transfer Protocol) settings and user account are needed from your E-mail service provider.

- SMTP server name (Outgoing Messages) e.g., smtp.gmail.com
- SMTP authentication (Outgoing Messages) e.g., SSL
- SMTP port (Outgoing Messages) e.g., 465

NOTE: *The LOGIQ P8/P9/P10 only supports the E-mail Send service; receiving E-mail is not supported. To receive E-mails, the same E-mail account needs to be installed on an Office-PC.*

NOTE: *Some E-mail servers allow less secure applications to access your account. If your account cannot gain access to the E-mail server from the LOGIQ P8/P9/P10, please contact the server administrator and configure access to your account to allow a less secure application. In case of Google gmail, please refer to the Accounts Help at https://support.google.com/accounts/answer/6010255?hl=en.*

Setting up the Email to MMS

1. Enter IP Address and Name of SMTP server to add an Email connection device in Device Tab.

2. Press Verify icon and Press Add button if the ping test is executed successfully.

3. Move to Service Tab, select "Email to MMS" in Service menu and Press "Add" button.

4. Enter your Account name or Email Address in the Identity group. As an option, you can enter a different reply to address and a signature text.

5. To verify E-mail configuration, click on Verify icon. The test message will be sent to the entered E-mail address followed by a message box.

6. To save your configuration, select the Save button.

Figure 10-48.   Email to MMS

Table 10-85:   Network Storage Service

Preset Parameter	Description
SMTP Server	Free text: give a descriptive name to the email server.
Server Connection	Options: • IP Address: Try connecting via IP address. • Server Name: Try connecting via SMTP server name. Select server connection method to access mail server.
Server Port	The port number of the email server.

Table 10-85:   Network Storage Service (Continued)

Preset Parameter	Description
Connection security	Options: • None • SSLTTLS • STARTTLS If your SMTP server requires SSL or STAR connection, select the proper option.
Authentication method	Enter user account and password for SMTP authentication. If your server doesn't require User authentication, uncheck the box and do not enter anything. Leave the User Name and Password fields blank.
User Name	Email Account User Name.
Password	Email Account Password.
Email Address	Enter To (receiver) Email Address for sending test message (Mandatory). Note: It will be used for From (sender) Email Address.
Subject	Free text: give a subject to test E-mail.
Message	Free text: give a body text message to test email.
Enable MMS	Enable MMS with E-mail service.
Domain Name for MMS	Domain Server Name for the 3rd party provider to MMS message.

MMS Configuration

The MMS phone number is mapped into the recipient E-mail address of the MMS service provider.

NOTE: *The LOGIQ P8/P9/P10 does not support MMS service. The LOGIQ P8/P9/P10 only supports patient phone number combined with MMS domain name when sending an email ("Phone number@DomainName").*

NOTE: *To use the MMS function, you need to contract with a 3rd party provider that offers E-mail to MMS service (e.g. SMSglobal). Contact a service provider!*

1. If it is desired to also use MMS, select "Enable MMS" in the Email Service Properties.
2. Enter 3rd party Domain Name.

NOTE: *Captured images will be sent to your E-mail account with "Phone number@DomainName".*

3. Store your configuration by selecting"Save" button.

Send Email

The user can send selected images from the Active Image page via "Send To".
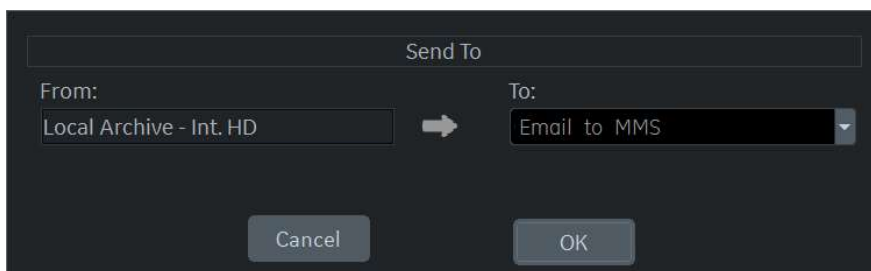
Figure 10-49.   Batch Send to E-mail

E-mails contain JPEGs for still image and WMV for Cine loops.

NOTE: *Exam send function is not supported for E-mail to MMS. You can only send selected images from the Active Image screen.*

How to enter Patient's E-mail address and Phone number in the Patient screen

To show and allow entering the patient's E-mail address, enable the "Use Email to MMS" option on the Connectivity -> Miscellaneous screen.

How to enter Patient's E-mail address and Phone number in the Patient screen (continued)

1. Press the "Details" button on the Patient screen. The Patient's E-mail address and Phone number controls appear.

2. Enter patient information and Comment. The content of the Comments will be used for the body text of the email. The subject of the E-mail will be automatically generated using the Patient Name and Exam Date information.

3. Select Register to save the patient's email configuration.

Setting up a Printer

Use Standard Print for digital peripherals. These are printers with either a USB interface or Ethernet interface (Sony UP-D25MD, for example).

On the Utility --> Connectivity --> Button page, select the Print key in the upper, left-hand corner of the display. In the middle portion of the page, under Available Input/Outputs, select the printer you want to configure. Next, press the two right arrows (>>) in the upper, right-hand corner of the page to move this printer into the Printflow View.

You can also configure the Standard Print button that appears on the Active Images screen.

Example: For instance a video capture device, on the Utility --> Connectivity --> Service page, in the Service Type to Add box, and press Add. In the properties box on the upper, right-hand side, select the type of device and in the Properties box in the lower, left-hand side, type in a unique descriptive name for this device.

Dataflow

⚠ CAUTION   DO NOT rename the factory default dataflow.

A dataflow is a set of pre-configured services. When you select a dataflow, the ultrasound system automatically works according to the services associated with the dataflow. The Dataflow tab allows you to select and review information about dataflows. You can also create, change, and remove dataflows.

Set up dataflows for the services.

NOTE: *You must be logged on as Administrator to use the Dataflow tab.*

NOTE: *Services added to the Dataflow View will receive images immediately if Direct Store is checked; or at the end of the exam if Direct Store is not checked.*

Figure 10-50.   Dataflow Preset Menu

Table 10-86:   Dataflow

Preset Parameter	Description
Name	Select the dataflow from the list.
Direct Store	Select to store data directly to archive (no buffer storage).
Hidden	Select so that this dataflow does not appear as a Dataflow on the Patient menu.
Default Dataflow	Select to use this dataflow as the default dataflow when you start the system.

Key Object Selection: Image Deletion Notification

Image Deletion Notification is available ONLY for the Direct Store Workflow and only generated when there are images deleted during the exam. This lets the reader at the PACS system know which images have been deleted. An indicator is

placed on deleted images with a reason, "Rejected for Quality Reasons," for example.

Button

You can assign print buttons via the Utility --> Connectivity --> Button page.

Assigning print buttons. First select the print button to configure on the upper, left corner of the page. Then select the device you want to add in the middle part of the pages. Then click on the right arrow in the top right corner of the page.

NOTE: *You can configure each print key to multiple output devices/ dataflows.*

NOTE: *Only attach one DICOM service per print key (e.g., PACS and DICOM printer). Multiple DICOM devices should be configured via a dataflow.*

NOTE: *When using a print key to send an image directly to a DICOM device, this causes a single DICOM association per image. Most devices (all known printers) work fine with this. However, some storage devices, such as ALI, Kodak Access, and Cemax, assume that the end of each association is the end of the exam and can result in a new folder for each image. In the Utility menu, select a single association or open PR for the desired DICOM storage device.*

Button (continued)

Table 10-87:   Print Button

Parameter	Description
Physical Print Buttons • Print 1-6 • PrintScreenAutoSweep • PrintScreen	
M&A only (no images)	Configures the system to send a DICOM structured report only; no image is generated or sent.
Still Images	• Format: Ultrasound Image, Secondary Capture (Image, Video, Screen) • Compression: None, Rle, Jpeg, Jpeg2000 • Quality: Lossless, 99, 98, 97, ... 50 (Displays when JPEG/JPEG2000 is the selected Compression)
Clips/Volume	• Clips: Add Multiframe Data: Checkbox • Compression: None, Rle, Jpeg, Jpeg2000 • Quality: Lossless, 99, 98, 97, ... 50 • Volume File Format*: 1-Standard DICOM (Default), 2-Standard DICOM with Raw Data; 3-Enhanced DICOM, 2&3 (2 files) *Easy3D replace format 3 with format 2
Note: The default Compression for Clips/Volumes is JPEG85. It is strongly recommended to keep the Compression set to JPEG85.	
Advanced	• VNav Data: V Nav View (Default), Ultrasound Only, or VNav & Ultrasound (2 files) • Compare Assistant: Comparison view (Default), New image, Both Comparison & New (2 files) • Scan Assistant Advance: On, Off, Use program (system uses setting from the Scan Assistant program which allows a user to configure two print keys identically except that one advances Scan Assistant and the other does not.) On =advances to the next step when that print key is pressed independently of the program setting. Off = does not advance to the next step when the print key is pressed independently of the program setting. Press "Application/Print Controls/Live Store" to hyperlink to the Application Print Controls utility page.
Active Images Page: Standard Print	

Removable Media

The Removable Media tab allows you to:

• Verify the DICOM directory on removable media.

• Verify the free space of the media.

• Verify that the media is finalized or unfinalized.

• Verify that the media is formatted or unformatted.

• Format removable media (rewritable CD/DVD)
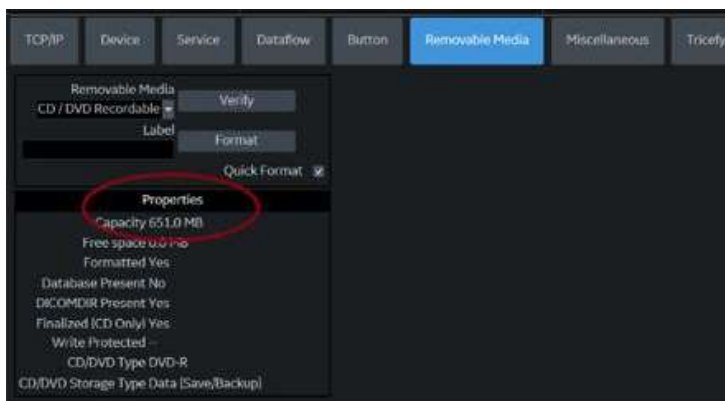
Figure 10-51.   Removable Media Preset Menu

Table 10-88:   Tools

Preset Parameter	Description
Removable Media	Select the removable media to format or verify.
Label	Type a label for a new removable media (free text).
Verify	• Select to verify DICOM directory on removable DICOM disk. • Verify the free space of the media. • Verify that the media is finalized or unfinalized. • Verify that the media is formatted or unformatted.
Format	Select to format removable media.
Quick Format	To format the media quickly, check this box. If you uncheck this box, the media is formatted with a full format. New media should always be formatted with a full format.

The bottom of the screen lists properties of the selected media.

Formatting removable media

1. Select the removable media from the Media list.
2. Type a name for the removable media in the Label field.

NOTE: *Do not use the following characters for labelling:*

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

3. Select *Format*. Confirm **OK** or **Cancel**.
4. An information window confirms when the format has been completed. Select **OK** to exit.

Verifying removable media

1. Select the removable media from the Media list.
2. Select *Verify*.

Miscellaneous

The Miscellaneous tab allows you to configure tools related to patient management and print and store options. You can specify default system functionality, such as whether patient ID is required when you archive data, or if you want the system to automatically search the archive for a patient when you enter patient data.

Table 10-89:   Patient/Exam Menu Options

Preset Parameter	Description
Use birthdate	In the Patient information window, enter either the patient age or the birth date: When selected, enter birth date, then the age is calculated.When cleared, enter age (birth date field not available).
Auto search for patient	In the Search/Create Patient window: When selected, the system automatically searches through the selected patient archive, while the user enters patient information.When cleared, the automatic search tool is turned off. If you are trying to keep the past patient data confidential, DO NOT use this feature.
Automatic generation of patient ID	In the Search/Create Patient window: When selected, the Patient ID is not required when entering a new patient in the archive. The system automatically generates an ID number. When cleared, the Patient ID is required when entering a new patient in the archive.
Auto Archiving patient data	Archives patient data automatically.
After [End Current Patient], go to:	Select Worklist screen or Patient screen.
Keep Search String	Search string is kept rather than cleared.
Worklist Auto Query	Automatically queries the worklist server.
Show BBT	Show BBT field on the OB patient screen to input the basal body temperature.
Double Click on Patient List to Start	Select Review or New Exam to display each time you double click on the patient name in the patient list on the Patient menu.
Detail Mode	Select to display Detail Mode, rather than Exam View, when you select the patient name in the patient list on the Patient menu. You can also type comments while in Detail Mode.
Export to USB HDD: Create DICOMDIR	Create DICOMDIR is a DICOM file format which contains how the directory and DICOM files structured for diagnostic portable media behave. It is important for portability between the LOGIQ P8/P9/P10 to PACS. If you want to save exams to the USB Hard drive and look at it on the PACS, the DICOMDIR is a must.
Export to Network storage: Create DICOMDIR	
Automatic Disable Patient Data	Select to automatically disable patient data. If selected, locks the patient name, date of birth and gender (like Patient ID). The Factory Default for this preset is unchecked.

Table 10-89:   Patient/Exam Menu Options (Continued)

Preset Parameter	Description
Remember Cursor Position on the Transfer Screen	To set a default cursor location on the Data Transfer screen: 1. Select the "Remember cursor position in the Transfer screen" preset and press Save. 2. On the Data Transfer screen, move the cursor to the desired field. 3. Exit out of the Data Transfer screen. When returning to the Data Transfer screen, the cursor location is in the position your selected.
Quick New Patient Entry	Select to store new patient automatically by pressing the Patient key.
User Email to MMS	To show and allow entering the patient¡¯s E-mail address in the patient information.
User Simple MPEGVue	Select to transfer the captured images to PC format (JPEG, WMV).
Use Pet Name	To show and allow entering the pet¡¯s name in the patient information.

Table 10-90:   Patient/Exam Message Options

Preset Parameter	Description
Request acknowledge of End Exam action	When selected, the user is asked to confirm action when ending an examination.
Warn Image Store without Patient	Select to receive a warning when you press the Print key without an active patient.
Warn Register to No Archive	Select to receive a warning when you register a patient to the "No Archive" data flow. Select a different data flow for permanent storage of patient data.
Warn image store to Read Only dataflow	The system posts a warning message if you attempt to store images to a read-only Dataflow.

Table 10-91:   Print and Store Options

Preset Parameter	Description
P[1-6] Key Sound	Select None, Click, Chimes, Ding, Ding-Dong, or Whoosh.
Store Dual as Dicom Only	Select to always store dual images as a DICOM (secondary capture) store, rather than Raw DICOM.
Dual When Color Support is Mixed	Dataflow Mixed is not available. While transferring dual images to the PACS, send black and white images as gray; send color images as color. Set up 2 services (one gray and one color), set up 2 dataflows, and set up 2 buttons. Each button needs to be tied to a different service. Select if you want to keep the user preset for Color Photometric Interpretation while in Dual mode.
Enable Smart Capture Area	Check box to select.
Store 2D Loop with Timeline Data	Check box to select.
Patient List Print-Font Size	Select font size.

Table 10-91:   Print and Store Options

Preset Parameter	Description
Add Titlebar Information to Multiframe Loops	Adds a title bar information to the multiframe loops.
Add Scan Parameter Information to Multiframe Loops	Adds scan parameter information to the multiframe loops.
Image Order Scheme	Select to Direct Store images in Acquisition Order, Scan Assistant Order, or Off. • **Off**. The clipboard on the Ultrasound system shows the image in the order it was acquired. Therefore, re-stored images appear where you'd expect. However, on the PACS system, images appear in arrival order or in image number order. • **Acquisition Order**. From the Ultrasound system perspective, the same as "Off." But on the PACS system (if based on image number order), images are displayed consistently with the way they are stored on the Ultrasound system. • **Scan Assistant Order**. You can define the storage order (reading order) via Scan Assistant Creator. Therefore, based on the order defined in Scan Assistant, images are re-ordered and displayed in this manner both on the Clipboard and on the PACS system.
Send Images via Wireless	When connected to the network via Wireless LAN and this box is checked, then images will be sent to the DICOM device over the Wireless LAN. If not checked, images spooled in the Spooler will be sent when the system is connected to the wired network.
Allow press and hold print key to replace an image	When an image is recalled and the user stores it locally on the system using press and hold the Print key, the currently recalled image is deleted from the exam and the newly stored image is saved. Or when you store the image without annotations, type the annotation and press and hold the Print key, the system replaces previously stored image with the new image.

Table 10-92:   Other ID Options

Preset Parameter	Description
Enable Other ID	Not selected is the Default. If selected, allow entering Other ID, such as Citizen Service Number, Burger Service Number (BSN), National Health System (NHS) number, along with patient ID information on the Patient Screen.
Validation Format	If the Enable Other ID preset is selected, the system validates the format of "Other ID" when an ID is entered. Choose: NHS Number *** ** *****, Letters and Numbers, Numbers, or Any (no restriction)

Table 10-93:   LOGIQ Apps

Function	Description
Unpair Bluetooth Devices	Un-paired from all trusted Bluetooth devices.

Examination list window column configuration

You can create new columns, remove columns, and select the information to display in a column.

1. Move the **Trackball** to highlight a column.
2. Press **Set.**
3. Use the arrows (<< or >>) to reposition column headings.

Tricefy Activation

Tricefy is a cloud-based image viewer and a platform to archive, collaborate, and share. The corresponding DICOM destinations can be used via the Print keys. An internet connection is necessary for uploading data to Tricefy. The Wireless LAN Option is required.

As soon as the Tricefy option is enabled, relevant Tricefy items are displayed.
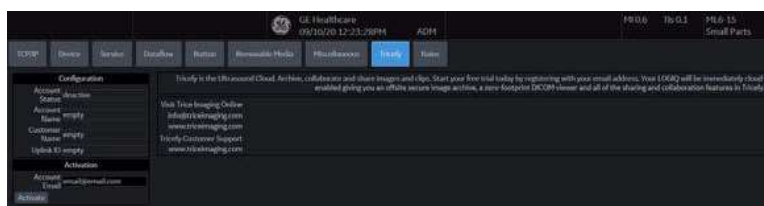
Figure 10-52.   Tricefy Preset Menu

Table 10-94:   Configuration

Preset Parameter	Description
Account Status	[TBD]
Account Name	Name for the account.
Customer Name	Customer's name.
Uplink ID	Uplink ID.

Table 10-95:   Activation

Preset Parameter	Description
Account Email	Account email
Activate	Press to activate the Tricefy option.

Barcode

Overview

The Barcode Scanner supports 1D and 2D encoding symbologies. The protocols supported are shown as below:

Table 10-96:   Protocols supported by Barcode Scanner

Category	Protocol
1D	Code 128, Code 93, Interleaved 2 of 5
2D	PDF417, Data Matrix

Barcode Scanner

Select Barcode Scanner in the drop-down list.

NOTE: *Reboot is required after the device is selected or changed.*

Input Mode

Off

Enter the Patient ID using the keyboard.

Patient ID

Scan the Barcode as the Patient ID or enter the Patient ID using the keyboard instead of the barcode.

Complexation

Scan the Barcode to input the Patient demographics or enter the Patient demographics using the keyboard instead of the barcode.

To enter the Patient demographics using the keyboard instead of the barcode, select Cancel.

1. Enter a string in the Input Data field by scanning from a barcode or typing with the keyboard.
2. Scan a sample barcode. The following items can be included in the barcode:
   - Patient ID
   - First Name, Last Name, Middle Name
   - Birth Year, Birth Month, Birthday

NOTE: *The length of BirthYear equals to 4, BirthMonth equals to 2 and BirthDay equals to 2, and they should always be provided together.*

   - Gender

Complexation (continued)

> 3. Configure the Start and End position for each item.

NOTE: *If the barcode does not contain the information of any item, configure the Start and End position as "0".*

> For example, if the scanned barcode is "000001LastNameFirstName191990101F", the configuration and results display as the following:

Figure 10-53.   Barcode Configuration Page Example

Cloud Reporting

Instead of storing and processing patient data on a local device, the user can store and access the patient data on a remote server which is outsourced to another company. The user can edit and print the report on the remote server. The patient data can be stored on the outsourced server though DICOM. Contact the Cloud Reporting vendor for DICOM service properties, such as IP Address, AE Title, Port number and URL address for Q-Path E.

There is currently one vendor for Cloud Reporting:

• Q-Path by Telexy

To review and edit the stored patient data on Cloud Reporting:

1. Press Utility -> Connectivity -> Miscellaneous -> Cloud Reporting.
2. Check the box for "Enable Cloud Reporting".
3. Select destination as "Q-Path E".
4. Select one protocol type. There are two options: http://, https://.
   • Q-Path Application URL is required to access Q-Path server. Contact the Telexy vendor for the URL

Cloud Reporting (continued)

5. Enter Username and Password.

- • Q-Path Application URL is required to access Q-Path server. Contact the Telexy vendor for the URL

Figure 10-54.   Input User information

6. Press Utility key on the touch panel and then select System. Go to User Configuration Key to assign Cloud Reporting button to User Defined Hard Key.

- • The Cloud Reporting button displays on User Defined Key If the Enable Cloud Reporting option is checked.

Cloud Reporting (continued)

7. Assign the Cloud Reporting button on User Defined Hard Key or MyPage User Defined Function Key.

8. Press Patient key on the touch panel and open the patient you sent to the Q-Path.

NOTE: *To view the patient in the Web browser, you need to send the exam to the DICOM server of Q-Path. See 'DICOM Image Storage' on page 16-140 in Basic User Manual for more information.*

9. Press the button you assigned to enter the website to edit the current patient exam.

10. The system opens the webpage for cloud Reporting of the selected destination.

    • If Q-Path server requires authentication or the login information is wrong, you may need input correct Username and Password.
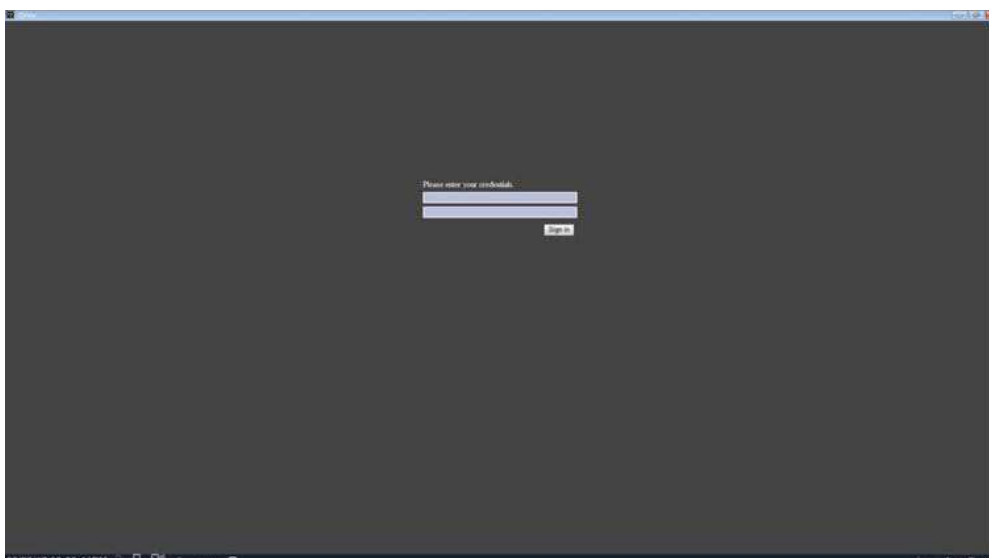
Figure 10-55.   Example - Q-Path E WebPage - Login

Cloud Reporting (continued)

• You can review and edit the patient data on the Webpage via custom browser.
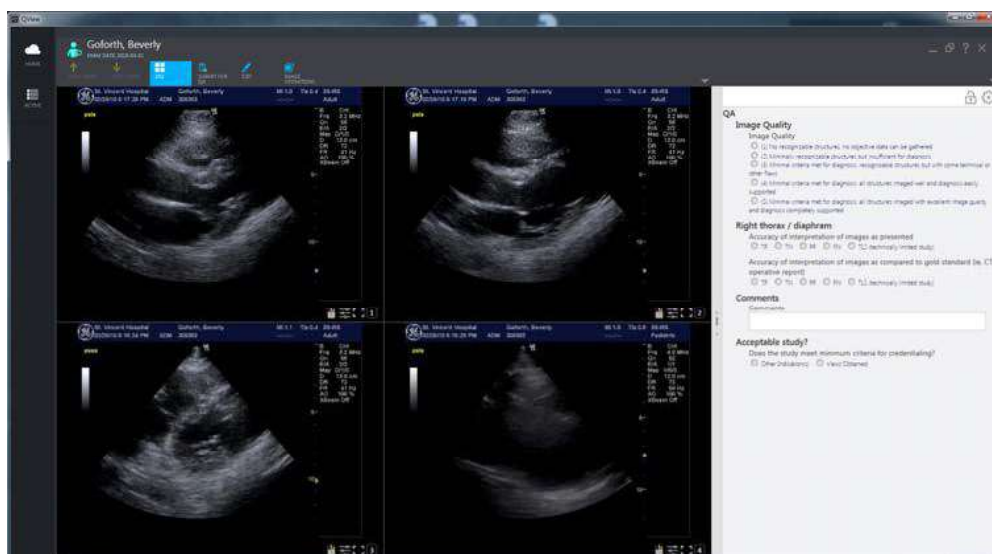
Figure 10-56.   Example - Q-Path E Webpage

NOTE: *Refer to the instruction from "Help" or "?" on the webpage or consult the DICOM server vendor about how to manage the patient data on the webpage.*

Table 10-97:   Cloud Reporting

Preset Parameter	Description
Enable Cloud Reporting	Select to enable Cloud Reporting. The Cloud Reporting button appears in Patient screen. Press the Cloud Reporting button to enter the website to edit and print the report.
Destination	Select the destination of Cloud Reporting.

Koios (not available in all countries)

Koios is a Breast Lesion Analysis Option. Koios is integrated with the LOGIQ P8/P9/P10 via DICOM. Koios is configured similar to a DICOM Service. The user can accept/reject analysis results.

To activate Koios,

1. Access the Utiliy --> Connectivity --> Koios Configuration page.

NOTE: *The Koios Configuration page will only appear if the option activation code is present. If there is no option activation code, the Koios tab will not display.*

2. Type in the IP address of the Koios Server.
3. Select the **Activate** button.
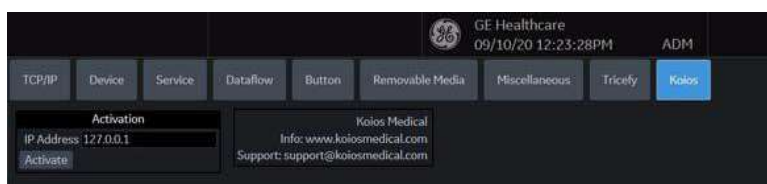
Figure 10-57.   Activate Koios

4. You will receive notification upon successfully connecting to the Koios Server (The activation was successful. Your system is connected to Koios). Confirm (Save Changes? --> Ok) that you want to save the changes on this Configuration page.

5. Confirm that the connection was successful by pinging the Koios Server via the Utiliy --> Connectivity --> Device page.
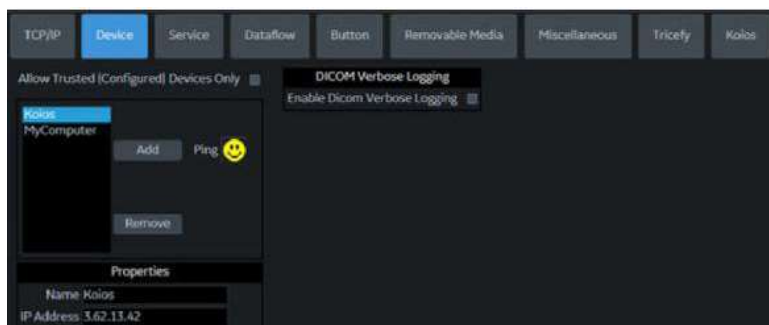
Figure 10-58.   Ping the Koios Server

Koios (not available in all countries) (continued)

6. Confirm that the Koios Assessment service is running by pinging the Koios Assessment service via the Utility --> Connectivit --> Service page.

Figure 10-59.   Ping the Koios Assessment Service

System Administration

Overview

The Admin screen has the following sections:

- **System Administration** – lists all the options implemented in the system.
- **Users** – allows you to define user IDs, specify operator's registration, operator's rights, registration of staff related to an examination (for example, referral doctors and sonographers) and password update requirements.
- **Logon** – defines logon procedures, allows the System Administrator to set password policies, and LDAP Configuration.
- **Groups** -- The System Administrator can set up user groups on this page.
- **System Password** -- Password for the Application Windows Logon Account.
- **Disk Encryption** -- The System Administrator can encrypt the disk for highest system security, if required.
- **Audit Report** -- Generates an audit report.
- **Vulnerability Scan Mode** -- Part of the Advanced Security Option. Vulnerability Scan Mode configures the system so that an external scanner can analyze the LOGIQ P8/P9/ P10.

NOTE: Only the System Administrator can access the pages.

Administrator Tasks

Here are the tasks typically performed by the LOGIQ P8/P9/P10 System Administrator. Instructions for each of these tasks can be found in this chapter.

- Privacy and Security Configuration options
- Define connection options for LDAP Directory Server
- Control encryption of the Patient Data drive
- Create Users/Groups
- Change rights for Users/Groups
- Change Encryption status for the system
- Change/Add Encryption Passwords
- Save/Print Recovery keys for encrypted drives
- Configure Password Policies
- Configure Session Policies
- Generate Audit Reports
- Configure Remote Logging Servers

Privacy and Security

Privacy protects both personal and private interests and information of persons. Security protects both system and information from risks to confidentiality, integrity, and availability. The LOGIQ P8/P9/P10 Privacy and Security capabilities are discussed in Chapter 12; Privacy and Security configuration is discussed below, followed by a description of each system administrative page.

Creating Password Policies and User Groups

The foundation of setting up effective privacy and security is controlling user groups, users, and their system permissions.

Enabling Password Policies

Check the "Enable Password Policies" box on the Utility-> Admin-> LOGON page.

In addition, set the password policy for each selection. These policies should be set **BEFORE** creating new users. Save the changes and reboot the system. This applies rules for the passwords.

HINTS

Ensure the ADM password is known **BEFORE** rebooting the system.

Figure 10-60.   Enable Password Policies

Groups

You define Group access rights via the Utility-> Admin-> Groups page. When each user logs in, they will have access to the system according to the rights assigned to their group(s). Default system groups are preset with pre-determined access rights. To view these access rights, highlight a group name in the Group List column on the left, then look in the Groups Rights column to see the permissions by group.

HINTS   Admin has full access rights.

Figure 10-61.   Groups Page

Adding users

You define Group access rights via the Utility-> Admin-> Users page.

Figure 10-62.   Page to Add Users

Creating a user

1. Press ***Add***.
2. Type the user ID.

HINTS ENSURE that you DO NOT include the following characters in a user's ID: slash (/), dash (-), asterisk (*), question mark (?), an underscore (_), ampersand (&), or blank spaces.

3. Type the user's information in the Identity section, ensuring that you are using the defined policies. User IDs are enforced as all uppercase letters for local users.

NOTE: *If a password is created, the user will be required to enter the password when logging on, even if Password Policies is not enabled. Remember, passwords are case-sensitive.*

4. Select the user's group(s). Multiple groups can be selected, if needed.

Creating a user (continued)

5. If the user needs full configuration and advanced operations access, select **Admin**.

6. Press **Save**.

NOTE: *DO NOT add users with the same User ID. The system allows you to do this; however, the first user is erased and only the second user remains.*

NOTE: *When adding a new user, press Add first. Then edit the ID from the default of "NewUser" and edit the other fields.* ***DO NOT press Add again unless you actually want to create another user. Press Save after adding one or more users. The user listed as NewUser on the list will be updated with the edited ID when you re-enter this screen.***

User Login

After the system administrator adds a new user, the new user should login with their new user name and password. If designated by the system administrator, they may be required to change their password.

The user will be prompted for their password when logging into the system or when selecting their user name from the Patient menu as well.

After logging in, the user will have access according to the rights available to them within their assigned group(s).

Changing a user configuration

The system administrator can update a user. The system administrator can also specify whether the user's account is "Active," "Blocked," or requires a password change. If needed, select the check box, "User must change password." Then the user will be prompted to change their password the next time they log into the LOGIQ P8/P9/P10.

1. Move the **Trackball** to a user ID in the User List.

2. Make the desired changes.

Deleting a user

The system administrator can delete a user.

1. Move the **Trackball** to a user ID in the User List.
2. Select *Remove*. This marks the account as inactive.
   The user is removed from the User List.
3. Select Remove again.

NOTE: *Accounts are not removed immediately because User data is retained for auditing purposes. This can be useful because their name will still appear in audit reports. Also, they can be reactivated.*

If you permanently remove the user, by selecting "Remove" on an inactive user, this traceability will be lost.

User Accounts and Password Policies Frequently Asked Questions

Here are answers to some frequently-asked questions:

Q I lost or forgot my password.
A System Admin can change your password.

Q I entered the wrong password multiple times and now the system says I am locked out.
A Wait until you are unlocked, enter the correct password. If you have forgotten your password, the System Amin can access the system and user details. Utility>Admin>Users

Q I am locked out after multiple attempts to remember my password, does the System Admin have to wait until my account is unlocked before accessing the system?
A The System Admin can logon with their own logon information before the users blocked time is over. The box "Block user account" Utility>Admin>User, should be unchecked to allow the user to logon.

Q I have created a list of users on one u/s system, I have three more in the department, can I do a backup to disk and restore the user list onto the other systems?
A Yes, you can copy both User and Password.

Q I have a sonographer who left the facility, how do I delete this user?
A The System Admin can deactivate or delete a user. Utility>Admin>Logon. Select the user and press "remove"

User Accounts and Password Policies Frequently Asked Questions

(continued)

Q I have a sonographer who is on medical leave for a few weeks. I do not want to remove their user logon but I want to make sure they cannot access the system while not working.
A The System Admin can block a user account. Utility>Admin>Logon, select the user and check "Block user account," or deselect "active user account."

Q We have information that a weekend users password may have been compromised, I need to ask the user to change their password the next time they logon.
A The System Admin can require the user to change their password. Utility>Admin>Logon, select the user and check "Require password change"

Q I have created a new user for a new sonographer, how do I assign the correct group?
A When a new user is added to the list, the groups list is located on the right column of the screen. Assign the user to a group or multiple groups with the appropriate access rights.

Q Can I change the access rights for a pre-defined group?
A Currently this is not supported. You can select multiple groups from the factory default list for any user that needs additional access but not full admin rights; or create your own groups with desired rights.

Q The default "ADM" user account does not have a password, can I create a password for this account?
A Yes, you can create a password for the default ADM. Be sure to write this down for anyone who will need access to the system, such as GE Service.

Q I was the last user on the system, the screen has gone black, do I need to logon again?
A Yes, once the Screen Lock time has been reached touch any button or the trackball on the operator panel to display the logon screen. Logon with your current credentials.

User Accounts and Password Policies Frequently Asked Questions

(continued)

Q Can I use the Auto Logon feature?
A Yes, the Auto logon if checked will logon with the last user if the "Use password policies" is unchecked and the user has blank password. If the user is not assigned a password they will be logged on with no other entry required. If the user is assigned a password the logon window will pop-up requiring the password to be entered.

Locking the Screen and Logon

You define Automatically Lock Screen via the Utility-> Admin-> Logon page by checking the Enable Session Timeout (Lock Screen) box. Then go to the bottom of the column to designate after how many minutes the screen should be locked (Session Lock Screen Timeout (min)).
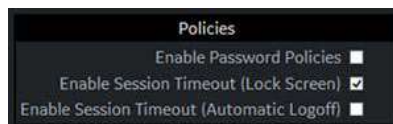
Figure 10-63.   Enable Lock Screen

The screen will lock after the designated time. During this time, the system will be completely black. To reactivate the system, the user will need to logon again.

NOTE: *If "use password policies" is unchecked and no password is set to the user, and when Auto Logon is checked, the system will start by using the ID of the last operator. If Admin is used as the operator, assure that all characters are removed from the password field.*

To lock the screen,

•   Type [Alt+L].

System Admin

The System Admin screen has information about any options implemented for the system.
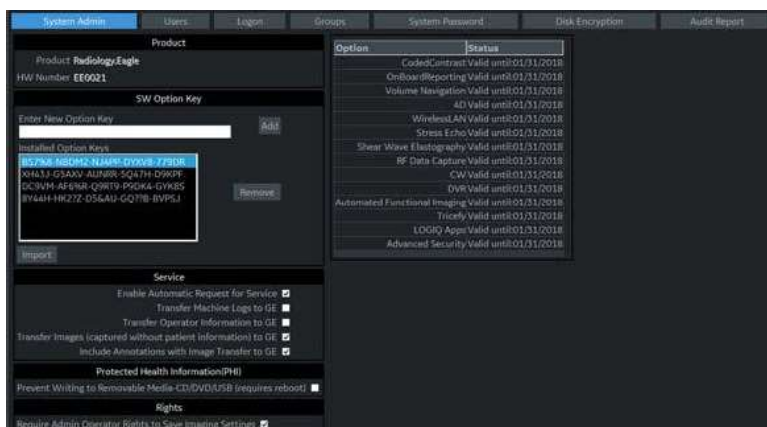
Figure 10-64.   Administrative System Admin Preset Menu

Table 10-98:   Product

Preset Parameter	Description
Product	The name of the product.
HW Number	The hardware number of the product.

Table 10-99:   Software Option Key

Preset Parameter	Description
Enter New Option Key	Type the key for the option you wish to add and press Add. *Note: The Option Key may contain alphanumeric characters (2-9, A-H, J-N, P-Z) and special characters ("?", "%" and "&").*
Installed Option Keys	Lists the key for the installed options.
Add	Press to add a software option key.
Remove	To remove a software option key, select the key in the SW Option Key list, and then select Remove.
Import	Used to import option strings stored on media (USB or DVD) or in the system (OptionKeys.txt may be stored at d:\service). When you press Import, a dialog box comes up that allows you to select from the following locations: USB drive, DVD drive, and d:\service.

Table 10-100:   Service

Preset Parameter	Description
Enable Request for Service	Check this box to enable the system to send system-generated requests for service, without your intervention.
Transfer Machine Logs to GE	Usage Analysis: Allows transfer of monitoring errors and status logs to GE back office for data analytics.
Transfer Operator Information to GE	Usage Analysis: Allows transfer of operator information to GE back office for usage analytics.
Transfer Images (captured without patient information) to GE	Usage Analysis: Allows transfer of images for analysis.
Include Annotation with Image transfer to GE	Usage Analysis: ? Allows transfer of operator information to GE back office for usage analytics.

If your site decides to deactivate the InSite RSVP Agent, then Remote Connectivity is no longer available on the LOGIQ P8/ P9/P10. This also means that Remote Service can no longer connect to the LOGIQ P8/P9/P10 via Disruptive Mode to diagnose system issues. and the "Service" section will be removed from this Utility page. In addition, you will not be able to initiate a Request for Service or Clinical Support Request via the "GE InSite RSVP" icon control located at the bottom of the Monitor Display.
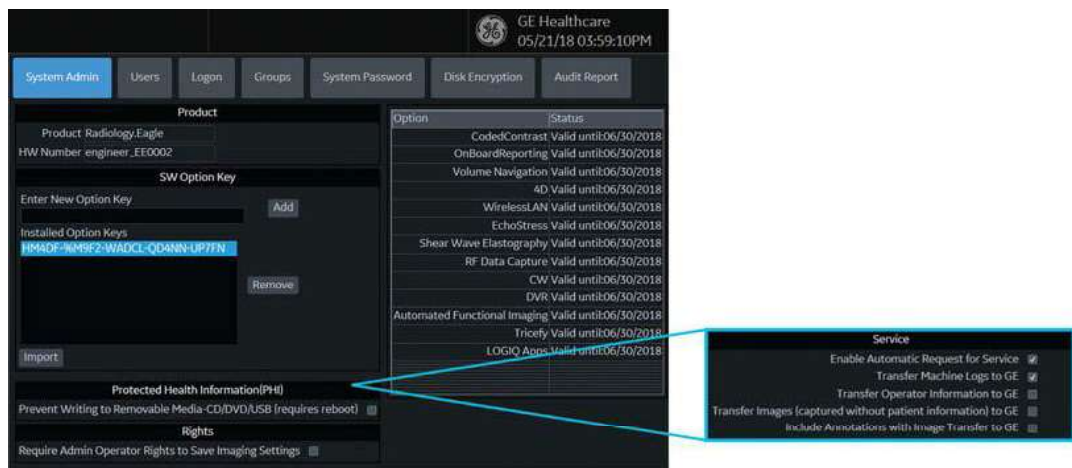
Figure 10-65.   Remote Connectivity Deactivated; Service Fields Removed

Table 10-101:   Protecting Health Information (PHI)

Preset Parameter	Description
Prevent Writing to Removable Media CD/ DVD/USB (requires reboot)	Check this box to prevent users from copying/saving information to removable media.

Table 10-102:   USB External Media

Preset Parameter	Description
USB External Media disabled (requires reboot) By Checking this box you will disconnect all external USB Mass Storage devices	Select to disable any USB media from connecting to the LOGIQ P8/P9/P10. **Please remember to enable this feature to reload software or to install the eIFU USB Media.**

Table 10-103:   Rights

Preset Parameter	Description
Require Admin Operator Rights to Save Imaging Settings	Check this box to require the User to have Administrative rights in order to save image settings.

Table 10-104:   Option Status

Preset Parameter	Description
Options	A list of the option name and status.
Status	Lists each option's effectivity.

Users

The Users screen allows you to define user IDs. It also allows you to specify operators registration, operator's rights setting, and registration of staff related to an examination (for example, referring and interpreting physicians).

Figure 10-66.   Users Preset Menu

Table 10-105:   User List

Preset Parameter	Description
User List	Lists the user ID for all system users.
Identity	Type the operator's user ID, Password, Prefix, Last Name, First Name, Middle Name, Suffix, Phone Number.
User Controls	The System Administrator can specify whether a user's account is active, blocked, or requires a password update.
Group Membership	Select the user's group: Operator (sonographers, doctors, or any person using the ultrasound system); Ref.Phys. (referring physician can be associated to the patient examination in the extended Patient information window); Perf.Phys. – physician performing the exam can be associated to the patient examination in the extended Patient information window. Note, other groups may exist as set up by the System Administrator.

Logon

The Logon section defines log on procedures.
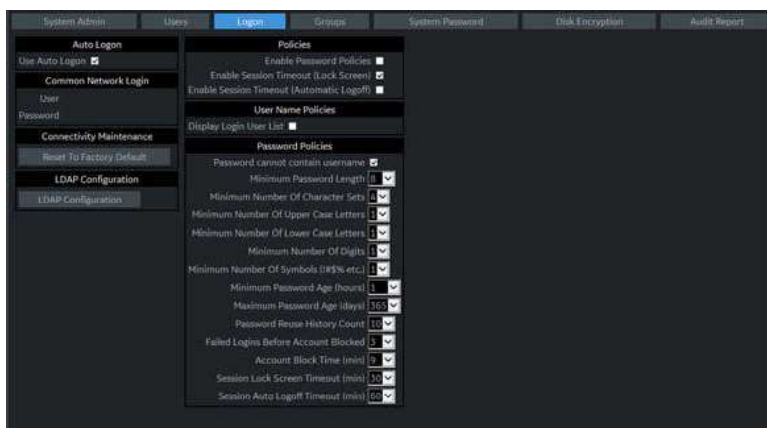
Figure 10-67.   Administrative Logon Preset Menu

Table 10-106:   Logon

Preset Parameter	Description

Auto Logon	Specifies logon procedures:
	• Use Auto Logon
	   • When selected, the system is started automatically, using the last user logon.
	   • When blank, the user must select a user ID and enter a password when logging on.
	 Note: Auto LOGON only works when password policies are disabled and if there is no password assigned to the user.
	• Allow Auto Logon for Admin users: The system is started automatically when logging in as an ADM user.
	• Allow Emergency User: The system will allow the EUSR user for emergency use.

Common Network Login	Specifies the user ID and password used to access the network. • User – User ID for network access • Password – Password for network access
Connectivity Maintenance	Reset to factory default.
LDAP Configuration	Refer to the next section for LDAP instructions.

Table 10-106:   Logon (Continued)

Preset Parameter	Description
Security Baseline	**Choose Security Baseline**. Select a baseline set of security policies for password and session management. For example: **Lowest (default)**: Autologon available. No password complexity rules. **Medium**: Autologon unavailable. Passwords must meet the following criteria: • Minimum password length of 8. • Minimum of 2 character sets. • Password should not contain username. • Password should not be any of the last 10 passwords. **High**: Autologon unavailable. Passwords must meet the following criteria: • Minimum password length of 10. • Minimum of 4 character sets. • Minimum of 1 lower case characters. • Minimum of 1 upper case characters. • Minimum of 1 special characters. • Minimum of 1 digits. • Password should not contain username. • Password should not be any of the last 15 passwords. **Highest**: Autologon unavailable. Passwords must meet the following criteria: • Minimum password length of 14. • Minimum of 4 character sets. • Minimum of 1 lower case characters. • Minimum of 1 upper case characters. • Minimum of 1 special characters. • Minimum of 1 digits. • Password should not contain username. • Password should not be any of the last 25 passwords. **Reset Security Baseline**: Clears the stored value for customer-selected security baseline. This forces the dialog which allows you to choose a baseline to be presented at the next Admin logon.

Table 10-107:   Policies

Preset Parameter	Description
Enable Password Policies	Specify whether to enable establishing policies for acceptable passwords, This specifies Password requirements such as # of letters, numbers, symbols, etc.
Enable Session Timeout (Lock Screen)	2-step logout: 1. System will display a lock screen after a set amount of time (configurable below under "session Lock Screen Timeout"). 2. System attempts to logout the user if "Automatic Logoff" is enabled and the timeout for it is reached or another user logs in instead.
Enable Session Timeout (Automatic Logoff)	This logs out a user automatically after a set amount of time.

Table 10-108:   User Name Policies

Preset Parameter	Description
Display Login User List	Check this box to display a list of Users.

Table 10-109:   Password Policies

Preset Parameter	Description
Password cannot contain username	Password policy stating that the password cannot contain the user's name.
Minimum Password Length	Password policy for password minimum length.
Minimum Number of Character Sets	Password policy for minimum number of characters types (Upper-Case, Lower-Case, Digits, Symbols).
Minimum Number of Upper Case Letters	Password policy for minimum number of upper-case letters allowed (A, B, C, etc.)
Minimum Number of Lower Case Letters	Password policy for minimum allowed for number of lower-case letters (a, b, c, etc.)
Minimum Number of Digits	Password polilcy for minimum number of numbers (1, 2, 3, etc)
Minimum Number of Symbols (~#$% etc.)	Password policy for minimum number of symbols allowed (#, @, etc.).
Minimum Password Age (hours)	Password policy for the minimum age for a password, in hours.
Maximum Password Age (days)	Password policy for the maximum age for a password, in days.
Password Reuse History Count	Password policy -- users can't reuse old password -- # of old passwords it stores so you can't reuse it
Failed Logins Before Account Blocked	Password policy for the number of failed attempts to login that are allowed.
Account Block Time (min)	There's a policy which will block an account for a certain amount of time after a certain number of failed logins -- you can set how long that time is
Session Lock Screen Timeout (min)	Password policy for the time, in minutes, before the system will lock the screen.
Session Auto Logoff Timeout (min)	Password policy for the time, in minutes, before the system will automatically log a user off the system.

LDAP Configuration

To enable LDAP authentication, check the "Enable LDAP authentication" box at the top of the LDAP Configuration page.
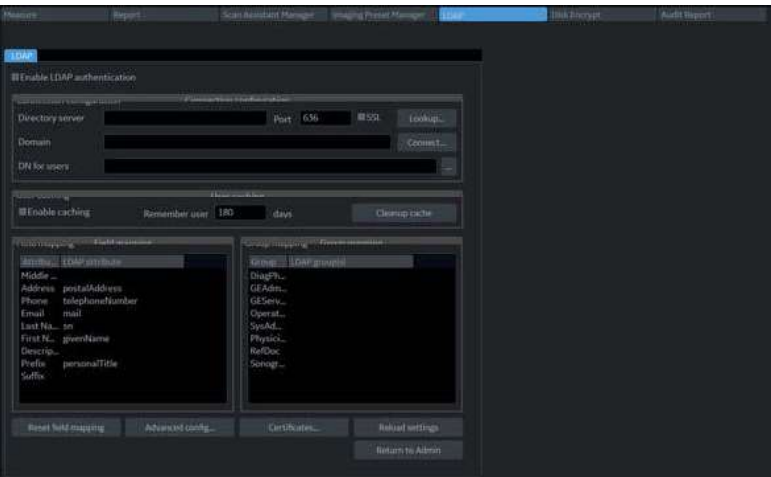
Figure 10-68.   LDAP Configuration

Table 10-110:   Connection Configuration

Preset Parameter	Description
Enable LDAP authentication	The administrator can select to enable system credentials using LDAP
Connection Configuration:	
Directory Server	URL for the Directory Server
Port	Port for the Directory Server
SSL	SSL (Secure Sockets Layer) -- Select to enable LDAPs (LDAP over SSL).
Lookup...	Button that opens up a Query pop-up for groups, domain, LDAP server, etc.
Domain	Domain name for LDAP server (if needed).
Connect...	Select to connect to server as...
DN for users	Distinguished Name for users. The LDAP API references an LDAP object by its distinguished name (DN). A DN is a sequence of relative distinguished names (RDN) connected by commas.
...	Select to open a list of DNs supported by the server.
User caching:	
Enable caching	The administrator can select to allow the user to cache their password credentials.

Table 10-110:   Connection Configuration (Continued)

Preset Parameter	Description
Remember user _____ days	This field specifies the number of days to remember the user for caching purposes.
Cleanup cache	The user can cache credentials. When they select this, it clears out the cache of credentials.
Field mapping:	
Field mapping	The mapping between attributes on the Ultrasound system and LDAP attributes. This allows you (for instance) to select which of several phone numbers that may be stored in your AD server are mapped to the Phone Number field of a user on the system or to refrain from mapping any AD element to that field.
Group mapping:	
Group mapping	Maps an LDAP group to a local group on the machine.
Selection buttons on bottom of screen:	
Reset field mapping	Resets field mapping to the factory defaults
Advanced config...	Entries in this menu should only be changed by experienced network administrators.
Certificates...	Server Certificate
Reload settings	Reloads LDAP settings.
Return to Admin	Press to go back to the Utility--> Admin configuration screens.

Lookup LDAP Servers

To look up LDAP Servers, select "Lookup" from the LDAP Configuration menu. Select the Domain from the pull-down menu, then select the LDAP Server from the list and press OK.

Logging on to the LDAP Server

To logon to the LDAP server, type your User Name and Password, then press OK.

Cleaning Up the Cache of Credentials

To clean up (empty) the cache of credentials, type your User Name and Password, then press OK.

Certificate Management

The Certificate Manager displays the system's Intermediate and Trusted Root Certification Authorities, as noted on the Certificate Manager's Tabs (Intermediate Certification Authorities and Trusted Root Certification Authorities). You can import or remove certificates.
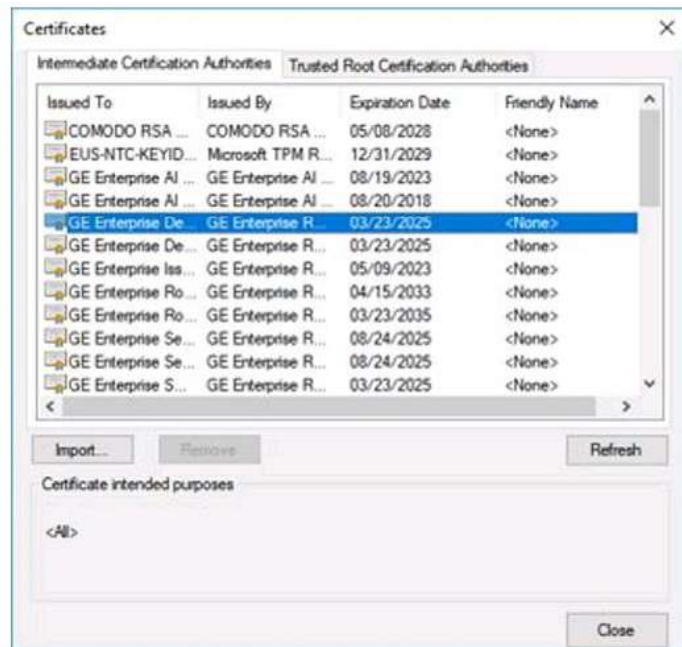
Figure 10-69.   Certificate manager

Select the appropriate Certification Authority, then press "Import" to import Certificates or press "Remove" to remove Certificates.

Figure 10-70.   Certificate Import Dialog

Advanced LDAP Configuration

Advanced LDAP Configuration Settings can be set on the Advanced LDAP Configuration menu.

Figure 10-71.   Advanced LDAP Configuration

Table 10-111:   Advanced LDAP Configuration

Preset Parameter	Description
Default naming context attribute	Attribute name for the naming context.
User search filter	Search for the user using a keyword
Account name attribute	Attribute name for LDAP Attribute to be used as Account/User Name
Group search filter	Search for the group using a keyword
Group name attribute	Attribute name for the LDAP group.
Member Of attribute	Attribute name for the "Member Of".
Search timeout(s)	Limits the time to perform a search
Search page size (objects)	Limits the number of search results
Two step authentication	Under LDAP there's a option for a secondary authentication so you give it a user name and password to login to the LDAP server. (Advanced Configuration)
Enabled	Check this box to enable two-step authentication.
User distinguished name	The user's distinguished name.

Table 10-111:   Advanced LDAP Configuration (Continued)

Preset Parameter	Description
User password	The user's password.
Load default settings	The user can select to load system default settings.

Logon Banner

The Power On Logon Banner displays the text at power-on and requires user confirmation to complete booting the system. This is user-configurable.

Updating the Logon Banner Page

You can change the text that displays when the user logs onto the LOGIQ P8/P9/P10 via the Utility-> Admin-> Login screen.

There are three login screens that can be used:

- GE Default Login Screen
- Department of Defense (DoD) Default Login Screen
- User-customized Login Screen
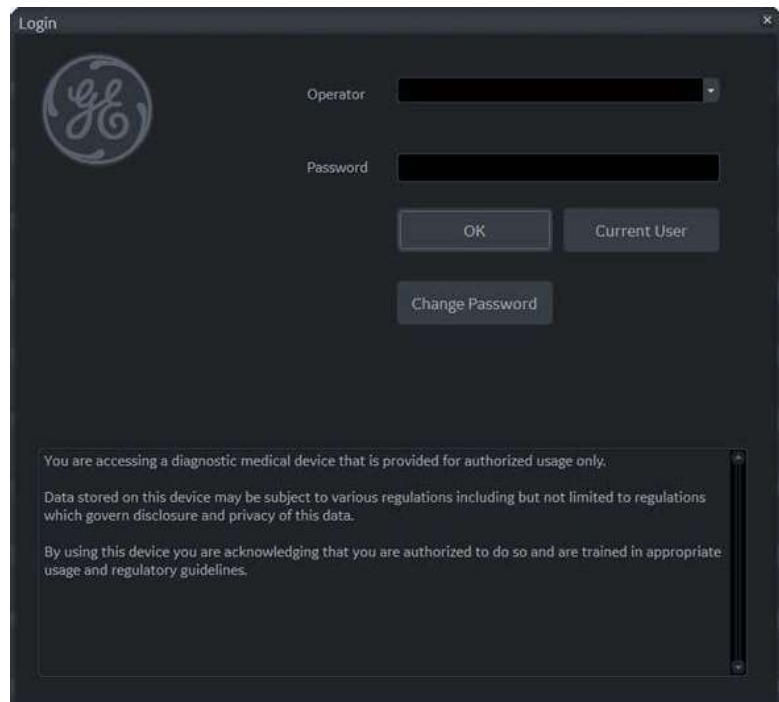
Figure 10-72.   GE Default Login Window

Updating the Logon Banner Page (continued)

To configure a customer-specific Login Banner page,

1. Access the Utility-> Admin-> Login screen.
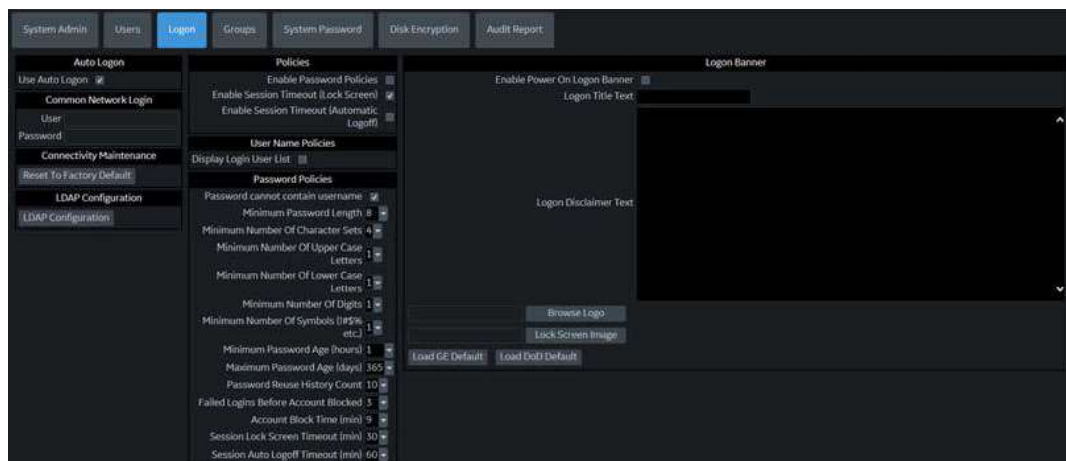
Update the Logon Banner portion of this screen:
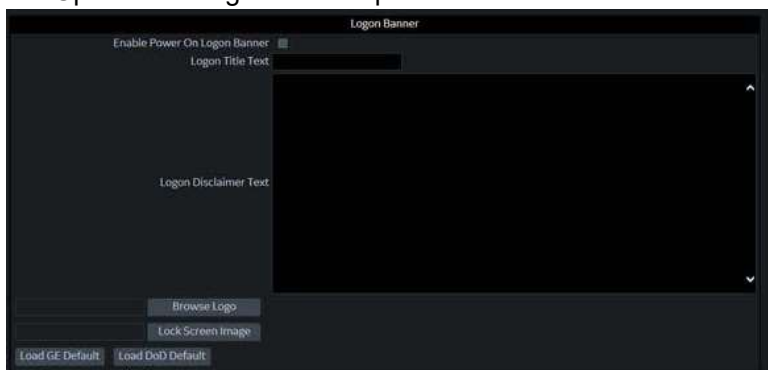
2. Type the Title into Logon Title Text.
3. Type the text into Logon Disclaimer Text.
4. Press Save.

Updating the Logon Banner Page (continued)

To set the GE Default as the Login window, press Load GE Default. Then press OK-> Save.

Figure 10-73.   Default GE Logon Banner

To set the DoD Default as the Login window, press Load DoD Default. Then press OK-> Save.
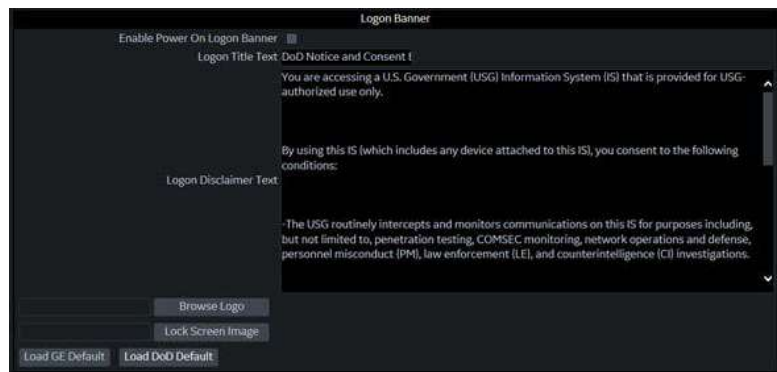
Figure 10-74.   Department of Defense Logon Banner

Enabling the Power On Logon Banner

To ensure the Power On Logon Banner displays and requires user confirmation to complete booting the system,
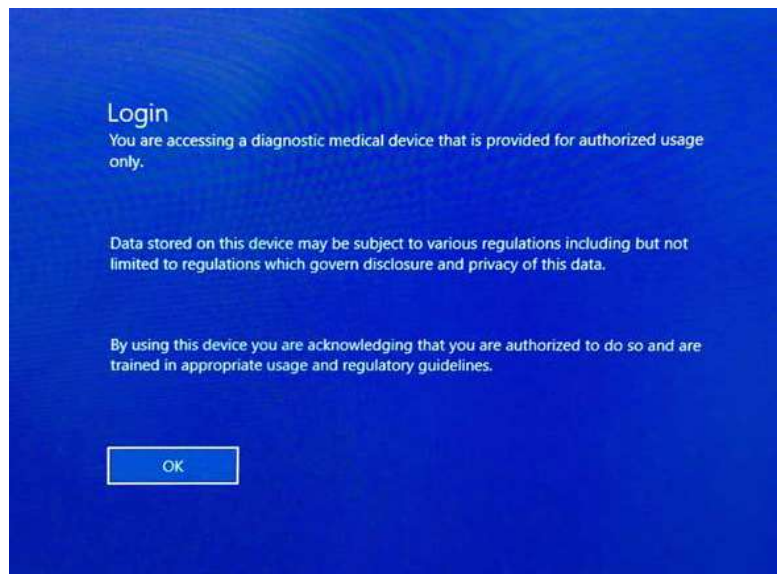
Figure 10-75.   Power On Logon Banner

1. Access the Utility-> Admin-> Login screen.
2. Checkmark **Enable Power On Logon Banner**.
3. Press Save and Exit.

Adding a Logon Logo

The system default logo on the LOGIQ P8/P9/P10 is the GE Logo. To add your own Logo,

1. Insert the USB Flash Drive with the Logo into a USB port on the LOGIQ P8/P9/P10.

    Specifications: The 'Logo' image should be a bitmap image (.BMP) format ONLY, with a size of 128x128.

2. Navigate to the Utility-> Admin-> Login screen.

3. Select Browse Logo. A pop-up window appears for you to navigate to the USB Flash Drive and Logo you want to add.

4. Select the Logo. Select OK. Then Save.

Adding a "Lock Screen" Image

You can add a custom lock-screen image.

Specifications: The 'Lock Screen' image should be a bitmap image (.BMP) format ONLY, with a size of 1920x1080.

NOTE: *Please select a screen that does not have high contrast or bright colors.*

To add a 'Lock Screen' image,

1. Insert the USB Flash Drive with the image into a USB port on the LOGIQ P8/P9/P10.

2. Navigate to the Utility-> Admin-> Login screen.

3. Select Lock Screen Image. A pop-up window appears for you to navigate to the USB Flash Drive and image you want to add.

4. Select the image. Select OK. Then Save.

Groups

System rights are set by the Administrator. If you do not have rights to a feature/function, please contact the Administrator. If access is denied, a message in red will appear in the status line (such as "You do not have the required permission to perform..." or a dialog will be displayed with more information. In some cases, buttons or sections of the screen may simply be disabled if you do not have appropriate rights.

Figure 10-76.   Groups Configuration

Table 10-112:   Group List

Preset Parameter	Description
Add	This creates a new group.
Default Groups	BioMed, DiagPhys, Emergency User, Lead Sonographer, Operator, Physician, RefDoc, Sonographer, and SysAdmin.
SysAdmin	All Group Rights
BioMed	All Group Rights, except Admin. Can edit Imaging/Connectivity Utility pages. Can change the system time and date. Can access the Service Desktop. Cannot edit Admin Utility pages.
Lead Sonographer	Login, Create/Update/Delete/Transfer/Export Patient Data, Basic/Imaging Configuration, Authorize Remote Service Access, and Capture Logs. Can edit Imaging Utility pages. Cannot edit Connectivity or Admin Utility pages and cannot change the system time and date.
Sonographer	Login, Create/Update/Transfer/Export Patient Data, Basic Configuration, Authorize Remote Service Access, and Capture Logs
Physician	Login, Create/Update/Delete/Transfer/Export Patient Data, Basic/Imaging Configuration, Authorize Remote Service Access, and Capture Logs

Table 10-113:   Name and Description

Preset Parameter	Description
Id	The Id, from the Group List.
Description	A description of the Group List Id.

Table 10-114:   Group Rights

Preset Parameter	Description
Rights assigned to each Group, by default	
Login	Allows users in this group to logon to the system.
Admin	Allows users in this group to have an system administrator's rights. Can add/remove users and enable/disable encryption, etc.
Create Patient Data	Allows users in this group to create patient and exam data.
Update Patient Data	Allows users in this group to change patient and exam data.
Delete Patient Data	Allows users in this group to delete patient and exam data.
Transfer Patient Data	Allows users to transfer patient and exam data over DICOM.
Export Patient Data	Allows users to export patient and exam data to media.
Basic Configuration	Allows access to and modification of basic Utility pages, which everyone has access to, except members of the Emergency User's Group.
Imaging Configuration	Allows modification of imaging preset Utility pages. Note, If the "Require Admin Operator Rights to Save Imaging Settings" is checked on the Utility page, then the "Imaging Configuration" right can only be used by a SysAdmin.
Advanced Configuration	Allows access to and modification of advanced configuration pages.
Authorize Remote Service Access	Allows users to authorize service engineers to connect to the system remotely and perform service tasks.
Capture Logs	Allows users in this group to capture and export a system log to monitor system performance.

Table 10-114:   Group Rights (Continued)

Preset Parameter	Description
Capture Logs with PHI	Allows users in this group to export log files with PHI included.
Access Service Desktop	Allows users in this group to access the Service Desktop.

To set up a new group,

1. Select the Group.

2. Assign the Rights you wish this Group to have.

System Password

The System Password is the Windows Password used by the LOGIQ P8/P9/P10 to automatically log into Windows. Users of the system will never need to use this password. The only reason to change the password will be if the user, for security reasons, prefers to define their own password instead of using the factory-created default password. As with all passwords, this should be treated with care and archived appropriately so that it can be provided to service personnel if necessary.

If you have changed the System Password, you must have the Current Password to change it.

To change the System Password,

1. Type your current password in the System Password field
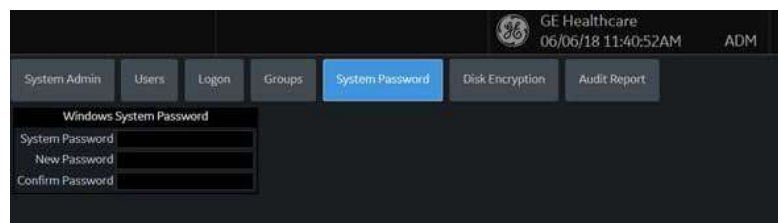
NOTE: *There is no need to enter the "current password" to change the System Password if the System Password has not been previously changed from the factory default. The same is true for the Database Password.*

2. Type the new password in the New Password field.
3. Type the new password again in the Confirm Password field.
4. Press Save to save the new Password; then press Exit.

NOTE: *'Windows System password' is the password for the underlying Windows OS user running this application. Do not change this password unless you are the system administrator of the device. This password is not needed for users of the system. It will only be needed by GEHC service in special situations. If you change the password, be sure to keep the new password secured and available if needed by GEHC service.*

Disk Encryption

Disk Encryption is designed to protect data privacy and assist your organization with HIPAA/HITECH compliance. Safeguards include:

- All patient data on the system's patient archive drive can be encrypted to provide protection in the event of a stolen device or hard drive.

CAUTION Make sure the system power cable is plugged into external power. **DO NOT** attempt to perform the initial encryption function on battery power.

CAUTION The security of the system, with respect to user encryption at rest, relies on the user's protection of the recovery key(s) and encryption passwords. If an adversary obtains an encrypted system or its hard-disk together with the recovery key(s) or encryption password, the encryption at rest will have no effect and give no protection of the data.

The selected encryption password and the recovery key(s) must be stored and managed in a safe and secure manner. It is the responsibility of the owner of the system to take care of these keys. If the keys are lost, the patient data stored on the system will be lost. There is no way for GE Healthcare to recover the data if the keys and password are lost.

For those using manual unlock with a recovery key(s) stored on USB rather than a password to regularly unlock the system. It is recommended to remove the USB when the system is not used.

Disk Encryption (continued)

CAUTION

If you've selected "Encryption ON. Key is stored on USB / password is entered manually" encryption, both password and recovery key are lost, you will not be able to access archived patient data (images and measurements included) nor store new patient data on this system.

The only way to recover the system to allow storing patient data is to reset the entire disk, which deletes all the archived patient data on the disk.

It is strongly recommended that all the patient data be stored in PACS or backed up to media prior to encrypting the disk.

In addition, it is recommended that the recovery key be stored on a USB storage device, printed, and kept in a secure location, ensuring that it will not be lost.

Disk Encryption (continued)

The system encrypts patient data by default (Encryption On. Disks are unlocked automatically).

1. If you wish to change the default encryption setting, select the desired Encryption Policy, then press Accept.
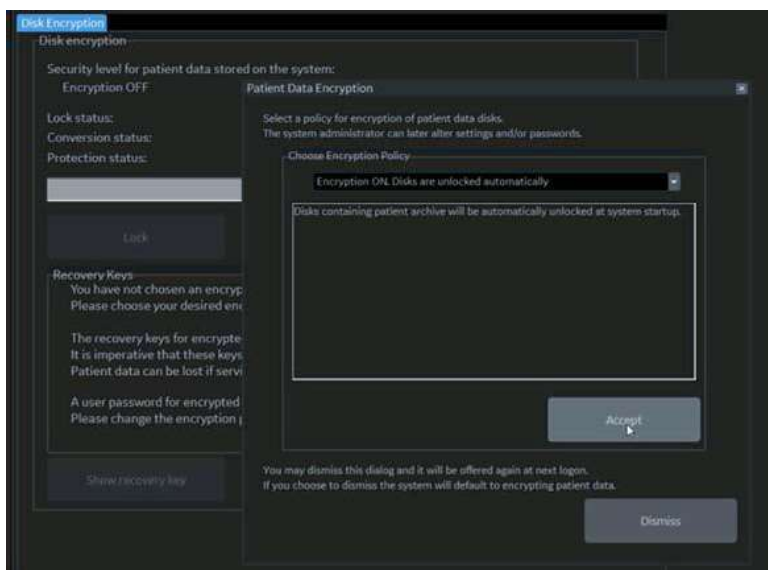
Figure 10-77.   Initialize System Encryption

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

Table 10-115:   Encryption Policy Selections

Encryption Policy	Description
Encryption OFF	Patient Data will not be encrypted. Selecting "OFF" will unencrypt the drive. System drive and recovery partition will remain encrypted.
Encryption ON. Disks are unlocked automatically	System Default. Patient data is encrypted and unlocked at system boot-up. Recovery Key and Password tied to the hard drive.
Encryption ON. Key is stored on USB / password is entered manually	The system will request the encryption password or recovery key at system startup. The system is not accessible until this password or a disk recovery key is provided. Requiring a password to access the patient archive may prevent emergency usage of the system.

NOTE: *If you choose to dismiss this dialog, you will be reminded to continue configuring encryption at each logon.*

Disk Encryption (continued)

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

   a. To reset the Encryption Password, "Change password".

NOTE: *If you receive this question, reply "No": "Password is already set on a disk. Do you want to reuse it? Press Yes to reuse existing password. Press No to delete existing password."*
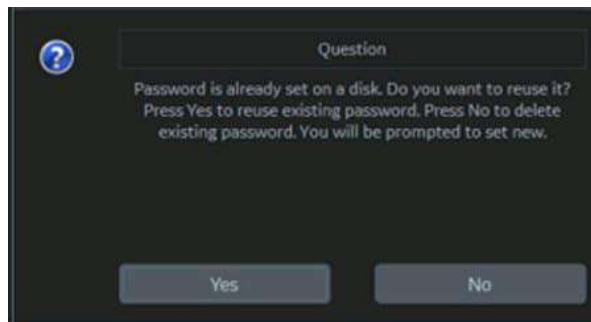
You can now update the encryption password, then press OK.

Disk Encryption (continued)

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

⚠️ CAUTION

Make sure to keep the password, recovery key, and any backup of these in a secure place, not accessible for any unintended audience.

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

a. Insert the USB flash drive into a USB port to save the recovery key.

NOTE: *Use the USB flash drive as the repository only for the recovery key. DO NOT use it for data archiving or DVR recording.*

Save recovery key to a USB Flash Drive by pressing **Save recovery keys**.

b. View the Recovery Key by pressing **Show recovery key**, then print it to a local printer or PACS.

Press the ***Print key*** to print the recovery key on the local printer.

c. Press ***Show recovery key*** to display the recovery key on the screen.

Press ***Hide recovery key*** to hide the recovery key.

Change password

Press ***Change Password*** to change the password as necessary.

Change the recovery key

If you want to change the recovery key, select **Change recovery key** to generate a new key.

NOTE: *Generating a new key causes the previous key to expire.*

Disk Encryption Frequently Asked Questions

Here are answers to some frequently-asked questions:

Q What type of encryption technology is used on my ultrasound system?
A AES (Advanced Encryption Standard) 256 bits supported. https://technet.microsoft.com/en-us/library/cc731549(v=ws.10).aspx

Q The system was accidentally turned off or lost power during the disk encryption process.
A The system will resume encryption automatically when restarted.

Q The USB recovery key was accidentally formatted. How do I access the system?
A If a password was created or the recovery key written down, enter this in the pop up window. Then go to Utility>Admin>Disc Encryption Select **Change recovery key**.   Be sure to print and save the new recovery key and store the USB in a secure location.

Q Is it possible to stop encrypting the data?
A Yes, via Utility>Admin>Disk encryption, choose Encryption, and select the "Encryption Off" from the pull-down menu. The process to unencrypt may take up to 15 minutes.

Disk Encryption Frequently Asked Questions (continued)

Q Is there a step I need to take every day to encrypt new data?
A No, the encryption will happen in the background without the need for any additional manual steps.

Q The encryption was done it took nearly 90 minutes, is this going to happen every time the data is encrypted?
A No, after the initial encryption process is completed, new data will be encrypted automatically.

Q How does this protect the patient data?
A The data is unreadable by anyone who attempts to use the system without the proper user rights and/or entering the password or recovery key.

Q I am using the system portable with Power Assistant, do I have to enter the password or recovery key after each exam?
A No, the password or recovery key will only need to be entered at each full boot up, and only if you have selected manual unlock.

Q I do not have Power Assistant but I take the system portable occasionally do I need to enter the recovery key or password each time?
A Only if "Disks unlocked manually" has been selected as the Encryption Policy. In this case the recovery key or password must be entered each time the system is turned on. If a USB with Recovery key is connected you will not need to manually enter the password or recovery key

Disk Encryption Frequently Asked Questions (continued)

Q The USB recovery key has been lost, how do I unlock the system?
A Manually enter the password or recovery key, then create a new USB key from the Disk Encryption page.

Q The USB recovery key and the password has been lost how do I unlock the disk?
A Contact your service, the system will need a base image and application reload. Create a new encryption key. *Note the patient data on the system is not recoverable from this scenario. Always store patient data to a PACS or backup to external media.

Q If it is not possible to unlock the data can I still scan and what cannot be used?
A If manual unlocking is used, the system cannot be operated without the password or recovery key.

Audit Report and System Log Server Configuration
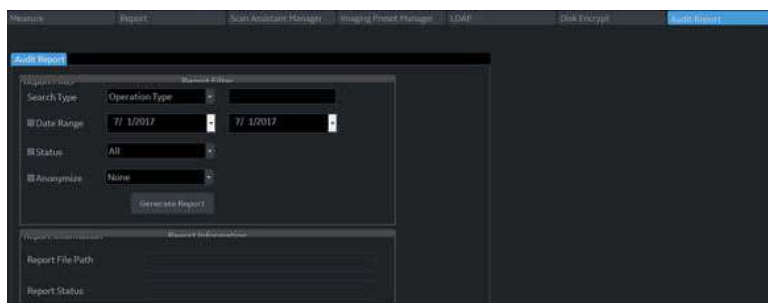
Figure 10-78. Audit Report

Table 10-116:   Audit Report

Preset Parameter	Description
Report Filter: Specify the following criteria.	
Search Type	Select the type of search.
Date Range	Specify the "From" and "To" date range.
Status	Specify the status.
Anonymize	Indicate whether to anonymize the report (remote patient data).
Generate Report	Press to generate the report.
Report Information: Generated report information.	
Report File Path	The location where to place the generated report.
Report Status	Report status.

Audit Report and System Log Server Configuration (continued)

Audit Report System Log Server Configuration page allows you to customize where to draw information from for the Audit Report.

You are also able to connect the LOGIQ P8/P9/P10 to a centralized logging database at your institution to monitor for pattern analysis. This way, if your system is compromised, the data can be analyzed for incident response.

This centralizes all the sytsem's data in the customer's data center -- It's like a DICOM connection page, but connects logs to a central location.

Figure 10-79.   System Log Server Configuration

Table 10-117:   Audit Report

Preset Parameter	Description
Connection.	
IP Address of the Server	The Server's IP address
TCP Listener Port	Transfer Control Protocol Listener Port. This is the port which we transfer logging data to use the syslog data protocol. It can be done by UDP or TCP, depending on the configuration of the customer logging server.

Table 10-117:   Audit Report (Continued)

Preset Parameter	Description
UDP Listener Port	User Datagram Protocol Listener Port. This is the port which we transfer logging data to use the syslog data protocol. It can be done by UDP or TCP, depending on the configuration of the customer logging server.
Mode of Transfer	Mode of transferring the data to the server (UDP, TCP, or TLS).
Windows Event Log	
Type of Logs to transfer	• Application Logs • Security Logs
Source of application event log to transfer: (Add * for no filter)	• Add Source: The user needs to specify where to draw data from for the audit report. • Delete Source: Delete the event log source from the application.
Transfer	
Send Time Period (Sec):	How often the system will attempt to contact the logging server to send logs. .
Number of days of Historic data to send:	If logging server connectivity has not been available, how many days of history should be sent when it is restored?
Batch Send Size	When sending historic data, how much to send in each transaction – this can help manage network traffic and server load, not typically necessary to change this.

Vulnerability Scan Mode (Option)

Please refer to the Advanced Security Option in Chapter 13.

Search

Utility Parameter Search

Opens up a search window to find a parameter on the utility pages.

To search for a utility parameter,

1. Press **Search** from the Utility Touch Panel or from another Utility page.

2. Type in the search string. For instance, if you're searching for Zoom you would just type 'zoom'.

Page	Tab	Item
System	System Display	Show Zoom Reference Image
System	System Imaging	Default Zoom Type
Imaging	B	Write Zoom Height
Imaging	B	Write Zoom Width
Imaging	B	Line Density Zoom

Search zoom

Service, Measure,Reports Unsupported
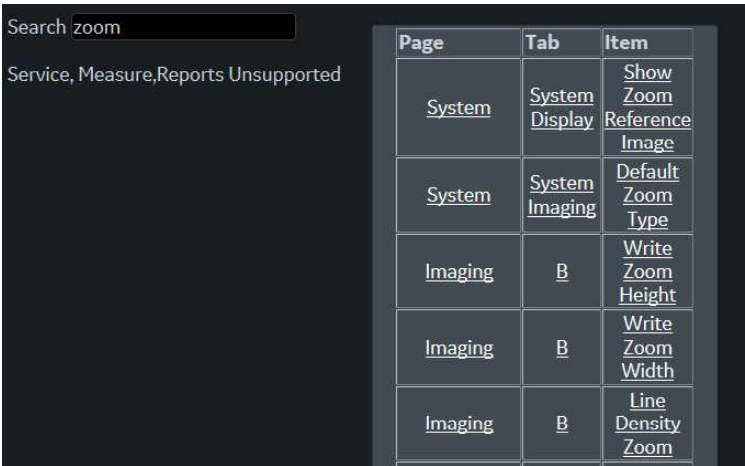
Figure 10-80.   Search Example

3. A list of possible matches appears to the right. Select the correct match.

NOTE: *You cannot perform a search on the Measure, Reports or Service utility pages.*

Measure

Please refer to Chapter 7, General Measurements and Calculations for more information on setting up Measurement and Analysis Presets.

Imaging Preset Manager

Overview

The Imaging Preset Manager allows you to:

- Create and Edit User Presets
  - Update User Presets
  - Rename User Presets
  - Delete User Presets
- Arrange presets on the Touch Panel
- Share User Presets across LOGIQ P8/P9/P10 systems
  - Export User Presets
  - Import User Presets

Creating a User-Defined Application Preset

To create a User-Defined Application Preset,

1. From the Touch Panel, select the active probe icon. The Model Touch Panel appears:
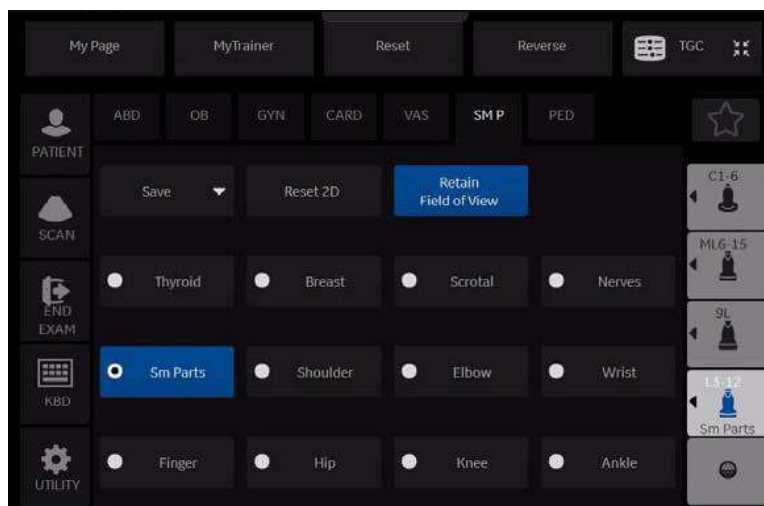
Figure 10-81.   Model Touch Panel

2. Select the *Model* and *Application* you want to use as a basis for the new Application Preset.

You are now ready to create your own user preset.

Creating a User-Defined Application Preset (continued)

3.   Press **Save**. A pop-up menu appears: The Create New
Application menu appears.
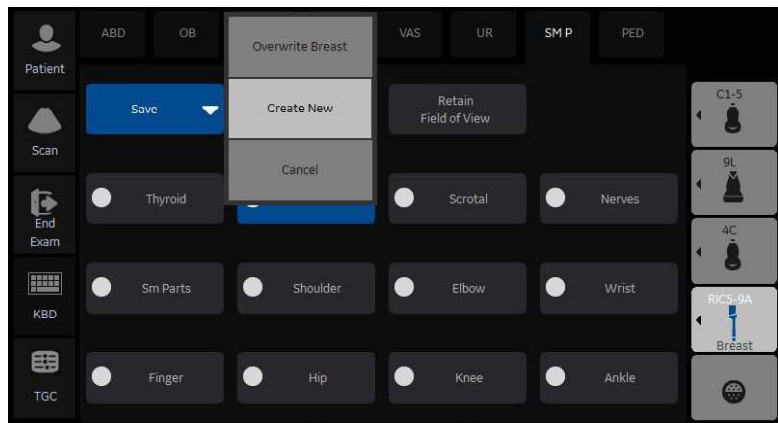
Figure 10-82.   Create New User Pop-up Menu

Creating a User-Defined Application Preset (continued)

4. Select **Create New**. The Create New Application menu appears.

    Type the name of the new application. Select **Create** OR press **Cancel** if you do not wish to proceed.
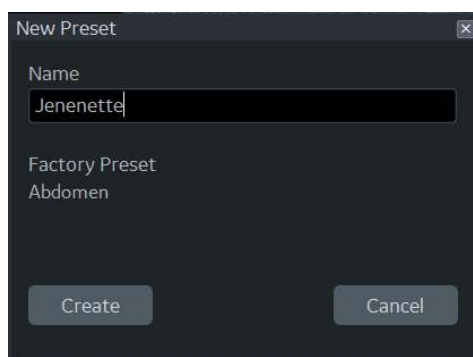
Figure 10-83.   Create New Preset

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

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

NOTE: *There is no limit to the number of user-defined application presets you can create for each exam category; you do not need to map all created presets to the Touch Panel.*

Creating a User-Defined Application Preset (continued)

After you select to create the new preset, the Imaging Preset Manager screen appears. The preset you just created now appears in the Available Imaging Presets column. You'll notice that it has the name you assigned it (Jeannette) + [Thyroid], the name of the application upon which it was based.
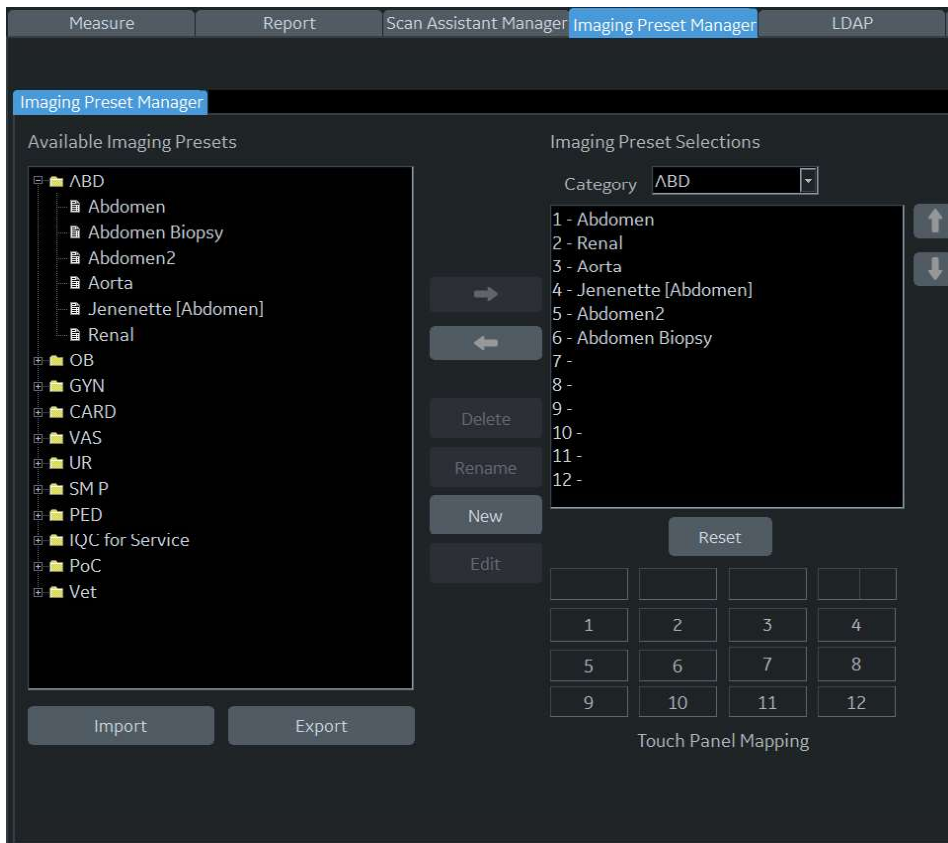
Figure 10-84.   Imaging Preset Manager

Updating User Presets

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

Editing Imaging Parameters

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

1. Adjust the image while in the user preset you want to edit.
2. Press active probe icon the Touch Panel screen.
3. Press *Save-->Overwrite* [Preset Name].
4. From the Utility--> Imaging menus.

To view/edit the parameters for the user defined preset

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

or

1. Adjust the image while in the user preset you want to edit.
2. Press *Model*.
3. Press *Save-->Overwrite [Preset Name]*.

Renaming a User Preset

To rename a user preset,

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

Deleting a User Preset

To delete a user preset,

1. Press Utility--> Imaging Preset Manager. Select the user preset you want to delete.

2. Press Delete. The Delete Preset pop-up menu appears.

3. Confirm that you want to delete this user preset and press OK.

Arranging Presets on the Touch Panel

On this screen, you specify where you want the new user (and existing) presets to appear on the exam's Touch Panel screen.

NOTE: *In the example above, the new user preset (Jeannette [Thyroid]) appears directly below Thyroid on the Touch Panel in the #5 position).*

Each control on the Touch Panel aligns with the numbers below. The Touch Panel has 12 controls that can be controlled by the user. In the example below, "1-Thyroid" would appear where the number "1" is on the Touch Panel Mapping grid. "2-Breast" would appear where the number "2" is on the Touch Panel Mapping grid. And so on. These applications can be positioned by you.
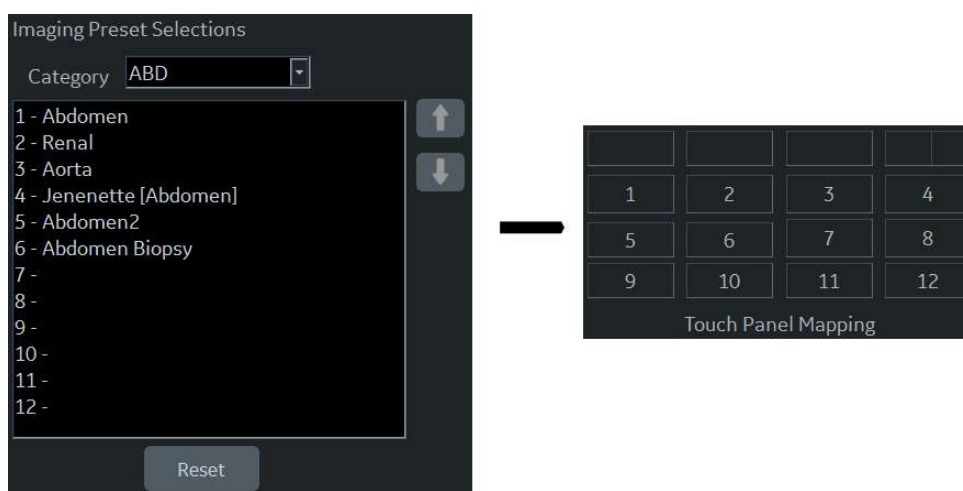
Figure 10-85.   Mapping Touch Panel keys

Arranging Presets on the Touch Panel (continued)

You can move the location of where the application appears on the Touch Panel via the Imaging Preset Manager (accessed from the Utility Touch Panel).

To reposition an application on the Touch Panel grid,

1. Select the Imaging Preset you want to move from the Imaging Preset Selection Column.
2.   Use the up/down arrow on the right side of the screen to move the preset to a position, next to the new map number
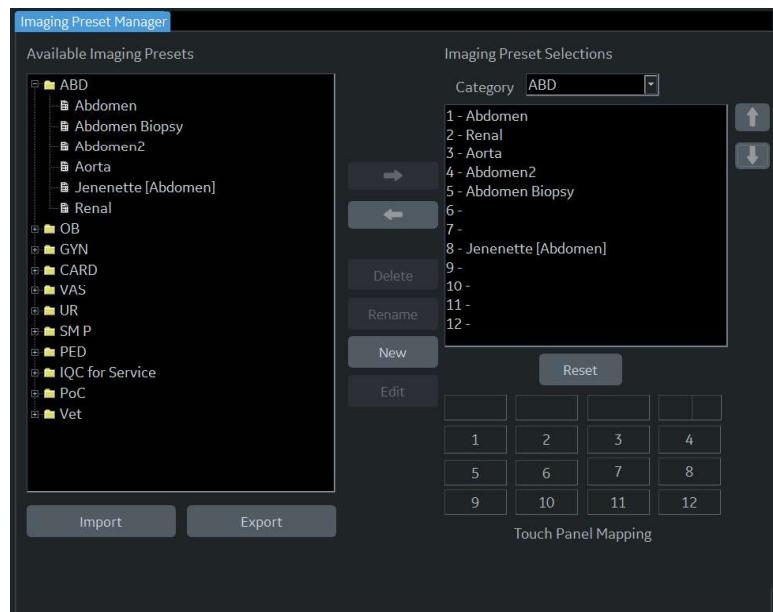
Figure 10-86.   Adjusting the position of the Preset

Arranging Presets on the Touch Panel (continued)

In the example below, the "Jeannette [Thyroid]) preset has been moved to the 9th position on the Touch Panel grid.
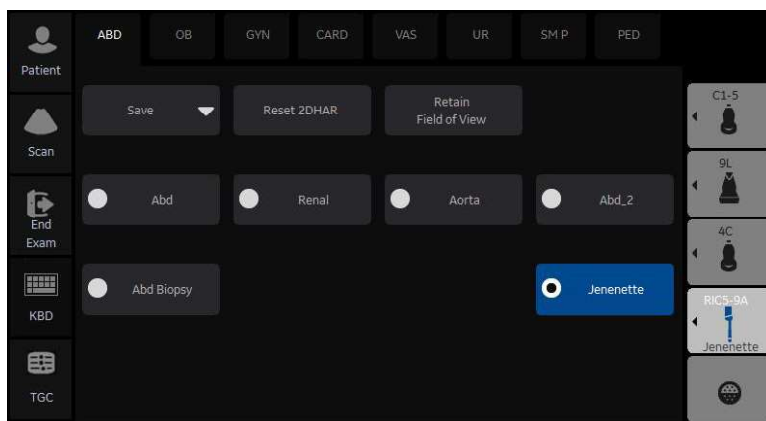
Figure 10-87.   Repositioned User Preset

Sharing User Presets between LOGIQ P8/P9/P10 Systems

You can share the user presets you have created between LOGIQ P8/P9/P10 systems by exporting/importing the preset(s) you want to share.

To move a user preset from one LOGIQ P8/P9/P10 to another LOGIQ P8/P9/P10 system (same software level), first export the user preset(s) you wish to share.

Exporting User Presets

To export a user preset (or presets),

1. Activate the **Imaging Preset Manager** from the Utility Touch Panel.
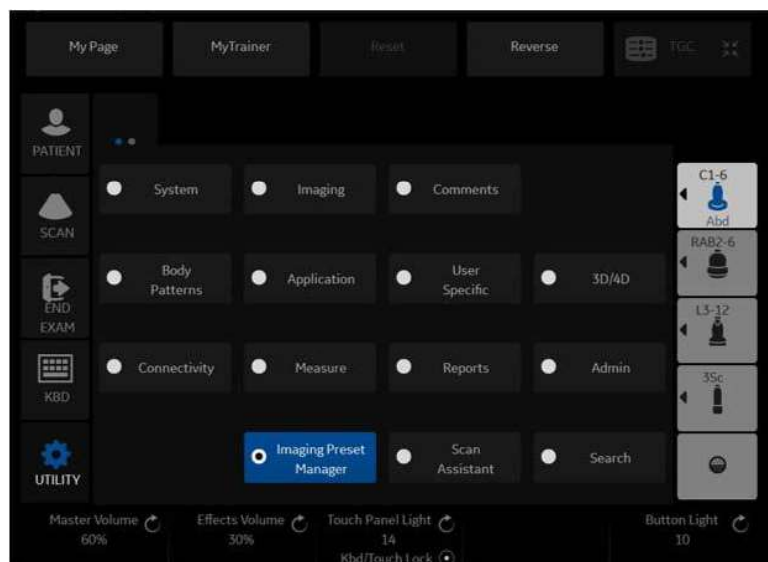
Figure 10-88.   Imaging Preset Manager Location on the Utility Touch Panel

2. Insert the media.

Exporting User Presets (continued)

3.   Press **Export** (on the bottom).
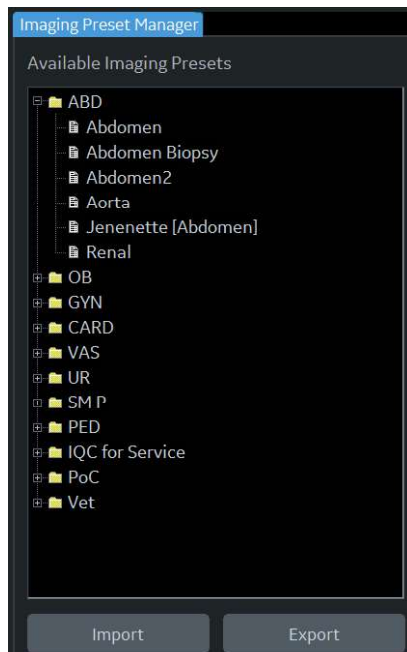
Figure 10-89.   Exporting a User Preset

Exporting User Presets (continued)

4. An Export Presets pop-up menu appears that indicates:

    a. destination location (USB Flash Drive/Hard Disk Drive drive location).

    b. preset directory where the preset should be saved (Preset Export).

    c. available presets on the scanner.

    Select the name for the Preset Directory from the Preset Directory pull-down.
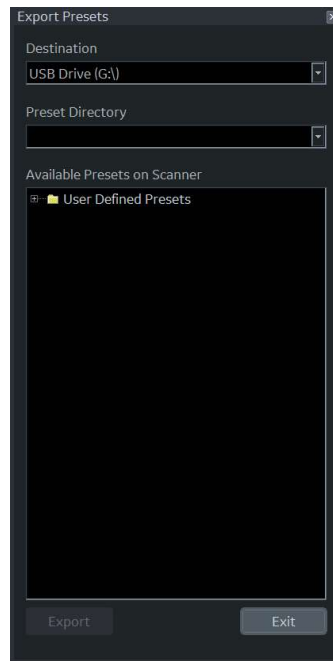
Figure 10-90.   Export Presets

5. Select the User Defined Presets under Available presets on Scanner and press Export.

6. Upon a successful Export, an informational message will pop-up indicating that "1 preset successfully exported." Press Ok. Then press Exit to close the Export Presets pop-up menu.

7. Press F3 to Eject the media. Take the media to the other LOGIQ P8/P9/P10 and follow the Importing User Presets instructions below.

Importing User Presets

To import a User Preset,

1. Activate the ***Imaging Preset Manager*** from the Utility Touch Panel.

2. Insert the media (Flash Drive, USB Hard Drive).

3. Press Import. The Import Presets pop-up appears and displays the Source Directory and Available Imaging Presets.

4. Select the "User Defined Presets" under Available Imaging Presets and press Import.

   If these presets are already on this LOGIQ P8/P9/P10, you will be asked whether you want to:

   • Overwrite this preset (Yes, Yes to All, No, or No to All).

   • Rename this preset (Type the new name and press Rename).

   • Cancel

5. Upon a successful Import, an informational message will pop-up indicating that "1 preset successfully imported." Press Ok. Then press Exit to close the Import Presets pop-up menu.

6. Press F3 to Eject the media.

Retain Field of View

Selecting Retain Field of View ensures that the Imaging Parameters shown in the table below stay constant over Probe and Preset changes.
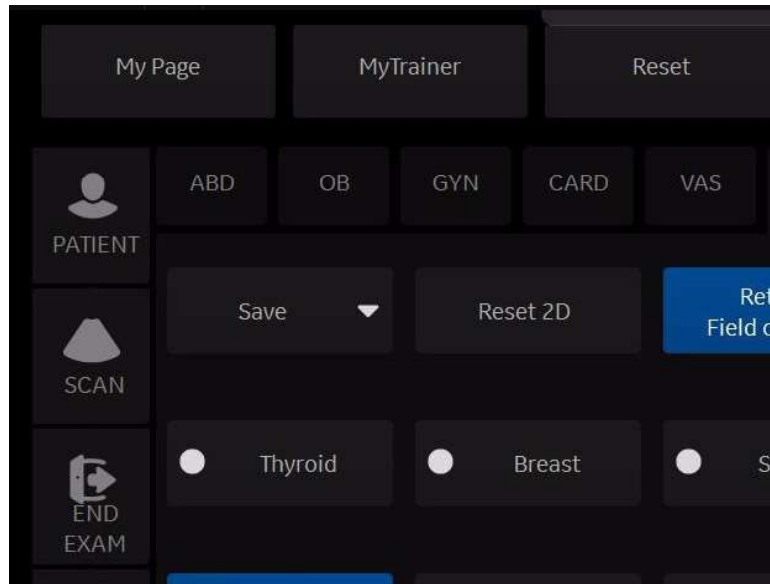
Figure 10-91.   Model Touch Panel

Table 10-118:   Retain Field of View

Mode	Probe	Retain Field of View Imaging Parameters
B-Mode, Harmonics, Contrast and B-Flow	Convex and Sector	Depth, Tilt, Zoom, Width
	Linear	Virtual Convex, Zoom, Depth, Steer
Color Flow Mode	Convex and Sector	ROI Size/Position
	Linear	ROI Size/Position, CF Virtual Convex, CF Steer
Doppler Mode		Doppler Cursor Position

MyPreset

Overview

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

The MyPreset allows you to:

- Arrange and edit presets on the Touch Panel

Activating MyPreset

1. From the Touch Panel, select the active probe icon.

   The star icon appears at the top left of the touch panel:
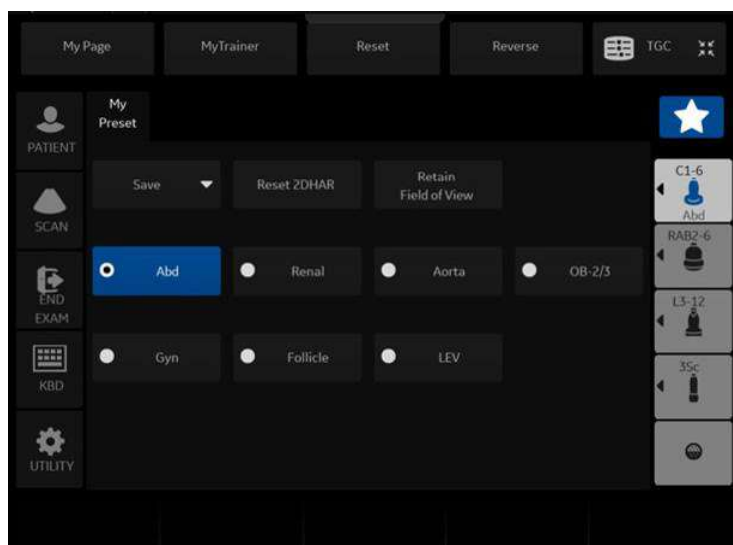
Figure 10-92.   MyPreset button on touch panel

2. Select the MyPreset button(star icon). Display the MyPreset page on touch panel.
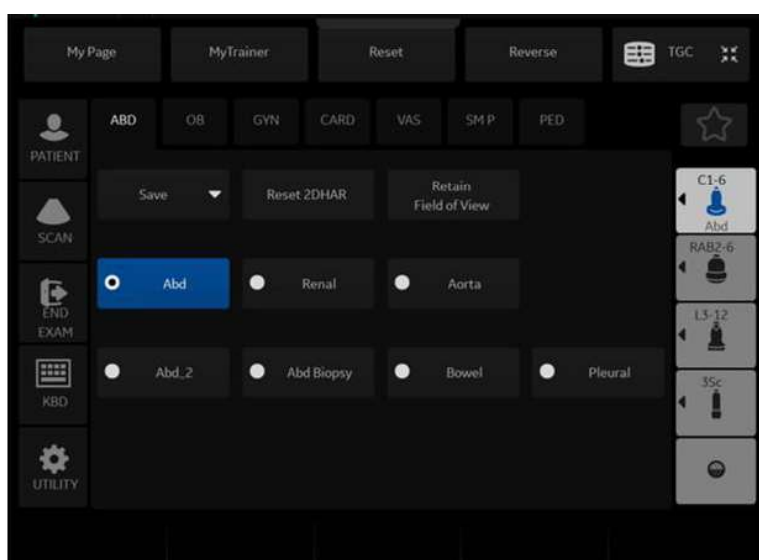
Figure 10-93.   MyPreset page

Arranging MyPreset

On this screen, you specify where you want the new user (and existing) presets to appear on the exam's Touch Panel screen according to probe.

For information about the specific MyPreset manager in utility, refer to "Imaging Preset manager"
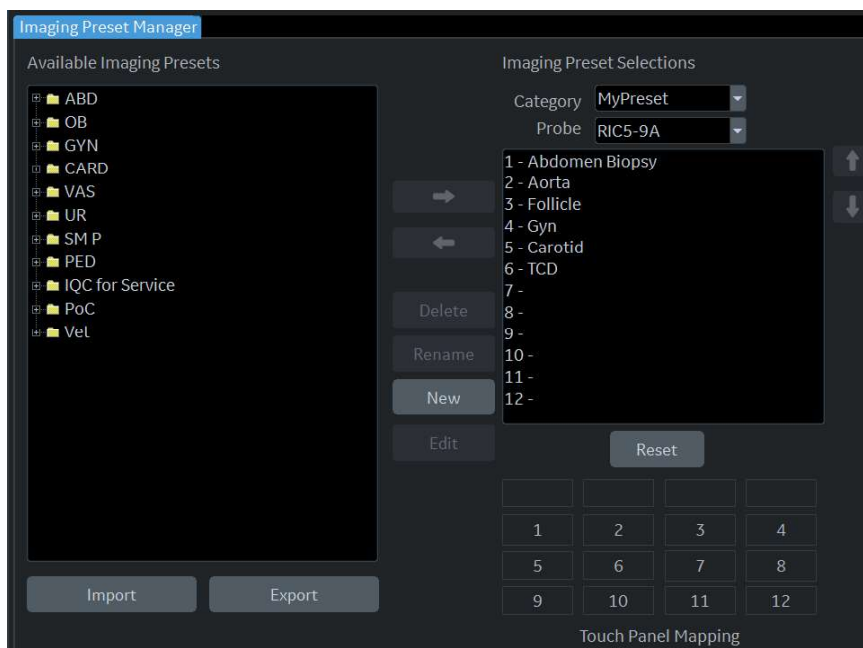
Figure 10-94.   MyPreset mapping touch panel keys

Service

Press Service to activate the Service browser interface.

Scan Screen

For more information, see the Wide Monitor section of Chapter 3.

Test Patterns

Overview

There are different test patterns available: Gray Bars, Color Bars, Resolution, Text, Angularity, Brightness Calibration, White, Gray, Red, Green, Blue and Pixel test patterns.

Pixel Test Patterns

Pixel patterns should appear to be a uniform color rectangle on the Blue/Yellow (B/Y and Y/B), Cyan/Red (C/R and R/C), Green/Magenta (G/M and M/G) and Black/White (K/W and W/K). If an area of the screen appears to have a dark or light grouping of pixels, first clean the screen to ensure that gel or dust is not causing an optical defect. If a pixel is defective, contact your Service Representative.

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Chapter 11

Probes and Biopsy

This chapter consists of the information of each probe and describes some special concerns, biopsy kits and accessories as well as basic procedures for attaching a biopsy guide to the different types of probes.

Probe Overview

Ergonomics

Probes have been ergonomically designed to:

- Handle and manipulate with ease
- Connect to the system with one hand
- Be lightweight and balanced
- Have rounded edges and smooth surfaces.
- Stand up to typical wear by cleaning and disinfectant agents, contact with approved gel, etc.

Cables have been designed to:

- Connect to system with appropriate cable length

Cable handling

Take the following precautions with probe cables:

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

Probe Orientation

Each probe is provided with an orientation marking. This mark is used to identify the end of the probe corresponding to the side of the image having the orientation mark on the display.

Figure 11-1.   Orientation Marking on Probe (Example)

1. Notch

Figure 11-2.   Probe orientation marker on the display

Labeling

Each probe is labeled with the following information:

*   Seller's name and manufacturer
*   Operating frequency (not shown on all probes)
*   GE part number
*   Probe serial number
*   Month and year of manufacture
*   Probe designation-provided on the probe grip and the top of the connector housing, so it is easily read when mounted on the system and is also automatically displayed on the screen when the probe is selected.

Supported probes

The LOGIQ P8/P9/P10 supports the following types of probes:

- Sector Phased Array
- Linear Array
- Convex Array
- Micro convex Array
- Matrix Array
- Split Crystal
- Volume probe (4D)

    - Convex Array
    - Micro Convex Array
    - Linear Array

NOTE: *Not all probes described in this document may be available or cleared for sale in all markets.*

Probe Naming Conventions

Table 11-1:   Probe Naming Convention

Type	Application	Frequency	Connector Type
C=Convex L=Linear M=Matrix S=Sector R=Real time 4D	AB=Abdominal IC=Intracavitary NA=Neonatal SP=Small Parts	"1-5"	RS D=DLP

Probe Description

Table 11-2:   Probe Description

Probe	Illustration	Application	Feature
C1-5-RS		Abdomen (incl. Pleural), Vascular (No transcranial), OB/GYN, Urology	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Contrast, Elastography, Shearwave Elastography, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
8C-RS		Pediatrics, Neonatal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, B Steer+
E8C-RS		OB/GYN, Urology, Transvaginal, Transrectal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy
E8CS-RS		OB/GYN (Transvaginal), Urology (Transrectal)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam,LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Elastography, Biopsy
IC9-RS		OB/GYN, Urology, (Transvaginal, Transrectal)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam,LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Elastography, Shearwave Elastography, Biopsy, Contrast, Max Angle

Table 11-2:   Probe Description (Continued)

Probe	Illustration	Application	Feature
BE9CS-RS		Urology (Transrectal)	B, CHI, CF, PDI, B-Flow, B-Flow Color, M, Anatomical M, PW, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Elastography, Contrast Biopsy
ML6-15- RS		Abdomen (incl. Pleural), Small Parts, Vascular (No transcranial), Pediatric, Neonatal, Musculoskeletal, Breast	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Shearwave Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
L3-12-RS		Abdomen (incl. Pleural), Vascular (No transcranial), Small Parts, Pediatric, Neonatal, OB, Breast, Musculoskeletal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+, Shear Wave Elastography
L4-12t-RS		Abdomen (incl. Pleural), Small Parts, Vascular (No transcranial), Pediatric, Neonatal, Musculoskeletal, Breast	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
12L-RS		Abdomen (incl. Pleural), Small Parts, Vascular (No transcranial), Pediatric, Neonatal, Musculoskeletal, Breast	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Shearwave Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
L6-12-RS		Abdomen (incl. Pleural), Vascular (No transcranial), Small Parts, Pediatric, Neonatal, Breast	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced3D, Biopsy, B Steer+

Table 11-2: Probe Description (Continued)

Probe	Illustration	Application	Feature
9L-RS		Abdomen (incl. Pleural), Small Parts, Vascular (No transcranial), Pediatric, Neonatal, OB, Breast, Musculoskeletal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Elastography, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Biopsy, B Steer+
L10-22-RS (LP10/LP9 only)		Small Parts, Musculoskeletal, Neonatal	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Virtual Convex,CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D
L8-18i-RS		Small Parts, Vascular (No transcranial), Neonatal, Pediatrics, Intraoperative (Not for China) Musculoskeletal, Peripheral Vascular	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Virtual Convex, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D
3Sc-RS		Cardiac, Abdomen (incl. Pleural), Transcranial	B, CHI, CF, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ASO, CTO, Stress Echo, SRI-HD, Advanced 3D, Biopsy, Contrast
6S-RS		Abdomen (incl. Pleural), Cardiac, Pediatrics, Neonatal, OB	B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced3D

Table 11-2:   Probe Description (Continued)

Probe	Illustration	Application	Feature
12S-RS		Abdomen (incl. Pleural), Pediatrics, Neonatal	B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced3D
RAB2-6- RS		Abdomen, OB/GYN, Urology	B, CHI, CF, PDI, M, PW, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, 3D/4D real-time imaging, Biopsy, Advanced 3D, B Steer+
RIC5-9A-RS		OB/GYN (Transvaginal), Urology (Transrectal)	B, CHI, CF, PDI, M, PW, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced3D, 3D/4D, Biopsy, Max Angle
P8D		Cardiac, Vascular (No transcranial)	CW, ASO
P6D		Cardiac, Vascular (No transcranial)	CW, ASO
P2D		Cardiac, Vascular (No transcranial)	CW, ASO
L3-9i-RS (LP10/LP9 only)		Small Parts, Vascular, Musculoskeletal, Neonatal, Intraoperatives (Not for China)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Virtual Convex,CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D

Table 11-2:   Probe Description (Continued)

Probe	Illustration	Application	Feature
6Tc-RS		Cardiac (Transesophageal)	B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Virtual Convex, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D Note: 6Tc-RS probe requires special handling. Refer to the TEE Probe User Manual enclosed with 6Tc-RS probe.
C1-6-D (LP10/LP9 only)		Abdomen (incl. Pleural), OB, Gynecology, Vascular (No transcranial), Urology	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Contrast, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, Elastography, Shearwave Elastography, Biopsy, B Steer+, UGAP
C2-7-D		Abdomen (incl. Pleural)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, Contrast, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, B Steer+
C3-10-D (LP10 only)		Abdomen (incl. Pleural), Neonatal, Pediatric, Vascular (No transcranial)	B, CHI, CF, PDI, M, PW, B-Flow, B-Flow Color, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, B Steer+
10C-D		Neonatal, Pediatric, Vascular, (No transcranial)	B, CHI, CF, PDI, M, PW, B-FLow, B-Flow Color, CrossXBeam, LOGIQView, ATO/ASO, CTO, SRI-HD, Advanced 3D, B Steer+
M5Sc-RS (LP10 only)		Cardiac, Transcranial, Abdomen (incl. Pleural)	B, CHI, CF, PDI, M, MCF, Anatomical M, PW, CW, TVI, TVD, Contrast, Virtual Convex, LOGIQView, ATO/ASO, CTO, Stress Echo, SRI-HD, Advanced 3D, Biopsy

BE9CS-RS Probe Changing Scan Method

Changing scan methods between two micro-convex. Press the switch on the BE9CS-RS probe.
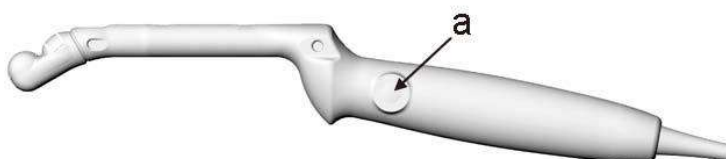
Figure 11-3. Switching button

a. Switching button

Figure 11-4. Scan plane orientation

Probe Safety

Probe handling and infection control

This information is intended to increase user awareness of the risks of disease transmission associated with using this equipment and provide guidance in making decisions directly affecting the safety of the patient as well as the equipment user.

Diagnostic ultrasound systems utilize ultrasound energy that must be coupled to the patient by direct physical contact. Depending on the type of examination, this contact occurs with a variety of tissues ranging from intact skin in a routine exam to recirculating blood in a surgical procedure. The level of risk of infection varies greatly with the type of contact.

One of the most effective ways to prevent transmission between patients is with single use or disposable devices. However, ultrasound transducers are complex and expensive devices that must be reused between patients. It is very important, therefore, to minimize the risk of disease transmission by using barriers and through proper processing between patients.

⚠ CAUTION — Adequate cleaning and disinfection are necessary to prevent disease transmission. It is the responsibility of the equipment user to verify and maintain the effectiveness of the infection control procedures in use.

⚠ CAUTION — To minimize the risk of infection from blood-borne pathogens, you must handle the probe and all disposables which have contacted blood, other potentially infectious materials, mucous membranes, and non-intact skin in accordance with infection control procedures. You must wear protective gloves when handling potentially infectious material. Use a face shield and gown if there is a risk of splashing or splatter.

Using protective sheaths

WARNING	Probe sheaths are disposable and must not be reused.

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.

Always use a legally marketed, sterile probe sheaths for intra-cavitary and intra-operative procedures.

For neurological intra-operative procedures, use of a legally marketed, sterile, pyrogen free probe sheath is REQUIRED. |

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 an expired probe sheath. Before using probe sheaths, verify whether the term of validity has expired.

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.

Instructions. Custom made sheaths are available for each probe. Each probe sheath kit consists of a flexible sheath used to cover the probe and cable and elastic bands used to secure the sheath.

Sterile probe sheaths are supplied as part of biopsy kits for those probes intended for use in biopsy procedures. In addition to the sheath and elastic bands, there are associated accessories for performing a biopsy procedure which are included in the kit. Refer to the biopsy instructions for the specific probes in the Discussion section of this chapter for further information.

Reordering. To reorder sheaths, please contact your local distributor or the appropriate support resource.

Using protective sheaths (continued)

Handling precautions

⚠️ WARNING   Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. DO NOT use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

⚠️ WARNING   Ultrasound transducers can easily be damaged by improper handling and by contact with certain chemicals. Failure to follow these precautions can result in serious injury and equipment damage.

- Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector and the adapter into any liquid.
- Avoid mechanical shock or impact to the transducer and do not apply excessive bending or pulling force to the cable.
- Transducer damage can result from contact with inappropriate coupling or cleaning agents:
  - Do not soak or saturate transducers with solutions containing alcohol, bleach, ammonium chloride compounds or hydrogen peroxide
  - Avoid contact with solutions or coupling gels containing mineral oil or lanolin
  - Avoid temperatures above 60°C.

⚠️ CAUTION   Probes for transvaginal and transrectal applications require special handling. Transvaginal/transrectal examinations and probe insertions should be performed only by personnel with adequate training.

Transesophageal probe safety

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

 CAUTION — Transesophageal probes require special handling. Refer to the user documentation enclosed with these probes.

 CAUTION — TEE probes should always be used with an appropriate Bite Guard in place.

Mechanical hazards

 CAUTION — A defective probe or excessive force can cause patient injury or probe damage:

- Observe depth markings and do not apply excessive force when inserting or manipulating intercavitary probes.
- Inspect probes for sharp edges or rough surfaces that could injure sensitive tissue.
- DO NOT apply excessive force to the probe connector when inserting into the probe port.

Electrical shock hazard

Electrical Hazard

The probe is driven with electrical energy that can injure the patient or user if live internal parts are contacted by conductive solution:

- **DO NOT** immerse the probe into any liquid beyond the level indicated by the immersion level diagram. Refer to the immersion illustration in the Probe Cleaning Process section. Never immerse the probe connector or probe adaptors into any liquid.

- **DO NOT** drop the probes or subject them to other types of mechanical shock or impact. Degraded performance or damage such as cracks or chips in the housing may result.

- Prior to each use, visually inspect the probe lens and case area for cracks, cuts, tears, and other signs of physical damage. DO NOT use a probe which appears to be damaged until you verify functional and safe performance. You must perform a more thorough inspection, including the cable, strain relief, and connector, each time you clean the probe.

- **DO NOT** kink, tightly coil, or apply excessive force on the probe cable. Insulation failure may result.

- Electrical leakage checks should be performed on a routine basis by GE Service or qualified hospital personnel. Refer to the service manual for leakage check procedures.

6Tc-RS Probe Thermal Safety

Maintaining a safe thermal environment for the patient has been a design priority at GE. In order to avoid damage to body tissues, for long term exposures, tissue contact probe tip temperatures should be less than 42-43 degrees C. The ultrasound scanner incorporates an elaborate thermal safety system which informs the physician of the operating temperature of the probe, and prevents the operative temperature from exceeding given limits. Whenever the 6Tc-RS Probe is plugged into the system and selected, the probe tip temperature is displayed on the system monitor.

If the temperature sensor is not working properly when you plug the probe into the system, the probe will not be accepted and scanning will not be possible.

The lower limits of the temperature observation of the system is 29 degrees C.

NOTE: *The system displays "29" on the title bar even if the temperature of the probe tip becomes less than 29 degrees C.*

High temperature protection levels

The temperature is always displayed on the system monitor. The system has two levels of upper thermal limit: the first high limit is set at 41.0 degrees C, and the second high limit is set at 42.7 degrees C. If the temperature of the probe tip reaches 41.0 degrees C, the temperature display turns red, the system enters freeze mode, and a warning appears on the monitor, asking the user if he/she wishes to continue scanning up to a higher temperature limit. If the response is OK, the scanner will resume scanning. If he/she selects Cancel, or no response is given, the system will remain in Freeze mode. If the temperature reaches 42.7 degrees C, the system will freeze unconditionally. The user will not be allowed to start scanning until the temperature has decreased 0.5 degrees C below the limit where the system entered Freeze mode. To restart scanning, the user must press the Freeze button.

NOTE: *If you receive a system error message while scanning with the 6Tc-RS TEE probe, discontinue scanning with this probe immediately -- the temperature exceeds normal operating conditions. Remove the probe from patient contact until the system no longer reports the overheating message. If the system continues to report an overheating message, contact Service. Refer to the TEE Probe User Manual for more information.*

Endocavitary probe safety

If the sterilization solution comes out of the endocavitary probe, please follow the cautions below.

⚠ WARNING   Sterile/sanitary sheaths are to be used on the probe during its actual use with patients. Wearing gloves protects the patient and operator.

⚠ CAUTION   Sterilant Exposure to Patient (e.g., Cidex)-Contact with a sterilant to the patient's skin or mucous membrane may cause an inflammation. If this happens, refer to the sterilant's instruction manual. Sterilant Exposure from Probe Handle/Connector to Patient (e.g., Cidex)-DO NOT allow the sterilant to contact the patient. Only immerse the probe to its specified level. Ensure that no solution has entered the probe's handle before scanning the patient. If sterilant comes into contact with the patient, refer to the sterilant's instruction manual. Endocavitary Probe Point of Contact-Refer to the sterilant's instruction manual.

Care and Maintenance

Planned maintenance

⚠️ CAUTION   Improper handling can lead to early probe failure and electric shock hazards.

DO follow the specific cleaning and disinfection procedures provided in this chapter and the germicide manufacturers instructions.

Failure to do so will void probe warranty.

The following maintenance schedule is suggested for the system and probes to ensure optimum operation and safety.

It is recommended to keep a maintenance log and note all probe malfunctions, along with a picture of any probe malfunction.

Table 11-3:   Planned Maintenance Program

Do the Following	Before Each Use	After Each Use	As Necessary
Inspect the Probes	X	X	X
Clean the Probes		X	X
Disinfect Probes		X	

Care and Handling

The following recommentions help to reduce preventable probe damage.

⚠️ **WARNING**   Failure to follow these precautions can result in serious injury and/or equipment damage.

NOTE: *Sporadically, silicone grease can leak in small amounts from 3D/ 4D probes' cable bushing. This leakage is not a failure or harmful to the human body, Silicone grease does not contain any hazardous substances and is only used to seal the cable bushing. In case of a leakage wipe the grease with a cloth.*

Table 11-4:   Probe Care Recommendations

Do:	Don't Do:
Handle all probes with extreme care.	DO NOT drop or knock the probe or probe lens. Impacting the probe lens face can cause fractures of the crystal elements leading to failulre.
Ensure that connected probes are placed in the probe holder yoke when not in use. Be sure to utilize the endocavity probe holder and the probe inserts for the 3D and small aperture probes that were provided at delivery.	DO NOT leave probes in places where they may be knocked over or dropped.
Use wall-mounted probe holders with lens facing upward.	Ultrasonic cleaning IS NOT approved for GE probes.
Visually inspect probes and cables for damage prior to connecting them to the LOGIQ P8/P9/P10. If a probe appears to be damaged, discontinue use and notify your GE Customer Service Representative. Possible damage may include, but is not limited to: • Bent or broken probe pins • Cable cuts or splitting • Surface cracks • Exposed wires or shielding • Fluid leaks	DO NOT drop probes into holders or into disinfectant containers with the probe's lens face down.
Disconnect probes from the system prior to cleaning or disinfecting the probe.	DO NOT let probe cables dangle loosely from the LOGIQ P8/P9/P10 where they might be caught in the wheels/casters while moving.
Ensure you follow the chemical manufacturer recommendations regarding the use and handling of the chemical.	DO NOT immerse probes deeper than permissible levels. NEVER immerese the connector or adapter into any liquid.
Always use bite guards withTransesophageal (TEE) probes.	DO NOT apply excessive bending or pulling force to the probe cable.

Table 11-4:   Probe Care Recommendations (Continued)

Do:	Don't Do:
Clean and disinfect all probes following the procedures contained in this manual, Probe User Manual and Probe Care Carad..	DO NOT kink, tightly coil, or apply excessive force on the probe cable or TEE endoscope shaft. Insulation failure may result.

Inspecting probes

⚠ CAUTION   If any damage is found, DO NOT use the probe until it has
been inspected and released for further use by a GE service
representative.

Before each use

1. Inspect the probe's lens, cable, casing, and connector for
    cracks, cuts, tears, and other signs of physical damage.
2. Test the functionality of the probe.
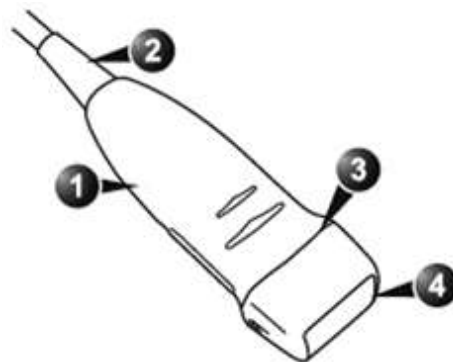
Figure 11-5.   Probe parts

1. Housing
2. Strain relief
3. Seal
4. Lens

After each use

1. Inspect the probe's lens, cable, casing, and connector for
    cracks, cuts, tears, and other signs of physical damage.
2. Look for any damage that would allow liquid to enter the
    probe.

Cleaning and disinfecting probes

⚠ 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.

Use only germicides that are listed in the Probe Care Card enclosed with the probe. In addition, refer to the local / national regulations.

⚠ WARNING   Do not steam, heat autoclave on general surface probes.

⚠ CAUTION   You MUST disconnect the probe from the LOGIQ P8/P9/P10 prior to cleaning/disinfecting the probe. Failure to do so could damage the system.

⚠ CAUTION   Avoid cross-contamination, follow all infection control policies established by your office, department or hospital as they apply to personnel and equipment.

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

⚠ CAUTION   Take extra care when handling the lens face of the ultrasound transducer. The lens face is especially sensitive and can easily be damaged by rough handling. NEVER use excessive force when cleaning the lens face.

Cleaning and disinfecting probes (continued)

CAUTION — Probes for neuro surgical intra-operative use must NOT be sterilized with liquid chemical sterilants because of the possibility of neuro toxic residues remaining on the probe. Neurological procedures must be done with the use of legally marketed, sterile, pyrogen free probe sheaths.

Biological Hazard — CREUTZFIELD-JACOB DISEASE

Neurological use on patients with this disease must be avoided. If a probe becomes contaminated, there is no adequate disinfecting means.

Probe Cleaning Process

To clean the probe:

NOTE: *Do not immerse the probe into any liquid beyond the level specified for that probe (See 'Immersion Level' on page 11-30 for more information.). Never immerse the transducer connector into any liquid.*

⚠ CAUTION
- Do not use paper products or products that are abrasive when cleaning the probe. They damage the soft lens of the probe.
- Before storing the probes, ensure that they are thoroughly dry. If it is necessary to dry the probe after cleaning, blot the probe with a soft cloth.

1. Inspect the probe's lens, cable, casing, and connector for cracks, cuts, tears, and other signs of physical damage.
2. Disconnect the probe from the ultrasound console and remove all coupling gel from the probe by wiping with a soft cloth and rinsing with flowing water.

NOTE: *DO NOT wipe the probe with a dry cloth.*

3. Soak the probe head in water. Scrub the probe as needed using a soft sponge, gauze, or cloth to remove all visible residue from the probe surface.
4. Rinse the probe with enough clean potable water.
5. Air dry or dry with a soft cloth.
6. After cleaning, inspect the probe's lens, cable, casing and connector. Look for any damage that would allow liquid to enter the probe. Also, inspect the probe functionality by live scan. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE service representative.

Choosing a Disinfectant

When choosing a disinfectant, determine the required level of disinfection. If the possibility of cross-contamination or exposure to unhealthy or non-intact skin exists, then high level disinfection should be performed. Good hand hygiene practice is highly recommended to help further reduce the risk of cross-contamination.

WARNING   Disinfectant wipes and topical spray products are not FDA cleared high level disinfectants and do not provide adequate protection should the probe become cross contaminated or in contact with unhealthy or non-intact skin.

NOTE: *For additional information about cleaning and disinfection, refer to the recommendations of the Association for Professionals in Infection Control (APIC), the U.S. Food and Drug Administration (FDA), and the U.S. Centers for Disease Control (CDC). For country-specific disinfection regulations, check with your local regulatory infection control authorities.*

HINTS   A validated, high-level disinfection process, combined with the use of a sterile gel and a probe cover/sheath is an accepted method of infection control for Ultrasound probes. Adequate records or a log book detailing the time, date, disinfection method, and verification of disinfectant effectiveness or test results is recommended. For more information about establishing an evidence based disinfection protocol for your practice, refer to the FDA, CDC, HICPAC, APIC, or the Joint Commission websites.

Disinfecting probes

In order to provide users with options in choosing a germicide, GE routinely reviews new medical germicides for compatibility with the materials used in the transducer housing, cable and lens. Although a necessary step in protecting patients and employees from disease transmission, liquid chemical germicides must also be selected to minimize potential damage to the transducer.

Refer to the Probe Care Card enclosed in the probe case or to the following web site for the latest list of compatible cleaning solutions and disinfectants.

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

Table 11-5:   Description of Pictogram on Probe Care Cards
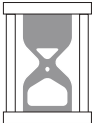
Pictogram	Description
	"ATTENTION" - Consult accompanying documents" is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.
	"CAUTION" - Dangerous voltage (the lightning flash with arrowhead) is used to indicate electric shock hazards.
	Biohazard - Patient/user infection due to contaminated equipment. Usage • Cleaning and care instructions • Sheath and glove guidelines
	Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use.
	Do not immerse the probe into any liquid beyond the level specified for that probe. Refer to the user manual of the ultrasound system.

Table 11-5:   Description of Pictogram on Probe Care Cards (Continued)

Pictogram	Description
	Since there is a possibility of having negative effects on the probe, observe the specified immersing time by the germicide manufacturer strictly. Do not immerse the probe in liquid chemical germicides more than the time prescribed in the care card.
	"Consult accompany document" - Refer to the ultrasound system user manual for important probe care and cleaning instruction.

Disinfecting probes (continued)

Use additional precautions (e.g. gloves and gown) when decontaminating an infected probe.

NOTE: *About the recommended disinfectant, review the probe care card that is packed with each probe.*

Low-level disinfection

1. After cleaning, the probe and cable may be wiped with a tissue sprayed with a recommended disinfectant.

NOTE: *In order for liquid chemical germicides to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described earlier before attempting disinfection.*

2. After disinfecting, inspect the probe's lens, cable, casing and connector. Look for any damage that would allow liquid to enter the probe. Also, inspect the probe functionality by live scan. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE service representative.

NOTE: *See 'Probe Cleaning' on page 12-28 for more information.*

Disinfecting probes (continued)

High-level disinfection

High-level Disinfection destroys vegetative bacteria; lipid & non-lipid viruses, fungi and, depending highly on time of contact, is effective on bacterial spores.

1. Prepare the high-level disinfectants solutions according to the manufacturer's instructions. Be sure to follow all precautions for storage, use and disposal.

NOTE: *In order for liquid chemical germicides to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described earlier before attempting disinfection.*

2. Place the cleaned and dried probe in contact with the germicide for the time specified by the germicide manufacturer. High-level disinfection is recommended for surface probes and is required for endocavitary and intraoperative probes (follow the germicide manufacturer's recommended time).

NOTE: *DO NOT soak probes in liquid chemical germicide for longer than is stated by the germicide instructions for use. Extended soaking may cause probe damage and early failure of the enclosure, resulting in possible electric shock hazard.*

3. Rinse the part of the probe which was in contact with the germicide according to the germicide manufacturer's instructions. Flush all visible germicide residue from the probe and allow to air dry.

NOTE: *Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector into any liquid.*

4. After disinfecting, inspect the probe's lens, cable, casing and connector. Look for any damage that would allow liquid to enter the probe. Also, inspect the probe functionality by live scan. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE service representative.

Immersion Level
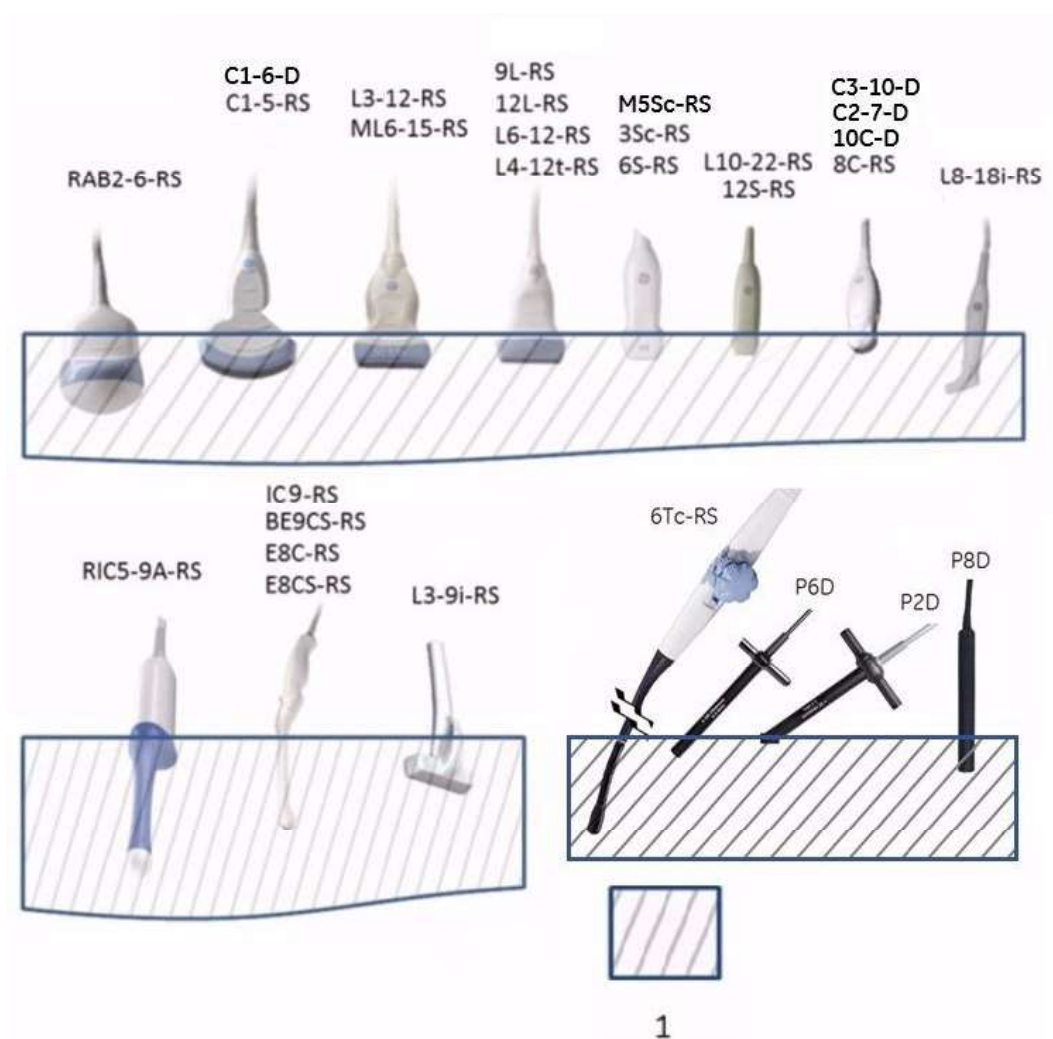
Figure 11-6.   Probe Immersion Level

1.   Fluid Level

Coupling gels

⚠ WARNING   Do not use unrecommended gels (lubricants). They may damage the probe and void the warranty.

About the recommended gel, review the probe care card that is packed with each probe.

Applying

In order to assure optimal transmission of energy between the patient and probe, a conductive gel or couplant must be applied liberally to the patient where scanning will be performed.

⚠ CAUTION   Do not apply gel to the eyes. If there is gel contact to the eye, flush eye thoroughly with water.

Precautions

Coupling gels should not contain the following ingredients as they are known to cause probe damage:

- Methanol, ethanol, isopropanol, or any other alcohol-based product
- Mineral oil
- Iodine
- Lotions
- Lanolin
- Aloe Vera
- Olive Oil
- Methyl or Ethyl Parabens (para hydroxybenzoic acid)
- Dimethylsilicone
- Polyether glycol based
- Petroleum

Sterile Ultrasound Procedures

ONLY ultrasound gel that is labeled as sterile, is sterile.

Ensure you always use sterile ultrasound gel for those procedures that require sterile ultrasound gel.

Once a container of sterile ultrasound gel is opened, it is no longer sterile and contamination during subsequent use is possible.

Returning/Shipping Probes and Repair Parts

US Department of Transportation and GE policy requires that equipment returned for service MUST be clean and free of blood and other infectious substances.

When you return a probe or part for service (Field Engineer or customer), you need to clean and disinfect the probe or part prior to packing and shipping the equipment.

Ensure that you follow probe cleaning and disinfection instructions provided in the Basic User Manual.

This ensures that employees in the transportation industry as well as the people who receive the package are protected from any risk.

Biopsy Special Concerns

Precautions Concerning the Use of Biopsy Procedures

WARNING   Do not freeze the image during a biopsy procedure. The image must be live to avoid a positioning error.

Biopsy guidezones are intended to assist the user in determining optimal probe placement and approximate the needle path. However, actual needle movement is likely to deviate from the guideline. Always monitor the relative positions of the biopsy needle and the subject mass during the procedure.

WARNING   NEVER reuse the TR5° disposable biopsy guide attachment and Disposable sterile Ultra-Pro II Needle guide kits.

CAUTION   The use of biopsy devices and accessories that have not been evaluated for use with this equipment may not be compatible and could result in injury.

Precautions Concerning the Use of Biopsy Procedures (continued)

⚠ 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.

⚠ CAUTION   Ensure that the needle (especially the needle tip) is always visible in the ultrasound image during the whole biopsy procedure.

⚠ CAUTION   Ensure the correct position and optimal fit every time before using a biopsy guide.

Freehand Biopsy

⚠ CAUTION   When performing a freehand biopsy, i.e. without a biopsy guide, it is the user's responsibility to use appropriate equipment.

Perform a biopsy

Displaying the Guidezone

Activate the Biopsy Kit by selecting it from the B-Mode Touch Panel.
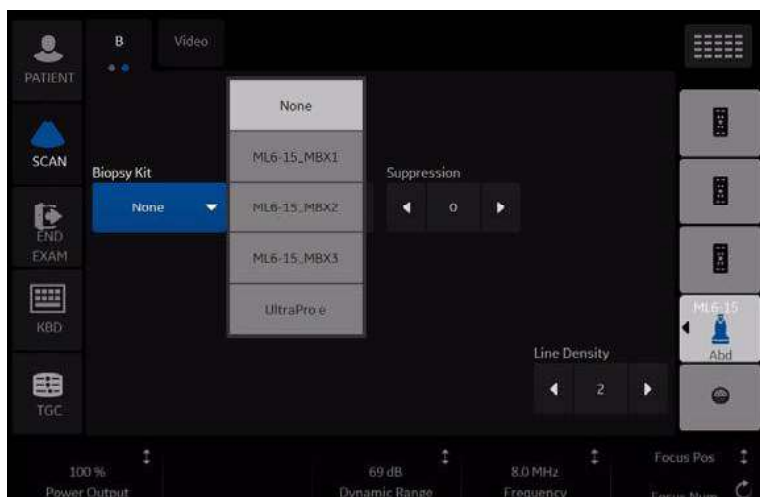
Figure 11-7.   B-Mode Touch Panel menu

The available biopsy options appear when Biopsy Kit is selected. There are fixed and adjustable angle biopsy kits and plastic/disposable and reusable biopsy guides available with the LOGIQ P8/P9/P10 depending on the probe. Select the desired biopsy kit.

NOTE: *You can display the biopsy guideline on the CFM image in simultaneous mode. Enabling Color Flow allows for visualization of the vascular structure around the area to be biopsied. Select the Show Biopsy Mark on CFM simultaneous Mode preset in the Utility -> System -> System Image -> Biopsy Guide screen.*

Displaying the Guidezone (continued)
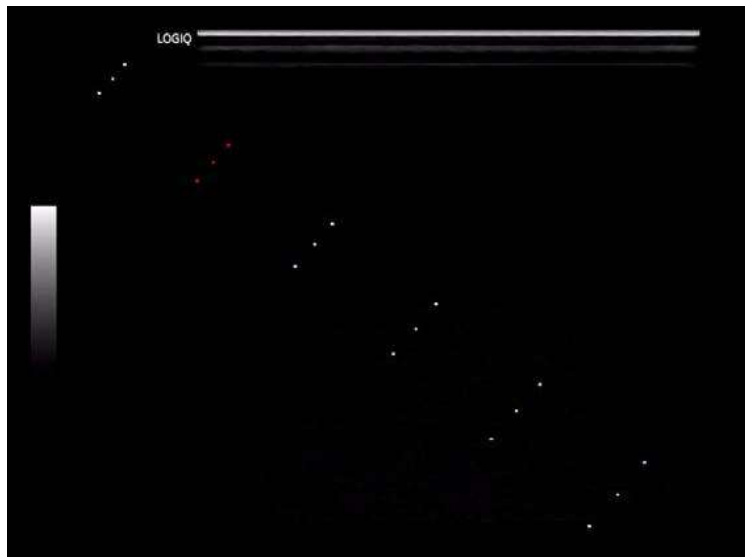
Figure 11-8.   Biopsy Guidezone display (example)

The biopsy guidezone represents a path of the needle. The dots which make up the guidezones is the depth readout where:

• Yellow represent 1 cm increments.

• Red represents 5 cm increments.

The display should be carefully monitored during a biopsy for any needle deviation from the center line or guidezone.

NOTE: *Biopsy Guide Lines do not appear on Recalled Images and PACS when the Print Button is set to DICOM or Secondary Capture.*

Displaying the Guidezone (continued)

The Biopsy Guidezone adjusts along with image adjustments, such as image inversion/rotations, zoom and depth changes.

NOTE: *To set up biopsy guidezones, refer to Table 16-9 for more details.*

The needle may vary from the center line or guidezone for various reasons:

- Needle barrel to needle clearance or strength.
- Bracket manufacturing tolerance.
- Needle deflection due to tissue resistance.
- Needle size chosen. Thinner needles may deflect more.

⚠ **DANGER**   Failure to match the guidezone displayed to the guide may cause the needle to track a path outside the zone.

It is extremely important that when using the adjustable angle biopsy guides, the angle displayed on the screen matches the angle set on the guide, otherwise the needle will not follow the displayed guidezone which could result in repeated biopsies or patient injury.

Preparing the Biopsy Guide Attachment

Convex, Sector and Linear probes have optional biopsy guide attachments for each probe. The guide consists of a non-disposable bracket to attach to the probe, disposable needle clip to attach to the bracket, sheath, gel (sterile gel if necessary) and disposable needle barrels.

⚠ **WARNING**

DO NOT attempt to use the biopsy bracket and needle guide until the manufacturer's instructions, provided with the biopsy bracket and needle guide in the kit, have been read and thoroughly understood.

Table 11-6:   Biopsy Guide Attachments

Probe	Attachment	Attachment with Probe
C1-5-RS Multi-angle		
9L-RS Multi-angle		
ML6-15-RS Multi-angle		

Table 11-6:   Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
3Sc-RS Multi-angle		
12L-RS Multi-angle		
12L-RS Infinite-angle		
12L-RS Transverse Bracket		

Table 11-6:   Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
RAB2-6-RS Multi-angle		
E8C-RS with reusable		
E8C-RS with TR5 (PROTEK)		
E8C-RS with TR5 (CIVCO)		
L6-12-RS Multi-angle		
RIC5-9A-RS with reusable		

Table 11-6:   Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
RIC5-9A-RS (CIVCO)		
BE9CS-RS with reusable		
BE9CS-RS (PROTEK)		
BE9CS-RS (CIVCO)		
BE9CS-RS (CIVCO)		
E8CS-RS with reusable		
E8CS-RS with TR5 (PROTEK)		

Table 11-6:   Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
E8CS-RS with TR5 (CIVCO)		
L4-12t-RS Multi-angle		
L4-12t-RS Infinite-angle		
L4-12t-RS Transverse Bracket		
L3-12-RS Multiangle		

Table 11-6:   Biopsy Guide Attachments (Continued)

Probe	Attachment	Attachment with Probe
IC9-RS with reusable		
IC9-RS Disposable		
C1-6-D Multi-angle		
C2-7-D Stainless reusable		
C2-7-D Multi-angle		
M5Sc-RS Multi-angle		

Multi Angle Biopsy Guide Assembly

⚠ WARNING	DO NOT attempt to use the biopsy bracket and needle guide until the manufacturer's instructions, provided with the biopsy bracket and needle guide in the kit, have been read and thoroughly understood.

1. Scan the patient and identify the target for biopsy. Move the probe to locate the target to the center of the image. Enable the system biopsy guidezone and try guidezone angles MBX1 to MBX3 to decide the best angle setting for needle path.
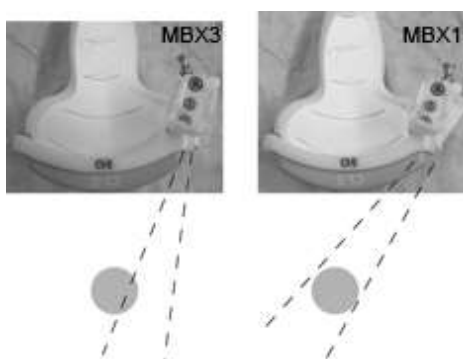
Figure 11-9.   Example

2. Pull up on the pin (Figure 11-10 a) to freely move the needle guide attachment. Align the pin with the selected position of the needle guide attachment.

   Push the pin down (Figure 11-10 b) into the desired slot to secure the angle position of the needle guide attachment.

Figure 11-10.   Pull up and push down the pin

Multi Angle Biopsy Guide Assembly (continued)

3. Fit a convex piece of the biopsy bracket (a) into the concave position of the probe (b).
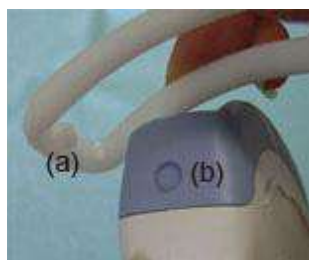
Figure 11-11.   Probe/Bracket Alignment

Hold the side (a) and tuck down the needle guide side (b) until it clicks or locks in place.
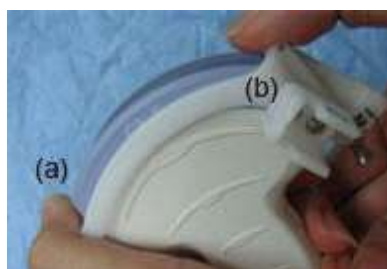
Figure 11-12.   Probe/Multi-angle Bracket Alignment 2

4. Place an adequate amount of coupling gel on the face of the probe.

Multi Angle Biopsy Guide Assembly (continued)

5. Place the proper sanitary sheath tightly over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.
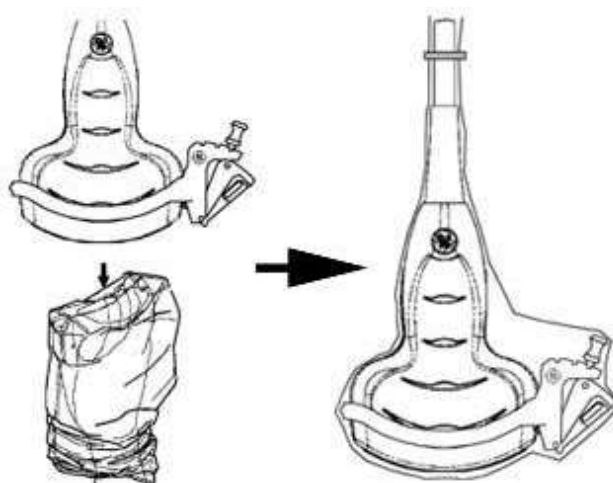
Figure 11-13.   Applying Sanitary Sheath

6. Snap the needle guide onto the biopsy guide bracket.
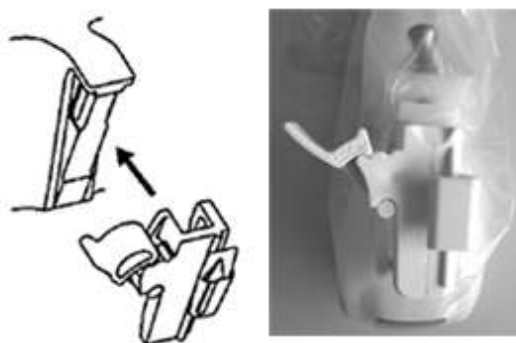
Figure 11-14.   Snap the needle guide

Multi Angle Biopsy Guide Assembly (continued)

7. Push the locking mechanism towards the bracket to secure the lock (a). Make sure the needle guide is firmly attached to the bracket.
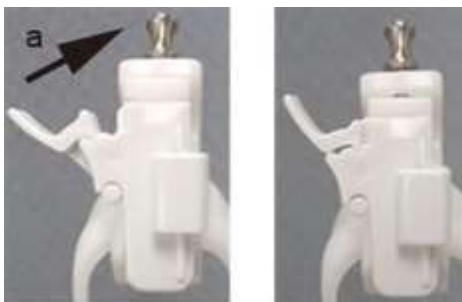
Figure 11-15.   Lock the Needle guide

8. Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.
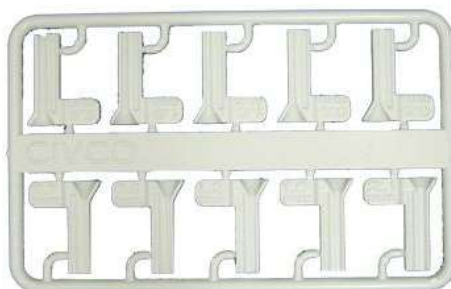
Figure 11-16.   Needle Barrel

9. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

Figure 11-17.   Needle Barrel Installation

Multi Angle Biopsy Guide Assembly (continued)

Remove the biopsy guide

1. Hold the other side and push out the needle clip attachment side. See Figure 11-18 .

Figure 11-18.   Remove the biopsy guide

⚠ CAUTION   Prevent damage to the probe lens with finger nails.

Releasing the needle

According to the following procedure, you remove the needle from a probe and an assembly without moving the needle.
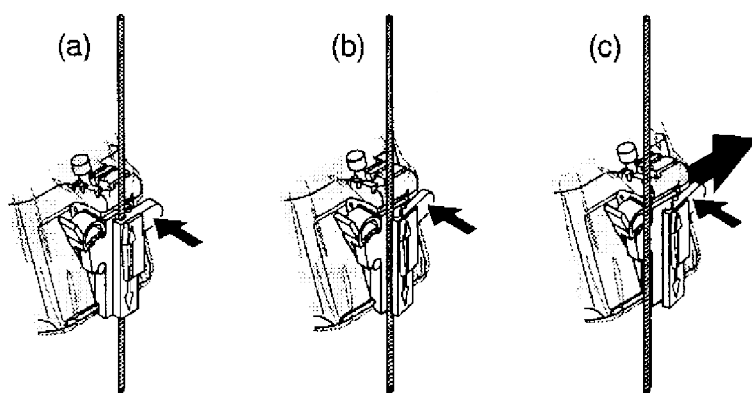
Figure 11-19.   Release the needle from assembly

a.   Push the knob portion of a sleeve in the direction of the arrow.
b.   The needle is released from the assembly.
c.   Push the probe and the assembly in the direction of the larger arrow to remove the needle.

4D Biopsy Guide Assembly - Representative Example

1. Place the needle guide onto the probe.

2. Push the needle guide until the bracket (b) catches in the support on the housing of the probe (a).

Figure 11-20.   Support on the housing
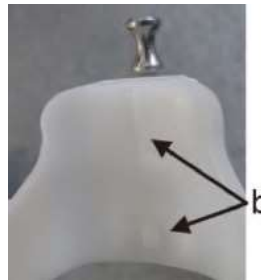
Figure 11-21.   Biopsy Needle Guide

3. Fix the needle guide by locking the frame on the opposite side.

4D Endocavitary Probe

1. Place an adequate amount of ultrasound gel inside the sheath tip (the gel is between the sheath inner surface and the probe aperture).

NOTE: *Ensure that only acoustic coupling gel is used for this purpose.*

2. Place the sheath tip over the probe aperture and then pull the sheath end toward the probe handle.
3. Inspect the sheath for nicks, cuts or tears.
4. Rub a finger over the tip of the probe to ensure all air bubbles have been removed.
5. Position the small swelling of the needle guide on the notch at the probe tip. Snap the needle guide.
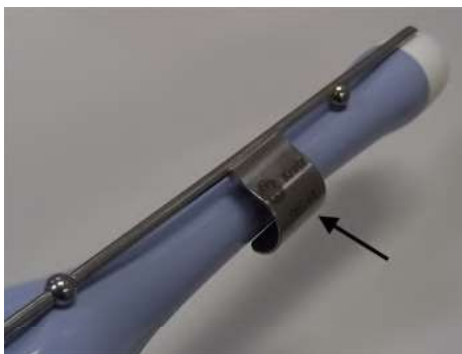
Figure 11-22.   Installation (without probe sheath)

NOTE: *Material: Stainless Steel*

NOTE: *Needle guide sterilization with autoclave possible.*

4D Probe Biopsy Needle Path Selection

To select the needle path and verify that the path of the needle is accurately indicated within the guidezone on the system monitor, perform the following before use:

1. Properly install the bracket and biopsy guide.
2. Scan in a container filler with water (47° C).
3. Select **Biopsy kit**. The available biopsy options from the Touch Panel.

   Select the biopsy guidezone where the needle echo passes through the center of the guidezone. Use the selected biopsy guidezone when performing the biopsy.

Biopsy Needle Path Verification

To verify that the path of the needle is accurately indicated within the guidezone on the system monitor, perform the following:

- Properly install the bracket and biopsy guide.
- Scan in a container filled with water (47° C).
- Display the biopsy guidezone on the monitor.
- Ensure that the needle echo falls within the guidezone markers.

Endocavitary Probe Biopsy Guide Assembly - Representative Example

⚠	WARNING	**DO NOT** use the needle with the catheter (soft tube). There is a possibility of breaking the catheter in the body.

⚠	CAUTION	Patient injury or repeated biopsies may result. The needle placement will not be as intended if the needle guide is not properly seated and secure.

⚠	CAUTION	Before inserting the needle, scan the patient to determine the correct puncture depth and site. Only the sterile/sanitary sheath and rubber band are on the probe during the pre-needle placement scanning.

Preparation

To prepare the endocavitary probe for use:

1. Remove the probe from the box and carefully examine it for any damage.
2. If the biopsy guide is to be attached, use the filling removal tool to clean out the attachment area on the probe head.
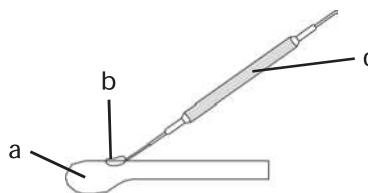
Figure 11-23.   Attachment Filling Removal

    a.   Probe Head

    b.   Attachment

    c.   Filling Removal Tool

3. Clean, then disinfect the probe.

NOTE: *Ensure that protective gloves are worn.*

Installing the sheath

To install the sheath:

1. Remove the sheath from its package. Do not unroll the sheath.

NOTE: *Remember to rinse all sanitary probe sheaths of powder before placing on the probe. Powder can degrade the displayed image.*

2. Place an adequate amount of ultrasound gel inside the sheath tip (the gel is between the sheath inner surface and the probe aperture).

NOTE: *Ensure that only acoustic coupling gel is used for this purpose.*

3. Place the sheath tip over the probe aperture and then pull the sheath end toward the probe handle.

4. Inspect the sheath for nicks, cuts or tears.
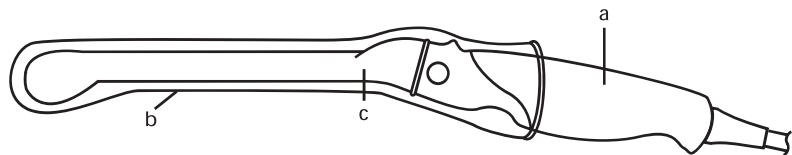
Figure 11-24. Endocavitary Probe with Sheath

a. Probe Handle
b. Sanitary Sheath
c. Probe Body

5. Rub a finger over the tip of the probe to ensure all air bubbles have been removed.

Endocavitary Probe Biopsy Guide Preparation

1. If a biopsy is to be performed, snap the metal or plastic biopsy guide on to the probe over the sheath.
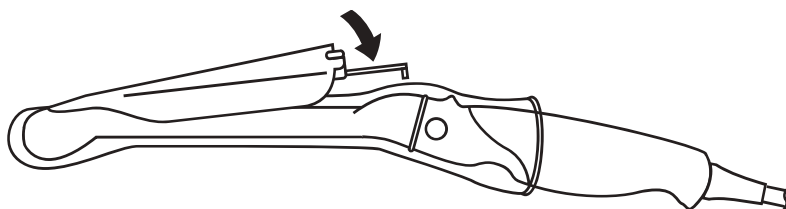
Figure 11-25.   Disposable Biopsy Guide 5 degree Angle
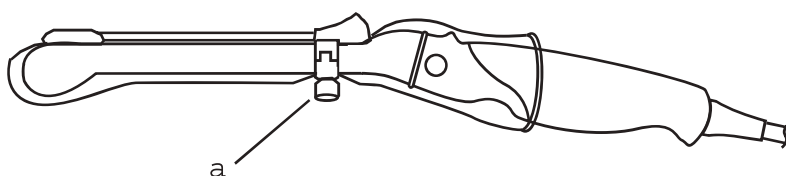
Figure 11-26.   Reusable Biopsy Guide

a.   Fix with a screw

NOTE: *For the E8C-RS,E8CS-RS and IC9-RS probe, use the TR5 guidelines for the plastic (disposable-only) biopsy guides; use the RU guidelines with the stainless steel reusable biopsy guides.*

2. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.
3. Ensure the guide is properly seated and secure by pushing forward on the needle insertion end of the guide until the attachment node is firmly in place in it's hole.

Biopsy Guideline Display
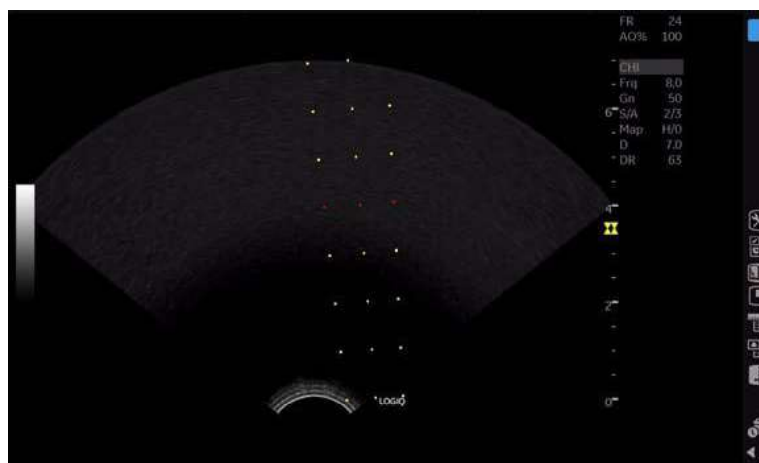
Figure 11-27.   Endocavitary Probe Biopsy Guideline -
Reusable
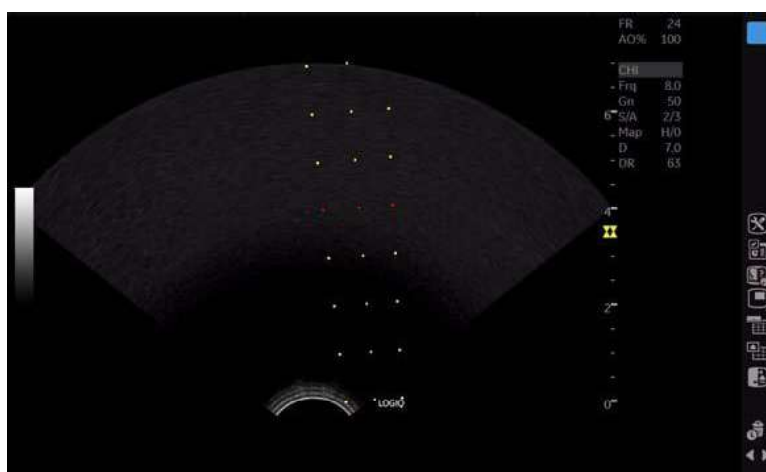
Figure 11-28.   Endocavitary Probe Biopsy Guideline - TR5

BE9CS-RS Biopsy Guide Preparation

> *NOTE:*   *The following graphics do not have a sheath pictured but a sheath must be installed before attaching the biopsy guide.*

> *NOTE:*   *Recommended Needle Length: greater or equal than 220 mm.*

> *NOTE:*   *Recommended Needle Gauge: 16 G or thinner needle*

Reusable type

1. Ensure that the fixing screw is loose.
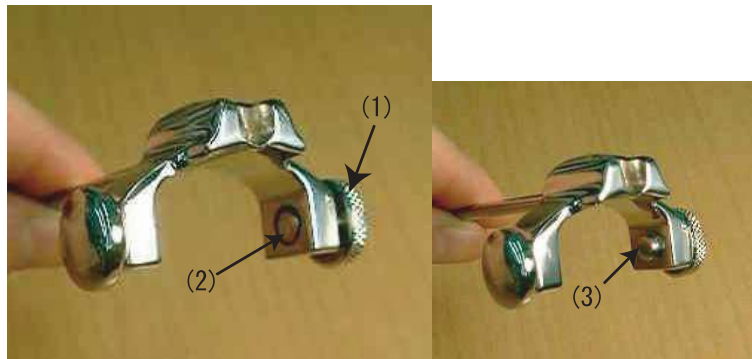
Figure 11-29.   BE9CS-RS Biopsy Guide Screws

1. Fixing screw
2. Loosened fixing screw (ensure that the screw end is not sticking out). Left side is a spring (not a screw).
3. Tightened fixing screw (the screw end is sticking out)

Reusable type (continued)

2. Align the tip of the biopsy guide to the edge on the probe shaft.
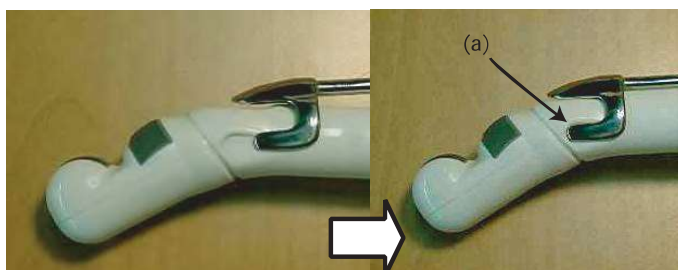
Figure 11-30.   Biopsy Guide Alignment

a.   Align with edge of probe

3. Push the guide down to the probe and snap the guide in place.

4. The biopsy guide should mate with the dent of the shaft on the handle side.

5. The fixing screws of the biopsy guide must be securely tightened.

NOTE: *Take care not to tear the sheath when tightening the screw.*
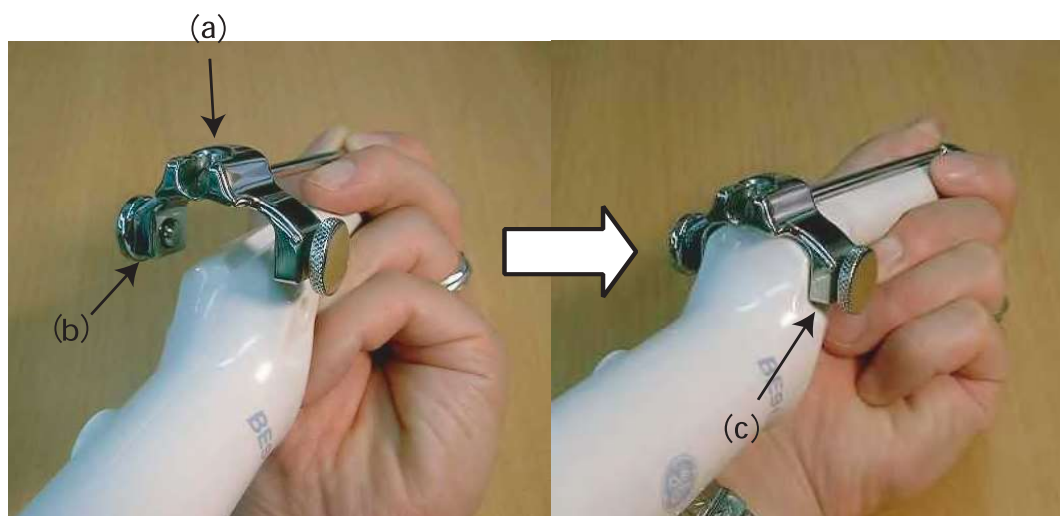
Figure 11-31.   Biopsy Guide Setting 3

6. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.

Disposable type

1. Align the tip of the biopsy guide to the edge on the probe shaft.

Figure 11-32.   Align the biopsy guide

2. Push the guide down to the probe and snap the guide in place.

Figure 11-33.   Push down the biopsy guide

Figure 11-34.   BE9CS-RS with disposable biopsy guide

Biopsy Guideline display

Figure 11-35.   BE9CS-RS Biopsy Guide Line - Longitudinal

Figure 11-36.   BE9CS-RS Biopsy Guide Line - Transverse

Biopsy Needle Path Verification

To verify that the path of the needle is accurately indicated within the guidezone on the system monitor, perform the following:

- Properly install the bracket and biopsy guide.
- Scan in a container filled with water (47° C).
- Display the biopsy guidezone on the monitor.
- Ensure that the needle echo falls within the guidezone markers.

The Biopsy Procedure

⚠ **WARNING** Biopsy procedures must only be performed on live images.

⚠ **CAUTION** Ensure that all guide parts are seated properly prior to performing a biopsy.

1. Place coupling gel on the scanning surface of the probe/ sheath/biopsy guide assembly.
2. Activate the biopsy guidezone on the system through the B-Mode Touch Panel. When using multi-angle guides, ensure that the proper guidezone angle is displayed.
3. Scan to locate the target. Center the target in the electronic guidezone path.

NOTE: *Enabling color flow would allow for visualization of the vascular structure around the area to be biopsied.*

4. Place the needle in the guide between the needle barrel and needle clip. Direct it into the area of interest for specimen retrieval.

Post Biopsy

When the biopsy is complete, remove the needle barrel, needle clip and probe sheath. Properly dispose of these items in accordance with current facility guidelines.

Clean and disinfect the probe.

The biopsy bracket can be cleaned and disinfected in a recommended disinfecting agent and reused.

⚠ CAUTION   When the biopsy needle guide kit is opened, all parts must be discarded after the procedure whether they have been used or not.

Surgery/Intra-operative Use

Preparing for Surgery/Intra-operative Procedures

Preparing the transducer for intra-operative use follows the same sterile procedure as for biopsy use except that no biopsy attachments are used. See 'Preparing the Biopsy Guide Attachment' on *page 11-39 for more information.* Sterile gel is applied to the transducer face and a sterile sheath completely covers the transducer and cable which has first undergone a thorough cleaning and high-level disinfection.

The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure prior to use.

⚠ CAUTION   For surgery/intra-operative procedures, a sterile environment is required. Therefore, both the operator and probe needs to be sterile.

Preparing for Surgery/Intra-operative Procedures (continued)

To ensure a sterile environment during the procedure, it is recommended that this be a two-person job.

1. Perform a high level disinfection of the probe.
2. The scanner (surgeon, sonographer, etc.) should be sterile and gloved.
3. Place an adequate amount of sterile coupling gel on the face of the probe.
4. Place the proper sterile sheath over the probe and cord.
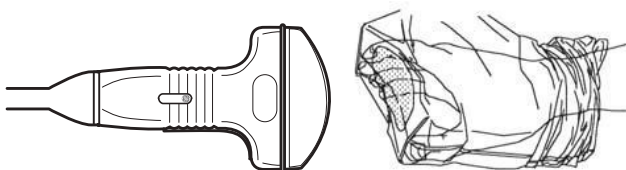
Figure 11-37.   Applying Sterile Sheath

5. Depending on the type of procedure, use either sterile water or sterile gel on the sheath cover.

NOTE: *Follow your institutions guidelines on post surgery/ intra-operative procedures for probe cleaning and disinfection.*

Chapter 12

User Maintenance

This chapter supplies system data, assistance information, and system care and maintenance instructions.

System Data

Features/Specifications

Table 12-1:   Physical Attributes

<u>Dimensions and Weight</u>
- Height: 1,345mm (Minimum), 1,595mm (Max.)
- Height (with HD Display): 1,390mm (Minimum), 1,640mm (Max.)
- Width : 545mm (23.8 inch monitor), 565mm (23.8 inch HD Display), 430mm (Operator Panel)
- Depth: Max 740mm
- Weight: 67 kg (148 lb.) (69 kg with HD Display (152 lb.))

<u>Console Design</u>
- 4 active probe ports
- 1 non imaging, CW pencil probe port (Option)
- Integrated SSD
- Integrated DVD-RW Multi Drive (Option)
- On-board storage of BW thermal printer
- Integrated speakers
- Locking mechanism that provides rolling lock and caster swivel lock
- Integrated cable management
- Front handle
- Rear handle (Option)
- Gel holder
- Easily removable air filters

<u>Electrical Power</u>
- Voltage:100V - 240V AC
- Frequency: 50/60 Hz
- Power: Consumption maximum of 500 VA with peripherals
- Power cord: Type SJT, SJE, SJO or SJTO, 14AWG, 3-Conductor, VW-1, 125 V or 250 V, 10 A, max 3.0 m long; One end with Hospital Grade Type, NEMA 5-15P or 6-15P. Other end with appliance coupler.

<u>Operator Panel</u>
- Operating keyboard adjustable in two dimensions of Height and Rotation
- Backlit alphanumeric keyboard (Option)
- Ergonomic hard key layout
- Interactive back-lighting
- Integrated recording keys for remote control of up to 6 peripheral or DICOM devices
- Gel warmer (Option)

<u>Touch panel</u>
- Wide 10.4 in High Resolution, Color, Touch, LCD screen
- Interactive dynamic software menu
- Brightness adjustment
- User-configurable layout
- Probe light

<u>LCD Monitor</u>
- 23.8inch bezel-less LCD LED backlight monitor
- 23.8inch HD Display (option)
- LCD translation (independent of console): 500 mm horizontal (end to end), 150 mm vertical (end to end), 90° Swivel
- Fold-down and lock mechanism for transportation
- Brightness & contrast adjustment
- Resolution: 1920 x 1080
- Horizontal/Vertical viewing angle of +/- 178°

Table 12-2:   System Overview

Applications	Display Modes

<u>Applications</u>
• Abdominal
• Obstetrical
• Gynecological
• Breast
• Small Parts
• Vascular
• Transcranial
• Transrectal
• Transvaginal
• Pediatric and Neonatal
• Musculoskeletal
• Urological
• Cardiac
• Intraoperative (Not for China)
• Peripheral vascular
• Transesophageal (Not for China)
 	
<u>Scanning Methods</u>
• Electronic Sector
• Electronic Convex
• Electronic Linear
• Mechanical Volume Sweep
 	
<u>Operating Modes</u>
• B-Mode
• M-Mode
• Color Flow Mode (CFM)
• M-Color Flow Mode
• Power Doppler Imaging (PDI)
• PW Doppler Mode
• CW Doppler Mode (Option)
• Volume Mode (Easy 3D, Advanced 3D, 4D, STIC, Omiview, HDLive)
• Anatomical-M Mode
• Curved Anatomical M-Mode
• B-Flow/B-Flow Color (Option)
• Extended Field of View (LOGIQView, Option)
• TVI Mode (Option)
• Coded Contrast Imaging (LP9 Only, Option)
• B-Steer + (Option)
• Coded Harmonic Imaging
• M-Color Flow mode
• Offline scanning mode (Power Assistant Option)
• Strain Elastography (Option)
• Shear Wave Elastography (Option)
• UGAP (Option)
	<u>Display Modes</u>
	• Simultaneous Capability
	    • B or CrossXBeam / PW
	    • B or CrossXBeam / CFM or PDI
	    • B / M
	    • B or CrossXBeam + CFM or PDI / PW
	      (Real-time Triplex Mode)
	    • B / CW (option)
	• Selectable Alternating Modes
	    • B or CrossXBeam / PW
	    • B or CrossXBeam + CFM(PDI) / PW
	    • B / CW (option)
	• Colorized Image
	    • B mode
	    • M mode
	    • Doppler mode
	• Time line Display
	    • Independent Dual B or CrossXBeam || PW Display
	    • CW Display
	    • 2 Display Formats (Top / Bottom, Side / Side selectable Format)
	    • Selectable Size Formats (Full format, Switchable after freeze, Vert 1/3 B, Vert 1/2 B, Vert 2/3 B, Horiz 1/2 B, Horiz 1/4 B)
	    • 2 Timeline Methods (Scrolling, Moving Bar)
	• Virtual Convex
	• Multi-image (split/quad screen)
	• Live and/or frozen
	    • B or CrossXBeam + B or CrossXBeam || CFM or PDI
	    • PW/M
	• Zoom: Write/Read
	• Simultaneous Bi-plane for Urology application
	    • BE9CS-RS
	
	<u>Transducer Types</u>
	• Sector Phased Array
	• Linear Array
	• Convex Array
	• Micro convex Array
	• Matrix Array (LP9 Only)
	• Single CW (Pencil) Probes
	• Volume probe (4D)

Table 12-2:   System Overview (Continued)

<u>Standard Features</u>
• Advanced user interface with high resolution 10.4 inch wide touch screen
• Automatic Optimization
• CrossXBeam
• Speckle Reduction Imaging (SRI-HD)
• Fine Angle Steer
• Coded Harmonic Imaging
• Virtual Convex
• Patient information database
• Image Archive on integrated CD/DVD and hard disk drive
• Real-time automatic Doppler calcs
• OB Calcs
• Fetal Trending
• Multi gestational Calcs
• Hip Dysplasia Calcs
• Gynecological Calcs
• Vascular Calcs
• Urological Calcs
• Renal Calcs
• Cardiac Calcs
• inSite ExC Capability
• On-board electronic documentation
• Raw Data Analysis
• MPEGVue
• Key Macro
• Network Storage
• Quick Save
• Quick Patient Entry
• Email2MMS
• Easy 3D
 	
<u>Options</u>
• Auto EF
• Cardiac Strain
• Auto IMT
• B-Flow/B-Flow Color
• Breast Measure Assistant
• Breast Productivity Package
• B Steer+
• Coded Contrast Imaging (CEUS, HRes)
• Compare Assistant
• CW Doppler
• DICOM 3.0 connectivity
• Digital Video Recording Software (Software DVR)
• Elastography Quantification
• LOGIQView
• OB Measure Assistant
• Offline scanning
• Power Assistant
• Standard Battery
• Extended Battery
	• Quantitative Flow Analysis
	• Real-Time 4D
	• Automated Volume Calculation (VOCAL II)
	• Tomographic Ultrasound Imaging
	• Volume Contrast Imaging (VCI) Static
	• OmniView
	• STIC
	• HDLive
	• Report Writer
	• Scan Assistant
	• Shear Wave Elastography
	• Strain Elastography
	• Stress Echo
	• Thyroid Productivity Package
	• Tissue Velocity Imaging (TVI)
	• LOGIQApps
	• Bluetooth
	• Wireless LAN
	• Gel warmer
	• DVDCabinet: High/Low Drive
	• Koios Breast Lesion Decision Support
	• Thyroid Productivity Package
	• UGAP
	• Hepatic Assistant
	
	<u>Peripheral Options</u>
	• Integrated options for
	    • Digital B/W thermal printer
	    • Digital color thermal printer
	• Digital A6 color thermal printer
	• External USB Printer connection
	• HDMI output available for compatible device
	• S-Video output available for compatible device
	• Composite Video output available for compatible device
	• Wireless LAN
	• Printing using Bluetooth connectivity (Inkjet printer option)
	• Printer installation kit
	• Footswitch with programmable functionality
	• Isolation Transformer
	• Isolated USB connector
	• EMI filter (PWR supply noise filter)
	• Drawer
	• Small Probe Holder (Probe Holder Adapter for Small Probe)
	• Probe cable hanger
	• ECG + AHA/IEC Cables
	• Power Assistant
	• Extended battery life
	• Battery Pack (for Power Assistant/Extended battery life)

Table 12-3:   System Parameters

Controls Available on Freeze or Recall	Scanning Parameters

• Automatic Optimization
• SRI-HD
• CrossXBeam - Display non-compounded and compounded image simultaneously in split screen
• 3D reconstruction from a stored CINE loop
• B/M/CrossXBeam Mode (Gray Map; TGC, Colorized B and M; Frame Average [Loops only]; Dynamic Range)
• Anatomical M-Mode
• Max Read Zoom to 20x
• Base Line Shift
• Sweep Speed
• PW-Mode (Gray Map; Post Gain; Baseline Shift; Sweep Speed; Invert Spectral Waveform; Compression; Rejection, Colorized Spectrum; Display Format; Doppler Audio; Angle Correct; Quick Angle Correct, Auto Angle Correct)
• Color Flow (Overall Gain [Loops and Stills]; Color Map; Transparency Map; Frame Averaging [Loops only]; Flash Suppression, CFM Display Threshold; Spectral Invert for Color/Doppler)
• Anatomical M-Mode on CINE Loop
• 4D (Gray Map, Colorize; Post Gain; Change display between single, dual, quad sectional or rendered)
 	
Controls Available While "Live"
• Write zoom
• B/M-Mode (Gain; TGC; Dynamic Range; Acoustic Output; Transmission Focus Position; Transmission Focus Number; Line Density Control; Sweep Speed for M-Mode; # of Angles for CrossXBeam)
• PW-Mode (Gain; Dynamic Range; Acoustic Output; Transmission Frequency; PRF; Wall Filter; Spectral Averaging; Sample Volume Gate for PW-Mode Length and Depth; Velocity Scale)
• Color Flow (CFM Gain; CFM Velocity Range; Acoustic Output; Wall Echo Filter; Packet Size; Frame Rate Control; CFM Spatial Filter; CFM Frame Averaging; CFM Line Resolution; Frequency/Velocity Baseline Shift)
	• Displayed Imaging Depth: 0 - 48 cm
	• Minimum Depth of Field: 0 - 1 cm (Zoom) (probe dependent)
	• Maximum Depth of Field: 0 - 48 cm (probe dependent)
	• Continuous Dynamic Receive Focus / Continuous Dynamic Receive Aperture
	• Adjustable Dynamic Range
	• Adjustable Field of View [FOV]
	• Image Reverse: Right/ Left
	• Image Rotation: 0°, 90°, 180°, 270°
	
	Image Storage
	• On-board database of patient information from past exams
	• Storage Formats:
	    • DICOM - compressed/ uncompressed, single/ multiframe, with/ without Raw Data
	    • Export JPEG,JPEG2000, WMV MPEG 4 and AVI formats
	• Storage Devices:
	    • USB Flash Device: 64MB to 4GB (for exporting individual images/clips)
	    • CD-R storage: 700MB
	    • DVD storage: -R (4.7GB)
	    • Hard Drive Image Storage: ~350GB
	• Compare old images with current exam
	• Reload of archived data sets
	
	CINE Memory/Image Memory
	• 776 MB of CINE Memory
	• Selectable CINE Sequence for CINE Review
	• Prospective CINE Mark
	• Measurements/Calculations & Annotations on CINE Playback
	• Scrolling timeline memory
	• Dual Image CINE Display
	• Quad Image CINE Display
	• CINE Gauge and CINE Image Number Display
	• CINE Review Loop
	• CINE Review Speed

Table 12-4: Measurements and Calculations

<table>
<tr>
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B-Mode
• Depth and Distance
• Circumference and Area (Ellipse/Trace)
• Volume (Ellipsoid)
• Angle between 2 Lines
• % Stenosis (Area or Diameter)

M-Mode
• M Depth and Distance
• Time
• Slope
• Heart Rate

Doppler Measurements/Calculations
• Velocity
• Time
• A/B Ratio (Velocities/Frequency Ratio)
• PS (Peak Systole)
• ED (End Diastole)
• PS/ED (PS/ED Ratio)
• ED/PS (ED/PS Ratio)
• AT (Acceleration Time)
• Accel (Acceleration)
• TAMAX (Time Averaged Maximum Velocity)
• Volume Flow [TAMEAN and Vessel Area]
• Heart Rate
• PI (Pulsatility Index)
• RI (Resistivity Index)

Vascular Measurements/Calculations
• Carotid, Vertebral, Subclavian Measurements, Auto IMT
• Summary Reports

Obstetrics Measurements/Calculations
• Gestational Age Calculation
• EFW Calculation
• Calculations and Ratios
• Measurements/Calculations
• Fetal Graphical Trending
• Growth Percentiles
• Multi-Gestational Calculation
• Fetal Qualitative Description (Anatomical Survey)
• Fetal Environmental Description (Biophysical profile)
• Programmable OB Tables
• Over 20 selectable OB Calcs
• Expanded Worksheets

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Obstetrics Measurements/Calculations
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• Fetal Environmental Description (Biophysical profile)
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Gynecology Measurements/Calculations
• Right/Left Ovary Length, Width, Height
• Uterus Length, Width, Height
• Cervix Length, Trace
• Ovarian Volume
• ENDO (Endometrial thickness)
• Ovarian/Uterine RI
• Summary Report

Urology Calculation
• Bladder, Prostate, Renal, Generic Volume Measurements
• Post-Void Bladder Volume

Cardiology Measurements/Calculations
• Cardiology Measurements and Calculations
• Summary Worksheet
• Summary Report

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Table 12-5:   Probes

• C1-5-RS [Applications: Abdomen(incl. Pleural), Vascular(No transcranial), OB/GYN, Urology] • C2-7-D [Applications: Abdomen(incl. Pleural)] • 8C-RS [Applications: Pediatrics, Neonatal] • 10C-D [Applications: Neonatal, Pediatric, Vascular(No transcranial)] • E8C-RS [Applications: OB/GYN, Urology, Transvaginal, Transrectal] • E8CS-RS [Applications: OB/GYN(Transvaginal), Urology(Transrectal)] • IC9-RS [Applications: OB/GYN, Urology(Transvaginal, Transrectal)] • BE9CS-RS [Applications: Urology(Transrectal)] • ML6-15-RS [Applications: Abdomen(incl. Pleural), Small Parts, Vascular(No transcranial), Pediatric, Neonatal, Musculoskeletal, Breast] • L3-12-RS [Applications: Abdomen(incl. Pleural), Vascular(No transcranial), Small Parts, Pediatric, Neonatal, OB, Breast, Musculoskeletal] • L4-12t-RS [Applications: Abdomen(incl. Pleural), Small Parts, Vascular(No transcranial), Pediatric, Neonatal, Musculoskeletal, Breast] • 12L-RS [Applications: Abdomen(incl. Pleural), Small Parts, Vascular(No transcranial), Pediatric, Neonatal, Musculoskeletal, Breast] • L6-12-RS [Applications: Abdomen(incl. Pleural), Vascular(No transcranial), Small Parts, Pediatric, Neonatal, Breast] • 9L-RS [Applications: Abdomen(incl. Pleural), Small Parts, Vascular(No transcranial), Pediatric, Neonatal, OB, Breast, Musculoskeletal]	• L8-18i-RS [Applications: Small Parts, Vascular(No transcranial), Peripheral Vascular, Neonatal, Pediatrics, Intraoperative(Not for China), Musculoskeletal] • 3Sc-RS [Applications: Cardiac, Abdomen(incl. Pleural), Transcranial] • 6S-RS [Applications: Abdomen(incl. Pleural), Cardiac, Pediatrics, Neonatal, OB] • 12S-RS [Applications: Abdomen(incl. Pleural), Pediatrics, Neonatal] • RAB2-6-RS [Applications: Abdomen, OB/GYN, Urology] • RIC5-9A-RS [Applications: OB/GYN(Transvaginal), Urology(Transrectal)] • P8D [Applications: Cardiac, Vascular(No transcranial)] • P6D [Applications: Cardiac, Vascular(No transcranial)] • P2D [Applications: Cardiac, Vascular(No transcranial)] • L3-9i-RS* [Applications: Small Parts, Vascular, Musculoskeletal, Neonatal, Intraoperative(Not for China)] • L10-22-RS* [Applications: Small Parts, Musculoskeletal, Neonatal] • 6Tc-RS [Applications: Cardiac(Transesophageal)] • C1-6-D* [Applications: Abdomen(incl. Pleural), OB, Gynecology, Vascular(No transcranial), Urology] • C3-10-D** [Applications: Abdomen(incl. Pleural), Neonatal, Pediatric, Vascular(No transcranial)] • M5Sc-RS** [Applications: Cardiac, Transcranial, Abdomen(incl. Pleural)]

*LOGIQ P10/P9
only

**LOGIQ P10 only

Table 12-6:   Biopsy Guides

• Single-Angle, disposable with a reusable bracket • Multi-Angle, disposable with a reusable bracket	• Single-Angle, disposable with a disposable bracket

Table 12-7:   Inputs and Outputs Signal

• USB 2.0 x 5 ports, USB 3.0 x 2 ports • HDMI connector	• Ethernet 1000/100/10BaseT • Audio Line Out (1.5mm pin jack)

Table 12-8:   Physiological Input Panel (Option)

• Physiological Input 　• ECG 2 lead 　• Dual R-Trigger 　• Pre-settable ECG R Delay Time 　• Pre-settable ECG Position 　• Adjustable ECG Gain Control	• Automatic Heart Rate Display

Clinical Measurement Accuracy

Basic Measurements

The following information is intended to provide guidance to the user in determining the amount of variation or measurement error that should be considered when performing clinical measurements with this equipment. Error can be contributed by equipment limitations and improper user technique. Be sure to follow all measurement instructions and develop uniform measurement techniques among all users to minimize the potential operator error. Also, in order to detect possible equipment malfunctions that could affect measurement accuracy, a quality assurance (QA) plan should be established for the equipment that includes routine accuracy checks with tissue mimicking phantoms.

Please be advised that all distance and Doppler related measurements through tissue are dependent upon the propagation velocity of sound within the tissue. The propagation velocity usually varies with the type of tissue, but an average velocity for soft tissue is assumed. This equipment is designed for, and the accuracy statements listed on are based on, an assumed average velocity of 1540 m/s. The percent accuracy when stated applies to the measurement obtained (not the full scale range). Where the accuracy is stated as a percent with a fixed value, the expected inaccuracy is the greater of the two.

Basic Measurements (continued)

Table 12-9:   System Measurements and Accuracies

Measurement	Units	Useful Range	Accuracy	Limitations or Conditions
Depth	mm	Full Screen	±max (5% or 1 mm)	
Angle	degree	Full Screen	±max (10% or 1deg)	
Distance:				
Axial	mm	Full Screen	±max (5% or 1 mm)	
Lateral	mm	Full Screen	±max (5% or 2 mm)	Linear Probes
Lateral	mm	Full Screen	±max (5% or 4 mm)	Convex Probes
Lateral	mm	Full Screen	±max (5% or 4 mm)	Sector Probes
Circumference:				
Trace	mm	Full Screen	±max (10% or 1 mm)	
Ellipse	mm	Full Screen	±max (5% or 1 mm)	
Area:				
Trace	mm^2	Full Screen	±max (5% or 1 $mm^{2)}$	
Ellipse	mm^2	Full Screen	±max (5% or 1 $mm^{2)}$	
3D Volume Accuracy	cm^3	Full Screen	±max (10% or 1.0 $cm^{3)}$	
Time	s	Timeline Display	±max (5% or 10 ms)	M mode, PWD mode, CWD mode, TVD mode
Slope	mm/s	Timeline Display	±max (5% or 1 mm/s)	M-Mode
Doppler SV Position	mm	Full Screen	±2 mm	PWD mode, TVD mode
Velocity	cm/s	Timeline Display	±max (10% or 1cm/s)	PWD mode, CWD mode, TVD mode

Table 12-9:   System Measurements and Accuracies

Measurement	Units	Useful Range	Accuracy	Limitations or Conditions
Doppler Angle Correction	cm/s	From 0-60° From 60-80°	±max (5% or 1deg) ±12%	PWD mode, CWD mode, TVD mode

Clinical Calculation Accuracy

Estimate the overall inaccuracy of a combined measurement and calculation by including the stated inaccuracy from the basic measurement accuracy statements.

CAUTION Diagnostic errors may result from the inappropriate use of clinical calculations. Review the referenced source of the stated formula or method to become familiar with the intended uses and possible limitations of the calculation.

Calculation formulas and databases are provided as a tool to assist the user, but should not be considered an undisputed database, in making a clinical diagnosis. The user is encouraged to research the literature and judge the equipment capabilities on an ongoing basis in order to assess its utility as a clinical tool.

Anti-Virus Software Note

LOGIQ P8/P9/P10 Security

Since the LOGIQ systems are integrated into your IT-network, GE wants to make sure that you are aware of the proactive measures we are taking to secure the system. Below are measures we have implemented to secure the LOGIQ systems.

- Use of Windows* Embedded Standard 10, a componentized version of Windows 10 specifically made for embedded systems. Only the components required are used for the LOGIQ scanners, thereby reducing the OS attack surface. Please note that Windows Embedded Standard 7 is NOT the same operating system as Windows 10.

- Disabled the user's ability to access the internet and Windows desktop.

- Disabled, or made inaccessible, functionality that is typically used as malware vectors for spreading viruses (e.g. email services, web browsers).

- Disabled AutoRun functionality on removable media.

- Closed network entry points that are not in use by the LOGIQ scanner software by strict firewall configuration and by disabling Services. The only Internet connection needed is on outbound port to GE's remote service platform (Insite™ ExC), which is only opened on request by the user and through a secure HTTPS connection (port 443), and inbound and outbound connections through port 104 for DICOM connectivity.

LOGIQ P8/P9/P10 Security (continued)

- System provides user access controls under customer management to control scanner access.
- Uses secure integration and communication between systems (Scanners, Workstations and Servers).
- Monitor public security bulletins from software vendors and news services, analyze for applicability to the LOGIQ scanner, and include third party software security patches as necessary within GE software.
- Release GEHC Ultrasound validated software or use other measures as necessary to resolve or mitigate product vulnerabilities.
- Assess potential vulnerabilities of our systems using up-to-date commercially available vulnerability scanning tools. Identified vulnerabilities are mitigated as appropriate based on risk assessment of the product.

GE believes that this Defense in Depth strategy using the combination of the security measures above and the security standards of Microsoft's Windows Embedded Standard 10 will provide security against malware, especially for a system used in a professinoal, hospital grade networking environment that itself should provide a high level of security measures.

Finally, a few points as to why GE (as well as all other manufacturers of PC-based medical Ultrasound devices) do not use Anti-Virus software: Commercial Anti-Virus software is commonly used on general-purpose computers to detect the presence of malicious software (e.g. virus, Trojan horse, worm). Anti-Virus software is useful on general-purpose computers as they typically cannot be sufficiently hardened against the attack vectors used by malicious software.

LOGIQ P8/P9/P10 Security (continued)

The LOGIQ ultrasound systems however are single purpose (dedicated) devices that have controlled intended use, and thus are well hardened. For the LOGIQ ultrasound systems, the potential patient safety and security risks introduced by using commercial Anti-virus software would outweigh the security benefits. Such risks include:

- Real-time anti-virus scanning can affect ultrasound system performance.
- The effectiveness of Anti-Virus software depends on regular updates of the virus definitions files. This would typically require internet connectivity for the ultrasound system.
- The Anti-Virus software itself is a popular attack vector.
- Disruptive nature of the support of the Anti-Virus software throughout the life cycle of the medical device. The operating system of a medical ultrasound system is part of a medical device that requires a special and controlled release process. Any update of the Anti-Virus software would require a change of the system software.

Due to the cited risks, the use of commercial anti-virus software is not part of the LOGIQ systems product security strategy.

*Microsoft and Windows are trademarks of Microsoft Corporation.

NOTE: *How to contact GE : For privacy and security concerns regarding GE products: http://www.ge.com/security*

NOTE: *Cybersecurity Bill of Material (CBOM) is listed in the software / Utility > System > About page.*

Copyrighted Material

Viewing Copyrighted Third Party Software License Information

The LOGIQ P8/P9/P10 contains copyrighted material. For more information, you can view Copyrighted Third Party Open Source Software Licenses via the Utility-> System-> Licenses page.

- Select Utility-> System-> Licenses
- Scroll to select the license you wish to view in the License Title section. Press Set.

Figure 12-1. Third Party Software License Information

- The selected software license appears in the License window. Use the Set+Trackball to scroll through the license.

System Care and Maintenance

Overview

The user must ensure that safety inspections are performed at least every 12 months according to the requirements of the patient safety standard IEC 60601-1 (1988). Refer to the Service manual, Chapter 10. Only trained persons are allowed to perform the safety inspections mentioned above. Technical descriptions are available on request. To ensure that the unit constantly operates at maximum efficiency we recommend that the following procedures be observed as part of the customer's internal routine maintenance program.

Contact the local Service Representative for parts or periodic maintenance inspections.

Expected Service Life Description

The expected service life for the LOGIQ P8/P9/P10 system and probes is identified in this table:

Table 12-10:   Expected Service Life

Equipment / Accessory	Expected Service Life
LOGIQ P8/P9/P10 system	The expected service life for the LOGIQ P8/P9/P10 is at least seven (7) years from the manufacturing date under the provision of regular maintenance by authorized service personnel.
LOGIQ P8/P9/P10 Probes	The expected service life for the LOGIQ P8/P9/P10 probes meets or exceeds five (5) years from the date the probe is placed in service, under the provision that the customer follows the care instructions provided on the Probe Care Card / Accompanying LOGIQ P8/P9/P10 Instructions for Use.

Inspecting the System

> ⚠️ **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.

Maintenance Schedule

Monthly Maintenance

Examine the following on a monthly basis (or whenever there is a reason to assume that any issue may have occurred):

- Connectors on cables for any mechanical defects.
- Entire length of electrical and power cables for cuts or abrasions.
- Equipment for loose or missing hardware.
- Control panel and keyboard for defects.
- Casters for proper locking operation.
- Trackball movement

  If the trackball is dusty, please clean it. See 'Trackball' on *page 12-24 for more information.*

Weekly Maintenance

The system requires weekly care and maintenance to function safely and properly. Clean the following:

- System Cabinet
- Monitor
- Operator control panel
- Touch Panel
- Probe holder

    If the probe holder is dusty, please clean it.

- Gel warmer

    If the gel warmer is dusty, please clean it. 'Gel warmer' on *page 12-25*

- Footswitch
- Air filter

    If the air filter is dusty, please clean it. See 'Cleaning the air filter' on *page 12-26 for more information.*

NOTE: *Frequency of the cleaning is depend on environment.*

Failure to perform required maintenance may result in unnecessary service calls.

Appropriate Cleaning Agents

Table 12-11:   Appropriate Cleaning Agents

Components		Probe holder	User interface *	Touch Panel	Monitor display	Hou-sing	Probes	Air Filter	Peri-pherals (e.g. Printers ...)
When to clean		See 'Maintenance Schedule' on *page 12-18 for more information.*							See 'Cleaning and disinfecting probes' on page 11-21 for more information.
How to clean		Wipe gently with a damp, non-abrasive cloth							
Cleaning Agent	OXIVIR TB WIPES	X	X	X	-	X			
	Acryl-Des Wipes	X	X	X	X	X			
	Alcohol (Isopropyl) 70%	X	X	X	X	X			
	CAVIWIPES 1	X	X	X	X	X			
	Cleanisept Wipes	X	X	X	X	X			
	Clinell Clorox Wipes	X	X	X	X	X			
	Clinell Universal Sanitizing Wipes	X	X	X	X	X			
	Clorox Healthcare™ Bleach Germicidal Wipes	X	X	X	X	X		Clean with a vacuum cleaner from the outside	Clean according to the instructions for the peripheral manufacturer
	Distel	X	X	X	X	X			
	Mikrobac® Tissues	X	X	X	X	X			
	Mikrozid® Sensitive Wipes	X	X	X	X	X			
	PDI Easy Screen Cleaning®	X	X	X	X	X			

Table 12-12:   Appropriate Cleaning Agents

Component		Probe holder	User Interface *	Touch Panel	Monitor display	Hou- sings	Probes	Air Filter	Peri- pherals (e.g. Printers ...)
Cleaning Agent	Protex Ultra Disinfectant Wipes	X	X	X	X	X	See 'Cleaning and disinfecting probes' on page 11-21 for more information.	Clean with a vacuum cleaner from the outside	Clean according to the instructions fof the peripheral manufacturer
	Sani-Cloth® Bleach	X	X	X	X	X			
	Sani-Cloth® HB	X	X	X	X	X			
	Sani-Cloth® Plus	X	X	X	X	X			
	Sani-Cloth® Prime	X	X	X	X	X			
	Septiwipes	X	X	X	X	X			
	Sodium Hypochlorite 5.25% (Bleach) Diluted 10:1	X	X	X	X	X			
	Sono Ultrasound Wipes	X	X	X	X	X			
	Super Sani-Cloth®	X	X	X	X	X			
	Trophon Companion Cleaning Wipes	X	X	X	X	X			

X : can be used on the component of the ultrasound console

- : do not use on component of the ultrasound console

NOTE: * Effective cleaning for parts with narrow gaps and holes (e.g. Keyboard, trackball...) is not possible. For more information, visit to http://cleaning.gehealthcare.com/. GE verified that the above listed agents are chemically compatible with the product. No statement on the cleaning or disinfection effectivity of the individual agents can be done by GE.

Cleaning the system

Prior to cleaning any part of the system:

1.   Turn off the system power. If possible, disconnect the power cord. See 'Power Off' on page 3-36 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.

NOTE: *The cloth should be damp, not dripping wet.*

2.   Wipe down the top, front, back, and both sides of the system cabinet.

NOTE: *Do not spray any liquid directly into the unit.*

LCD Monitor and Touch Panel

NOTE: *Never use thinner, benzene, alcohol (ethanol or methanol), abrasive cleaners, or other strong solvents, as these may cause damage to the cabinet or LCD panel.*

NOTE: *DO NOT scratch or press on the panel with any sharp objects, such as pencils or pens, as this may result in damage to the panel.*

To clean the LCD panel and the Touch Panel:

•   The surface can be cleaned with a dry and soft cloth, such as cloths for cleaning glasses.
•   If necessary, stubborn stains can be removed by moistening part of a cloth with water to enhance its cleaning power.

Operator Control Panel

To clean the operator control panel:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
2. Wipe down operator control panel.
3. Use a cotton swab to clean around keys or controls. Use a toothpick to remove solids from between keys and controls.

NOTE: *When cleaning the operator control panel, make sure not to spill or spray any liquid on the controls, into the system cabinet, or in the probe connection receptacle.*

NOTE: *In case of SARS, use bleach, alcohol, or Cidex in a normal diluted form for cleaning/disinfecting the operator panel.*

NOTE: *DO NOT use T-spray or Sani Wipes on the control panel.*

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

NOTE: *The cloth should be damp, not dripping wet.*

Footswitch

To clean 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.

Trackball

1. Power off the system.
2. Rotate the retainer counterclockwise until it can be removed from the keyboard.
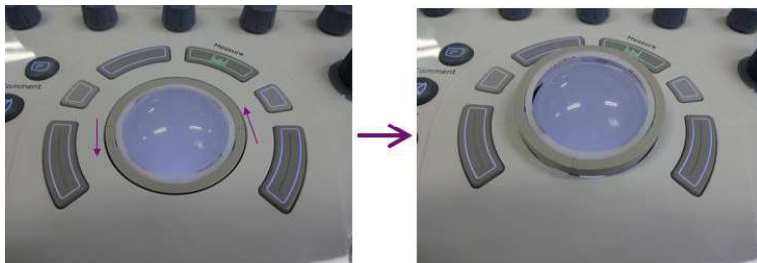
Figure 12-2.   Remove the retainer

3. Separate the trackball and the retainer. Wipe off any oil or dust from the trackball, retainer and the trackball housing using a cleaner or cotton swab.
4. Assemble the trackball and retainer, then put it into the housing and rotate it clockwise until its notches are set in position.

CAUTION	When cleaning, make sure not to spill or spray any liquid into the trackball housing (keyboard or system).

Probe holder

1. Remove the holder.

Figure 12-3.   Remove the holder

2. Wash the holder with mild soap in lukewarm water. Scrub it using a soft sponge, gauze, or cloth to remove all visible residue from the surface. Prolonged soaking or scrubbing with a soft bristle brush (such as a toothbrush) may be necessary if material has dried onto the surface.
3. Rinse the holder with enough water.
4. Dry with a soft cloth and put it back.

Gel warmer

NOTE: *Gel Warmer is expected to be cleaned when dust or other debris cumulates.*

1. Remove the screw-on lid of the bottom.

Figure 12-4.   Gel warmer cap

2. Wipe inside of the gel warmer with soft cloth.
3. Wash the cap with mild soap in lukewarm water. Rinse the cap with enough water.
4. Dry with a soft cloth and put it back.

Cleaning the air filter

Clean the system's air filters to ensure that a clogged filter does not cause the system to overheat and reduce system performance and reliability. It is recommended the filters be cleaned every two weeks, but the requirements will vary due to your system use.

⚠ CAUTION Be sure to lock the wheels before cleaning the air filters to avoid injury by any unexpected movement of the system.

DO NOT operate the unit without the air filters in place.

Allow the air filters to dry thoroughly before re-installing them on the unit.

Cleaning

1. Pull the front cover of cabinet with hand and pull out the air filter.
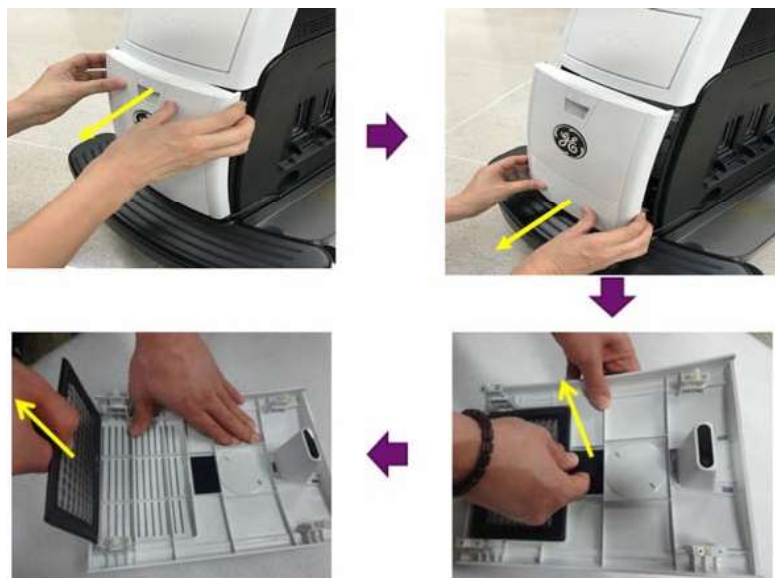
Figure 12-5.   Air filter location

Cleaning (continued)

2. Pull out the filter.

Figure 12-6.   Air filter location

3. Dust the filter with a vacuum cleaner and/or wash it with a mild soapy solution.

    If washed, rinse and dry the filter before re-installation.

4. Put back the air filter and the front cover.

Probe Cleaning

Refer to Chapter 17, the Probes Chapter, for probe cleaning and disinfecting instructions.

⚠ CAUTION   NEVER use any cleaner or disinfectant containing alcohol.

When cleaning/disinfecting probes using a spray cleaner/disinfectant, DO NOT spray the probe while the probe is set in its probe holder on the Ultrasound system. Overspray can damage the TGC controls.

Figure 12-7.   DO NOT Spray a Probe While in its Holder

Probe Cleaning (continued)

If you use a spray cleaner, spray AWAY from the Ultrasound system.

Figure 12-8.   Spray Probes AWAY from the Ultrasound System

If you are cleaning/disinfecting probes while they are on the Ultrasound system, use a wipe cleaner/disinfectant instead.

Figure 12-9.   Using a Wipe to Clean/Disinfect a Probe

Prevention of static electricity interference

Interference from static electricity can damage electronic components in the system. The following measures help to reduce the likelihood of electrostatic discharge:

• Wipe the alphanumeric keyboard and monitor with lint-free tissue or a soft cloth dampened with anti-static spray on a monthly basis.

• Spray carpets with anti-static spray because constant walking on carpets in or near the scanning room may be a source of static electricity.

Disposal

Table 12-13:   WEEE symbol

	Rear of the system Probe connector

Disposal of Old Electrical & Electronic Equipment (applicable in the European Union and other European countries with separate collection systems). This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Battery Replacement and Disposal

Battery replacement every two years is recommended. Contact a local Service Representative for the replacement of the battery.

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

NOTE: *WHEN REMOVING A DEFECTIVE BATTERY, ENSURE THAT IT IS DISPOSED OF IN ACCORDANCE WITH LOCAL REGULATIONS. ALTERNATIVELY, FORWARD IT TO GE MEDICAL SYSTEMS FOR PROPER DISPOSAL.*

Troubleshooting

Refer to the LOGIQ P8/P9/P10 Service Manual if other messages appear on the monitor display.

Table 12-14: Error message and workaround
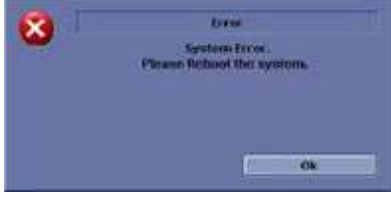
	The system has detected the lower air filter requires cleaning. Please clean the lower filter. 1. Shutdown the system. 2. Clean the air filter according to 'Cleaning the air filter' on *page 12-26* .
	System temperature is too high. System will shut down. 1. Shutdown the system. 2. Clean the air filter according to 'Cleaning the air filter' on *page 12-26* .
	System voltage fault. System will shut down. 1. Select *OK* and reboot the system. 2. If the same message appears after reboot, shut down the system and turn off the breaker. Then turn on the system according to 'Power On' on page 3-31.
	System Error. Please reboot the system. 1. Select *OK* and reboot the system. 2. If the same message appears after reboot, shut down the system and turn off the breaker. Then turn on the system according to 'Power On' on page 3-31.

Image Quality Check

Image Quality Check is intended to facilitate Image Quality checks during Quality Assurance Evaluations. Quality Assurance tests are used to determine whether a scanner is providing the same level of performance year after year.

By using the same settings year after year, this ensures that the data collection is consistent, independently of who performs the test.

This preset only includes fundamental settings for B-Mode. Processing modes like SRI, Harmonics, etc., are turned off.

To do an Image Quality Check (IQC),

1. Activate IQC via Utility--> Imaging Preset Manager--> Category (select the Category first).
2. Click on the plus sign in front of IQC for Service and select IQC.
3. Assign IQC to a Touch Panel key by using the right arrow key. Map the IQC to the location you want it to appear on the Touch Panel.
4. Map the IQC to the location you want it to appear on the Touch Panel.
5. Select Model. Then select IQC.

Quality Assurance

Introduction

A good Quality Assurance Evaluation program consists of periodic systematic actions that provide the user with adequate confidence that their diagnostic ultrasound system will produce consistently high quality images and quantitative information.

Therefore, it is in the best interests of every ultrasound user to routinely monitor equipment performance.

The frequency of Quality Assurance evaluations should be based on user's specific needs and clinical practice.

Periodic monitoring is essential in order to detect the performance changes that occur through normal aging of system components. Routine equipment evaluations may also reduce the duration of exams, number of repeat exams, and maintenance time required.

For details on system and peripheral routine preventive maintenance instructions, See 'System Care and Maintenance' on *page 12-16 for more information.*

Typical Tests to Perform

Quality assurance measurements provide results relating to system performance. Typically these are:

• Axial Measurement Accuracy

• Lateral Measurement Accuracy

• Axial and Lateral Resolution

• Penetration

• Functional & Contrast Resolution

• Gray Scale Photography.

With these tests, a performance baseline can be set at installation with the phantom in your department. Future test results can be compared to the baseline in order to maintain a record of system performance trends.

Frequency of tests

Quality assurance tests are used to determine whether a scanner is providing the same level of performance from day to day.

The frequency of testing varies with the amount of system usage and modes to be tested. It is recommended that the user perform quality assurance tests at least every three months or every 400 patient studies. Tests should also be performed when a question about system performance exists.

A mobile system may require more frequent tests.

Image quality should also be tested immediately after the following events:

• Service calls

• System upgrades/modifications

• Dropped probe, power surge, etc.

Phantoms

Quality Assurance Evaluations may be done with phantoms and test objects that are applicable to the parameters being evaluated or to the user's clinical practice.

Typical phantoms are composed of material that acoustically mimic human tissue. Pins, anechoic and echogenic targets are physically positioned to provide information for a variety of tests.

Doppler phantoms are currently expensive and complicated to deal with on the user level. If a problem with any Doppler parameters or measurement is suspected, contact a local service representative for evaluation.

The RMI 403GS phantom is shown in the illustration below as a representative example of a phantom.

Phantoms (continued)
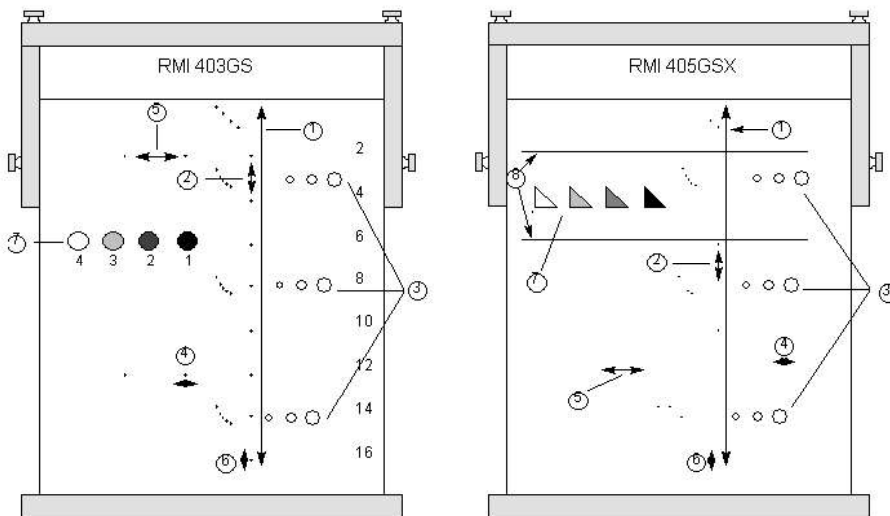
Figure 12-10.   Representative Phantom Example

1. Penetration
2. Axial Distance Measurement
3. Functional Resolution
4. Lateral Resolution
5. Lateral Distance Measurement
6. Axial Resolution
7. Contrast Resolution and Gray Scale Photography
8. Gray Scale Plane Targets

Baselines

An absolute necessity for a quality assurance program is establishing baselines for each test or check. Baselines are established after the system has been verified to be working properly at installation or after a repair. If a probe or major assembly is replaced, new baselines should be generated.

Baselines can be made by adjusting system parameters to prescribed levels or to the best possible image. The key factor to remember is reproducibility. The same conditions must be reproduced for each periodic check.

All system parameters not displayed on the monitor should be recorded for the permanent record.

Periodic Checks

Periodic checks should be performed in accordance with your facility's quality assurance requirements. For the data to be valid, periodic checks should mimic the baseline setup parameters.

The resulting image, when scanning the phantom exactly as before, should be recorded and compared to the baseline. When a matching image is obtained, it can be assumed that the system performance has not degraded from the baseline.

If a significant difference between the baseline and periodic check is noted, double check the system setup and repeat the test. If the difference between the baseline and periodic check persists, contact a local Service Representative.

Failing to reproduce the control settings as in the baselines will introduce errors in the data and potentially invalidate the results.

Results

Lack of standardization among test instruments, the wide range of acceptance criteria, and incomplete knowledge regarding the significance of certain performance parameters prohibit the establishment of absolute performance criteria for these tests.

Quality Assurance Evaluation results should be compared to previously-recorded results.

Performance trends can then be detected. Unacceptable performance or diminishing trends should be identified for maintenance or repair before a malfunction or inappropriate diagnosis occurs.

The user should determine the best method for recording and archiving the baseline and periodic checks. In most cases the choice is hard copy.

It is important to maintain good consistent records for inspections that may arise, as well as to detect system performance trends.

System Setup

The user should tailor the tests to their particular needs. It is certainly not necessary to make all checks with all probes. A representative example, with the probes used most often by the customer, should be adequate in judging system performance trends.

Use a gray scale phantom as the scan object for the tests. Commercial phantoms are supplied with its own operator manual. Be familiar with proper phantom operating procedures prior to use for quality assurance evaluations.

1. Adjust image monitor. Brightness and contrast should be set to the normal viewing of a good gray scale image.
2. Check all recording devices for proper duplication of image monitor. Ensure that what is seen is what is recorded.
3. Annotate non-displayed image processing controls.
4. Set TGC slide pots to center (detent) position.
5. Place focal zone marker(s) in area of interest for an optimum image.

Test Procedures

The following are recommended Quality Assurance tests. A brief description of the test, the benefit it provides and steps to accomplish the test are supplied.

The importance of recording scan parameters and consistent record keeping cannot be stressed enough. Reproducibility to monitor system trends is the key to quality assurance evaluations.

Using the system's dual image display format is often very convenient and saves recording media.

Axial distance measurements

Description

Axial measurements are the distance measurements obtained along the sound beam. See Figure 12-10 for more information.

Benefit

The accurate measurement of the size, depth and volume of a structure is a critical factor in determining a proper diagnosis. Most imaging systems use depth markers and/or electronic calipers for this purpose.

Method

Axial distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths or fields of view can be tested.

Procedure

To measure axial distance:

1. Scan a test phantom with precisely-spaced vertical pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.

2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.

3. Scan the vertical pins in zoom or at different depth/scale factors.

4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.

5. Document the measurements for reference and future comparison.

Contact a Service Engineer if vertical measurements differ by more than 1.50% of the actual distance.

Lateral distance measurements

Description

Lateral measurements are distance measurements obtained perpendicular to the axis of the sound beam. See Figure 12-10 for more information.

Benefit

The purpose is the same as vertical measurements. Precisely-spaced horizontal pin targets are scanned and results compared to the known distance in the phantom.

Method

Lateral distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths of fields of view can be tested.

Procedure

To measure lateral distance:

1. Scan a test phantom with precisely-spaced horizontal pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets from side to side.
2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.
3. Scan the horizontal pins in zoom or at different depth/scale factors.
4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.
5. Document the measurements for reference and future comparison.

Contact a Service Engineer if horizontal measurements differ by more than 3mm or 3% of that depth, whichever is greater.

Axial resolution

Descprition

Axial resolution is the minimum reflector separation between two closely-spaced objects to produce discrete reflections along the axis of the sound beam. It can also be monitored by checking the vertical size of known pin targets. See Figure 12-10 for more information.

Axial resolution is affected by the transmitting section of the system and the probe.

Benefit

In clinical imaging, poor axial resolution displays small structures lying close together as a single dot. This may lead to improper interpretation of the ultrasound image.

Procedure

To measure Axial resolution:

1. Scan a test phantom with precisely-spaced vertical pin targets.
2. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.
3. Press **Freeze** to stop image acquisition.
4. Perform a standard distance measurement of the pin vertical thickness at different points in the image. Record all images for archiving.
5. Scan the vertical pins in zoom or at different depth/scale factors.
6. Press **Freeze** to stop image acquisition; repeat the vertical thickness measurements of the pins and record the images for archiving.
7. Document the measurements for reference and future comparison.

Axial resolution should remain stable over time. Contact a Service Engineer if any changes are observed.

Lateral resolution

Description

Lateral resolution is the minimum reflector separation between two closely spaced objects to produce discrete reflections perpendicular to the axis of the sound beam. It can also be monitored by checking the horizontal size of known pin targets. See Figure 12-10 for more information.

Lateral resolution is dependent upon the beam width produced by the probe. The narrower the beam, the better the lateral resolution.

The beam width is affected by the frequency, degree of focusing, and distance of the object from the face of the probe.

Benefit

Clinically, poor lateral resolution will display small structures lying close together as a single dot. This may lead to improper interpretation of the ultrasound image.

Procedure

To measure lateral resolution:

1. Scan a test phantom with precisely-spaced horizontal pin targets.
2. Adjust all scan controls, as necessary, for the best image of the pin targets from side to side.
3. Press **Freeze** to stop image acquisition and perform a standard distance measurement of the horizontal thickness of a pin at different points in the image. Record all images for archiving.
4. Scan the horizontal pins in zoom or at different depth/scale factors.
5. Press **Freeze** to stop image acquisition; repeat the horizontal thickness measurements of the pins and record the images for archiving.
6. Document the measurements for reference and future comparison.

Pin width should remain relatively constant over time ("1mm). Dramatic changes in pin width may indicate beamforming problems. Contact a Service Engineer if beam width changes consistently over 2 to 3 periodic tests.

Penetration

Description

Penetration is the ability of an imaging system to detect and display weak echoes from small objects at large depths. See Figure 12-10 for more information.

Penetration can be affected by the system's:

• Transmitter/receiver

• Degree of probe focusing

• Attenuation of the medium

• Depth and shape of reflecting object

• Electromagnetic interference from local surroundings.

Benefit

Weak reflecting echoes are commonly produced from the internal structure of organs. Definition of this tissue texture is important in the interpretation of the ultrasound findings.

Method

Scan a phantom to see how echoes begin to fade as depth is increased. The maximum depth of penetration is the point at which homogeneous material in the phantom begins to lose brightness.

Procedure

To measure penetration:

1. Set the front panel TGC slide pots to their center (detent) position.

2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.

3. Scan a test phantom along the vertical pin targets to typical depths for the probe being used.

4. Perform a standard distance measurement from the top of the image displayed to the point at which homogeneous material in the phantom begins to lose brightness.

5. Document the depth measurement for reference and future comparison.

Contact a Service Engineer if the depth of penetration shifts more than one centimeter (1cm) when using the same probe and same system settings.

Functional resolution

Description

Functional resolution is an imaging system's ability to detect and display the size, shape, and depth of an anechoic structure, as opposed to a pin target. See Figure 12-10 for more information.

The very best possible image is somewhat less important than reproducibility and stability over time. Routine tests at the same settings should produce the same results.

Benefit

The data obtained will give a relative indication of the smallest structure the system is capable of resolving at a given depth.

Procedure

To measure functional resolution:

1. Set the front panel TGC slide pots to their center (detent) position.
2. Gain and acoustic output can be adjusted as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with a vertical row of anechoic cyst targets to typical depths for the probe being used.
4. Evaluate the cysts at various depths for a good (round) shape, well-defined borders and no fill in. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide optimal cystic clearing.
5. Document all results for future reference and comparison.

Contact a Service Engineer if a greatly distorted image is obtained.

Contrast resolution

Description

Contrast resolution is the ability of an imaging system to detect and display the shape and echogenic characteristics of a structure. See Figure 12-10 for more information.

Specific values measured are less important than stability over time. Routine tests at the same settings should produce the same results.

Benefit

A correct diagnosis is dependent upon an imaging system's ability to differentiate between a cystic or solid structure versus echo patterns from normal surrounding tissue.

Method

A phantom with echogenic targets of different sizes and depths should be used.

Procedure

To measure contrast resolution:

1. Set the front panel TGC slide pots to their center (detent) position. Set dynamic range to 54 db.
2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with echogenic targets at the depths available.
4. Evaluate the echogenic targets for contrast between each other and between the surrounding phantom material. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide an optimal scan image.
5. Document all results for future reference and comparison.

Contact a Service Engineer if the echogenic characteristics or shapes of the targets appear distorted.

Gray Scale photography

Description

Poor photography will cause loss of low level echoes and the lack of contrast between large amplitude echoes. See Figure 12-10 for more information.

Benefit

When photographic controls and film processors are properly adjusted, weak echoes, as well as strong echoes, are accurately recorded on film.

Procedure

1. Adjust the camera according to the manufacturer's instructions until the hard copy and video display are equal.
2. Scan the phantom and it's echogenic contrast targets.
3. Make a hard copy photograph of the display and compare it to the image on the video monitor for contrast and weak echo display.
4. Document all results for future reference and comparison.

Contact a Service Engineer if camera cannot duplicate what is on the image monitor.

NOTE: *Optimization of brightness/contrast controls on the display monitor is imperative in order to make sure that the hardcopy and monitor look alike.*

The display monitor is adjusted first. The hardcopy camera or printer is adjusted to match the display monitor.

Setting up a Record Keeping System

Preparation

The following is needed:

- Quality Assurance binder.
- Hard copy or electronic file of images.
- Quality Assurance Checklists.
- Display the following information while testing quality assurance:
  - Acoustic Output
  - Gain
  - Depth
  - Probe
  - Dynamic Range
  - Set up new patient to be the name of the test.
- Annotate the following:

  - Any control where its value is **NOT** displayed.
  - Significant phantom information.

Record Keeping

Complete the following:

1. Fill out the Ultrasound Quality Assurance Checklist for each probe, as scheduled.
2. Make a hard copy or archive the image.
3. Compare images to baseline images and acceptable values.
4. Evaluate trends over previous test periods.
5. File hard copy or electronic file of images and checklist in Quality Assurance binder.

Ultrasound Quality Assurance Checklist

Table 12-15:   Ultrasound Quality Assurance Checklist (Part 1)

Performed By		Date
System		Serial Number
Probe Type	Probe Model	Serial Number
Phantom Model	Serial Number	Room Temperature
Acoustic Output	Gain	Focal Zone
Gray Map	TGC	Depth
Monitor Setting		
Peripheral Settings		
Other Image Processing Control Settings		

Table 12-16:   (Part 2)

Test	Baseline Value Range	Tested Value	Image Hardcopy/Archived	Acceptable? Yes/No	Service Called (Date)	Date Resolved
Vertical Measurement Accuracy						
Horizontal Measurement Accuracy						
Axial Resolution						
Lateral Resolution						
Penetration						
Functional Resolution						
Contrast Resolution						
Gray Scale Photography						

Assistance

Supplies/Accessories

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

⚠ CAUTION Use only GE approved internal equipment when replacing an internal peripheral.

The user or the operator should never install/replace the internal peripheral. Service representatives authorized by GEHC will install/replace the internal peripheral.

Not all features or products described in this document may be available or cleared for sale in all markets. Contact the distributor, GE affiliate or sales representative for approved peripherals. For HCATs, contact your sales person. For 2million/5million number part numbers, these are service replacement part numbers that may be either new or refurbished. To order these, contact CARES in the US, or call service in Europe and Asia.

The following supplies/accessories have been verified to be compatible with the system:

Peripherals

Table 12-17:   Peripherals and Accessories

Accessory
Sony B/W Printer Model UP-D898
Sony Color Printer Model UP-D25MD
DVR
UVC
Digital expert

ECG Accessories

Table 12-18:   ECG Accessories

Accessory
ECG module
ECG cable - AHA typee
ECG cable - IEC type
External ECG Cable

Console

Table 12-19:   Console Accessories

Accessory
Footswitch
Endocavity Probe Holder
Optional Probe Holder
Side Tray
Low cabinet
Mid cabinet
High cabinet
Side cabinet
Greek Keyboard
Russian Keyboard
English keyboard
French keyboard
German keyboard
Norwegian/Danish Keyboard
Swedish Keyboard
Power Cord - US
Power Cord - Argentina
Power Cord - Italy
Power Cord - UK-Ireland
Power Cord - Switzerland
Power Cord - Denmark
Power Cord - Israel
Power Cord - Japan
Power Cord - China
Power Cord - Australia
Power Cord - India
Power Cord - Taiwan
Power Cord - South Africa
Power Cord - Brazil

Probes

Table 12-20:   Probes and Accessories

Probe	Biopsy Guide
C1-5-RS	Multi Angle, Disposable with a Reusable Bracket
E8C-RS	Single Angle, Disposable with a Plastic Bracket or Reusable with a Stainless Steel Bracket
L8-18i-RS	Not Available
9L-RS	Multi Angle, Disposable with a Reusable Bracket
P8D	Not Available
12L-RS	Multi Angle, Disposable with a Reusable Bracket Infinite-angle (in plane biopsy kit), Disposable with a Reusable Bracket Transverse Bracket (off plane biopsy kit), Disposable with a Reusable Bracket
ML6-15-RS	Multi Angle, Disposable with a Reusable Bracket
3Sc-RS	Multi Angle, Disposable with a Reusable Bracket
RAB2-6-RS	Single Angle, Disposable with a Reusable Bracket, Single angle reusable
8C-RS	Not Available
6S-RS	Not Available
L6-12-RS	Multi Angle, Disposable with a Reusable Bracket
RIC5-9A-RS	Single Angle, Disposable with a Plastic Bracket or Reusable with a Stainless Steel Bracket
BE9CS-RS	Single Angle, Disposable with a Plastic Bracket or Reusable with a Stainless Steel Bracket
E8CS-RS	Single Angle, Disposable with a Plastic Bracket or Reusable with a Stainless Steel Bracket
L4-12t-RS	Multi Angle, Disposable with a Reusable Bracket Infinite-angle (in plane biopsy kit), Disposable with a Reusable Bracket Transverse Bracket (off plane biopsy kit), Disposable with a Reusable Bracket
L10-22-RS	Not Available
L3-9i-RS	Not Available
12S-RS	Not Available
P6D	Not Available
L3-12-RS	Multi Angle Bracket

Table 12-20:   Probes and Accessories (Continued)

Probe	Biopsy Guide
6Tc-RS	Not Available
P2D	Not Available
IC9-RS	Reusable, Disposable Bracket
C1-6-D	Multi-Angle, Disposable wih a Reusable Bracket
C2-7-D	Multi-Angle, Disposable with a Reusable Bracket Multi-Angle, Reusable with a Stainless Steel Bracket
C3-10-D	Not Available
10C-D	Not Available
M5Sc-RS	Multi-Angle, Disposable with a Reusable Bracket

Options

Table 12-21:   Options

Accessory
LOGIQView
Contrast Enhanced Ultrasound*
Scan Assistant
DICOM 3.0 connectivity
Report Writer
Real time 4D
4D with VCI
VOCAL II (Volume Calculation)
Tomographic Ultrasound Imaging
Continuous Wave (CW)
Tissue Velocity Imaging (TVI)
Elastography
Elastography Quantification (Not available in the USA)
Advanced 3D
B-Flow
Auto IMT
Flow Quantification
Stress Echo
B Steer+
ECG
SW DVR
Footswitch
Auto EF
Advanced 3D
Volume Contrast Imaging (VCI)
STIC
Omniview
HD Live
Wireless Lan (WLAN)

Table 12-21:   Options (Continued)

Accessory
LOGIQ Apps
Bluetooth
Compare Assistant
Breast Productivity Package
Thyroid Productivity Package
OB Measure Assistant
Breast Measure Assistant
Video Scan Converter
Automated Function Imaging
Shear Wave Elastography
KOIOS SW
Ultrasound Guided Attenuation Parameter (UGAP)
*The LOGIQ P8/P9/P10 is designed for compatibility with commercially available Ultrasound contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is cleared for use. Contrast-related product features are enabled only on systems for delivery to an authorized country or region of use.

Chapter 13

Advanced Features

This chapter consists of information about System Options.

List of Advanced Features

Table of Contents

NOTE: *The following features are an option. If these options are not installed, the button/key are disabled or not displayed.*

Table of Contents (continued)

B-Mode Option

LOGIQView

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

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

LOGIQView is not available for the following:

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

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

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

LOGIQView (continued)

Using LOGIQView   To perform an exam using LOGIQView,

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

HINTS   When you scan, start with a strong, quick sweep in the direction of the acquisition and then complete the LOGIQView image with a a slow steady sweep. LOGIQView acquires images via leading edge vectors (and does not acquire slices, as in CINE). The image is being stored as you perform the scan and you can watch the LOGIQView as it is being acquired.

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

NOTE: *Measurement error is within 10% or 4mm of the distance you measured for all linear probes.*

LOGIQView (continued)

Uniform Motion

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

Guidance and precautions for uniform motion:

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

Bioeffects

Activating LOGIQView has no affect upon Acoustic Output values.

B Steer+ (Option)

Description   B Steer+ allows you to obtain better biopsy (needle) imaging without slanting the B Mode image. B Steer+ is operable in B mode, Color Flow mode, PDI mode or GT mode. B Steer+ is available with all linear probes and following convex probes: C1-5-RS, 8C-RS, RAB2-6-RS, C1-6-D, C2-7-D, C3-10-D and 10C-D.

Benefits   B Steer+ provides better biopsy visualization compared to normal B Mode image. B Steer+ allows you to adjust beam angle and needle gain to achieve best biopsy image without changing B mode image.

Activating   To acivate B Steer+ in B mode, press left or right key. To activate B Steer+ in B mode or Color flow mode or PDI mode or GT mode, press user-difined hard key after assigning the key to B Steer+ in Utility -> System -> User Configurable Key -> User Defined hard key.

NOTE: *Activating B Steer+ may decrease frame rate.*

NOTE: *B Steer+ user-defined key activates B Steer+ even when "Enable B Steer+" preset is off*

Using B Steer+   To optimize biopsy image using B Steer+ functionality, adjust B Steer+ beam direction, angle and needle gain.

Adjust B Steer+ beam direction and angle to make biopsy and beam angle as perpendicular as possible. B Steer+ beam direction and angle are selectable using the direction and angle buttons on the touch panel (supporting 20, 30, 40 and 50 degree for linear probes, 10, 20, 30, 40 degree for following four convex probes: C1-5-RS, 8C-RS, RAB2-6-RS, C1-6-D, C2-7-D, C3-10-D and 10C-D)

Adjust Needle Gain and find best brightness for biopsy. Needle Gain is adjustable using the Needle Gain rotary (range from 0 to 100).

Turn on B Steer+ Dynamic FOV preset option that helps you to achieve better biopsy visualization when your biopsy and beam angle are not perpendicular enough. B Steer+ Dynamic FOV is selectable in Utility -> Imaging -> B Tab.

NOTE: *Turning on B Steer+ Dynamic FOV preset option may decrease frame rate.*

B Steer+ (Option) (continued)

Select Needle Thickness preset option to make biopsy visualized thin or thick. B Steer+ Needle Thickness is selectable in Utility -> Imaging -> B Tab.

B Steer+ values (including enable/disable, beam direction, angle and Needle Gain) are returned to factory default values or user preset values when you change: Probe, Exam Category, Exam Calcs or New Patient.
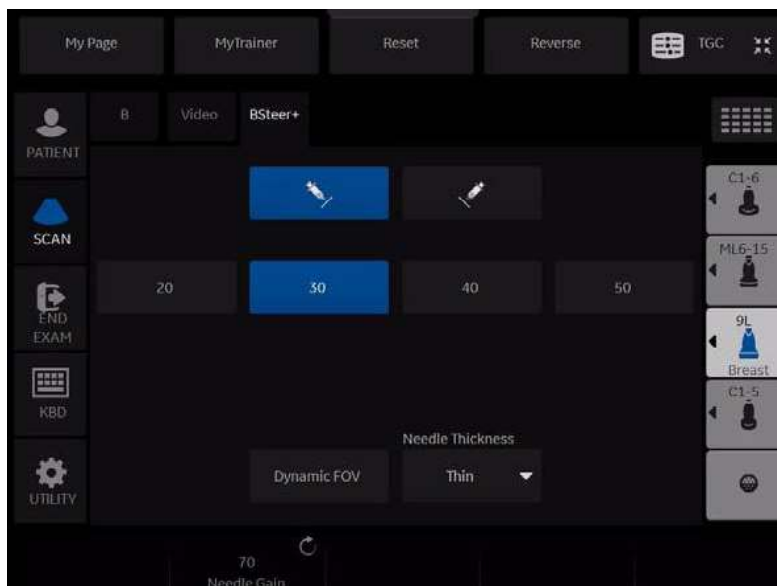
Figure 13-1.   B Steer+ Tab in Touch Panel

Preset   B Steer+ Enable/Disable - preset via Utility -> Imaging -> General.

B Steer+ Beam Direction - preset via Utility -> Imaging -> B Tab.

B Steer+ Beam Angle - preset via Utility -> Imaging -> B Tab.

B Steer+ Needle Gain - preset via Utility -> Imaging -> B Tab.

B Steer+ Dynamic FOV - preset via Utility -> Imaging -> B Tab.

B Steer+ Needle Thickness - preset via Utility -> Imaging -> B Tab.

B Steer+ (Option) (continued)

Bioeffects   Activating B Steer+ may change the TI and/or MI. Observe the
                     output display for possible effects.
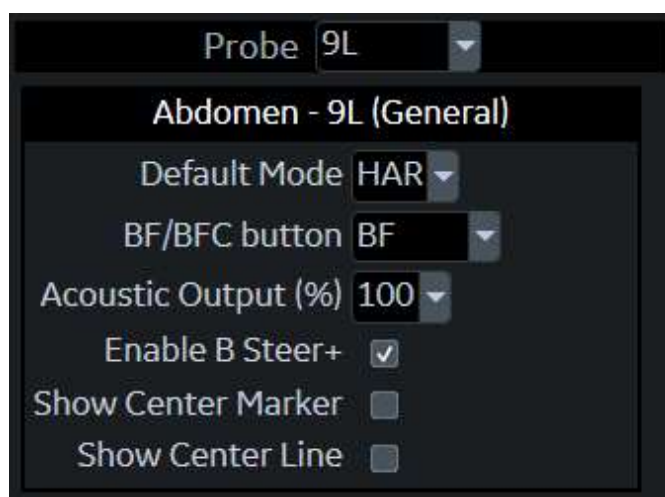
Figure 13-2.   Enable B Steer+

Figure 13-3.   B Steer+ Preset+

Biplane (BE9CS-RS probe)

Description BE9CS-RS probe can scan and display both the longitudinal and the transverse planes simultaneously.

NOTE: *When displaying single plane, pressing the button on the probe toggles scan plane between the longitudinal and the transverse. When scanning biplanes, pressing the button exits biplane and displays only the longitudinal scan plane.*

Figure 13-4. Biplane Image Display (Example)

Biplane (BE9CS-RS probe) (continued)

Values   On/Off.

To activate Biplane, select Biplane on the 2nd Touch Panel page of B, CF and PDI.

NOTE: *Only the longitudinal plane can scan CF and PDI during Biplane.*

Preset   User Configurable key can activate/deactivate Biplane. Assign "Biplane" to the key in Utility -> System -> User Configurable Key.

BE9CS-RS can start Biplane scan as default. Check "Start with Biplane" in Utility -> Imaging -> B.

Biplane can display two planes side by side. Check "Horizontal Display for Biplane" in Utility -> Application -> Settings -> Image Control & Display.

BE9CS-RS Probe Changing Scan Method

Changing scan methods between two micro-convex. Press the switch on the BE9CS-RS probe.

Figure 13-5.   Switching button

a.   Switching button

Figure 13-6.   Scan plane orientation

a.   Longitudinal scan plane
b.   Transverse scan plane

Tissue Velocity Imaging (TVI)

Intended Use

Tissue Velocity Imaging (TVI) calculates and color-codes the velocities in tissue. The tissue velocity information is acquired by sampling of tissue Doppler velocity values at discrete points. The information is stored in a combined format with gray scale imaging during one or several cardiac cycles with high temporal resolution.
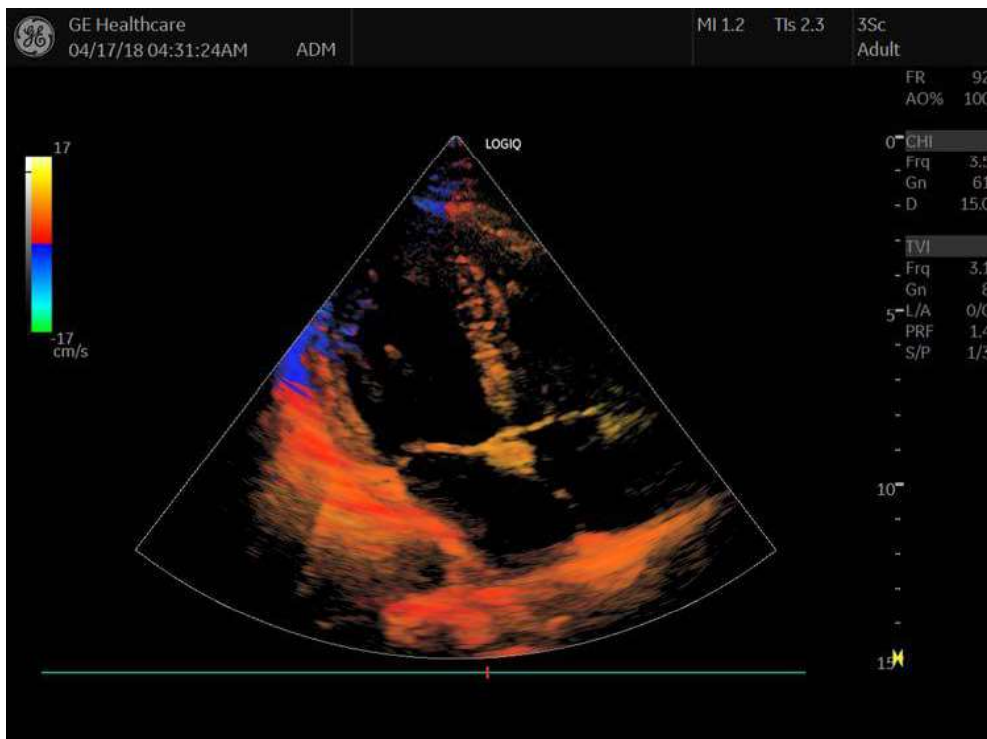
Figure 13-7.   Tissue Velocity Imaging Display

Activating TVI

1. Select the desired probe.

2. While in B-Mode, press the **TVI** key. The TVI image and the Touch Panel display.

   While in TVI, press **M** to activate TVM.

   While in TVI, press **PW** to activate TVD.

3. Use the trackball (assigned function: Pos) to position the ROI frame over the area to be examined.

4. Use the trackball (assigned function: Size) to adjust the dimension of the ROI.

Optimizing TVI

The use of preset gives optimum performance with minimum adjustment. If necessary, the following controls can be adjusted to further optimize the TVI display:

- To reduce quantification noise (variance), the Nyquist limit should be as low as possible, without creating aliasing. To reduce the Nyquist limit: Reduce the Scale value.

NOTE: *The Scale value also affects the frame rate. There is a trade off between the frame rate and quantification noise.*

- TVI provides velocity information only in the beam direction. The apical view typically provides the best window since the beams are then approximately aligned to the longitudinal direction of the myocardium (except near the apex). To obtain radial or circumferential tissue velocities, a parasternal view must be used. However, from this window the beam cannot be aligned to the muscle for all the parts of the ventricle.

NOTE: *PW will be optimized for Tissue Velocities when activated from inside TVI.*

NOTE: *You can preset the value on the Utility -> Imaging -> TVI or TVD mode and press* **Save***.*

TVI

You can preset all parameters in Utility -> Imaging ->TVI.

The TVI parameters function the same as those described in the Color Flow specific section. The only differences would be that it pertains to tissue velocity rather than the color flow image. In the table below any TVI parameter or parameter specifics are noted.

About optimizing other parameters, see 'Optimizing Color Flow' on *page 5-44* for details.

Table 13-1:   TVI Parameters

Control	Details
Visible Description Adjusting Values	In LIVE/Freeze/Archive, you can display TVI Color with TVI. Select **Visible** on the Touch Panel. On or Off.
Line Density	0 or 1. Optimizes B-Mode frame rate or spatial resolution for the best possible image.
Map	Values: TV1 and TV2.
Threshold	High values display more color. Low values limit the color to lower tissue echo (Opposite of Threshold in Color Flow Mode).
Spatial Filter	Values 0, 1 and 2.
TVI Gain	Control color transparency. High values display more color; low values display more tissue. This parameter is assigned to the Color Gain control.

TVM Parameters

About optimizing other parameters, see 'Optimizing M-Mode' on *page 5-38 for more information*.

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

Adjusting   Press left or right arrow key to select the value.

Values   0, 1 or 2.

Benefits   Smooths the image.

TVD Parameters

About optimizing other parameters, see 'Optimizing Spectral Doppler' on *page 5-64 for details*.

Contrast Imaging

Overview

⚠️ **WARNING**   Appropriate training

Only physicians or echo technicians who have received appropriate training can use the Contrast applications.

⚠️ **WARNING**   **Misdiagnosis based on image artifacts**

Misdiagnosis in ultrasound contrast images may be caused by several artifacts, most importantly:

Motion artifacts: gives rise to signals independently of contrast presence. This may be caused by patient movement; including respiration, or by probe movement influenced by the operator.

Regional drop outs: caused by unintentional destruction of the contrast agent, too low concentration of contrast agent, poor acoustic penetration due to rib/lung shadows or system failing to detect the contrast agent due to erroneous settings induced by the operator.

Tissue harmonics: gives contrast-like signals independently of the presence of contrast agent.

⚠️ **CAUTION**   Cardiac rhythm disturbances during perfusion studies using gas ultrasound contrast agents have been observed in the diagnostic range of Mechanical Index (MI) values. See the specific package insert for the contrast agent being used for details.

Overview (continued)

CAUTION   Read and follow contrast agent instructions provided by the
            manufacturer.

NOTE: *The LOGIQ P8/P9/P10 is designed for compatibility with
            commercially available Ultrasound contrast agents. Because the
            availability of these agents is subject to government regulation
            and approval, product features intended for use with these
            agents may not be commercially marketed nor made available
            before the contrast agent is cleared for use. Contrast-related
            product features are enabled only on systems for delivery to an
            authorized country or region of use.*

Contrast Imaging Overview

Benefits

Injected contrast agents re-emit incident acoustic energy at a harmonic frequency much more efficiently than the surrounding tissue. Blood containing the contrast agent stands out brightly against a dark background of normal tissue.

Clinical Use

Possible clinical uses are to detect and characterize tumors of the liver, kidney, and pancreas and to enhance flow signals in the determination of stenosis or thrombus.

Affect on other controls

The default acoustic output adjusts for contrast imaging and the Power Output key provides more subtle gradations for use while in contrast imaging. When you exit Contrast Imaging, the system returns the acoustic output to its original setting. When you reactivate Contrast Imaging, the system enters the default Contrast Mode.

Most system controls are available (Depth, Zoom, Colorize, etc.). However, some controls are not available (Anatomical M Mode, Rejection, and Suppression).

Controls adjusted while in Contrast Imaging retain these values when you exit Contrast Imaging (except for post-processing controls).

Bioeffect

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

Feature Availability

Multi Image and LOGIQView are not available.

Mode

Reference Mode

Reference (Ref) Mode is to image the anatomical reference, not the contrast enhancement.

Contrast Mode

There are several contrast imaging techniques. Note that the appropriate imaging technique may vary by agent and application. In other words, the imaging technique is not dedicated for the agent and vice versa.

Parameters

You can be preset almost controls in the Utility --> Imaging --> CON or Ref Tab.

Contrast Tech.

Description
Select the active contrast acquisition mode. "HRes", "AM", and "CHA"

Table 13-2:   Available Contrast Techniques

Label	Description	Clinical Use
HRes	The main purpose of HRes mode is to image the harmonic signal from the contrast agent. This mode transmits two consecutive pulses with inverted polarity as a contrast transmit group. The received signals are summed to cancel the fundamental (i.e. linear) responses and then the non-linear harmonic responses are extracted.	Harmonic - perfusion, tumor flow characteristics
Coded Harmonic Angio (CHA)	The main purpose of CHA mode is to image the non-linear signal from the contrast agent with strong tissue suppression. This mode transmits four consecutive pulses with alternate polarity (i.e. two pairs of Phase Inversion) as a contrast transmit group.	Vascular, early phase imaging
Amplitude Modulation (AM)	The main purpose of AM mode is to image the non-linear signal from the contrast agent. This mode transmits two or more consecutive pulses with the different amplitude as a contrast transmit group. The received signals are summed with the different coefficients to cancel the linear responses and then the non-linear responses are extracted.	Tumor detection and characterization

NOTE: *The available options for the Contrast Tech. is depend on the supported contrast acquisition mode for the active probe.*

Parameters (continued)

Single View/Dual View

Description   ***Single View*** displays the active Contrast image only.

                         Dual View displays the active Contrast image and the reference image simultaneously.

Visualization

Description   Define the display technique.

Values   •   **Contrast**. Displays the contrast-enhanced image.
                         •   **Tissue**. Displays the tissue image.
                         •   **Hybrid Contrast**. Displays the contrast-enhanced image and the tissue image using Hybrid Map.

**Visualization/Map
Indication**

Figure 13-8.   Imaging parameter

1.   Gray/Colorize Map for current visualization.
2.   Visualization: C=Contrast, T=Tissue, HC=Hybrid Contrast

Parameters (continued)

Hybrid Map

Description   Select the hybrid map for the Hybrid Contrast visualization in the
Dual/Hybrid Display.

Gray Map

Description   You can select a map for the contrast image and reference
tissue image independently.

Adjusting   Press *Gray Map* and select the map in each tab.

Contrast Color

Description   Select the color map for the Contrast mode image.

Adjusting   Press *Colorize* and select the map.

Contrast only

Description   Only transmit and receive the acoustic power signal for the
contrast-enhanced image.

Adjusting   Press *Contrast Only*.

Parameters (continued)

Frequency

Description	Select frequency type for each contrast technique.
Adjusting	Frequency can be preset in the Utility -> Imaging -> CON.

- Frequency (AM): Res, Gen, Pen
- Frequency (HRes): Gen

Sonazoid

Description	If you use Sonazoid for Contrast agent, you have to check Sonazoid in Utility -> Imaging -> CON.

Target MI

Description	Target MI Control provides the automated adjustment of the acoustic output to keep the specified target MI value to reduce the unexpected results on the contrast exam.
	Target MI control can be preset in the Utility -> Imaging -> CON and Ref.

NOTE: *The value of Target MI for Reference Image is adjustable on Ref tab, only when Ref-Only mode.*

Accumulation

Description	Accumulation enhances the flow in an image.
	If Accumulation is turned off, then Frame Averaging is used; if Accumulation value is set, then Accumulation is used.
Availability	Available in Contrast, Color Flow, PDI, and B-Flow.
Benefit	Accumulation detects the maximum signal and holds it for the level specified.

Parameters (continued)

Max (Maximum) Enhance

Description	Sets the acoustic output to its maximum setting (100%)
Values	On/Off. When you deactivate Max Enhance, the acoustic output is returned to its previous setting. Max Enhance is deactivated by the system when you turn it off, change probes, or change the contrast technique.
Benefits	This control provides quick transition to High MI imaging. This allows the user a quick one-button push to destroy the agent. Useful when the user is interested in the bubble wash-in characteristics of the anatomy being scanned.

Trigger

Description	The Contrast Trigger scans images at set intervals, delaying imaging according to the time delay that you specify.
Adjusting	On/Off. Press **Trigger** assigned rotary.

Time Delay

Description	The Contrast Trigger scans images at set intervals, delaying imaging according to the time delay that you specify.
Adjusting	Press **Trigger** to activate **Time Delay** (select the interval of the interval timer triggered acquisition). Move the rotary up/down to select the index.
	Set the default seconds of Time Delay in Utility -> Imaging -> Con.

Parameters (continued)

Flash

Description	This feature provides a way to expose the higher acoustic power for a specified time duration by pressing a control once.
Adjusting	Press *Flash*.

Set the frame numbers to scanned with the higher acoustic power in Utility--> Imaging--> Con--> Flash Frames. The frame numbers defined by Flash Frames are applied to both the contrast imaging modes.

- If you select Flash once in the Con menus, the system scans with 100% acoustic output burst pulses for the specified number of frames. The acoustic output then reverts to the original settings.

- When Max Enhance is ON for the contrast imaging modes, the system keeps Max Enhance = ON with no acoustic output change when Flash is selected in the Con menu.

Parameters (continued)

Contrast Clock (Timer)

Description
You can use the Contrast Clock by activating it at the time of injection and deactivating it at the end of the exam.

Two timers can be displayed on the bottom-left corner in image area and info area for several injection.

NOTE:
You can also configure the system to perform a countdown for the contrast injection with the Utility -> System -> System Imaging -> Countdown Time for Contrast preset.

Adjusting
- Press *Contrast Clock 1* to start/stop the T1 timer.
- Press *Contrast Clock 2* to start/stop the T2 timer.

Display
There are two areas on the screen where the Contrast Clock displays: on the image and on the lower, left-hand portion of the display. The timer on the image freezes when you freeze the image (the timer updates when you unfreeze the image). However, the timer located on the lower, left-hand portion of the display continues to display over a freeze, probe change, mode change, multi image, and zoom.

The timer also appears on CINE Loops and archived images.

Benefits
The Contrast Clock measures the time since injection.

You can save the data of contrast clock to an external file by using Export Traces of TIC.

1. Press **Freeze**. Scroll with the Trackball to show Cine tab.
2. Press *TIC Analysis* on the Touch Panel to enter TIC application.
3. Put a ROI on the image.
4. Press Export Traces. Type the file name and store it to the storage device.

Relationship with other controls

- L + R Simultaneous Display (L: Tissue, R: Active Visualization)
    - Accumulation/Cine Capture
        - Applied on the right side image only.
        - You cannot compare On and Off image using L + R.
    - SRI-HD
        - Applied on both side image.
    - Frame Average
        - Applied on both side image.
- TIC
    - Measured on active visualization, except "Hybrid Contrast".
    - "Hybrid Contrast" is disabled and measured on "Contrast" visualization.
- Easy 3D
    - Build volume data from active visualization, except "Hybrid Contrast".
    - Hybrid map is disabled and forces "Contrast" visualization.
- Advanced 3D
    - Build volume data from active visualization.
    - For the Single/Dual View data set of contrast mode, both reference and contrast data are rendered in individual volume segments. Each volume data is manipulated using Active Data and Visual Data.
- Archive
    - The raw data size increases between two to three times the size compared to the previous raw data. It takes a longer period of time to save as Cine.

Ultrasound-Guided Attenuation Parameter (UGAP) Option

Overview

Ultrasound-Guided Attenuation Parameter (UGAP) measures the attenuation value (i.e. attenuation coefficient [dB/cm/MHz] or attenuation rate [dB/m]) in the liver to evaluate diffuse liver disease. There are three visualizations: B Ref, Color Ref and Color Dual. All visualizations measure a representative attenuation value. Color Ref and Color Dual measure a representative attenuation value in 2D color map and dual display of B-mode and 2D color map, respectively.

UPGAP is available on the C1-6-D probe in the Abdomen (ABD) application.

Figure 13-9.   Set UGAP as any User-defined Hard Key

Activation

To activate UGAP, select the C1-6-D probe Abdominal application, then press User Defined Hard Key you selected.UGAP parameters are displayed as "U" (Frequency and Acoustic Output Percent) in Simple Mode. Unit of attenuation coefficient values are displayed as dB/cm/MHz.

Figure 13-10.   UGAP Display

Measurement and Worksheet

Measure the Coefficient Value

1. Scan to get the appropriate view to measure.
2. Press Start (right Set key)

NOTE: *The Measurement ROI can be moved using the Trackball; more than one ROI can be placed in one frame.*
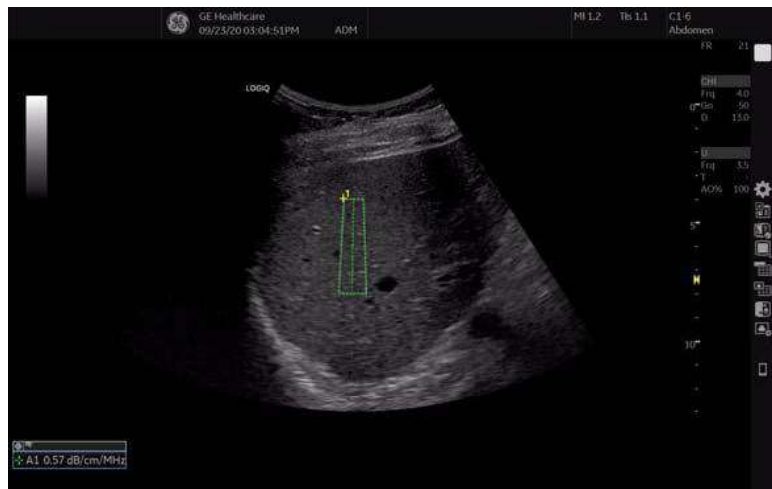
Figure 13-11.   UGAP Study

Measurements can be performed afterwards using CINE or recalled data where multiple frames can be selected to measure attenuation coefficients.

Add a New Site

Once measurements are complete, you can elect to add another site to the exam. To add another site:

1. Press the **Measurement** button on the console.
2. Select *Add Site* on the Touch Panel
3. Select *Enter Site Name* to add the name for the new site.
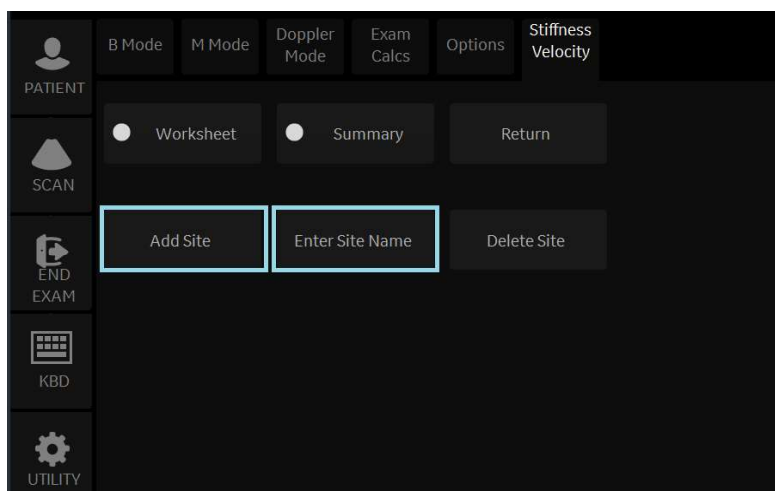
Figure 13-12.   Add Additional Shear Wave Site and Enter Site Name

NOTE: *If you no longer need the added site, you can select to delete the site via **Delete Site** on the Touch Panel.*

Summary and Overall Worksheets

Measurements are transferred to the Summary and Overall Worksheets.

Shear Elasto / UGAP (Site1)				
	Stiffness	**Velocity**	**Attenuation Coefficient**	**Attenuation Rate**
Name	Site1	Site1	Site1	Site1
Med	2.26 kPa	0.87 m/s	0.50 dB/cm/MHz	
IQR	0.08 kPa	0.01 m/s	0.02 dB/cm/MHz	
IQR/Med	3.4 %	1.7 %	3.7 %	
N	6	6	5	
1	2.34 kPa	0.88 m/s	0.49 dB/cm/MHz	
2	2.26 kPa	0.87 m/s	0.50 dB/cm/MHz	
3	1.98 kPa	0.81 m/s	0.51 dB/cm/MHz	
4	2.24 kPa	0.86 m/s	0.51 dB/cm/MHz	
5	2.49 kPa	0.91 m/s	0.49 dB/cm/MHz	
6	2.25 kPa	0.87 m/s		
7				
8				

Figure 13-13.   UGAP Summary Worksheet

Parameter	Value		m1	m2	m3	m4	m5	m6	Method
B Mode Measurements									
Attenuation,dB/cm/MHz									
C1	0.91	dB/cm	0.91						Last
C2	0.85	dB/cm	0.85						Last
C3	0.87	dB/cm	0.87						Last
C Median	0.87	dB/cm	0.87						
C IQR	0.03	dB/cm	0.03						
C IQR/Median	3.2	%	3.2						
N	3		3						

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Figure 13-14.   UGAP Overall Worksheet

Attenuation Coefficients are displayed (C1, C2, C3), Median, IQR, IQR/Median, and number of measurements (N).

2D Color Map

2D color map is available on Color Ref and Color Dual. There are two 2D color maps: Attenuation Map and Quality Map. Attenuation Map provides the distribution of attenuation values. Quality Map provides the position where attenuation can be measured with high accuracy.
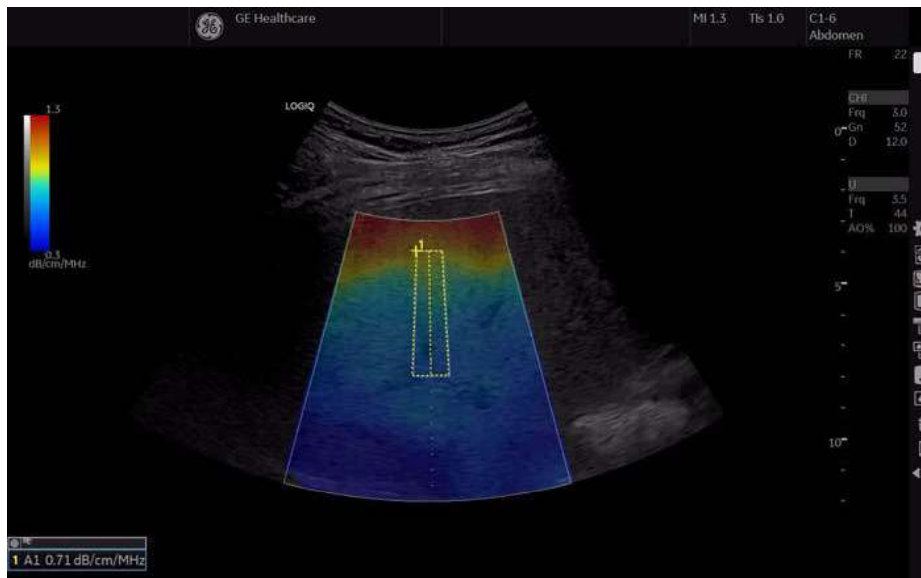
Figure 13-15.   Attenuation Map

Figure 13-16.   Quality Map

Time Intensity Curve (TIC) Analysis

Overview

Time Intensity Curve (TIC) enables the user to perform the following analysis:

- Time-Intensity analysis allows instant time-intensity calculation from up to eight regions of interest.
- Curve fitting analysis for research studies of myocardial contrast agent concentration rates.

The basic TIC process works as follows:

1. Scan the patient after injecting the contrast agent.
2. Watch the agent flow through the anatomy of interest.
3. When the desired contrast effect has been visualized, freeze the image and select a range of images for analysis.
4. Position an ROI (region of interest) on one of those images where the contrast effect is visible.
5. The system then calculates the mean pixel intensity within that ROI for all frames in the user designated loop and plots the resulting data as a function of time.

You can also choose to fit this data to one of several mathematical functions. The fundamental idea is that the contrast effect flowing through the organ of interest can be modeled mathematically, and details of the wash in and washout of the agent can be gleaned by analyzing the numerical parameters of the mathematical model.

Activating TIC

Starting TIC in cine loop

1. Open an examination and select a contrast cineloop.
2. Select *TIC Analysis* on the Touch Panel.

Starting TIC in live mode

1. Scan and freeze the patient in Contrast live mode.
2. Move the trackball to activate Cine.
3. Select *TIC Analysis* ont the Touch Panel..

Exiting TIC Analysis

There are several methods to exit TIC Analysis.

•   Select *Exit TIC Analysis* on the TIC Touch Panel.
•   Press **Freeze** to unfreeze and resume scanning.
•   Press any other button that returns the system to real-time scanning.

TIC Analysis Screen Description
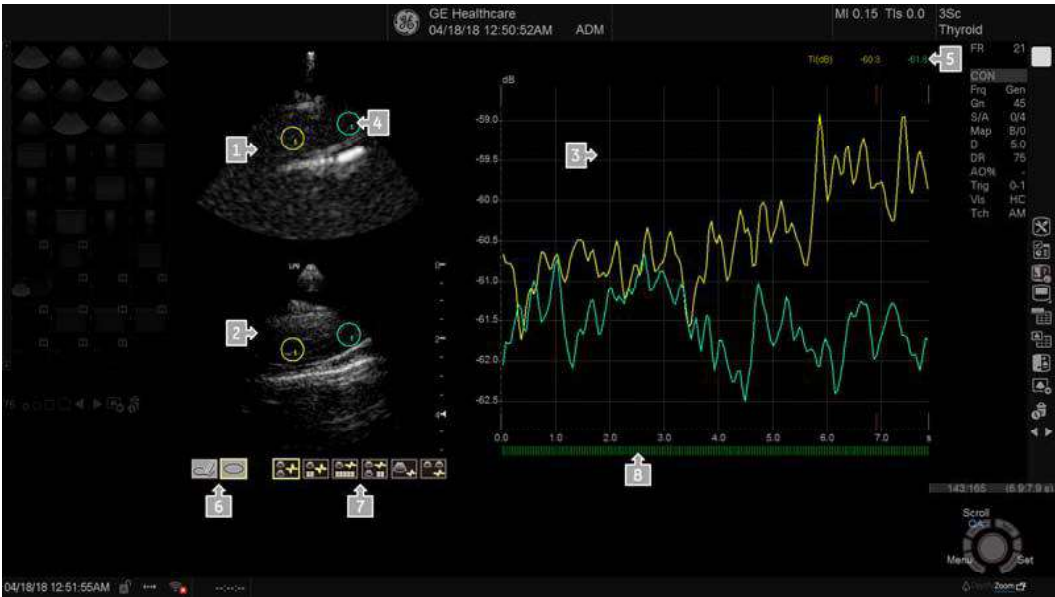
Figure 13-17.   TIC Analysis Screen - Graph with dual image layout (example)

1. Contrast cineloop window
2. B-Mode cineloop window
3. Analysis window
4. Sample area
5. Time and velocity at cursor position
6. Sample area tools
7. Layout icons
8. Frame marker

Table 13-3:   Cineloop windows
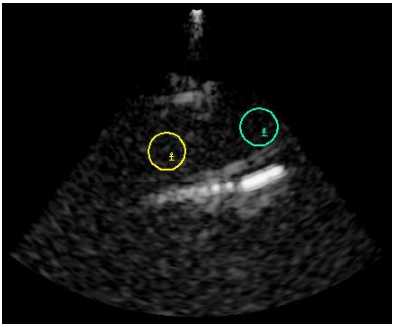
Graphic	Description
	Displays Contrast image data Sample area: Indicates sampling position of the intensity trace. The sample area is color-coded: the first sample area is yellow, the second blue...etc.

Table 13-3: Cineloop windows (Continued)

Graphic	Description
	Displays B-mode data Sample area: Indicates sampling position of the intensity trace. The sample area is color-coded: the first sample area is yellow, the second blue...etc. NOTE: B-mode image is not displayed when cine clip stored in contrast only mode.
	System menu on Sample Area This menu is displayed by pressing the left Set key when the cursor is placed over a sample area in one of the Cineloop windows. Note: The system menu is dependent on mode. • Set As Default ROI Size: Displays on elliptical ROI. • Delete Anchor (On ROI setting as anchor point only) • Label Sample Area: sets a descriptive name to the sample area. The label is useful for identification of the sample area when exporting data. • Copy Sample Area • Copy & Move • Copy & Move (Same Depth) • Move (Same Depth) • Set Curve Fit Start Frame: Displays only while curve fitting • Set Curve Fit End Frame: Displays only while curve fitting • Cancel: exits the System menu. System menu on Image when copy sample area is selected. • Paste Sample Area
	Displays time-intensity curve. • Y axis: Intensity scale (logarithmic) (db) or linear acoustic units (AU). • X axis: Time(s) or Dt(s), elapsed time from previous frame. • ECG (where available -- not shown): displays ECG trace (where available). • Frame Marker: the current frame marker and the start and stop markers for the cineloop. • Time at cursor position and velocity at cursor position. • Intensity (dB or AU) at cursor position. • Intensity (dB or AU) at frame marker position (color coded)

Table 13-3:   Cineloop windows (Continued)

Graphic	Description
	System menu of the analysis window This menu is displayed by pressing left Set key when the cursor is in the Analysis window. Note: The system menu is dependent on mode. • Vertical Auto-Scaling: selects between full unit range or a range according to the maximum and minimum values of the displayed trace(s). Delayed, On, Off. • Vertical Unit: toggles between logarithmic (dB) and linear acoustical units (AU). • Line Style: selects between solid line only or solid line with square markers at each data point. • Curve Fitting Parameters: toggles between Wash-in, Wash-out, Gamma Variate and off. • Gradient : On or Off. • Gradient Plot: Gradient, Gradient Derivative, All or Off • ECG Triggering • Cancel: exits the System menu.

Table 13-4:   Analysis windows
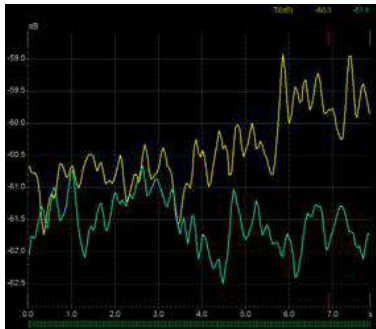
Graphic	Description
	Displays time-intensity curve. • Y axis: Intensity scale (logarithmic) (db) or linear acoustic units (AU). • X axis: Time(s) or Dt(s), elapsed time from previous frame. • ECG (where available -- not shown): displays ECG trace (where available). • Frame Marker: the current frame marker and the start and stop markers for the cineloop. • Time at cursor position and velocity at cursor position. • Intensity (dB or AU) at cursor position. • Intensity (dB or AU) at frame marker position (color coded)

Table 13-5:   Layout icon

Graphic	Description
	You can select layout from following. • Graph with Dual Image Layout • Small Data Layout • Large Data Layout • Everything Layout • Single Image Layout • Dual Image Layout

Table 13-5:   Layout icon (Continued)

Graphic	Description
	Indicates an analysis graph.
	Indicates an image One icon means Contrast image. Two icons mean Contrast and B-Mode.
	Indicates parameters. 10 dots means that all parameters display. 4 dots means that only displays high level parameters.

Table 13-6:   Sample area drawing tool
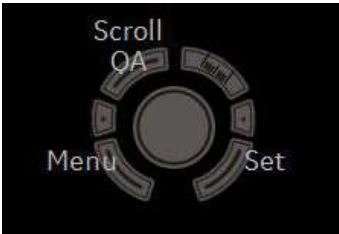
Graphic	Description
	Creates a sample are based on freehand drawing.
	Creates a sample area with a pre-defined circular/elliptic shape.

Table 13-7:   Trackball Assignment

Graphic	Description

	Press the top Trackball key to toggle the trackball assignment between QA and Scroll.
	
	• QA
	  Pointing tool in TIC mode.
	• Scroll
	  When the cineloop is stopped, enables scrolling through the cineloop.
	• Menu
	  Press left Set key to display System Menu.
	• Set

TIC Touch Panel
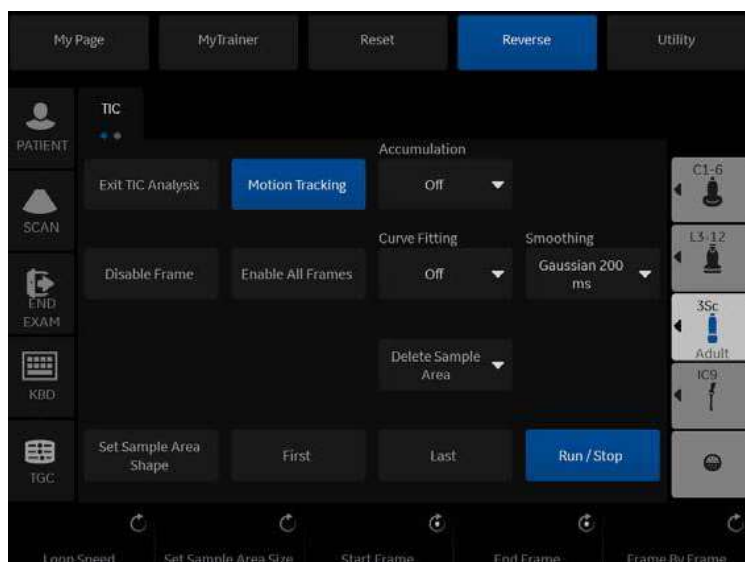
Figure 13-18.   TIC Touch Panel

Table 13-8:   TIC Touch Panel Description

Parameter	Description
Exit TIC Analysis	Exit TIC.
Motion Tracking	Users use TIC to analyze tumor characteristics precisely, without distortion due to patient movement. Motion Tracker enables the system to automatically adjust the ROI's placement across multiple frames in order to accommodate patient breathing or body movements. To activate, press Motion Tracking on the Touch Panel.This starts the calculation to adjust the all ROI positions for every image frame. After completion, the ROI graphic on each frame is changed to the ROI with the anchor.
Accumulation	Enhances the flow in an image.
Enable All Frames	Re-enables disabled frames.
Curve Fitting	Toggles between Wash-In, Wash-Out, Gamma Variable and Off.
Smoothing	Smooths the trace displayed by applying a filter over a defined time window. Both the filter type and time window are user-selectable. The type of filter available depends on the analysis signal displayed.
Delete Sample Area	Removes selected sample area from the CINE Loop window and accompanying trace in the Analysis window. The Trackball marker must be pointed at an anchored sample area.
First	Move to the first frame of cineloop.
Last	Move to the last frame of cineloop.

Table 13-8:   TIC Touch Panel Description (Continued)

Parameter	Description
Run/Stop	Start/Stop the cineloop review.
Loop Speed	Adjust the cine loop playback speed.
Start Frame	Rotate the rotary to select the start frame and push to set the frame.
End Frame	Rotate the rotary to select the end frame and push to set the frame..
Frame by Frame	Rotate the rotary to review the CINE image frame by frame manually.
Disable Frame	Push the rotary to disable the selected frame.

Generating a Trace

Up to eight traces can be generated.

About the sample area

The sample area can be in three different states:

- Free sample area: freely moving sample area (QA cursor) before anchoring.

NOTE: *The free sample area disappears when the QA cursor is moved over a static anchored frame.*

- Static sample area: the free sample area is anchored by pressing **Set.**
- Dynamic anchored sample area: the sample area is anchored in two or more frames (see Manual tracking below). In these particular frames, the sample area is displayed with an anchor. The sample area moves smoothly between he anchored positions when playing/scrolling the cineloop.

Trace from a pre-defined sample area (Ellipse ROI)

1. Press the top **Trackball** key until the QA trackball assignment is selected.
2. If necessary, select the sample area Ellipse ROI button (shape icon on the monitor display).
3. Move the cursor to one of the Cineloop windows using the **Trackball**
4. The cursor is changed to a sample area (white circle). A preview of the trace is displayed in the Analysis window. .
5. Press **Set** to anchor the sample area.
6. In this frame, the sample area is marked with an anchor. If the cineloop has more than on heart cycle, a sample area will also be anchored in the corresponding frame in the next heart cycle.

   The trace is updated accordingly in the Analysis window.

Generating a Trace (continued)

Trace from freehand sample area

1. Select the Freehand ROI button (pencil icon on the monitor display).
2. Move the cursor to one of the Cineloop windows using the **Trackball**.
3. Trace the ourline of the desired ROI by moving the caliper with the **Trackball**.
4. Press **Set** to anchor the sample area.
5. The sample area is automatically closed and the trace is updated accordingly in the Analysis window.

Copy, move and paste a Sample Area

To copy and past the ROI,

1. Move the cursor over the ROI and press the left **Set** key. The system menu displays.
2. Select *Copy sample area.*
3. Move the cursor to the desired location for the copied ROI and press the left **Set** key. The system menu displays.
4. Select *Paste sample area.*

To copy and move the ROI,

1. Move the cursor over the ROI and press the left **Set** key. The system menu displays.
2. Select *Copy & move.* Or if you want to move to the same depth as the original ROI, select *Copy & move (same depth).*
3. Move the copied ROI using the **Trackball.** Press **Set** to fix the position.

To move the ROI,

1. Move the cursor over the ROI and press the left **Set** key. The system menu displays.
2. Select *Move (same depth).*
3. Move the ROI using the **Trackball**. Press **Set** to fix the position.

Manual tracking of the sample area (dynamic anchored sample area)

The sample area can be moved within the loop to ensure that data in the trace is generated from the same anatomical location during the cyclic motion of the heart.

1. Place a sample area over a region of interest. Note the anatomical location of the sample area.
2. Scroll to a new frame using the **Trackball**.
3. Press the top **Trackball** key until the QA trackball assignment is selected.
4. Move the cursor to the sample area using the **Trackball**.
5. Press **Set**. The sample area is unanchored.
6. Drag the sample area to the corresponding anatomical location in the new frame.

    When the sample area is anchored in more than one frame, linear interpolation is performed so that the sample area is smoothly moved between the anchored positions in the selected frames when running the cineloop.

NOTE: *In the original frame and this particular frame the sample area is marked with an anchor.*

7. Press the top **Trackball** key until the scroll trackball assignment is selected.
8. Using the **Trackball**, scroll through the cineloop and control that the sample area follows the moving anatomical structure.
9. Add anchored sample areas in several frames to obtain a more accurate displacement of the sample area.

Manual tracking of the sample area (dynamic anchored sample area) (continued)

Moving a dynamic anchored sample area

1. Freeze the image.
2. Press top Trackball key until the scroll trackball assignment is selected.
3. Using the **Trackball**, browse through the cineloop to display one of the frames where the sample area was anchored.

NOTE: *In these frames, the sample area is marked with an anchor.*

4. Press top Trackball key until the QA trackball assignment is selected.
5. Move the cursor to the sample area using the **Trackball**.
6. Press **Set**. The sample area is unanchored.
7. Drag the sample area to a new location.
8. Press **Set** to anchor the sample area to the new location.

If you want to move the sample area to the same depth, select *Move (same depth)* from the System Menu.

Zooming in the Analysis window

To zoom:

1. In the Analysis window, press and hold down the **Set** key while dragging the cursor to define the zooming area.

2. Release the **Set** key.

To unzoom:

1. Press the left **Set** key in the Analysis window. The system menu displays.

2. Select *Unzoom*.

NOTE: *Shown only in zoom mode.*

Delete a trace

The user can delete all traces at once or one at a time.

1. If necessary, press the top Trackball key until the QA trackball assignment is selected.

2. Move the cursor over one of the sample area. Confirm that cursor is changed to hand icon.

3. Press the *Delete Sample Area* on the touch panel.

4. Select *Current Sample* or *Delete all* as necessary.

NOTE: *The corresponding traces for the deleted ROIs are erased from the plot.*

Disabling/Enabling the frame

Frame disabling excludes the actual frame from the cineloop display. Frame disabling is available only with contrast data.

Disabling the frame from the frame marker

To disable One Frame:

1. Use the **Trackball** to move the cursor to he frame on the Frame Marker which you want disable.
2. Press **Set** to disable the frame.
3. The frame marker is changed from green to red to indicate the frame has been disabled.

NOTE: *The disabled frame is no longer displayed in the reference window when scrolling through CINE memory.*

Disabling multi-frames from the frame marker

1. Use the **Trackball** to move the cursor to he frame on the Frame Marker.
2. Press and hold down **Set**.
3. Move the cursor with the **Trackball** to the last frame to be disabled and release **Set**.

    The marker is turn red and the data from that frame is removed from the trace and any subsequent trace processing.

Disabling/Enabling the frame (continued)

Disabling ECG triggered frame (where available)

In a multi-cycle acquisition, the user may deselect all frames in all heart cycles but a selected one. This function can be used for example to select a particular systolic frame for each heart cycle.

1. Scroll through the cineloop to identify the cardiac phase to analyze or identify the cardiac phase on the ECG trace (where available).
2. Position the cursor on the analysis window and press left **Set** key. The system menu displays.
3. Select *ECG triggering* (where available).

All frames in all heart cycles are disabled except for the selected and corressponding frames in the other heart cycle.

Disabling/Enabling the frame (continued)

To enable the frames

1. Select **Enable all frames** on the Touch Panel.
2. All disabled frames are re-enabled.
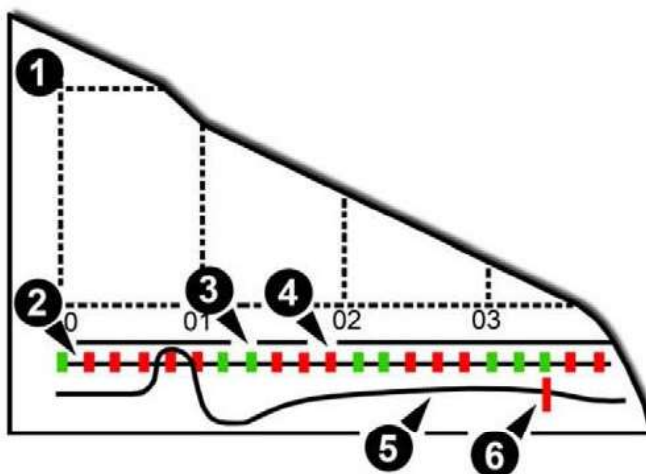
Figure 13-10.   Frame markers

Figure 13-19.   Frame markers

1. Analysis Window
2. Frame markers axis
3. Enable frame (Green)
4. Disabled frame (Red)
5. ECG (where available)
6. Crrent frame

Manipulating the Sample Area

Up to eight ROIs can be saved on the reference image, with the corresponding eight races plotted simulatneously on the graph. Each ROI display has a different color, and its corresponding trace data is plotted using that same color.

Once eight ROIs have been saved, the system does not automatically generate an active ROI when the cursor is positioned over the displayed reference image.

The saved ROIs can be a mixture of elliptical and freehand ROIs.

When the user repositions an ROI, the old trace data is erased from the plot and the trace data for the new position replotted.

If the ROI position on the last frame of the selected image range is moved, the corresponding ROIs on all frames are repositioned to match the last frame.

The user shall also have the capability of setting separate ROI positions on differend frames of he contrast images, and the system shall linearly interpolate the ROI positions for the frames in between the selected frames.

Manipulating the Sample Area (continued)

Setting the default sample area shape

1. Place the cursor on the sample area.
2. Press left **Set** key. The system menu displays.
3. Select *Set as Default ROI Size*.
4. The current ROI size is set as the default for subsequent Ellipse ROIs.

Manipulating the Sample Area (continued)

Labeling a Sample Area

The sample area label is used to idenify data associated with the sample area when exporting.

1. Position the cursor on the ROI to label and press the left **Set** key.
2. The ROI sysem menu displays. Select *Label sample area*. The Label Dialog box displays.
3. Enter a name for the sample area.
4. Select *OK*.

TIC Plot Control

Vertical Unit

When analyzing the contrast data, the Y-axis can be set to display either logarithmic scale (dB) or linear, acoustic units (AU) for both tissue intensity (2D) or Angio intensity data.

To toggle between dB and acoustical display units for the Y-axis.

- *dB*—The traditional log compressed B-mode data is used to calculate the time-intensity curve values.
- *Acoustic*—The system reverse the log compression function to provide un-log compressed data for the TIC analysis.

Vertical auto-scaling

The system can be configured to display the full unit range or a range according to the maximum and minimum values of the displayed trace(s) (auto-scaling function). In addition, the auto-scaling function can be set to be live update (updates while the sample area is moved) or delayed (updated when the sample area is anchored).

- *Delayed*—The system automatically rescale the vertical axis of the trace graph only when a new ROI is saved, to account for changing input dynamic range.
- *On*—The system automatically rescale the vertical axis of the trace graph every time the currently selected (active) ROI is moved.
- *Off*—Disable any automatic scaling of the vertical axis. There is user-defined system defaults on the system preset page for the fixed vertical scale to be used for the plot.

Y-Scale

1. When you select "Off" for Vertical Auto-Scaling, Y-Scale dialog displays.
2. Enter maximum and minimum value for vertical scale on the graph.
3. Press *OK*. The vertical scale is updated.

TIC Plot Control (continued)

Line Style

- *Solid*—Setting the results in a plotted trace that does not display small boxes at the data points
- *Squares*—Setting the results in a plot where small squares are displayed at each data point, and the squares are linked together by lines.

Horizontal Scale

Set the horizontal unit as time scaling (s) or time interval (dt) between frames.

NOTE: *The Horizontal Scale menu displays for Phase Inversion.*

Smoothing

The system can smooth the traces displayed by applying a filter over a defined time window. The type of filter available is depending on the analysis signal displayed.

1. Select **Smoothing** on the Touch Panel.

NOTE: *When smoothing is turned on, it applies to all traces in the plot window.*

2. The smoothing filter list displays. Select the appropriate parameter.

NOTE: *When smoothing is turned on, it applies to all traces in the plot window.*

Trace Measurement

Gradient

Gradient is displayed on the screen instead of Intensity (db or AU). The gradient calculates from 7 points (includes previous and next frames).
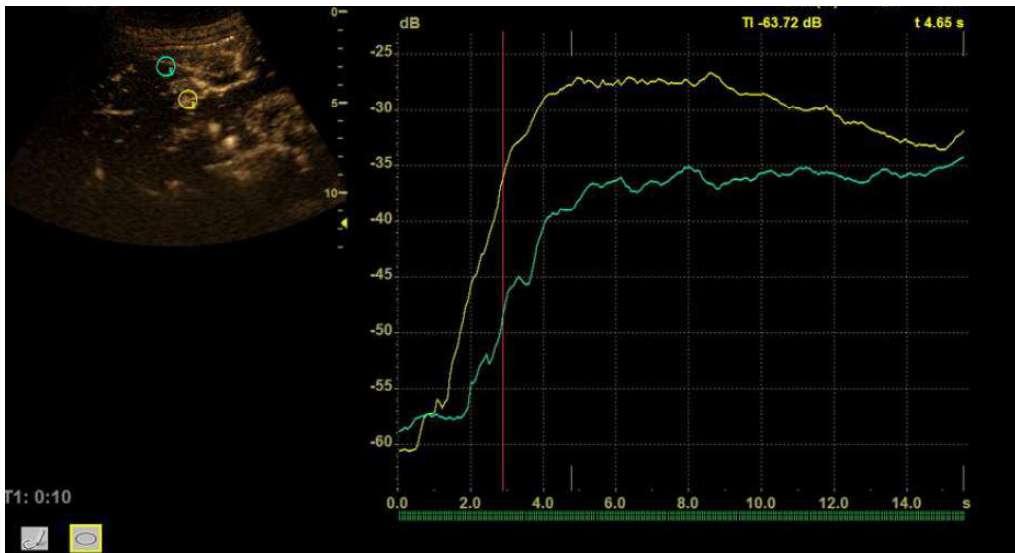
Figure 13-20.   Gradient

Trace Measurement (continued)

Max Gradient

Max Gradient is displayed when Small Data Layout and Everything Layout is selected while Curve fitting is off.

Displays the time and gradient that becomes the maximum gradient between the cine start and end frame.
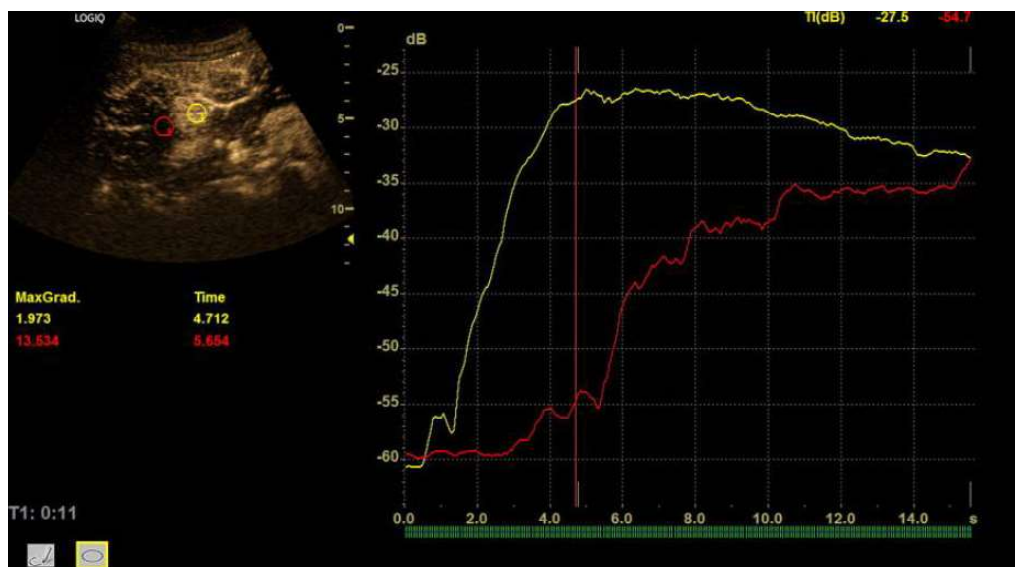
Figure 13-21.   Max Gradient

Trace Measurement (continued)

Show graph (Gradient plot)

1. Select *Gradient Plot* from the pull-down menu.
2. Select the parameter.

   - Off: A graph plots TIC.
   - Gradient: Two graphs plot TIC and TIC gradient.

     - Unit of Y-axis is dB or AU in case of intensity.

     - The unit is d(db)/dt or d(AU)/dt in case of the intensity gradient.

     - Gradient values for the current frame are displayed in the upper right corner of the graph.

   - Gradient Derivative: Two graphs plot TIC and TIC gradient derivative.

     - The Y-axis units is d2(dB)/dt2 or d2(AU)/dts in case of the intensity gradient derivative.

     - Gradient derivative values for the current frame are displayed in the upper right corner of the graph.

   - All: Three graphs plot TIC, TIC gradient and TIC gradient derivative.

Curve Fit

1. Select ***Curve Fiting*** on the Touch Panel.
2. The Curve Fit selection list displays.
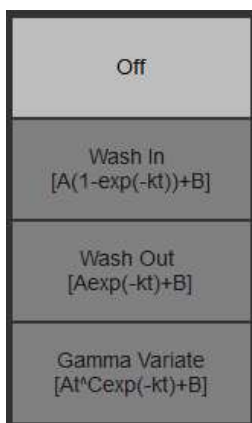
Figure 13-22.   Curve Fit Selection List

- ***Off***—Remove the fitted curves from the plot and the fit parameters from the display.
- ***Wash-in***—Used to find and estimate the local perfusion rate using the contrast agent. Expotential wash-in is described by the function:

  $Y(t) = A(1-exp(-kt))+B$, where:
  - A (dB or AU) is the intensity from the contrast agent.
  - B (dB or AU) is the intensity at time t=0 (defined as the time of the left marker). This corresponds to the tissue (baseline) signal if no contrast is present at the selected starting point.

NOTE: *A + B = contrast + tissue = plateau level.*

  - k (1/s) is a time constant.

Curve Fit (continued)

- *Wash-out*—Used to find and estimate a local wash-out rate. Expotential wash-out is described by the function:

  $Y(t) = A\exp(-kt)+B$, where :

  - A (dB or AU) is the intensity from the contrast agent.
  - B (dB or AU) is the intensity from the tissue = baseline signal.

NOTE: *A + B is the initial intensity level.*

  - k (1/s) is a time constant.

- *Gamma variate*

  $Y(t) = At^c\exp(-kt)+B$

Parameters of Gamma curve fitting

Figure 13-23.   Gamma Curve
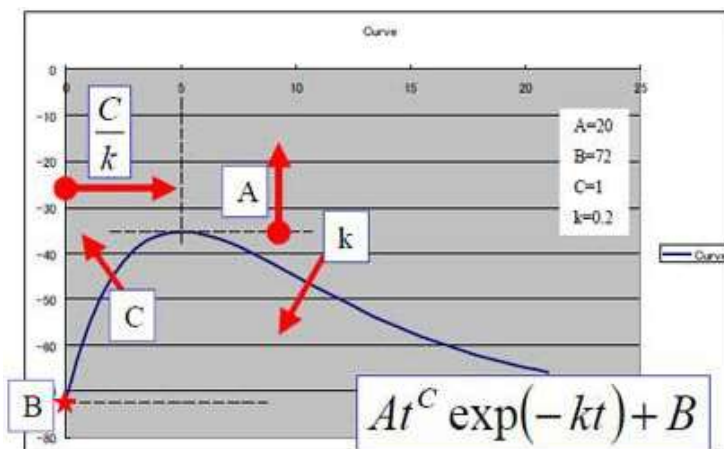
- t^C: Increasing function (C>0) for "Wash-in".

  For larger C, the intensity increases quickly before the peak.
- exp(-kt): Decreasing function (k>0) for "Wash-out".

  For larger k, the intensity decreases quickly after the peak.
- B: Intercept intensity at t=0.
- The peak intensity of the curve is affected by all parameters.

  Larger A, larger B, larger C, and smaller k make larger peak. The peak time is calculated by C/k.
- MSE: Mean Square Error

  If the MSE is small, the difference of actual data and the fitted curve is small.

Set Start/End Frame for Curve Fit per ROI position

1. Generate TIC and perform a Curve Fit.

    In this state, the Curve Fit graph is drawn from Cine Start Frame to Cine End Frame for all the ROIs.

2. Select the start frame as with Cine or move the cursor to the desired position on the graph and press the right **Set** key.

3. Move the arrow pointer on the ROI (hand cursor appears) and press the left **Set** key. The system menu appears.

4. Select *Set curve fit start frame* from the menu.

5. Select the End Frame as with Cine or move the cursor to the desired position on the graph and select the right **Set** key.

6. Move the arrow pointer on the ROI (hand cursor appears) and select the unmarked key (the left **Set** key). The system menu appears.

7. Select *Set curve fit end frame* from the menu. The ROI colored line displays.

8. Repeat the above procedures as necessary.

    The system retains the start/end frame per ROI while TIC is active. Once the TIC menu is closed, the settings are lost.

Display/Hide Calculation Values

1. Place the cursor on the analysis graph and press left **Set** key. Select *Curve Fitting Parameters* from the pull-down menu. The Curve Fitting Parameters dialog appears.

2. The Curve Fitting Parameters dialog appears.
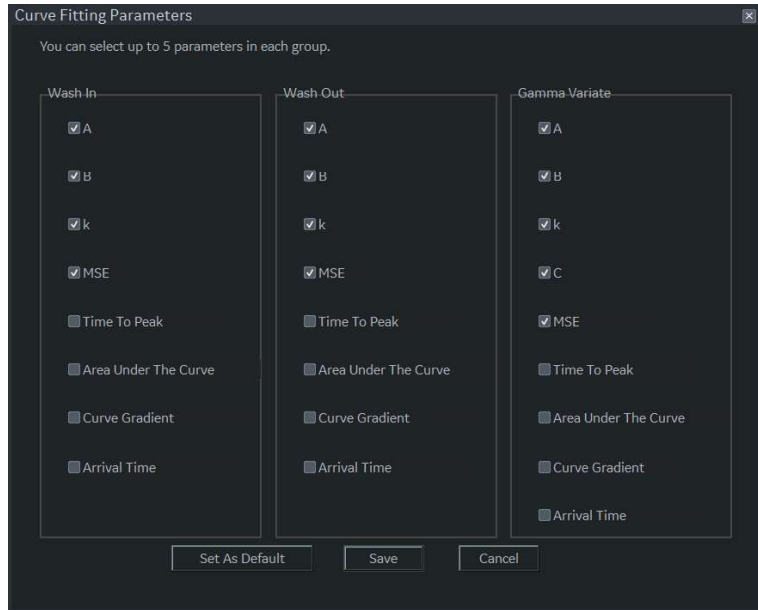
Figure 13-24.   Curve Fitting Parameters Dialog

3. Select a maximum of 5 parameters to display for each curve fitting.
   - Save as default: saves as a system preset.
   - Save: saves as temporary.
   - Cancel

NOTE: *If you select more than 5 parameters and select "Save" or "Save as default," you will be prompted to select only 4 parameters.*

4. The selected parameter displays below the image with the curve fitting active. Press the display button to display all parameters; or press the hide button to hide all parameters.

Raw Data store with TIC Setting

You can store the raw data with TIC setting.

1. Run TIC cineloop.
2. During cine running mode, press appropriate print key.

When you recall the raw data clip with TIC data, you can add, delete or modify the analysis measurements on the recalled raw data in TIC mode.

Printing TIC Data

1. Press **Run/Stop** to freeze the image.

   The still image can be get when cineloop is stopped by Run/Stop button.
2.

The system capture a single still frame which consists of the plot, the reference image and user annotation.

Annotating the TIC Data

The user can annotate both the reference image and the trace plot displays. Use **Comment** key to type the annotation. See Chapter 6 for reference.

SaveAs (Save image file and export trace data)

You can save the image file and trace data.

1. Select *SaveAs*.
2. The following dialog displays.
   - Location: Select Location which to save.
   - Filename: Enter the file name. (Only Text)
   - Export Trace: If you check this box, LOGIQ P8/P9/P10 exports trace data to csv file.

     Note: Name of exported file has same name as the image file saved at the same time.
3. Select *OK* to save the image and data and return to the TIC Analysis screen.
   - All displayed ROI traces are saved in the exported file.
   - The fit parameters are included in the trace file if the user has done a curve fit.

NOTE: *The Smoothed trace is the one saved if the user has applied a smoothing filter.*

NOTE: *Only data from the user selected image range is included in the exported trace file.*

NOTE: *Data for disabled frames are not included in the exported trace file.*

NOTE: *No trace results are saved in the standard image database.*

NOTE: *Trace results are not shown on the Worksheet.*

Quantitative Analysis (QAnalysis)

Overview

Quantitative Analysis is available for the following CINE loops obtained in the following modes: Tissue Velocity Imaging, Color Flow Mode, Power Doppler Mode and Elastography. All of the Quantitative Analysis modes operate similarly, with some variation.

The Touch Panel may be slightly different, for example; and the type of information you quantify varies by mode as well. Please see a summary of each mode below; followed by general instructions on how to perform Quantitative Analysis.

Quantitative Flow Analysis

Provide tools for semi-quantitative assessment of inflammation in joints and vascularization in tumors.

NOTE: *There is frame number limitation for color quantification as 400 frames.*

Statistics

The LOGIQ P8/P9/P10 extracts various statistics from the image data within each ROI. The statistics depends on the imaging mode in use.

Press **Statistics** to enable/disable display of statistics of the frame or loop. The statistics are shown only when the loop is stopped.

- Ratio: Ratio of Color (Power) Doppler pixels over total ROI area.
- Area (mm2): The size of ROI
- Max Ratio/Time of Max Ratio: Maximum Ratio of Color (Power) Doppler pixels in each ROI, and which frame that occurs in.
- Min Ratio/Time of Min Ratio: Minimum Ratio of Color (Power) Doppler pixels in each ROI, and which frame that occurs in.

Quantification supports two different statistical display formats: Short Form and Long Form.

Statistics (continued)

- • Short Form: Ratio and Area.

Figure 13-25.   Color Flow Mode Short Form - Example

- • Long Form: Ratio, Area, Max Ratio/Time of Max Ratio, Min Ratio/Time of Min Ratio
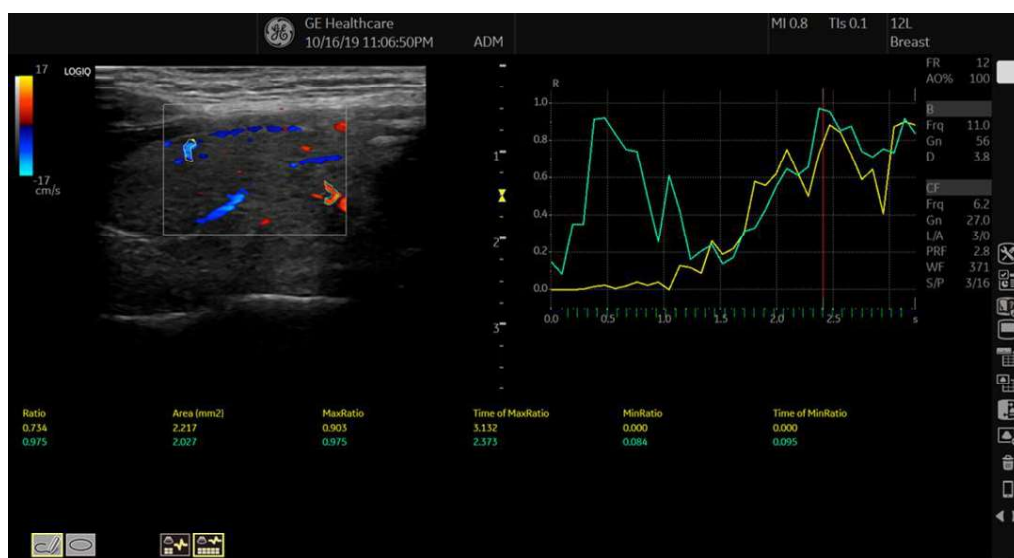
Figure 13-26.   Color Flow Mode Long Form - Example

QAnalysis - Tissue Velocity Imaging

Multiple Time -Motion trace display from selected points in the myocardium.

QAnalysis Screen Description
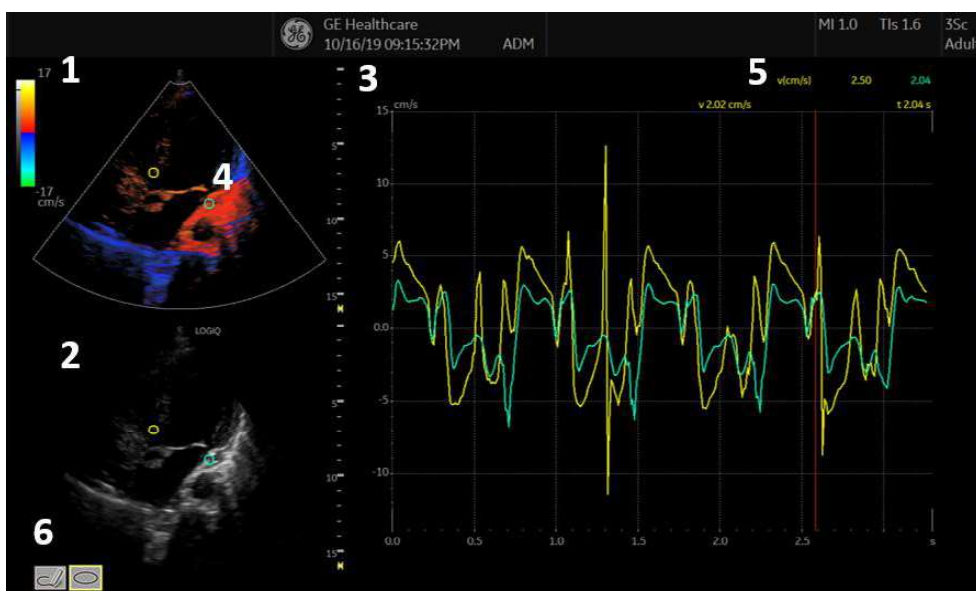
Figure 13-27.   Q-Analysis Screen

Table 13-9:   QAnalysis Screen Description

1.	TVI Cineloop Window Sample Area: Indicates sampling position of the velocity. The sample area is color-coded: the first sample area is yellow, the second green, etc.
2.	B Cineloop Window Sample Area: Indicates sampling position of the velocity. The sample area is color-coded: the first sample area is yellow, the second green, etc.
3.	Analysis Window. • Y axis: Velocity scale (cm/s) • X axis: Time(s) • ECG • Time at cursor position. • Velocity at Cursor position. • Velocity at frame marker position (Color coded)
4.	Sample Area
5.	Time at cursor position and velocity at cursor position. Position the pointer cursor over the analysis window.
6.	Sample Area Tools. • Pencil Icon: Creates a sample area based on freehand drawing. • Shape Icon: Creates a sample area with a pre-defined circular/ellipse shape.

QAnalysis Plot Control

The following controls are user configurable presets which are configurable through the pull-down menu in QAnalysis mode. When using the pull-down menu:

1. Place the cursor over the analysis window and press the left *Set* key. The system menu displays at the cursor position.

2. Select the appropriate parameter.

To switch trace (Analysis signal)

Analysis Signal toggles the trace display between velocity, displacement or gray scale intensity curves.

1. Position the cursor over the plot window and select Analysis Signal from the pull-down menu.

2. Select *Velocity*, *Displacement* or *Grayscale Intensity* as necessary.

Vertical Unit

NOTE: *Vertical Unit is only available when Grayscale intensity is selected in Analysis Signal.*

When analyzing the data, the Y-axis can be set to display either logarithmic scale (dB) or linear, acoustic units (AU).

To toggle between dB and acoustical display units for the Y-axis.

- *dB*—The traditional log compressed B-mode data is used to calculate the time-intensity curve values.

- *Acoustic*—The system reverse the log compression function to provide un-log compressed data for the Qanalysis.

Drift Compensation

Drift Compensation compensates drifting of Tissue Tracking curves by either resetting the curve to zero at the tracking start point (cycle resetting) or by linear compensation throughout the cycle (linear compensation).

NOTE: *When Displacement is chosen by AnalysisSignal, Drift Compensation is active.*

NOTE: *Drift Compensation is inactive if ECG data cannot be acquired.*

Trace Measurements

Gradient Select Gradient entry on the pull-down menu that is obtained when the cursor is placed over the plot.

Gradient is displayed on the screen instead of velocity. The gradient calculates from 7 points (includes previous and next frames).

Max Gradient Displays the time and gradient that becomes the maximum gradient between the CINE start and end frame.
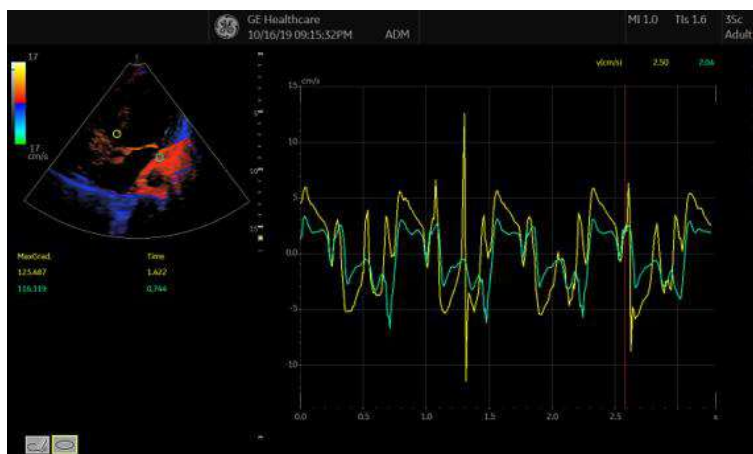
Figure 13-28.   Max Gradient

Elastography Quantification

Use Quantification Analysis in Elastography to determine the Elastography index of a single ROI, and the ratio between multiple ROIs.

NOTE: *Elastography Quantification IS NOT available in the United States.*

Q-Analysis. Plot each elasticity index and their ratio on the timeline axis. Use the first ROI as a reference point [in yellow] for calculating the ratio between multiple ROIs. A maximum of 8 ROI and 7 ratio curves are available. Automatic disables (skips) low quality frames. ECG and Quality graph are displayed on the same time line.
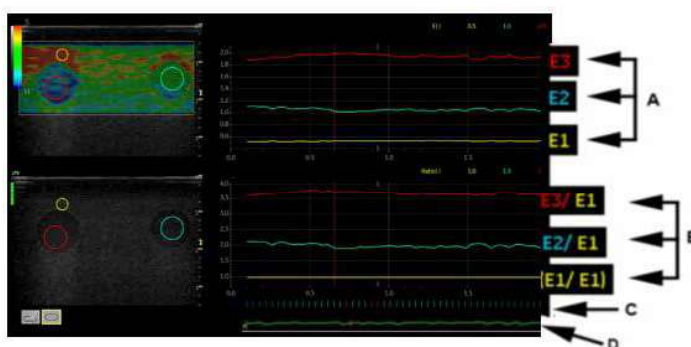
Figure 13-29.   Q-Analysis

    a.   E Index - graph

    b.   E Ratio - graph

    c.   Skip frames is shown as a red bar

    d.   Quality

Plot Control

Ratio

Select *Ratio* allows the user to toggle between Elastography data and Ratio plot display.

The LOGIQ P8/P9/P10 plots the ratio of the original ROI and the first ROI (ROI 1). The two plots are displayed together one on top of the other in the plot area.

Ratio formula: Ratio = ROI 1 / ROI n (n: 2-8)

Ratio for ROI 1 is 1.0 for all frames. When ROI 1 is removed, then Ratio is not calculated for ROI n (n: 2-8).

Ratio Plot Values

- Ratio
- Diff: The LOGIQ P8/P9/P10 displays the second derivative as a function of time below the traditional plot.
  Diff formula: Ratio Diff = ROI 1- ROI n (n: 2-8),
- All: The LOGIQ P8/P9/P10 plots the three plots in the plot area of the screen.
- Off

Additional Notes for Elastography Quantification

When the desired elastography image has been visualized, press Freeze; then select a range of CINE loops for analysis. The Q Analysis button appears on the CINE Touch Panel. Press Q Analysis to enter analysis mode. Set the ROI on the image for the E graph to appear. For ratio calculation, set the first ROI and then set the second and more ROI; then press "Ratio" or select "System Menu => Ratio Plot => Ratio". Adjust the ROI size by using the "body pattern and ellipse" controls.
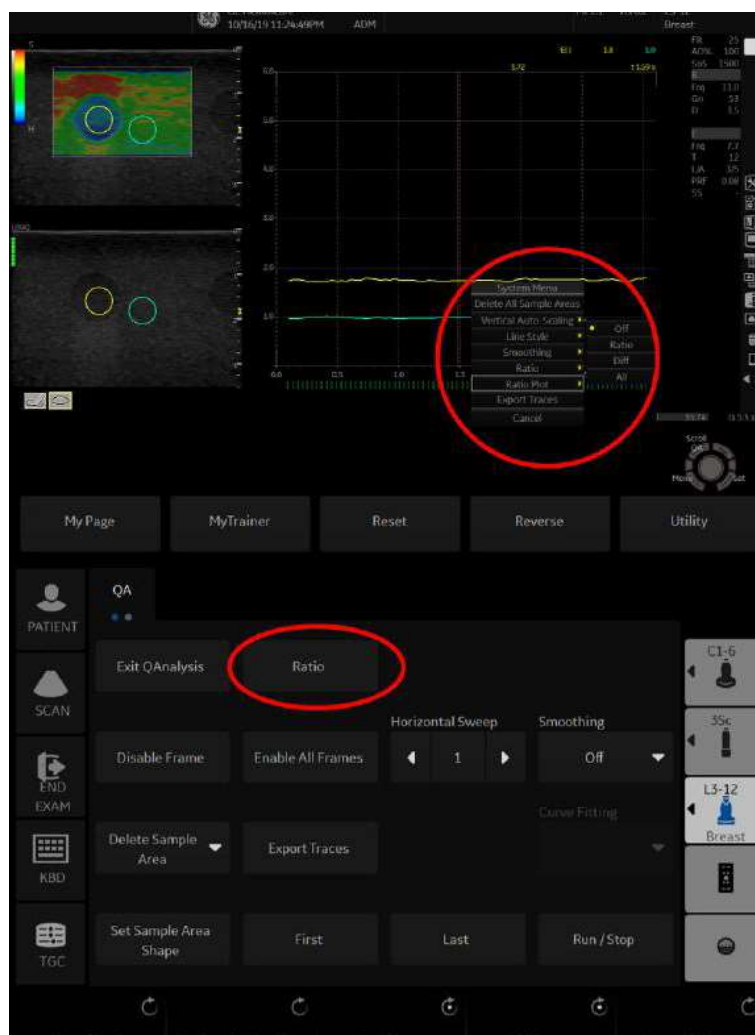
Figure 13-30.   Q-Analysis

Additional Notes for Elastography Quantification (continued)

HINTS

Highlights:

• Raw data capability. User can do some further calculations (modifying ROI position/size, adding another ROI, and recalculating the ratio or difference between them) for recalled images at a later time.

• The result of just one ROI (elasticity index) becomes the effective index. This quantifies the color distribution in the area of interest. By setting two ROI, the ratio is automatically calculated.

HINTS

Limitations:

• This is a relative quantification tool based on freehand manual palpation technology. It cannot show the stiffness by the kPa (kilopascal).

• There is no compatibility among manufacturers regarding the value. It depends on their strain imaging technology and definition of the value.

• Colors indicate degree of stiffness and do not directly correlate to a specific tissue type. Interpretation of what the tissues are and how to apply these ratios clinically is at the discretion of the user.

• Elastography physics dictates that cystic structures will be displayed with a three-layer pattern. This three-layer pattern will start with blue on the LOGIQ P8/P9/P10 factory default map (which corresponds to hard), then progresses to green and then to red (which corresponds to soft). The posterior displacement of elastography patterns also may cause the B-Mode cyst to consist primarily of blue with the green to red being posterior to the B-Mode cyst. You need to be aware of the three-layer pattern of a cyst in elastography. Utilizing elastography quantification and setting the ROI in the blue portion of the three-layer pattern on the cyst and then setting the ROI in the "normal" tissue may cause you to misinterpret the elastography quantification ratio as the cyst to be hard as compared to the "normal" tissue.

Selecting QAnalysis Image Range

A range of frames is selected for the Qanalysis in Cine mode (before accessing QAnalysis). Only the frames in this range are used for the QAnalysis.

If a range is not selected prior to accessing the QAnalysis, the system uses the default Cine start and end frames as the default start and stop frames.

1. The first frame in the analysis series is selected by adjusting the *Start Frame* control to the desired frame

    OR

    using the **Trackball** or the *Frame by Frame* control to select the desired first frame and then selecting the *Start Frame* control.

2. The last frame in the analysis series is selected by adjusting the CINE *End Frame* control to the desired frame

    OR

    using the **Trackball** or the *Frame by Frame* control to select the desired end frame and then selecting the *End Frame* control.

Activating QAnalysis

1. Scan and Freeze the patient in the desired live mode or recall a desired cine loop from the stored images.

NOTE: *QAnalysis is only available when the system is in CINE mode.*

NOTE: *Images from the current scan session acquired in the desired analysis mode (already in CINE) or from a saved image loop can be used for QAnalysis.*

2. **QAnalysis** displays on the Cine Touch Panel.
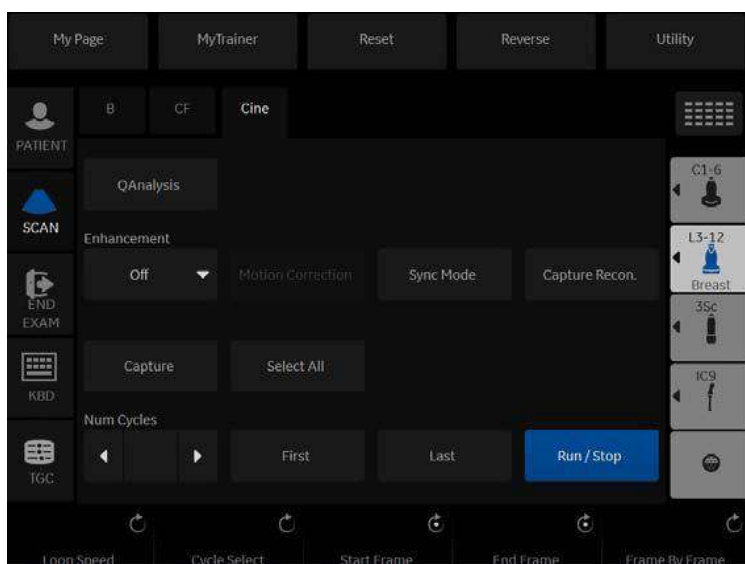
Figure 13-31.   Cine Touch Panel

3. Select **QAnalysis**. The QAnalysis screen and Touch Panel displays. To toggle the trackball function between QA and Scroll, press the top **Trackball** key.

Activating QAnalysis (continued)
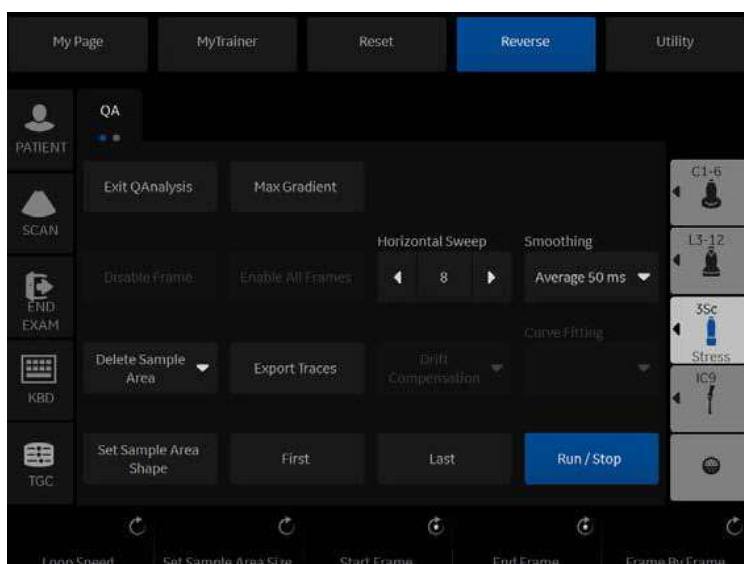
Figure 13-32.   TVI QAnalysis Touch Panel, Page 1
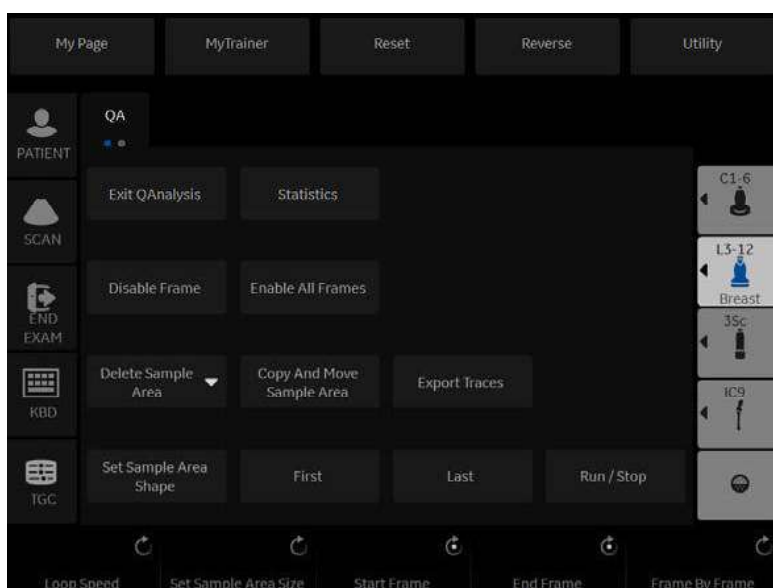
Figure 13-33.   Color Flow and PDI Mode QAnalysis Touch Panel

Activating QAnalysis (continued)
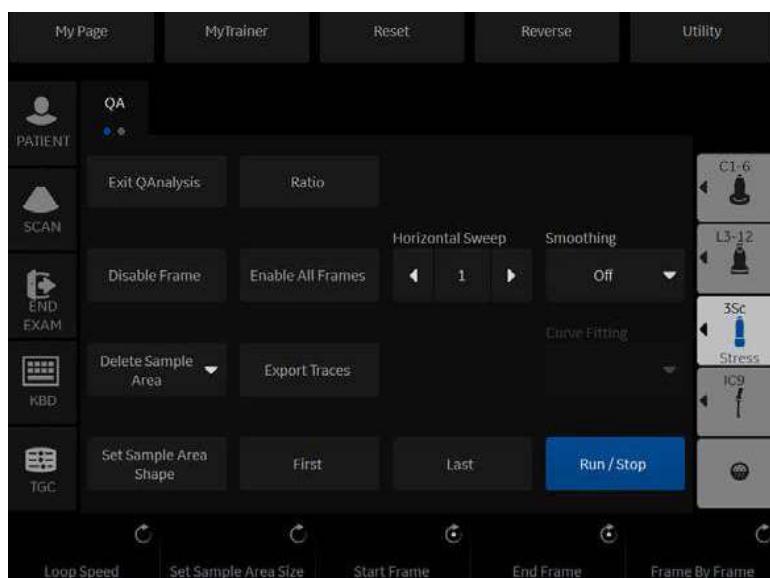
Figure 13-34.   Elastography QAnalysis Touch Panel

Common QAnalysis Function

Display the System Menu

Place the cursor to the desired position and press the left *Set* key. The system menu displays at the cursor position.

The system menu is dependent on the area which you place the cursor.

Generating a Trace

Up to eight traces can be generated.

About the sample area

The sample area can be in three different states:

- **Free sample area**: freely moving sample area (QA cursor) before anchoring.

NOTE: *The free sample area disappears when the QA cursor is moved over a static anchored frame.*

- **Static sample area**: the free sample area is anchored by pressing Set.
- **Dynamic anchored sample area**: the sample area is anchored in two or more frames (see Manual tracking below). In these particular frames, the sample area is displayed with an anchor. The sample area moves smoothly between the anchored positions when playing/scrolling the cineloop.

Trace from a pre-defined sample area

1. If the trackball assignment is not on QA, press the top **Trackball** key until QA highlights.
2. If necessary, select the sample area Ellipse ROI button (shape icon on the monitor display).
3. Move the cursor to one of the Cineloop windows using the **Trackball**.
4. Press **Set** to anchor the sample area.

   In this frame, the sample area is marked with an anchor. If the cineloop has more than one heart cycle, a sample area will also be anchored in the corresponding frame in the next heart cycle.

   The trace is updated accordingly in the Analysis window.

Generating a Trace (continued)

Trace from freehand sample area

1. Select the Freehand ROI button (pencil icon on the monitor display).
2. Move the cursor to one of the Cineloop windows using the **Trackball**.
3. Press and hold down the **Set** key while drawing a sample area using the **Trackball**.
4. Release the **Set** key.

    The sample area is automatically closed and the trace is updated accordingly in the Analysis window.

Generating a Trace (continued)

Manual tracking of the sample area (dynamic anchored sample area)

1. Place a sample area over a region of interest. Note the anatomical location of the sample area.

2. Scroll to a new frame using the **Trackball**.

3. Press the top **Trackball** key until the QA trackball assignment is selected.

4. Move the cursor to the sample area using the **Trackball**.

5. Press **Set**. The sample area is unanchored.

6. Drag the sample area to the corresponding anatomical location in the new frame.

   When the sample area is anchored in more than one frame, linear interpolation is performed so that the sample area is smoothly moved between the anchored positions in the selected frames when running the cineloop.

7. Press the top **Trackball** key until the scroll trackball assignment is selected.

8. Using the **Trackball**, scroll through the cineloop and control that the sample area follows the moving anatomical structure.

9. Add anchored sample areas in several frames to obtain a more accurate displacement of the sample area.

Generating a Trace (continued)

Moving a dynamic anchored sample area

1. Press the top **Trackball** key until the scroll trackball assignment is selected.

2. Using the **Trackball**, browse thought the cineloop to display one of the frames where the sample area was anchored.

NOTE: *In these frames, the sample area is marked with an anchor.*

3. Press the top **Trackball** key until the QA trackball assignment is selected.

4. Move the cursor to the sample area using the **Trackball**.

5. Press **Set**. The sample area is unanchored.

6. Drag the sample area to a new location.

7. Press **Set** to anchor the sample area to the new location.

If you want to move the sample area to the same depth, select ***Move (same depth)*** from the System Menu.

Manipulating the Sample Area

Up to eight ROIs can be saved on the reference image, with the corresponding eight traces plotted simultaneously on the graph. Each ROI display has a different color, and its corresponding trace data is plotted using that same color.

Once eight ROIs have been saved, the system does not automatically generate an active ROI when the cursor is positioned over the displayed reference image.

The saved ROIs can be a mixture of elliptical and freehand ROIs.

When the user repositions an ROI, the old trace data is erased from the plot and the trace data for the new position replotted.

If the ROI position on the last frame of the selected image range is moved, the corresponding ROIs on all frames are repositioned to match the last frame.

The user shall also have the capability of setting separate ROI positions on different frames of the contrast images, and the system shall linearly interpolate the ROI positions for the frames in between the selected frames.

Setting the default sample area shape

1. Select ***Set sample area shape***. The Information Box displays.
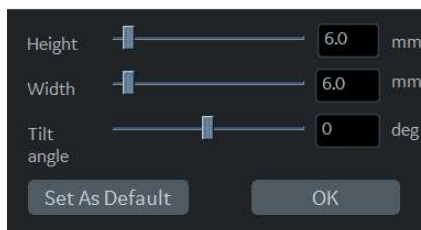
Figure 13-35.   Sample Area Information Box

2. Select Height, Width and Tilt angle.
3. Select ***Set as default***. The current ROI size is set as the default for subsequent Ellipse ROIs.

Sample Area Shapes

There are two different methods for determining the shapes of the sample area.

<u>**Ellipse ROI**</u>

1. Select the ellipse icon (shape icon on the monitor display).

2. When the trackball positions the image display cursor over the reference image(s), an elliptical ROI is automatically generated and displays on the reference image(s).

3. The average velocity value inside the ellipse is calculated for every image in the image analysis range and plotted in the image display area.

4. The last generated or selected ellipse is considered the active ROI, and its trace plot automatically updates as the user repositions it on the reference image. Old traces are erased.

5. When scanning with an elliptical ROI, press **Set** to fix the ROI position and freeze its corresponding trace on the plot. A new active ROI is generated whose position is manipulated by the trackball and whose velocity curve traces will be plotted as before, while the previous ROI and trace remain fixed at the points they were saved at.

NOTE: *Elliptical ROIs can be positioned in any manner that keeps their center within the image boundaries. In the case that part of the ROI is outside the image boundary, only data from within the image boundary is used for calculating the mean velocity value.*

NOTE: *You can change the size of the Ellipse ROI by adjusting the Ellipse control.*

Sample Area Shapes (continued)

Freehand ROI

1. Select Freehand icon (pencil icon on the monitor display).

    Use the **Trackball** to position the caliper on the reference image at the start point. Press **Set** to fix the start point.

2. While holding down the **Set** key, trace the outline of the desired ROI by moving the caliper with the **Trackball**.

Reshaping a Sample Area

To reshape the sample area:

1. Position the cursor on the ROI to reshape and press the left **Set** key.

2. The ROI system menu displays. Select ***Set sample area shape***.
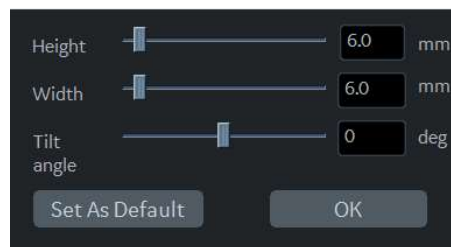
Figure 13-36.   Sample Area Information Box

3. Adjust Height, Width and Tilt angle.
4. Press ***OK***. The selected ROI size changes.

Labeling a Sample Area

The sample area label is used to identify data associated with the sample area when exporting.

1. Position the cursor on the ROI to label and press the left **Set** key.

2. The ROI system menu displays. Select *Label sample area*. The Label Dialog box displays.
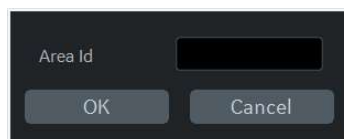
Figure 13-37.   Label Dialog Box

3. Enter a name for the sample area.

4. Select *OK*.

Copy, move, and paste a Sample Area

To copy and paste the ROI,

1. Move the cursor over the ROI and press the left Set key. The system menu displays.

2. Select *Copy sample area*.

3. Move the cursor to the desired location for the copied ROI and press the left Set Key. The system menu displays.

4. Select *Paste sample area*.

To copy and move the ROI,

1. Move the cursor over the ROI and press the left Set key. The system menu displays.

2. Select *Copy & move*. Or if you want to move to the same depth as the original ROI, select *Copy & move (same depth)*.

3. Move the copied ROI using the **Trackball**. Press **Set** to fix the position.

Deleting a Sample Area

Sample ROIs and their corresponding traces can be deleted using ***Delete Sample Area***.

1. Select ***Delete Sample Area***; a pull-down menu displays.
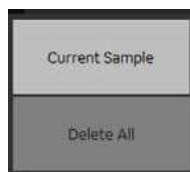
Figure 13-38.   Delete Sample Area pull-down menu

2. Select ***Current sample*** to delete the currently active ROI.

   Select ***Delete all*** to delete all currently set ROIs and all of their traces.

NOTE: *The corresponding traces for the deleted ROIs are erased from the plot.*

NOTE: *Deleting an ROI causes the ROIs to be deleted from all frames in the analysis loop.*

QAnalysis Plot Control

> *NOTE:*   *Plot Control is available only with TVI and Elastography modes.*
>
> The following controls are user configurable presets which are configurable through the pull-down menu in QAnalysis mode. When using the pull-down menu:
>
> 1. Place the cursor over the analysis window and press the left *Set* key. The system menu displays at the cursor position.
> 2. Select the appropriate parameter.

Vertical auto-scaling

The system can be configured to display the full unit range or a range according to the maximum and minimum values of the displayed trace(s) (auto-scaling function). In addition, the auto-scaling function can be set to be live update (updates while the sample area is moved) or delayed (updated when the sample area is anchored).

- *Delayed*—The system automatically rescale the vertical axis of the trace graph only when a new ROI is saved, to account for changing input dynamic range.

- *On*—The system automatically rescale the vertical axis of the trace graph every time the currently selected (active) ROI is moved.

- *Off*—Disable any automatic scaling of the vertical axis. There is user-defined system defaults on the system preset page for the fixed vertical scale to be used for the plot.

Figure 13-39.   Vertical Autoscale Pop-up menu

Line Style

- *Solid*—Setting the results in a plotted trace that does not display small boxes at the data points.
- *Squares*—Setting the results in a plot where small squares are displayed at each data point, and the squares are linked together by lines.
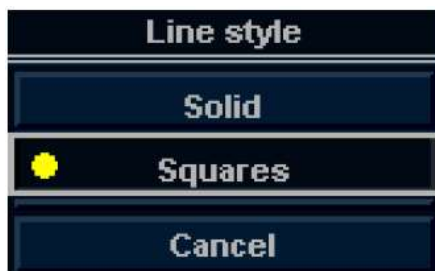
Figure 13-40.   Line Style Pop-up menu

Smoothing

The system can smooth the traces displayed by applying a filter over a defined time window. The type of filter available is depending on the analysis signal displayed.

1. Select **Smoothing**.

NOTE: *When smoothing is turned on, it applies to all traces in the plot window.*

2. The smoothing filter list displays. Select the appropriate parameter.

Horizontal Sweep

Horizontal Sweep allows you to increase or decrease the time interval over which to plot the analysis curve.

The default is the user selected image range. If the user has not yet selected a first and last frame, the first and last default frames from the displayed CINE loop are used.

Zooming in the Analysis window

To zoom:

1. In the Analysis window, press and hold down the **Set** key while dragging the cursor to define the zooming area.

2. Release the **Set** key.

To unzoom:

1. Press the left **Set** key in the Analysis window. The system menu displays.

2. Select ***Unzoom***.

Disabling/Enabling the frame

NOTE: *Frame disable/enable is available only with Elastography, CF, and PDI modes.*

Frame disabling excludes the actual frame from the cineloop display.

Disabling the frame from the frame marker

To disable One Frame:

1. Use the **Trackball** to move the cursor to the frame maker to disable.
2. Press **Set** to disable the frame.
3. The frame marker is changed from green to red to indicate the frame has been disabled.

NOTE: *The disabled frame is no longer displayed in the reference window when scrolling through CINE memory.*

Disabling multi-frames from the frame marker

1. Use the trackball to move the cursor to the first frame maker to disable.
2. Press and hold down *Set*
3. Move the cursor with the Trackball to the last frame to be disabled and release Set.

   The marker is turn red and the data from that frame is removed from the trace and any subsequent trace processing.

Disabling a frame from the cineloop window

1. Use the trackball to move the cursor to the cineloop window.
2. Press the left *Set* key. The system menu displays.
3. Select *Disable frame*.

   The current frame is disabled and the corresponding frame marker displays red.

Disabling/Enabling the frame (continued)

Disabling Frames - Auto

When the user enters Elasto Quantification, the useless frames are disabled automatically. The LOGIQ P8/P9/P10 uses Elastography Index value to find useless frame (low quality frames).

Disabling ECG triggered frame (where available)

In a multi-cycle acquisition, the user may deselect all frames in all heart cycles but a selected one. This function can be used for example to select a particular systolic frame for each heart cycle.

1. Scroll through the cineloop to identify the cardiac phase to analyze or identify the cardiac phase on the ECG trace (where available).
2. Position the cursor on the ECG trace (where available) and press left **Set** key. The system menu displays.
3. Select *ECG triggering* (where available).

    All frames in all heart cycles are disabled except for the selected and corresponding frames in the other heart cycles.

Disabling/Enabling the frame (continued)

To enable the frames

To re-enable all deleted frames:

1. Position the cursor on the Frame Marker line and press the left *Set* key. The system menu is displayed at the cursor position.
2. Select *Enable all frames*.
3. All disabled frames are re-enabled.
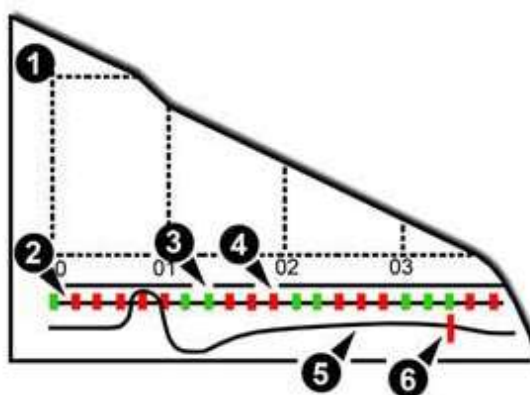
Figure 13-41.   Frame Makers

1. Analysis Window
2. Frame markers axis
3. Enabled frame (Green)
4. Disabled frame (Red)
5. ECG (where available)
6. Current frame

Exporting Traces (Saving the Trace Data)

You can save the trace data to an external file in ASCII format, readable in spreadsheet programs.

1. Select **Export Traces** to save the trace data.
2. The following window displays.

Figure 13-42.   Export Trace Window

- Location : Select Location which to save.
- Filename : Enter the filename. (Only Text)

3. Select **OK** to save the data and return to the QAnalysis screen.

- All displayed ROI traces are saved in the exported file.

NOTE: *The Smoothed trace is the one saved if the user has applied a smoothing filter.*

NOTE: *Only data from the user selected image range is included in the exported trace file.*

NOTE: *No trace results are saved in the standard image database.*

Annotating the QAnalysis Data

The user can annotate both the reference image and the trace plot displays. Use **Comment** key to type the annotation. See Chapter 6 for reference.

Printing QAnalysis Data

Press the appropriate print key in the desired analysis mode mode.

The system captures a single still frame which consists of the plot, the reference image, and user annotation.

Exiting QAnalysis

There are several methods to exit QAnalysis.

- Toggling *Exit QAnalysis* on the QATouch Panel.
- Press **Freeze** to unfreeze and resume scanning.
- Press any other button that returns the system to real-time scanning.

Real-time 4D

4D Introduction

4D provides continuous, high volume acquisition of 3D images. 4D adds the dimension of "movement" to a 3D image by providing continuous, real-time displays. With 4D, you can apply rendering techniques to smooth out the appearance of an anatomical structure, for example, a baby's spine.

You can perform the following types of volume acquisitions within the 4D feature:

Table 13-10:   4D Package Options

4D Type	Description	Acquisition Mode
4D	Designed for continuous volume acquisition of a 3D image.	B, 4D
Static 3D	Designed for single volume acquisition of a 3D image.	B, 3D

Features supported with 4D

The following features are supported with 4D:

- Most B-Mode controls
- Annotations
- Measurements and Calculations

The following post-processing controls are available with 4D:

- CINE
- Zoom

4D Principles of Operation

The acquisition of volume starts with a 2D image using special probes designed for performing 3D sweeps and 4D scans. The volume box defines the region of interest to be used for the volume sweep.

Volume sweep refers to the range of the sweep of the 2D image to be transformed into a rendered, 3D or 4D image. Static 3D acquisition involves a single volume sweep. 4D involves multiple, continuous volume sweeps.

Figure 13-43.   Volume Sweep

1. Central 2D scan
2. Start 2D scan
3. Range of VOI sweep

When you initiate a volume sweep, you can adjust the angle of the volume.

What is Interactive 3D Rendering?

Interactive 3D rendering allows you to visualize certain structures and to view and analyze different sections of the volume.

Region of Interest (ROI) / Render Box

The Region of Interest (ROI) - also referred to as the Render Box in rendering - contains the section of the volume you want to render. Therefore, objects that are not inside of the box are not included in the render process and are cut out (this is important in surface mode to allow a free line of sight). This may or might not be the entire Volume of Interest (VOI).

You can adjust the view direction of the ROI.
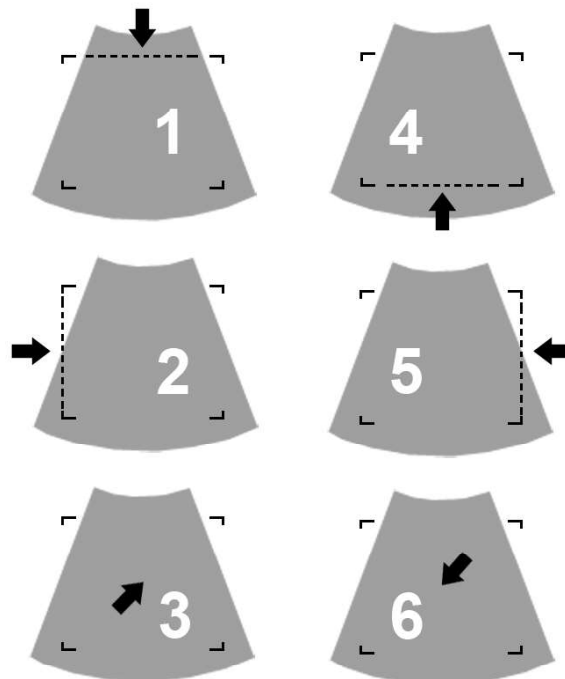
Figure 13-44.   Render View Directions

1. Up/Down	4. Down/Up
2. Left/Right	5. Right/Left
3. Front/Back	6. Back/Front

Principle of Sectional Planes

Sectional planes represent three different planes of the same 3D volume. There are three separate planes, A (Longitudinal), B, (Transverse) and C (Coronal).
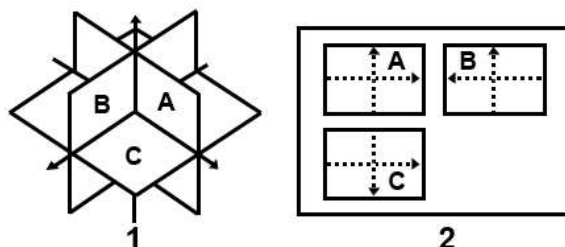
Figure 13-45.   Illustration of Sectional Planes

The presentation of three orthogonal sectional planes is different from the conventional patient orientation in 2D sonography.

NOTE: *Whenever you select the usual, longitudinal section of the patient to display in field A, the conventional orientation for longitudinal and transverse sections is valid.*

Reference Images

Reference images are the individual image displays within the corresponding sectional plane. Reference image A represents the longitudinal view; reference image B the transverse view, and reference image C represents the coronal view.
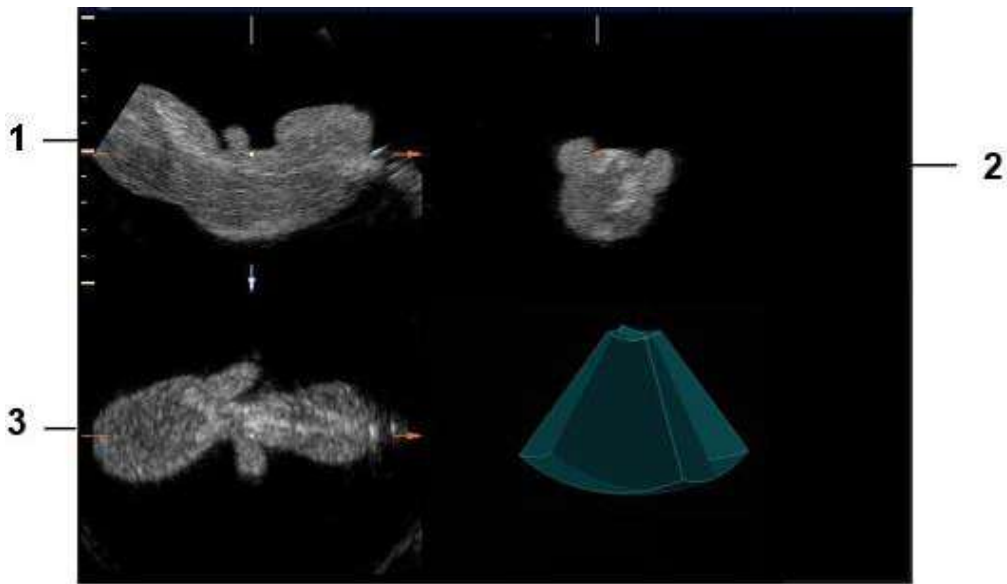
Figure 13-46.   Monitor Display of Reference Images in Sectional View

1.   Reference Image A (Longitudinal)
2.   Reference Image B (Transverse)
3.   Reference Image C (Coronal)

Orientation Help. When you view a 4D image on the display, it's sometimes difficult to recognize the orientation. To help, the system displays a three-dimensional drawing to illustrate the orientation. This drawing displays ONLY in sectional view.

Reference Images (continued)
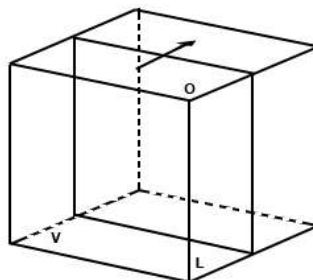
Figure 13-47.   Reference Image A

For Reference image A, the transducer plane migrates from the FRONT to the REAR through the volume body.
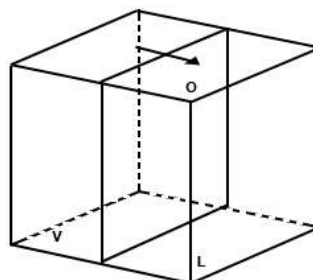
Figure 13-48.   Reference Image B

For Reference image B, the transducer plane migrates from the LEFT to the RIGHT through the volume body.
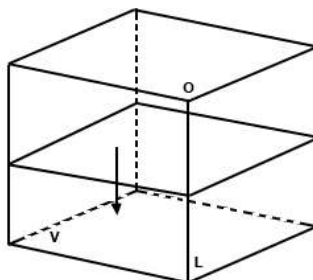
Figure 13-49.   Reference Image C

For Reference image C, the transducer plane migrates from the TOP to the BOTTOM through the volume body.

Reference Images (continued)

Examples of Probe Orientation with Reference Planes
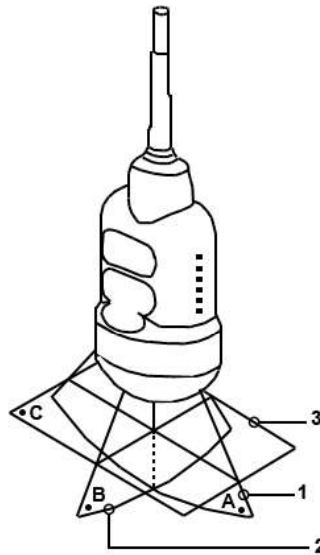
Figure 13-50.   Abdominal Probe Orientation

1.   Image Plane A
2.   image Plane B
3.   Image Plane C

Reference Images (continued)

Examples of Probe Orientation with Reference Planes
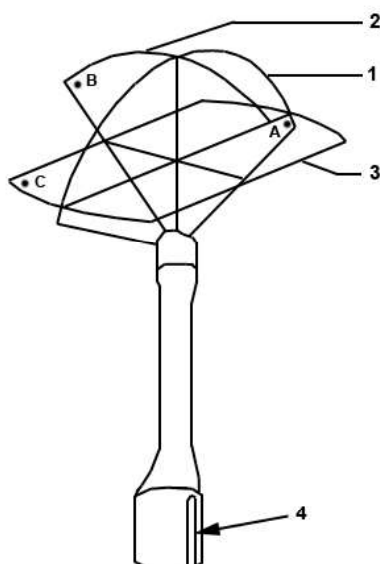
Figure 13-51.   Endocavity Probe Orientation

1.   Image Plane A
2.   Image Plane B
3.   Image Plane C
4.   Groove

4D Operational Controls

Control Panel Overview

When you enter 3D/4D mode, the behavior of some of the Control Panel buttons changes. For example, in 3D/4D mode, you use the PW-Mode, CF-Mode, M-Mode buttons (along with Depth) to manipulate the Volume of Interest (VOI).

Figure 13-52.   Control Panel Buttons

1. 3D/4D key, used to activate/deactivate 3D/4D.
2. CF Key, CF-Mode key is used to rotate about the X axis.
3. PW Key, PW-Mode key is used to rotate about the X axis.
4. M Key, M-Mode key is used to rotate about the X axis.
5. Ellipse key, used as a transverse translation through the image.
6. Top Trackball key, used to adjust the size and position of the VOI.
7. Trackball, used to move the VOI. Also, the 4 keys surrounding the Trackball map to additional functionality, as shown on the monitor display.
8. L (left) key, used to begin a 4D acquisition.
9. Freeze or R (right) key, used to freeze a 4D image.

4D Monitor Display

Imaging parameters are displayed in the upper right-hand portion of the display. The 4D specific parameters are Quality (Q), Volume Angle (A) and Volume Rate (VR). The Status Bar contains instructions on the tasks you can perform at each stage of the 4D imaging process. Remember to take a look at the Status Bar as needed.

4D Touch Panel Overview

The following is the first Touch Panel that appears when you press **3D/4D**.
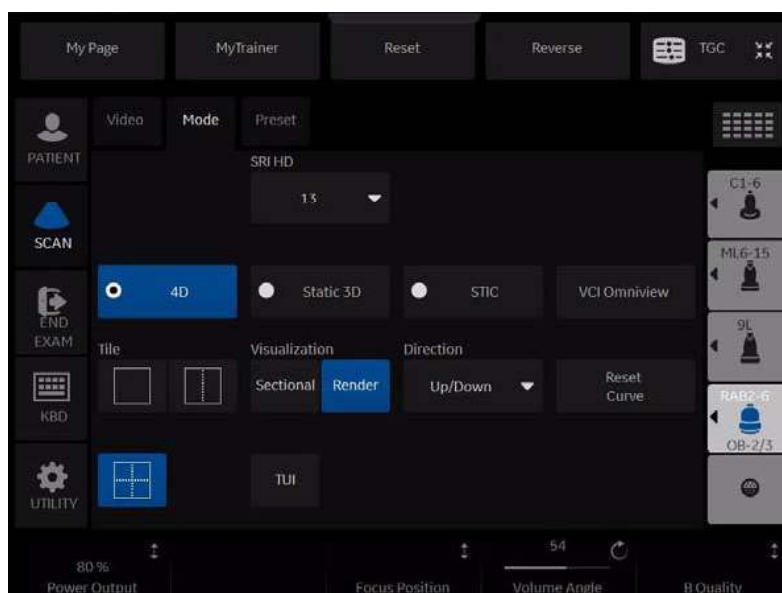
Figure 13-53.   First Touch Panel displayed when entering 3D/ 4D mode

Common 4D Touch Panel Controls

Most 4D Touch Panel screens contain some similar controls. Refer to the table below for descriptions of these controls. Controls that are unique to or that contain slightly different functionality are described in their respective sections.

Table 13-11:   Common 4D Touch Panel Controls

Preset Parameter	Description
SRI-HD	Allows you to apply SRI-HD (High Detection Speckle Reduction Imaging) to the selected reference image.
Tile	You can divide the display into 1, 2, or 4 windows for Render view (Render = On) and 1 or 4 windows for Sectional view (Render = Off).
Reset Curve	Resets the three-point curve to a straight line.
Direction	Adjusts the view direction of the ROI.
Visualization	Sectional, Render, VCI-Static, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image.
Focus Position	Adjusts the focal position.

Table 13-11:   Common 4D Touch Panel Controls (Continued)

Preset Parameter	Description
Volume Angle	Sets the range of the volume sweep.
Quality	Balances speed with line density. Max combines the highest density with the slowest speed; Low combines the lowest density with the highest speed.

Real-Time 4D/Static 3D Presets

1. When you enter 3D/4D mode, press the Preset tab.
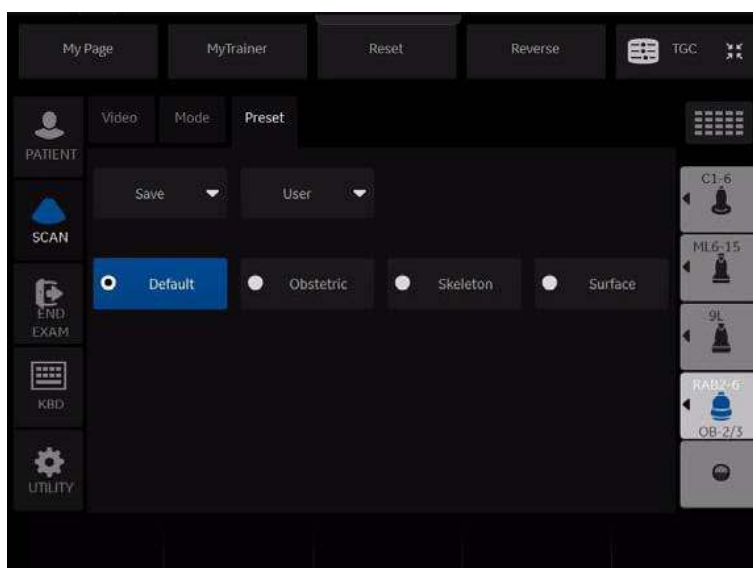
Figure 13-54.   4D Preset

2. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

Table 13-12:   Common 4D Touch Panel Controls

Preset Parameter	Description
Save	Selections: Overwrite, Create New, Cancel. **Overwrite**. Overwrite the application preset file with the changes you just made. **Create New**. Create a new user application preset file based upon the current exam category and application. **Cancel**. Cancel without saving preset parameters.
Pre-defined Preset	Reloads the presets for the selected application. Abdomen, Obstetric, Gyn, Surface, Skeleton, Default, Peri. Vasc., Small Part, Contrast
User	Used to define new user presets for a given application.

Static 3D Presets

1. When you enter 3D/4D mode, press *Static 3D*, then the *Preset* tab.
2. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

Storing 4D Images

You store 4D images exactly as you would your 2D images. Because 4D images contain more data, they also require more space. Pay close attention to the size of the volumes.

• Still image: Store as Raw Data
• CINE: Store as DICOM

Anatomical Markers in 4D

Anatomical markers are available in 4D.

To add an anatomical marker in 4D,

•   Rotate the Body Pattern/Ellipse key. A person pattern overlays the 4th quadrant on the display.

To change the person pattern,

•   Press the Touch Panel key. From left to right, select either Transrectal, Neonatal Head, Face (down), or Face (up).

To rotate the person pattern,

•   Rotate the Body Rotation Touch Panel key (0, 45, 90, 135, 180, 225, 270, or 315 degrees).

To tilt the probe,

•   Rotate the Probe Tilt Touch Panel key (0, 45, 90).

To align the marker with the probe's orientation marker.

•   Rotate the Body Pattern/Ellipse key.

To position the marker on the anatomy,

•   Move the Trackball to position the marker at the appropriate anatomy.

The display is also annotated, for example:

•   Cr = Cranial
•   Ca = Caudal
•   A = Anterior
•   P = Posterior
•   L = Left
•   R = Right

To exit Anatomical Markers:

•   Press the **Set** key.

Performing a 4D Scan

4D provides continuous, high volume acquisition of 3D images. You can apply rendering techniques to smooth out the appearance of an anatomical structure, for example, a baby face.

4D imaging contains three main viewing modes: Sectional, Render, and Tomographic Ultrasound Imaging (TUI). Sectional mode displays three separate representations of the image: Longitudinal (original 2D image), Transverse (elevational), and Coronal (horizontal). Render mode displays one rendered 4D image.

Visualizations

4D provides two types of views for displaying and working with images: Sectional, Render, and Tomographic Ultrasound Imaging (TUI).

Sectional View

Sectional view contains one display for each sectional plane.
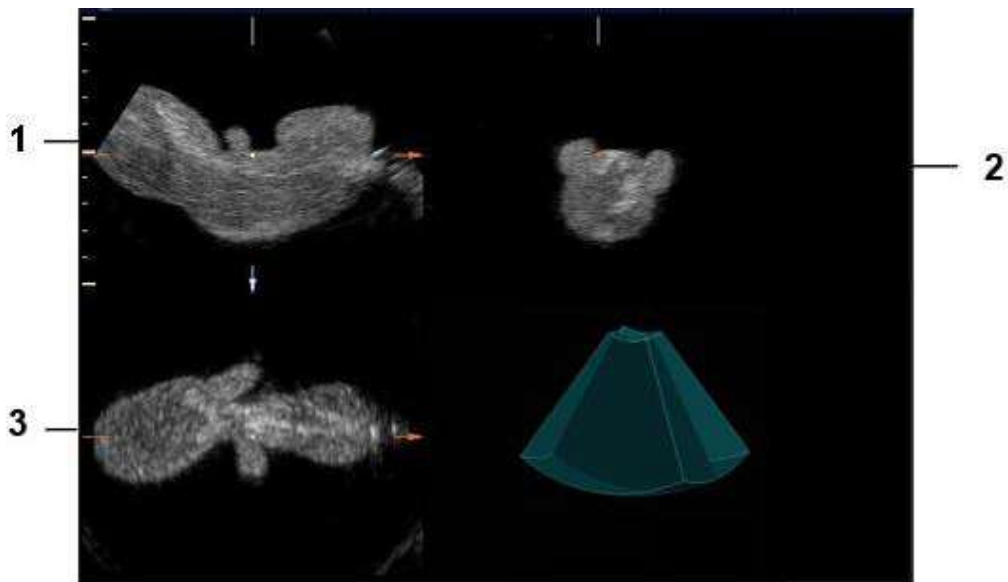
Figure 13-55.   Monitor Display in Sectional View

1.   Sectional Image A
2.   Sectional Image B
3.   Sectional Image C

Visualizations (continued)

Render View

The LOGIQ P8/P9/P10 continuously displays the 4D rendered image.

NOTE: *When the tile selection is single, only the rendered 4D image appears. When the tile selection is quad, the sectional images are located in 3 quadrants with the rendered 4D image in the fourth.*
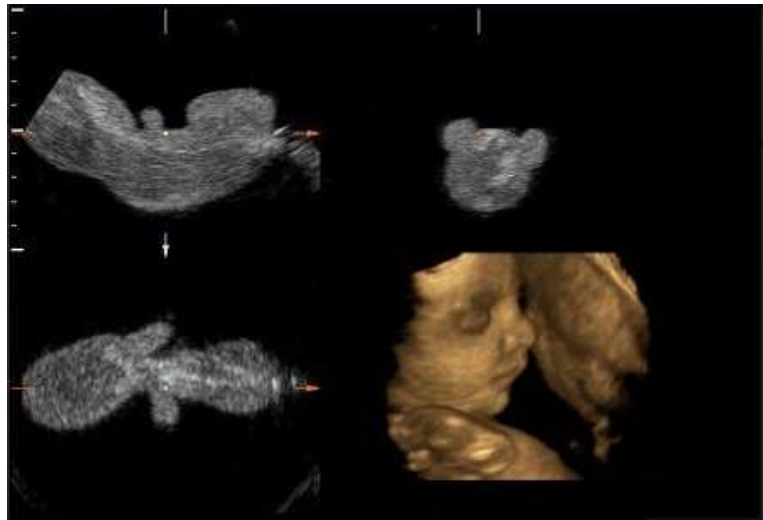
Figure 13-56.   Quad Tile Render View

Visualizations (continued)

Orientation Help

When you view a 4D image on the display monitor, it's sometimes difficult to recognize he orientation. To help, the system displays a three-dimensional drawing to illustrate the orientation. This drawing displays ONLY in sectional view.
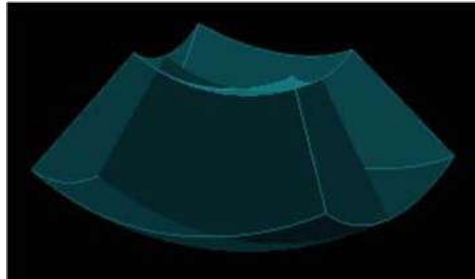
Figure 13-57.   Orientation Help Graphic

Acquiring and Rendering a 4D VOI

Starting with a 2D Image

To create a 4D image, you start with an optimized 2D image. The 2D image serves as the mid-line for the resulting 4D image.

1. Connect the appropriae 4D-compatible probe, leaving the probes in their respective holders. Follow he guidelines in Chapter 3 for connecting probes.

NOTE: *If the appropriate 4D probe is not connected, the original 3D Touch Panel appears.*

2. Obtain a 2D image. Optimize the image as usual.

Entering 3D/4D Mode

In 3D/4D mode, you choose the type of scan you want to perform: 4D or Static 3D.

1. Press **3D/4D** to enter 3D/4D mode. The first time you press 3D/4D, the system is in B Pre mode.

NOTE: *The location of the number of focal zones might change when you enter 3D/4D mode, since the number of zones is pre-determined by the default ROI.*

The default acquisition mode varies by application. If you are in OB, the default acquisition mode is Real-Time 4D; for all other applications, Static 3D is the default acquisition mode. Wen you enter pre-mode, an ROI graphic may appear on the monitor display that defines the initial ROI (Region of Interest) of the volume.
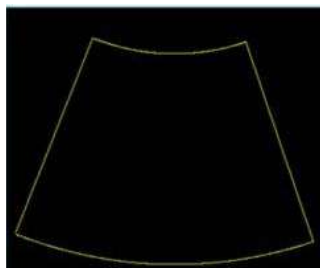
Figure 13-58.   ROI Graphic

2. Press the ***Preset*** tab. Select one of the preset settings for data acquisition and display. Presets are defined in the preset file and differ by application.

Quick Acquisition Steps

1. Connect the appropriate 4D-compatible probe, leaving the probes in their respective holders. Follow the guidelines in Chapter 3 for connecting probes.

2. Select a 4D probe from the probe indicator.

3. Obtain a 2D image. Optimize the image as usual.

4. Press **3D/4D**. An ROI graphic appears. 4D is selected.

5. Define the Volume of Interest (VOI) to be scanned. Use the **Trackball** to move the VOI and the **Width** button to re-size and re-position the VOI. Only the area defined within the VOI is rendered.

6. Adjust the volume angle and quality. This defines the range of the volume sweep. A small sweep angle results in a lower number of slices with a high volume rate.

7. To begin 4D acquisition, press the **L** key.

   You DO NOT have to hold the probe steady during data acquisition.

   During data acquisition, you can manipulate the VOI to see different views of the image. To rotate the VOI left or right, use the *PW* control. To rotate the VOI forward or backward, use the *M* control. To rotate the VOI in a circular motion, use the *CF* control.

   To return to 3D/4D pre-mode, press **L**.

NOTE: *If the volume size is too large, the message "Volume Size Too Big - Quality Degraded" displays in the status bar. The system changes the quality automatically to below the upper limit and displays the proper Quality value in the information window.*

8. Set Render to On.

9. To complete the acquisition, press **Freeze** or **R**.

10. Store the image.

Acquiring a 4D Volume of Interest (VOI)

Once you have acquired an optimized 2D image, you can perform a 4D scan to acquire the 4D image.

During 4D image acquisition:

- Frame Averaging is disabled.
- You cannot change the transmit frequency.
- To change the position of the focal zone, adjust the depth of the VOI.
- You cannot change the number of focal zones.

Acquiring a 4D Volume of Interest (VOI) (continued)

To acquire a 4D VOI:

1. Press *4D*.

2. Make sure the VOI is defined appropriately. If necessary, adjust the volume angle. This defines the range of the volume sweep. A small sweep angle results in a lower number of slices with a higher volume rate.

   See Manipulating the Volume of Interest (VOI) for more information.

3. To begin 4D acquisition, press the **L** key. The system will perform continuous sweeps across the VOI. You do not have to hold the probe steady during a 4D scan.

   To return to 4D pre-mode, press **L**.

4. Set the Render to On.

Sectional VOI Acquisition

Sectional view provides three separate views of the same image: Longitudinal (original image), Transverse (elevational), and Coronal (horizontal).

1. In the 4D tab, Render defaults to On (Render mode). Change Render to Off for Sectional view.

2. To select a reference image, use the Ref Image control on the Touch Panel. The reference image selected contains the focus for control panel keys, allowing you to manipulate or optimize that image.
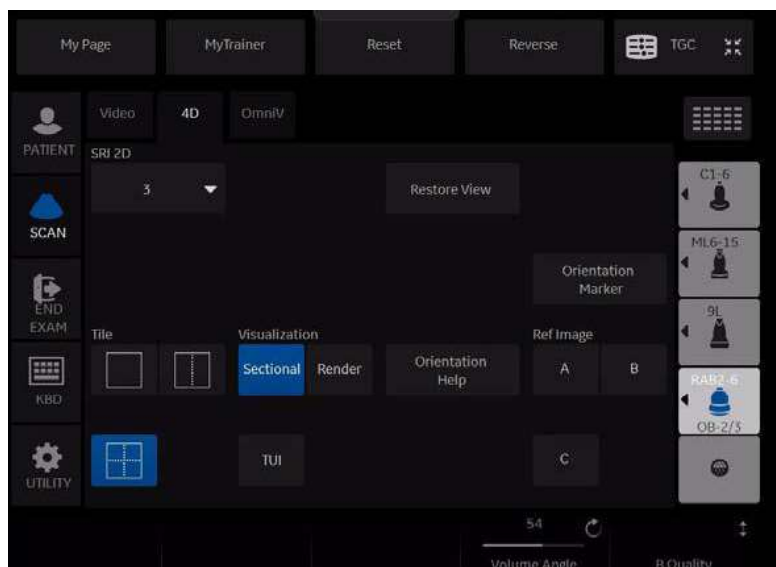
Figure 13-59.   4D Data Acquisition Sectional View

Table 13-13:   4D Data Acquisition Parameters

4D Parameter	Description
Restore View	Resets all parameters back to the original values or chosen presets.
Tile	Selections: Single, Quad. You can divide the display into 1 or 4 windows.
Visualization	Sectional, Render, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image.
Ref Image	Use to select the reference image that has focus for use with the control panel keys and **Trackball**.
Orientation Help	Displays a three-dimensional drawing to illustrate the orientation. Only displays in sectional view.
Volume Angle	Sets the range of the volume sweep.

Table 13-13:   4D Data Acquisition Parameters (Continued)

4D Parameter	Description
B Quality	Selections: Max, Hi2, Hi1, Mid2, Mid1, Low. Used to balance speed with line density. Max combines the highest density with the slowest speed. Low combines the lowest density with the highest speed. BQ displays on the display.

Render VOI Acquisition

Rendering allows you to distinguish subtle anatomical detail. You can render all areas of an VOI, or just certain regions of the VOI. The region you define for rendering is referred to as the Render Box.

1. Define the area you want to render. For example, if you have an image of an entire fetus, you might only want the fetal face to be rendered. Therefore, you would define the fetal face as the VOI.

2. Set Render to On.

Render VOI Acquisition (continued)
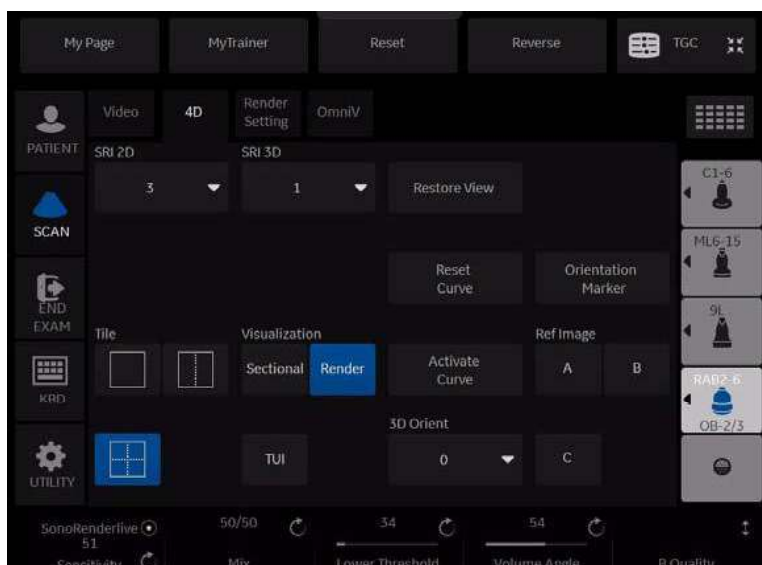
Figure 13-60.   4D Tab (Data Acquisition) Render View

Table 13-14:   4D Data Acquisition Parameters - Render Mode

4D Parameter	Description
Restore View	Select to reset all parameters back to the original values or chosen presets.
Tile	Selections: Single, Dual, Quad. You can divide the display into 1, 2, or 4 windows.
Visualization	Sectional, Render, or Tomographic Ultrasound Imaging (TUI). Render view displays one rendered image, or reference image(s) and rendered image.
3D Orient	When selected, changes the orientation of the image on the monitor display. Selections include: 0 degrees, 90 degrees, 180 degrees, and 270 degrees.
Ref Image	Use to select the reference image that has focus for use with the control panel keys and **Trackball**. This control is enabled only if Tile is set to Quad.
Volume Angle	Sets the range of the volume sweep.
Quality	Selections: Max, Hi2, Hi1, Mid2, Mid1, Low. Used to balance speed with line density. Max combines the highest density with the slowest speed. Low combines the lowest density with the highest speed.
Activate Curve	Define a three-point curved surface for the render window using the Trackball.
Reset Curve	Reset the three-point curve to a straight line.
Mix	Selections: 0-100% in increments of 2. Allows you to mix a Rend Mode 1 mode with a Rend Mode 2 mode. Always select two modes.

Table 13-14:   4D Data Acquisition Parameters - Render Mode (Continued)

4D Parameter	Description
Lower Threshold	Selections: 0-255. Sets a lower threshold below which weaker echoes are removed.

Render VOI Acquisition (continued)

1. Select the *Render Setting* tab.

   The Render Setting tab allows you select and combine gray-scale and color rendering modes.

HINTS   If you are using Surface modes, we recommend that you adjust the Lower Threshold to recognize border structures more clearly.
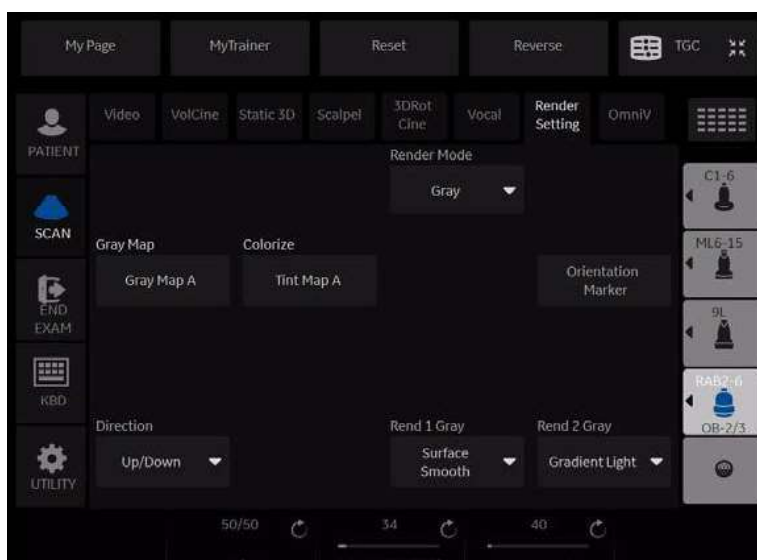
Figure 13-61.   Render Setting Tab (4D Data Acquisition)

Table 13-15:   4D (Data Acquisition) Render Parameters

4D Parameter	Description
Direction	The ROI determines the region that is rendered during 4D acquisition. You can change the direction in which this ROI is viewed. Selections: **Up/Down**, **Down Up**, **Left/Right**, **Right/Left**, **Front/Back**, **Back/Front**.
Gray Map	Displays the gray map selections on the display monitor. Select maps using the **Trackball**.
Colorize	Displays the tint map selections on the display monitor. Select maps using the **Trackball**.
Render Mode	Select Gray or Inversion. If you select Inversion, inverts the gray values of the rendered image (e.g., image information that was black becomes white and vice versa).

Table 13-15:   4D (Data Acquisition) Render Parameters (Continued)

4D Parameter	Description
Render 1	Allows you to combine render mode values from render mode 1. Select the render map combination from the upper-left portion of the monitor display. Select map combinations using the **Trackball**. Render Mode 1 Selections: Surface Smooth, Surface Texture, Transp Max, Transp X-ray, Transp Min, HDlive Texture. **Surface Smooth** - Surface displays in a smoothed texture mode, which means that the gray values of the surface are identical with the gray values of the original 2D scan. **Surface Texture** - Surface displays in texture mode, which means that the gray values of the surface are identical with the gray values of the original 2D scan. **Transp Max.** - Displays the maximum intensity of gray values in the ROI. This is helpful for viewing bony structures. **Transp X-Ray** - Displays the mean value of all gray values in the ROI. **Trans Min.** - Displays the minimum number of gray values in the ROI. This is helpful for viewing vessels and hollow structures. **HDlive Texture** - Uses an illumination source that can be positioned by the user around the rendered 3D object on a spherical coordinate. By highlighting structures from the side, the three-dimensional impression can be improved considerably.
Render 2	Allows you to combine render mode values from render mode 2. Render Mode 2 Selections: Surface Smooth, Light, Gradient Light, Transp Max, Transp X-ray, Transp. Min., HDlive Smooth. **Surface Smooth** - Surface displays in a smoothed texture mode, which means that the gray values of the surface are identical with the gray values of the original 2D scan. **Light** - Surface displays in light mode. Structures in the near field are brighter; structures in the far field are darker. **Gradient Light** - Surface displays as if it is illuminated from a spot light source. This is helpful if the displayed surface is surrounded by hypoechoic structures (for example, liquids). **Transp Max.** - Displays the maximum intensity of gray values in the ROI. This is helpful for viewing bony structures. **Transp X-ray** - Displays the mean value of all gray values in the ROI. **Transp Min.** - Displays the minimum number of gray values in the ROI. This is helpful for viewing vessels and hollo4w structures. **HDlive Smooth** - Smoothed HDlive texture mode. When Render 1 value is set to HDlive Texture, the only available mode for Render 2 is HDlive Smooth. Note: HDlive rendering is not available if VCI is active.
Edit Light	Activates the light editor for the virtual light source in HDlive render mode. User can position the light source by moving the Trackball, A light icon on the main display indicates the direction of the light. Note: The **Edit Light** parameter is only available for the HDlive rendering modes.
Transparency	Selections: 20 to 250. Sets the transparency of the image. The higher the number, the more transparent the gray scale information.

Manipulating the Volume of Interest (VOI)

Imagine you are able to manipulate the 4D volume of interest (VOI) in your hand. The 3D/4D ROI is a tangible anatomical object that you can see and manipulate easily using the **Trackball** and other control panel keys.

If the monitor display is in Sectional view, select the desired reference image before you manipulate the image.

NOTE: *The manipulation examples are with A set as the reference image.*

Rotating the 4D VOI Left/Right or Forward/Backward

You can rotate the VOI around the X, Y, and Z axes. To rotate the VOI around the X axis, turn the **CF** left/right.
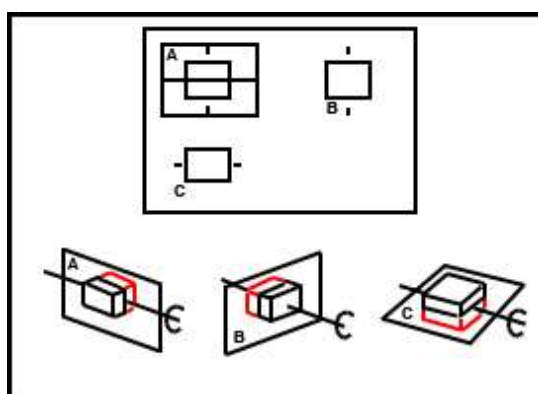
Figure 13-62.   Rotate about X Axis with CF Control

Manipulating the Volume of Interest (VOI) (continued)

To rotate the VOI around the Y axis, turn the **PW** left/right.
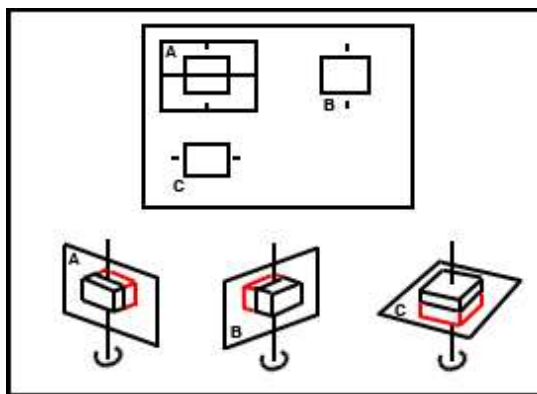
Figure 13-63.   Rotate about Y Axis with PW Control

Rotating the 4D Image in a Circular Motion

To rotate the VOI around the Z axis, turn the **M** left/right.
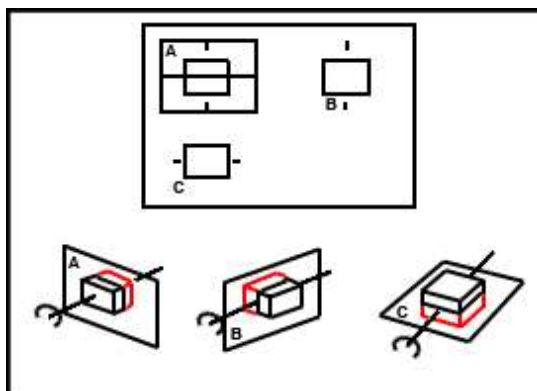
Figure 13-64.   Rotate about Z Axis with M Control

NOTE: *To speed up the rotation, press the **PW**, **CF**, or **M** controls before you turn them. To slow down the rotation, press **PW** or **CF** again.*

Manipulating the Volume of Interest (VOI) (continued)

Moving through the VOI
To move through the image to view a particular slice, press **Depth**.

This allows a displacement of the center of rotation along the intersection lines of the sectional planes A, B, and C. The displacement of the center of rotation leads to the display of parallel sectional images. See 'Reference Images' on *page 13-105 for more information.*

Zooming the Image
Rotate **Zoom** to zoom on the image.

Moving the VOI Position
To move the position of the VOI, move the **Trackball** left, right, up and down, as needed.

Resizing the VOI
To re-size the VOI, use the **Width** control panel button. See the Width section in this chapter.

Stopping 4D Image Acquisition

To stop acquiring a 4D image, press **Freeze** or R if you are in Render view or just **Freeze** if you are in Sectional view.

4D VOI Post-Processing

When you press **Freeze** or **R**, one of the following Touch Panel displays, depending on whether you are in Render view or Sectional view.
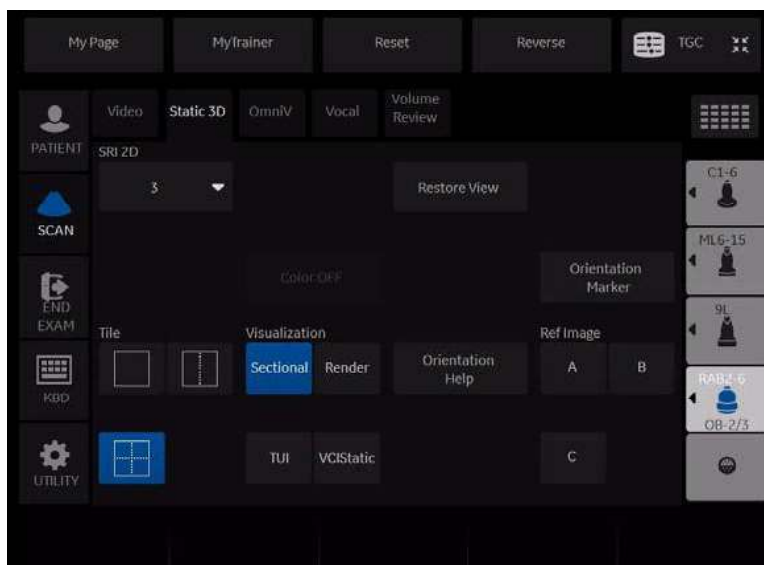
Figure 13-65.　4D (After Acquisition) Touch Panel - Sectional View
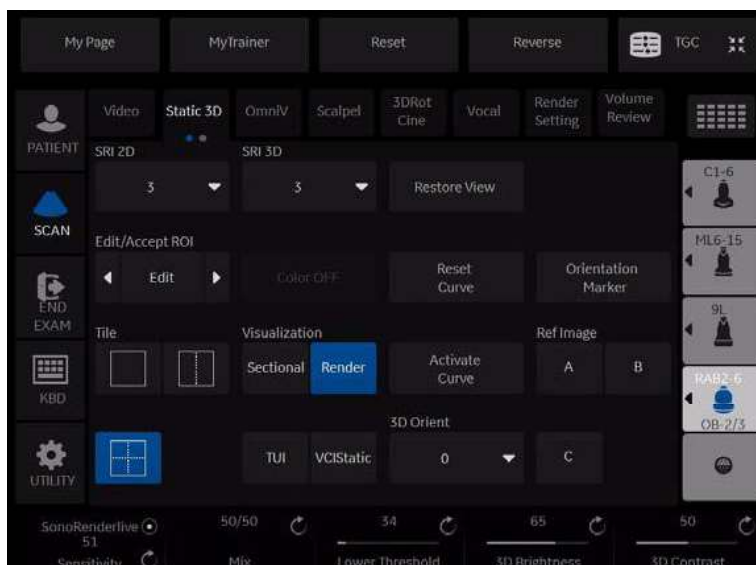
Figure 13-66.　4D (After Acquisition) Touch Panel - Render View

Static 3D

You can create a single sweep, single volume static 3D image.

Performing a Static 3D Scan

1. Connect the appropriate 4D-compatible probe, leaving the probes in their respective holders. Follow the guidelines in Chapter 3 for connecting probes.
2. Select a 4D probe from the probe indicator.
3. Obtain a 2D image. Optimize the image as usual.
4. Press **3D/4D**.
5. Press *Static 3D*. Set Visualization to Render.
6. Set the Volume of Interest (VOI) to be rendered. Use the **Trackball** to move the VOI and **Width** to re-size the ROI.
7. Adjust the volume angle. This defines the range of the volume sweep. A small sweep angle results in a lower number of slices with a high volume rate.
8. Set the probe down on the patient, making sure the probe is held steady. Press the **L** key to start acquisition.

NOTE: *During 3D acquisition, no control panel keys are not available, except for 'R.'*

NOTE: *When the 3D acquisition begins, the Touch Panel appears blank for a brief moment.*

9. Hold the probe steady until the system stops automatically. You will know the acquisition has stopped when the **Touch Panel** changes to display the Render Setting, 3D Rotational Cine, and Scalpel tabs.

   To stop the acquisition manually, press the **R** key.
10. Save the image.
11. To further manipulate the 3D image, press *Static 3D*.

    The Touch Panel that displays depends on the visualization mode selected prior to freeze, Sectional, Render, TUI or VCI Static.

Static 3D Sectional View
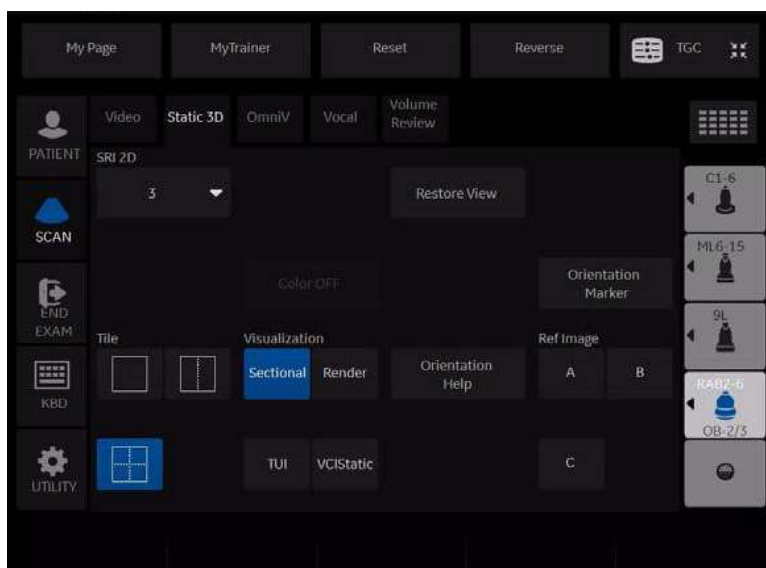
Figure 13-67.   3D (After Acquisition) Touch Panel - Sectional View

Table 13-16:   3D After Acquisition Parameters - Sectional View

Preset Parameter	Description
Orientation Help	Displays a 3-dimensional drawing to illustrate the orientation. Only displays in sectional view.

Static 3D Render View
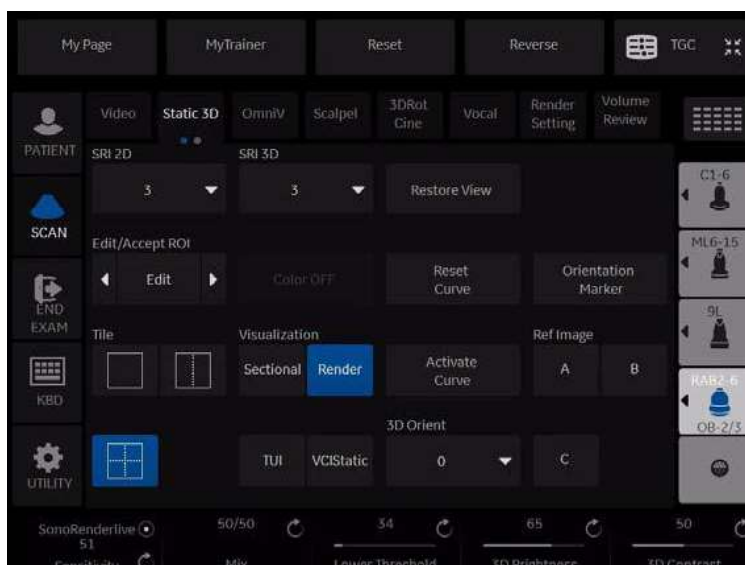
Figure 13-68.   3D (After Acquisition) Touch Panel - Render View

Table 13-17:   3D After Acquisition Parameters - Render View - Page 1

Preset Parameter	Description
Edit/Accept ROI	Selections include Edit, Accept. **Edit** - Select to adjust the size of the Region of Interest (ROI). **Accept** - accepts the active 3D image.
3D Orient	When selected, changes the orientation of the image on the monitor display. Selections include: 0 degrees, 90 degrees, 180 degrees, and 270 degrees.

Volume Review

You can post process VOI (the entire volume of interest) and scroll through acquisition planes via Volume Review. This allows you to review all of the frames within this volume set.

In Volume Review, start in Run/Stop so that every frame in the volume is displayed.

NOTE: *If you adjust the screen while in Volume Review, these changes ARE NOT reflected on the Static 3D volume.*

Static 3D Color

To view Static 3D Color,

1. Acquire the anatomy you want to view in B-Mode.

2. Activate Color Flow or PDI.

3. Activate 3D/4D. The Pre-3D displays. Select the desired Visualization.

NOTE: *4D cannot be selected from Pre-Mode with Color active.*

4. Press 'L' to render the image.

The color is rendered. You can adjust the Render Mode (default is Glass Body):

- **Gray**. Gray, no color.
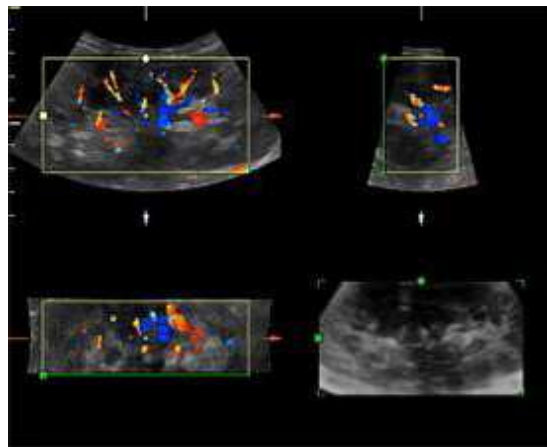
Figure 13-69.   3D Color - Gray

- **Inversion**. Inverts the grayscale.

Static 3D Color (continued)

- **Color**. Displays Color-Flow.

  Select the rendering method ([Rend Color1] (Surface only) or [Rend Color2]) and the mixing ratio.
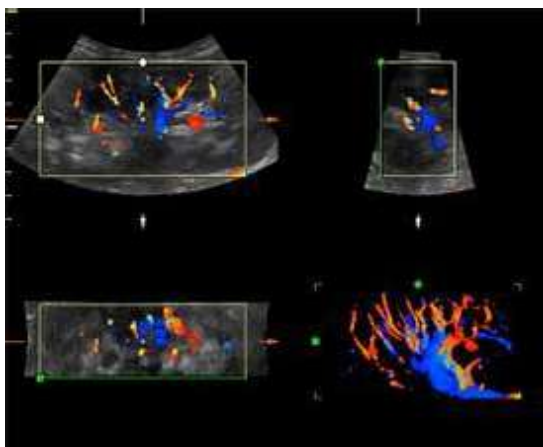
Figure 13-70.   3D Color - Color

- **Glass Body**. Displays both Color-Flow and B-Mode.

  Select the rendering method ([Rend Gray] or [Rend Color]) and the mixing ratio.
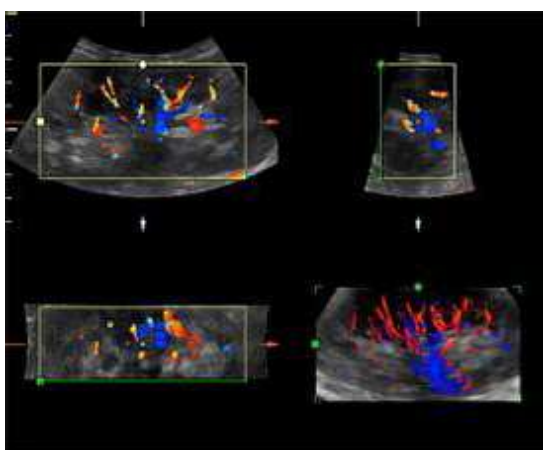
Figure 13-71.   3D Color - Glass Body

To hide the color on the sectional planes, select *Color Off* from the Touch Panel.

NOTE: *If you scan in Render mode and select Tile as Quad, you can hide the color with the Color Off Touch Panel key.*

Scalpel

Scalpel allows you to edit/cut sections of a 3D image. Scalpel is available only on a rendered image.

1. Press *Scalpel*.
2. Select the cut mode.
3. Use the **Trackball** and **Set** key to define the portion of the image to cut. Press **Set** to start, move the **Trackball** to define the region, then press **Set** again to cut the image. The portion is removed.

   To undo the last cut, select *Undo Last*.

   To undo all cuts in the current session, select *Undo All*.
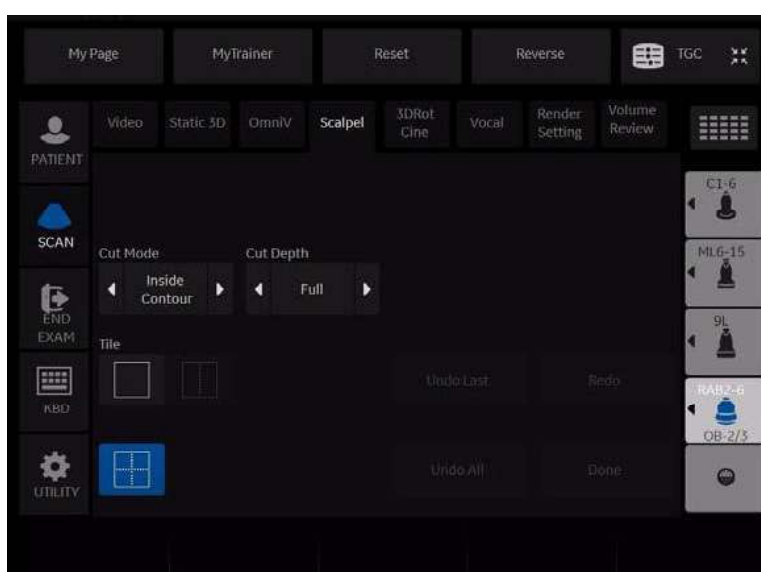
Figure 13-72.   Scalpel

Table 13-18:   Scalpel Parameters

Preset Parameter	Description
Cut Mode	Selections: Inside Contour, Outside Contour, Inside Box, Outside Box, Eraser Big, Eraser Small. **Inside Contour, Outside Contour** - Allows you to trace the portion of the image you want to cut. Trace Outside removes all portions of the image that fall outside your traced region. Trace Inside removes all portions of the image that fall inside your traced region. **Inside Box, Outside Box** - Displays a box you can use to define the portion of the image you want to cut. Outside Box removes all portions of the image that fall outside the box. Inside Box removes all portions of the image that fall inside the box. **Eraser Big, Eraser Small** - Provides a big and small eraser tool you can use to define the portion of the image to cut by hand. Available only if Depth is Full.

Table 13-18:   Scalpel Parameters (Continued)

Preset Parameter	Description
Cut Depth	Selections: Full, Define. **Full** -The entire depth of the selected region will be cut. **Define** - Allows you to define the depth to cut using the Depth control panel knob.
Undo Last	Undoes the last cut only.
Redo	Select to redo scalpel.
Undo All	Undoes all cuts since you entered Scalpel mode.
Done	Applies to User Defined Cut Depth when complete.

NOTE: *With the cut image displayed, if you attempt to switch to the Static 3D tab to edit the ROI, the following warning message appears: Scalpel changes will be lost. Do you want to continue? [Yes/No].*

3D Rotation CINE

3D Rotation CINE allows you to view the 3D image from various angles.

To activate rotation CINE in 3D:

1. Press **Freeze.**
2. Select the 3DRot Cine tab.
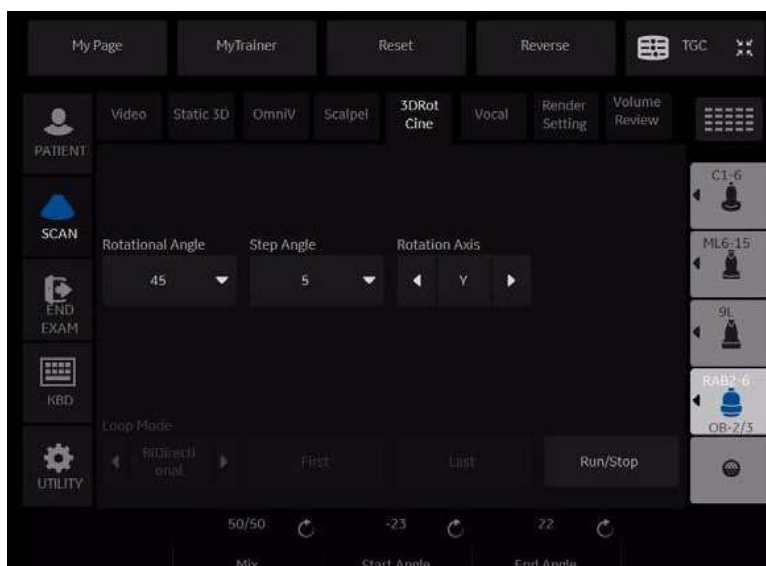
Figure 13-73.   3D Rotation Cine

Table 13-19:   3D Rotation Cine Parameters

Preset Parameter	Description
Rotational Angle	Sets the rotational angle of the 3D image over which the CINE loop is played. Typical values are 30, 45, 60, 90, 180 and 360 degrees.
Step Angle	Sets the step angle between individual frames in the CINE loop.
Rotation Axis	Sets the axis about which the CINE loop is calculated. Selections X and Y.
Loop Mode	Selections include: One Way, BiDirectional (two-way). **One Way** - plays one loop sequence forward. **BiDirectional** - plays the sequence forward and backward.
First	Displays the first volume in the CINE.
Last	Displays the last volume in the CINE.
Run/Stop	Starts and stops the CINE sequence.

Table 13-19:   3D Rotation Cine Parameters (Continued)

Preset Parameter	Description
Start Angle	Used to select the starting angle in the CINE loop range. The default Start Image is calculated from the rotational angle as: -1 X Rotational angle / 2 If you adjust the Start Image, the Rotational Angle is re-set to be the value of the adjusted Start Image.
End Angle	Used to select the ending angle in the CINE loop range. The default End Image is calculated from the rotational angle as: Rotational angle / 2 If you adjust the End Image, the Rotational Angle is re-set to be the value of the adjusted End Image.
Image by Image	Used to select an individual image in the CINE loop.

Volume CINE

The system constantly stores CINE images so you can play back and review those images. CINE is useful for focusing on images during the specific part of the heart cycle or to view short segments of a scan session.

To activate CINE in 4D:

1. Press **Freeze.**

2. Select the **VolCine** tab.
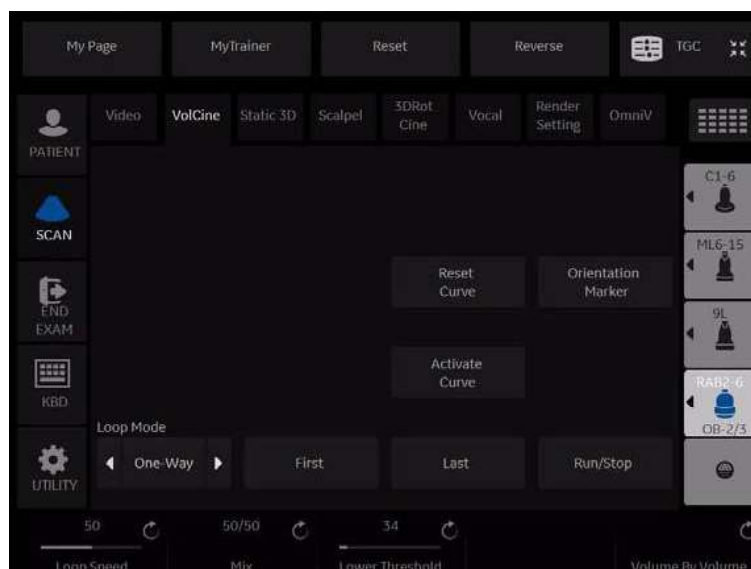
Figure 13-74.   4D Volume Cine

Table 13-20:   4D Cine Parameters

Preset Parameter	Description
Loop Mode	Selections include: One Way, BiDirectional (two-way). **One Way** - plays one loop sequence forward. **BiDirectional** - plays the sequence forward and backward.
First	Displays the first volume in the CINE loop.
Last	Displays the last volume in the CINE loop.
Run/Stop	Starts and stops the CINE loop.
Loop Speed	Adjusts the CINE loop speed.
Volume by Volume	Used to select an individual volume in the CINE loop.

Volume CINE (continued)

1. If you were in Render visualization mode when you entered
   4D CINE mode; press **L** to return to Pre-Mode.

   If you were in Sectional visualization mode when you
   entered 4D CINE mode; press **L** to return to Pre-Mode.

2. To re-start real-time 4D acquisition, press **Freeze**.

VCI Static

Introduction

VCI (Volume Contrast Imaging) allows you to sweep smaller slices of data with a higher volume rate. The resulting image shows an average, integrated gray value of the tissue contained within the ROI. VCI improves the contrast resolution and signal/ noise ratio. It also reduces image speckle. This may facilitate finding diffuse lesions in organs.

Touch Panel

The data is represented as in Static 3D - Sectional Planes. However, the three planes are VCI renderings (tissue information of a thick slice) computed from the 3D dataset.
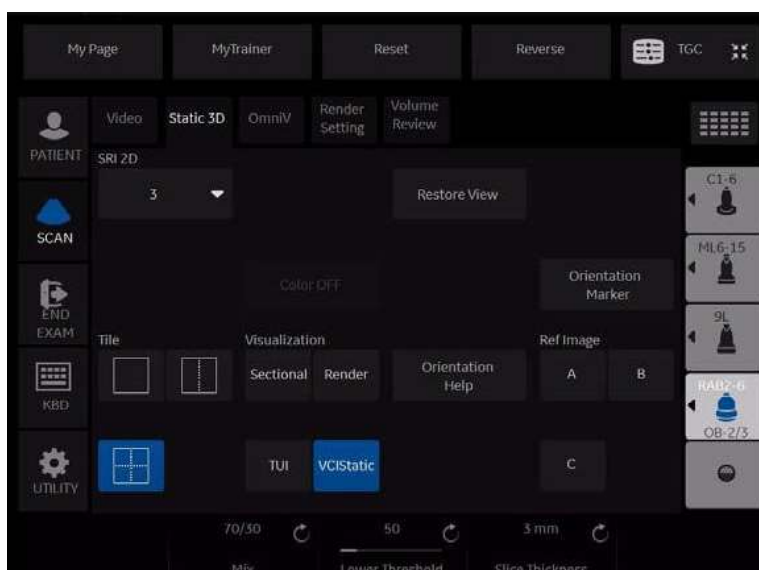
Figure 13-75.   3D (After Acquisition) Touch Panel VCI Static

Table 13-21:   VCI Static View

Preset Parameter	Description
Slice Thickness	Select the slice thickness

Tomographic Ultrasound Imaging (TUI)

Tomographic Ultrasound Imaging (TUI) is a visualization mode which presents data as parallel slices (planes) through the dataset. This method of visualization is consistent with CT and MRI. The distance between the different planes can be adjusted.

1. Select TUI as the Visualization mode.
2. Press 'L' to start acquisition.
3. If in 4D, press 'R' to end the acquisition. This step is not required in Static 3D.

   The reference image + the number of specified slices appears. The reference image always displays and indicates which slices you are currently viewing as solid lines.

Tomographic Ultrasound Imaging (TUI) (continued)
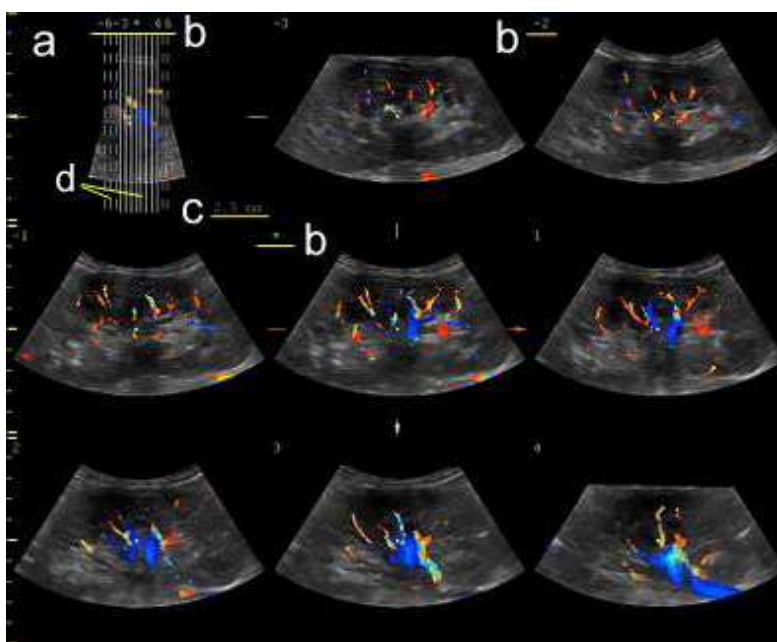
Figure 13-76.   TUI 3x3 Example

    a.   The TUI reference image that shows the slice position. This image is orthogonal to the reference image.

    b.   The number and green asterisk shows the position of each slice. A green asterisk indicates the center image (A, B or C-plane).

    c.   Slice distance displays when the slices are in certain intervals.

    d.   A solid line indicates the slice appears on the monitor.

        A dotted line indicates the slice did not appear on the monitor.

NOTE: *TUI with Color is only available with Static 3D, not with 4D.*

Tomographic Ultrasound Imaging (TUI) (continued)

4. Adjust the number of slices and slice distance.

    You can adjust the number of slices by using the *Slices* rotary. You can adjust the distance between the slices using the *Slice Distance* rotary. Max value is 40mm.
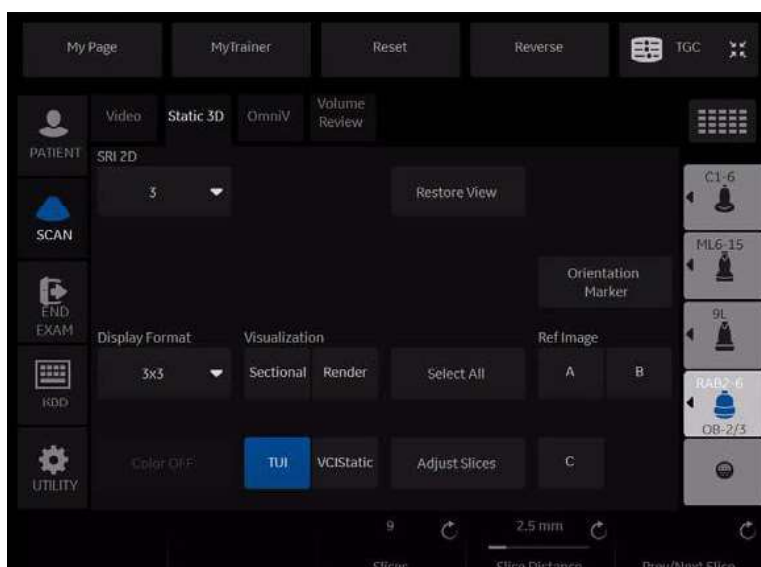
Figure 13-77.   TUI Touch Panel

- Move forward/backward through the slices via *Prev./ Next Slice*.

- Change the center image via *Ref. Image* if needed (Reference image A, B or C).

- Select *Display Format* from 1X1, 1X2, 2X2 and 3X3.

- For Orientation Marker, please refer to 'Easy 3D' on *page 5-143* .

- The following features are supported in TUI: Zoom, Rotation (X/Y/Z), Trackball (Move the position), Translation and Gain.

- To hide the color, select *Color Off* from the Touch Panel.

Tomographic Ultrasound Imaging (TUI) (continued)

You can adjust each slice position with *Adjust Slices*.

1.   Press *Adjust Slices* on the Touch Panel.

2.   The pointer displays. Select a slice by using the **Trackball**.
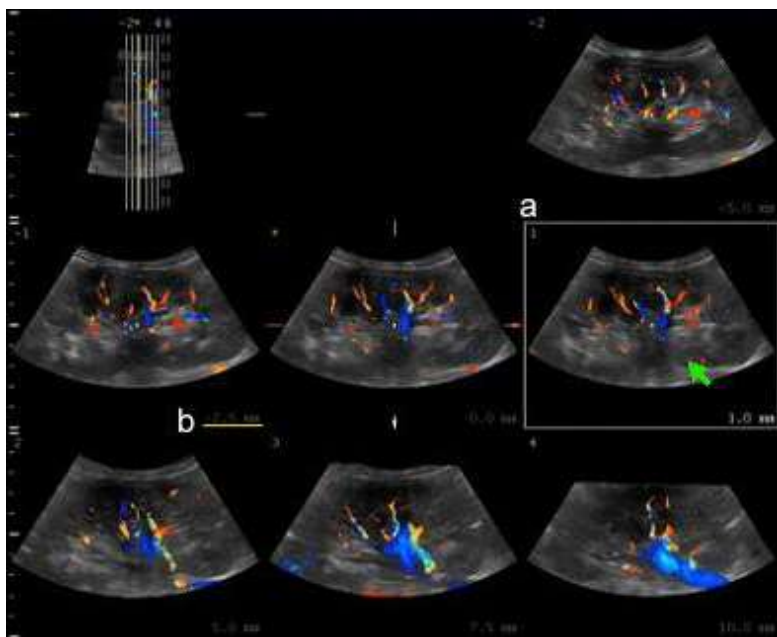
Figure 13-78.   Adjust Slice screen (example)

a.   Selected slice displays with yellow border

b.   Distance from the center image

•   Adjust the slice distance from the reference image by using *Slice Position*. Slice Position only affects the selected slice.

NOTE: *If you place the pointer on the reference image and rotate **Slice Position**, the position of the reference image and all slices are moved.*

•   Adjust the number of right and left slices off the center image by using *Left Slices* or *Right Slices*.

3.   After the adjustment is finished, press **Set**. The slice is marked with an "X". To print this slice, press a print key.

VOCAL

You use VOCAL (Virtual Organ Computer-aided Analysis) to visualize and calculate the volume of anatomical structures, such as a tumor lesion, cysts, and the prostate. VOCAL is available after a Static 3D or Real-Time 4D acquisition.

1. Press *Vocal*. Specify the volume calculation method (*Manual*, *Contour Detect*, *SemiAuto Detect*, or *Sphere*). Select the reference image you want to use to perform the trace by selecting *Ref Image* A, B, or C. Press *Start*.

2. Trace the anatomy using the **Trackball**. Press **Set** to start and end the trace. You must go across the dotted line for the trace to take effect (it turns yellow). The trace is performed on each image slice, separated by the rotational step angle. Rotate the *Rot. Ref* dial until you have completed the total of the required rotations (for example, if you've selected 30 degrees, you need to complete six traces if you've selected Manual). After you've completed the trace target, the *Calc Volume* button is active for you to press. The calculated VOCAL image appears in the lower, right-hand corner of the display. You are now in the edit state.

NOTE: *Trace not used for Sphere. For Sphere, set the Poles.*

3. Edit as necessary. You can apply a shell, adjust its thickness, navigate through the reference angles, or restart the VOCAL.

VOCAL (continued)
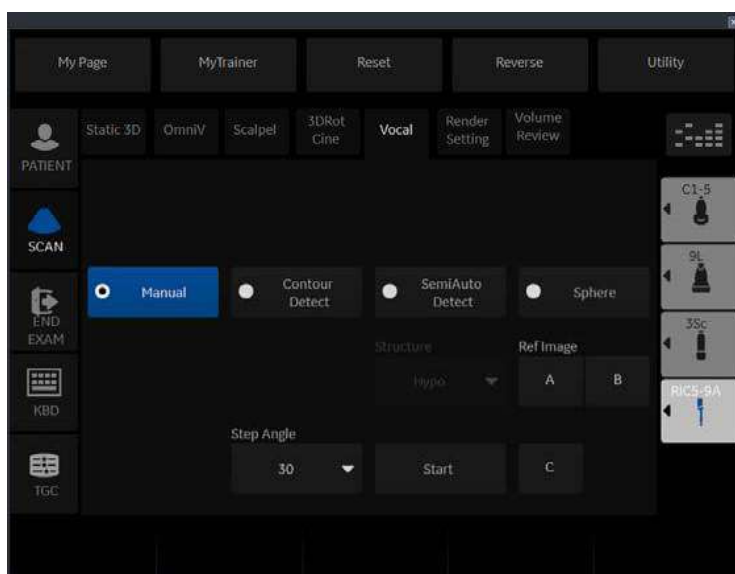
Figure 13-79.   VOCAL Setup

Table 13-22:   VOCAL Parameters on Setup Touch Panel

Parameter	Description
Manual	When you select the Manual method, you need to perform a manual trace on each of the rotation angles.
Contour Detect	When you select the Contour Detect method, you need to perform a manual trace on each of the rotation angles.
SemiAuto Detect	When you select the Semi Automatic Detect method, you need to perform a trace on only two rotation angles. The system applies an algorithm to define the traces.
Structure	Structure is only available with the SemiAuto Detect method. Select Hypo, Cystic, or Hyper/Iso.
Sphere	Calculates the volume based on the pole settings.
Pole 1	Adjust the upper contour point (green arrow) of the structure.
Pole 2	Adjust the lower contour point (green arrow) of the structure.
Rotational Step Angle	Specify the angular spacing between contour traces. Typical values are 6, 9, 15, and 30 degrees. The number of planes varies by this formula: 180 degrees / selected rotational step angle.
Ref Image	Use this to select the image you want to use to perform the trace.
Start	Press Start when you're ready to perform the trace.
Rot.Ref #/# Back/Next	Select Next/Back to move to the next image for contour definition in the rotation step.

VOCAL (continued)
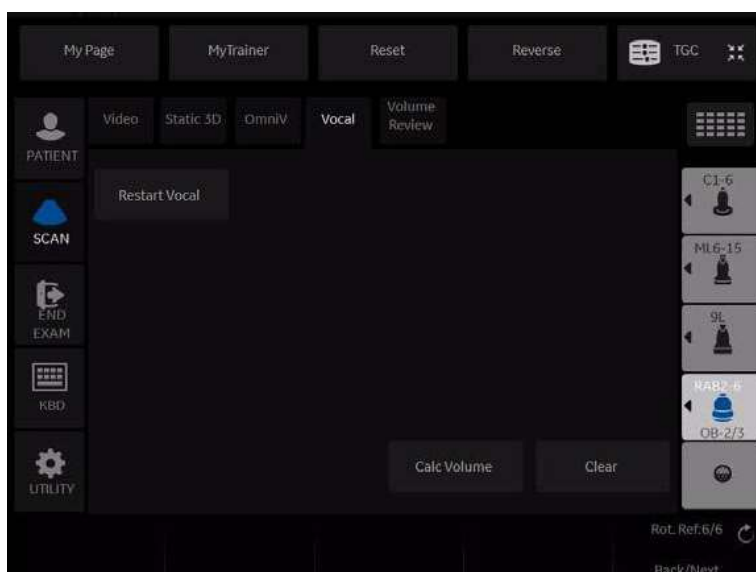
Figure 13-80.   VOCAL Calculate Volume Touch Panel

Table 13-23:   VOCAL Calculate Volume Touch Panel

Parameter	Description
Calc Volume	Press Calc Volume to initiate the VOCAL image calculation.
Clear	Press Clear to remove the trace from the image.
Restart Vocal	Press Restart Vocal to return to the initial VOCAL state.

VOCAL (continued)
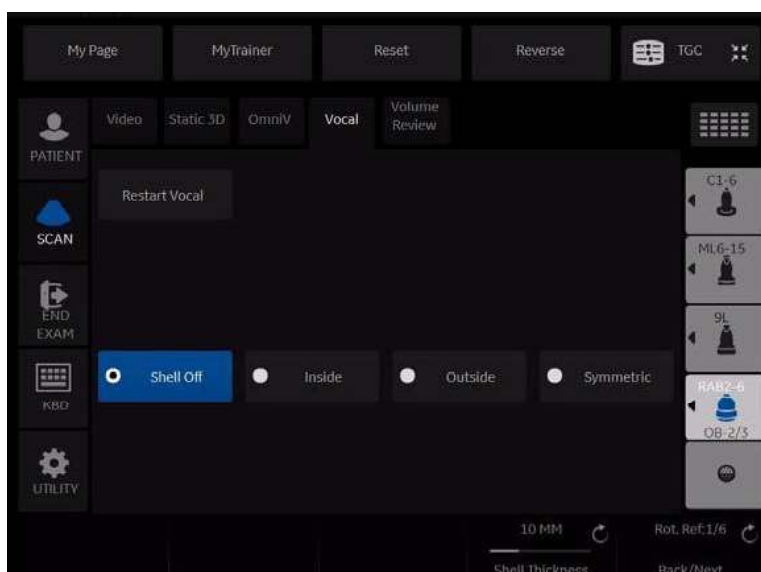
Figure 13-81.   VOCAL Edit Touch Panel

The Shell Modes allows you to construct a shell or contour "around" the structure of interest, which enables you to distinguish between the contour of the targeted structure and the contours the inside and outside of the structure.

Table 13-24:   VOCAL Parameters on Edit Touch Panel

Parameter	Description
Shell Off	Select Shell Off if you do not want a shell around the VOCAL image.
Inside	Select Inside if you want a shell inside the volume.
Outside	Select Outside if you want a shell outside the volume.
Symmetric	Select Symmetric if you want half of the shell thickness inside and half outside the volume's perimeter.
Shell Thickness	Adjust to vary the thickness of the shell.

SonoRenderlive

SonoRenderlive helps to find the render start position to easily separate solid tissue in front of the render object.

The SonoRenderlive algorithm "looks" for the transition from solid to liquid tissue and positions the "Render Start" into the liquid area visualized by the green render start line. The render start line is not a staright line but a "free" trace for optimal adaptation to the render object.

Figure 13-82.　Screen Display Off
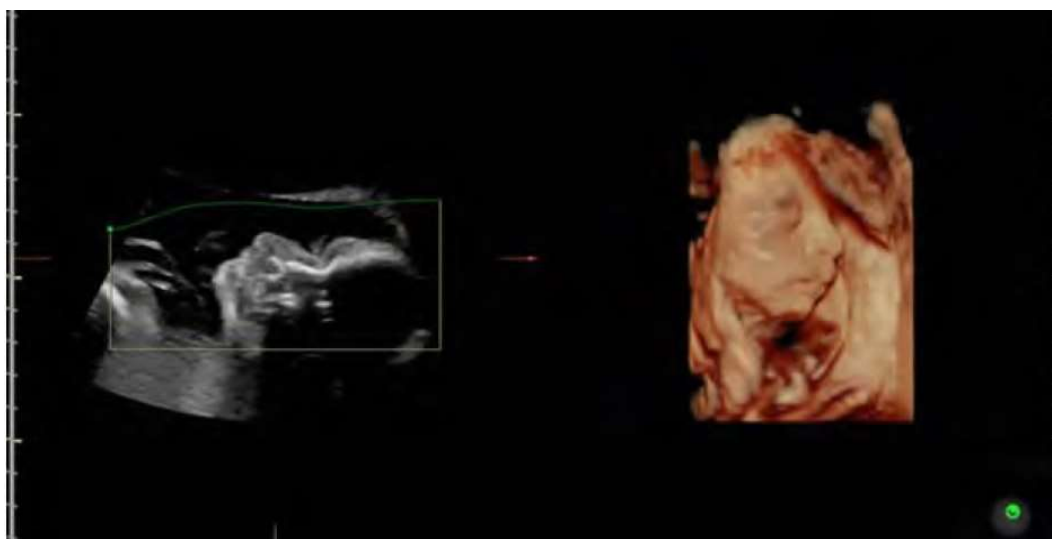
Figure 13-83.　Screen Display On

Using SonoRenderlive

1. Start the Render Visualization Mode.

2. Press the **SonoRenderlive** Rotary control.

3. To adjust the distance between the render start position and the render object, rotate the **Sensitivity** control below the touch panel. A high value indicates a smaller distance.

NOTE: *If SonoRenderlive is not used, the Render Start line can also be modified manually. Press the trackball button Curve to activate Curved Render Start and move the trackball to modify the line.*

SonoAVC^{TM}

Overview

SonoAVC helps detect low echogenic objects (eg. cysts) in an organ (eg. Kidney) and analyzes their shape and volume. From the calculated volume of the object, an average diameter is calculated. All calculated objects are listed according to size. The calculation results are displayed in the top left corner, with the object numbers color-coded to denote the object on the image. If the mouse cursor hovers over a specific item on the list, the respective object in the image is highlighted (and vice versa). The color of the object is bound to its position on the list.
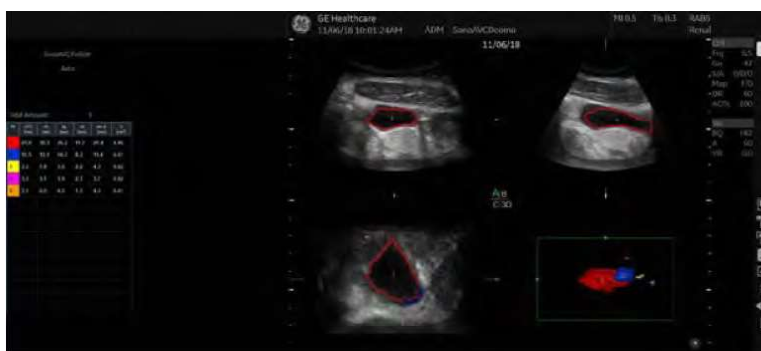
Figure 13-84.   SonoAVC Display Screen

- d(V): Diameter, calculated as if the object were a perfect sphere
- dx: Length of x-axis of the best fitting ellipsoid
- dy: Length of y-axis of the best fitting ellipsoid
- dz: Length of z-axis of the best fitting ellipsoid
- mean d: Average value of the x-axis, y-axis and z-axis
- V: Volume of the object

Overview (continued)
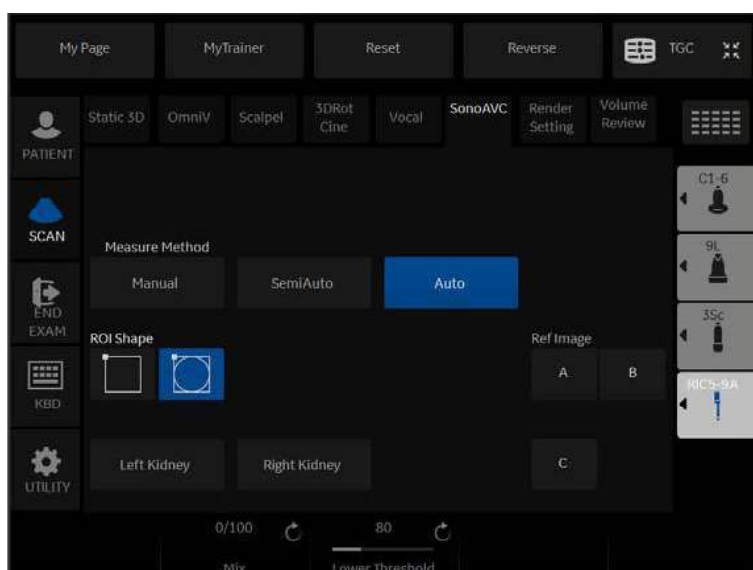
Figure 13-85.   SonoAVC Menu

Table 13-25:   Menu

Parameter	Description
Measure Method	• Manual: Each object has to be selected and measured manually • SemiAuto: Each object is selected manually with the system cursor but traced / measured automatically • Auto: Objects are detected automatically (Default)
ROI Shape	• Rounded: The box has the shape of a rectangle • Angular: The box has an elliptic shape with rounded corners (Default)
Ref Image	Select the reference image to which all image dependent functions like parallel shifts, rotations, etc. are applied.
Start SonoAVC	With Abd application: • Left Kidney • Right Kidney With Gyn application: • Left Ovary • Right Ovary

SonoAVC Main Menu
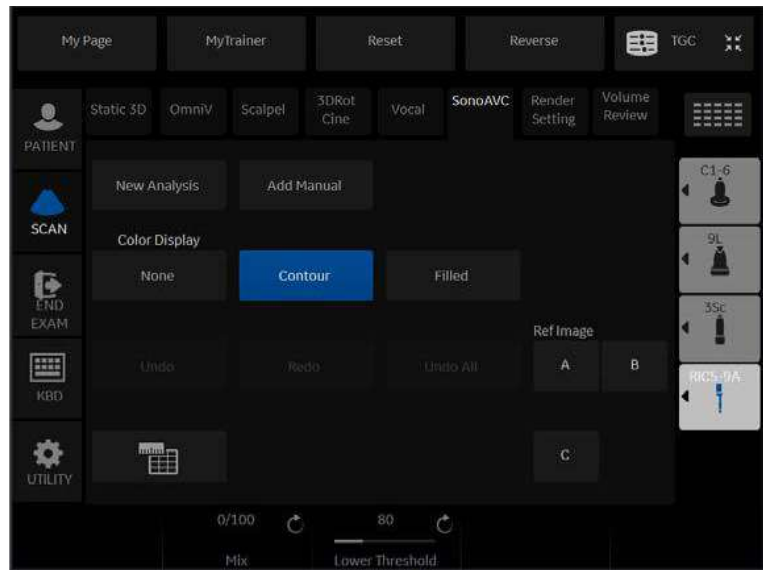
Figure 13-86.   SonoAVC main Menu

Figure 13-87.   SonoAVC Trackball Menu

SonoAVC Main Menu (continued)

Table 13-26:

Parameter	Description
New Analysis	Starts a new analysis.
Add Manual	Only available when auto or semi-auto is selected. Objects not automatically detected can be added manually, or wrongly detected objects can be removed.
Save	Add the result to database.
Worksheet	Open the worksheet.
Cut/Merge	• Undo All: Undo all edits • Redo: Redo the last edit • Undo: Undo the last edit
Display	• None: No visible segmentation • Contour: Segmentation are shown with a contour-line • Filled: Segmentation are filled with color
Ref Image	Select the reference image to which all image dependent functions like parallel shifts, rotations, etc. are applied.
Add/Rem.	Add detected objects manually.
Cut	Cut detected objects.
Merge	Combine detected objects.

Using SonoAVC

Manual

1. Acquire 3D volume or reload previously acquired volume.
2. Select *SonoAVC* tab.
3. Switch sect. plane A to full size if not present.
4. Adjust the sect. plane A with x, y, z rotation, parallel shift and zoom to achieve the correct measuring plane.
5. Select *SonoAVC*.
6. Select *Manual* and adjust the ROI shape, if desired.
7. Start the measurement by selecting either Left Ovary or Right Ovary.
8. The green measurement cross appears in the middle of the image.
9. Perform measurements:
   a. Position the start-point of the long diameter with the Trackball and press **Set**.
   b. Position end-point of the long diameter with the Trackball and press **Set**.
   c. Position the start-point of the short diameter with the Trackball and press **Set**.
   d. Position end-point of the short diameter with the Trackball and press **Set**.
   e. To start the next measurement, move the Trackball and repeat step 9.
10. Select Save to save the measurements to the current exam.

Using SonoAVC (continued)

Semi Auto

1. Acquire 3D volume or reload previously acquired volume.
2. Select *SonoAVC.*
3. Select *SemiAuto* and adjust the ROI shape, if desired.
4. Start the measurement by selecting either Left Ovary or Right Ovary.
5. Measure all desired objects on the current plane:
   a. Position the system cursor over the object to be measured and press **Add/Rem**.
   b. Click the cursor by pressing **Set** on the object.

      The selected trace with corresponding color and number is displayed.
   c. Position the system cursor over the next object to be measured.
   d. If the measurement is not finished, repeat step 5.
6. Select *Save* to save the measurements to the current exam.

Auto

1. Acquire 3D volume or reload previously acquired volume.
2. Select *SonoAVC*.
3. Select *Auto* and adjust the ROI shape, if desired.
4. Start the measurement by selecting either Left Ovary or Right Ovary.

   The rendered objects and the result list are displayed on the screen.
5. Select *Save* to save the measurements to the current exam.

Using SonoAVC (continued)

Add Manual

1. Press **Add Manual** button.

2. The measurement cross appears in the middle of the sect. plane A.

3. Perform measurements:

    a. Position the start-point of the long diameter with the Trackball and press **Set**.

    b. Position end-point of the long diameter with the Trackball and press **Set**.

    c. Position the start-point of the short diameter with the Trackball and press **Set**.

    d. Position end-point of the short diameter with the Trackball and press **Set**.

       The second measurement displays.

    e. To start the next measurement move the Trackball and repeat step 3.

OmniView

OmniView provides an arbitrary cross-sectional plane, as opposed to a strict coronal plane. In VCI OmniView, the rendering box is very thin so you can visualize the tissue information of a thick slice. The resulting image shows the average (integrated) gray value of the tissue contained within the narrow box.

VCI OmniView improves the contrast resolution and the signal/noise ratio and therefore facilitates the detection of diffuse lesions in organs. The result is an image with no speckle pattern and a highly improved tissue contrast.

Possible Acquisition Modes: (Sectional Planes Visualization only)

- 4D Real Time
- 3D Static
- STIC

Workflow

1. Press **3D/4D**.
2. Select *VCI OmniView*.
3. Adjust Volume Angle and B Quality as necessary.
4. Press the right **Set** key to start acquisition.

   The volume acquisition starts and the acquired images are displayed.
5. The cross cursor displays on the reference image.
6. Select the appropriate trace mode to display the sectional plane.

   • Line: Select the sectional image by using straight line.

   • Curve: Select the sectional image by using curved line.

   Move the cursor to the start point and press **Set**. Move the cursor to the end point and press **Set**. Use the **Trackball** to make a curved line and press **Set**.

   • Trace: Select the sectional image by using any arbitrary curve.

   • Polyline: Select the sectional image by using a continuous line composed of one or more line segments. You can create a polyline by specifying the endpoints of each segment by press **Set**.

OmniView Main Menu
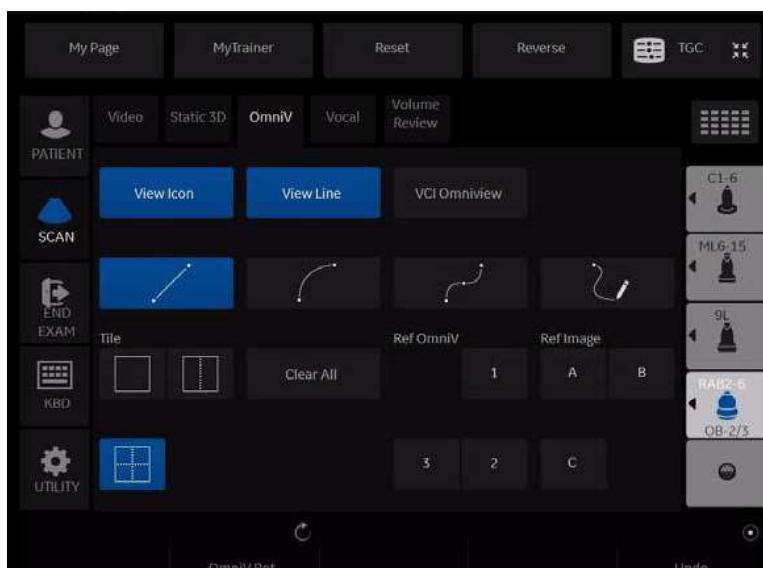
Figure 13-88.   OmniView Menu

Table 13-27:   OmniView Parameters on Edit Touch Panel

Parameter	Description
View Icon	Show or hide the OmniView Icon.
View Line	Show or hide the OmniView Line.
VCI OmniView	Switch to VCI Omniview.
Trace Mode	Four tracking line methods are available.
Tile	Select a display format (Singul, Dual, Quad)
Clear All	All existing lines are deleted and a new line entry is started.
Ref. OmniV	To activate OmniView Ref. Line view.
Ref. Image	Select the Reference image.
OmniV. Rot	Rotates the OmniView line.
Undo	To re-adjust the traced line.

OmniView Control

Figure 13-89.   OmniView Control

Table 13-28:   OmniView Parameters on Line Edit Mode: New

Parameter	Description
Undo	Restart the line.
Pre mode	Go back to Pre-mode.

VCI OmniView

With help of OmniView sectional planes derived from an entered trace can be visualized and so special coronal planes are possible. The trace can be entered in the Vol. Pre image or if a volume data set is present on image A, B or C. The trace can be a straight line, a curved line or any freeform trace. Together with the VCI function images with less speckle pattern and a highly improved tissue contrast can be archived.
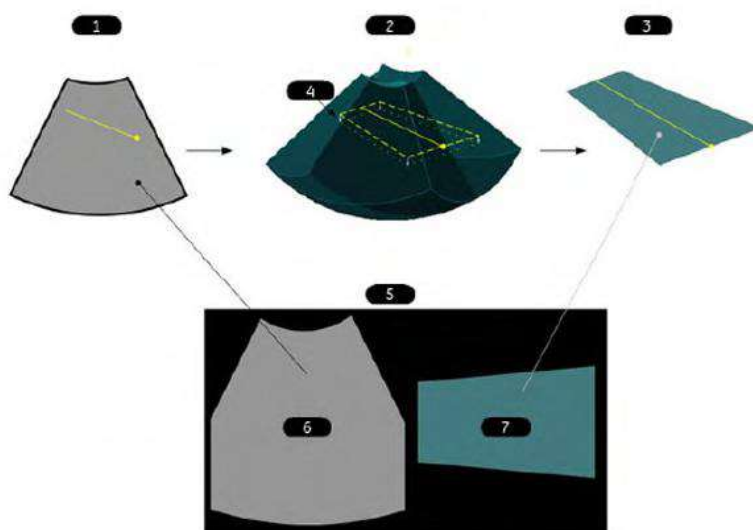
Figure 13-90.   VCI OmniView

1. OmniView pre mode:
   Entered OmniView line in center position of Vol. sweep
2. Acquired Volume block:
   dashed line: plane position orthogonal to the center image dotted line:
   VCI (slice) thickness
3. Calculated result:
   OmniView image including VCI rendering if on
4. Render direction
5. Screen display
6. Ref. Image
7. OmniView image

STIC (Spatio-Temporal Image Correlation)

> *NOTE:* *STIC is an option.*

Overview

With this acquisition method the fetal heart or vascularity can be visualized. It is not a Real Time 4D technique, but a post processed 3D acquisition.

STIC is designed for beating (fetal heart) as well as blood perfused organs. Only STIC can synchronize structures that have a pulsation in Doppler mode, but no visible pulsation in B-mode.

Data is acquired for a predefined period of time. The acquired images are post processed to calculate a Volume Cine sequence representing one complete heart cycle.

In order to achieve a good result, try to adjust the size of the volume box and the sweep angle to be as small as possible. The longer the acquisition time, the better the spatial resolution will be. The user must be sure that there is minimal movement of the participating persons (e.g., mother and fetus), and that the probe is held absolutely still throughout the acquisition period. Movement will cause a failure of the acquisition. If the user (trained operator) clearly recognizes a disturbance during the acquisition period, the acquisition has to be canceled.

A good STIC data set shows a regular and synchronous beating of the fetal heart or of an artery. Please make sure that the borders of the fetal heart or the artery are smooth and there are no sudden discontinuities. Always adopt a critical attitude to images created in STIC mode.

If the expected frame rate is too low (10Hz) for a good STIC quality, a warning is displayed in STIC mode.

After the STIC acquisition is finished the calculation process starts to calculate the volume cine sequence. If a result is detected by the system, the Volume cine sequence is shown in run mode and the STIC accept menu appears. As soon as the result is accepted the system releases the volume cine mode. If the result is not accepted but canceled, the system switches back to STICpre mode.

Overview (continued)

One or more of the following artefacts in the data set indicate a disturbance during acquisition:

- Sudden discontinuities in the reference image B: These are due to the motion of the mother, the fetus or fetal arrhythmia during acquisition.

- Sudden discontinuities in the color display: Motion of the mother, the fetus or fetal arrhythmia affects the color flow in the same way it affects the gray image.

- Fetal heart rate far too low or far too high: After acquisition the estimated fetal heart rate is displayed. If the value does not correspond to the estimations based on other diagnostic methods at all, the acquisition failed and has to be repeated.

- Asynchronous movement in different parts of the image: e.g., the left part of the image is contracting and the right part is expanding at the same time.

- The color does not fit the structures displayed in gray mode: The color is displayed above or below the actual vessel.

- Color "moves" through the image in a certain direction: This artefact is caused by a failure in detecting the heart rate due to low acquisition frame rate. Use higher acquisition frame rate for better result.

NOTE: *In all of the above cases the data set has to be discarded and the acquisition has to be repeated.*

When is it not allowed to perform the STIC fetal cardio acquisition?

- Severe fetal arrhythmia

Following STIC acquisition modes are available:

- STIC
- STIC CFM
- STIC PDI

Performing STIC Scan

NOTE: *STIC can only use in OB application.*

NOTE: *Supported probe: RAB2-6-D and RIC5-9-RS.*

1. Select a 4D probe from the probe indicator.
2. After obtaining a feasible 2D image of the fetal heart or an artery, press 3D/4D to activate the Volume mode.
3. Select *STIC*.
4. Set the Volume of Interest (VOI) to be rendered. Use the Trackball to move and resize the VOI.

NOTE: *Press top Trackball key to switch Pos and Size.*

5. Adjust the *Acquisition Time*.
6. Set the volume sweep angle by using *Volume Angle*.

NOTE: *In order to acquire a good result, try to adjust the ROI and the sweep angle to be as small as possible. The longer the acquisition time, the better the spatial resolution will be.*

7. Hold the probe still and ask the patient not to move.
8. Press the right **Set** key to start the acquisition.

NOTE: *When the STIC acquisition begins, the Stop Acquisition button appears. If the user recognizes a movement of the probe, fetus or the patient during the scan, press Stop acquisition to cancel the acquisition.*

9. Hold the probe steady until the system stops automatically. Estimated Fetal Heart Rate and Accept/Cancel buttons appears on the Touch Panel.
10. Press *Accept* if the fetal heart rate displayed on the Touch Panel is accepted. STIC image is displayed.

   If the result is not accepted, select *Cancel*. The system switches back to STIC-pre mode.

NOTE: *If the user (trained operator) clearly recognizes a disturbance during the acquisition period, the acquisition has to be canceled.*

Screen Layout

The yellow caution icon and the calculated heart rate are displayed as well.

NOTE: *Displayed Heart Rate indicates the heart rate [B/min] calculated from the delta time length per beat. A yellow caution icon indicates that the displayed heart rate is only an estimation. Do not diagnose based on this value.*
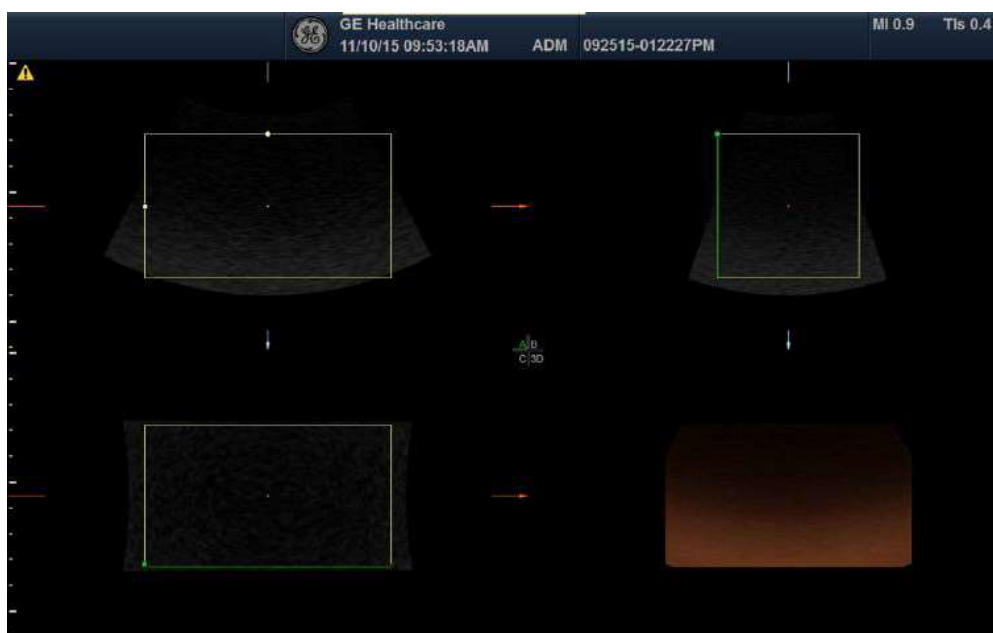
Figure 13-91.   Screen Layout

STIC Controls

Touch Panel/All hard key and trackball controls are the same as in 4D/Static 3D mode. Therefore only the STIC relevant controls are described here:

Table 13-29:   STIC Pre-mode Touch Panel

Relevant controls	Description
Acq. Time	Only available in STIC. Acquisition time can be set.
Volume Angle	Adjusts the volume angle.

HDLive

NOTE: *HDlive is an option*

NOTE: *The virtual light source of HDlive mode can be positioned by keeping the small center trackball button pressed while moving the trackball.*

NOTE: *HDlive rendering is just available if Static 3D is active.*

NOTE: *The Render Mode for HDLive is available when HDLive is activated.*

Render Parameter

HDlive Texture Activates HDlive Texture.

HDlive Smooth Activates HDlive Smooth.

HDLive Activation

1. Press 3D/4D.
2. Select [Static3D] button and then HDLive preset
3. Select Render in Visualization.
4. Start Static3D acquisition.
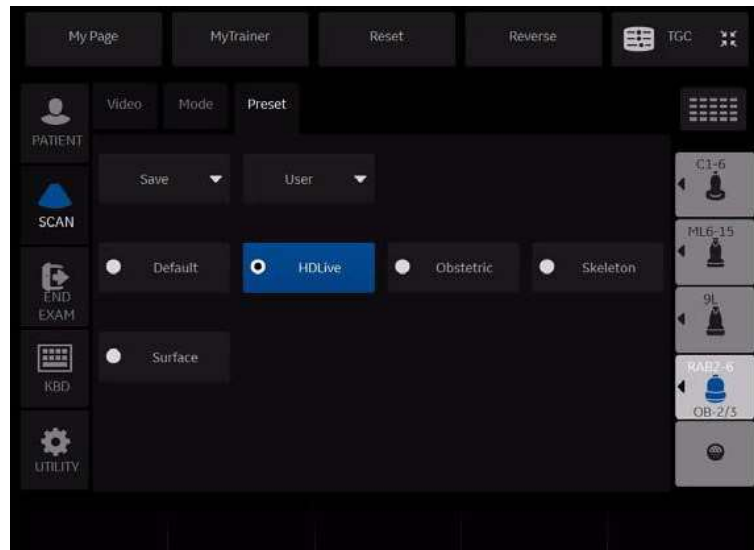
Figure 13-92.   HDLive Preset

Light Control

1. Select Light with Top-Left setkey
2. Move the cursor with trackball the direction of light

Figure 13-93.   HDLive Light Control

Figure 13-94.   HDLive Light Control

Compare Assistant

Overview

Compare Assistant allows you to perform serial scans on a patient when you can compare the images from a patient's previous exam(s) to the patient's current exam.

NOTE: *In order to reload imaging parameters from a previous exam, the image must have been stored as raw data.*

NOTE: *Side-by-side scanning comparison is present whether or not you are able to import the scanning parameters.*

In Comparison Mode the system can automatically reload scanning parameters from a previous exam performed on a LOGIQ P8/P9/P10 archived as raw data and allow for side-by-side scanning for image comparison. This allows you to use consistent scanning parameters from exam to exam on the same patient and may assist in assessing the progress of the patient.

Compare Assistant is available in B-Mode, Harmonics, Contrast, and in Color Flow and Power Doppler Imaging Modes.

In B-Mode the following parameters can be transferred from the Compared Image to the Active B-Mode Image: Gain, Depth, Frequency, CrossXBeam, Virtual Convex (linear probes), SRI, Frame Averaging, Map, Dynamic Range, Acoustic Output, Harmonic state, Focal Zone Number and Position, Width, and Line Density.

In Color Flow/PDI Mode the following parameters can be transferred from the Compared Image to the Active Color Flow/ PDI Mode image: Gain, ROI Size/Position, Frequency, Frame Averaging, Packet Size, Flow Model, Scale (PRF), Wall Filter, Spatial Filter, Acoustic Output, Invert, Threshold, Sample Volume, Color Map, Virtual Convex (linear probes), and Line Density.

Overview (continued)

Image parameter copy is now supported for the following additional modes: Contrast (supports depth, focal zone position, acoustic output, and frequency), Elasto (supports ROI size, ROI position, frequency, and scale), B-Flow (supports depth, frequency, focal zones, and sensitivity), and B-Flow Color (supports ROI Size, ROI Position, frequency, and scale)

Annotations and Body Patterns can also be transferred from a patient's previous exam to the patient's current active exam.

Up to four (4) exams, three (3) other exams and the current active exam, can be compared. Each exam is displayed on the bottom of the display, with Tabs indicating each exam. Tabs are shown in chronological order with the most recent exam displayed on the left.

Compare Assistant is not supported with PW, CW, M-Mode, V-Nav, 3D/4D, Quantitative Analysis, Stress Echo, or LOGIQView.

Only measurements taken during the active exam are transferred to the current exam's Worksheet; previous exam measurement information is not included on active worksheets.

In order to utilize the Compare Assistant tool, images should have RawDICOM data. The RawDICOM data is saved locally when available. Some scanning modes do not provide raw data. If the raw data associated with the comparison image cannot be displayed in dual image format, the DICOM image data is used to display the image. RawDICOM data is typically removed when images are sent to PACS; therefore, images that are loaded using Query/Retrieve will likely be standard DICOM only.

NOTE: *Images from some other 'unsupported' modes (PW Mode, CW Mode, and M-Mode) can be recalled in Compare Assistant, but the tool will not attempt to copy over imaging parameters unless it is one of the types listed above (it will still attempt annotation copy). Imaging parameter copy will also not be attempted unless the current probe is the same as the probe used to capture the original image and RawDICOM data for the original image is available.*

Workflow example

> *NOTE:* *If you use DICOM images for comparison, check "Compare" checkbox of the DICOM Image folder and press Compare in the Image History page.*

1. Place the cursor on the Compare Assistant icon and press Set to activate Compare Assistant.

2. Place the cursor on the date tab of the desired comparison exam and press **Set**.

3. Place the cursor on the desired comparison image and press Set.

4. Start scan and freeze the image at the same position to make a comparison.

   Use Copy Setting Icon as necessary. Comparison Image parameters transfer to the Active Image based on your preset (automatic or manual).

5. Place the cursor on the Compare Assistant icon and press Set to deactivate Compare Assistant.
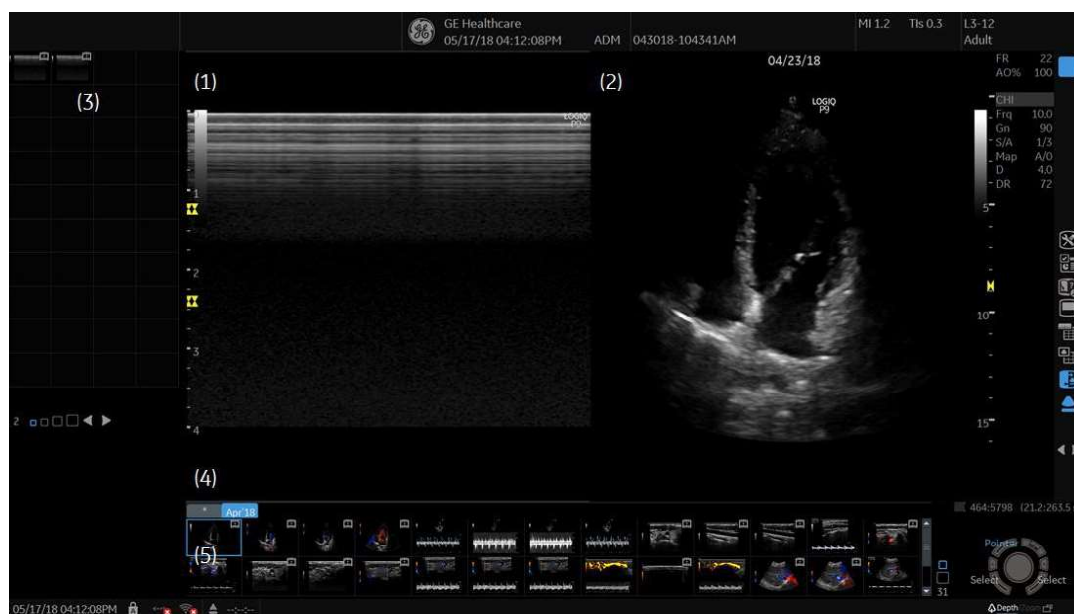
Figure 13-95.   Compare Assistant Screen (example)

1. Active Image
2. Comparison Image
3. Active Exam clipboard
4. Date tab of comparison exam
5. Comparison exam clipboard

Setting Up Compare Assistant

Compare Assistant allows you to set the following parameters:

- Side to place the compared image (left/right)
- Date settings for the compared image
- Imaging and Annotation parameters to be copied from the patient's Compared to the Current image
- Clipboard, Active Image, and Image History Label Layout and Color

You can set these parameters on the System Imaging page via Utility--> System--> System Imaging.
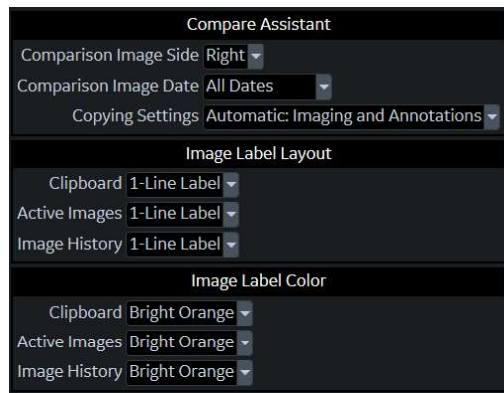
Figure 13-96.   Setting Up Compare Assistant Parameters

Table 13-30:   Compare Assistant Parameters

Parameter	Settings
Comparison Image Side	• Left • Right (Default)
Comparison Image Date	• All Dates (Default): The date is always displayed on the comparison image. • Different Date: Date only displayed when the date of the comparison image is different than the active exam date. • None: No comparison image date is displayed.

Table 13-30:   Compare Assistant Parameters

Parameter	Settings
Copying Settings	You can set the default Compare settings on the System Imaging Utility page or you can select the Compare setting via the On-screen controls. Comparison Image parameters transfer to the Active Image based on your preset (automatic or manual). **Automatic Settings** are copied from the Comparison Image to the current image as soon as the comparison image is loaded. • **Automatic: Imaging & Annotations** (Default): Imaging Parameters, Annotations, and Body Patterns copied • **Automatic: Imaging Only:** Only Imaging Parameters copied • **Automatic: Annotation Only:** Only Annotations and Body Patterns copied **Manual Settings** are copied from the Comparison Image to the current image when you manually select the control. • **Manual: Imaging & Annotations:** (Default) Imaging parameters, Annotations, and Body Patterns copied • **Manual: Imaging Only:** Only Imaging Parameters copied • **Manual: Annotations Only:** Only Annotations and Body Patterns copied **Off**: No parameters copied.
Note: Copy settings are restored to the default whenever Compare Assistant is turned on and the active exam or current patient has changed since the last time it was on.	
Image Label Layout: Clipboard Active Images Image History	• No Label • 1-Line Label (Default) • 2-Line Label
Image Label Color: Clipboard Active Images Image History	• Bright/Soft White • Bright/Soft Yellow • Bright/Soft Red • Bright/Soft Orange • Bright/Soft Blue • Bright/Soft Purple

To set Compare Assistant print parameters, select Utility--> Connectivity--> Button--> Advanced. You can set the system to print the Comparison image only, to store the New Image only; or to store both the Comparison and New Image.

Compare Assistant Controls

The following controls can be used while in Compare Assistant:

Table 13-31:   Compare Assistant Controls

Control	Description
	1. Image Display Area Icon 2. Worksheet 3. Active Image Screen 4. Compare Assistant On/Off. Select the Compare Assistant Icon to activate Compare Assistant. 5. Copying Settings 6. Save As Menu 7. Next/Previous Image, or Press [Ctrl]+[Next Image Arrow] to start a Slide Show.
Keyboard Arrow Keys	You can also use the Arrow Keys on the Keyboard to move to the next/ previous clipboard image.
Operator Panel L/R Keys	If comparison mode is on and the single image display is active, to enter dual comparison display press the L (Left) or R (Right) key. If dual comparison display is on and the dual comparison display is active, to enter single image display, press the L (Left) or R (Right) key.
Freeze Key	To deactivate Comparison Mode, select the comparison image side while in Dual Comparison Display and press Freeze.
Print Key	When you store an image while in Dual Comparison Display, the system automatically switches to the active exam side prior to storing the image.

Compare Assistant Controls (continued)

Table 13-32:   Compare Assistant icon and Copy Setting icon

	Compare Assistant On. Copy to Right.		Compare Assistant On. Copy to Left.
	Off		Off
	Automatic: Imaging and Annotations		Automatic: Imaging Only
	Automatic: Annotation Only		Manual: Imaging & Annotations
	Manual: Imaging Only		Manual: Annotations Only
	Off. No parameters copied.		Disabled.

Table 13-33:   Compare Assistant icon and Copy Setting icon

	Compare Assistant On. Copy to Right.		Compare Assistant On. Copy to Left.
	Off		Off

Table 13-33:   Compare Assistant icon and Copy Setting icon

	Automatic: Imaging and Annotations		Automatic: Imaging Only
	Automatic: Annotation Only		Manual: Imaging & Annotations
	Manual: Imaging Only		Manual: Annotations Only
	Off. No parameters copied.		Disabled.

NOTE: *Compare Assistant icon is disabled when the system does not have Compare Assistant Option.*

Comparison Clipboard

In Comparison Mode two (2) image clipboard areas display images from the active exam and the selected comparison exam. The Comparison Clipboard can display up to four (4) exams, including the active exam. Each exam has a tab that you click on to select the desired comparison or active exam. The active exam is always displayed (either on the Left or Right side, depending on your preset).

Figure 13-97.   Comparison Clipboard

The comparison exam(s) are identified by the date of the exam on the tab; the active exam is identified by the word, "Active" and by the asterisk (*). You can activate the Image History screen by clicking on the "..." tab.
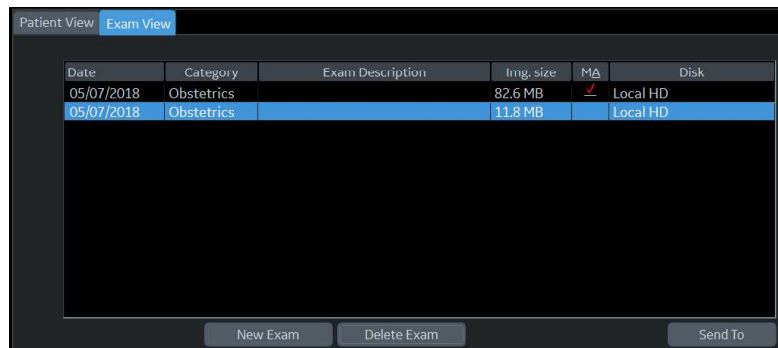
Each image clipboard has its own scroll bar that can be used to scroll through all the images.

The highlighted image in the clipboard is the image that's displayed along with the exam's active image.

Query/Retrieve

You can use DICOM Query/Retrieve to search for a patient's previous exams. When you select a patient on the Patient Screen, select the "Query" button. This automatically registers the patient (if needed) and initiates a query via the Data Transfer page. Select the exams you wish to be transferred and press the "Transfer" button.

After the retrieve completes, the system automatically returns to the Patient Screen with the same patient and exam active as when you selected to Query this patient.

Figure 13-98.   Patient Exam View

Activating Compare Assistant

Compare Assistant displays an image associated with the active exam (live, frozen, or CINE) and the other side contains an image from the comparison exam.

Comparison Image parameters transfer to the Active Image based on your preset (automatic or manual). You can also use the Display Copying control adjacent to the clipboard to copy settings from the comparison image to the active image.

NOTE: *If an imaging parameter is not available for the current probe, a message in the status bar indicates that this parameter is not available.*

You activate Compare Assistant via the Comparison Mode Key adjacent to the Image Clipboard and On-screen Trackball Controls or you can activate Compare Assistant via the Patient Image History screen by selecting the image and pressing "Compare."

Figure 13-99.   Image History

At the start of an exam the system automatically checkmarks the three (3) most recent exams, excluding active exams and exams without any images as the comparison exams. You can adjust this by placing a checkmark next to the exam you wish to include in Compare Mode (the system automatically deselects the oldest checked exam). To activate Comparison Mode, select which specific image you would like to compare to the current image from the clipboard on the Image History screen. Select the image and press the "Compare" button.

Exiting Compare Assistant

To exit Compare Assistant Mode, select the Comparison Mode Key adjacent to the Image Clipboard, or change the exam Model, change active exam, change patient, or recall an image from the active clipboard.

Compare Assistant Quick Card

LOGIQ Techniques: Compare Assistant

Table 13-34:   Getting Started

1. Import Previous images onto system by using a USB, DVD or by Query retrieve directly from PACS.
2. Select patient from Patient View by double clicking over name.
3. Start a new exam.
4. Select Image History to view previous studies.

Note: Compare Assistant is also accessible from Active Image Screen by using icon adjacent to clipboard. At anytime, select Compare Assistant icon to get in or out of Compare Assistant.

LOGIQ Techniques: Compare Assistant (continued)

Table 13-35:   Comparing Studies

1. From Image History Screen, select image from exam to compare and then select the Compare Key.

OR

2. Select the Compare Assistant icon to the right of the clipboard to start Compare Assistant from main screen.

Note: In image history screen . Select checkboxes adjacent to previous exams to be compared. These exams will show up as tabs within compare assistant shown by date of study. Up to 3 exams may be chosen to compare.

Table 13-36:   Clinical Use

1. Follow-up Routine Exams and known pathology.
2. View prior exams side-by-side with a real-time ultrasound image so you can quickly identify the area of interest.
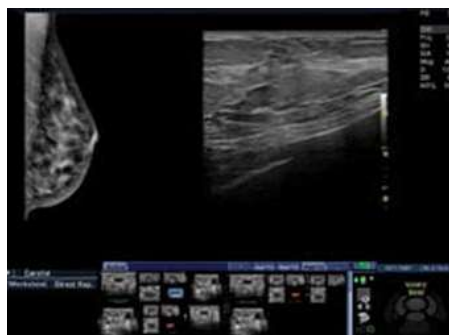
LOGIQ Techniques: Compare Assistant (continued)

Table 13-37:   Compare Assistant Screen

1. In Dual screen, the left side is the active image and the right side is the prior image.
2. Comparison image date will be seen at top of comparison image.

Note: Active Image side can be changed by default.

Smart Start (Start Assistant)

Introduction

Smart Start (Start Assistant) saves exam setting Mappings automatically when the first image is acquired during an exam. Saved Smart Start Exam Mappings are automatically recalled when a Worklist item is loaded, keying off the Worklist Exam Description.

Smart Start saves and loads the following exam settings:

- Exam Description - Populated from the Worklist item, the Exam Description is the default key by which the exam Mapping is saved.
- Category
- Scan Assistant
- Preset
- Probe

NOTE: *If a new Patient is entered manually (without using a Worklist), and no Exam Description is entered, Scan Assistant will become the key by which the Mapping is saved. An Exam Description or Scan Assistant program entry must be present for Smart Start to save the Mapping.*

Saved Smart Start Exam Mappings can also be added, edited or deleted with the Smart Start Mapping Editor - See

NOTE: *The "Use Smart Start" box on the Utility-> System-> General page is checked by default.*

Smart Start (Start Assistant) Mapping Editor

The Smart Start (Start Assistant) Mapping Editor can be accessed from the Utility-> System-> General screen by selecting "Edit mappings" under the Smart Start section.

Figure 13-100.   Smart Start (Start Assistant) on Utility-> System-> General Page

On the Smart Start Mapping Editor screen you can Add, Edit or Remove a Smart Start map.

Figure 13-101.   Smart Start (Start Assistant) Mapping Editor

Add a Smart Start (Start Assistant) Mapping

Select **Add** to add a new mapping.

Figure 13-102.   Add Smart Start (Start Assistant) Mapping

Edit a Smart Start (Start Assistant) Mapping

Highlight an existing mapping and select **Edit**or double-click the item to edit a mapping.
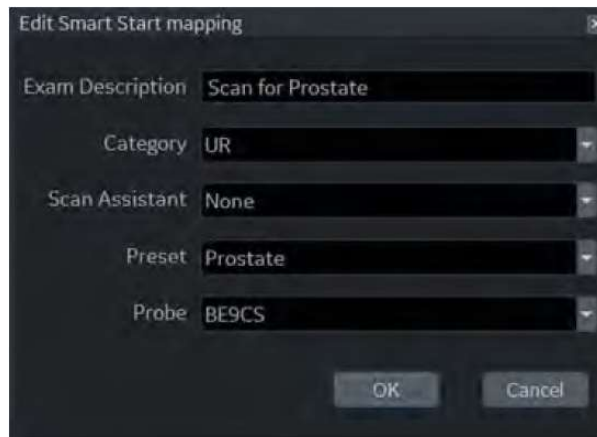
Figure 13-103.   Edit Smart Start (Start Assistant) Mapping

Delete a Smart Start (Start Assistant) Mapping

Highlight one or more existing mappings and select **Delete** to delete.

Save and Exit Smart Start (Start Assistant) Mapping Editor

Before exiting Smart Start (Start Assistant) Mapping Editor, select **Save** to save any changes you have made.

Select **Exit** to exit Smart Start mapping Editor.

Scan Assistant

Introduction

Scan Assistant provides an automated exam script that moves you through an exam step-by-step. This allows you to focus on performing the exam rather than on controlling the system and can help you to increase consistency while reducing keystrokes. The system automatically invokes the correct mode and imaging parameters, advances to the next step in an exam, annotates the image, initiates measurements, and assigns the measurements to the worksheet/report.

Availability

The following additional imaging parameters and preferences are available for use in a Scan Assistant program: Contrast, Contrast Clock, CW Doppler, Dual on Freeze, Depth, Color Scale, PW Doppler Scale, PW Sample Volume size, and Flow Model Selection.

You can initiate one or more manual Doppler measurements/ calculations.

Body Patterns are available for use during a Scan Assistant program. You can turn a Body Pattern on/off, select a particular Body Pattern graphic, and specify the position of the probe mark on the Body Pattern graphic.

The footswitch can be used with Scan Assistant. You can map Pause/Resume, Previous Step, and Next Step to the footswitch.

The "Always Use Doppler Cursor" preset, available on the Utility --> System --> General page, allows all PW Doppler steps to start with full screen 2D image plus mode cursor. You can specify the Store Order in Scan Assistant to set the Reading Order for the radiologist. The Learn Probe attribute can be set to learn and change the probe for the user in the middle of the exam.

Scan Assistant Definitions

Scan Assistant definitions:

• **Scan Assistant Manager**. Available via the Utility -> Scan Assistant page to import/export Programs created via the Scan Assistant Creator and to assign Programs to a user/ exam category.

• **Import**. Used to load Programs created via the Scan Assistant Creator on to the LOGIQ P8/P9/P10.

• **Export**. Used to move Programs from one LOGIQ P8/P9/ P10 system to another LOGIQ P8/P9/P10.

• **Scan Assistant Creator**. Used to create Scan Assistant Programs.

Scan Assistant Description

Figure 13-104.   Scan Assistant Display Description

1. Program name, completed steps/out of total number of steps, and step description area.

2. Program step status (Complete/Incomplete), step number, step name. A checkmark indicates that this step has been completed. You can also manually check the box to bypass this step.

3. This column indicates the mode or when a measurement needs to be made.

4. This column indicates that the action moves the Program to the next step.

5. Active step The box is green when the program is active or yellow when it is paused.

6. Navigation: Stop, Pause, Pause/Resume. Edit (Pencil Icon). Also available via the left/right keyboard arrow keys. Stop also allows the program to be stopped, restarted, or a new program selected.

Setting up Scan Assistant

To set up Scan Assistant,

1. Import the Scan Assistant Program created using the Scan Assistant Creator or exported from another LOGIQ P8/P9/ P10 program.

    a. Insert the media with the saved Program from the Scan Assistant Creator or exported program from another LOGIQ P8/P9/P10.

NOTE:　　　*If you insert the media with exported program from another LOGIQ S8 and LOGIQ E9, the following dialog displays before Import Programs. Select Default for LOGIQ P9/P7 or LOGIQ S8 or LOGIQ E9.*
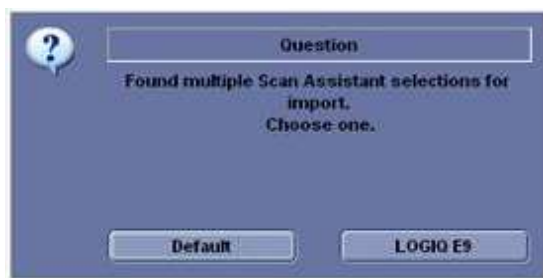
Figure 13-105.   LOGIQ S8 and LOGIQ E9

NOTE:　　　*If you insert the media with exported program from LOGIQ E9, the following dialog displays before Import Programs. Click OK.*
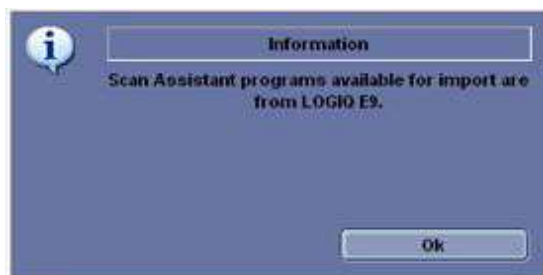
Figure 13-106.   LOGIQ E9 only

Setting up Scan Assistant (continued)

       b.   Press Utility -> Scan Assistant.

       c.   Select Import from the Scan Assistant Manager page.
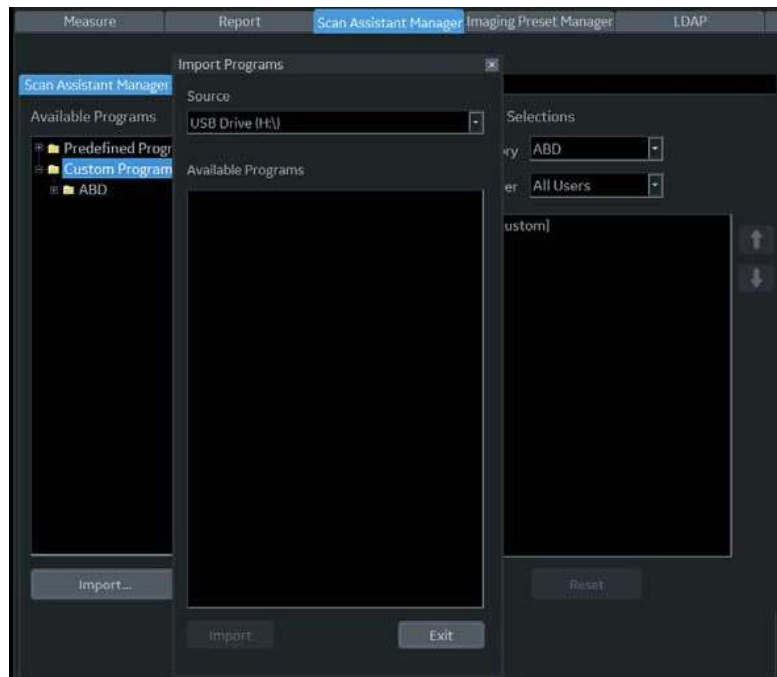
Figure 13-107.   Import Programs

Setting up Scan Assistant (continued)

d. In the Source field at the top of the Import Programs pop-up, select the media that the Program is stored on.

e. Highlight the Program(s) to be imported. If a folder is highlighted, all programs in the folder are selected.
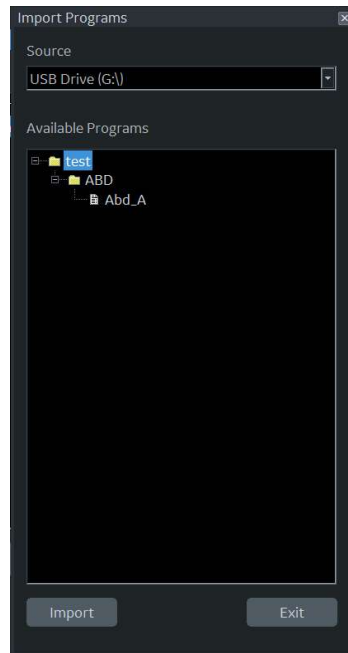
Figure 13-108.   Import Programs

Setting up Scan Assistant (continued)

f.   Select Import. The Program(s) you selected are stored
to the LOGIQ P8/P9/P10. You can add it to the exam
category and user.
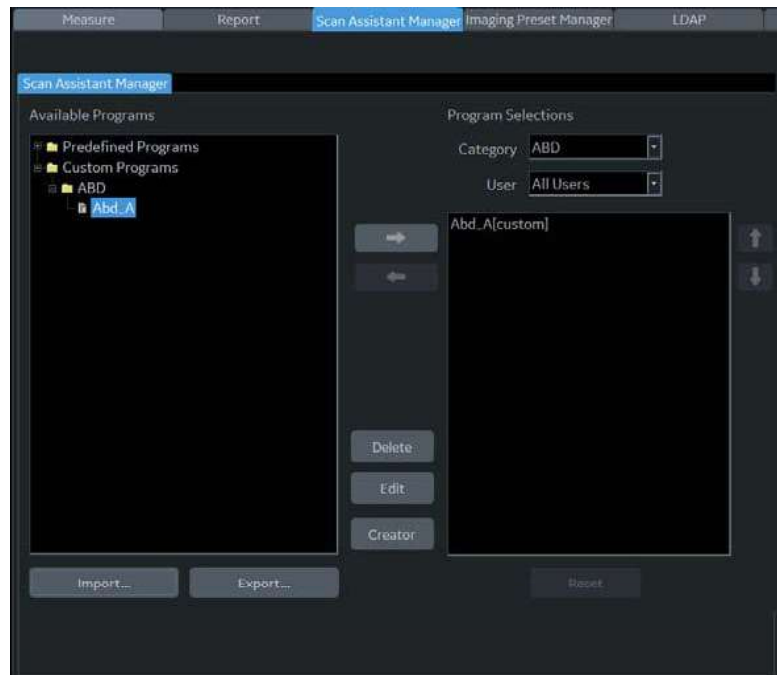
Figure 13-109.   Add Program

Setting up Scan Assistant (continued)

2. Assign the imported Program to the exam category and user. Under Program Selections on the right-hand side of the Scan Assistant Manager page, specify the Exam Category and User for this Program. You can select All Users, or a specific user. If you specify All Users, all users will have the ability to use this Program while in the specified exam category, unless the user has his/her own list defined.

3. Select the imported Program from Available Programs -> Custom Programs on the left-hand side of the page. Then press the right arrow button to move the imported Program to the exam category and user selected above.
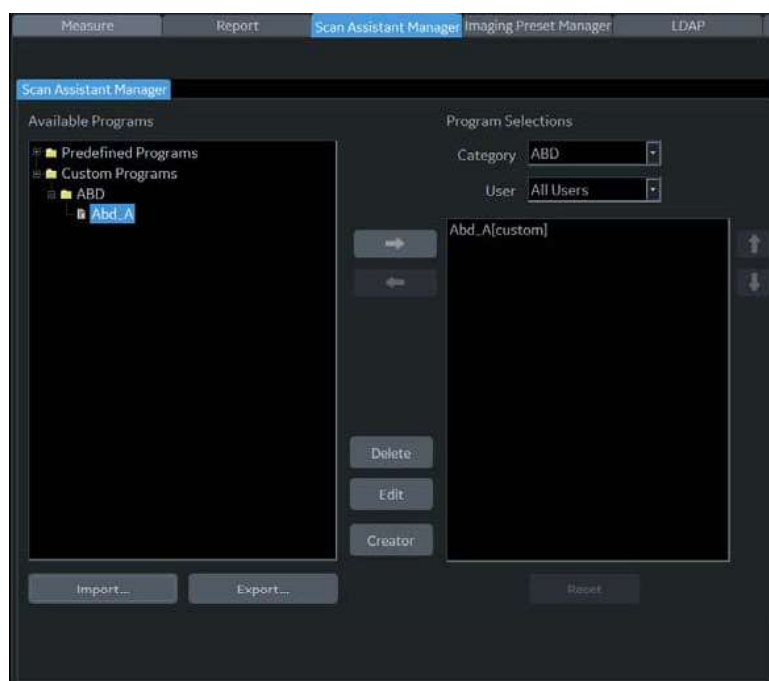
Figure 13-110.   Add Program

Setting up Scan Assistant (continued)

4. If you want the system to automatically select the last-used Program based on the Exam Description or Exam Category, you can preset the system to do so. Go to Utility -> System -> General -> Scan Assistant -> Auto Selection -> and select Description or Category.
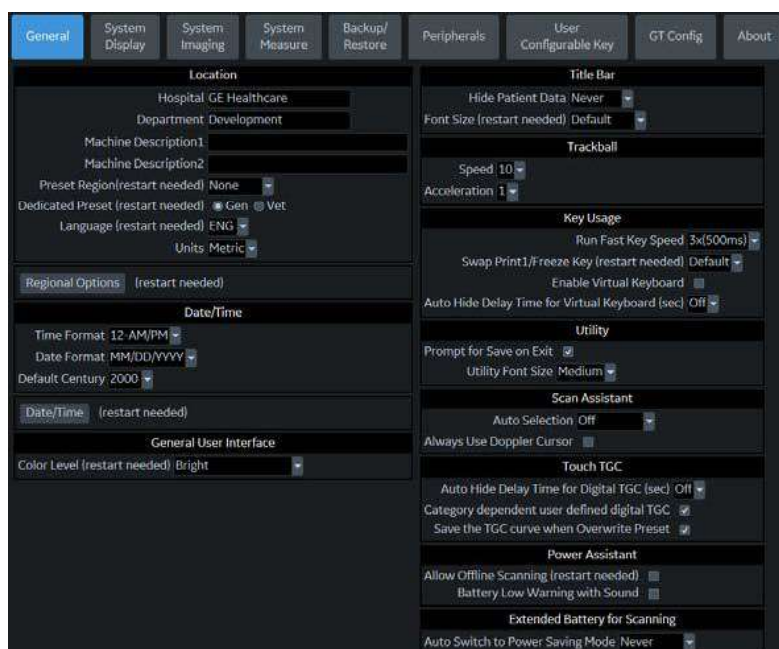
Figure 13-111.   Scan Assistant Auto Selection

5. The Program list you created in Utility ->Scan Assistant is visible in the Program field on the Patient menu. Pressing **New Patient** erases any patient data and Scan Assistant program you entered. First press **New Patient** and then set up patient data, Scan Assistant program, and finally, press **Register** Patient.
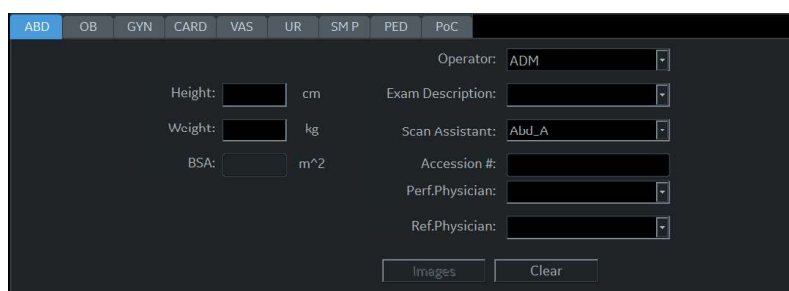
Figure 13-112.   Patient Scan Assistant Program

Setting up Scan Assistant (continued)

You can access the Scan Assistant Creator to edit the exam's program from the imaging display via the Creator Icon located at the bottom, left-hand corner of the Scan Assistant Program monitor on the display. You can activate the Scan Assistant Creator from the image screen, make edits, and then run Scan Assistant to test your changes.

NOTE: *If you edit the program after you have already stored several images, and your edits change the number of program steps, you are prompted to Restart or Continue the Scan Assistant program.*

NOTE: *If you edit the program after you have already completed several steps, checkmarked steps remain checkmarked, even if you insert a new step between checkmarked steps. If this is not correct, you can edit the checkmarks or restart the program.*

Using Scan Assistant

After you have set up Scan Assistant, the Program is active when you exit the Patient menu. The Program is located on the left-hand side of the display and as you can see in the example below, the annotation for the first step has been automatically noted on the image, ready for you to scan the specified anatomy.
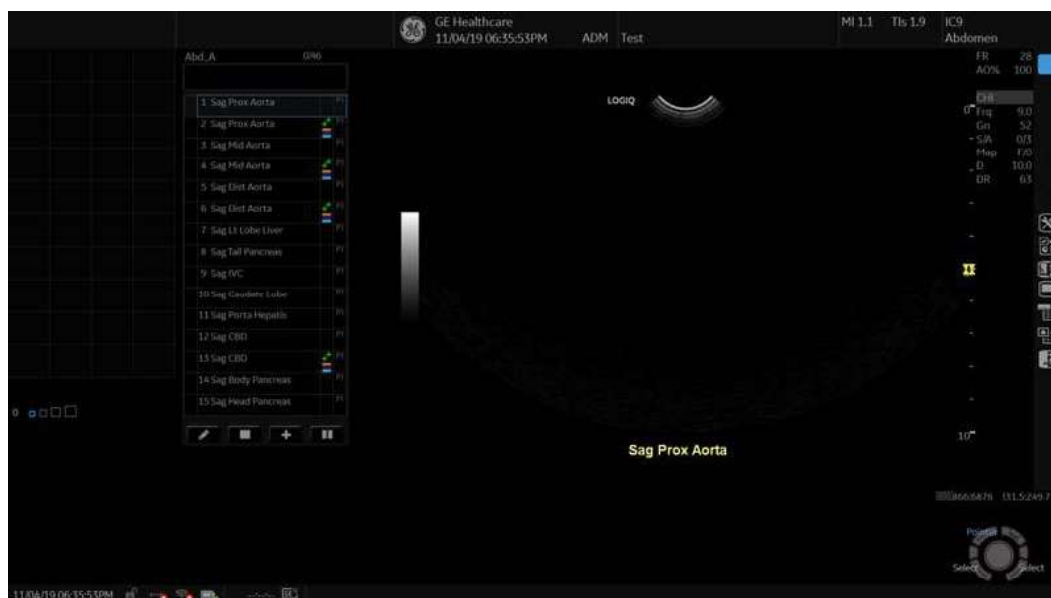
Figure 13-113.   Scan Assistant Display

Using Scan Assistant (continued)

1. Follow the steps indicated in the Program: image/measure the appropriate anatomy.

2. Perform the indicated trigger to move to the next step in the Program.

NOTE: *The footswitch can be used with Scan Assistant. You can map Pause/Resume, Previous Step, and Next Step to the footswitch.*

3. To pause or unpause Scan Assistant, press the pause button on the display or press the left/right arrow on the keyboard.

4. To stop or restart a Program, press the Stop icon at the bottom of the Scan Assistant Program. A dialog pops up. This dialog lets you restart the current Program, start another Program, or stop Scan Assistant.

5. To skip a step or move to a certain step, press the up/down arrows on the keyboard or select the step you want to move to using the Trackball and Set keys.

Inserting a step

1. To insert a pre-defined step to the active Scan Assistant Program, press the Plus Sign (+) on the Scan Assistant Display.

Figure 13-114.   Insert Steps

The Insert Steps Pop-Up Menu appears.
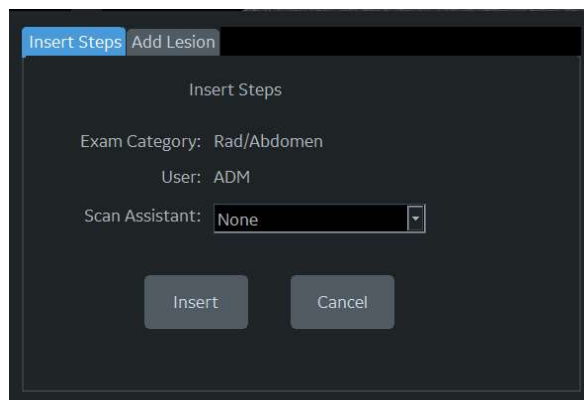
Figure 13-115.   Insert Steps Pop-up menu

2. Select the steps to be inserted via the pull-down Scan Assistant menu.
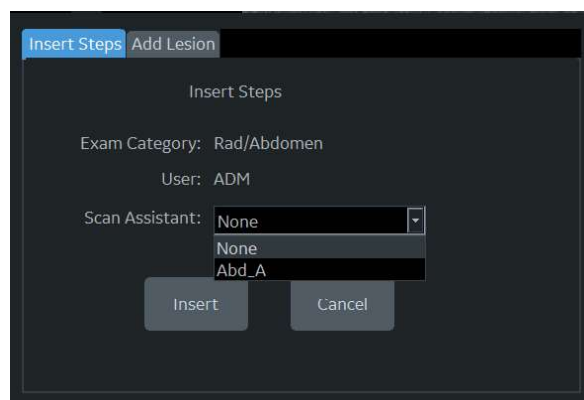
Figure 13-116.   Select from pull-down menu

Inserting a step (continued)

3. Press Insert. All the steps in the inserted program are added immediately after the active step in the current program.

    To undo inserted steps, use Edit button to edit the program and delete the recently inserted steps.

NOTE: *After the exam is completed, the system removes the temporarily saved Scan Assistant program with inserted steps.*

NOTE: *The inserted steps is not adapt the annotation and body pattern from the active step.*

Breast Measurement Auto Insert Steps

To add a program to be inserted whenever the Add Lesion key is selected,

1. Press the Plus Sign (+) on the Scan Assistant Display.

Figure 13-117.   Insert Steps

2. Select the "Add Lesion" tab.
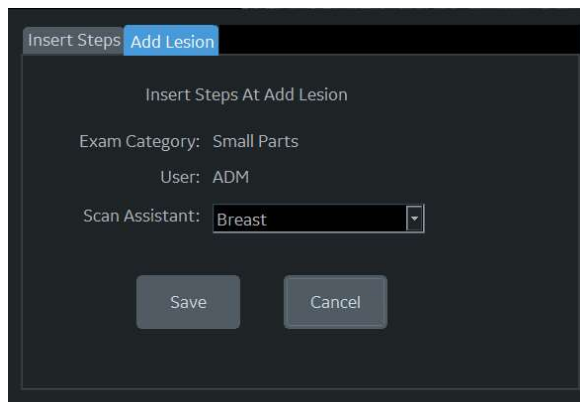
Figure 13-118.   Select from pull-down menu

Breast Measurement Auto Insert Steps (continued)

3. In the Scan Assistant field, select the steps to be inserted when the user presses the Add Lesion Touch Key shown below.
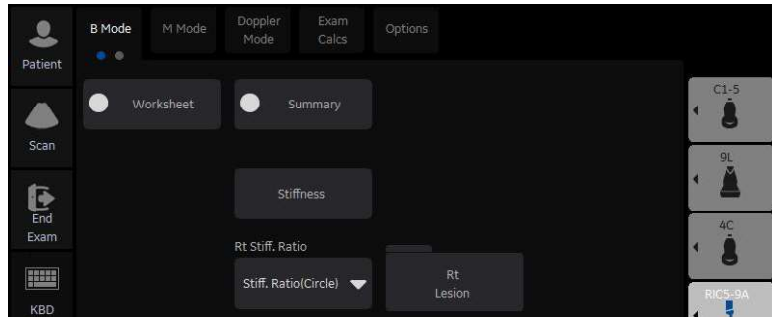
Figure 13-119.   Add Lesion key

Exporting Scan Assistant Programs

Exporting Scan Assistant Programs allows them to be imported to another LOGIQ P8/P9/P10 or to be edited offline with the Scan Assistant Creator tool. To export a Program,

1. Insert the media to save the Program to.
2. Press Utility -> Scan Assistant.
3. Select Export from the Scan Assistant Manager page.
4. In the Source field at the top of the Export Programs pop-up, select the media that the Program is to be stored on.
5. Specify the Program Directory using the drop-down menu if the desired Program Directory already exists on the media. If not, or if you want to export the Program to a new Program Directory, type a new Program Directory name in the field.
6. Highlight the Program(s) to be exported. If a folder is highlighted, all programs in the folder are selected.
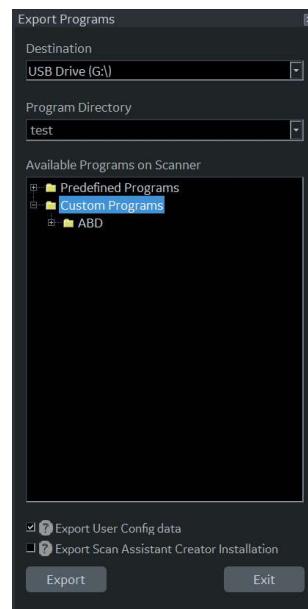
Figure 13-120.   Export Programs

7. Select Export. The Program(s) you selected are stored to the media. You can now import it to a new LOGIQ P8/P9/ P10.

Scan Assistant Creator

Activating the Scan Assistant Creator

To activate the Scan Assistant Creator on the LOGIQ P8/P9/
P10, press the Creator key in Utility -> Scan Assistant Manager.
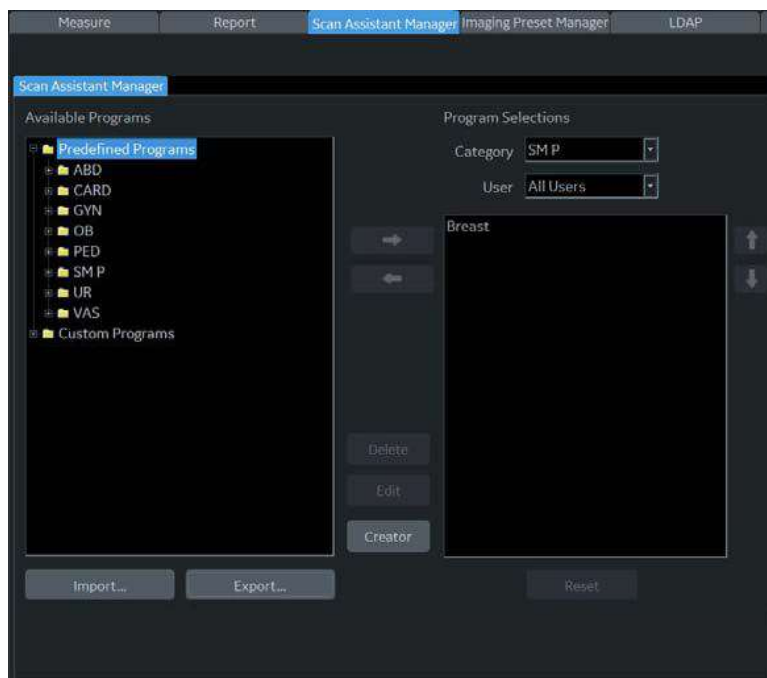
Figure 13-121.   Scan Assistant Manager

Overview

The Scan Assistant Creator is used to build customized Programs that can be imported onto the LOGIQ P8/P9/P10. These Programs automate many of the steps normally performed manually by the user, thereby reducing the number of user actions and the amount of time to perform an exam.
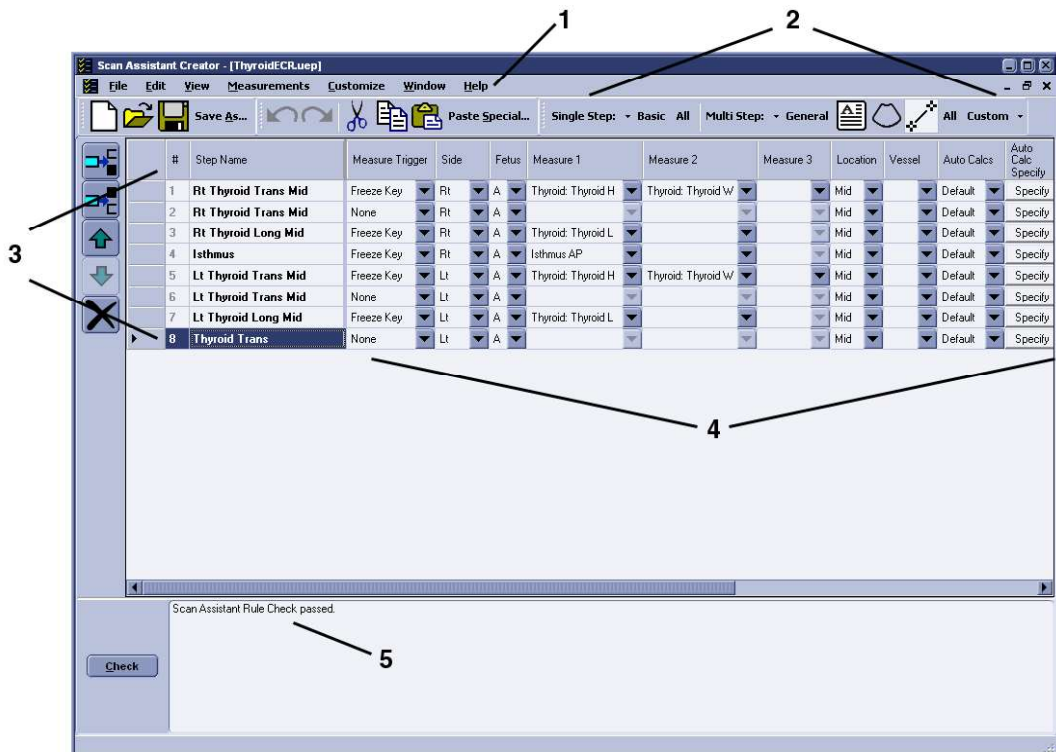
Figure 13-122.   Tool Layout Overview

1.   Menu
2.   Toolbars
3.   Steps
4.   Step Attributes
5.   Rule Checking

Overview (continued)

The Scan Assistant Creator tool can be used both on the scanner and as an off scanner tool. Where there are differences in behavior, this user's guide uses the term 'on scanner' to indicate when the tool is running on the scanner and 'off scanner' to indicate when the tool is running off the scanner.

File Handling

When using Scan Assistant Creator off the scanner, it is very important to organize the programs in a way that will make it easy to import the programs onto the scanner. Each Program is a computer file. While these computer files can be copied, pasted and deleted like any other computer file, the Program files are only viewable using the Scan Assistant Creator.

Off-Scanner Directory Structure

The Scan Assistant Creator organizes the Programs in a directory structure that allows easy importing into the LOGIQ P8/P9/P10. In order to be imported, all Programs must be stored in a LOGIQ_SCAN_ASSISTANT Programs Directory. Within this directory, one or more user-specified directories are created. Within each of these user-specified directories are the category directories (VAS, ABD, etc.) that hold the actual Programs.

The dialog in the figure below allows the user to specify the location of the LOGIQ_SCAN_ASSISTANT directory (root directory) and to either select an existing User Program Directory or create a new one.

Figure 13-123.   Directory Structure

Off-Scanner Directory Structure (continued)

The Directory Structure dialog can be accessed via the File menu.

Figure 13-124.   File Menu

Figure 13-125.   File Toolbar

File Extensions

Factory defined Programs have an .ep (exam Program) extension while user-defined Programs have an .uep (user exam Program) extension. Both factory and user-defined Programs can be read into the Scan Assistant Creator, but only user-defined Programs are created. If a factory Program is read into the Scan Assistant Creator and then edited, it is saved as a user-defined Program.

Upon installation of the Scan Assistant Creator, files with a .ep or .uep extension are automatically associated with the Scan Assistant Creator.

Exporting Programs from LOGIQ P8/P9/P10

Factory or user-defined Programs on the LOGIQ P8/P9/P10 are easily exported for editing with the Scan Assistant Creator.

On the LOGIQ P8/P9/P10:

1. Insert a USB storage device (or CD/DVD).
2. Select *Utility* -> *Scan Assistant*.
3. Select **Export**.
4. Select the media type and specify a directory. If a directory is specified that already exists, the Export adds the Programs along with any existing Programs. If the names of Programs are the same, use the resulting dialog to decide how to continue.
5. Select the Program to be exported and export them.

On the computer with the Scan Assistant Creator installed:

1. Insert the USB storage device (or CD/DVD) used above.
2. Copy the LOGIQ_SCAN_ASSISTANT directory from the USB storage device (or CD/DVD) to the hard drive. The hard drive directory that you copy to is the root directory. If you want to work with the Programs directly on the USB storage device, this step can be skipped.
3. Either open a Program by double-clicking it or selecting File '-> Open from the Scan Assistant Creator.

Importing Programs to LOGIQ P8/P9/P10

Programs created with the Scan Assistant Creator are easily imported to the LOGIQ P8/P9/P10.

On the computer with the Scan Assistant Creator installed:

Copy the complete LOGIQ_SCAN_ASSISTANT directory from the computer hard drive to a USB device (or CD/DVD). The LOGIQ_SCAN_ASSISTANT directory needs to be at the top level (not in a subdirectory) on the USB device (or CD/DVD).

Example of Directory structure:

LOGIQ_SCAN_ASSISTANT

    MyUserNameDirectory

        ABD

        CARD

        GYN

        OB

        PED

        SMP

        UR

        VAS

On the LOGIQ P8/P9/P10:

1. Insert the USB device (or CD/DVD).
2. Select *Utility* -> *Scan Assistant*.
3. Select **Import**.
4. Select the media type.
5. Select the Programs to be imported and import them. If you attempt to import Programs that already exist with the same name, use the resulting dialog to decide how to continue.

Creating New Programs

A new Program is created by selecting File -> New, by clicking on the New document icon in the Toolbar, or by using the keyboard shortcut Ctrl+N.

1. Before creating a New Program, select *Single Step* or *Multi Step* in the Toolbar.

Figure 13-126.   File Toolbar

2. Proceed to add/update your settings for the Step: Step Name, Instructions, etc.

3. Once finished, highlight the finished Step.

Creating New Programs (continued)

4. Select **Edit** -> **Copy**
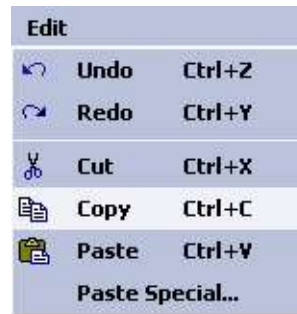
Figure 13-127.   Edit -> Copy

5. In the Toolbar along the left, select **Insert Step Before Selected** or **Insert Step After Selected**.

Figure 13-128.   Insert Step

6. Highlight the copied step and proceed to edit accordingly.

7. Proceed to follow the same procedure to add more steps to your Program.

Creating New Programs (continued)

8. When you are done, select **Check** to verify your Steps.

Figure 13-129.   Rule Check and results area

9. The results are listed as to whether the Scan Assistant Rule Check Passed or if any Issues were detected. Issues found when running the check do not mean the Program is unusable.

NOTE: *The rule check may report an unequal number of left and right steps. This may or may not be the expected result. If a change is made in response to the rule check results, a new rule check can be run to see if the issue has been resolved.*

Opening New Programs

Multiple Programs can be open at the same time by selecting File -> Open. Each Program will open within the primary Scan Assistant Creator window.

Opening Existing Programs

An existing Program is opened by selecting File -> Open, by clicking on the File -> Open icon in the Toolbar, or by using the shortcut Ctrl+O. Finding the Program file (.ep or .uep) and opening the file automatically opens the file in the Scan Assistant Creator. Multiple Programs can be opened at the same time.

Saving Programs

Programs are saved via the Save or Save As functions available on the File Menu and the File Toolbar. Save is also available via the Ctrl+S keyboard shortcut. "Save" saves the Program using its current name and file location. "Save As" allows the name and file locations to be edited.

When Saving a Program, the Scan Assistant Creator provides an opportunity to run a rule check on the Program before saving it as shown in the following figure. **Yes** runs the rule check, **No** bypasses the rule check and **Cancel** cancels the Save request. See 'Rule Checking' on *page 13-252* for more details on Rule Checking Programs.

Figure 13-130.   Program Rule Check Reminder

NOTE: *The name of a Program is appended with an asterisk (*) when the Program has been changed, but those changes have not yet been saved*

A Program can be closed without saving it using the Close selection on the File Menu or by using the "X" in the upper right corner of the Program window.

Sharing Programs

If you want to share a program with someone else, the file can simply be sent via e-mail as an attachment or copied onto a media. If the person receiving the program has the Scan Assistant Creator tool installed, he can simply open the file and then use "Save As" to save it to an appropriate directory. See Section 3.1. If the person receiving the program does not have the Scan Assistant Creator tool installed, he can still load the program onto a scanner by creating the following directory structure on a media device, copying the file to one of the category directories and then importing the protocol onto the scanner.

Top Level Directory on media: LOGIQ_SCAN_ASSISTANTUser Program Directory: Any user nameCategory Directories: Abd, Card, Gyn, OB, Ped, SMP, UR, Vas

If you want to share an entire portfolio of programs with some else, the entire user program directory can be zipped. Make sure to set the options to include subfolders and to include relative path information. On the receiving end, the user can unzip the directory into a LOGIQ_SCAN_ASSISTANT directory.

Views

A Program is made up of a series of steps. Each step is made up of various step attributes. The step and step attribute data can be viewed in many ways using the Scan Assistant Creator. The different ways to look at the data are called Views. The view of choice is selected from the View Selection Menu or the View Toolbar Menu.

Figure 13-131. View Selection Menu

Figure 13-132. View Toolbar Menu

Single Step Views

There are two Single Step views: Basic and All. The Basic view shows the most common attributes of the selected step. The All view shows all of the attributes of a given step.

For both views, the step names are shown on the left with the active step highlighted. The step attributes appear on the right and are separated into four groupings:

General attributes at the top

Imaging and Comment attributes on the left

Measure attributes on the right.
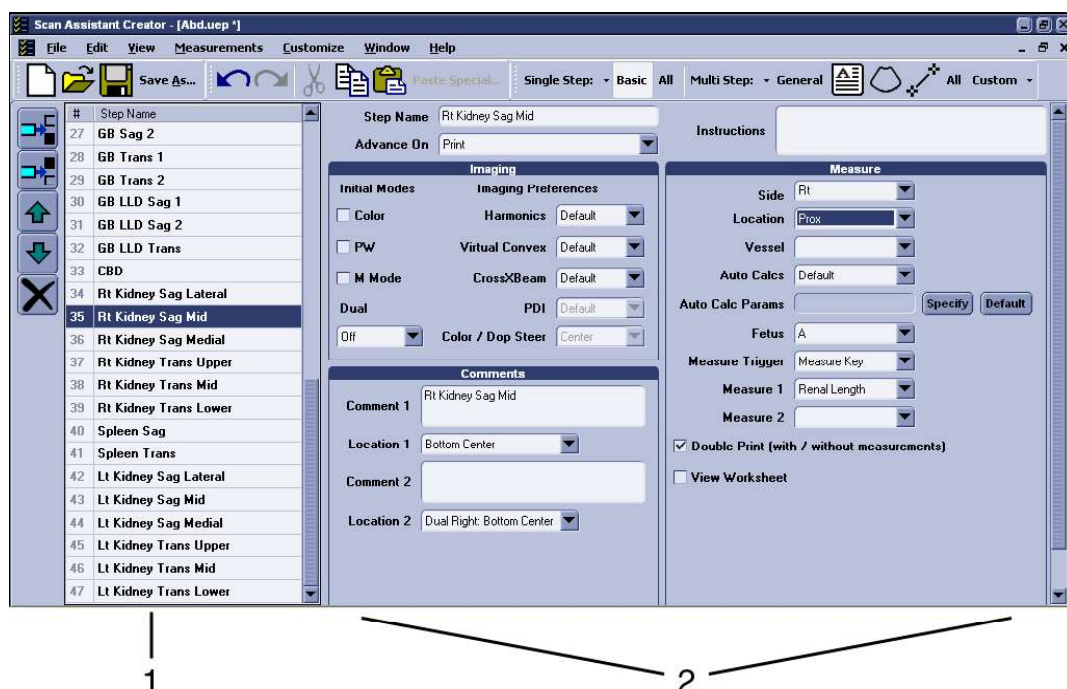
Figure 13-133.   Basic Single Step View

1.   Steps
2.   Step Attributes

Multi Step Views

Multi Step views show certain step attributes for all the steps in a Program. There are six Multi Step views: General, Comment, Scan, Measure, Custom and All.

Figure 13-134.   Multi Step Scan View

1.   Steps
2.   Step Attributes

Customizing Multi Step Views

The contents of the Multi Step views is configurable via the Customize Menu or the small downward pointing arrow next to the word "Custom" on the View Toolbar Menu. In either case the Customize Multi Step Views dialog appears. Each tab represents a different Multi Step view. Within a tab, the checked boxes are the step attributes that are displayed in that Multi Step view.

See 'HTML Export' on *page 13-254* for details on the HTML Export Multi Step view.
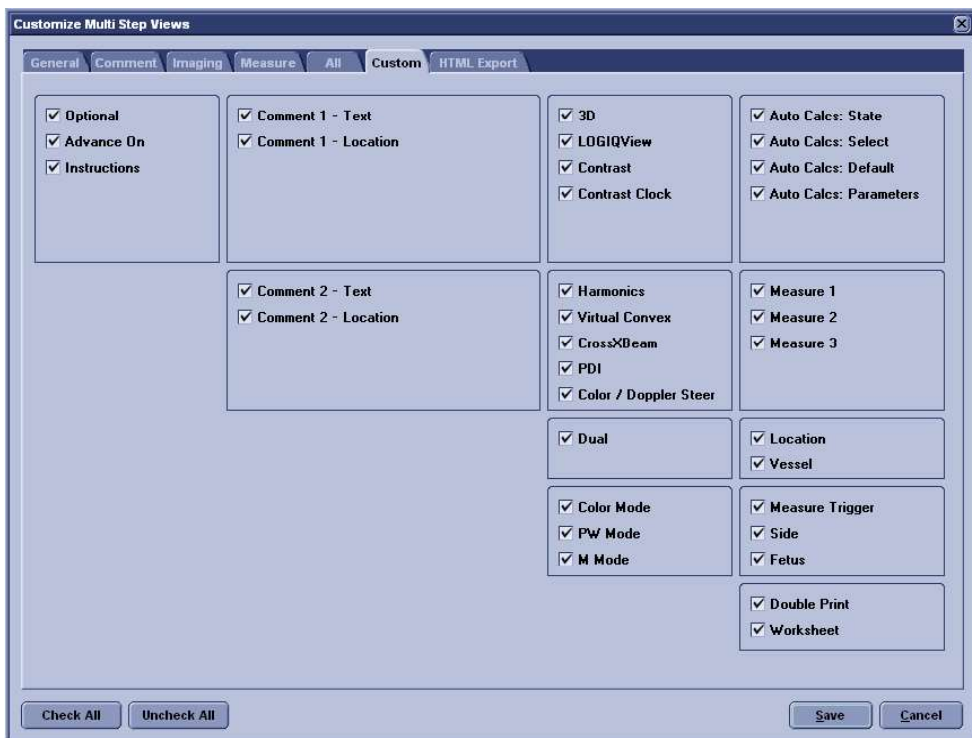
Figure 13-135. Customize Multi Step Views Dialog

Scan Assistant Features

Scan Assistant allows the user to program the steps in an exam and to program certain attributes for each step. The attributes are what give the Scan Assistant Program behavior. The tables below provide the names of all attributes along with a description of how each one is interpreted by the Scan Assistant feature.

General Attributes

Table 13-38:   General Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Step Number	Numeric	Number of the step that appears in the Scan Assistant Navigation menu	1	Previous plus one
Step Name	Any	Name of the step that appears in the Scan Assistant Navigation menu	Step Name	Same as previous step
Advance On	Print	Advance to the next step and go live after Print / Image Store (e.g P1 key). This can be a single image store or a loop store.	Print	Same as previous step
	Print & Unfreeze	Advance to the next step after Print / Image Store (e.g. P1 key) and unfreeze. This can be a single image store or a loop store.		
	User Selection	Advance to next step only after next step is manually selected (e.g. down arrow)		
Instructions	[Any Text]	User notes displayed in the Scan Assistant Navigation menu when the step is active	Blank	Same as previous step

Table 13-38: General Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Optional	Optional (checked)	An optional step is given a check mark during Program execution even if no image is acquired	Mandatory	Same as previous step
	Mandatory (unchecked)	A mandatory step is given a check mark only if an image is acquired for the step		

Comment Attributes

Table 13-39:   Comment Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Comment 1, Comment 2	[Any Text]	User annotation associated with the step. When editing in a Multi Step View, use Alt+Enter to create a new line.	Same as Step Name attribute	Same as Step Name attribute
Location 1, Location 2	Top Left	Annotation is placed in the top left corner of the image area	Location 1: Bottom Center	Same as previous step
	Middle Left	Annotation is placed in the middle left side of the image area		
	Bottom Left	Annotation is placed in the bottom left corner of the image area	Location 2: Dual Right: Bottom Center	
	Top Center	Annotation is placed in the top center of the image area		
	Bottom Center	Annotation is placed in the bottom center of the image area		
	Top Right	Annotation is placed in the top right corner of the image area		
	Mid Right	Annotation is placed in the middle right side of the image area		
	Bottom Right	Annotation is placed in the bottom right corner of the image area		

Table 13-39:   Comment Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
	Dual Left: Bottom Center	Annotation is placed on the bottom center of the left image in dual screen		
	Dual Left: Top Left	Annotation is placed on the top left of the left image in dual screen		
	Dual Right: Bottom Center	Annotation is placed on the bottom center of the right image in dual screen		
	Dual Right: Top Left	Annotation is placed on the top left of the right image in dual screen		

Imaging Mode Attributes

The probe and application associated with a program is not configurable. Instead, the scanner remembers the last probe and application used for a given Scan Assistant program and automatically selects them the next time the program is started.

Table 13-40:   Imaging Mode Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Color Mode	On (checked)	Color Doppler is on	Off	Same as previous step
	Off (unchecked)	Color Doppler is off		
PW Doppler Mode	On (checked)	PW Doppler is on. If PW Doppler is not on and the new activated step indicates that Doppler should be on, the Mode Cursor is displayed or, if the Mode Cursor is already displayed, then PW Doppler is turned on.	Off	Same as previous step
	Off (unchecked)	PW Doppler is off		
M Mode	On (checked)	M-Mode is on	Off	Same as previous step
	Off (unchecked)	M-mode is off		
Dual	Off	Dual screen not in use	Off	Same as previous step
	Left Active	Dual screen is active and the left image is the active image.		
	Right Active	Dual screen is active and the right image is the active image.		
	DualView (simul)	DualView is active (both left and right images are live)		

Table 13-40:   Imaging Mode Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
3D	On (checked)	3D on	Off	Same as previous step
	Off (unchecked)	3D off		
LOGIQView	On (checked)	LOGIQView on	Off	Same as previous step
	Off (unchecked)	LOGIQView off		
Contrast Mode	On (checked)	Contrast mode on	Off	Same as previous step
	Off (unchecked)	Contrast mode off		
Contrast Clock	On (checked)	Contrast Clock on	Off	Same as previous step
	Off (unchecked)	Contrast Clock off		
B-Flow	On (checked)	B-Flow on	Off	Same as previous step
	Off (unchecked)	B-Flow off		
B-Flow Color	On (checked)	BFC on	Off	Same as previous step
	Off (unchecked)	BFC off		
Elastography	On (checked)	Elastography on	Off	Same as previous step
	Off (unchecked)	Elastography off		

Imaging Preference Attributes

Imaging Preferences work slightly different than other attributes. For example, if an abdomen Program has 20 steps and all steps have the Harmonics attribute set to Default, then Scan Assistant will not affect the harmonics setting. Now, assume that steps 10-12 are gallbladder steps and that the harmonics attribute has been set to on for these steps. When transitioning into this group of steps (step 9 to step 10, e.g.), harmonics will be turned on (or remain on if it was previously on). If harmonics is then manually turned off in step 10 then Scan Assistant will not turn it back on when advancing to step 11. In other words, a group of consecutive steps with the same Imaging Preference are treated as a group by Scan Assistant and not as individual steps.

Table 13-41:   Imaging Preference Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Harmonics	Off	Harmonics off	Default	Same as previous step
	On	Harmonics on		
	Default	Harmonics not specified. Scan Assistant does not set Harmonics on or off.		
Virtual Convex	Off	Virtual Convex off	Default	Same as previous step
	On	Virtual Convex on		
	Default	Virtual Convex not specified. Scan Assistant does not set Virtual Convex on or off.		
CrossXBeam	Off	CrossXBeam off	Default	Same as previous step
	On	CrossXBeam on		
	Default	CrossXBeam not specified. Scan Assistant does not set CrossXBeam on or off.		
PDI	Off	PDI off	Default	Same as previous step
	On	PDI on		

Table 13-41:   Imaging Preference Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
	Default	PDI not specified. Scan Assistant does not set PDI on or off.		
Color/Doppler Steer	Left	Color/Doppler steered to the left	Center	Same as previous step
	Center	Color/Doppler not steered		
	Right	Color/Doppler steered to the right		
Flow Model	Default	Flow Model not specified. Scan Assistant does not set Flow Model	Default	Default
	Aorta, Renal, Penetration, Slow Flow, Med Flow, Fast Flow	Specified Flow Model is selected		
Depth	Default	Depth not specified. Scan Assistant does not set Depth	Default	Default
	2.0 to 36.0	Specified or the nearest available Depth is selected		
Color Scale	Default	Color Scale not specified. Scan Assistant does not set Color Scale	Default	Default
	1 to 200	Specified or the nearest available Color Scale is selected		
Doppler Scale	Default	Doppler Scale not specified. Scan Assistant does not set Doppler Scale	Default	Default
	1 to 200	Specified or the nearest available Doppler Scale is selected	Default	Default

Table 13-41:   Imaging Preference Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
SV	Default	PW Sample Volume Size not specified. Scan Assistant does not set PW Sample Volume Size	Default	Default
	1 to 16	Specified or the nearest available PW Sample Volume Size is selected		
Baseline (PW Doppler and Color Flow)	Default	Baseline not specified. Scan Assistant does not set PW Sample Volume Size.	Default	Default
	100	Specified or the nearest available Baseline is selected.		
B-Flow Sensitivity	Default	B-Flow Sensitivity not specified. Scan Assistant does not set B-Flow Sensitivity.	Default	Default
	1.0 to 50	Specified or the nearest available B-Flow Sensitivity is selected.		
B-Flow Color Scale	Default	BFC Scale not specified. Scan Assistant does not set BFC Scale.	Default	Default
	0.20 to 1.500	Specified or the nearest available BFC Scale is selected.		

Table 13-41:   Imaging Preference Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Color Baseline	Default	Color Baseline not specified. Scan Assistant does not set Color Baseline.	Default	Default
	0 to 100	Specified or the nearest available Color Baseline is selected.		
Doppler Baseline	Default	Doppler Baseline not specified. Scan Assistant does not set Doppler Baseline.	Default	Default
	5 to 95	Specified or the nearest available Doppler Baseline is selected.		

Measurement Attributes

Table 13-42:   Measure Attributes

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Measure Trigger	Measure Key	Initiate "Measure 1" attribute when the Measure key is manually selected.	None	None
	Freeze Key	Initiate "Measure 1" attribute when the image is frozen.		
	Image Store	Initiate "Measure 1" attribute when the Measure key is manually selected or the image is stored. This is used to store / print an image and then measure on it and then store it again. Therefore, the Advance On Print attribute is ignored on the first store / print when the Measure Trigger attribute is set to Image Store.		
	None	Measurements are not triggered by Scan Assistant. The "Measure 1" attribute is ignored.		
Side	Rt	The side measurement qualifier is set to Right side of the body	Rt	Derived from Step Name attribute if possible. Otherwise, same as previous step
	Lt	The side measurement qualifier is set to Right side of the body		
	None	The side measurement qualifier is not used (neither Right nor Left)		
Fetus	A	The fetus measurement qualifier is set to Fetus A	A	Same as previous step
	B	The fetus measurement qualifier is set to Fetus B		
	C	The fetus measurement qualifier is set to Fetus C		
	D	The fetus measurement qualifier is set to Fetus D		

Table 13-42:   Measure Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Location	Prox	The location measurement qualifier is set to Proximal	Prox	Same as previous step
	Mid	The location measurement qualifier is set to Middle		
	Dist	The location measurement qualifier is set to Distal		
	None	The location measurement qualifier is not used		
Measure 1	Various 2D or M-mode measurements	Specifies the first 2D or M-mode measurement to be initiated. The point at which the measurement is initiated is based upon the Measure Trigger attribute. See Section 6 for more information.	Blank	Blank
Measure 2	Various 2D or M-mode measurements	Specifies the second 2D or M-mode measurement to be initiated after the measurement associated with the Measure 1 attribute is completed. See Section 6 for more information	Blank	Blank
Measure 3	Various 2D or M-mode measurements	Specifies the second 2D or M-mode measurement to be initiated after the measurement associated with the Measure 2 attribute is completed. See Section 6 for more information.	Blank	Blank
Vessel	Various Doppler measurement Vessel folders	Specifies the Vessel folder to assign auto calcs to. The assignment happens when the image is stored / printed (e.g. P1 key). See Section 6 for more information.	Blank	Blank
Auto Calcs	Default	Auto Calcs state not specified. Scan Assistant does not set Auto Calcs state.	Default	Same as previous step
	Off	Auto Calcs state set to Off		
	Frozen	Auto Calcs state set to Frozen		
	Live	Auto Calcs state set to Live		

Table 13-42:   Measure Attributes (Continued)

Attribute Name	Selections	Description	First Step Default	Other Steps Default
Auto Calc Params	Various Auto Calc parameters	Specifies the auto calc parameters to be used.	Default	Same as previous step
	Default	Auto Calc parameters are not specified. Scan Assistant does not set the Auto Calc parameters.		
Auto Calc Specify	[Not Applicable]	Button used to enable the Auto Calcs Parameter Selection dialog so that the Auto Calc Params attribute can be set	[Not Applicable]	[Not Applicable]
Auto Calc Default	[Not Applicable]	Button used to set the Auto Calcs Params attribute to Default.	[Not Applicable]	[Not Applicable]
Double Print	On (checked)	If an Image Store / Print (P1 key, e.g.) is performed on an image with measurements, the image is stored / printed two times, once with the measurements and once without.	Off	Same as previous step
	Off (unchecked)	No special Store / Print behavior.		
Double Print	On (checked)	If an Image Store / Print (P1 key, e.g.) is performed on an image with color, the image is stored / printed two times, once with color and once without. If double print on color and double print on measurements are both configured to be on, the image is stored / printed two times, once with the measurements and once without.		
	Off (unchecked)	No special Store / Print behavior.		
View Worksheet	On (checked)	The worksheet is turned on	Off	Off
	Off (unchecked)	The worksheet is not turned on		

Measurements

Because there are many measurements available on the LOGIQ P8/P9/P10 and because the measurement package is highly customizable, there is some special handling for measurements. The Measurement attributes affected by this special handling are Measure 1-3 and Vessel.

Selecting a Measurement Package

The Measurement selection menu can be used to specify which measurement package is to be used for the Program. The Measurements packages are organized by category and subcategory. The choices for the Measure 1-3 and Vessel attributes are limited by the selection of category and subcategory. To select a subcategory, select a category, move to the subcategory list and select a subcategory. To select all subcategories for a given category, select the category and then reselect the Measurements menu item to remove the menu.

A single Program is not allowed to have measurements from multiple categories, but it may have measurements from multiple subcategories.
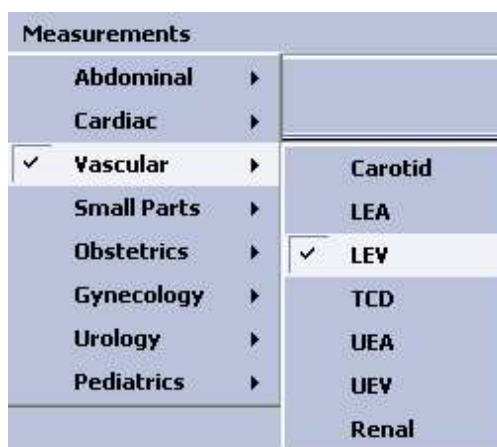
Figure 13-136.   Measurements Menu

User-Defined Measurements

User-defined subcategories and individual measurements can be used with the Scan Assistant feature. To do so, the Scan Assistant Creator needs to know about the user-defined measurements on the LOGIQ P8/P9/P10.

On the LOGIQ P8/P9/P10, use the Scan Assistant utility menu to Export Programs to a USB storage device (or CD/DVD). On the export menu, check the "Export user config data" checkbox to store the user-defined measurement information to the Program User Directory on the media. The name of the file is UserConfigSystemFile.res. When this file exists in the Program User Directory, then it is used. Otherwise, the default file installed with the Scan Assistant Creator is used.
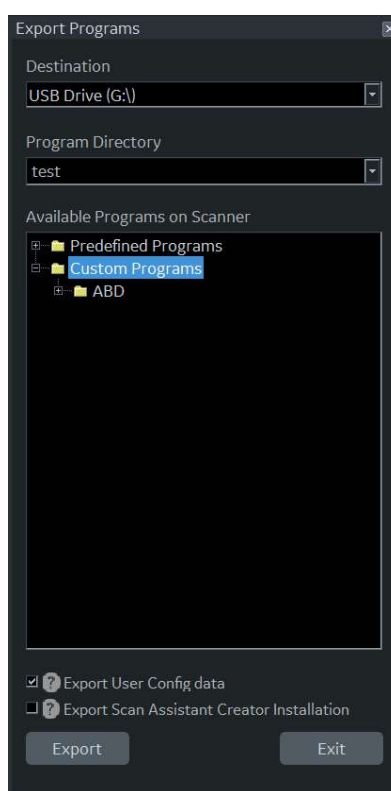
Figure 13-137.   Program Export Menu on LOGIQ P8/P9/P10

Navigating Programs

In addition to moving the windows pointer and selecting an item, there are several keyboard controls that navigate a Program.

Table 13-43:   Keyboard Program Navigation

Keyboard Entry	Step Selected	Step Attribute Selected
Enter	Moves to next step. If on the last step, it creates a new step and selects it.	Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to same step attribute in the next step. If on the last step, it creates a new step and selects it.
Tab	Single Step View: Moves to next step. On the last step it moves to the first step attribute. Multi Step View: Moves to the first step attribute.	Moves to next step attribute. If last attribute for the step, moves to next step.
Alt+Tab	Single Step View: Moves to previous step. On the first step it moves to the last step attribute. Multi Step View: Moves to the last step attribute of the previous step.	Moves to next step attribute. If first attribute for the step, moves to previous step.
Up Arrow	Moves to previous step	Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to same step attribute in the previous step.
Down Arrow	Moves to next step	Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to same step attribute in the next step.
Left Arrow	No action	Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to the previous step attribute.
Right Arrow	Single Step View: No action. Multi Step View: Moves to the first step attribute.	Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to next step attribute.
Page Up	Scrolls to previous page of steps	Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to same step attribute in the previous step.
Page Down	Scroll to next page of steps	Single Step View: Varies based on the step attribute selected. Multi Step View: Moves to same step attribute in the next step.

Editing Programs

When editing Programs, changes can be made at both the step level and the step attribute level. Steps can be added, inserted, moved, deleted, copied and pasted. Step attributes can be modified for a given step or across multiple steps.

Editing Steps

The step toolbar allows steps to be inserted, moved up and down, and deleted. For steps to be moved, one or more consecutive steps must be selected. Some of the controls have shortcuts (Control Key + another key).

When the last step in a Program is selected, the Enter key automatically appends a new step to the end of the Program and selects the new step. When the Enter key is pressed on any other step, the next step is activated. The up and down arrows can also be used to move between steps.
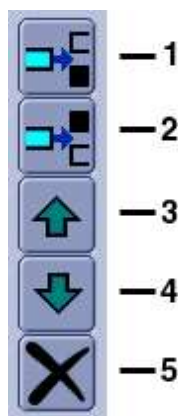
Figure 13-138.   Step Toolbar

1. Insert Step above selected step (Ctrl+I)
2. Insert Step below selected step
3. Move selected step(s) up (Ctrl+Up Arrow)
4. Move selected step(s) down (Ctrl+Down Arrow)
5. Delete selected step(s)

Editing Steps (continued)

The Edit Menu and Edit toolbar provides access to the Cut, Copy, Paste and Paste Special features. The Undo and Redo actions also appear on Edit Menu and Edit Toolbar.

Figure 13-139.   Edit Menu

Figure 13-140.   Edit Toolbar

When selecting multiple steps for Cutting or Copying, the Shift + Left Mouse and Ctrl + Left Mouse key combinations can be used. Multiple steps are also selected by holding the Left Mouse key and dragging across the steps of interest. When pasting steps they are added after the currently selected step.

The Paste Special control allows copied steps to be pasted with some modification. For example, the steps associated with the Right Kidney can be Copied and Pasted so that they are converted into Left Kidney steps during the paste. The Paste Special dialog is shown in the figure below . Simply select the desired Conversion and choose the "Paste" key.

Editing Steps (continued)

- • Step Name (Text)
- • Comment 1 (Text)
- • Comment 2 (Text)
- • Side (Measurement qualifier)
- • Location (Measurement qualifier)
- • Fetus (Measurement qualifier)

Figure 13-141.   Paste Special Dialog

Editing Steps (continued)

The Define Conversions key is used to define the text that is converted. An example is shown in the figure below. If an exact case match is found, it is used for the conversion. If there is a match, but with different case, it is used only if there is not an exact case match.

There are 3 user-defined conversions that can be edited and named. These user-defined conversions can also be used to perform a find and replace capability.
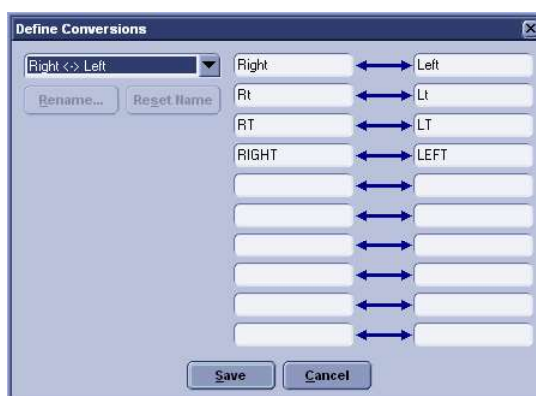
Figure 13-142.   Define Conversions Dialog

Editing Step Attributes

To edit a step attribute simply select the step attribute and edit it, such as picking from a drop down menu, checking or unchecking a box or typing in text. To edit multiple steps in a Multi Step view, select the step attribute of choice and do the following actions:

- Set the value of the step attribute as desired.
- Left click (and release) in the square in the bottom right-hand corner of the attribute.
- Drag to highlight the other steps to be changed in the same way.
- Left click (and release) again.

This will take the original step's content and copy it down the highlighted steps. This is also available when multiple attributes are selected within the same step.

To edit multiple steps in the single step view, highlight the multiple steps that you want to edit and then change the step attribute. If a step attribute is highlighted in green, this indicates that its current value varies across the selected steps.

If a step attribute is not editable, it may be because the attribute requires a different attribute to be set a particular way in order to become enabled. These dependencies are outlined below.

Table 13-44:   Step Attribute Dependencies

Step Attribute	Dependency
PDI	Color step attribute must be checked
Color / Dop Steer	Color or PW step attribute must be checked
Measure 1	Measure Trigger must not be set to None
Measure 2	Measure 1 must be set
Measure 3	Measure 1 and Measure 2 must be set

Editing Multiple Programs

Multiple Programs can be opened at the same time. To switch between Programs, the title banner of the window is selected or the Program is selected from the Window Menu. An asterisk indicates that the Program has been edited but not saved.
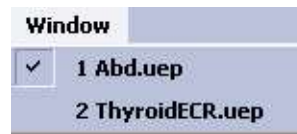
Figure 13-143.   Window Menu

With multiple Programs open, steps copied from one Program can be put inserted into another Program via the paste or paste special features.

Undo/Redo

The Undo feature allows the previous action to be undone. For example, pressing undo 6 times will undo the last 6 changes. Redo cancels the Undo of an action. For example, pressing undo 6 times will undo the last 6 changes and then pressing Undo 2 times will cause only the last 4 actions to be undone.

Editing the Current Program on the Scanner

If you are currently using a Scan Assistant program and choose to edit that program while using it, the program will be reloaded when scanning is restarted. If the number of steps is changed, the checkmarks that were in place before editing are cleared. If the number of steps in the program has not changed, the checkmarks that were in place before editing are maintained.

The current program can be restarted at any time by selecting the Stop button on the Scan Assistant navigation window and selecting restart.

Rule Checking

Scan Assistant Creator allows Programs to be checked. During a rule check, Scan Assistant Creator applies a series of rules against the Program being checked and reports any inconsistencies between the rules and the Program. This rule check is intended to find potential issues in the Program before it is tested on a LOGIQ P8/P9/P10. Issues found when running the check do not mean the Program is unusable. It means that if there happens to be a problem with running the Program, the first place to look would be at the Issue noted when you ran the Check.

For example, if there is a step name Right Kidney and the Measurement Location is set to "Left", the rule check would report this inconsistency.

Running a Rule Check

The "Check" button below the Program area is used to initiate a rule check. The results are displayed in the Rule Check Results window to the right of the button. A rule check is also initiated when attempting to save a Program that has not previously passed a rule check.
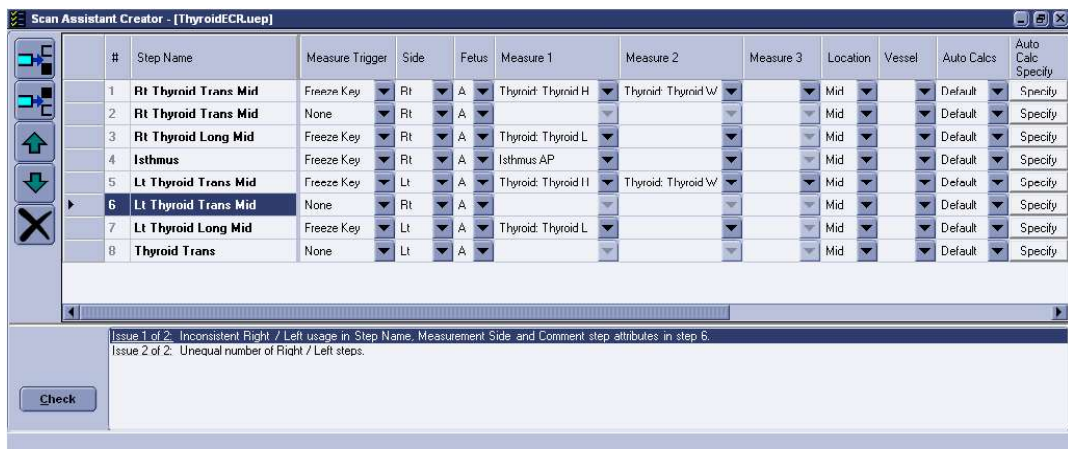
Figure 13-144.   Rule Check Button and Rule Check Results

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Rule Check Results

If the issue is specific to a particular step, double-clicking on the issue number in the Rule Check Results window selects the step associated with the issue. The results are intended to be potential issues and therefore may be ignored at the discretion of the user. For example, the rule check may report that there are an unequal number of left and right steps. For a particular Program, this may be the expected result. If a change is made in response to the rule check results, a new rule check can be run to see if the issue has been resolved.

Documenting Programs

The HTML Export feature allows a Program to be stored in a file format (*.mht) that is compatible with Windows Internet Explorer. This file is useful for printing the Program or viewing the Program, but is not useful for editing the Program. HTML Export is available via the File Menu.

An example of how a Program looks in HTML format is shown below.

Figure 13-145.   HTML Export

The step attributes shown in the HTML Export are configurable via the Views selection on the Customize Menu.

Customization

The Customize Menu is shown below. The Views selection allows the contents of the Multi Step views and HTML Export to be configured as described in 'Customizing Multi Step Views' on *page 13-228* .

Figure 13-146.   Customize Menu

The Language selection allows the Scan Assistant Creator language to be configured.

The column widths of the steps and step attributes are customizable. The desired width is set by selecting and dragging the line separating column headers. These adjustments are remembered for the next time the Scan Assistant Creator is used.

The locations of the toolbars are customizable. The location is set by selecting and dragging the toolbar gripper as shown in the figure below. The toolbars can be placed at the top, left, right or bottom of the Scan Assistant Creator.

Figure 13-147.   Gripper used for Toolbar placement

1.   Toolbar Gripper

Help

Help is available via the About Menu or the F1 key.

Exporting the Scan Assistant Creator to a PC

To export the Scan Assistant Creator to a PC,

1. Insert a USB Flash Drive in a USB port on the Control Panel.

2. Press Utility--> Scan Assistant.

3. Press *Export*.

4. Place a checkmark in the Export Scan Assistant Creator Installation.

5. Press *Export*.
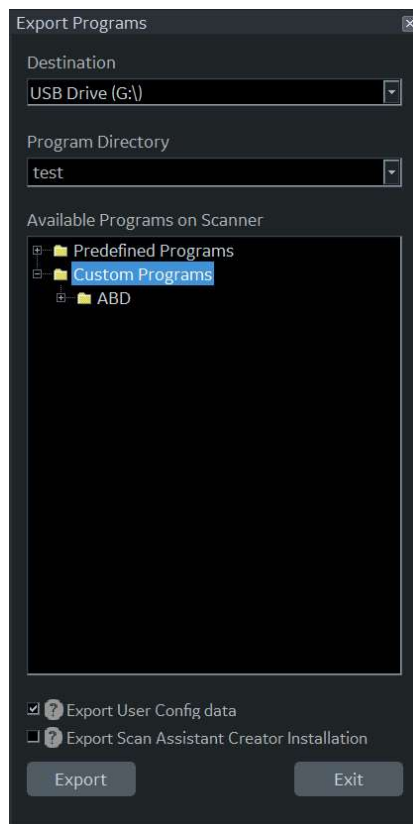
Figure 13-148.   Export Scan Assistant Creator Installation

Installation (Install from a zip file)

Create a directory called Scan Assistant Creator on your PC's hard drive under \Program Files\GE\. It should look something like this:

Drive Letter:\Program Files\GE\Scan Assistant Creator.

Unzip the contents of the zip file into the Scan Assistant Creator directory. After unzipping, go to the directory and double-click on the setup.exe file. Follow the steps in the setup wizard to complete installation.

To export the Scan Assistant Creator tool from the scanner for off scanner use, go to the Utility->Scan Assistant page on the LOGIQ P8/P9/P10 scanner. Select the Export button. On the Export dialog, select the media to be exported to, select the 'Scan Assistant Creator Tool' check box and then choose Export. The files needed to install the tool off the scanner are copied to the media. Insert the media in the computer where you want to install the off scanner version and use the setup.exe file to initiate the installation.

System Requirements

Scan Assistant Creator requires the Windows XP Professional Service Pack 2 or Windows Vista Business operating system. It also requires .NET Framework 2.0 Service Pack 1. If the computer does not have this installed, the installation utility will direct you to a link where it can be downloaded.

OB Measure Assistant

The user can request the system to trace/outline the borders of specified OB measurements using the OB Measure Assistant feature. You can auto-detect the Biparietal Diameter, Head Circumference, Abdominal Circumference, Femur Length and Humerus Length.

NOTE: *OB Measure Assistant is not currently available in the US (not cleared by the FDA).*

To automatically trace the fetal anatomy on the display,

1. Press **Measure Assist Settings** on the OB B-Mode measurement Touch Panel to set OB Measure Assistant parameters.

2. Press **Return** to return the measurement mode.

3. Press the measurement (BPD, HC, AC, FL or HL). The trace is auto generated on the display.

4. To edit the selected measurement graphics:

   • Move the Trackball to appropriately size the edit region of interest

   • Edit the Calipers via Cursor Select.

   • Adjust the circumference using the Ellipse key.

   Press **Set** on the Trackball to complete the measurement.

NOTE: *Specify the mode to measure the BPD: Outer to Inner, or Outer to Outer via Utility--> Measure--> Advanced--> Obstetrics--> Measure Assistant BPD Method.*

If the system was not able to detect the anatomy automatically, measurement calipers are displayed in the center of the screen in an editable state and a message is displayed on the status bar.

OB Measure Assistant Touch Panel
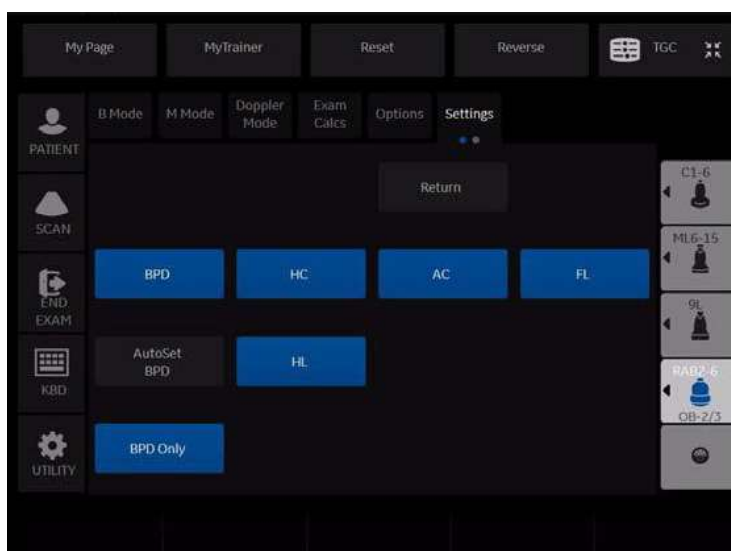
Figure 13-149.   OB Measure Assistant Touch Panel

Table 13-45:   OB Measure Assistant Touch Panel

Touch Panel Settings	Description
Default	When you first activate the Measure Assistant Touch Panel, the following measurements are highlighted: BPD, HC, AC, FL and HL. This means that OB Measure Assistant is active for all these measurements.
There are four (4) BPD Auto Custom Settings:	
1. BPD Highlighted	BPD and HC OB Measure Assistant is generated one at a time. BPD is auto generated--> Edit/Set--> HC is auto generated--> Edit/Set--> Done
2. BPD + AutoSet BPD	BPD and HC generated at the same time. BPD and HC are auto generated--> Edit/Set HC--> Edit/Set BPD--> Done.
3. BPD + BPD Only	Only the BPD is auto generated--> Edit/Set--> Done.
4. No Highlight	User must perform these measurements manually

Breast Options

There are two options related to Breast:

• Breast Measure Assistant — this contains the auto contour feature and auto Height and Length. It also has measurements related to Breast (distance to nipple, ratio)

• Breast Productivity Package — this includes lesion measurement folders, show features, summary, etc.

This section covers both the Breast Productivity Package (Breast Lesion) and Breast Measure Assistant (Auto Contour) features.

NOTE: *The Productivity Package is only activated when Breast Measure Assistant is available.*

Breast Productivity Package (Lesion M&A)

Breast Lesion M&A allows you to document up to 30 breast lesions for each breast. Lesion Height/Width/Length, Distance to Nipple, and A/B Ratio are available. Distance to Nipple allows you to enter the value. This is not a calculated measurement.

BI-RADS lesion classification can be notated via Show Features and Show Assessment.

The Breast Measure Assistant (Auto Contour) feature can also be used to automatically detect and outline the breast lesion.

Worksheet and Summary Worksheets show all the documented right/left breast lesions.

From the Small Parts Model, select the Breast Application. Next, select the Right/Left Lesion (Select Rt Side/Lt Side below the Touch Panel). The following Touch Panel appears:
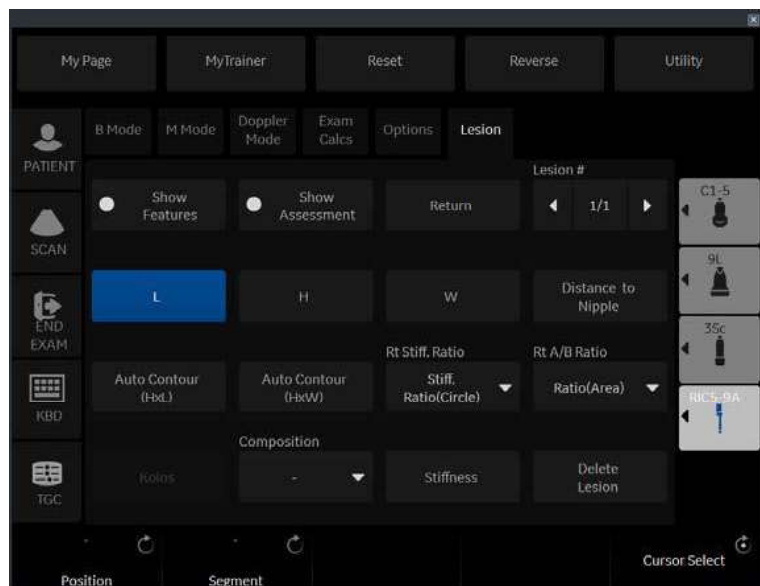
Figure 13-150.   Default Breast Lesion M&A Touch Panel

Table 13-46:   Breast Lesion M&A Touch Panel

Preset Parameter	Description
Position	Specify the position of the lesion: Clock position 1-12 O'Clock, Areolar, SubAreolar, Axillary, or "-" (default).
Segment	Specify A, B, C, None, or "-" (default).

Table 13-46:   Breast Lesion M&A Touch Panel (Continued)

Preset Parameter	Description
Show Features	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature. If a Feature has an asterisk next to it (*), then you can select multiple notations -- select all that apply and then select 'Done.' These features are displayed on the Below is a list of each Feature with its possible notations: • Shape: Oval, Round, Irregular, None (-) • Orientation: Parallel, Not Parallel, None (-) • Margin: Circumscribed, Indistinct, Angular, Microlobulated, Spiculated, None (-) • Boundary: Abrupt Interface, Echogenic Halo, None (-) • Echo Pattern: Anechoic, Hyperechoic, Complex, Hypoechoic, Isoechoic, None (-) • Posterior Features: No posterior features, Enhancement, Shadowing, Combined Pattern, None (-) • Surrounding Tissue*: Duct changes, Cooper's ligament changes, Edema, Architectural distortion, Skin thickening, Skin retraction/irregularity, None (-) • Calcifications*: Macrocalcifications, Microcalcifications out of mass, Microcalcifications in mass, None (-) • Special Cases*: Clustered microcysts, Complicated cysts, Mass in or on skin, Foreign body, Lymph nodes-intramammary, Lymph nodes-axillary, None (-) • Vascularity: Not Present or not assessed, Present in Lesion, Adjacent to Lesion, Diffuse in surrounding tissue, None (-)
Show Assessment	Specify the BI-RADS Assessment: None (-), 0, 1, 2, 3, 4a, 4b, 4c, 5, 6. A comment field is available directly below the BI-RADS Assessment.
Koios Assessment	Specify the Koios assessment.
Return	Press to return to the previous Touch Panel.
Lesion #	Indicates which lesion you are viewing (Lesion # of Total Number of Lesions). Press the left/right arrow to move from lesion to lesion.
L	Lesion Length
H	Lesion Height
W	Lesion Width
Distance to Nipple	Used to manually enter the distance the lesion is from the nipple.
Auto Contour (HxL)	Press to activate the Auto Contour feature, using the height and length.
Auto Contour (HxW)	Press to activate the Auto Contour feature, using the height and width.
Rt or Lt A/B Ratio	Right or Left Lesion A/B Ratio, measured by Area or Diameter.
Composition	Specify the composition of the lesion: None (-), Solid, Systolic, or Complex.
Delete Lesion	Press to delete this lesion.

Worksheet and Summary Worksheets

Worksheets and Summary Worksheets are provided for all documented Breast Lesions.

Figure 13-151.   Breast Lesion Worksheet

Worksheet and Summary Worksheets (continued)

To move to the next page, select the Page Change control beneath the Touch Panel.
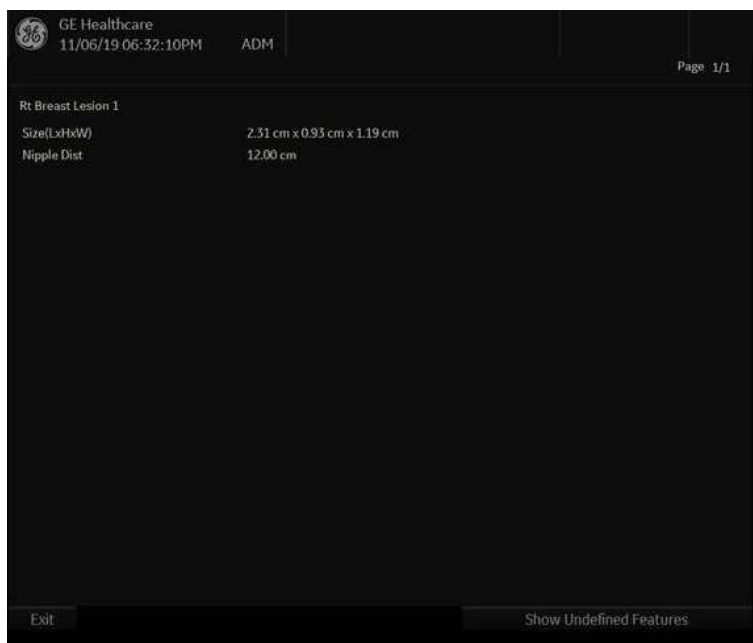
Figure 13-152.   Breast Lesion Summary

NOTE: *Only defined features are displayed on the Summary. To display the undefined features, select "Show Undefined Features" at the bottom of the Summary Worksheet.*

Breast Measure Assistant (Auto Contour)

You can request that the system trace/outline the border of a breast lesion using Breast Measure Assistant (Auto Contour). You do this by setting the Region of Interest (ROI) around the lesion; the system can then measure the lesion by drawing the contour around it.

The system can store up to 30 breast lesions. The system tracks these by numbering the lesions consecutively.

To automatically detect the breast lesion on the display,

1. Press **Measure**.
2. Select the side of breast (Left or Right) using Side selection rotary below the Touch Panel.
3. Press *Rt Lesion* (or Lt Lesion) folder.
4. Press *Auto Contour (HxW)* on the Touch Panel.
5. Place the Cursor in the center of the lesion and press **Set**. Size the ROI around the lesion. Use the Trackball to resize the ROI.
   - To increase the size of the circle, move the Trackball down and to the right.
   - To decrease the size of the circle, move the Trackball up and to the left.

NOTE: *Include the entire lesion, even if additional surrounding tissue is included.*

6. Press **Set** on the Trackball. A trace appears around the lesion.
7. Size the trace via the Trackball.
8. Press **Set**. The contour around the breast lesion is generated.

NOTE: *Multiple breast lesion traces may be generated by the system.*

9. Inspect the generated contour for accuracy. If edits are necessary, execute steps 8-10 to edit the contour prior to accepting the measurement. Otherwise, skip to step 11.
10. To cycle through the generated contours, use the Select Contours rotary on the Touch Panel.

Breast Measure Assistant (Auto Contour) (continued)

11. To edit the selected contour, move the Trackball to appropriately size the edit region and then press **Set** on the Trackball.

12. The blue portion of the contour can be edited by moving the Trackball to the portion of the contour you want to edit.

NOTE: *The Caliper closest to the cursor enables editing.*

NOTE: *To limit the horizontal/vertical editing capabilities, you can set a preset via Utility--> Measure--> Advanced--> Small Parts--> Restrict Breast Contour Caliper Edit.*

13. After you have completed any required edits, to accept the measurement press Done on Trackball or press Print.

Breast Assistant, Powered by Koios DS (not available in all countries)

Breast Assistant, Powered by Koios DS is a Breast Lesion Analysis Option. Breast Assistant, Powered by Koios DS is integrated with the General Topic or Product Name via DICOM. Koios DS is configured similar to a DICOM Service. The user can accept/reject analysis results.

To perform Breast lesion analysis using Breast Assistant, Powered by Koios DS:

1. In B-Mofe in the Breast Application, select the Breast Productivity Package Lesion # then press **Koios DS**via the Touch Panel.
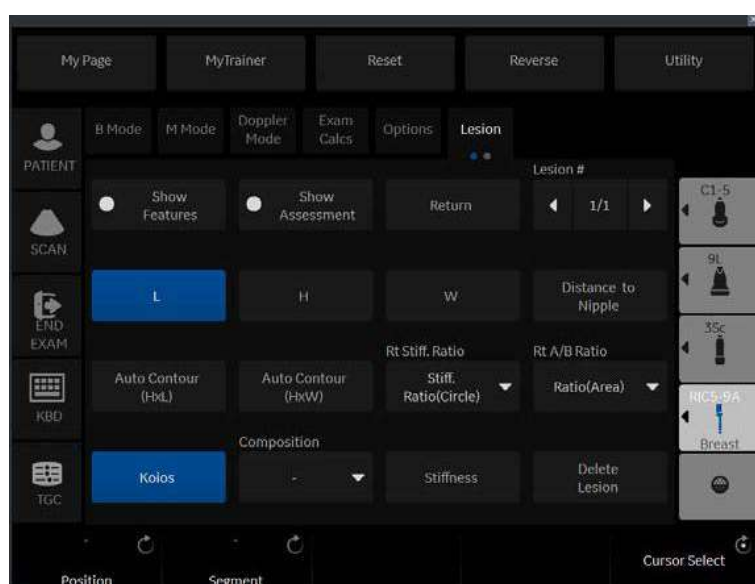
Figure 13-153.   B-Mode Touch Panel in Breast Application

Breast Assistant, Powered by Koios DS (not available in all countries) (continued)

2. Press Dual Image, image the breast lesion, then press Freeze.

3. Measure the breast lesion (Length, Width, Heigh) over 2 scan planes; or measure the lesion using Auto Contour.

4. Using the Trackball control, press **Analyze.**

5. Koios DS analyzes the lesion (a pop-up appears, "Analyzing").
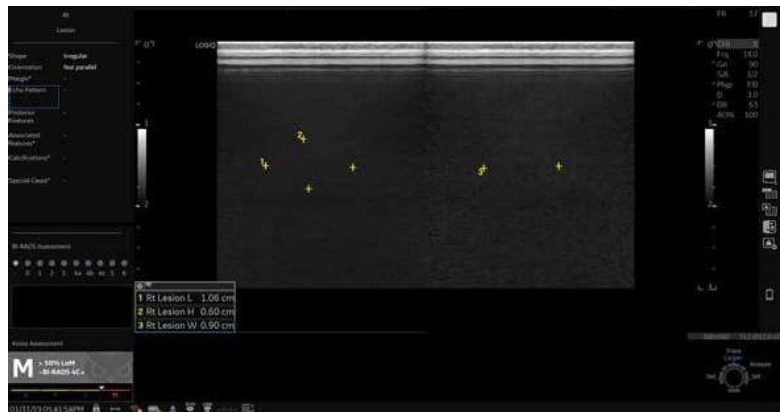
Figure 13-154.   Koios DS Analysis

6. Accept the analysis and Koios DS returns a BI-RADS Assessment. This assessment is also transferred to the exam's Summary Report.

To deactivate Koios DS:

1. Access Utiliy --> Connectivity --> Koios DS Configuration page.

2. Press Deactivate.

Breast Options Quick Card

LOGIQ Techniques: Breast Productivity Package

Table 13-47:   Getting Started

1. Select measure to activate Breast productivity package.
2. Select side of scan. Use Rotary knob to change between Right and Left side at the bottom of the Touch Panel (TP).

3. Select position and segment using rotary knobs on the left lower region of the touch panel.
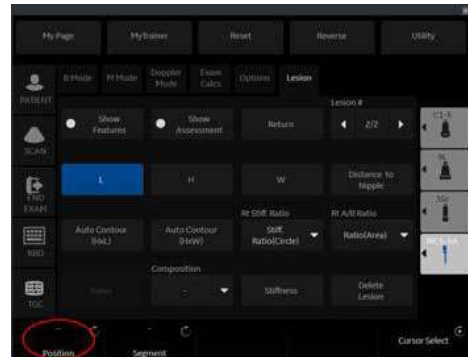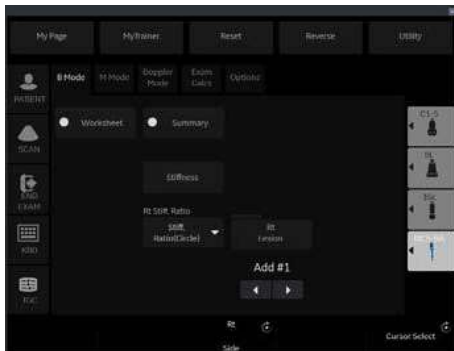
LOGIQ Techniques: Breast Productivity Package (continued)

Table 13-48:   Measuring Lesions

1. Select lesion folder on TP.   Width and Height will become available.
2. To measure manually, use calipers and Set Keys located on either side of the Trackball.

Note: Length is available to be added to TP. This may be confi gured in the utilities page.

3. For Auto Measurements, select Auto-contour on TP. (Two Choices Auto Contour (HxL) or Auto-contour (HxW).
4. Once Auto-contour is selected, identify the middle of lesion with cursor. Select Set Key.

5. Next, identify borders of lesion using Trackball to change size of circle so it encompasses the entire lesion. Select Set Key.
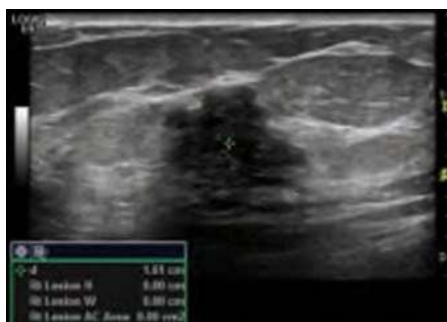
6. System will then segment lesion and generate measurements.

Note: System generates 4 different contour selections. Use Rotary Knob at bottom of TP to change between auto-contour selections.

LOGIQ Techniques: Breast Productivity Package (continued)

Table 13-49:   Characterize Lesion

1. Characterize the features of each lesion by selecting the Show Features Button. Select Feature by using Trackball and Arrow Key.
2. Select show assessment if applicable. Add comments and BI-Rad™ assessment.
3. At the end of the exam, select worksheet to view measurements. Select summary to view features and measurements.

Note: More than one Characteristic may be selected for each lesion. The Features and Characteristics that have an asterisk allow user to select more than one Feature within those selections.
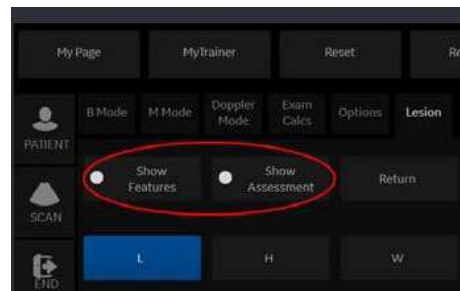
Table 13-50:   Adding/Editing

Enter multiple measurements by selecting the Lesion folder. When adding a new Lesion, Add #2, 3, 4, etc. For example, after measuring fi rst Lesion select Return on TP. Then select Lesion folder. This will add an additional Lesion to be measured.

When editing, folder will appear open and Edit will be shown.

This Selection control indicates which lesion is being assessed.
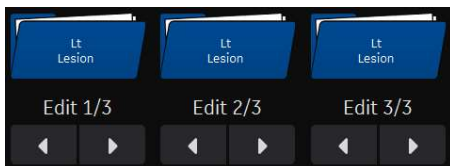
A 1st, 2nd, and/or 3rd left breast lesion will be edited or added. (If the Lesion folder is selected to add a Lesion, but no measurements are completed, the Lesion is not added.)

LOGIQ Techniques: Breast Productivity Package (continued)

Table 13-51:   Deleting

Select Delete Button on Touch Panel (TP) to delete current lesion that you are measuring.
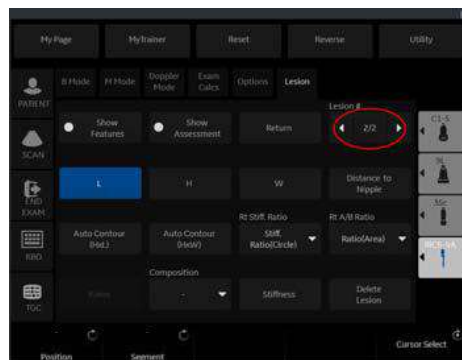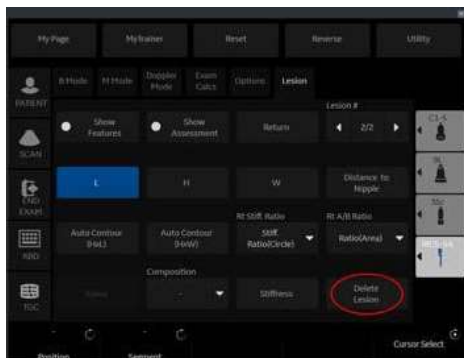
Note: To access a different Lesion to Edit or delete, select the # of the Lesion in the upper Right hand corner of the TP while in the measurement package.

Thyroid Productivity Package

The Thyroid Productivity Package is only available when the Thyroid Productivity Option is activated.
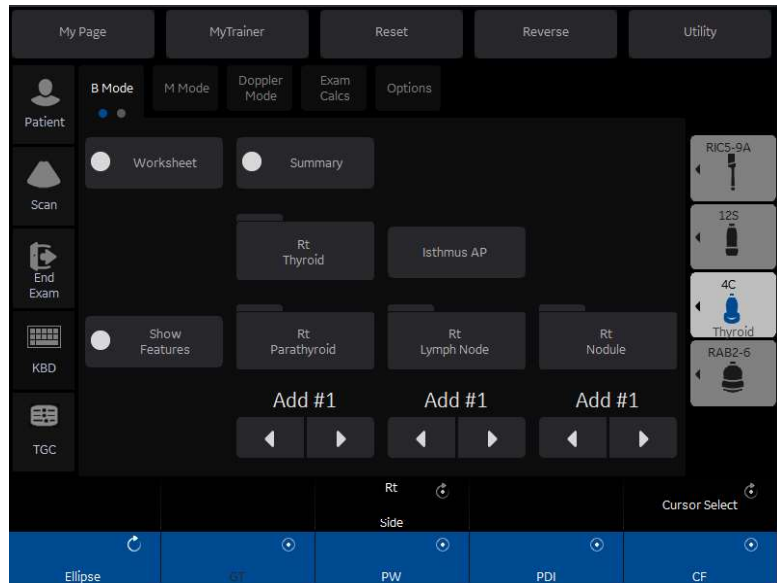
Figure 13-155.   Thyroid/Parathyroid/Lymph Node Touch Panel

Table 13-52:   Thyroid/Parathyroid/Lymph Node Touch Panel

Preset Parameter	Description
Side	Specify the side: **Right, Left, Isthmus**.
Worksheet/Summary	Select to view the Worksheet/Summary Worksheet.
Add#1, Add#2, etc.	Cycles through the available lesions, or adds a new lesion/node/nodule, etc.
Rt/Lt Thyroid Rt/Lt Parathyroid Rt/Lt Lymph Node Rt/Lt Nodule	When measuring the Left/Right Thyroid/Parathyroid/Lymph Node/Nodule, these folders highlight on the Touch Panel. Length, Height, and Width are available for all thyroid measurements. The Cortical Thickness measurement is available for the Lymph Node. Show Features is available for all thyroid measurements.

Table 13-52:   Thyroid/Parathyroid/Lymph Node Touch Panel (Continued)

Preset Parameter	Description
Isthmus Lymph Node Isthmus Nodule	When measuring the Isthmus Lymph Node/Nodule, these folders highlight on the Touch Panel. Length, Height, and Width are available for all isthmus measurements. The Cortical Thickness measurement is available for the Lymph Node. Show Features is available all isthmus measurements.

Show Features - Overall Thyroid	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature and on the Summary Worksheet. Below is a list of each Feature with its possible notations by measurement type:
	• Overall Thyroid (Top Level Touch Panel)
	   • Resected: Totally, Partially, None (-)
	   • Appearance: Within normal limits, Abnormal, Symmetric, Asymmetric R>L, Asymmetric L>R, None (-)
	   • Comment

Table 13-52:   Thyroid/Parathyroid/Lymph Node Touch Panel (Continued)

Preset Parameter	Description

Show Features - Lt/Rt Thyroid / Parathyroid / Lymph Node / Nodule	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature and on the Summary Worksheet.
	Below is a list of each Feature with its possible notations by measurement type:
	• Lt/Rt Thyroid
	    • Resected: Totally, Partially, None (-)
	    • Echogenicity: Homogeneous; Coarse; Heterogeneous; Hashimoto, Classic; Hashimoto, Probable; None (-)
	    • Vascularity: Normal, Increased, Decreased, None (-)
	    • Size: Normal, Enlarged, Small, None (-)
	    • Comment
	    • Isthmus Comment
	• Lt/Rt Parathyroid -- Upper/Lower Gland
	    • Visibility: Visualized, Not Visualized, None (-)
	    • Comment
	• Lt/Rt Lymph Node
	    • Appearance: Within normal limits, Suspicious, Pathologic, None (-)
	    • Composition: Cystic, Complex, Solid, None (-)
	    • Vascularity: Normal, Increased hilar, Increased non-hilar, None (-)
	    • Comment
	• Lt/Rt Nodule
	    • Shape: Round, Oval, Irregular, Lobulated, None (-)
	    • Margin: Well Defined, Well Defined with halo, Well Defined with partial halo, Well Defined with complete halo, Poorly defined, Irregular, None (-)
	    • Composition: Solid, Cystic, Mixed, Complex, Heterogeneous, None (-)
	    • Vascularity: Normal, Increased, Decreased, Central Vasc (Avascular, Hypovascular, Isovascular, Hypervascular, Severely Hypervascular), None (-)
	    • Calcification: No Calcification, Coarse central, Coarse rim, Punctate scattered, Punctate clumped, Colloid, Mixed, None(-)
	    • Comment
	    • Koios Assessment

Table 13-52:   Thyroid/Parathyroid/Lymph Node Touch Panel (Continued)

Preset Parameter	Description

Show Features - Isthmus	Press to activate the Show Features notations. To add notations for each feature, position the trackball to the right of each feature and press Set. This brings up the available notations. Move the Trackball to highlight a notation and press Set to select a notation. The notation will then appear next to the feature. Below is a list of each Feature with its possible notations by measurement type:
	• Isthmus Lymph Node
	   • Appearance: Within normal limits, Pathologic, None (-)
	   • Composition: Cystic, Complex, Solid, None (-)
	   • Vascularity: Normal, Increased, None (-)
	   • Comment
	• Isthmus Nodule
	   • Shape: Round, Oval, Irregular, Lobulated, None (-)
	   • Margin: Well Defined, Well Defined with halo, Well Defined with partial halo, Poorly defined, Irregular, None (-)
	   • Composition: Solid, Cystic, Mixed, Complex, Heterogeneous, None (-)
	   • Vascularity: Normal, Increased, Central Vasc (Avascular, Hypovascular, Isovascular, Hypervascular, Severely Hypervascular), None (-)
	   • Calcification: Coarse central, Coarse rim, Punctuate scattered, Punctuate clumped, Colloid, Mixed, None (-)
	   • Comment
	   • Koios Assessment

Return	Press to return to the previous Touch Panel.
H	Height
W	Width
L	Length
Isthmus AP	Used to measure the Isthmus height distance.
Cortical Thickness	Cortical thickness of the lymph node.
Delete	Press to delete this anatomy.

Worksheet and Summary Worksheets

Worksheets and Summary Worksheets are provided for all documented Thyroid anatomies.

Figure 13-156.   Thyroid Worksheet

To move to the next page, select the Page Change control beneath the Touch Panel.

Worksheet and Summary Worksheets (continued)
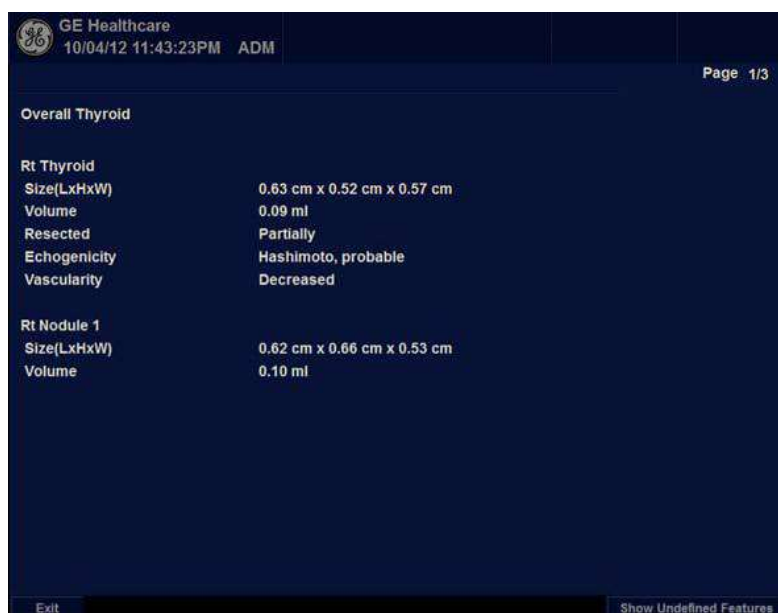
Figure 13-157.   Thyroid Summary Report

NOTE: Only defined features are displayed on the Summary Report. To display the undefined features, select "Show Undefined Features" at the bottom of the Summary Worksheet.

NOTE: To exit back to the previous measurement screen, press Set on exit.

NOTE: To exit back to the scan screen, press Worksheet/Summary on the Touch Panel.

Thyroid Productivity Package Quick Card

LOGIQ Techniques: Thyroid Productivity Package

Table 13-53:   Getting Started

1. Select measure to activate Thyroid productivity package.
2. Select side of scan. Use Rotary Knob to change between Right, Left, and Isthmus at the bottom of the Touch Panel (TP).
3. Choose folder specific to the area of interest (Isthmus is an option as well as RT and LT Thyroid, Parathyroid, Lymph node or nodule).
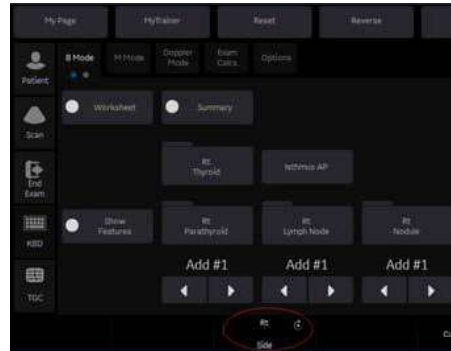
Table 13-54:   Measuring

1. Once Folder is selected, L, H, and W measurements will become available. Use Trackball and Set Keys on either side of the Trackball to measure.
2. After measuring Area of Interest, select Location A and Location B. Toggle rotary knobs up or down between selections, then choose desired locations.
3. Store image after measurements are completed. These measurements will then transfer to Worksheet/Summary Page.
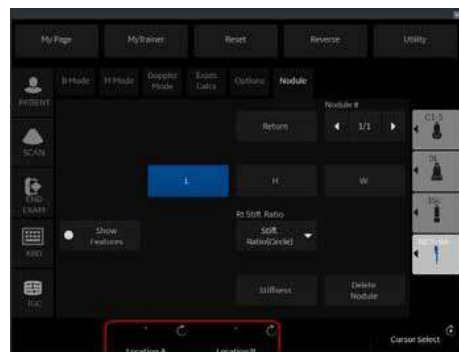
Note: At any time, select Return on TP to return to previous page, or select measure again to exit the productivity package.

LOGIQ Techniques: Thyroid Productivity Package (continued)

Table 13-55:   Characterize Thyroid, Parathyroid, Lymph Node or Nodule

1. Select the show features button on the Touch Panel to describe the characteristics of the Thyroid, Parathyroid, Lymph node or nodule which is being measured.
2. Place arrow over selection and choose from items in Drop Box.
3. Add additional comments as needed in Comments Box.
4. At the end of the exam, select Worksheet to view measurements and Summary to view Features and Measurements.
5. Select Exit to get back to Measurements Package.
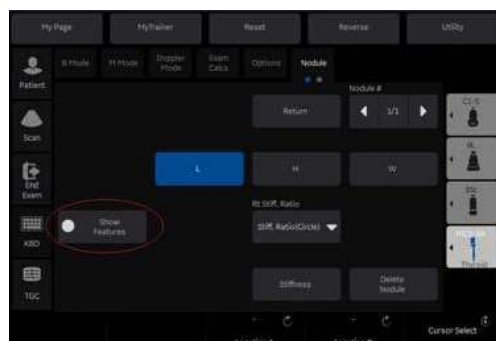
Note: More than one Characteristic may be selected. Features/Characteristics that have an asterisk allow user to select more than one Feature within those selections.
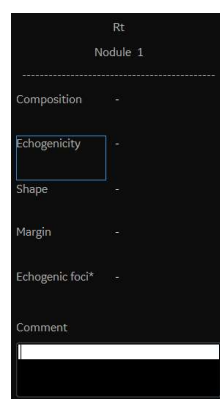
Table 13-56:   Adding/Editing

Enter multiple measurements by selecting the Nodule, Lymph node or Parathyroid folder. When adding a new nodule, add #2, 3, 4, etc. For example, after measuring first nodule, select Return on Touch Panel. Then select nodule folder. This will add an additional nodule to be measured.

When editing, folder will appear open and Edit will be shown.

This selection control indicates what action the Nodule folder above it is going to take when pushed.

Note: Up to 30 Rt/Lt thyroid lymph nodes/nodules can be added or edited.
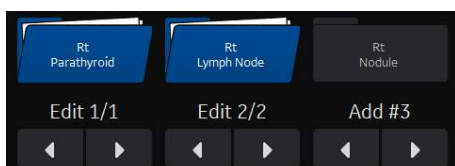
A 1st, 2nd, and/or 3rd right thyroid nodule will be edited or added. (If the nodule folder is selected to add a nodule, but no measurements are completed, the nodule is not added.)

LOGIQ Techniques: Thyroid Productivity Package (continued)

Table 13-57:   Deleting

Select Delete Button on Touch Panel to delete current nodule that you are measuring.
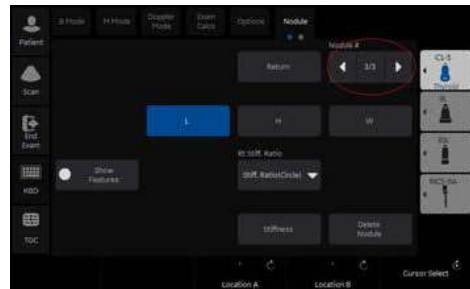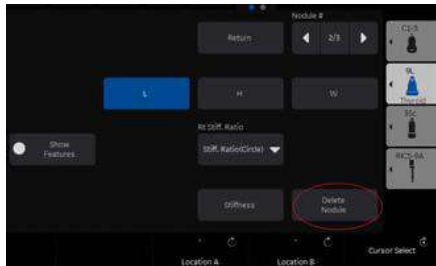
Note: To access a different nodule, Parathyroid or Lymph node to edit or delete, select the # of the nodule in the upper right hand corner of the TP while in the measurement package.

Auto EF Measurements

Automated Ejection Fraction (AutoEF) is a semi-automatic measurement tool used for measurement of the global EF (Ejection fraction). The AutoEF tool is used as an optional decision support tool.

The AutoEF tool tracks and calculates the myocardial tissue deformation based on feature tracking on B-mode cine loops.

AutoEF is performed on either one or both apical 4-chamber or 2-chamber views, in any order.

The result is presented as Ejection Fraction value for each view and average Ejection Fraction for the whole LV. All values are stored to the worksheet after the results are approved (see See 'Tracking Validation' on *page 13-292 for more information.*).

NOTE: *The AutoEF tool is intended for adult cardiology and is not intended to be used in pediatrics cardiology.*

Acquisition

NOTE: *AutoEF is only available on 3Sc-RS, 6S-RS, 12S-RS, 6Tc-RS and M5Sc-RS.*

1. Create an exam, connect the ECG device and make sure to obtain a stable ECG trace.

2. Acquire B-mode cineloops of an Apical 4 chamber view (4-ch) and an Apical 2 chamber view (2-ch).

   • The frame rate should be between 37 and 80 frames per second. A higher frame rate is recommended for high heart rate.

   • LOGIQ P8/P9/P10 should be configured to store at least 100 ms before and after each heart cycle.

   • If the acquisition has more than one heart cycle, the analysis will be done on the second last heart cycle.

   • The entire myocardium should be visible.

   • A depth range that includes the entire left ventricle should be used

NOTE: *The AutoEF processed image loop runs slower than the actual cardiac motion. To see the loop in correct playback speed, exit AutoEF.*

Starting AutoEF

1. Recall any one of the stored views and press **Measure**.

2. In the Touch Panel, select *AutoEF*.

    The View selection menu is displayed.

Figure 13-158.   View Selection Menu

3. Select the name of the current view: 4-ch or 2-ch. A ROI is defined and tracked through the entire heart cycle as detailed below.

Defining the endocardial border (EB)

When selecting a view to analyze, the system automatically displays a frame where the endocardial border is usually clearly visible. The system automatically displays the ROI for tracking on the screen and the tissue tracking starts. When the tracking is completed and displayed, you can either accept the results or recalculate/redraw the endocardial border (EB).

Selecting "Recalc"

When selecting Recalc, you have the option to correct the EB manually or to revert to the semi-automatic 3 Point EB definition mode. (To revert to semi-automatic mode, press Auto ROI.) If you adjust any point in the EB and wait a few seconds, the system automatically starts reprocessing.

You can also choose another frame to redefine the EB. To choose another frame, turn off the YOYO function, and adjust the Left/Right marker.

It is also possible to define an EB in semi-automatic 3 Point mode.

Defining Endocardial Border (EB) in semi-automatic 3 Point mode

To define the endocardial border, place three points at the endocardial border; two annular points at the base and one at the apex. Follow the indications displayed on the screen when placing the three points.

After placing the third point on the Apex, an endocardial border will automatically be traced (Figure 13-159 *on page 13-287*).

After Selecting 3 Points, the old EB is cleared from the screen and you can redefine a new EB using the 3 Point EB Definition method as described above.

NOTE: *Correct border tracing is important for an accurate EF measurement. The system has an adaptive border tracing function: using the endocardial three points as a guide, the system will analyze the image and automatically adapt the border tracing to an optimal position.*

NOTE: *The YOYO function is turned on to help finding the correct location for the points.*

Editing the endocardial border trace

1. If required, use the Edge Shift Left/Right controls to delineate separately the left or right portions of the endocardial border visually as best as possible.

2. If required, move the trackball cursor over the border trace, select an anchor point (red circle), press SET and correct the trace by dragging the anchor point to a new location (Figure 13-160 *on page 13-288*). The shape of the border trace will update accordingly.

3. In case you wish to start over, press 3 Points and re-position the 3 points defining the basal and apex points.
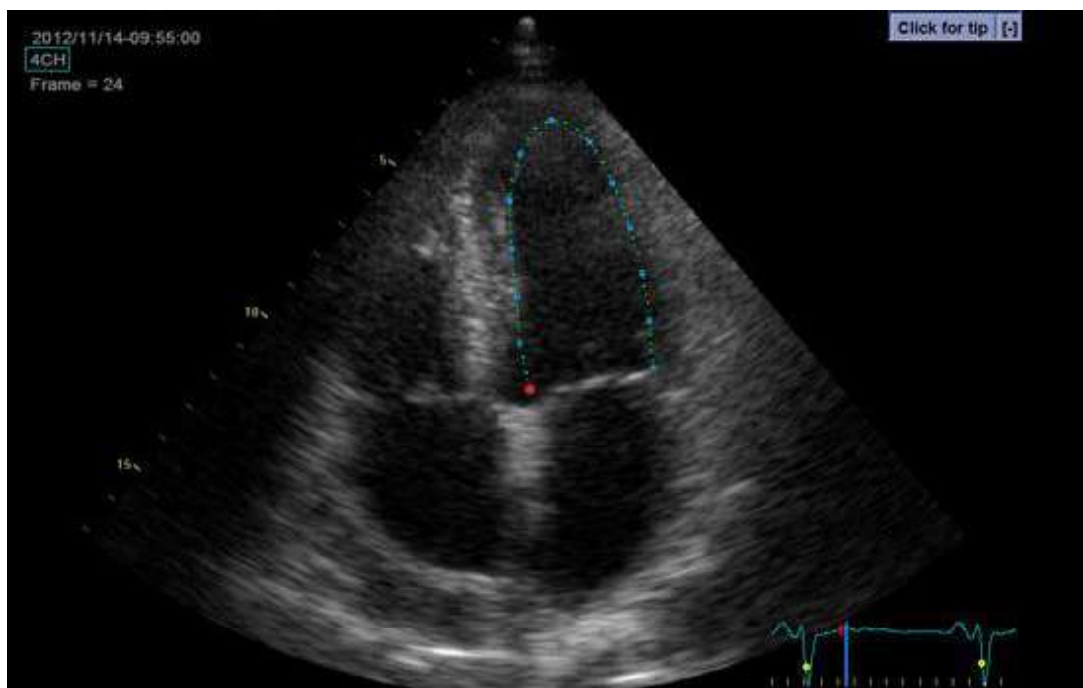
Figure 13-159.   Defining a ROI

Editing the endocardial border trace (continued)

4. Place the trackball cursor over the desired point.

5. Selected Point is marked by a red circle.

6. Click over the red circle, it will turn to a square.
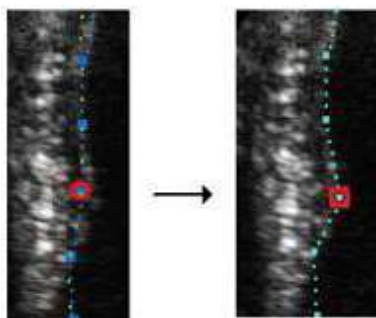
Figure 13-160.   Selected anchor point on the inner border trace

7. Move the square to re-align the border trace.

8. Press the **Process** button when ready.

NOTE: *Data processing is configured by default to start automatically if the cursor is not moved for a few seconds. If the trace needs to be adjusted, make sure to make the changes immediately after the ROI is displayed.*

EF results screen

When processing is complete the EF results screen is displayed (Figure 13-161 *on page 13-290*).

NOTE: *The bi-plane results (BiP) will only appear on screen (Figure 13-161) after measuring both 2-Ch and 4-Ch views.*

The AutoEF processed image runs slower than the original loop speed. In order to see the loop in correct playback speed exit AutoEF.

The running loop is shown on the left. A green dotted line marks the inner border of the chamber. In case of poor tracking, the system will automatically display parts of the border in red.

The system will automatically pick the frames with the maximal area (ED) and minimal area (ES) and place them on the right area of the display.

The End Diastolic volume (EDV) and end Systolic Volume (ESV) is calculated and shown above each frame.

The resulting EF calculation is displayed on the top of the screen.

EF results screen (continued)
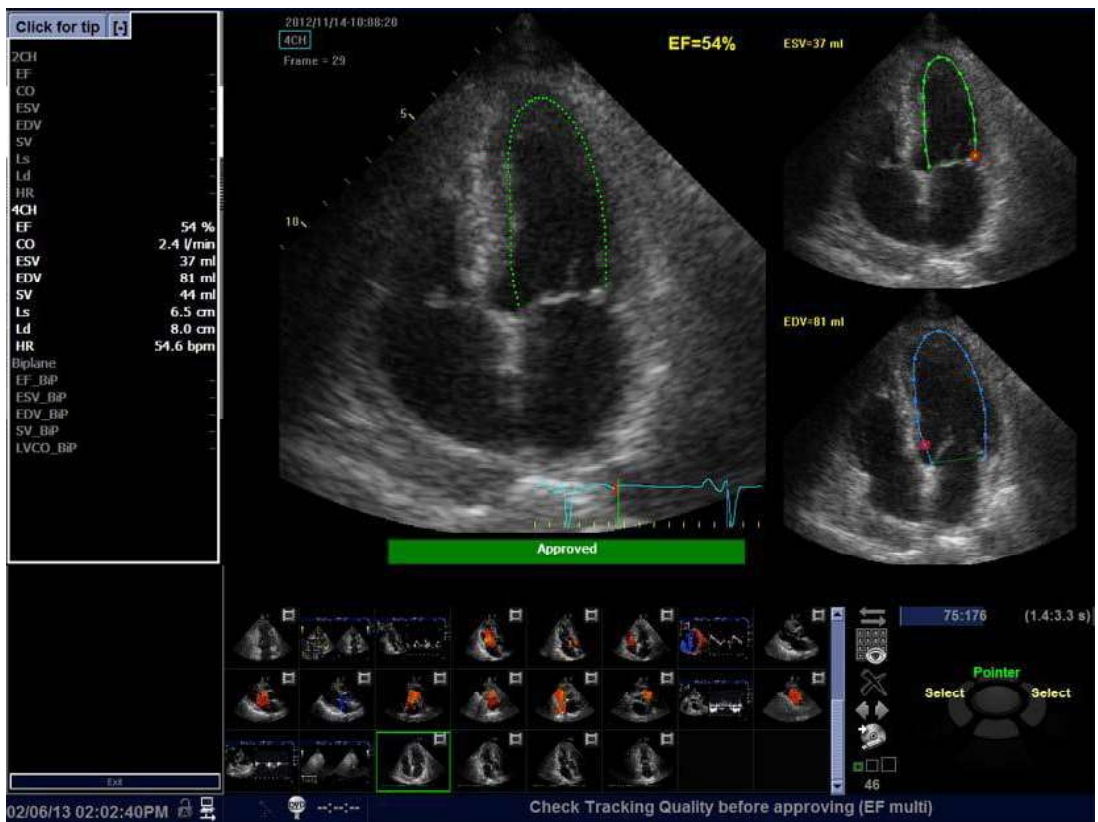
Figure 13-161.   AutoEF Result Multi Screen

EF results screen (continued)
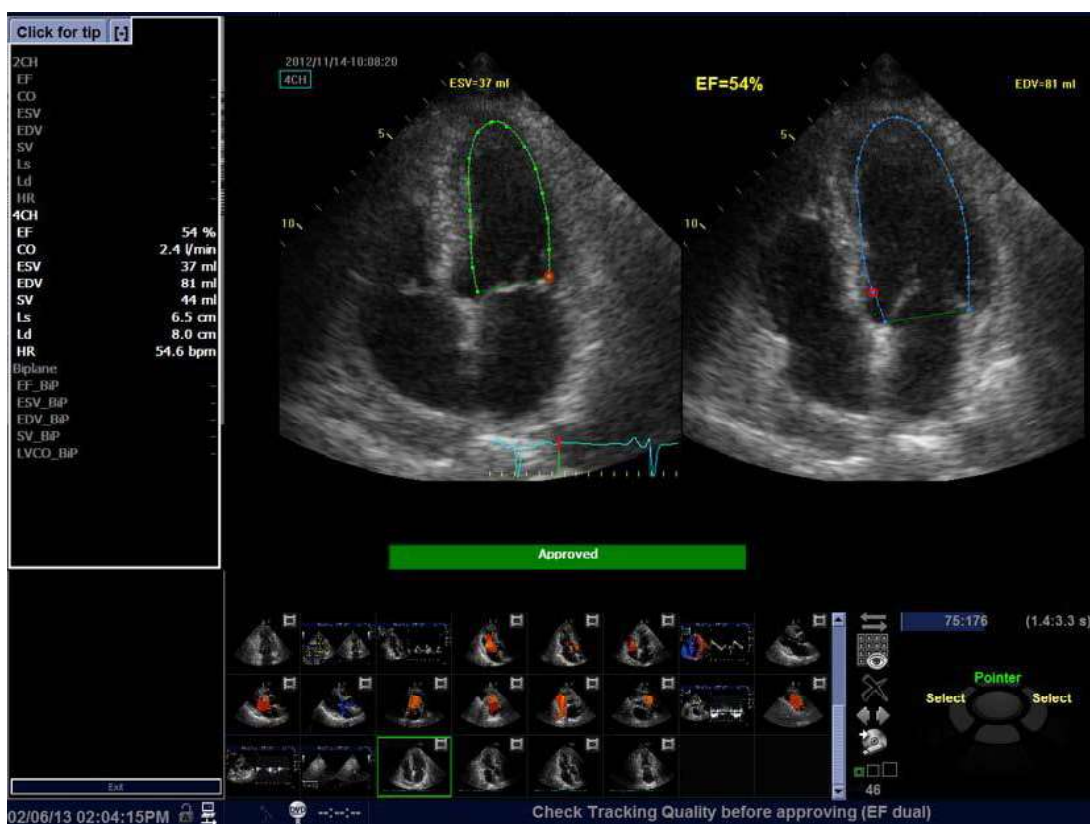
Figure 13-162.   AutoEF Results Dual Screen - Alternative screen mode

Tracking Validation

The tracking must be visually controlled and validated. If the tracking results are visually correct press the red Approve button. The button turns green and is labeled Approved. The calculated values will be stored and appear in the worksheet.

The following can be done if tracking needs correction:

- Press *EF Dual* to enlarge ES and ED frames and position them side-by-side (Figure 13-162 *on page 13-291*).

- You may manually select a different ED frame or ES frame using the ED frame or ES frame rotary.

- You may edit any misaligned point on either ED or ES frames. This is done by:

    a. Placing the trackball cursor over the desired point.

    b. Clicking over the red circle, it will turn to a square.

    c. Pressing **Set** and moving the square to re-align the border trace.

    d. The ESV, EDV and EF will be recalculated accordingly.
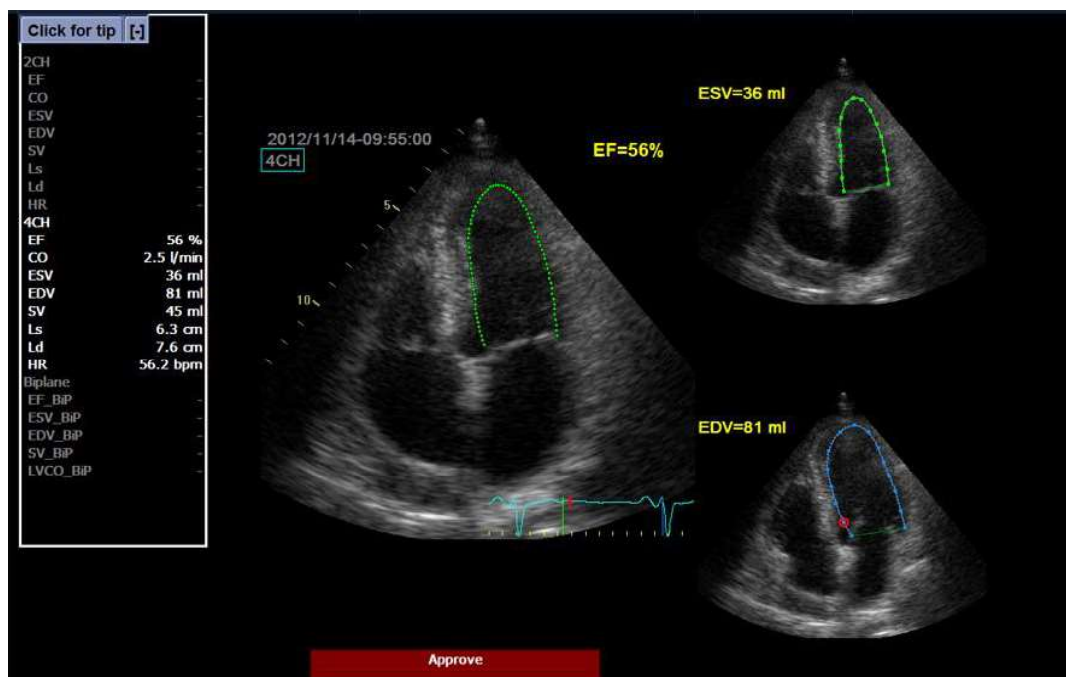
Figure 13-163.   Border trace edit

Tracking Validation (continued)

- In case these results are incorrect, you may go back to the previous step by pressing the Recalc button and editing the endocardial border ('Defining the endocardial border (EB)' on *page 13-285*).

- In case editing the endocardial border is too difficult, you may start all over again by pressing Auto ROI and retrace the border ('Defining the endocardial border (EB)' on *page 13-285*).

Possible causes of poor tracking

Poor tracking quality could result from a variety of causes. The common causes for bad tracking are:

- Erroneous placement of the basal points when defining the border. If the basal points are placed too far from the annular region, the border segments at the annular base will not move together with the underlying 2D image throughout the entire heart beat.

- Erroneous placement of the apex point when defining the border. The point should be placed so that the resulting border trace covers mainly the endocardium. If the apex point is placed too high, the border trace will mainly cover the epicardium resulting in poor tracking.

- Too much clutter. Images with too much static clutter will result in poor tracking.

Results

For each of the views, a results screen containing the EF calculation, appears (Figure 13-161 *on page 13-290*) in a mini-report. The mini-report appears on the left side of the results window.

Figure 13-164.   Mini Report

Results (continued)

The results are summarized in the worksheet and in the report.

Figure 13-165.   Results in Worksheet - Page 1

Results (continued)

Figure 13-166.   Results in Report template

Exit AutoEF

Press **Exit** to end AutoEF.

Pressing Report, Patient or Scan also closes the AutoEF package.

NOTE: *Do not disable any sub-measurement of AutoEF in Utility --> Measure, as this will disable the whole set of AutoEF measurements.*

NOTE: *For consistent results, do not delete individual AutoEF measurements from the worksheet. Always delete a full column.*

Cardiac Automated Function Imaging (Cardiac Strain)

Cardiac Strain is a decision support tool for regional assessment of the LV systolic function. Cardiac Strain is a tool derived from 2D Strain, which calculates the myocardial tissue deformation based on feature tracking on B-Mode grey scale loops.

Cardiac Strain is performed on apical views in the following order: apical long-axis, 4-chamber and 2-chamber view, following an on screen guided workflow. The apical views may be acquired sequentially in B-Mode.

Cardiac Strain is also available for standard apical views acquired with a TEE probe.

The result is presented as a Bull's eye display showing color coded and numerical values for peak systolic longitudinal strain.

All values are stored to the worksheet. In addition, Global Strain for each view, Average Global Strain for the whole LV and the Aortic Valve Closure time used in the analysis are stored to the worksheet.

Table 13-58:   Cardiac Strain Workflow

	1	2	3	
	APLAX	**4-CH**	**2-CH**	**Step**
1				Acquired views

Table 13-58:   Cardiac Strain Workflow (Continued)
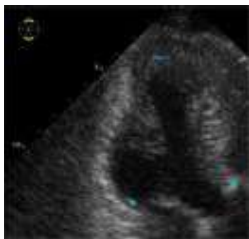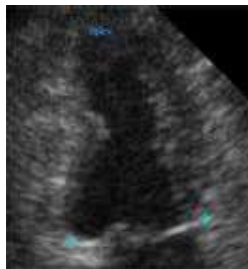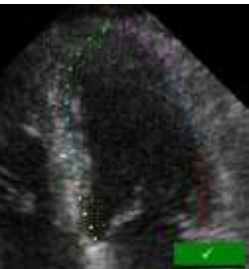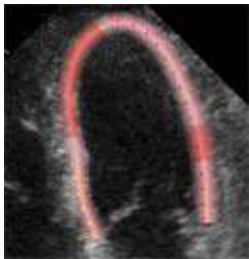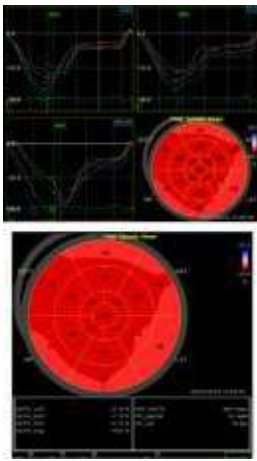
	1	2	3	
	APLAX	**4-CH**	**2-CH**	**Step**
2				Defining a ROI
3				Tracking Validation
4		-	-	AVC Timing Adjustment
5			-	Parametric image result

Table 13-58:   Cardiac Strain Workflow (Continued)

	1	2	3	
	APLAX	**4-CH**	**2-CH**	**Step**
6	-	-		Trace and Bull's eye result

Acquisition

CAUTION — Cardiac Strain is only recommended for adult cardiac images acquired with the 3Sc-RS, 6S-RS, 12S-RS, 6Tc-RS and M5Sc-RS.

1. Specify Cardiac Strain-specific values for certain parameters in M&A Advanced Preset if needed.
2. Create an exam, connect the ECG device and make sure to obtain a stable ECG trace.
3. Select **CARD** -> **Adult** from the model menus. Acquire a sequential acquisition.

   Acquire B-Mode gray scale cineloops of an Apical long axis (APLAX) view.

   NOTE: It is recommended to acquire all three apical views sequentially in order to get similar heart rate in all views.

   • The frame rate should be between 37 and 80 frames per second. A higher frame rate is recommended for high heart rate.
   • The system should be configured to store 100 ms before and after each heart cycle.
   • If the acquisition has more than one heart cycle, the analysis will be done on the second to last heart cycle.
   • The entire myocardium should be visible.
   • A depth range that includes the entire left ventricle should be used.

4. Press **Freeze**. Run the cine and press **P1** to store the cine into the clipboard.
5. Acquire and store B-Mode gray scale cineloops of an Apical 4 chamber view and an Apical 2 chamber view as described above.

Starting Cardiac Strain

Starting Cardiac Strain from sequential acquisition.

1. Open an APLAX view and press **Measure**.
2. Select *AFI* on the Touch Panel.
3. Three apical view buttons appears on the left side menu.

⚠ CAUTION

When performing Cardiac Strain on all three apical views, the user is asked to start with the APLAX view. This allows manual adjustment of the Aortic Valve Closure (AVC) event timing that is used in the calculation of the longitudinal systolic strain in all apical views.

Cardiac Strain on the APLAX view

1. Select *APLAX*.

    A ROI following the endocardium is created and the Tracking validation screen is displayed.
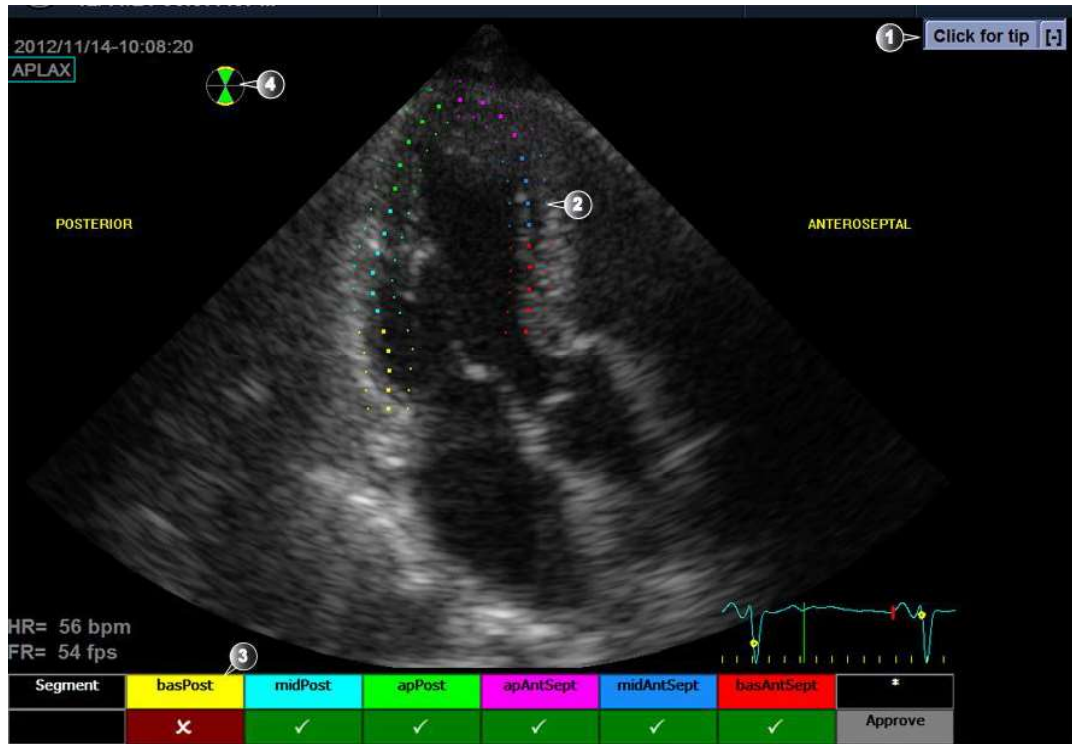
Figure 13-167.   Tracking Validation screen

> 1. Display Quick Tips on tracking quality assessment
> 2. The ROI divided in segments
> 3. The Scoring table
>   • acceptable tracking
>   • not acceptable tracking
> 4. Bull's eye icon:
>   • Green sectors with yellow border: views being analyzed.
>   • Green sectors: views already analyzed.
>   • Black sectors: views not analyzed.

Cardiac Strain on the APLAX view (continued)

2. Pay attention on the left/right orientation of the image: compare the LV wall names with a visual inspection of the image.

   If the image orientation is wrong create a new ROI manually as described in the section 'To create a new ROI' on *page 13-308* . Make sure to place the basal points correctly relative to the image landmarks when defining the ROI.

NOTE: *You may alternatively exit Cardiac Strain, invert the image and start Cardiac Strain again.*

The ROI is divided into segments. The tracking quality for each segment is automatically evaluated and summarized in the Scoring table (see Figure 13-167 *on page 13-303*).

The tracking for each segment must be visually controlled and validated as described below.

Tracking Validation

⚠ CAUTION Poor tracking quality may lead to incorrect measurement results. The tracking for each segment must be visually controlled and validated.

Poor tracking quality could result from a variety of causes. Select Quick tips (see Figure 13-167 *on page 13-303*) to get tips on the most common causes for bad tracking. The common causes for bad tracking are:

- Erroneous placement of the basal points when defining the ROI. If the basal points are placed too far from the annular region, the ROI segments at the annular base will not move together with the underlying 2D image throughout the entire heart beat (see example cineloops in the Quick tips).

- Erroneous placement of the apex point when defining the ROI. The point should be placed so that the resulting ROI covers mainly the myocardium. If the apex point is placed too high, the ROI will mainly cover the epicardium resulting in poor tracking (see example cineloops in the Quick tips).

- Too narrow ROI width. Narrowing the ROI too much will result in poor tracking due to lack of tissue data in the ROI (see example cineloops in the Quick tips).

- Too much clutter. Images with too much static clutter will result in poor tracking (see example cineloops in the Quick tips).

Tracking Validation (continued)

1. Inspect each segment and make sure that the center line is moving together with the underlying 2D image.

    The tracking quality is automatically evaluated for each segment and displayed in the Scoring table.

    The tracking in each segment is scored as either Acceptable (v) or Not acceptable (x).

    If the tracking needs to be improved for some segments, the user can modify the ROI or create a new ROI as described in 'ROI adjustment' on *page 13-307* or create a new ROI as described in 'To create a new ROI' on *page 13-308* .

    The user may override the tracking quality evaluation done by the system by clicking on the evaluation result in the Scoring table.

2. Once the tracking quality has been controlled for all segments, press Approve in the Scoring table.

    The user is asked to confirm or adjust the AVC timing setting (see 'Timing Validation' on *page 13-312*).

ROI adjustment

If the automatic ROI is not optimal resulting in poor tracking, the user can either adjust the ROI or create a new ROI as described below.

To adjust the ROI

1. Press **Recalc**.
2. The following adjustments can be done to the existing ROI:
   - Adjust ROI Width.
   - Adjust the shape of the existing ROI: move the cursor over the inner ROI border, select an anchor point and move it to a new location. The shape of the ROI is updated accordingly.
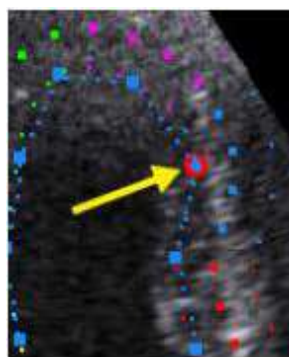
Figure 13-168.   Selected anchor point on the inner ROI border

Data processing is started automatically if the cursor is not moved for a few seconds.

NOTE: *If the ROI needs to be adjusted make sure to make the changes immediately after the ROI is displayed.*

NOTE: *The auto processing function is configurable (from Utility -> Measure -> Advanced -> AFI auto processing).*

The Tracking validation screen is displayed.

3. Perform Tracking validation (see 'Tracking Validation' on *page 13-305*).

To create a new ROI

1. Press *Recalc*.

2. Press *3 Points* to re-define the ROI.

   The system automatically displays a frame where the endocardial border is usually clearly visible.

3. To define a ROI, place three points at the endocardial border; two annular points and one at the apex (see Figure 13-169). Follow the indications displayed next to the pointer and on the Status bar when placing the three points.

NOTE: *The Yo-yo function is turned on to help find correct location for the points.*
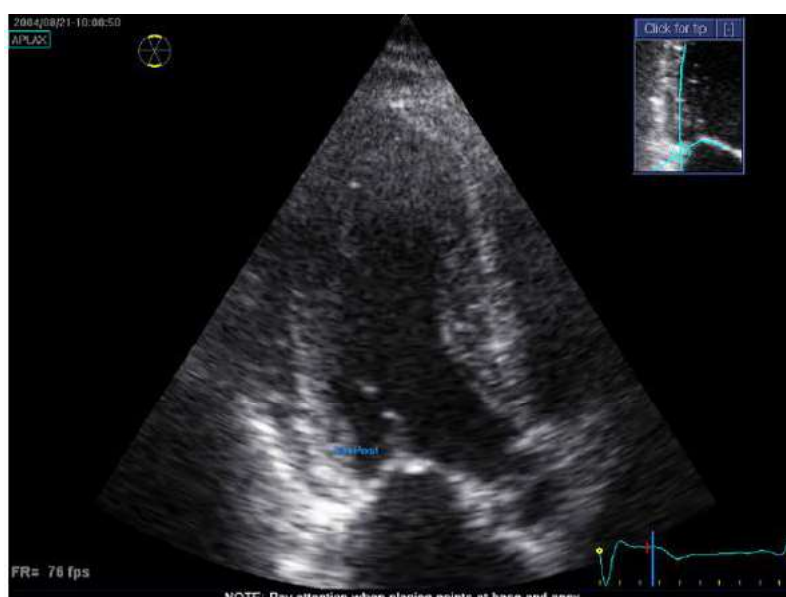
Figure 13-169.   Defining a ROI

After placing the apex point, the ROI is displayed.

NOTE: *Correct ROI definition is important for an accurate strain measurement. The system has an adaptive ROI function: using the endocardial three points as a guide, the system will analyze the image and automatically adapt the ROI to an optimal position.*

Data processing is started automatically if the cursor is not moved for a few seconds.
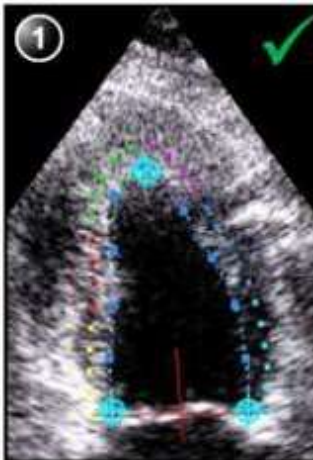
The Tracking validation screen is displayed.
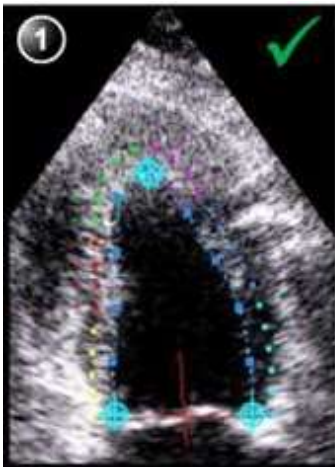
4. Perform Tracking validation (see 'Tracking Validation' on *page 13-305*).
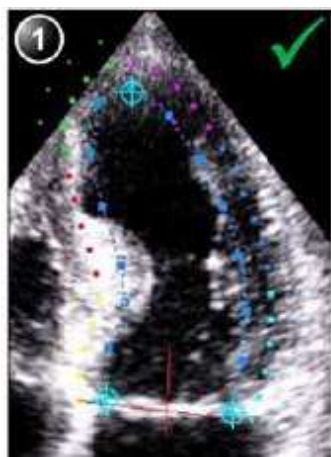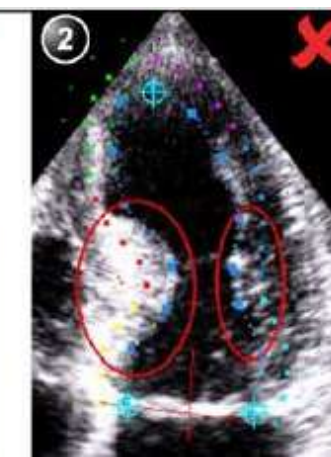
Quick tips when re-creating the ROI
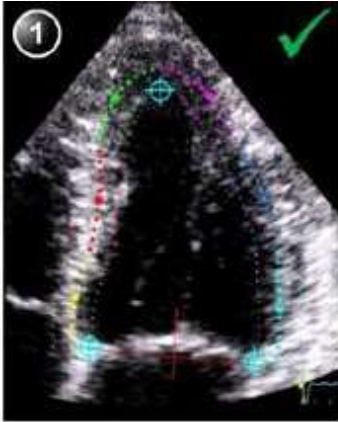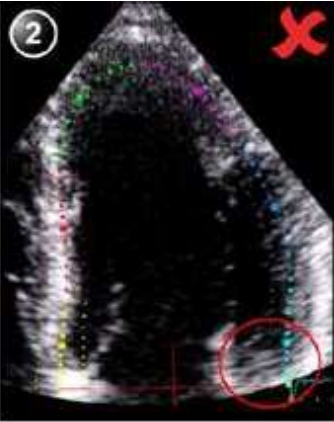
Correct ROI definition is crucial to get good tracking. Refer to the example displayed in the Tip window for correct point placements. To display additional guidelines, select Click for Tip. Make sure to follow the recommendations when placing the three points (see below).

Base	Correct	Wrong
1. Correct position of the base points. 2. The ROI extends into the aortic tract.		

Apex	Correct	Wrong
1. Correct position of the Apex points. 2. The apex point is placed too high. The ROI is extending beyond the epicardium.		

Apex	Correct	Wrong
1. Correct position of the Apex points. 2. The upper right border of the ROI is way too much into the chamber cavity..		

Bulges	Correct	Wrong
1. Correct ROI. 2. ROI should not be bulging or follow the papillary muscle. To edit the ROI, see 'ROI adjustment' on *page 13-307* .		

General	Correct	Wrong
The left ventricle must be visible through the entire cycle. 1. End systole frame: the entire left ventricle is displayed.. 2. End diastole frame: the annulus is not displayed.		

Timing Validation

Timing information may be crucial to accurate diagnosis. The most important event timing is the aortic valve closure (AVC), since it is part of the definition of the end systolic strain parameter.

Determination of the AVC timing by the system is as follows, depending on the situation:

• An automatic AVC estimate determined by the temporal contraction of all LV segments (Strain curves) is used.

• From the APLAX view, the user can adjust the estimated AVC timing. The adjusted AVC timing will then be used in the other apical views when running Cardiac Strain on these views.

This option is only available from the APLAX view.

AVC Timing Adjustment

This procedure is available in the APLAX view only.

1. After validation of the tracking quality, the frame for the automatic AVC setting is displayed and highlighted on the ECG.

2. To keep the current AVC setting, press **Set**. To change the AVC setting, use the trackball to display another frame and press **Set**.

If the AVC setting was changed, a Confirmation window is displayed. Select one of the following options:

• Manual to accept the manual AVC setting.

• Auto to discard the manual AVC setting and use the automatic AVC timing.

The parametric systolic strain APLAX view is displayed.
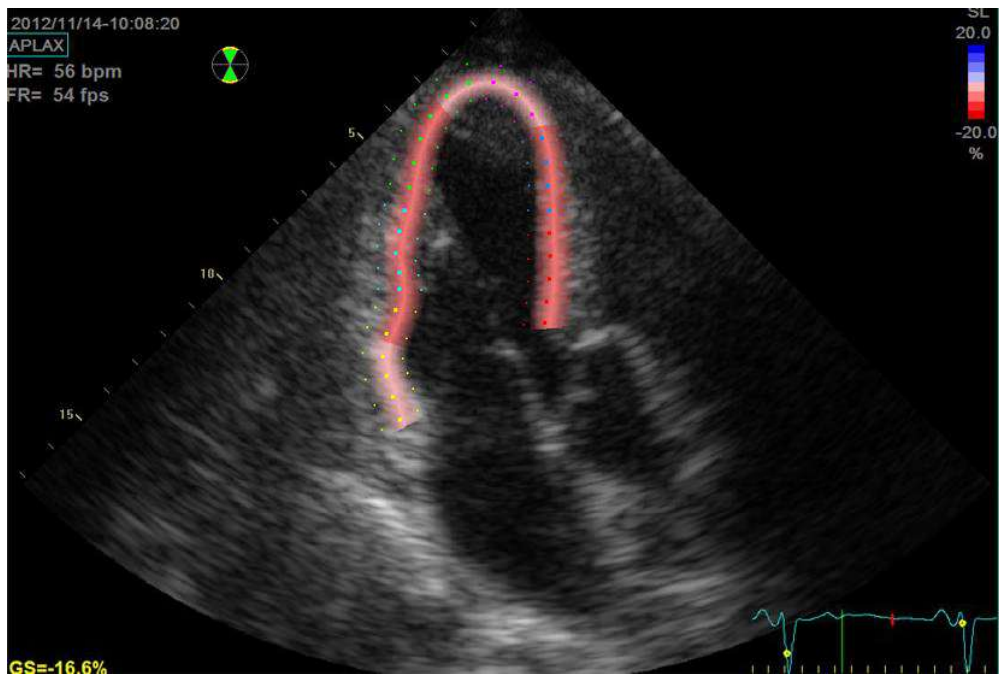
Figure 13-170.   Parametric systolic strain APLAX view

AVC Timing Adjustment (continued)

NOTE: *The image will not be saved unless Print key is pressed.*

To activate a quad display, press and hold down **L**.

- 2D image with the ROI
- 2D image with Peak systolic strain parametric data
- Segmental curves with peak marker
- M-Mode image with strain parametric data
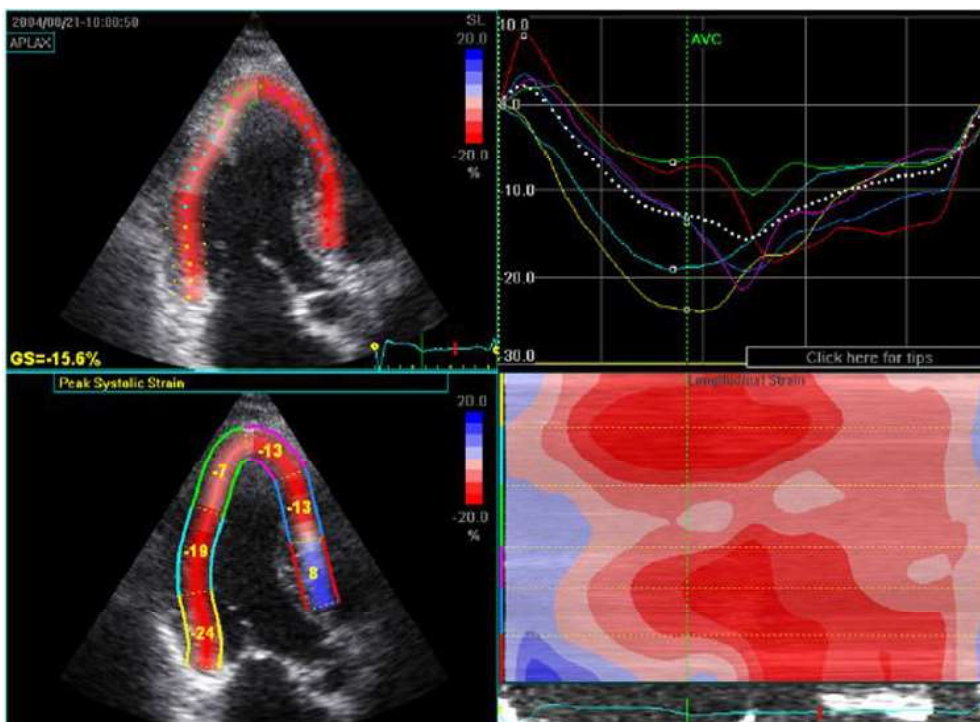
Figure 13-171.   Quad screen for the APLAX view

NOTE: *The Quad screen will not be saved unless Print key is pressed.*

Cardiac Strain on A4-Ch and A2-Ch views

The procedure for Cardiac Strain on Apical 4-chamber and 2-chamber views is similar to the one used in the APLAX view.

For sequential acquisition,

1. Open the apical view from the clipboard.
2. Select the corresponding view in the View selection menu.
3. Validate tracking (see 'Tracking Validation' on *page 13-305*).

NOTE: *The AVC timing setting defined in the APLAX view is used by the system when running Cardiac Strain on the other apical views.*

Results

For the APLAX and apical 4-chamber views the following results are available:

- 2D image with the ROI
- 2D image with Peak systolic strain parametric data
- M-Mode image with strain data
- Segmental curves

CAUTION

If auto-AVC is used as AVC timing calculation method when running Cardiac Strain (see 'Timing Validation' on *page 13-312*), the strain values displayed in the Quad screen for the APLAX and 4 Chamber views may differ from the strain values obtained after the system has performed the final calculation from all three views.

The reason for this is that the Auto-AVC calculation derived from all three views is most accurate and may be different from the intermediate AVC calculations used for each view.

The strain values displayed in the Quad screen on APLAX and 4 Chamber views are therefor preliminary values (A warning text about this is displayed on the Quad screen). Only final strain values should be reported.

Note: If you enter Quad screen again after all three loops have been processed, the strain values will be correct.

Results (continued)

When performing Cardiac Strain on all three apical views the following results are also available:

- Bull's Eye and Traces screen displaying:
    - Segmental curves for each three Apical views
    - Bull's eye presentation with segmental Peak systolic strain color coding and segmental Peak systolic strain values.

Select *BE+Trace* to display.
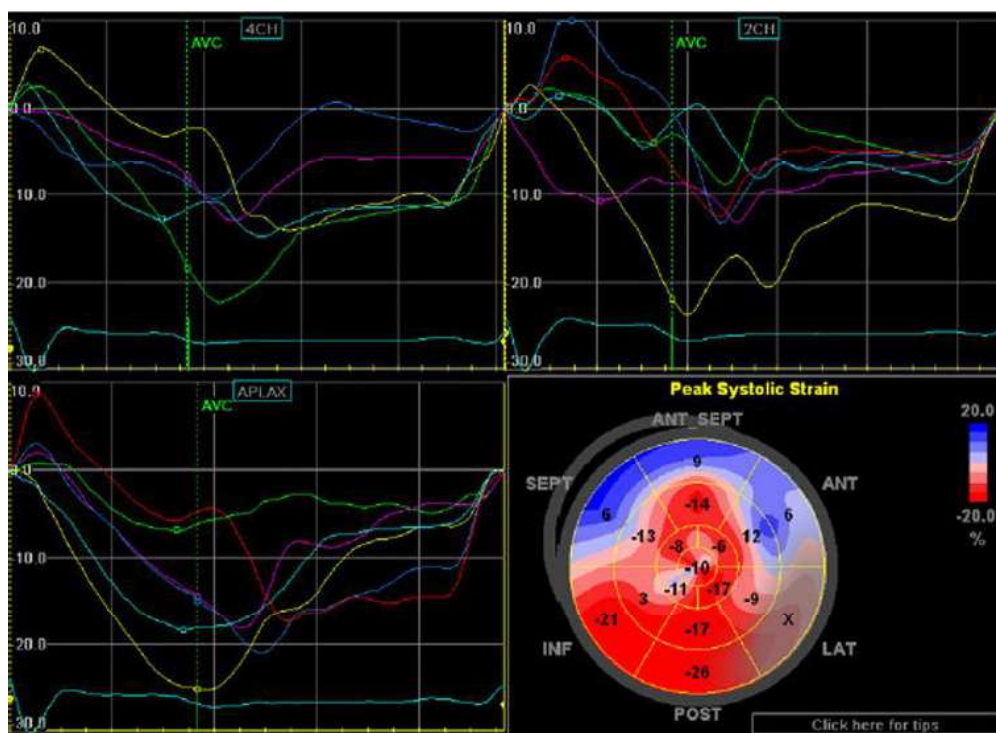
Figure 13-172.   BE+Trace screen

Results (continued)

- Bull's Eye and Review screen displaying:
  - Bull's Eye together with cine clips for all 3 views.
  - Cine Stop or Cine Play (changed in toggle) on the Touch Panel controls the cine stop or play of the displayed image.

  Select *BE+Review* to display.
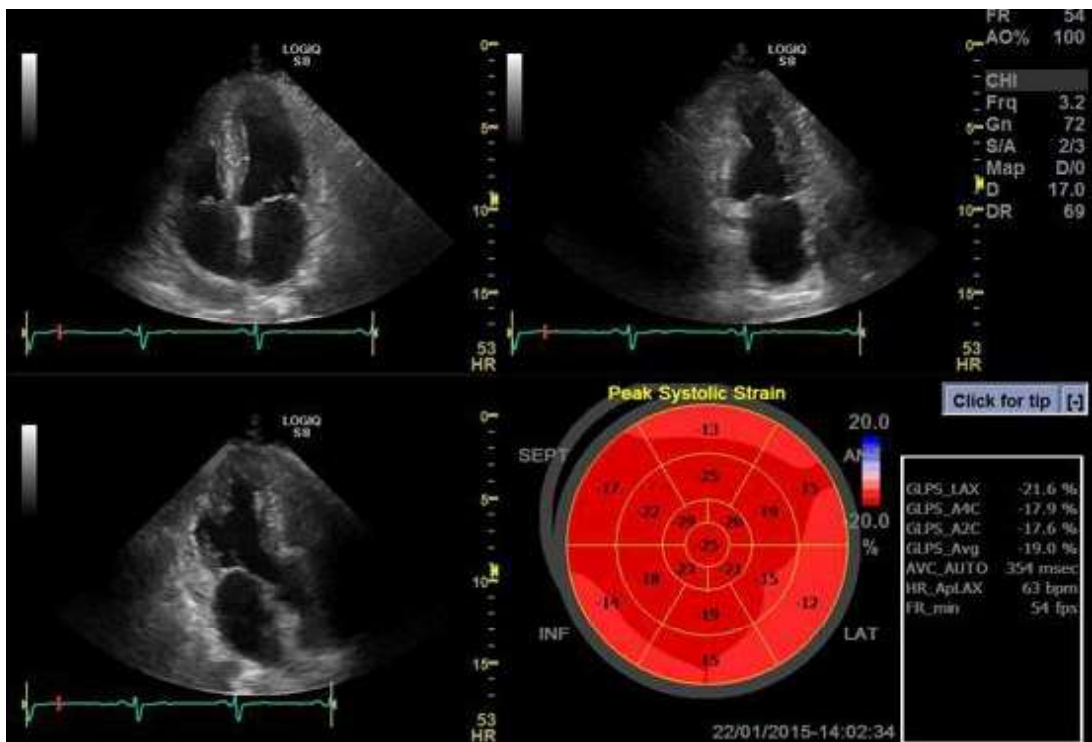
Figure 13-173.   BE+Review screen

Results (continued)

- • Bull's Eye Only screen displaying:

    - • Bull's eye presentation with segmental Peak systolic strain color coding and segmental Peak systolic strain values

    NOTE: *The Bull's eye can be configured to display either 18 or 17 segments (from Utility/Measure/Advanced/AFI segment model).*

    NOTE: *Press BE Maps to select another color map for the Bull's eye.*

    NOTE: *The system can be configured so that the user can also choose to display Post systolic strain index (PSI) color coding and segmental PSI values in the Bull's eye (from Utility/Measure/Advanced/AFI PSS/PSI Mode).*

    - • Global Strain (GS) values for all three apical views.

        In a given view the Global Strain (GS), also called Global Longitudinal Peak Strain (GLPS), is defined as the percentage of maximal contraction over the whole cardiac cycle of the entire myocardial wall relative to its end diastolic length.

    - • Averaged Global Strain value from all three apical view data.

    - • AVC measurement (either automatic or manual, see 'Timing Validation' on *page 13-312*)

Results (continued)

Select *BE+Only* to display.
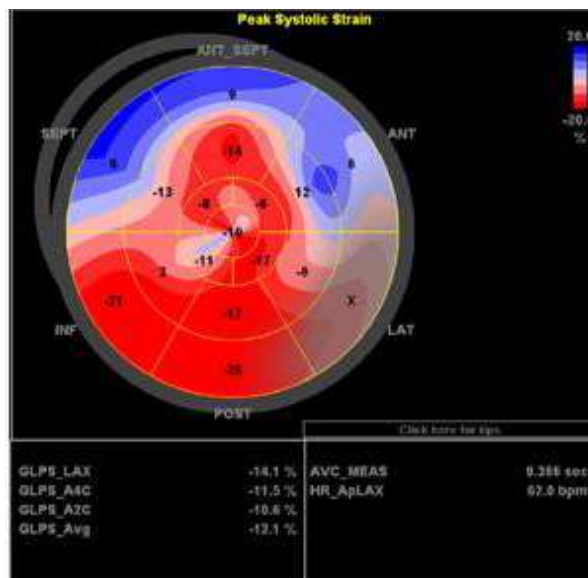
Figure 13-174.   Bull's Eye Only screen

Getting the result

To save the results, exit Cardiac Strain and answer yes to the question "Do you want to store AFI Results?". Once the results are saved, the measurements are available in the worksheet and can be used in the report.

If the tracking quality of a segment was scored as Not acceptable (x), the colorimetric display on the Bull's eye is greyed.
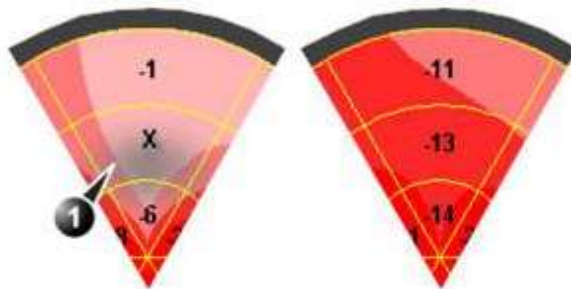
Figure 13-175.   Colorimetric display

1.   Segment with tracking quality scored as Not acceptable (x).

Peak detection

The peak systolic strain detection for each segment can be verified and eventually manually changed.

To adjust the peak detection:

1. Press *BE+Traces*.

   The Bull's Eye and Traces screen is displayed showing:

   • Trace plots for all three loops

   • Bull's Eye with Peak systolic strain values

2. To change the peak marker position on a curve:

   • Press **Set** on the peak marker (square point) on one of the curves, move the peak marker to a new position and press **Set** again to fix the point.

   or

   • Place the cursor on a segment in the Bull's Eye. The corresponding curve is highlighted.

   Click on the segment to select the corresponding peak marker and move it to a new position. Press Set to fix the point.

NOTE: *You can change Peak Maker only during Start point of Heart Cycle and AVC Time.*

The position of the AVC marker can also be checked in the Bull's Eye and Traces screen. If needed, the APLAX view should be reprocessed to change the AVC time.

About the results

Be aware of the following:

- Clinical assessments should be made based on both color and segmental Peak systolic strain values.
- The Save As function is intended for research purposes and should not be used to archive diagnostic data.
- To populate the worksheet and the report the Bull's Eye Only screen must be saved.
- All results shown (curves, colors and values) are based on drift compensated values. Any strain drifting is linearly compensated throughout the cycle. If the drift compensation in a given segment is too high, the tracking quality is automatically set to Not acceptable (X).
- If the tracking quality was scored as Not acceptable (X) in more than one segment, the Global Strain value is not calculated.

Stress Echo

Introduction

The LOGIQ P8/P9/P10 Ultrasound system provides an integrated stress echo package, with the ability to perform image acquisition, review, image optimization, and wall segment scoring and reporting for a complete, efficient stress echo examination.

The stress package provides a protocol template for the two types of stress exams (exercise and pharmacological stress).

In addition to preset factory protocol templates, templates can be created or modified to suit your needs.

You can define various quad screen review groups, in any order and combination, that will suit your normal review protocol.

When reviewing stress examination images, the images are viewed at their original image quality, and different post-processing and zoom factors may be applied to the images under review for effective image optimization.

The protocol template may be configured for Continuous Capture.

A stress echo examination consists of three steps:

- Selection of a stress test protocol template
- Image acquisition
- Stress Analysis

NOTE: *If Wall Motion Segment Score is not displayed on the screen, select the "Wall Motion" preset in the Utility -> Measure -> M&A -> Plot -> Available Folders and Measurements.*

Getting started with a stress study

1. After selecting the appropriate application and probe, press the *Protocol* tab on the Touch Panel. The protocol screen displays the layout of the default stress protocol for the current probe. This layout is also known as a template.
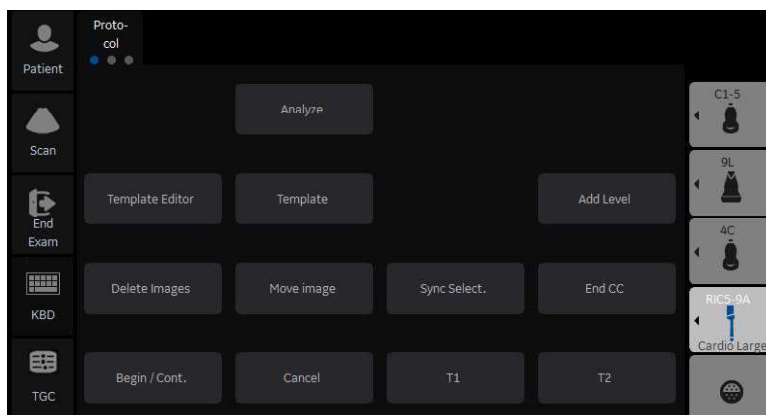
Figure 13-176.   Protocol Tab

Table 13-59:   Protocol Tab

Parameter	Description
Analyze	Display the Analysis screen
Template Editor	Display the template editor screen
Add Level	Add Level to the template
Delete Images	Delete the selected image
Move Image	Move the selected image to the another cell
Sync. Select	Synchronize the selected images.
End CC	End Continuous Capture
Begin/Cont.	Begin or continue the acquisition
Template	Display the template list
T1	Display/Hide the timer T1
T2	Display/Hide the timer T2
Cancel	Cancel Stress Echo

Getting started with a stress study (continued)

2. To use the current template, press ***Begin/Cont.*** to initiate scanning.

    To use another template, press ***Template***. The template list displays.
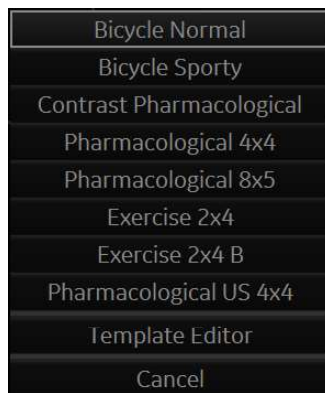
Figure 13-177.   Template List

3. **Trackball** to the desired template and press **Set**.

Getting started with a stress study (continued)

4. The selected template displays.
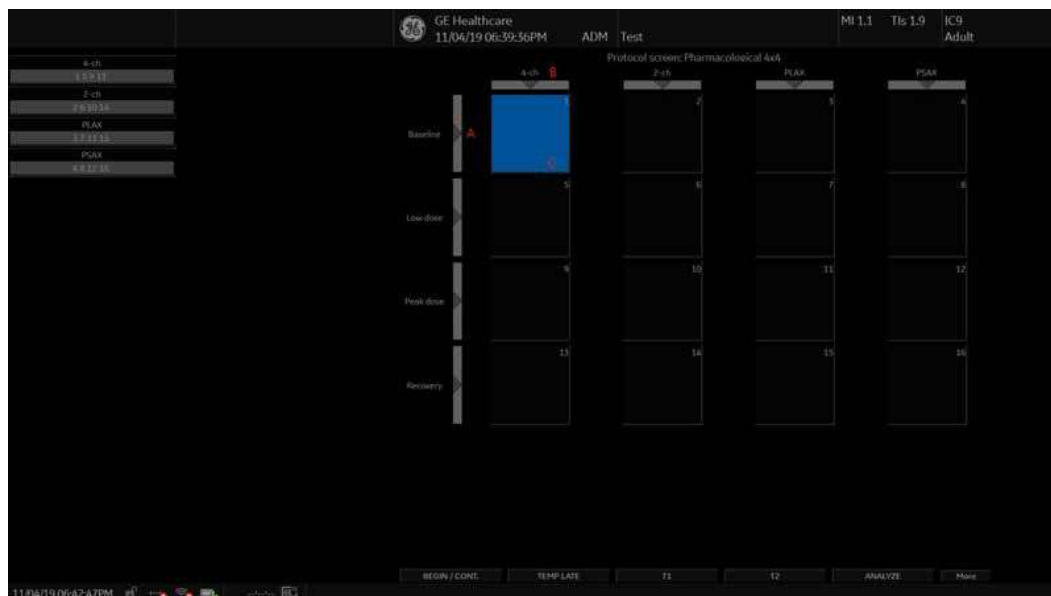
Figure 13-178.   Template (Example)

a. Level

b. Projection

c. Current Acquisition (green)

5. Press ***Begin/Cont.*** to initiate scanning using the new template.

Image acquisition

Images are acquired in a pre-defined order, according to the selected template. The highlighted (green) cell of the template matrix, displayed in the Clipboard window, indicates which view is currently being acquired.

The names of the view and levels for the current cell are displayed on the top left corner of the image area and under the template matrix.

Acquisition Screen

1. Current View Level
2. Timer
3. Template Matrix
4. Current View (Green cell)

Starting acquisition

1. Select the template.

2. Press *Begin/Cont.*

3. Perform a scan that conforms with the view that is highlighted in the template matrix on the Clipboard window.

4. Press the **P1** (Image Store) key.

   • If the actual stress level is configured to preview the cine loop before storing, use the cine loop controls to select the most appropriate heart cycle and if desired adjust the loop markers. Press **P1** again to save the selected cine loop.

   or

   If you do not want to store the cine loop, press **Freeze** to cancel. Return to the scan screen.

   • If the actual stress level is not configured to preview the cine loop before storing, the system automatically stores the last heart cycle.

   Stress levels can be configured for side-by-side display/ comparison of the reference loop from baseline or previous level and the loop to acquire.

5. After storing the cine loop, the system automatically highlights the next view in the matrix to be acquired.

6. Repeat previous steps until all required views are completed.

7. If you select Auto Start Analysis on the Template Editor for this template, a dialogue asking "Do you want to start protocol analysis now?" displays when the last acquisition is complete. If you select Yes, the Stress Echo Analysis screen is displayed.

The template used can be configured so that analysis automatically starts by displaying the first protocol group. The wall segment scoring diagrams for each view is displayed in the Parameter window on the left side of the screen.

Starting acquisition (continued)

If the *Protocol* tab is selected during acquisition, the following Touch Panel displays.
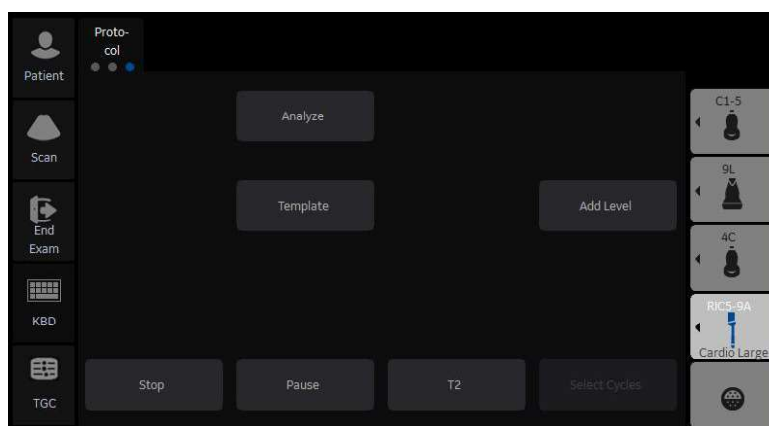
Figure 13-179.   Protocol Tab during acquisition

Table 13-60:   Protocol Tab during acquisition

Parameter	Description
Stop	Stop Stress Echo.
Pause	Pause Stress Echo. The template matrix continues in display. Even if you press P1, the cine loop does not store to the matrix.
Select Cycles	The Continuous Capture Selection screen is displayed (only available in Continuous Capture mode).
Analyze	Enter Analysis screen.
Template	Enter Template screen.
Add Level	Add level to the template.
T2	Display (Start)/Hide Timer T2.

Selecting a view during acquisition

A fixed protocol is provided for scanning, based on the selected template. The system automatically highlights the next view to be acquired in the template matrix, as images are stored. However, the order of scanning may be changed manually as follows:

Manual selection of a view during acquisition

1. Use the **Trackball** or the *arrow keys* on the alphanumeric keyboard to move the cursor to the cell that represents the view to be acquired.

    The selected cell in the template matrix, highlighted in red, indicates the non-default position. When blinking, it contains a previously-stored acquisition.

2. Press *Begin/Cont.* to initiate scanning.

3. Scan and save the selected loop as explained in the previous section.

After storage, the system automatically highlights the next available view to be acquired.

Moving an acquired image

An image can be moved from one cell to another during acquisition.

Procedure 1

1. When in the Protocol screen, press *Move Image*.
2. Use the **Trackball** to move the cursor to the desired image.
3. Press **Set**.
4. Use the **Trackball** to move the cursor to the destination cell.
5. Press **Set**. The image is moved from the source cell to the destination cell.

Procedure 2

1. In the Protocol screen, use the **Trackball** to move the cursor to the cell containing the image to move (source cell).
2. Press and hold down **Set**.
3. With the **Set** key still depressed, move the **Trackball** to the desired cell.
4. Release the **Set** key. The image is moved from the source cell to the destination cell.

If the destination cell contains an image, the images from the source and destination cells is exchanged when moving an acquired image.

Timers

Two timers can be displayed in the Stress mode acquisition screen, beside the template matrix.

Timers

- T1 displays the elapsed time from the start of stress examination.
- T2 starts when entering live scanning on the second stress level.

Both T1 and T2 timers can be manually stopped and restarted during the acquisition.

The display of T1 and T2 is user-configurable.

NOTE: *If you activate the Timer in Stress Echo, the T1 timer is displayed in the lower left-hand corner of the image area after exiting Stress Echo.*

Continuous Capture mode

Continuous Capture mode enables the user to perform acquisition continuously for all views at any level depending on the selected template configuration. Continuous Capture consists of temporary images and loops acquired during the session in a storage buffer in system memory. To enable best possible use of the limited storage buffer capacity, a Pause/ Capture mode is provided, as opposed to the normal Freeze/ Scan mode. The Pause mode enables scanning and live display on the screen, without any capture, thereby leaving the buffer available.

To run Continuous Capture, the user has to select a template where this feature is activated.

The buffer bar

When entering a level with Continuous Capture enabled, a buffer bar displays in the window.

The Buffer bar displays the following information:

- The scanning state
  - Pause (live scanning without storing)
  - Capture (live scanning with storing temporary images and loops to system memory buffer)
- The percentage of the buffer that is filled
- The buffer filling progression showed by a filling gage
- The capturing sessions, reflected by the red lines along the buffer bar
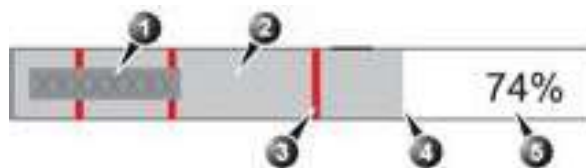
Figure 13-180. Buffer Bar

1. System's state
2. Capture session
3. Pause session
4. Buffer gauge
5. Percentage of filled buffer

Controlling the capture process

When entering a stress level with Continuous Capture enabled, the system is automatically set in Pause mode.

1. Press **P1** to start image capture.

   "Capture" is displayed in the buffer bar, the gage starts filling and the percentage of filled memory buffer increases.

2. Press P1 again to stop capture.

   "Pause" is displayed in the buffer bar.

   When 90% of the memory buffer is filled up, the text display in the buffer bar turns red.

   The system enters Freeze mode automatically once the buffer is full and the captured loops display in the Continuous Capture selection screen.

Activating Continuous Capture

1. Do all your pre-stress acquisitions in the Cardiac application.
2. Press the *Protocol* tab to enter the Stress Echo mode. The Protocol screen displays.
3. Press *Template*. The template list displays.
4. Select the template *Exercise 2x4* from the list.
5. Press *Begin/Cont.*.
6. Acquire the resting loops in all four views.

NOTE: *Use the P1 key to store the images.*

7. Once the fourth loop is acquired, the system enters into a waiting mode where Continuous Capture is in a pause state awaiting the patient to exercise.
8. When the patient is back on the bed, press **P1**. The Continuous Capture acquisition starts.
9. Acquire all your views.

   The memory buffer gage increases. When memory exceeds 90%, the percent number turns red.

10. Press **Freeze** to finish.

Activating Continuous Capture (continued)

11. Press *Select Cycle*.

The Continuous Capture selection screen displays.

If the buffer is full, the system automatically displays the Continuous Capture Selection screen.

Refer to the next section if additional image acquisitions are necessary after the buffer is full.
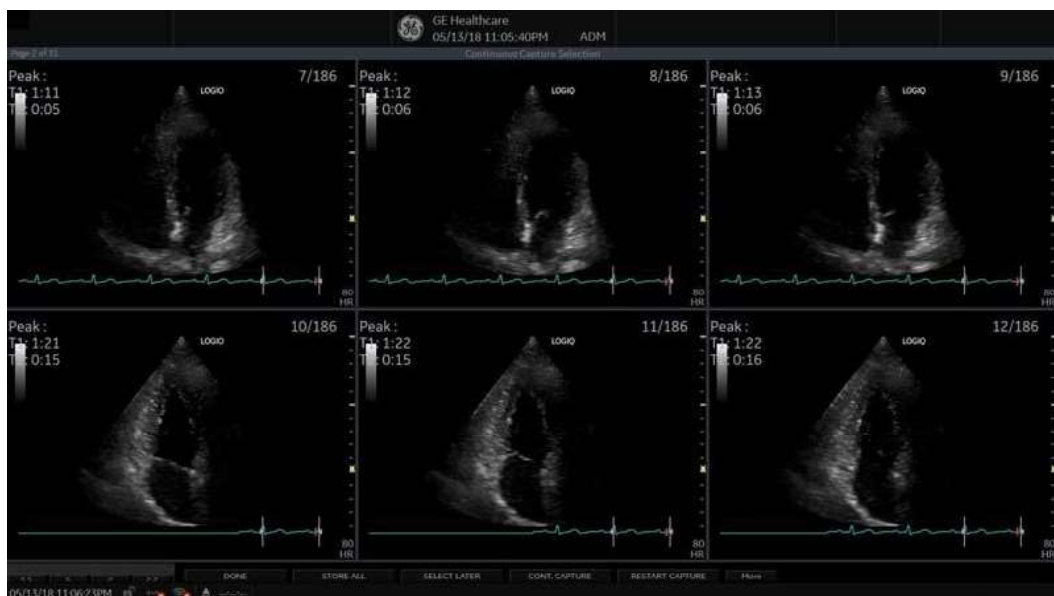
Figure 13-181.   Continuous Capture Selection Screen

Activating Continuous Capture (continued)

12. Assign the cine loops to the four views.

    a. **Trackball** to the desired loop.

    b. Press **Set**. A drop-down menu appears with the available choices.

    c. **Trackball** to the appropriate view.

    d. Press **Set**.

Figure 13-182.   Drop-down Menu

    e. Continue these steps until all views are selected.

NOTE: *To access additional cycles, use the arrow keys on the lower left portion of the select cycle screen.*

Activating Continuous Capture (continued)

f. Select *Done* when complete. A dialogue window displays, asking whether the entire Continuous Capture acquisition should be saved.
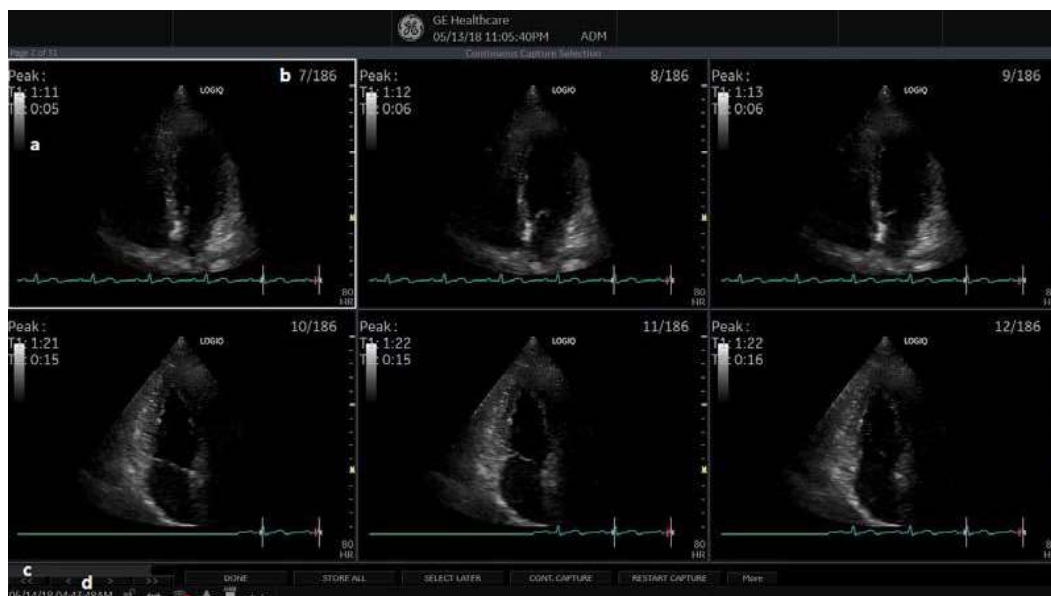
Figure 13-183.   Dialogue Window

13. Press *Delete* to discard the loop or press *Store* to keep the entire loop.
14. Perform Analysis and scoring.

Continuous Capture with additional image acquisition

If the buffer is filled up before all the image acquisitions are done, additional loops can be stored in the clipboard before doing image assignment to the views.

1. Perform the Continuous Capture. See 'Activating Continuous Capture' on *page 13-335 for more information.* (Steps 1 to 11).

2. In the Continuous Capture selection screen, press **Select Later**.

   The Continuous Capture screen displays.

3. Perform the additional acquisition.

4. In order to resume the stress echo exam and assign loops for the views from the Continuous Capture buffer, press **Protocol**. If not displayed, select the template **Exercise 2x4** from the template list.

5. Click the continuous capture images on the Protocol Template screen.

   The Continuous Capture selection screen displays.

6. Assign the cine loops to the view. See 'Activating Continuous Capture' on *page 13-335 for more information.* (Step 12 a - f).

7. Press **Delete** to discard the loop or press **Store all** to keep the entire loop.

   The normal procedure is to discard the loop. The loop is very big and requires a lot of disk space.

8. Perform Analysis and Scoring.

Postponed image assignment

The assignment of the cine loops to the view can be done on a later stage on a stored Continuous Capture acquisition.

1. Perform the Continuous Capture. See 'Activating Continuous Capture' on *page 13-335 for more information.* (Steps 1 to 11).

2. Press *Store all*.

   The entire Continuous Capture acquisition is stored. The examination can be ended and the image assignment, analysis and scoring can be done later.

3. Re-open the examination, if necessary.

4. Press *Protocol*. The Protocol screen displays.

5. Click the continuous capture images on the Protocol Template screen.

   The Continuous Capture selection screen displays.

6. Assign the cine loops to the view. See 'Activating Continuous Capture' on *page 13-335 for more information.* (Step 12 a - f).

7. Select *Done*.

8. Perform analysis and scoring.

Restart capture from the Continuous Capture Selection

• Press *Restart Capture*.

   The recording in memory is deleted and the Continuous Capture starts again.

Resume Continuous Capture

• Press *Continue Capture*.

   Resumes Continuous Capture recording (only if the Continuous Capture buffer is not full).

Assigning and storing the cine loop

The cine loops captured in the buffer are assigned to the stress protocol views and stored from the Continuous Capture selection screen.
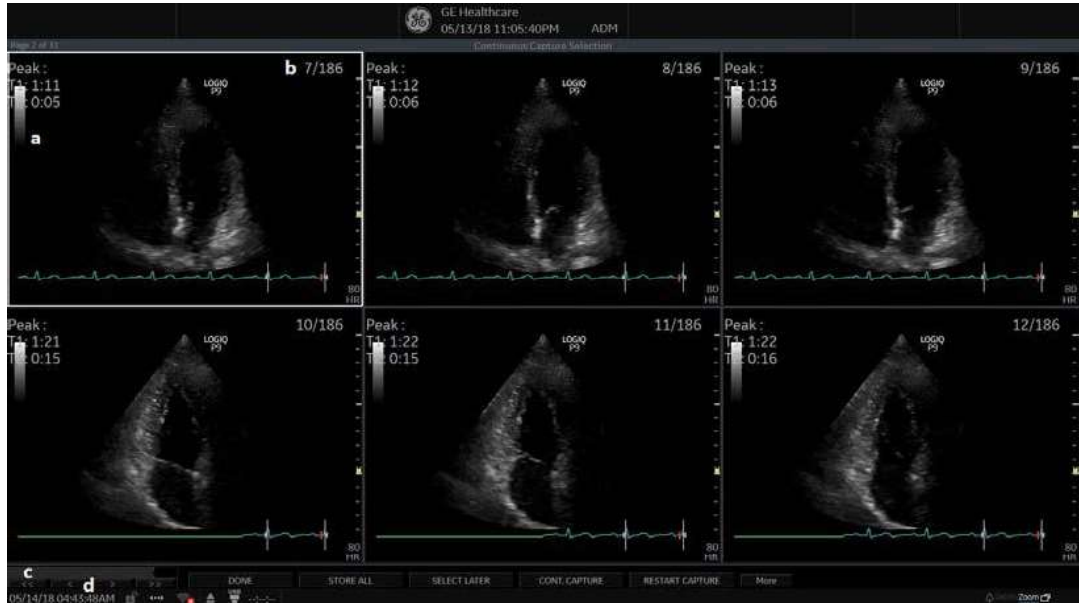
Figure 13-184.   Continuous Capture Selection Screen

a. Highlighted loop

b. Cycle number and total number of cycles

c. Gray Gauge: Position of the highlighted loop within buffer area.

d. Navigation Controls: << < > >> (back to first selection, back to previous selection, forward to next selection, and forward to final selection).

Assigning a cine loop to a view

1. Use the **Trackball** to move the cursor to the desired cine loop in order to assign it to a particular view of the stress template.

    The frame of the loop is highlighted.

2. Press **Set**.

    A pop-up menu displays with the view names of the template.
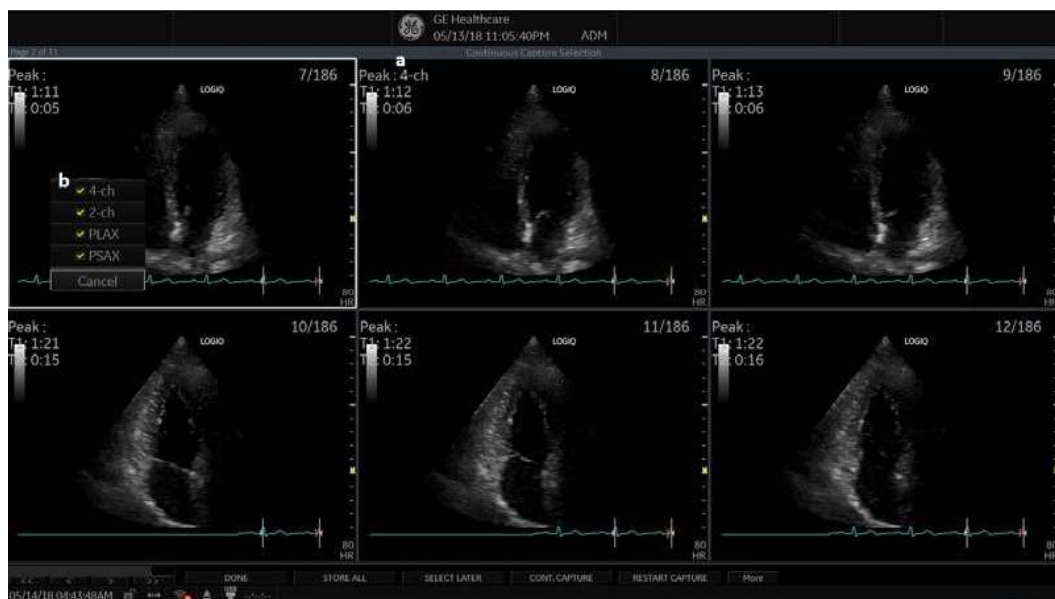
Figure 13-185.   Loop Assignment

a.   Already assigned view

b.   Views pop-up menu

NOTE: *A checkmark appears on the Views pop-up after you have assigned a view to an image.*

Assigning a cine loop to a view (continued)

3.   Use the **Trackball** to select the required view name.

4.   Press **Set**.

The name of the view displays above the timers in the window.

5.   Repeat steps 1 through 4 to assign loops to the other views of the level.

6.   Press ***Done*** when complete.

A dialogue window displays asking whether the entire Continuous Capture acquisition should be saved.

7.   Press ***Delete*** to discard the loop or press ***Store all*** to keep the entire loop.

The normal procedure is to discard the loop. The loop is very big and requires a lot of disk space.

Post Acquisition Features

Post acquisition, you can utilize Raw Data to adjust the following in B-Mode:

- Zoom
- SRI HD
- Rejection
- Frame Average
- TGC
- Maps
- Dynamic Range
- Gain
- Rotation

You can also take measurements post Stress Echo acquisition.

Analysis

Analysis consists of viewing previously saved loops and assigning scores to each cardiac segment, in order to quantify the function of the muscle or wall segment.

Depending on the protocol configuration, the analysis stage can start manually or automatically after completion of the stress test. In this case, the usual procedure consists of sequentially opening all image groups (if defined) and performing scoring from image to image.

The quad screen is the standard display for comparing heart cycles. The heart cycle loops in the display are synchronized to enable comparison. Each loop in the quad screen can be magnified, using the zoom control.

Image Selection for Analysis

Images can be selected manually or from a pre-defined group in the Protocol screen.

Selection of Images from a group

If groups of images have been defined in the protocol template, you can select a group of images for analysis and sequentially analyze all images from all groups from within the Analysis screen.

1. In a stress examination, press *Protocol*. A preview of the acquisition displays.
2. Press *Analysis*. A pre-defined group appears in the display with a Wall Segment window on the left.
3. To advance to other groups, use the **Trackball** to move the cursor to the arrows at the bottom of the Wall Segment window. Select an arrow to advance to another group. For further clarification, see callout E in Figure 13-186 .

Manual selection of images from Analysis screen

1. When currently in the protocol analysis screen in the Stress analysis quad screen, hold down the *SHIFT* key while performing Steps 2 through 4.
2. Use the **Trackball** to move the cursor to the first image to select in the template matrix.
3. Press **Set**. The frame of the selected loop is in the Stress analysis screen and the next window in the quad screen is automatically selected.
4. Repeat step 2 and 3 to select other images.
5. Depress *SHIFT*.

Manual selection of images in the Protocol screen

1. In a stress examination, press *Protocol*. A preview of the acquisition displays.
2. Use the **Trackball** to move the cursor to the first image to select.
3. Press **Set**. The frame of the selected loop highlights.
4. Repeat Steps 2 and 3 to select other images.
5. Press *Analyze* to open images in the Analysis screen.

Scoring acquired loops

1. After image selection, press ***Analyze***.

   The Stress Echo analyze screen displays.
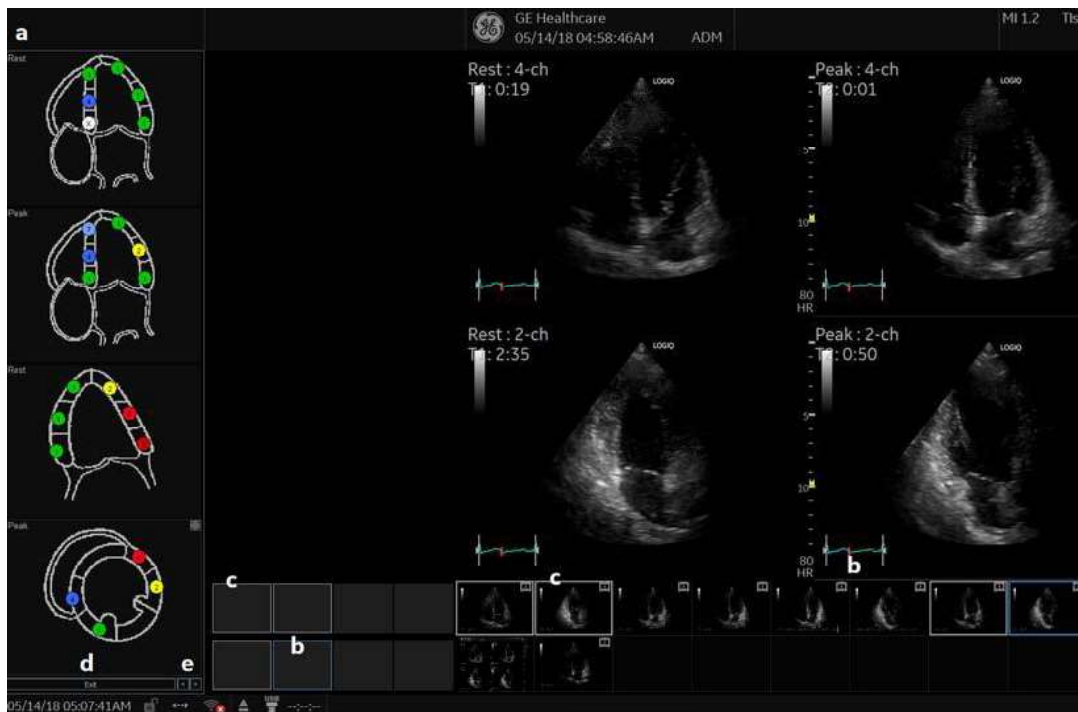
Figure 13-186.   Analysis Screen

a.   Wall segment diagram

b.   Selected loop (Highlighted frame)

c.   Displayed loops (Highlighted frames)

d.   Exit Wall motion scoring

e.   Change page or enter next image group

Scoring acquired loops (continued)

2. Use the **Trackball** to move the cursor to a segment in one of the scoring diagrams and press **Set**.

   The Score pop-up list displays.

3. Use the **Trackball** to move the cursor to a score.

4. Press **Set**.

   The score displays in the relevant segment area in the diagram.

NOTE: *To edit a score, select it and choose a new score.*

5. Repeat step 1 through 3 to score relevant segments.

6. Press the **Change Page** arrow to display the next group of images.

7. Repeat step 1 through 3 to score relevant segments on the new loops.
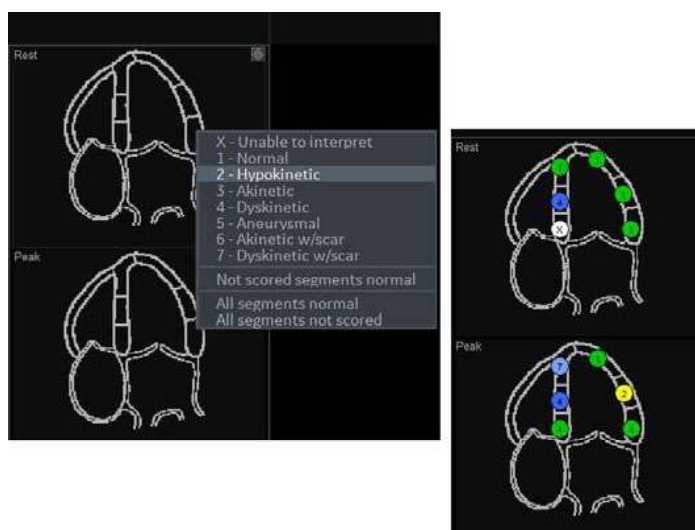
Figure 13-187.   Segment Scoring

NOTE: *Since Cine changes into sync mode, subsequent scans are also synchronized. Exit sync mode from the Cine menu.*

Editing/Creating template

The stress package provides protocol templates for exercise as well as pharmacological stress examinations.

The user can create new templates or modify existing templates to suit the individual needs. Up to ten projections and fourteen stress levels can be created in a template.

Templates created may be temporary, used only during the current examination, or saved as new templates, for future use and reference.

The editions that may be performed include:

• Adding/Deleting levels and projections.
• Assigning new labels to levels and projections.
• Defining level options.
• Defining new groups.

Templates are edited/created from the Template editor screen.

Entering the Template editor screen

1. Press *Protocol* to enter the stress echo mode.
2. Press *Template*. The template list displays.
3. Use the **Trackball** to select the Template Editor.
4. Press **Set**. The Template Editor screen displays.

OR

1. Press *Protocol* to enter the stress echo mode.
2. Press *Template Editor* on the Touch Panel. The Template Editor screen displays.

Template Editor screen overview
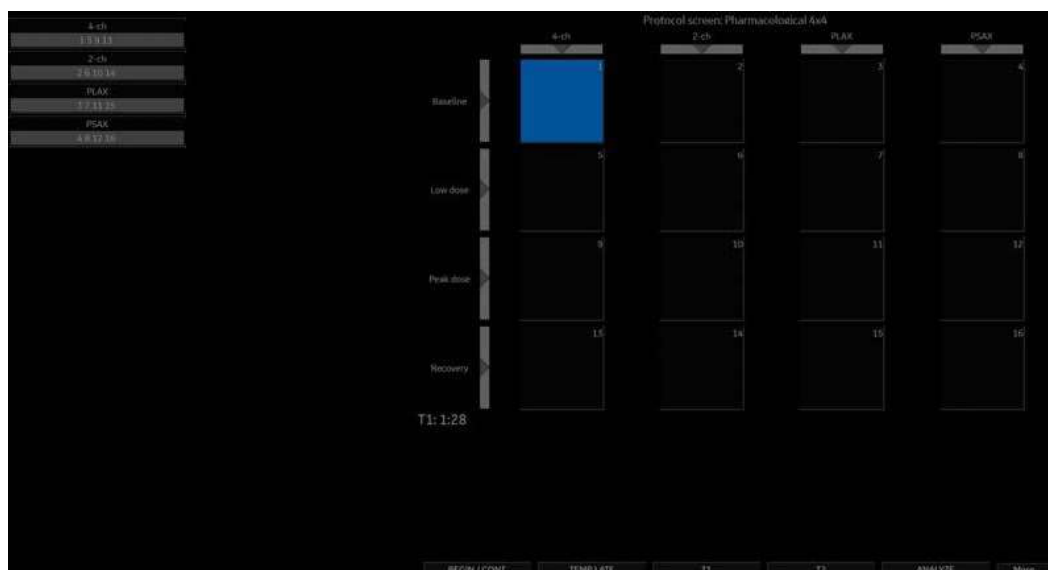
Figure 13-188.   Template Editor Screen

Table 13-61:   Template

Parameter	Description
Template	Select a pre-defined template from the pull-down menu. The protocol template preview updates accordingly.

Table 13-62:   Protocol Template Preview

Parameter	Description
Protocol Template Preview	• Displays an updated preview of the template accordingly to the settings applied. • To change Projection and Stress level labels, select a pre-defined label from the pull-down menu or press **Set** in the actual label field and type a new name.

Table 13-63:   Template Settings

Parameter	Description
Template Settings	• Cycles: select the number of cine loop heart cycles to store for each level from the pull-down menu or enter the desired value manually. • Continuous Capture: Checking this parameter enables continuous image acquisition throughout the level. The images acquired are temporarily stored in the system's storage buffer. • Preview of store: Checking this parameter enables review and adjustment of cine loops before store. • Show reference: Checking this parameter displays a dual screen with the reference level (first or previous level) on the left and the live image on the right.

Table 13-64:   Scan Mode

Parameter	Description
Scan Modes	• 2D, Color, PW (Pulsed Wave Doppler), CW (Continuous Wave Doppler), MM (M-Mode), Color MM, Color PW, Color CW

Table 13-65:   Other options

Parameter	Description
Other Options	• Grid Size: Enter the number of levels and projections for the selected template. • Timers: If you check this parameter, starts T1 and T2 timers automatically. • Auto-start analysis: If you check this parameter, displays the Stress Echo Analysis when the last acquisition is performed. • Show Systole in Analysis: When selected, the systolic part of the cardiac or ECG cycle is only displayed. The whole cycle is not displayed. • Smart Stress: Check Smart Stress to store a subset of the image acquisition settings (e.g., Zoom, Gain, Compress, etc.) for each view in the protocol. Smart Stress enables you to set image acquisition settings for each view at a baseline level and automatically get the same image settings in the corresponding views in the next levels. • Reference image: When Show Reference is selected, selects either corresponding baseline loop or corresponding loop from the previous level to be displayed as reference image during acquisition.

Table 13-66:   Pre-defined groups

Parameter	Description
Pre-defined groups	• Shows the image groups created. • New group: Creates a new image group. Select the desired images on the template preview. • Update group: Edits a selected group after new loop selection on the template preview. • Delete group: Deletes a selected group.

Selecting a base template to edit

1. Select the base template from the template pull-down menu on the upper left corner.

2. Press **Set**.

   The selected template displays in the protocol template preview field, showing the levels, projections and their labels.

Adding/Deleting levels and projections

1. Enter the number of levels and projections in the Grid size field.

   The new grid size displays in the protocol template preview field.

2. Press ***New Template*** to create a new template.

   or

   Press ***Save Template*** to update the base template.

Display timers

1. Check the box(es) to display timer(s) as specified.

NOTE: *The timers can also be started or stopped at any time during stress examination by using the T1 and T2 Touch panel key.*

Start analysis automatically

1. Check ***Auto Start Analysis*** to display the Stress Echo Analysis screen when the last acquisition is performed.

Smart Stress

1. Check Smart Stress to store and automatically reuse a subset of the image acquisition settings in the baseline level view in the corresponding views in the next levels.

Configuring levels

The following options can be set up for each level:

Number of cycles to be stored in the cine loop:

1. Enter the desired number (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20) in the Cycles field.

Continuous Capture

1. Check Continuous Capture if continuous image acquisition throughout the level is desired.

   When Continuous Capture is selected, preview of the cine loop and reference display during acquisition are not possible.

Preview of store

1. Check Preview of store if review and adjustment of cine loops before storage is desired.

Show reference

1. Check Show reference if the display of the corresponding reference loop is desired during acquisition (Dual screen mode).

Adding a group

1. In the Protocol template preview field, select the cells to be part of the group.
2. In the Pre-defined group field, press ***New group***.

   A dialogue box displays to ask the user to enter a name for the new group.
3. Enter the group name.
4. Press ***OK***. The new group displays in the pre-defined group field.

Updating an existing group

1. In the Pre-defined group field, select the group to edit.

   The selected cells are highlighted in the Protocol template preview field.

NOTE: *A selected group is highlighted by a blue frame.*

2. Either select a new cell(s) to add to the group or deselect an existing cell(s) to remove from the group.
3. Press ***Update group***.

   The display in the Protocol template preview field is updated accordingly.

Deleting a group

1. In the Pre-defined group field, select the group to delete.

NOTE: *The selected group is highlighted by a blue frame.*

2. Press ***Delete group***.

   The group is removed from the list in the pre-defined group field.

Specifying Scan Mode for each Projection

1. Specify the Scan Mode for each Projection: 2D (B-Mode), Color Flow Mode, M-Mode, Color M-Mode, PW Mode, Color PW Mode, CW Mode, or Color CW Mode.

Saving the Template

You can save the template using controls at the bottom of the Template Editor page, or use the controls on the Touch Panel.
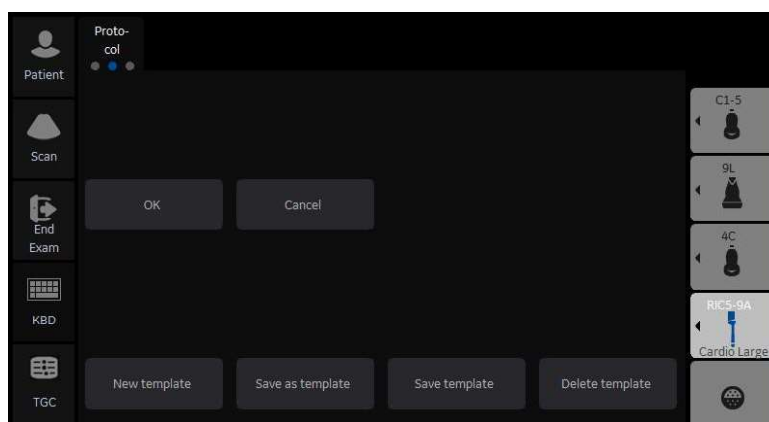
Figure 13-189.   Template Editor Touch Panel

Table 13-67:   Template Editor Saving Options

Parameter	Value
New Template	Select this option to create an entirely new template.
Save As Template	If you would like to create a new template based on the existing template with your modifications, select to Save this Template As, and give it a name.
Save Template	Select this option to save the default template with your modifications.
Delete Template	Select this option to delete a template.

Wall Motion Segment Setup

You can set up the following parameters for Wall Motion Segment in the Utility screen (Utility--> Measure--> Advanced--> Cardiac).
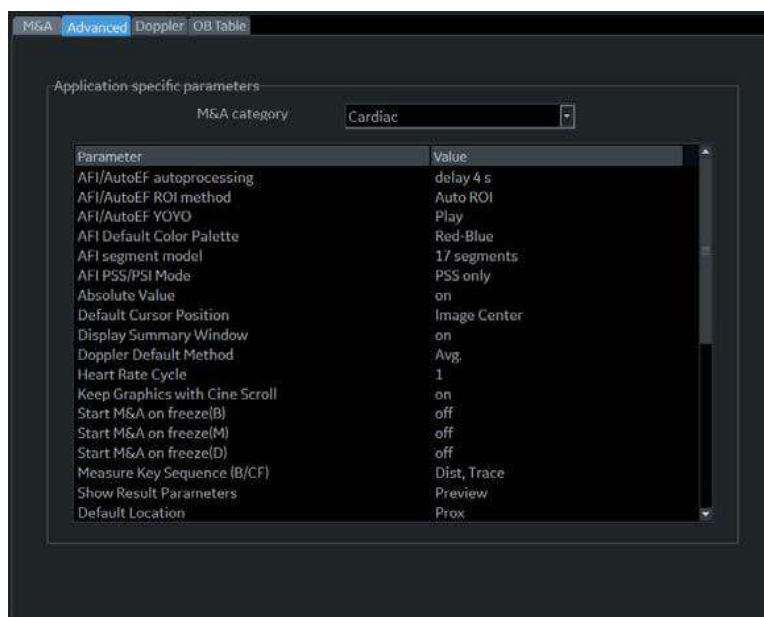
Figure 13-190.   Cardiac Wall Motion Segment Setup

Table 13-68:   Wall Motion Segment Parameters

Parameter	Value
WMS freeze loop at ES	Specify to freeze the Loop at End Systole
WMS Segment Model	Select 16 or 18 segments
WMS initial scoring	Undefined or Normal
WMS scoring legend	ASE, ASIA or European

Utility Application Settings for Protocol
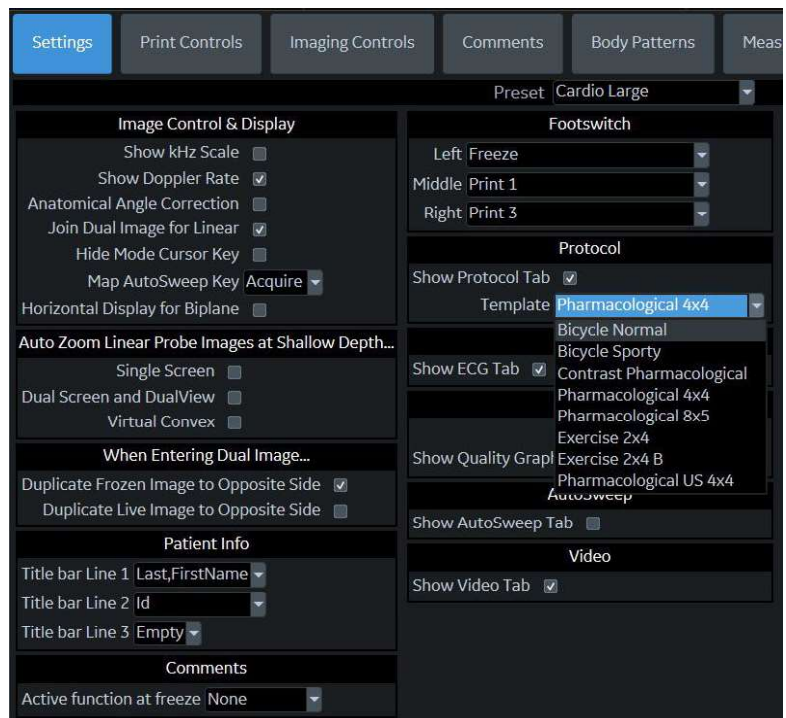
Figure 13-191.   Protocol Setup

Table 13-69:   Protocol Parameters

Parameter	Description
Show Protocol Tab	Show/Hide the Protocol tab for that preset (Bicycle Normal, Bicycle Sporty, Contrast Pharmacological, Pharmacological 4x4, Pharmacological 8x5, Exercise 2x4, Exercise 2x4 B, Pharmacological US 4x4, or User-configured).
Template	Select the default template.

Report

If you set up the Wall Motion Analysis field on the Report, you can insert the results. See 'Cardiac Studies Wall Motion Analysis' on *page 13-440 for more information.*

Select Report to view either the Bull's Eye or Cut Plane Report.
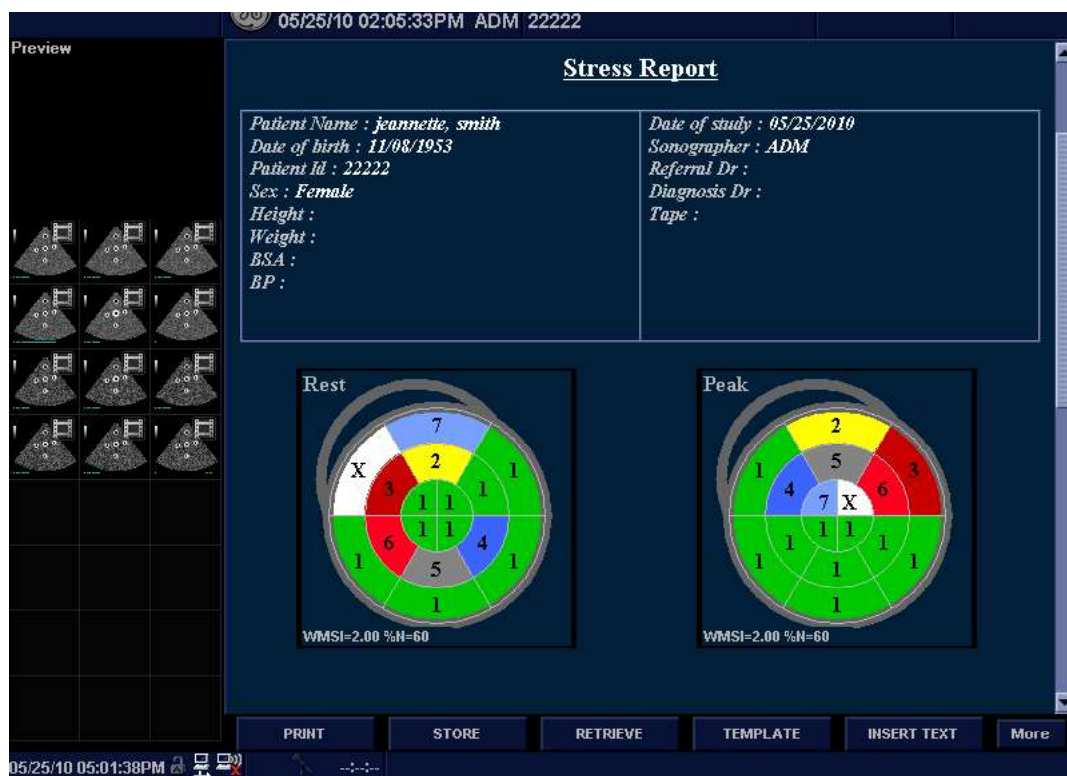
Figure 13-192.   Bull's Eye Report Sample

Report (continued)
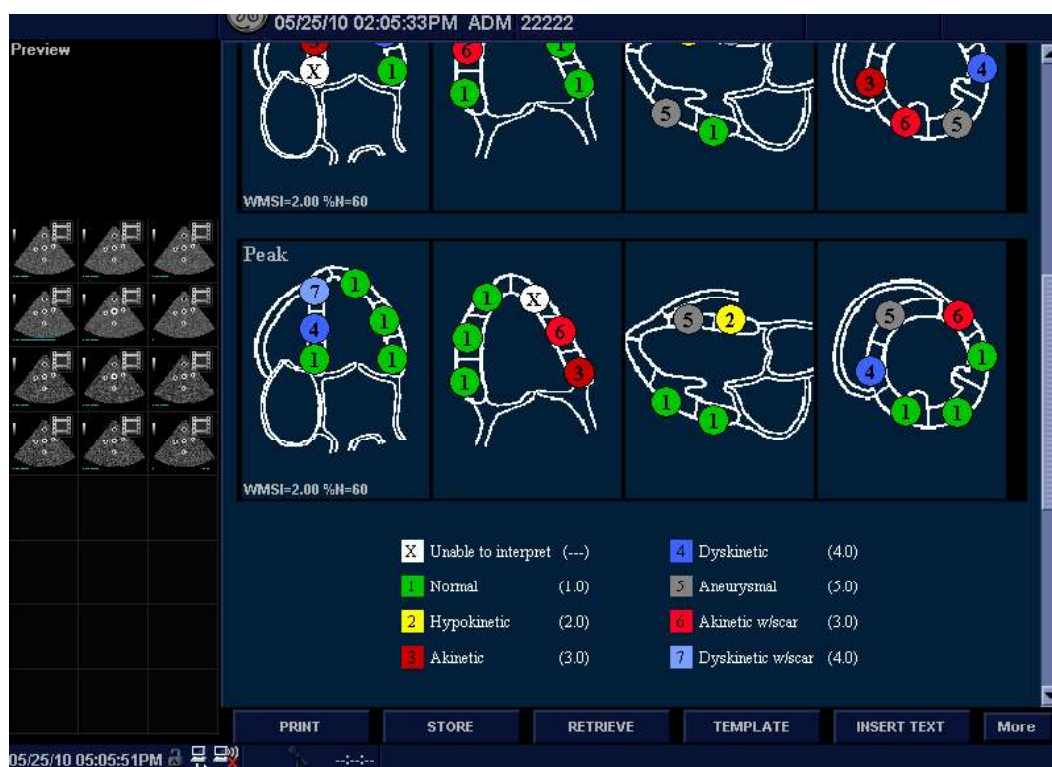
Figure 13-193.   Cut Planes Report Example

HINTS   Select either Bull's Eye or Cut Plane on the Reports--> Adult
Template.
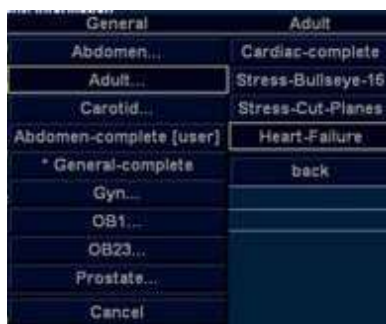
IMT Measurement - Auto

Auto IMT automatically measures the thickness of the Intima Media on the far and near vessel walls. Near Wall IMT is the distance between the trailing edges of the adventitia and intima; the Far Wall IMT is the distance between the leading edges of the adventitia and intima.

Set up

Set up the parameters you want to record on the worksheet on the Utility -> Measure -> M&A page while are in the Carotid application. Select CCA/ICA/BIF -> IMT Far/Near -> Parameter (Average, Max, Min, Standard Deviation, Points, or Distance).
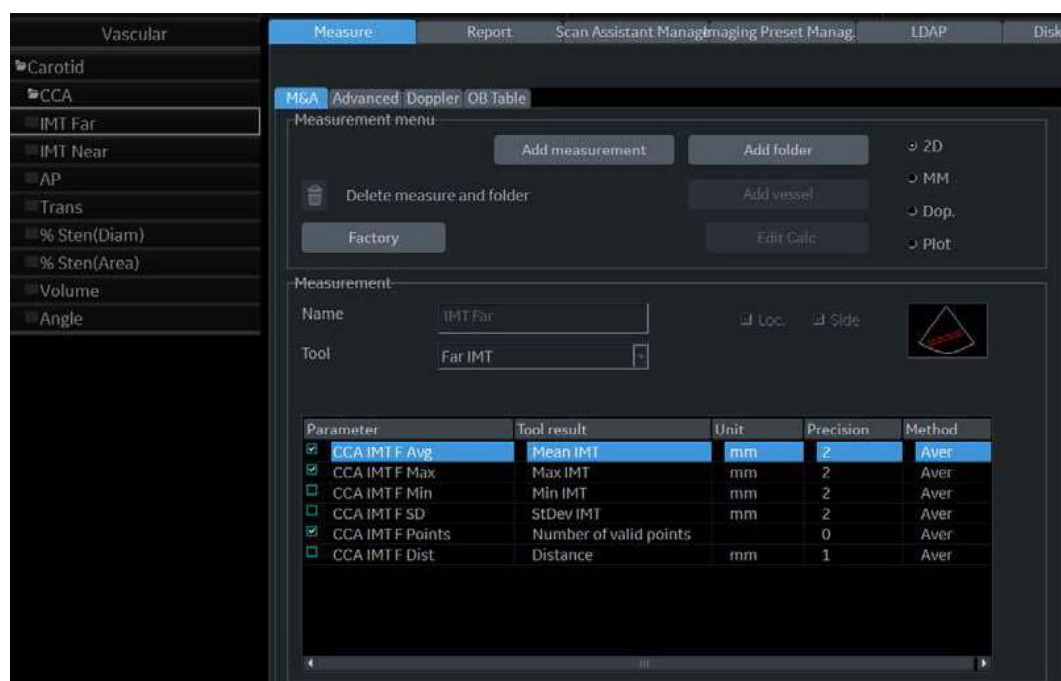
Figure 13-194.   Configuring Auto IMT

Controls

In the Vascular Carotid application, the Auto IMT measurement is available.
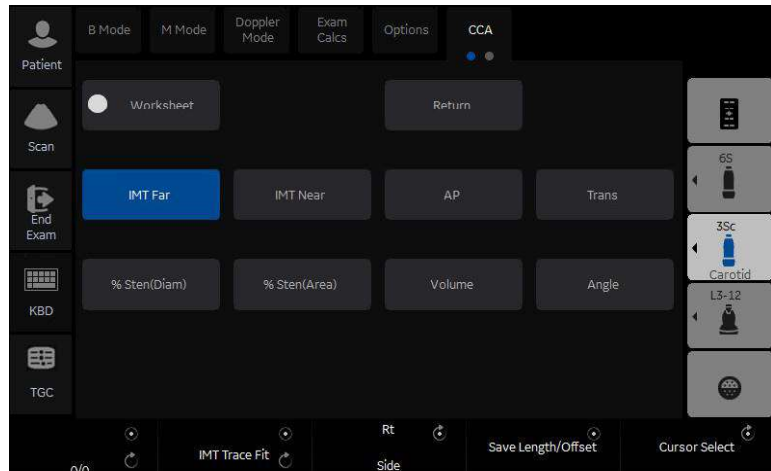
Figure 13-195.   Auto IMT Touch Panel

The following controls are available.

Table 13-70:   Auto IMT Touch Panel Description

Parameter	Description
Worksheet	Select to view the Worksheet
IMT Far	Select to begin the Far Field IMT measurement.
IMT Near	Select to begin the Near Field IMT measurement.
AP	Anterior Posterior
Trans	Transverse
Length/Offset Rotary	-40/+40 Length. At zero, you can freely adjust the length, but only vertically. Offset distance, -20 (Left) / +20 (Right)
Save Length/Offset	Push to save Length/Offset as a preset. Press key to save value as default.
Overall / IMT Trace Fit / Intima	Adjusts (remeasures) the IMT automatically measured by the system.
Rt / Lt Side	Select Left / Right Side.
Cursor Select	Allows you to update cursor placement.

How to measure

To measure the IMT,

1. In the Carotid application, press **Freeze**, press **Measure**.

2. Select the appropriate IMT measurement. For example, if measuring the IMT of the far wall of the right common carotid artery, select Rt CCA folder, and then *IMT Far*.

3. Use the **Trackball** to set the length.

   Or

   Use the *Length / Offset* control on the Touch Panel to set the length and offset distance. The Offset key controls how far away from the vertical line the measurement starts. Length is the length of the tool itself. If set to zero, you can adjust it anywhere on the image.

4. Press **Set**.

   You can either adjust the trace prior to pressing the Print key or press the Print key to store the image which also saves the measurement to the Worksheet.

   To adjust the trace, use the *Overall IMT Trace Fit Intima* control on the Touch Panel. The Trace fit (up/down) adjusts the inter luminal line whereas the overall (rotate) adjusts both IMT lines.
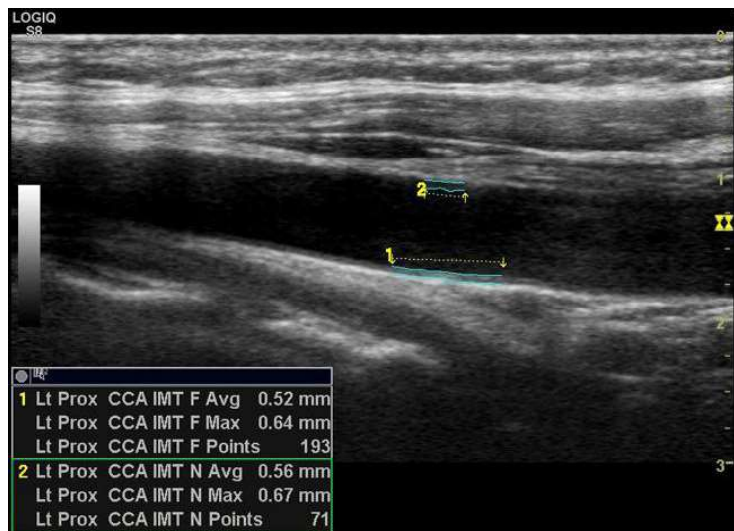
Figure 13-196.   Example of Auto IMT Far Measurement

How to measure (continued)

5. Position the cursor, then select IMT Near.

6. Use the **Trackball** to set the length.

    Or

    Use the *Length / Offset* control on the Touch Panel to set the length and offset distance.

7. Press **Set**. "Store image to accept IMT measurement" displays in the message area. If the traces fit both layers of the wall, approve the measurement by pressing the **Print** key to store the image.

    To adjust the trace prior to pressing the Print key, use the IMT Trace Fit control on the Touch Panel. The measurement is saved to the Worksheet.

NOTE: *Since the IMT measurements are semi-automatic, the operator has to approve the detection by visual inspection before storing the results in the worksheet and report.*

ECG

Overview

⚠ WARNING   DO NOT USE the physiological traces of the LOGIQ P8/P9/P10 Ultrasound system for diagnosis and monitoring.

DO NOT USE with the Defibrillator.

⚠ CAUTION
- ECG electrodes should not make contact with other conductive parts, including earth.
- After the defibrillator stimulates the patient, the ECG needs 4 to 5 seconds for recovery.
- The quality of the ECG trace depends on the stability and conductivity of the electrodes during the test, especially during high stages when the patient's movements can cause artifacts.
- Make sure that the lead wires do not swing.
- The device is not waterproof. Do not expose the device to water or any kind of liquid. Maintain in a dry place:
    - The exterior of the recorder may be wiped clean with a soft cloth. Do not use harsh cleaning agents to clean the unit. Do not immerse the unit in any liquid.
    - Clean the cables with a hospital approved cleaning procedure such as those recommended by AAMI or AORN. Do not immerse cables in water.
    - Worn or damaged patient cables are the most common cause of poor ECG signals. ECG signals (or wave patterns) that consistently contain noise or artifact may suggest need for ECG wire or cable replacement.
    - Store the device in a dry place.
    - Always protect the recorder from coming into contact with moisture. In rain or snow conditions, protect the recorder from bad weather elements by wearing the recorder inside a coat.
- When Difibrillator is using, all attached patient applied parts connected to ultrasound system must remove from patient.

ECG Cable

⚠️ **WARNING** For defibrillation situation, patient connection cable MUST BE USED with the "Norav, code C3-C-E-ODU-##" and "Norav, code C3-C-U-ODU-##" only.

⚠️ **WARNING** The patient cable protects against the effects of the discharged of a cardiac defibrillator.

⚠️ **CAUTION** Make sure the leads are attached properly, and use only GE recommended ECG leads. It is important to confirm ECG trace clarity before the scan.

The ECG Cable is a modular cable consisting of two different cable parts:

- Single cable with a system connection at one end and a cable splitter at the other.
- A triple color-coded electrode cable to be inserted into the splitter device. Each electrode cable hooks up to the appropriate stick-on electrode by a color-coded clip type connector.

The color-coding of the electrodes follows one of two standards that are common in different parts of the world. The cable splitter device has a drawing defining the color codes, names and body location for the two standard color codes.

Table 13-71: ECG Color Code Cable

IEC (Europe, Asia, ROW)		AHA (USA)		Position of the human body surface
Electrode Mark	**Color Code**	**Electrode Mark**	**Color Code**	
R	Red	RA	White	Right Arm
L	Yellow	LA	Black	Left Arm
N or RF	Black	RL	Green	Right Leg (Neutral)

ECG connector

The ECG connector is located on the base of the monitor arm.

Figure 13-197.   ECG connector

ECG Trace Monitor Display

The scanned image is synchronized with the ECG trace. In Doppler or M-Mode, the traces are synchronized with that particular mode's sweep.

The user can control the gain, position and sweep speed of the traces using the Touch Panel controls.

Figure 13-198.   ECG Trace Display

1.   ECG
2.   Auto Heart Rate Display

ECG Touch Panel

The ECG Touch Panel provides for control of the input signals.

Without the ECG option, the ECG Touch Panel is not displayed.
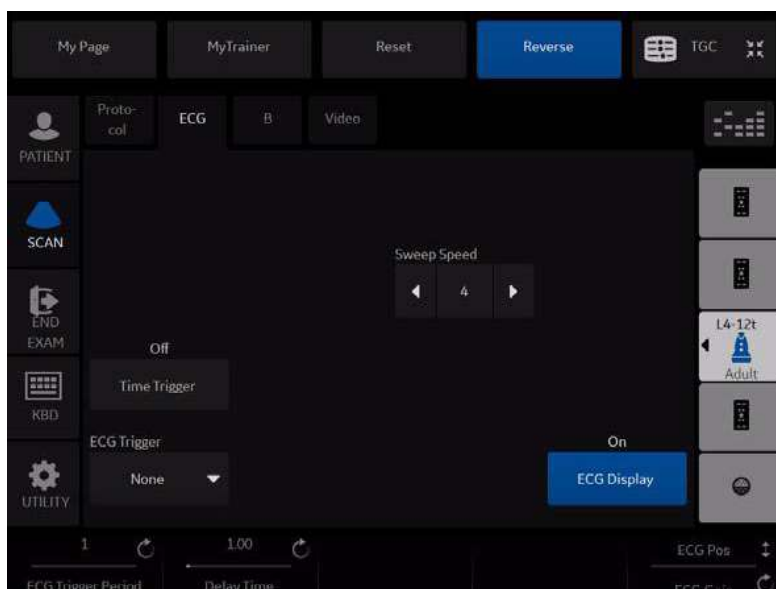
Figure 13-199.   ECG Touch Panel

Table 13-72:   ECG parameters

Parameter	Description
Sweep Speed	Change the speed of the trace. The sweep speed of the physio signal on the B-Mode image can be set independent of the timeline (Doppler and M-Mode) sweep speed.
Timer Trigger	On/Off. Enables intermittent imaging based on a timer. NOTE: If Timer Trigger is turned on, the ECG Trigger is set to None.
ECG Trigger	Enables intermittent imaging based on the ECG. The trigger location(s) relative to the R trigger are set with the Delay Time key. Press ECG Trigger and select one of the options (None, Trig1, Trig2, and Both) and adjust the delay time using the Delay Time key. • ECG Trig 1 specifies the delay (ms) from R-wave to triggered frame. • ECG Trig 2 specifies the delay from R-wave to second frame. • Both activates ECG Trig 1 and ECG Trig 2 simultaneously. Trig 2 must be greater than Trig 1 for dual triggering (Both) to be active. NOTE: If other than None is selected, Timer Trigger is turned off.
ECG Display	Provides the ability to turn on the ECG trace and Auto Heart Rate for display on the monitor.

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Table 13-72:   ECG parameters (Continued)

Parameter	Description
ECG Trigger Period	The control specifies the number of heart cycles (R-waves) that are skipped between ECG triggers. The default is 1 or no skipping.
Delay Time	In ECG Trigger Mode: If only ECG Trig1 or ECG Trig2 is selected via the ECG Trigger key, the Delay Time key controls the R-Delay time of the active trigger. If both triggers are selected (Both), press this key to toggle ECG Trig1 and ECG Trig2 and rotate the key to change the delay time. Once the trigger is set, the snap shot image is displayed each time the update line passes the active trigger(s). In Timer Trigger Mode: Rotating the knob changes the delay time between images.
ECG Gain/Position	Allows for the amplitude control of the ECG trace or allows for the vertical positioning of the ECG trace on the image display. Press the knob to toggle between Gain and Position. The default is Gain.

DICOM

Overview

Refer following sections for DICOM usage.

- 'Save As' on *page 9-19* .
- 'DICOM Import' on *page 9-46* .
- Hide Patient Data in 'System/General Preset Menu' on *page 10-7* .
- GSDF in 'System/System Display Preset Menu' on *page 10-11* .

Anonymize the patient

Overview

The LOGIQ P8/P9/P10 offers an option to extract all measurements and DICOM tags from a selected patient in the Patient List when that patient is not active. This option makes the exam(s) anonymous and attaches this information to a newly created Anonymous Patient.

The LOGIQ P8/P9/P10 warns the user on possible data loss, data mismatch and data that cannot be copied anonymously, including:

- Links to Reports will be lost.
- Non-ultrasound exams will not be anonymous.

Anonymize the patient

1. Ensure that you are logged in as an Administrator on the system.
2. Select the Local Archive dataflow.
3. Select the patient from the Patient View list and left click to bring up the "Anonymize" pop-up menu.
4. A confirmation dialog displays. Select *OK*.
5. The "Anonymize Patient" dialog displays. All the fields inherit the values from the original patient's exam, except for Patient ID.

   Fill in the Patient information fields.

   Press *OK* to continue.

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

Anonymize the patient (continued)

- *Empty Other DICOM Tags*: Check to clear all DICOM Tags.
- *Manage DICOM Tags*: Manage DICOM tags dialog displays. Select DICOM tags individually.
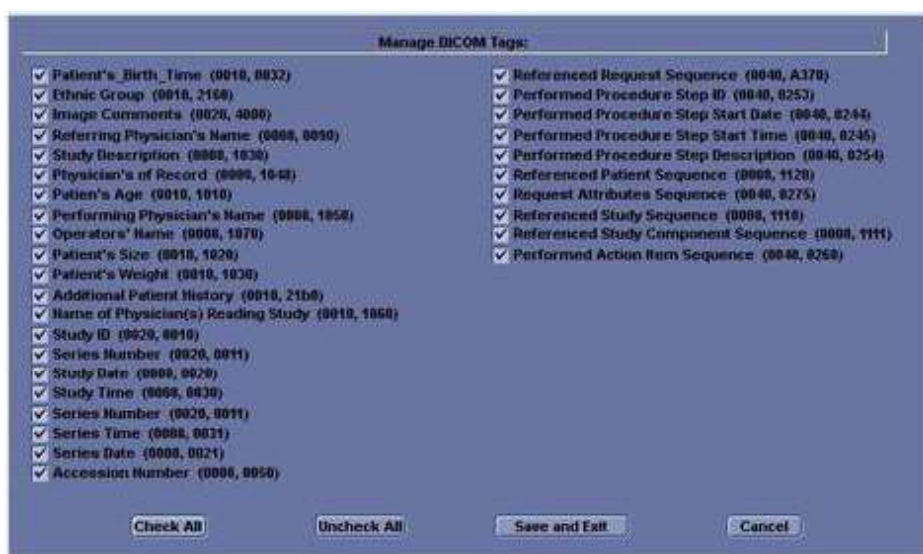
Figure 13-200.   Manage DICOM Tags

Structured Reporting

DICOM Structured Reporting provides the results of a procedure as structured data elements (well-defined fields) as opposed to unstructured data (large amounts of text undifferentiated by individual fields). This greatly improves query capability. DICOM Structured Reporting creates coded clinical data that can be used for clinical research, outcomes analysis, and disease management.

DICOM Structured Reporting is a standardized format for medical results. LOGIQ P8/P9/P10 supports the following templates:

- OB-GYN REPORT TEMPLATES
- VASCULAR ULTRASOUND REPORT TEMPLATES

    The system supports selectable vessels with their locations for B-Mode measurements.

    For Vascular studies (Bypass Graft, UEV Map, LEV Map, LEA/UEA, and Carotid), additional measurement locations were added. For instance, for a Bypass Graft, there are now measurements at Inflow, Anast, Thigh, Knee, Calf, Ankle, Graft, RunOff, Pre-Sent, Stent, Post-Stent, and Outflow locations.

- ECHOCARDIOGRAPHY PROCEDURE REPORT TEMPLATES
- Abdomen Report Templates
- Breast Report Templates
- Thyroid Report Templates

These templates do not support all M&A results for the LOGIQ P8/P9/P10.

Supported parameters

The DICOM supported parameters are listed in the DICOM Conformance Statement at the following website under DICOM - Ultrasound:

http://www.gehealthcare.com/usen/interoperability/dicom/

DICOM Image Storage

DICOM Image Storage allows the system to send or receive ultrasound images in a format that can be interpreted by PACS.

⚠ CAUTION   GE does not warrant the operation if the DICOM format of send image (US, USMF, SC) does not correspond with the DICOM Server.

Table 13-73:   DICOM Image Storage

Preset Parameter	Description
Allow Clips	Select to allow cine loop storage.
Allow raw data	Select to save data in both TruAccess (raw data) and DICOM format. Clear to save in DICOM format only.
Compression	Select the compression type: None, Rle or Jpeg.
Max Frame rate	Select the Max Frame rate : Full, 25, 30, 60, 80.
Color Support	Select: Mixed, Gray or Color
Reopen per image	Reopen per image
Enable Structured Reporting	Select for Structured Reporting.
Key Image Notes	Image deletion notification. ONLY available for the Direct Store Workflow and ONLY generated when there are images deleted during the exam. Selecting this lets the reader at the PACS system know which images have been deleted. An indicator is placed on deleted images with a reason, "Rejected for Quality Reasons," for example.

DICOM Performed Procedure

DICOM Performed Procedure provides an acknowledgement that a study has been performed.

DICOM Print

DICOM Print provides the ability to send or receive ultrasound image data to DICOM printers.

Table 13-74:   Properties

Preset Parameter	Description
Vendor	Specify PACS Vendor. This enables annotation on patient information since by definition patient information is missing on the title bar.
Format	Indicates how many prints to print per page, for example, 1,1, 1,2, 1,3, up to 7,5. Partial prints are displayed as one print job.
Priority	Specify the print job priority: High, Medium, or Low.
Medium	Select the print medium: Clear Film, Paper, or Blue Film.
Copies	Enter the number of copies.
Orientation	Specify whether to print the image Portrait (vertically) or Landscape (horizontally).
Film Size	Specify the dimensions of the film size.
Film Destination	Specify the film destination for the exposed film • Magazine – Store in a film magazine • Processor – Develop in a film processor
Magnification	Specify how the printer magnifies the image to fit it onto the film. • Replicate – Interpolated pixel are copies of the adjacent pixels • Bilinear – Interpolated pixels are created by bilinear interpolations between the adjacent pixels • Cubic – Interpolated pixels are created by cubic interpolations between the adjacent pixels • None – No interpolation
Smoothing Type	Specify the printer's magnification interpolation for the output.
Trim	Specify whether you want a trim box to be printed around each image on the film: Yes or No.
Min Density	Enter a number indicating the minimum density level of the film.
Max Density	Enter a number indicating the maximum density level of the film.
Border	Select to have the border area surrounding and between the images of the film: Black or White.
Empty Image	Select to have a Black or White empty image.
Color	Select whether to have the image Color or Grey.
Configuration Information	Enter vendor-specific image quality settings.
Film Session Label	Type a name for the group of film labels associated with the print job.

Table 13-75: Annotation

Preset Parameter	Description
Enable	Lets you annotate the image.

DICOM Query/Retrieve

DICOM Query/Retrieve provides a list of patients sorted by query parameters.

NOTE: *Some PACS vendors only offer Query/Retrieve as an option. Please confirm that this service is available.*

Verify Before Query

Box Checked. The system DOES CHECK the DICOM connection status PRIOR to issuing the Worklist Query/Retrieve request. This way, the system ensures that the PACS or HIS/RIS server is 'alive' before performing the actual query. If the server is down, the scanner will not issue the query request and the system is accessible to the user within the configured "Verify Timeout (sec.)" preset value which is ~10 minutes.

Box unchecked. The system DOES NOT CHECK the DICOM connection status PRIOR to issuing the Worklist Query/Retrieve request to the PACS or HIS/RIS server. If the server is down, the scanner is accessible only AFTER configured query timeout value with configured number of retries which is ~5 minutes.

Table 13-76:   DICOM Query/Retrieve

Preset Parameter	Description
Maximum Results	Specify the maximum number of patient records you want the system to retrieve when searching the patient database.
Search Criteria	Displays the Search Criteria window, where you can enter search parameters for the system to use when searching the patient database.

DICOM Query/Retrieve (continued)

NOTE: *If you are experiencing problems with slow responses from DICOM servers, increase the time-out in the DICOM server properties dialog. (Utility -> Connectivity -> Service -> Properties -> Maximum Retries and Timeout). Problems with slow responses may result in images being re-sent automatically and low transfer rates. The retry settings can be used to make jobs retry on bad networks. When portable (off-line), use minimum time-out and no retries or it will affect shutdown speed.*

Table 13-77:   DICOM Query/Retrieve Search Criteria

Preset Parameter	Description
Select Search Criteria to Add	Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time.
Tags (at least one)	The name of a tag selected to use for search criteria.
Properties: Value	Type the value of the Selected Tag item. For example, if you select Referring Physician's Name in the Select Tag field, you can enter the name of the physician in the Value field.
Properties: Don't Use	Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don't Use and then select Add to List.
Add	Select to add the tag and value to the list of search criteria.
Remove	Select to remove the tag and value from the list of search criteria.
Clear	Clears all tags.

Query/Retrieve Per Series

You can now display/retrieve multiple series by patient on the Patient--> Data Transfer--> Q/R page.

DICOM Storage Commitment

DICOM Storage Commitment provides acknowledgement from PACS that the study has been accepted into archive.

Table 13-78:   DICOM Storage Commitment

Preset Parameter	Description
Associated Storage	This selection is based on the services entered by the user.

DICOM Worklist

DICOM Worklist provides a list of patients sorted by query parameters.
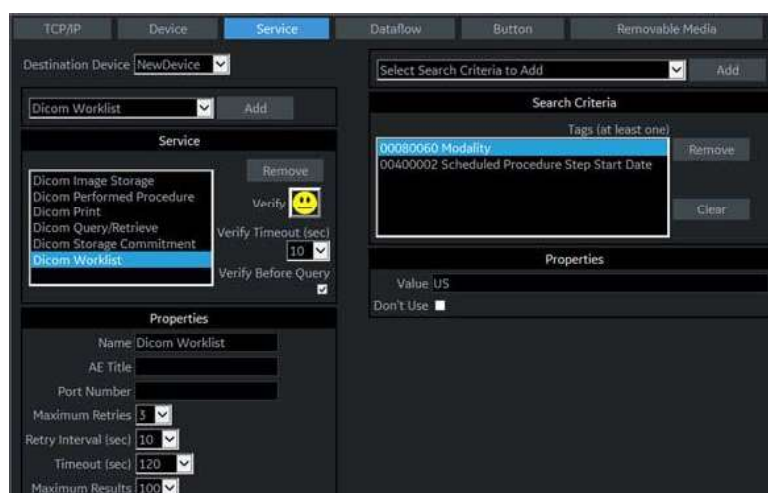
Figure 13-201.   DICOM Worklist Service

Verify Before Query

Box Checked. The system DOES CHECK the DICOM connection status PRIOR to issuing the Worklist Query/Retrieve request. This way, the system ensures that the PACS or HIS/RIS server is 'alive' before performing the actual query. If the server is down, the scanner will not issue the query request and the system is accessible to the user within the configured "Verify Timeout (sec.)" preset value which is ~10 minutes.

Box unchecked. The system DOES NOT CHECK the DICOM connection status PRIOR to issuing the Worklist Query/Retrieve request to the PACS or HIS/RIS server. If the server is down, the scanner is accessible only AFTER configured query timeout value with configured number of retries which is ~5 minutes.

Table 13-79:   DICOM Worklist

Preset Parameter	Description
Max. Result	Specify the maximum number of patient records you want the system to retrieve when searching the patient database.
Search Criteria	Displays the Search Criteria window, where you can enter search parameters for the system to use when searching the patient database.

Table 13-80:   DICOM Worklist Search Criteria

Preset Parameter	Description
Select Search Criteria to Add	Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time.
Tags (at least one)	The name of a tag selected to use for search criteria.
Properties: Value	Type the value of the Selected Tag item. For example, if you select Referring Physician's Name in the Select Tag field, you can enter the name of the physician in the Value field.
Properties: Don't Use	Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don't Use and then select Add to List.
Add	Select to add the tag and value to the list of search criteria.
Remove	Select to remove the tag and value from the list of search criteria.
Clear	Clears all tags.

Query/Retrieve (Search and retrieve the data from DICOM device)

You can display/retrieve individual images or multiple series by patient on the Patient--> Data Transfer--> Q/R page.

NOTE: *For Query/Retrieve to find a patient, the patient MUST have a Patient ID.*

Query

1. Press **Patient** and select *Data Transfer*. The Data Transfer screen displays.
2. Select Q/R. The patient/exam list in the Local Archive displays in the Transfer To section.

NOTE: *Only "Local Archive - Int.HD" is enabled for Transfer To.*

3. Select the Query/Retrieve server from the Transfer From pull-down menu.

NOTE: *The server is configured in the Utility screen. Multiple servers are able to be configured.*

4. Press Query in the Transfer From section. The Query is performed.
5. The server's patient list displays.

NOTE: *Press Query again to refresh the list.*

Retrieve

1. Select the patient(s) or the exam(s) to be retrieved from the patient list.
2. Press Transfer. Retrieve the data from the Query/Retrieve Server. The progress bar displays during the transfer.

One Click Query/Retrieve (One Click Q/R)

When a patient is selected on the Patient Screen, you can press the Query This Patient button on the Patient Screen to initiate a DICOM Query.

1. Select the patient.
2. Select *Query This Patient*.

The following occurs automatically:

*   The patient is registered (if needed)
*   The Data Transfer page appears with the following steps automatically performed:

    *   The Q/R service is selected.

NOTE: *If there is more than one Q/R service defined, the last one used is selected by default.*

    *   The current patient ID is filled in as the Search Criteria (not editable by the user).
    *   The Query is initiated.

The Queried patient is expanded to show a full list of series with the most recent series at the top.

NOTE: *The current active series is not listed.*

One Click Query/Retrieve (One Click Q/R) (continued)

If the retrieved patient has a single study, the system automatically imports that exam. If the retrieved patient has multiple exams, then:

1. Manually select exam(s) for transfer.
2. Press ***Transfer***. The Retrieve is completed without any confirmation required by the user regarding the patient already existing.

After the retrieve completes, the system automatically returns to the Patient screen with the same patient and exam active as when the ***Query This Patient*** was first selected.

If the Retrieve fails, the system does not auto return to the Patient screen.

If the user manually returns to the Patient screen or otherwise exits the Data Transfer screen, the same patient and exam are active as when the Query this Patient button was first selected.

Send To (Send the image to the DICOM Device)

"Send To" sends the selected exam for a patient and to interactively Send-To the exam to a destination DICOM device configured on the system. An exam in this case includes its images and any corresponding Structured Report.

1. Search and select the patient and press **Review**. The Patient Exam screen displays.

2. Select the exam which has the images and press **Send to**.

NOTE: *You can only select "Local Archive - Int.HD" for Workflow.*

The Send To Dialogue box displays.

3. Select the destination device and press **OK**.

NOTE: *The destination device is configured in the Utility screen. Multiple devices are able to be configured.*

The successful/unsuccessful message is displayed at the bottom of the screen.

Selectable Send To

"Selectable Send To" sends the selected exam image(s) and from the Local Archive or DICOM Read device to a destination DICOM device configured in the system via Utility--> Connectivity--> Service.

1. Select a patient or an exam in the Patient menu.
2. Go to Active Images.
3. Select an image (images) and press **Send To**. The Send To Dialogue displays.

NOTE: *If the image is not selected, a warning dialog is displayed and no image is sent.*

4. Select a destination from the pull-down menu and press **OK**.

"Selected image(s) is (are) send to" message displays on the status bar.

NOTE: *Active Images menu and the Touch Panel shall not have "Send To" button if the patient is not selected.*

Using the DICOM Spooler

⚠️ CAUTION   If working off-line with a dataflow pointing to a DICOM server, the images stored during the examination may have to be manually resent in the DICOM spooler when reconnecting the unit. Resend all jobs that are failed or on hold.

To monitor/control DICOM jobs, press F4. You can view, resend, redirect, and delete images from the DICOM spooler by selecting a job, then specifying the action to be performed on this job.

NOTE: *If you find a failed job(s) in the Spooler, please remove the failed job(s) from the Spooler.*

Table 13-81:   Spooler status description

Status	Description
Hold	Waiting for user activity. Select Resend or Send-To to complete the job.
Pending	Waiting for the previous job(s) to finish (a previous job may be Active or Pending). No user interaction required.
Append	Not completed. Example 1: Direct Storing job. Waiting for more images or the end of the exam (by selecting New Patient or End Current Patient). Example 2: Print job with 3x3 images has only 8 images. Waiting for one more image or the end of the exam (by selecting New Patient or End Current Patient).
Active	Signifies network activity (or connection attempt).
Success	Sent successfully.
Failed	Unsuccessful job attempt. Job stays in spooler. Select Retry or Delete to complete the job.
Done	Finished successfully.

Load DICOM Volume Dataset

To load a pre-acquired DICOM volume dataset,

You can exit and re-enter V Nav and retain the Dataset by pressing the V Nav control. OR, to discard the pre-acquired Dataset, press Exit and Clear on the Touch Panel.

From disk

NOTE: *Volume datasets that can be loaded from disk may include CT, MR, PET, XA, DX and Invenia (US).*

1. If applicable, insert the media containing the pre-acquired 3D dataset.

2. Press *Load* and select *from Disk*.

3. Double click on the DICOMDIR or database file (or single click and select the Open button).

4. Navigate to the location of the 3D dataset.

5. A list of patients and a list of image series for each patient displays. Highlight the Series you want to import and select *Import Series*.
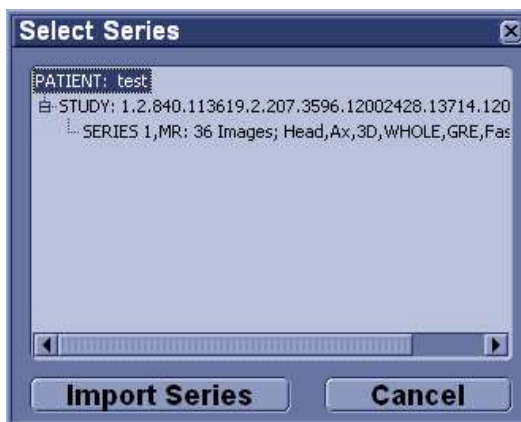
Figure 13-202.   Selecting the Patient's 3D Dataset

From disk (continued)

6. The Check Patient Data screen appears. Confirm that the patient information matches the patient associated with the current exam. After verifying patient information, press Accept (or Reject). You can also specify to display Patient Data by checking the Display Patient Data box.

 If you turn on "Display Patient Data", Patient name, ID and birth date are displayed on the Volume data. These are remained on the live scanning image.
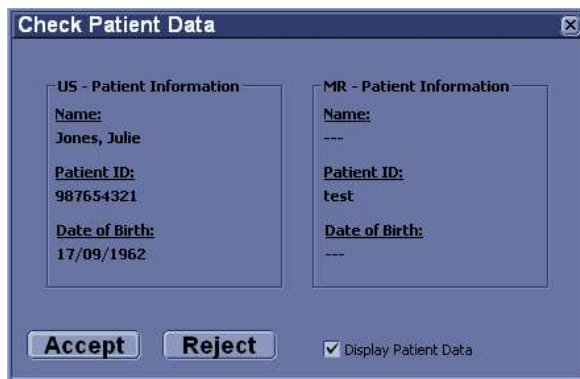
Figure 13-203.   Check Patient Data Dialog

NOTE: *If Hide Patient Data preset (Utility->System->General) is set to "On Store", then the patient data is removed from the volume dataset prior to image storage and then redisplayed after image storage.*

7. B-mode image displays on the left side and the loaded volume data displays on the right side.

Load DICOM Volume Dataset (continued)

From Database

> *NOTE:* *Volume datasets that can be loaded from the database: CT, MR, PET, XA and Auto Sweep.*

1. Press **Load** and select **from Database**.

2. Select the desired volume from the Image History screen and press **Load**.

3. The Check Patient Data screen appears. Confirm that the patient information matches the patient associated with the current exam. After verifying patient information, press Accept (or Reject). You can also specify to display Patient Data by checking the Display Patient Data box.

   If you turn on "Display Patient Data", Patient name, ID and birth date are displayed on the Volume data. These are remained on the live scanning image.
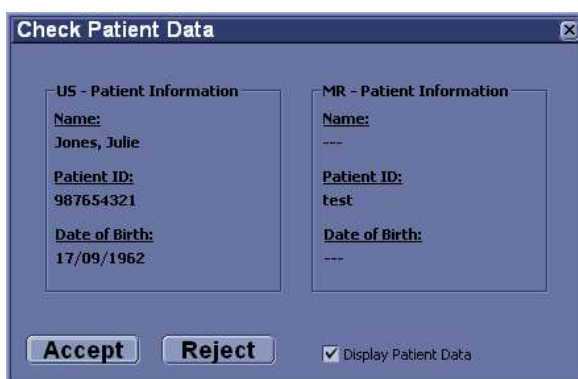
Figure 13-204.   Check Patient Data Dialog

> *NOTE:* *If Hide Patient Data preset (Utility->System->General) is set to "On Store", then the patient data is removed from the volume dataset prior to image storage and then redisplayed after image storage.*

> *NOTE:* *If you Load From Database and want to cancel out, use the Exit button on the Image History screen.*

4. B-mode image displays on the left side and the loaded volume data displays on the right side.

Load Multi Volume Datasets

You can load multiple datasets (up to 10 datasets) of same study at the same time:

Sometimes there are multiple acquisitions stored within a single series. When you select Load All, these are loaded as one dataset (if they are not overlapping) or as two datasets (if two or more datasets are overlapping).

1. Load dataset from disk, check data of the Select Series pop-up.

Figure 13-205.   Select Series pop-up

Load dataset from database, select one image from each exam and press *Load* in the Image History screen.

Figure 13-206.   Image History screen

Load Multi Volume Datasets (continued)

2. V Nav screen and multiple dataset menu are displayed.

Table 13-82:   Multiple dataset menu

Item	Description
1-5	Dataset List (CT, US and MR in this example)
1	Active Dataset Indicator
2	Name of dataset
3	Visivility Indicator
4	Display Weighting
5	Display Color
6-12	Control Area
6	Single Display
7	Multiple Overlapping Display
8	Color Control
9	Volume-to-Volume Registration
10	Delete
11	Compare Volume
12	Expand/Collapse Dataset list

Load Multi Volume Datasets (continued)

Using the Touch Panel control, you can adjust:

Table 13-83:

	Item	Description
	1	Toggle Up/Down: Select the dataset.
	2	Push: Fix the selected dataset.
	3	Rotate: Weight Dataset. You can weight the overlay amount of the volume dataset.
	4	Dataset number and its Weight (%)

NOTE: *When you select **Save Volume** on the Touch Panel, all volumes are saved to a single file on the Clipboard, including GPS Markers.*

Load additional volume datasets

Whenever a dataset is loaded and you want to load another dataset from disk, from clipboard or from database or if you generate a dataset and switches then back to VNav, the system asks you that add the dataset as an additional or replace the existing dataset(s).

If you choose to add the dataset, the necessary adaption of the datasets with regard to size and resolution will be performed automatically at the end of the load.

Tricefy Uplink

Introduction

Tricefy is a cloud-based image viewer and a platform to archive, collaborate, and share. The Tricefy DICOM server may be used in the way any DICOM server on the product may be used, i.e., Print keys, Send To, etc. The corresponding DICOM destinations can be used via the Print keys. An internet connection is necessary for uploading data to Tricefy.

NOTE: *To engage in service offerings with Tricefy, confirm that your country has entered into an agreement with Tricefy.*

NOTE: *Tricefy DOES NOT support IPv6 and cannot be used in conjunction with Tricefy.*
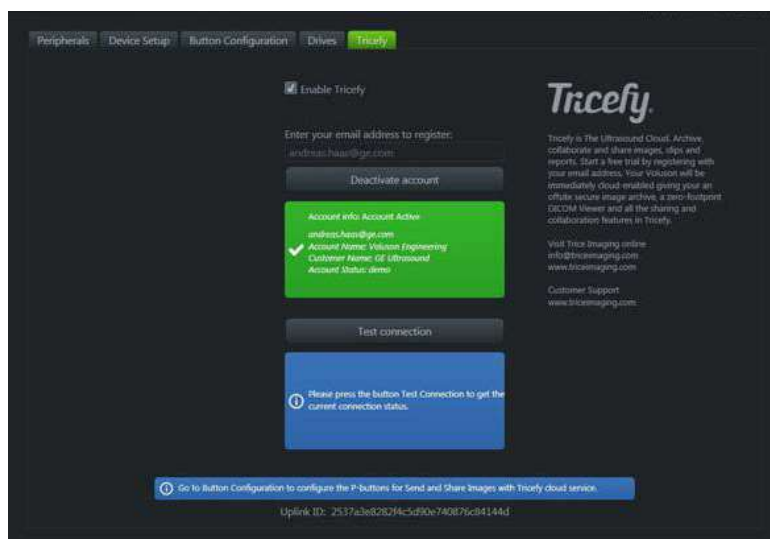
Figure 13-207.   Tricefy Account

The tab displays a general info area with a short description of Tricefy, an uplink ID, and an info badge for how to configure Print buttons on system setup (only available when an account is active). Furthermore the account area displays controls and information about the Tricefy account while the test connection

area enables you to test a connection and gives detailed
information about it.

Uploading Exam Information to the Tricefy Cloud

Enabling Tricefy

1. To enable Tricefy, fill out the information on Utility --> Connectivity--> Tricefy. As soon as this option is enabled, relevant Tricefy items are displayed (e.g. email text field, Activate button,.... and options within the system setup to share or store data to Tricefy via the print key or status bar icons (described below).

2. Enter your email address to register and click Activate account. (If you want to deactivate an active account, click Deactivate account.)

3. Depending on the account status, different account information is displayed:
   - green badge containing the account info, email address, account name, customer name and account status- account activated
   - blue badge - information about a disconnected account
   - orange badge - connection to Tricefy™ failed (due to timeout,...)

4. For testing the connection click Activate. Depending on the connection status, different information is displayed:
   - green badge - connection ok
   - blue badge - instruction for testing the connection (only displayed as long as Activate is not pressed)
   - orange badge - connection failed

5. Upon success activation, you will receive an Uplink ID.

NOTE: *When tricefy is successfully activated an image storage and Query//Retrieve service will be created with port number 8104.*

Configuring Tricefy

1. Set up the Tricefy Service via Utility > Connectivity > Service. Set the DICOM Image Storage and Query/Retrieve ports to Port 8104. Refer to the DICOM sections in this chapter and in Chapter 10 for more information. Verify the service.

2. Set up a Dataflow for Tricefy. Refer to the DICOM sections in this chapter and in Chapter 10 for more information. Verify the Dataflow.

3. Configure the Print buttons via Utility > Connectivity > button. Refer to the DICOM sections in this chapter and in Chapter 10 for more information. Verify the Print button(s).

Using Tricefy

1. You can send a patient's exam to the Tricefy Image Storage service via the Exam Tab. .

1. Select the patient's exam and press the Send To button. Select the Tricefy Image Storage service. Press OK.

    You can check the job status by pressing F4 (DICOM Job Spooler).

    You can confirm the exam is on the Tricefy Server via a web browser. Navigate to https://tricefy4.com. Log in with your account information. The patient and image(s) you sent are on the Tricefy cloud.

2. To Query/Receive patient information on the Tricefy cloud, on the Patient page, go to the Data Transfer page. Select the Q/R radial button, then press Query. A list of patients on the Tricefy cloud is displayed. Select the patient you want to retrieve, then select Transfer.

Tricefy Icons

Tricefy icons are explained below.

Table 13-84:   Tricefy Icons

Connection Icons	Store Icons	Share Icons
Connected to Tricefy. Ready to Store and Share	Upload Image to Tricefy	Share Image with Patient via Tricefy.
Disconnected from Tricefy.	Upload CINE to Tricefy	Share CINE with Patient via Tricefy.
Registration incomplete.	Upload 4D Image to Tricefy	ri
	Upload 3D Image to Tricefy	

Tricefy Activation

Refer to Chapter 10 for more information.

Report Writer

Introduction

The LOGIQ P8/P9/P10 enables the generation of patient reports based on the examination performed and the analyses that were made during the exam. The reports are generated using the data stored in the system with pre-selected templates.

You may edit a report while performing the exam; customize, delete, or add measurements; and save changes until you use the Store command. Once Stored, the reports are read-only.

It is recommended that the data be saved often, and then carefully reviewed before the report is Stored. Use the worksheet to facilitate the review and adjust data before storing a report. The final report can be printed on a standard printer.

Creating a report

Reports summarize the data obtained in the examination. They can contain data, images, and cine loops.

Once generated, the report can be viewed, images can be added, and the patient's personal data can be modified. The examination data itself CANNOT be changed.

Figure 13-208.   Report Example

Activating the Report

1. Select **Reports** on the Touch Panel.

2. The system displays the default report for the current application on the monitor.

   The information entered during the examination is automatically filled in the appropriate fields (e.g. demographic, diagnosis, comments).

   The preview image appears when the cursor is over the clipboard image.

NOTE: *The template is the skeleton of your report. It is composed of different objects that can be customized by the user.*

3. Adjust the **Page Change** control to move down the page.

Figure 13-209.   Report Page Example

Activating the Report (continued)

Table 13-85:   Report Button Controls

Button	Description
Print	Prints out the report to the default printer.
Store	Stores the report page into Archive as CHM* file.
Retrieve	Retrieves the report page from Archive. Stored Date/Time is appended to the name of stored report.
Template	Selects template from the list of selected applications.
Designer	Accesses template editor screen.
Save As	Exports the report page to storage media as CHM or PDF format.
Delete	Deletes the report page from Archive.
Worksheet	Accesses Worksheet Page.
Graph	Accesses OB Graph page (applies only to OB).
Anatomical Page	Accesses Anatomical Survey page (applies only to OB).
*CHM is a compressed HTML help file.	

Selecting another template

You can select another template for the current patient:

1. Select ***TEMPLATE*** at the bottom of the monitor display or the Touch Panel.
2. A list of available templates and exam categories (Abdomen, Adul, Carotid, etc.) displays.
3. Select the desired template using the **Trackball/Trackball** and press **Set**.

   The selected template displays on the monitor.

NOTE: *If you select another exam category, the template list of the selected category displays. Select the desired template.*

Figure 13-210.   Available Template list

4. Select the desired template name and press **Set**.
5. The report changes to the selected template.

Factory Templates

The system has factory templates for each application. You can modify these templates or create user-defined templates. You need to save revised/new templates with unique names.

A template may include one or more of the following:

- Measurements
- Worksheet or Vessel Summary Images
- Anatomical Surveys or Biophysical Profiles
- Anatomical Graphics
- Graphs
- Images areas
- Score Boxes

NOTE: Additional factory templates can be added from the Utility-->Report menu (OB for multiple gestation, Renal, etc.).

Editing a Report

Entering the hospital address

When using a factory template, the area for the hospital information is usually placed in the upper portion of the report.

To make a new area, see 'Fixed Text' on *page 13-448* for more information.

To modify the factory template:

1. Select *Reports*.
2. Select *Designer*.
3. Double-click on the area for the hospital information in the template. The Fixed Text dialogue box displays.
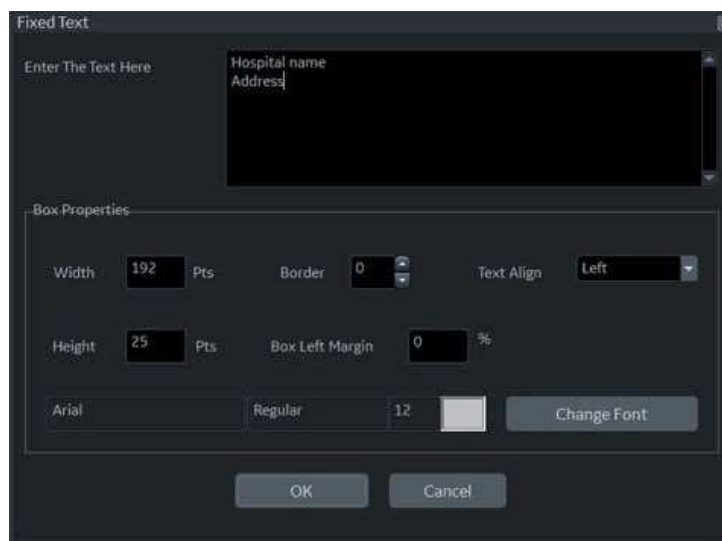
Figure 13-211. Fixed Text Dialogue Box

4. Make changes as necessary.
   a. Enter the hospital address in the text area.
   b. Modify Box Properties (box width, box border line width, text align, box height, box left margin, and font).
5. Select *OK*.

Entering the hospital address (continued)

6. Save the template.

    To keep the same template name:

    *   Select *Save* from the File menu, and press **Set**. The Save Template dialog box opens.
    *   Select *Yes*. The template retains the same name and appends "[user]". For example, OB23-Basic[user].

    To save the template with a new name:

    *   Select *Save As* from the File menu, and press **Set**. The Save Template As dialog box opens.
    *   Enter the name of the new template, and press **Set**. The template receives the new name and appends "[user]". For example, NewReport[user].

7. Exit the Report Designer. The report with the hospital address displays.

Inserting the hospital logo

When using a factory template, the area for the logo is usually placed in the upper left portion of the report.

To make a new area, see 'Fixed Text' on *page 13-448* for more information.

To modify the factory template:

1. Save the preferred hospital logo in either a jpeg or bmp format on the removable media.

NOTE: *Label the logo with a unique name (e.g. HospitalNameLogo.bmp).*

2. Insert the removable media.

3. Select **Reports**.

4. Select **Designer**.

5. Double-click logo box at the left top so that the frame is highlighted. The logo box displays.
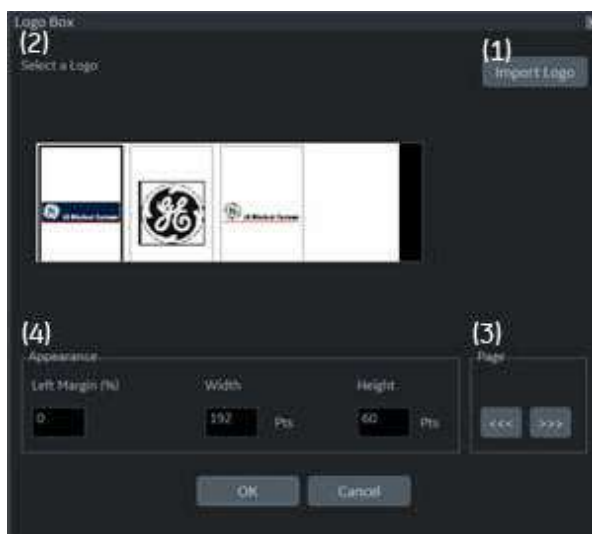
Figure 13-212.   Logo Box

Inserting the hospital logo (continued)

6. Select ***Import Logo*** (1). Select the CD drive first and then the hospital logo.

7. Select ***OK***. The hospital logo displays in the logo list (2). Click the logo to select.

NOTE: *Scroll the logo list using the left/right arrow key (3).*

8. Modify Appearance (4).

9. Select ***OK***.

10. Save the template.

   To keep the same template name:

   • Select ***Save*** from the File menu, and press **Set**. The Save Template dialog box opens.

   • Select ***Yes***. The template retains the same name and adds "[user]". For example, OB23-Basic[user].

   To save the template with a new name:

   • Select ***Save As*** from the File menu, and press **Set**. The Save Template As dialog box opens.

   • Enter the name of the new template, and press **Set**. The template receives the new name and adds "[user]". For example, NewReport[user].

11. Exit the Report Designer. The template with the hospital logo displays.

NOTE: *If a different logo prints on the report, rename the logo image which you want on the report and insert it into the report template again.*

Changing the Archive Information

When using a factory template, the Archive Information is usually placed below the hospital name and logo.

The contents of the Archive Information is inserted through the related page automatically. If you want to change the description, such as Information or Comments that was entered in the patient menu:

1. Double-click the yellow text to be changed, e.g. Information or Comments.

    The area where the description was entered (e.g. Patient menu) displays.

2. Change the existing data as necessary.

3. Select *Report* to return to the report.

Figure 13-213.   Patient Information Area (Example)

Modifying the displayed objects of Archive Information

1. Select ***Designer***.

2. Double click on the area for the Archive Information in the template. The Archive Information Box displays.
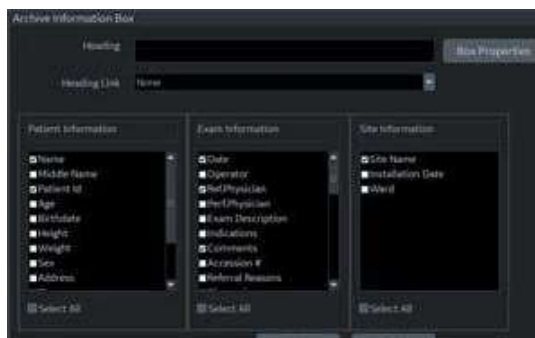
Figure 13-214.   Archive Information Box

3. Click the checkboxes to select and deselect the objects.

   Objects with checkmarks will appear in the report template.

4. Select Box Properties to change the font, font size, font color, or box size, and select ***OK***.

5. Select ***OK*** to return to the Report Designer.

Modifying the displayed objects of Archive Information (continued)

6. Save the template.

   To keep the same template name:

   • Select **Save** from the File menu, and press **Set**. The Save Template dialog box opens.

   • Select **Yes**. The template retains the same name and adds "[user]". For example, OB23-Basic[user].

   To save the template with a new name:

   • Select **Save As** from the File menu, and press **Set**. The Save Template As dialog box opens.

   • Enter the name of the new template, and press **Set**. The template receives the new name and adds "[user]". For example, NewReport[user].

7. Select File -> Exit to leave the Report Designer.

Entering free text

You can enter free text to the report using the alphanumeric keyboard.

The factory template terms their text area as "Summary or Comments".

1. Move the cursor to the text field and press **Set**.

NOTE: *You can enter the text only to the field set as free text in the Report Designer.*

NOTE: *DO NOT enter "%s" in a free text field and then try to edit/ save the template in the Report Designer.*

2. Type the text.

Inserting Text

1. Select **Designer**.
2. Move the cursor where the text is to be inserted and press **Set**.
3. Select the Text Field from the Insert menu. The Text Field dialog box displays.
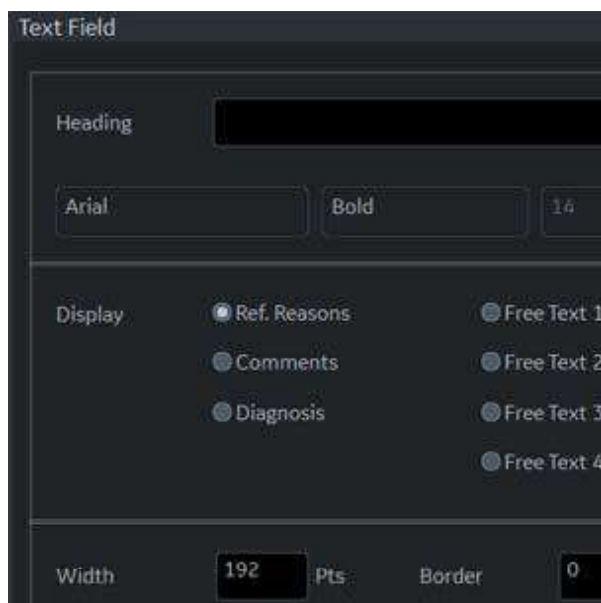
Figure 13-215.   Text Field Dialogue Box

4. Select the appropriate display items:
   - Ref. Reasons: Retrieves this information from the Direct Report
   - Comments: Retrieves this information from the Comment field of the patient screen and the Exam Comment field of the worksheet.
   - Diagnosis: Retrieves this information from the Direct Report
   - Free Text 1 - 8

Inserting Text (continued)

5. Type the heading Text.
6. Modify box properties, the heading text and font, and data.
7. Select *OK* or Cancel.
8. Save the template.

   To keep the same template name:
   • Select *Save* from the File menu, and press **Set**. The Save Template dialog box opens.
   • Select *Yes*. The template retains the same name and adds "[user]". For example, OB23-Basic[user].

   To save the template with a new name:
   • Select *Save As* from the File menu, and press **Set**. The Save Template As dialog box opens.
   • Enter the name of the new template, and press **Set**. The template receives the new name and adds "[user]". For example, NewReport[user].

Inserting an image to the report

Some factory templates include an image area. If you want to insert or modify the image area, see 'Image Display Fields' on *page 13-440* for more information.

To insert images from clipboard into the image field of the report:

1. Move the cursor to the desired image on the clipboard.

NOTE: *The preview image appears when the cursor is over a clipboard image.*

2. Press and hold down the **Set** key and drag the selected image to the report by using the **Trackball** or double click the **Set** key on the desired image.

3. To move images between image areas, press and hold down the **Set** key and using the **Trackball**, drag the selected image to the new location.

   To remove an image from the report, press and hold down the **Set** key and using the **Trackball**, drag the select image back to the clipboard.

Measurement result section

Measurement results for the current patient display automatically if you have the measurement section in the report template.

The factory template has an appropriate measurement result area. If you want to insert or modify the measurement area, see 'Measurements' on *page 13-446* for more information.

Figure 13-216.   Measurement section

Inserting the worksheet

You can insert the worksheet (like you can insert an image) to the image display field. To set an image display field in the report template, see 'Image Display Fields' on *page 13-440* for more information.

1. Display the worksheet on the monitor display.
2. Save the worksheet using the **Print** key.
3. Press *Report*.
4. Drag the worksheet into the report.
    a. Move the cursor to the desired worksheet on the clipboard.
    b. Press and hold down the **Set** key. Use the **Trackball** to drag the selected worksheet into the Image Display Field.
    c. Release **Set**.

NOTE: *You can also move the cursor to the desired worksheet on the clipboard, double-click the worksheet, move the cursor to the Image Display Field, and select* **Set***.*

5. The worksheet displays on the report.

NOTE: *You can double-click the worksheet in the report to change the background color to white to save ink during printing. Double-click the worksheet again to return the worksheet to the original color.*

Placing objects side-by-side

If you want to place images, the image and comment, anatomical graphic and comment, etc. side-by-side, you must first place a table, which has two (or more) columns, into the report template.

1. Select *Report*.

2. Select *Designer* to display the Report Designer.

3. Place the cursor where you want to insert the object.

4. Select *Table* from the Insert menu. Insert Table box displays.

Figure 13-217.   Insert Table Box

5. Set the number of columns to 2 (or more, as required) and change the table parameters, if needed. Select *OK*.

NOTE: *If you do not need a table border, set the Border to 0. Add additional rows if required.*

6. Place the cursor in the column and select the desired items from the Insert menu (e.g. logo, image, free text). Specify those items.

7. Repeat step 6 for each column as required.

Placing objects side-by-side (continued)

8. Save the template.

    To keep the same template name:

    •   Select *Save* from the File menu, and press **Set**. The Save Template dialog box opens.

    •   Select *Yes*. The template retains the same name and adds "[user]". For example, OB23-Basic[user].

    To save the template with a new name:

    •   Select *Save As* from the File menu, and press **Set**. The Save Template As dialog box opens.

    •   Enter the name of the new template, and press **Set**. The template receives the new name and adds "[user]". For example, NewReport[user].

You can insert the images in the order preferred, by row or column, on the factory templates. See 'Inserting the Table' on *page 13-432 for more information.*

Accessing Worksheet, OB Graph and Anatomical Survey Pages

If the Worksheet, OB Graph, and/or Anatomical Survey pages have been saved for the current patient, you can access these pages from the report page.

NOTE: *OB Graph and Anatomical Survey pages applies to OB, GYN and Abdomen.*

1. Select either **Worksheet**, **Graph** or **Anatomical Page** on the Touch Panel.

NOTE: *There is also Fixed Text set up as hyperlinks for these pages. Cursor to the fixed text and press **Set**.*

2. The system displays the appropriate page (Worksheet, OB Graph or Anatomical Survey) with the corresponding Touch Panel.

3. Select **Report** to return to the Report page.

Storing the Report

1. Select **Store**.

    The Report is saved as a CHM file to Archive.

NOTE: *The archived report cannot be edited; therefore, it is recommended that the data is carefully reviewed before the report is saved.*

Retrieving an Archived Report

1. Select **Retrieve**. The Retrieve menu displays.

Figure 13-218.   Retrieve Menu (Prefix "User1\" may not appear)

2. Select the desired report and press **Set**.

NOTE: *The retrieved report cannot be edited.*

Deleting a Report from Archive

1. Select *Delete*. The Retrieve menu appears on the screen.

Figure 13-219.   Delete Reports Menu (Prefix "User1\" may not appear)

2. Select the report to delete and press **Set**.

Printing the Report

To preview the Print Layout before printing, see 'Preview the Print Layout' on *page 13-430* for more information.

NOTE: *Double-click the worksheet and/or image in the report to change the background color to white A white background will save ink during printing. Double-click the worksheet or image again to return to the original color.*

1. Select *Print* to print out the report.

The Report is printed on the default printer.

Exporting the Report to Media

1. Select *More*.

2. Select *Save As*.

    The Save As dialog box appears on the screen.

3. Enter the Report title and select the file format.

4. Select the media to export the Report. The system supplies a name (numeric DICOM UID, unique identifier).

Figure 13-220.   Save as Dialog Box

5. Select *Save*.

Exiting the report

1. Select *Store* to save the report.

NOTE: *If the user is working on a report and leaves the report screen for any reason, all information added to the report is automatically saved without loss of data.*

2. Select another key to close the report page.

Designing Your Own Template

Template Designer

You can design and create your own customized template from a blank template page, or you can use an existing template (factory or user-defined) and save the changes.

Display the desired template and select *Designer* to open the Template Designer page.

Figure 13-221.   Report Designer

File Menu

Table 13-86:   File Menu

	Description
New	Creates a new template. A blank template appears.
Save	Overwrites the existing template.
Save As	Saves as a new name.
Page Setup	Enters Print Layout screen.
Print Preview	Executes print preview.
Exit	Exits Report Designer page.

Create a new template

To design a new template without using a pre-existing factory template:

1. Select *Designer* to open the Report Designer.
2. Select *New* from the File menu, and press **Set**.
    The blank template displays.
3. Create the report template as needed.
4. Select *Save* from the File menu, and press **Set**.
    The Save Template As dialogue box displays.
5. Enter a template name and click *OK*.
6. To exit Report Designer, select **Exit** from the File menu, and press **Set**.

    •   Yes: Saves changes and exits Report Designer.
    •   No: Does not save changes and exits Report Designer.
    •   Cancel: Returns to Report Designer.

Create a new template and save as a factory template name

To design a new template by modifying an existing factory template and keeping the same name of the factory template:

1. Select and display the existing factory template.

2. Select *Designer* to open the Report Designer.

3. Modify the report template as needed.

4. To save changes, select **Save** from the File menu, and press **Set**.

   The Save Template dialog box displays.

   • Yes: Saves changes.

   • No: Does not save changes.

   • Cancel: Returns to Report Designer.

NOTE: *The template name displays in the template list, retains the same name, and adds "[user]". For example, "OB23-Basic[user]". You do not lose the original factory template.*

5. To exit Report Designer, select **Exit** from the File menu, and press **Set**.

   • Yes: Saves changes and exits Report Designer.

   • No: Does not save changes and exits Report Designer.

   • Cancel: Returns to Report Designer.

HINTS   Save changes frequently as you modify your template. Saving often reduces the risk of losing all your changes.

Create a new template and save with a new name

To design a new template by modifying or copying an existing factory template and saving it with a new name:

1. Select and display the existing factory template.
2. Select *Designer* to open the Report Designer.
3. Modify the report template as needed.
4. Select *Save as* from File menu and press **Set**.

   The Save Template As dialog box displays.
5. Type the new template name and click OK.
6. Select *Exit* from the File menu and **Set**.
7. The Report Designer closes and returns to the Report Page.

NOTE: *The template receives the new name and adds "[user]". For example, NewReport[user].*

Page Setup

1. Modify the factory template as necessary in **Designer**.
2. Select **Page Setup** from File menu and press **Set**.
3. Change the paper size or orientation to fit the print layout, as necessary.

   To define the header and footer for the printed report, type text and enter the required variables listed in the table below. Select "Different for first page" and enter a specific header/footer for that page.

Table 13-87:   Variable and Definition

Variable	Definition	Variable	Definition
{pid}	Patient ID	{prt}	Current time (printing time)
{pnm}	Patient name	{cp}	Current page
{pbd}	Patient date of birth	{tp}	Page count
{exd}	Examination date	{c}	Subsequent text is centered
{prd}	Current date (printing date)	{r}	Subsequent text is right aligned.
{inm}	Institution name		

NOTE: *Default is left aligned. Report will appear as black ink on white background.*

Page Setup (continued)

4. Select *OK* or Cancel.
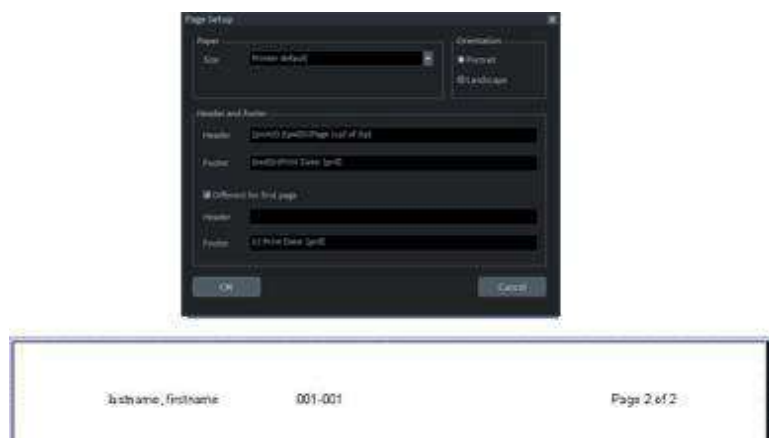
Figure 13-222.   Page Setup with Header Example

Preview the Print Layout

1. Select *Template* to choose the Report Template.

2. The Print Preview screen displays.

    If changes need to be made, select **Close** to exit the Preview page. Modify the template or return to the Report and modify the contents.

Edit Menu

Table 13-88:   Edit Menu

	Description
Delete	Deletes the selected object from the report template.
Undo	Restores the previous state(s) of the report template.

Deleting a template object

1. Select the object to be deleted.

2. Select *Delete* from the Edit menu, and press **Set**. The object is deleted from the template.

Undoing the operation

1. Select *Undo* from the Edit menu, and press **Set**.

2. Repeat as required.

Insert Menu

Table 13-89:   Insert Menu

	Description
Page Break	Inserts a Page Break.
Table	Inserts a Table.
Logo	Inserts a Logo Bitmap File.
Archive Info	Inserts Archive Information.
Anatomical Graphics	Selects anatomical graphics by category to be inserted into a field.
Anatomical Survey	Selects OB, GYN or Abdomen.
Image	Inserts the image display field to the template.
Wall Motion Analysis	Selects Cut Planes, Bull's Eye, or Score Table Box.
OB/GYN	Selects OB Graph, Bar Graph or Anatomy.
Small Parts	Selects Breast or Thyroid.
Measurements	Inserts the measurement display field in the template.
Text Field	Edits text field.
Fixed Text	Enters any comments as Fixed Text.

Inserting the Page Break

1. Place the cursor where the Page Break is to be inserted and press **Set**.

2. Select Page Break from the Insert menu and press **Set**. The page break line displays on the template.

NOTE: *To edit the page break line, select the line and double click the **Set** key.*

Inserting the Table

1. Place the cursor where the table is to be inserted and press **Set**.

2. Select Table from the Insert menu and press **Set**. The Insert Table dialog box displays.

Figure 13-223.   Insert Table Dialog

3. Specify each parameter as required.

NOTE: *To set the table border as not visible, set "Border" parameter to 0 (zero)*

4. Select *OK* to insert the table or Cancel.

NOTE: *To insert/delete a row/column from the table or access table properties, double click the **Set** key in any empty area inside the table. A table menu appears with those options.*

Inserting Images in a Table

You can choose the order in which images are inserted into tables: by row (default) or by column.

Image Order by Row

The system default inserts images in the cells of the first row, then to the next row.

Figure 13-224.   Image Order—Row Preference
(System Default)

1. Follow the instruction for inserting a table. When specifying parameters, specify:

   No. of Columns=2; No. of Rows=2

2. After inserting the table, insert an image box in each cell of the table.

   a. Move the cursor to the first cell and select Insert -> Image.

   b. Repeat this step for each cell in the table.

After the template is saved and you are working in the ReportWriter, when you select images to be inserted in the table, they are placed in the default order.

Inserting Images in a Table (continued)

<u>**Image Order by Column**</u>

If you prefer to have the image placement by column, images are inserted in each cell of the first column, then the next column.
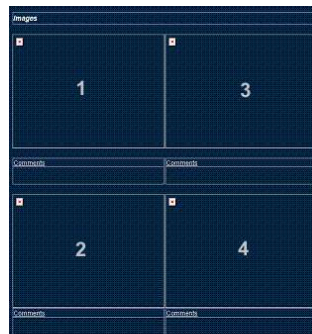
Figure 13-225.   Image Order—Column preference

In order to achieve the column preference, you need to create a table with 2 columns and 1 row. In each cell of this table, you need to insert another table.

1. Follow the instructions for inserting a table. When specifying parameters, specify:

    No. of Columns=2; No. of Rows=1

2. After inserting the table, create a table inside each of the existing table's cells.

    a. Move the cursor to the left column's cell and press **Set**.

    b. Select Table from the Insert menu and press **Set**.

    c. When specifying parameters, specify:

        No. of Columns=2; No. of Rows=1; Width=290 pixels.

        Select *OK*.

    d. Repeat steps a-c for the next column.

3. Insert an image box to each table cell.

    a. Move the cursor to the first cell and select Insert -> Image.

    b. Repeat this step for each cell in the 2 tables.

After the template is saved and you are working in the ReportWriter, when you select images to be inserted in the table, they are placed with your column preference.

Inserting Logos

1. Place the cursor where you want to insert the logo and press **Set**.

2. Select Logo from the Insert menu and press **Set**. The Logo Box displays.
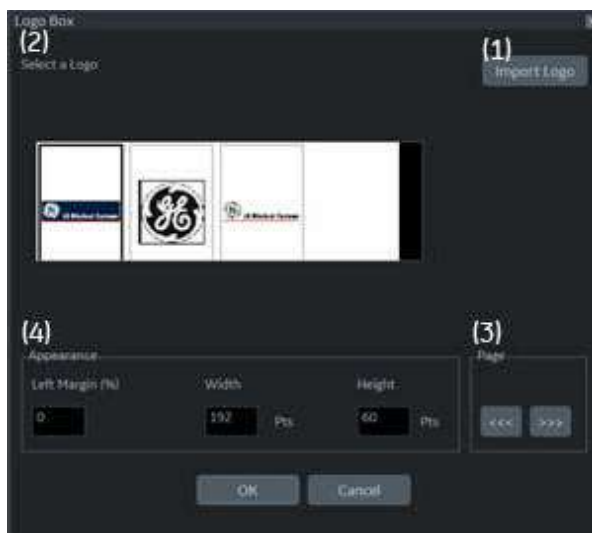
Figure 13-226.   Logo box

3. Select a logo that you want to insert (1). or import a bmp or jpg file from the removable media (2). Scroll the images using the arrow key (3). Specify the appearance (4).

4. Select *OK* to insert the logo or Cancel.

Changing a logo:

1. Place the cursor on the logo to be changed and press **Set** twice. The Logo Box displays.

2. Select a different logo. If the desired logo is not shown, select Import Logo to import a different logo.

3. Specify the appearance.

4. Select *OK* or Cancel.

Inserting Archive Information

Archive information contains all the objects from the different information menus (Patient, Exam, and Site Information). This box accumulates different information menu selections that can be grouped together and displayed in one table.

1. Place the cursor where you want to enter the archive information and press **Set**.

   If you use a factory template, double click on the current archive information area to display the Archive Information Box.

2. Select *Archive Info* from the Insert menu and press **Set**. The Archive Info Box displays.
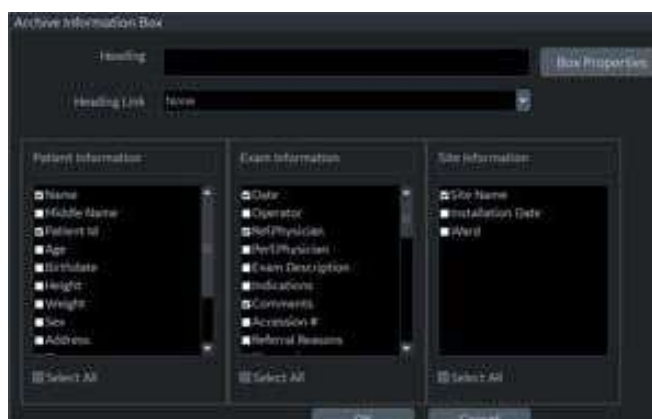
Figure 13-227.   Archive Information Box

3. Type the Heading, select a heading link from the pull-down menu, and select the parameters you want to display in the report.

Inserting Archive Information (continued)

4. Select Box Properties to change the Font, Alignment, Appearance, etc.

NOTE: *To set the same font to all fields, select Set All fields.*

Figure 13-228.   Table Properties

5. Select *OK* or Cancel. The contents of the Archive Information is inserted to the related page automatically.

Figure 13-229.   Patient (Archive) Information Example

Inserting Archive Information (continued)

Editing displayed Archive Information:

1. Select *Designer*.
2. Move the cursor to Archive Information field to be edited.
3. Press **Set** twice. The Archive Information Box displays.
4. Edit the heading, the Heading Link and Information parameters, as necessary.
5. Select *OK* to save or Cancel.

Anatomical graphics

1. Place the cursor where you want to insert the Anatomical Graphics and press **Set**.

2. Select *Anatomical Graphics* from the Insert menu.

3. Select the desired category and press **Set**. The graphic box displays.
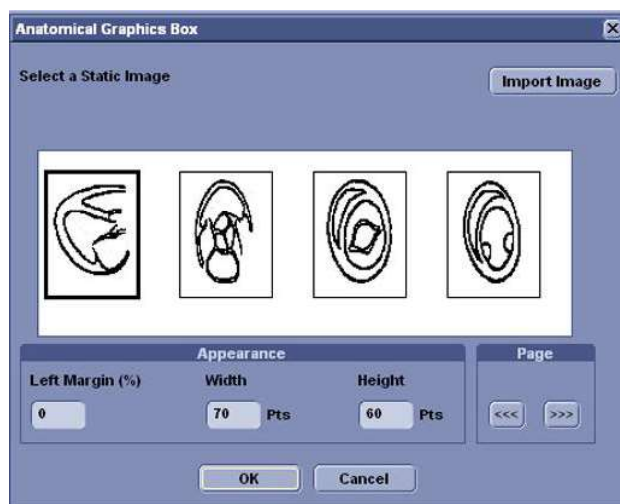
Figure 13-230.   Anatomical Graphics Box Example

4. Select the graphic to be inserted to the template or import a bmp or jpg file from the removable media. Scroll the images using the arrow key.

5. Select Appearance.

6. Select *OK* or Cancel.

Image Display Fields

1. Place the cursor where you want to insert the image.

2. Select image from the Insert menu and press **Set**. The Ultrasound Image Box displays.

Figure 13-231.   Ultrasound Image Box

3. Type the Heading text, modify the box properties, and change the heading text font, as necessary.

NOTE: *For no heading, type a Space in the Heading text.*

To keep the monitor image appearance, the ratio of width to height (W:H) should be 4:3. So, basically 640:480 for large images and 300:225 for two side-by-side images.

4. Select *OK* or Cancel.

Cardiac Studies Wall Motion Analysis

1. Place the cursor where you want to insert the wall motion analysis and press **Set**.

2. Select Wall Motion Analysis from the Insert menu.

Cardiac Studies Wall Motion Analysis (continued)

3. Select and set up the desired parameter.

• Bull's Eye

Figure 13-232.   Bull's Eye Dialog Box
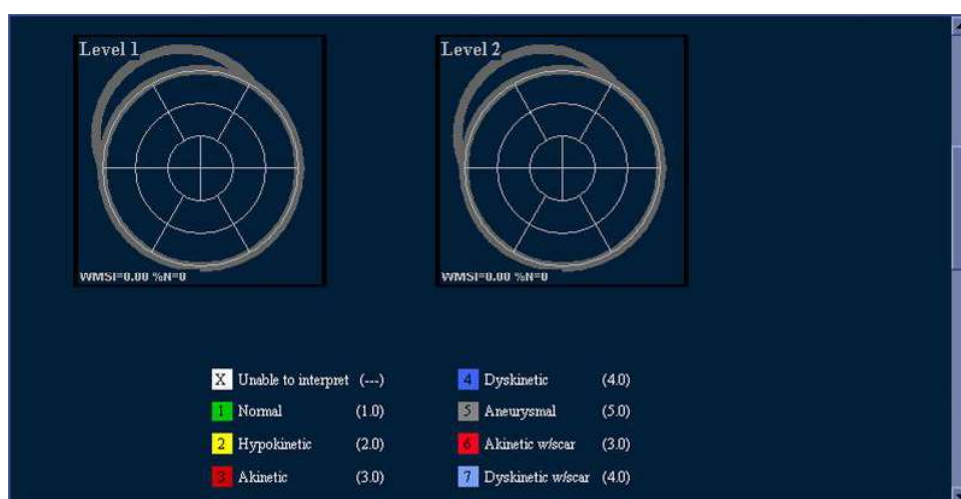
Figure 13-233.   Bull's Eye Report Example

Cardiac Studies Wall Motion Analysis (continued)

•   Cut Planes

NOTE: *The Cut Planes dialog box parameters are similar to the Bull's Eye Dialog Box shown previously.*

Figure 13-234.   Cut Planes Report Example

•   Score Table Box

Figure 13-235.   Score Table Box Dialog Box

OB/GYN (OB and GYN Only)

The OB Graph, Bar Graph and Anatomy can be entered into the Report.

1. Place the cursor where you want to insert the graph or anatomy and press **Set**.

2. From the Insert menu, select OB/GYN. The selection menu displays.

3. Select the appropriate item as necessary. A dialog box displays.

   • OB Graph
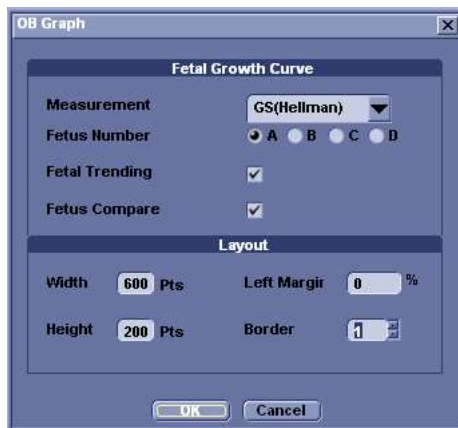
Figure 13-236.   OB Graph Dialog Box

   a. Select the Measurement and Fetus Number.

   b. Check Fetus Trending and Fetus Compare, if appropriate.

   c. Modify the Layout, if necessary.

   d. Select *OK*

OB/GYN (OB and GYN Only) (continued)

- Bar Graph
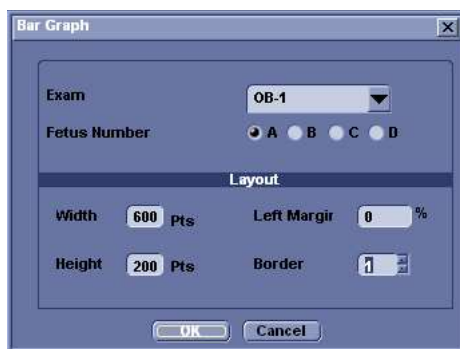
Figure 13-237.   Bar Graph Dialog Box

a. Select the exam and fetus number.

b. Modify the Layout, if necessary.

c. Select **OK**.

NOTE: *The Bar Graph already contains default application measurements.*

OB/GYN (OB and GYN Only) (continued)

- Anatomy
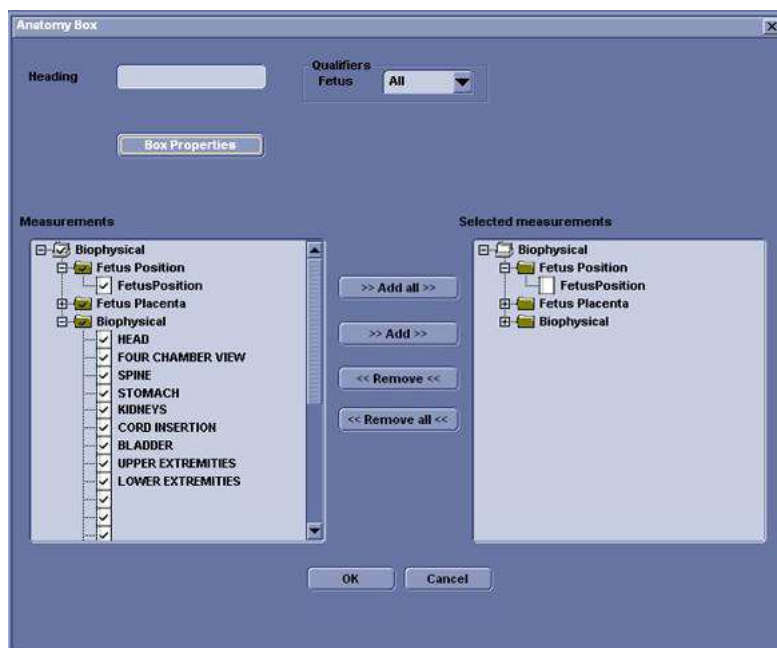
Figure 13-238.   Anatomy Dialog Box

    a.   Type the Heading.

    b.   Select qualifiers from the pull-down menu.

    c.   Select "***Add all***" to copy all measurements to the right column

    d.   Check the box in front of the measurement you need in the left column and select "***Add***". The select measurements copy to the right column.

    e.   To remove measurements you do not need, check the boxes in front of those measurements in the right column, and select "***Remove***" or "***Remove all***".

    f.   If you want to modify the properties, select Box Properties and set required parameters.

Measurements

Insert a field to display the measurements. The measured parameters displayed in the measurement display field are configured.

1. Place the cursor where you want to insert the measurement and press **Set**.

2. Select Measurements from the Insert menu and press **Set**. The Measurements Box displays.
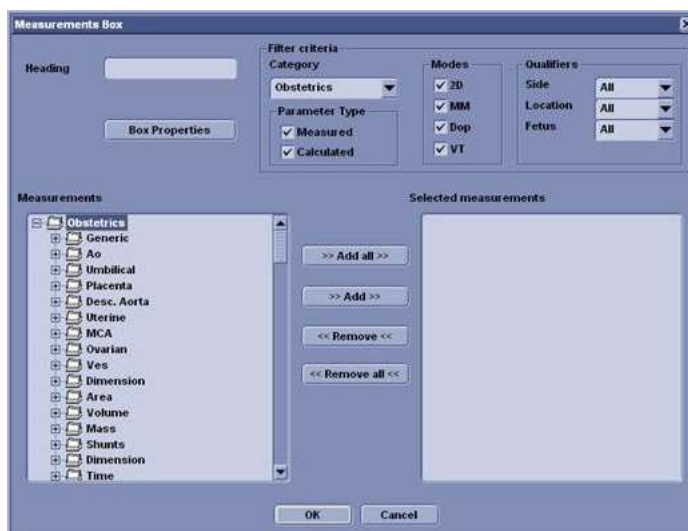
Figure 13-239.   Measurement Box

3. Type the Heading text, select the Filter Criteria and measurements from the tree, as necessary.

4. Select *OK* or Cancel.

Text Fields

1. Place the cursor where you want to insert the text and press **Set**.

2. Select Text Field from the Insert menu and press **Set**. The Text Field dialog box displays.
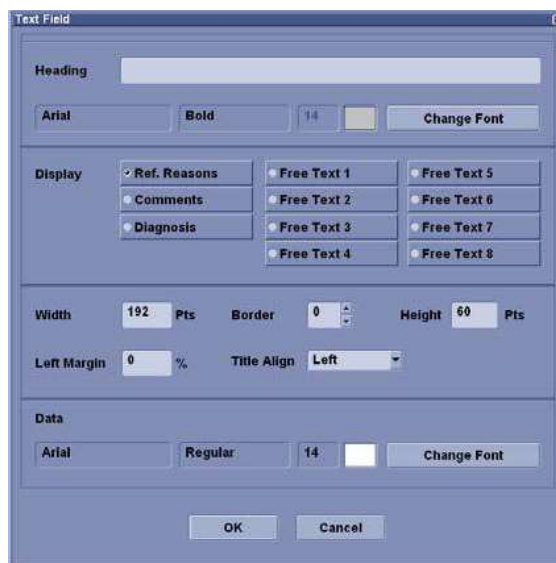
Figure 13-240.   Text Field Dialog Box

3. Type the Heading Text. If you do not need the heading, type a space.

4. Select Display item.

    •   Ref.Reason: Reason for Referral.

    •   Comments: Gets information from the Comment field of the Patient screen and the Exam Comment field of the Worksheet.

    •   Diagnosis.

    •   Free Text: 1 - 8

5. Specify the border of the Text Field and Font as necessary.

6. Select *OK* or Cancel.

The text is saved automatically into the corresponding area selected on this dialog box.

Text Fields (continued)

Editing an existing text field:

1. Move the cursor to the Text Field to be edited.
2. Press **Set** twice. The Text Field dialog box displays.
3. Edit the heading, the settings, or font, as necessary.
4. Select *OK* or Cancel.

Fixed Text

1. Place the cursor where you want to insert the fixed text and press **Set**.
2. Select Text Field from the Customize menu and press **Set**. The Fixed Text dialog box displays.

Figure 13-241.   Fixed Text Dialog Box

3. Type the text (e.g. hospital information, report title, or table title) and specify the border and font.
4. Select *OK* or Cancel.

Editing existing Fixed Text:

1. Move the cursor to the Fixed Text to be edited.
2. Press **Set** twice. The Fixed Text dialog box displays.
3. Edit the text, the border or font, as necessary.
4. Select *OK* or Cancel.

Customize Menu

Table 13-90:   Customize Menu

	Description
Page Color	Changes the template color.
Preference	The Preference menu for Archive Information field displays.

Page Color

1. To change the page color, select Page Color from the Customize Menu and press **Set**. The Color dialog box displays.
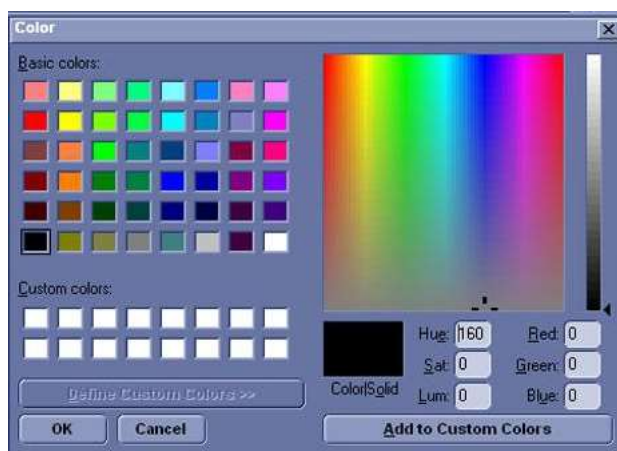
Figure 13-242.   Color Dialog

2. Choose the desired color or create a new color.
3. Select **OK** or Cancel.

Setting Preferences

To set preferences for the Archive Information:

1. Select Preferences from the Customize menu and press **Set**. The Preference Box displays.
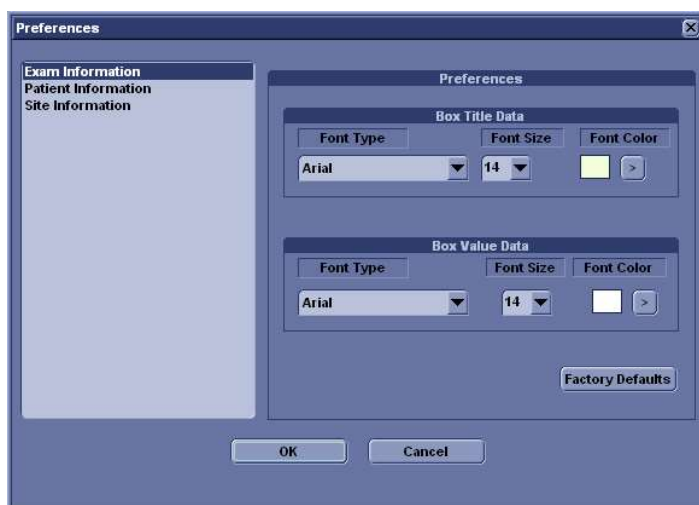
Figure 13-243.   Preferences Box

2. Select the information to be modified and set the desired preferences.

3. Select *OK* or Cancel.

4. Save the template.

Direct Report

You can use Direct Report to enter Comments, Diagnosis, and Referral Reasons at any time during the examination that will be part of the final report. The comments are reflected on the Report if the Report is configured for those parameters.

1. Select *Direct Rep.* on the measurement Summary window.

Figure 13-244.   Measurement Summary Window

Direct Report (continued)

2. The Direct Report displays on the left side of the screen.
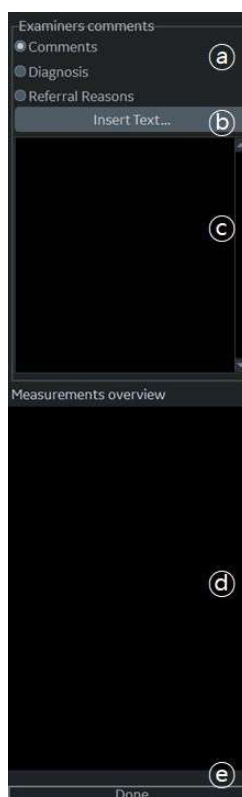
Figure 13-245.   Direct Report

a. Select the type of information

NOTE: *Comments entered under Diagnosis appear in the Clinical Diagnosis section of the final report. Comments entered under Referral Reasons appear in the Referral Diagnosis section of the final report.*

b. Create/insert pre-defined text

c. Text field

d. The measurement results display on the Measurement Overview field.

Double Click: inserts value only for selected line, e.g. 5.98 cm

Shift + Double Click: inserts whole line for selected line, e.g. BPD 5.98 cm

e. Exits the Direct report

Direct Report (continued)

3. Select the appropriate parameter and type the free text with the alphanumeric keyboard or use Insert Text.

NOTE: *You can configure the pre-defined text at the Utility Report screen.*

a. Select ***Insert Text*** to display the Insert Text Window.

b. Use the **Trackball** to select the text to be inserted.

c. Press **Set**. The selected text displays on the Direct Report.
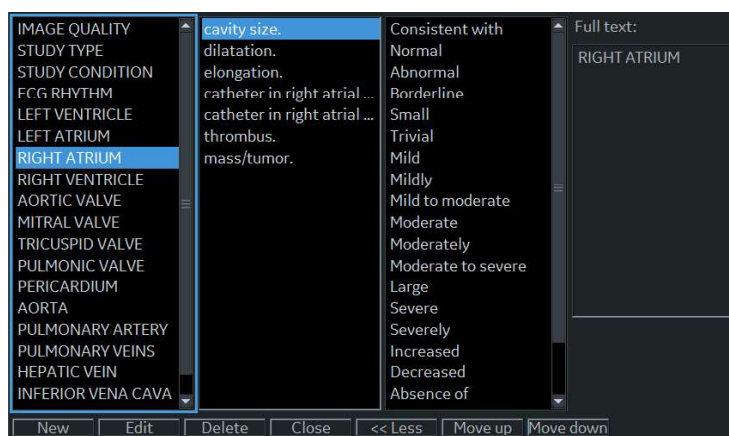
Figure 13-246.   Full Insert Text Window

- New: Enters the new text
- Edit: Edits the existing text
- Delete: Deletes the existing text
- Close: Closes the insert text window
- More>>: Displays the Full Insert Text Window
- <<Less: Minimizes the insert text window
- Move up/Move down: Moves the text up or down

4. Move the cursor over the measurement result displayed in the overview window, and double click the **Set** key.

Direct Report (continued)

5. Select ***Done*** at the bottom of Direct Report to exit.

    If you configure the field of comment, diagnosis, referral reasons or Measurement on the Report, the text and/or measurement results entered in the Direct Report are automatically displayed on the Report.

Figure 13-247.   Direct Report and Report

Report Presets

You can edit the report template, diagnosis code, and text on the Utility Report page.

Templates

Left Column: The list of all templates (Factory Default, User defined, etc)

Right Column: The list of templates displayed on the template list.
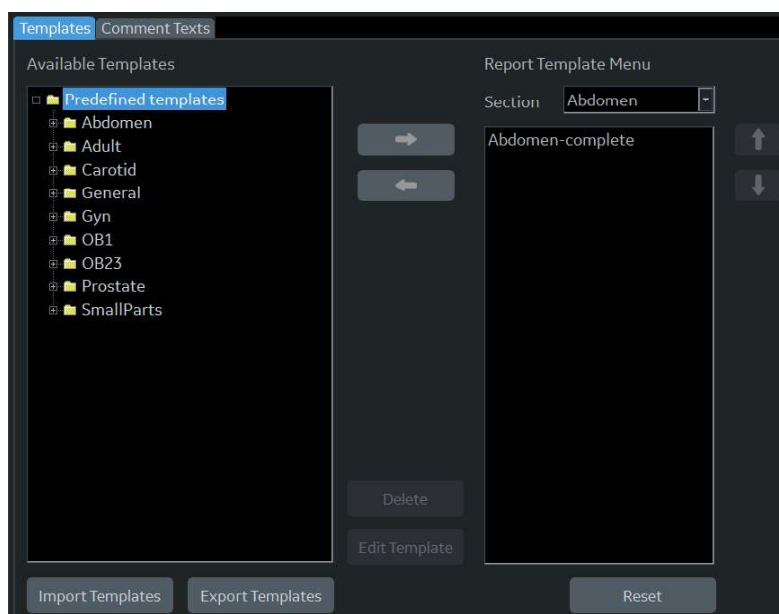
Figure 13-248.   Report Template Tab

Templates (continued)

- To insert the template on the template list:
    a. Select the application which you want to insert into the template from the pull-down menu above the right column.
    b. Select the category (categories) and/or the template(s) in the left column by the check the box.
    c. Select the right arrow to copy the template to the right column.

- To remove the template from the template list but not from the system):
    a. Select the template in the right column.
    b. Use the left arrow to remove the template from the right column.

- To edit the template or to make a new template:
    a. Enter Utility -> Report -> Template tab.
    b. Select the appropriate template in the left column.
    c. Select **Edit Template**. The Template Designer page displays.
    d. Edit the template and save or save as with a new name.

       If you use Save As with a new name, the new template is added to the left column. See 'Designing Your Own Template' on *page 13-426 for more information.*

- To delete the template:
    a. Select the template to be deleted.
    b. Press **Delete**.

Templates (continued)

- To export the template:

HINTS

Export templates to removable media (CDs, DVDs, USBs) so, at a later time, you can import those templates to a system. Export only works on templates, not data.

a. Insert the removable media in the drive.

b. Move the cursor to "Export Templates" and press **Set**. The available user-defined templates display in the Export Templates window.
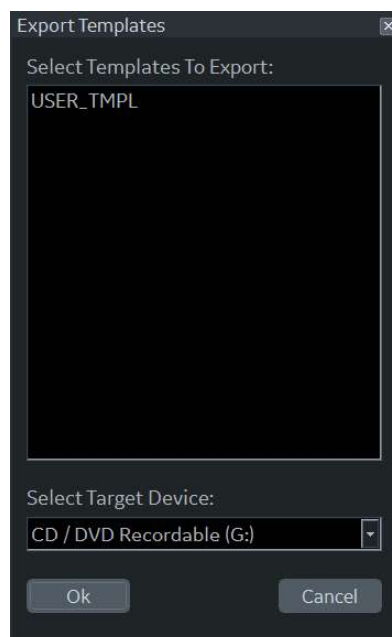
Figure 13-249.   Export Templates

c. Select the template(s) to be exported.

NOTE: *To select multiple templates, use the **Ctrl** or **Shift** keys.*

d. Select the desired removable media under the Select Target Device field.

e. Select **OK**.

f. Press **F3** to eject the media.

Templates (continued)

- • To import the template:

NOTE: *Import only works on templates, not data.*

   a. Insert the removable media with the report template(s) to be imported.

   b. Select **Import Template**. The Import Template window displays.
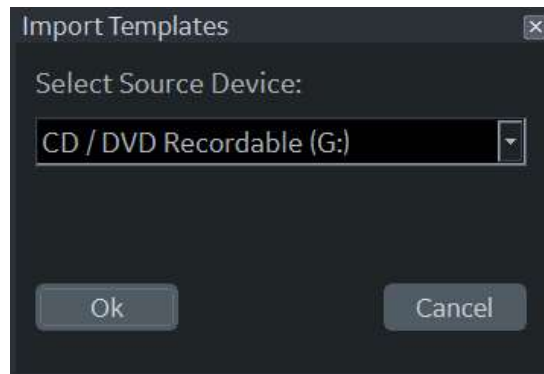
Figure 13-250.   Import Templates

   c. Select the Source Device from the pull-down menu. Select **OK**.

   d. Press **F3** to eject the media.

NOTE: *Imported templates are stored in the User defined templates\General directory.*

- • To move the template from the left column to the right, or from the right to the left:

   a. Select the template to be moved.

   b. Select the Right Arrow or Left Arrow button.

- • To move the template up or down in the right column:

   a. Select the template to be moved.

   b. Press the Up Arrow or Down Arrow button.

Comment Texts

You can edit the comment text on the Comment Texts tab.
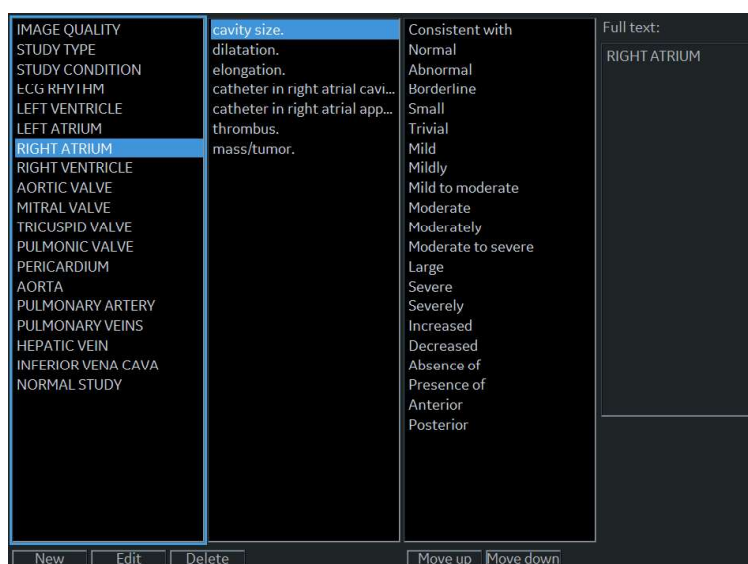
Figure 13-251.   Comment Texts Tab

- New: Enters the new comment.
- Edit: Edits the existing comment.
- Delete: Deletes the existing comment.
- Move up/Move down: Moves the comment up or down.

Backup/Restore Report Templates

Backup moves templates to removable media (CDs, DVDs, USBs).

Restore moves templates, that were backed up onto media, to the LOGIQ P8/P9/P10 with the same software version.

NOTE: *To move reports with patient data, use Backup/Restore Report Archive and Patient Archive.*

To backup the report template:

1. Select *Utility*.
2. Select *System* and select the Backup/Restore tab.
3. Select the media.
4. Check User Defined configuration box of the Backup field.
5. Select *Backup*.
6. Select *Save* and eject the media.

To restore the report template:

1. Insert the media.
2. Select *Utility*.
3. Select *System* and select Backup/Restore tab.
4. Check Report Template box of the Detailed Restore of User Defined.
5. Select *Restore*.
6. After the system reboot, select *Utility* and *Report*.
7. Select the Template tab.
8. Select the appropriate template (See 'Templates' on *page 13-455 for more information.*)

For preset specifics, see Chapter 11.

Using InSite ExC

Service Desktop (Administrator)

The Administrator (and others, granted the "Access Service Desktop" privilege) can access the Service Desktop to:

- Access the Service Home Page.
- Perform the following Utilities
    - Change Password
    - Data Transfer
    - Delete Files
    - SSA License
    - Gather Logs
    - View Third Party Licenses
    - Disruptive Mode Utility
- View Installed Options
- InSite Agent Configuration

Figure 13-252.   Service Desktop

Accessing the Service Desktop

1. Press Utility. Go to Page 2 of the Utility Menus.
2. Press Service.

Using the Service Desktop

Disruptive mode is a way to control interruptions of operation.

- When Disruptive mode is On, all functionality on the Service Desktop is allowed but operation of the LOGIQ P8/P9/P10 can be limited.
- When Disruptive mode is Off, some functionality on the Service Desktop is not available operation of the LOGIQ P8/P9/P10 is normal.

Additionally, setting Disruptive mode depends on the logged in user.

- Local user – a user locally logged into the machine will be able to set the system to Disruptive mode if they have "Authorize Remote Service Access. If the user does not have this right, the remote user's request will be denied automatically.
- Remote user – a user remotely accessing the machine will not be able to automatically switch to Disruptive mode. The logged in user (user actually logged on to the LOGIQ P8/P9/P10) needs to have remote log in permissions (ability to grant remote access) The logged in user (user actually logged on to the LOGIQ P8/P9/P10) will be notified through a dialog box and asked to allow Disruptive mode.

Color Statuses

Throughout the Service Desktop, colors indicate the following:

- Green – Status is normal
- Orange – Status is a warning
- Red – Status is an error

Viewing System Information

System Information displays general information about the LOGIQ P8/P9/P10. The information on System Information is available to all class licenses.
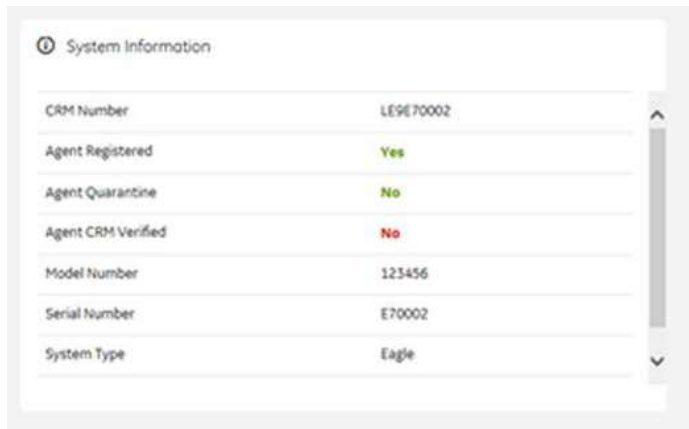
Figure 13-253. System Information

Table 13-91: System Information

Parameter	Description
CRM Number	Customer Relationship Management (CRM) number. System identifier assigned to the customer unit by the service region.
Agent Registered	Registered status of the agent. Valid values are: • Yes – The agent is registered in the back office. • No – The agent is not registered in the back office. • Not Available – Information about the agent is not available.
Agent Quarantine	Quarantine status of the agent. Valid values are: • Yes – The agent has more than one device registered with the same CRM Number in the back office. • No – The agent has one device registered with the listed CRM Number in the back office. • Not Available – Information about the agent is not available.
Agent CRM Verified	CRM verified status of the agent. Valid values are: • Yes – The agent is verified in the back office. • No – The agent is not verified in the back office. • Not Available – Information about the agent is not available.
Model Number	GE part number for the LOGIQ P8/P9/P10. The same number as listed on the rating plate.
Serial Number	Serial number of the LOGIQ P8/P9/P10. The same number as listed on the rating plate.
System Type	Product name of the LOGIQ P8/P9/P10.
Facility	Name of the hospital or facility where the LOGIQ P8/P9/P10 is installed.

Viewing System Information (continued)

> *NOTE:* *Please note the following:*

- Model number and serial number are in the VPD.
- CRM number and agent issues are corrected on the Agent Configuration page.
- Facility is changed in the Utility Page of the LOGIQ P8/P9/P10.
- A system is successfully configured when the back office is:

   - Registered: Yes
   - Quarantined: No
   - Verified: Yes. The system cannot send data back to GGE or be accessed remotely if the Quarantine status is Yes. It is typically caused by two scanners having the same CRM number.

Viewing Software Status

Use Software Status to view general information about the software installed on the LOGIQ P8/P9/P10. The information on Software Status is available to all class licenses.
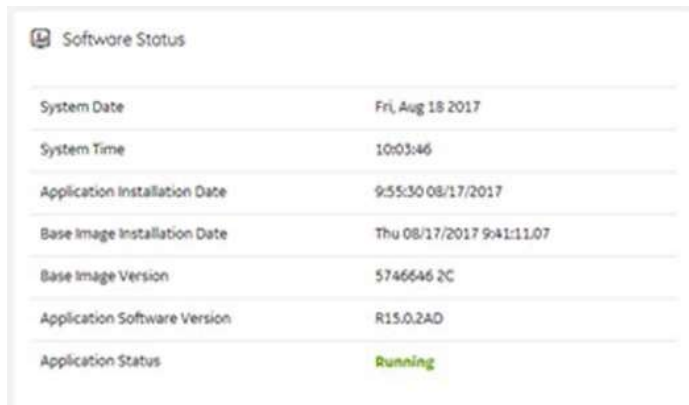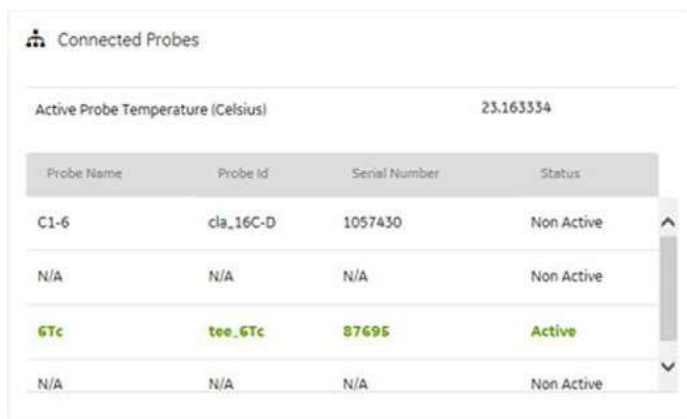
Figure 13-254.   Software Status

Table 13-92:   Software Status

Parameter	Description
System Date	Current date in the format <day>, <month> <date> <year>.
System Time	Local time based on the last time the system desktop was refreshed in the format <hh:mm:ss>.
Application Installation Date	Date the application software was installed. The application software includes the LOGIQ P8/P9/P10 product-specific software.
Base Image Installation Date	Date the base image software was installed. The base image software includes the Windows operating system and other supporting software.
Base Image Version	Version number of the base image software.
Application Software Version	Version number of the application software.
Application Status	Status of the application. Valid values are: • Running • Stopped

Viewing Connected Probes

Connected Probes shows probes connected to the LOGIQ P8/P9/P10. The order on the user interface is top down matching the left-to-right order on the LOGIQ P8/P9/P10. The information on Connected Probes is available to all class licenses.

Figure 13-255.   Connected Probes

Table 13-93:   Connected Probes

Parameter	Description
Active Probe (Celsius)	Temperature of the active probe, if available.
Probe Name	Name of the probe connected to the LOGIQ P8/P9/P10.
Probe ID	Identifier of the probe connected to the LOGIQ P8/P9/P10.
Serial Number	Serial number of the probe connected to the LOGIQ P8/P9/P10.
Status	Statuses of the probe connected to the LOGIQ P8/P9/P10. Valid values are: • Active • Non Active

Gathering Logs

Gather Logs provides a way to collect system logs and place the log files in a directory for retrieval by the online center. These log files do not include protected data such as crash dumps and keyboard shadow logs. The customer can collect logs (including protected data) using Alt+D when Protected Data is checked. Log files are compressed into a .zip file and the file path and file name display. If the application software is not running, use the Gather Logs shortcut on the Windows desktop.
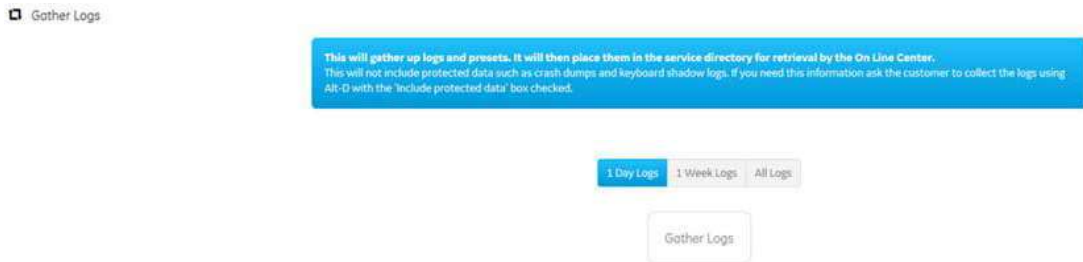
Figure 13-256.   Gathering Logs

Table 13-94:   Gathering Logs

Parameter	Description
1 Day Logs	When selected, gathers log files for one day.
1 Week Logs	When selected, gathers log files for one week.
All Logs	When selected, gathers all available log files.
Gather Logs	Select to gather the log files for the selected time period.

To gather log files

1. Navigate to Utility > Service > Utilities > Gather Logs
2. Select one of the following:
   • 1 Day Logs
   • 1 Week Logs
   • All Logs
3. Click Gather Logs.
4. In the resulting dialog box, record the location of the log files and click OK.

Deleting Files

Delete Files displays all the files and folders present in the D:\Service folder and allows for their deletion. Deleting unneeded files improves performance and reduces the need to defragment the disk drive. To access Delete Files, select Utility--> Service--> Utilities--> Delete Files.

Figure 13-257.   Deleting Files

Table 13-95:   Deleting Files

Parameter	Description
Delete Files	Displays the files that are available for deletion.
Delete	Deletes the selected files.

To delete files,

1.   Navigate to select Utility > Service > Utilities > Delete Files.
2.   Under Delete Files, select the available folders and files that you want to delete.
3.   Press Delete.
4.   In the resulting dialog box, click Delete and then click OK.

Changing the Password

⚠ WARNING
The selected encryption password and the recovery key(s) must be stored and managed in a safe and secure manner. It is the responsibility of the owner of the system to take care of these keys. If the keys are lost, the patient data stored on the system will be lost. There is no way for GE Healthcare to recover the data if the keys and password are lost.

⚠ CAUTION
If both password and recovery key are lost, you will not be able to access archived patient data (images and measurements included) nor store new patient data on this system.
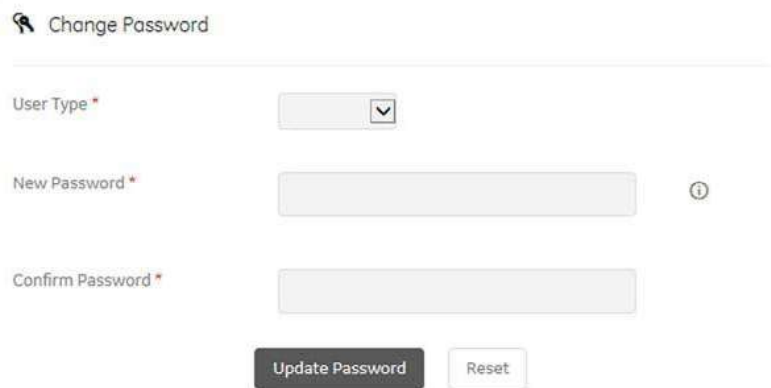
The only way to recover the system to allow storing patient data is to reset the entire disk, which deletes all the archived patient data on the disk.

It is strongly recommended that all the patient data be stored in PACS or backup to media prior to encrypting the disk.

In addition, it is recommended that the recovery key be stored on a USB storage device, printed, and kept in a secure location, ensuring that is will not be lost.

Change Password allows you to change the password for a specified user type. To access Change Password, select Utility > Service > Utilities > Change Password.

Changing the Password (continued)

Figure 13-258.   Changing the Password

Table 13-96:   Changing the Password

Parameter	Description
User Type	Type of user for the password reset.
New Password	Password
Confirm Password	Password
Update Password	Select to update the password.
Reset	Select to reset the information.

Viewing Third Party Licenses

Third Party Software Licenses displays the third-party software licenses used as part of the service platform. To access Third Party Software Licenses, select Utility > Service > Utilities > Third Party Software Licenses.
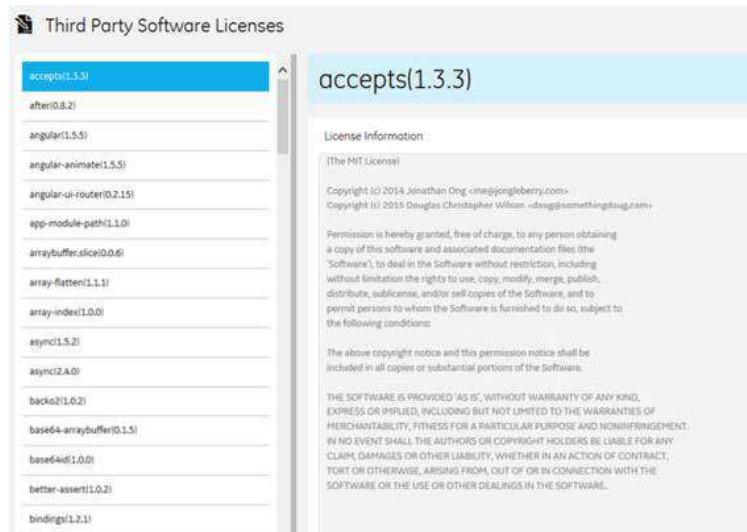
Figure 13-259.   Third Party Licenses

Disruptive Mode

Disruptive Mode provides a way to enable and disable Disruptive mode. When enabled, Disruptive mode allows a remote user to access the LOGIQ P8/P9/P10 which can disrupt normal operation. Disruptive mode can be remotely turned on when the logged-in user has "Authorize Remote Service Access" privilege. If the logged-in user does not have remote service privilege, an error message displays.

When initiating Disruptive mode from a remote location, a message displays on the LOGIQ P8/P9/P10 asking whether the user will allow Disruptive mode and notifying them that normal operation might be disturbed.

* If Yes is selected, then Disruptive mode is turned on.
* If No is selected, then Disruptive mode is not turned on and an error message displays saying that permission to change the mode was denied.

When Disruptive mode is On, the GE icon in the status bar changes to red and displays this message: "Due to Service testing restart needed."

When Disruptive mode is changed to Off, the GE icon turns white and this message displays: "Due to Service testing restart needed." In addition, VCO and SSH stop if running.

To access Disruptive Mode, select Utility > Service > Utilities > Disruptive Mode Utility.

Figure 13-260.   Disruptive Mode

Data Transfer

To enable data transfer, the schedule must be configured in the service platform and the types of data transferred must be enabled in the Utility page. Admin rights are needed to access this page.

NOTE: *Data is sent incrementally so that only what changed since the last transfer is sent.*

Data Transfer provides a way to do the following:

• View information about past transfers of (APM) information.

• Set up automatic/scheduled transfer of allowed data files from the LOGIQ P8/P9/P10 to the server.

• Manually transfer data files allowed data files from the LOGIQ P8/P9/P10 to the server.

To access Data Transfer, select Utility > Service > Utilities > Data Transfer.

Figure 13-261.   Data Transfer

Table 13-97:   Data Transfer

Parameter	Description
Type of Upload	Type of log file. For example, Incremental Logs or Full Logs. Monitoring Logs, System Logs, and Windows Logs are incrementally transferred when automatic transfer is enabled. To enable automatic transfer, navigate to System Admin and, under Service, check Enable Automatic Request for Service.
Upload Permission	Whether the permission to upload the log file is allowed or not.
Last Upload Status	Whether the last log file upload was successful or not.
Last Upload Attempt	Date and time the last log file upload was attempted.
Last Successful Upload	Date and time the last log file was successfully uploaded.

Table 13-97:   Data Transfer (Continued)

Parameter	Description
Scheduler	When selected, enables the related day selections. For example, All Days, Monday, and Tuesday.
Save Settings	Saves the information.
Send All	Manually send the selected log files to the server.

To configure automatic data transfers:

1. Navigate to Utility > System Admin.
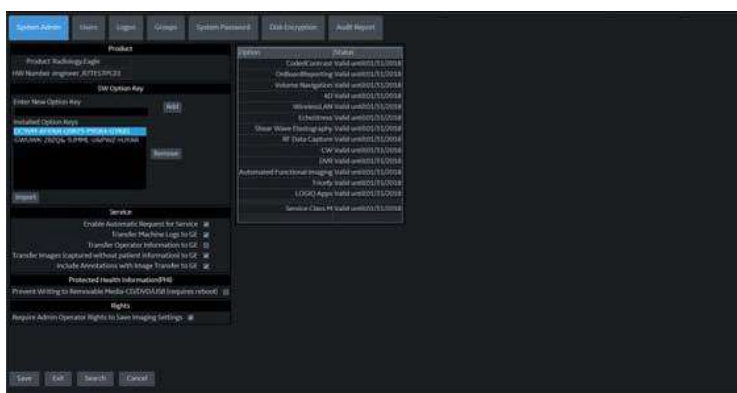
2. On System Admin, configure these settings:
    -   Transfer Machine Logs to GE – Default is checked
    -   Transfer Operator Information to GE
    -   Transfer Images (captured without patient information) to GE – Default is checked.

3. Click Save.

Data Transfer (continued)

4. Navigate to Utility > Service > Utilities > Data Transfer

5. On Data Transfer, select Scheduler, and the select the days to perform the data transfer.
6. Click Save Settings.
7. To manually perform a data transfer, click Reset Send Full.

Viewing/Adding Options

Shows the status of all possible options. You can select one of the option keys and view its details. If the key is valid, it reloads; shows which options are included in the selected key.

You can also add a new option key by typing in its Key String and pressing Add.

To access Options, navigate to Utility > Service > Options.

Figure 13-262. Viewing Options

Table 13-98: Viewing Options

Parameter	Description
Software Options	
Option	Software options on the LOGIQ P8/P9/P10.
Status	Status of the options on the LOGIQ P8/P9/P10.
Software Option Details	
Product	Name of the product.
Hardware Number	Number for the hardware. The hardware number is the hash of the serial number that is used to generate the option key.
Serial Number	Serial number of the LOGIQ P8/P9/P10.
Software Option Keys	
Available Keys	List of the option keys installed on the LOGIQ P8/P9/P10.

InSite ExC Agent Configuration

To access Agent Configuration, navigate to Utility > Service > Agent Configuration. Confirm with your IT whether a proxy and proxy confirmation is needed for the CRM. Use Agent Configuration to:

- Edit and configure the following:
  - Enterprise host name in the agent
  - Enterprise port number in the agent
  - Proxy server in the agent
  - Proxy port in the agent
  - CRM number in the agent
  - Display name in the agent
- Set the serial number in the agent
- Enter the username and password for the proxy
- Reset the edited unsaved value

Figure 13-263.   Agent Configuration

Table 13-99:   Agent Configuration

Parameter	Description
Agent Configuration	
Agent Status	Status for the agent. Valid values are: • Running • Not Running
Agent Registered	Registered status of the agent. Valid values are: • Yes – The agent is registered in the back office. • No – The agent is not registered in the back office. • Not Available – Information about the agent is not available.

Table 13-99:   Agent Configuration (Continued)

Parameter	Description
Agent Quarantine	Quarantine status of the agent. Valid values are: • Yes – The agent has more than one device registered with the same CRM Number in the back office. • No – The agent has one device registered with the listed CRM Number in the back office. • Not Available – Information about the agent is not available.
Agent CRM Verified	CRM verified status of the agent. Valid values are: • Yes – The agent is verified in the back office. • No – The agent is not verified in the back office. • Not Available – Information about the agent is not available.
Agent Model Number	GE part number for the LOGIQ P8/P9/P10. The same number as listed on the rating plate.
Serial Number	Serial number of the agent (read-only). If the agent is not registered with a serial number, this field is populated with the serial number of the LOGIQ P8/P9/P10. The serial number of the agent is tied to the serial number of the LOGIQ P8/P9/P10.
CRM No	Customer Relationship Management (CRM) number. System identifier assigned to the customer unit by the service region.
Display Name	Displayed name of the agent.
Advanced Configuration	
Enterprise Server	Name of the enterprise server.
Enterprise Host	Number of the enterprise host.
Enterprise Port	Number of the enterprise port.
Proxy Configuration	
Enable Proxy	Enables the proxy server.
Proxy Server	When Enable Proxy is selected, name of the proxy server IP.
Proxy Port	When Enable Proxy is selected, number of the proxy server port.
Credentials	
Enable Proxy Credentials	Enables the proxy credentials.
Username	When Enable Proxy Credentials is selected, name of the user.
Password	When Enable Proxy Credentials is selected, password for the user.

NOTE: A new outbound firewall rule was added for Agent communication. Ports 88, 3011, 3031 have been added to port 443 for available ports.

DVR

Using the DVR

1. Create a patient record or open an existing one.

2. Press *Video* assigned key or Video tab.

3. Insert a DVD media or USB storage.

   Advance configurations are required. See 'Setting up the DVR' on *page 13-480* for details.

NOTE: *The DVD which formatted in Utility > Connectivity > Removable Media is for data archiving, it cannot use for the DVR recording.*

4. Scan a patient.

5. Press *Record* to start recording.

   The status bar updates with the recording information. While recording, you can only pause or stop the recording and cannot start any other DVR functionalities.

NOTE: *Recording automatically pauses when start Utility screen.*

NOTE: *When more than one USB storage is connected, the DVR records to the first drive letter in alphabetical order.*

NOTE: *The system does not start the recording when following operation is in progress: Data Transfer, EZBackup, Utility screen.*

6. Press *Record* or *Pause* to pause/resume the recording.

7. Press *Stop* on the Touch Panel to stop the recording.

   When you stop recording, the DVR writes the title data. During this period of time, the busy state icon is displayed in the status bar (green allow circling) and you cannot operate any DVR functionalities.

NOTE: *Stop recording may take up to 2 minutes for DVD-RW/DVD+RW.*

NOTE: *The DVR automatically stops recording before media reaches to full.*

8. Press *Eject* on the Touch Panel or F3 key to eject.

Setting up the DVR

To set up the Digital Video Recorder (DVR),

1. Set up following parameters in ***Utility --> System --> Peripherals***.
   - Media: DVD, USB
   - DVD Format: NTSC, PAL
   - Picture Quality: HQ, SP, LP, EP
   - DVD Chapter Record Interval (sec.): 15, 30, 60, 120
   - USB Playback Skip Interval (sec.): 15, 30, 60, 120

2. If needed, assign [Video] to one of the User Configurable Key to turn on/off Video tab, in ***Utility -> System -> User Configurable Keys***.

3. If needed, check "Show Video Tab" in ***Utility -> Application -> Settings*** to display a Video tab on the Touch Panel.

4. If needed, assign [DVR Record/Pause] to a Print key in following steps.
   a. Add [Video Capture] and select [DVR Record/Pause] as the Type, in Utility -> Connectivity -> Service.
   b. Assign the [Video Capture] to the Print Button, in Utility -> Connectivity -> Button.

5. Restart the system.

The DVR functions records scan screen.

Video Touch Panel Menu

Following are the Touch Panel menu for the DVR operation.

Figure 13-264.   Video tab 1
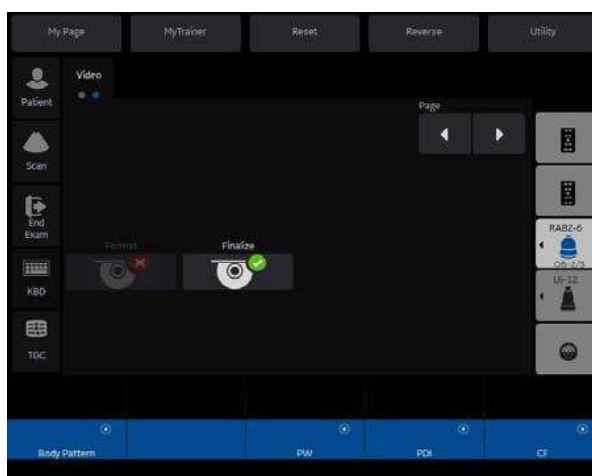
Figure 13-265.   Video tab 2

Table 13-100:   Touch Panel Keys

Graphic	Explanation
	Skip DVD media: Skip to the previous/next chapter. USB storage: Skip specific time to backward/forward.

Table 13-100:   Touch Panel Keys (Continued)

Graphic	Explanation
	4x Skip DVD media: Skip the four chapters to backward/forward. USB storage: Quad time interval skip to backward/forward.
	Search Press Search button to display the dialog. Select Title, then press Search on the dialog. The title name is as following: <Date>_<Time>_<Patient Last name>_<Patient First name> VIDEO SEARCH Recording Title 01 - 2015-03-11_20.10_Last.First Search Cancel
	Record Start recording.
	Pause Pauses and resumes Recording and Playback. NOTE: Freeze key works the same as Pause button, when Playback.
	Eject Eject the DVD media/USB storage. Also you can eject media pressing F3 key.
	Play Play a video from DVD or USB storage.
	Stop Stop the playback or recording.
	Format Reformats a DVD+RW/-RW. NOTE: Format deletes all the contents in the media.
	Finalize Finalize a DVD-R. NOTE: DVD+RW/-RW is automatically finalized when stop recording.

DVR Display Icons

Displays the following icons in the status bar:

Figure 13-266.   DVR Disk Status

Table 13-101:   DVR icons

1. DVR status			
	Recording		Stopping
	Pause Recording		Pause Playback
	Playback		Busy
	No media		
2. DVD Media status Displays media type and size of the free space size.			
	DVD+RW/-RW is in the tray		DVD-R is in the tray
3. USB storage status Displays the device availability and the free space size.			
	USB Storage is attached		
4. Current Title Number. Displays while recording			
5. Time counter.			

Recording Functionality

Table 13-102:   Recording Functionality

Parameter	DVD media	USB Storage
Support media	DVD-R, DVD+RW, DVD-RW	USB-HDD (NTFS only) USB Flash Device (NTFS only) Note: Cannot record or play FAT (exFAT, FAT32, etc) on USB Device. Please format to NTFS file system on PC.
Support video format	NTSC or PAL	MPEG video file (*.mpg) for each title Note: The file size is up to 2GB. Note: The mpeg video file doesn't have a chapter.
Support Picture Quality	• HQ (Record length: approx. 70 minutes) • SP (Record length: approx. 90 minutes) • LP (Record length: approx. 140 minutes) • EP (Record length: approx. 280 minutes)	• HQ (Record length: approx. 30 minutes) • SP (Record length: approx. 40 minutes) • LP (Record length: approx. 60 minutes) • EP (Record length: approx. 130 minutes) Note: The maximum size of each video file: 4GB.
Number of Titles and Chapters	Up to 99 titles in a disk and 92 chapters in a title. Up to 92 chapters in a title. While recording to DVD, chapter is automatically created at specific interval that is configured in Utility -> System -> Peripherals. When you stop recording, DVR writes the title data. When you end examination (e.g. pressing New Patient, End Current Patient, ...), DVR auto stops recording and creates a title.	N/A
Volume label	The system automatically labels following string to DVD media: YYYYMMDD_XX • YYYY - Year (4 digit) • MM - Month (2 digit) • DD - Day (2 digit) • XX - Serial number of the day (2 digit) Note: Volume label of DVD+RW/-RW can edit in Utility -> Connectivity -> Removable Media.	N/A

Table 13-102:   Recording Functionality (Continued)

Parameter	DVD media	USB Storage
Video title	<Date>_< Time>_<Patient Last name>_<Patient First name> Note: If a patient name is not provided, a serial number is used as following: <Date>_< Time>_<serial number>.	<Date>_<Time>_<Patient Last name>_<Patient First name>. Note: If a patient name is not provided, the video file name is as following, <Date>_<Time>_<serial number> where serial number is the number of video files in the media plus one.
Compatibility	• Player on LOGIQ P8/P9/P10 • DVD video player on PC • Commercial DVD video player	

NOTE: *Properties of the DVD media displays in Utility -> Configuration -> Removable media.*

Recovery from power failure (DVD only)

While recording to DVD (DVD-R or DVD+RW/-RW), if power failure occurs the system will automatically start recovery of the media right after system restart.

NOTE: *If the recording is incomplete by the power failure, the last title may be unreadable. Recovery copies the cached last title to the media.*

If the DVD media in the tray does not have sufficient free space, you get the following Recovery menu instead of starting auto recovery.
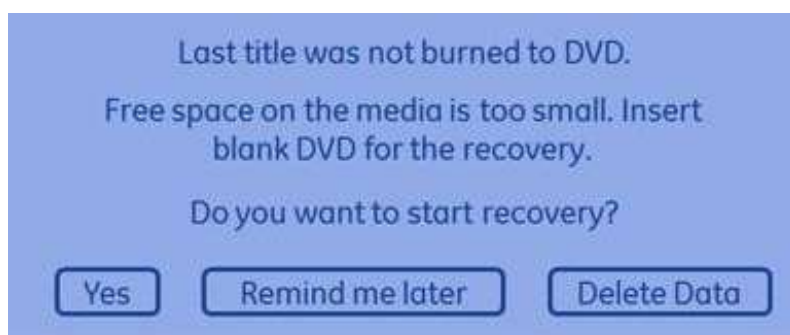
Figure 13-267.   Recovery Menu

• Remind me later

If you select "Remind me later", you can cancel the Recovery operation. But if you press Record button, displays the recovery menu again and cannot start the recording.

Select "Yes" (Recover) or "Delete Data" to enable the recording.

Recovery from power failure (DVD only) (continued)

- • Yes (Recover)

  If you select "Yes", the following dialogue displays. Insert the blank media and press "OK".

  Insert blank DVD for the recovery.

  OK

  Figure 13-268.   Recovery "Yes"

  During recovery, the massage "Recovery of DVR media is in progress" displays in the status bar.

- • Delete Data

  If you select "Delete Data", you get the following confirmation menu.

  Are you sure you want to delete unburned DVR data?
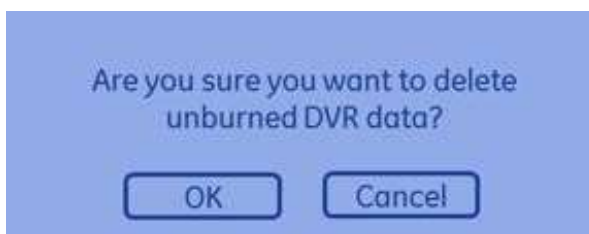
  OK   Cancel

  Figure 13-269.   Delete Data

  OK: Deletes the unburned cached data.
  Cancel: Go back to the Recovery menu.

Configuring the Wireless Network

A Wireless Network (WLAN) is available on the LOGIQ P8/P9/P10. When the WLAN is active, an icon appears in the status bar to indicate whether the WLAN is installed or disconnected.

Wireless LAN (WLAN) Specifications

The Wireless LAN (WLAN) supports the following network protocols:

Standards
- IEEE 802.11n, 802.11g, 802.11a, 802.11b, 802.11ac

Security Types
- None/Open
- WPA2 - Enterprise
- WPA2 - Personal

Encryption Type
- None
- WEP
- AES

Frequency
- 2.4 GHz to 2.5 GHz CCK and CFDM modulation
- 5 GHz OFDM, 802. 11ac MCS0-9 coding scheme

Supported Standards
- FCC Part 15
- Japan MIC
- Canada Requirements
- RED (Radio Equipment Directive) Directive 2014/53/EU
- KC (South Korea)
- NCC (Taiwan)
- RCM (Australia, NewZealand)
- SRRC (China)

Connecting to the WLAN

To connect the LOGIQ P8/P9/P10 to the WLAN,

1. Press Utility --> Connectivity --> TCP/IP --> Wireless Network --> Configuration (located under Wireless Network).

   The Wireless Network Configuration tool appears. If enabled, Wireless Networks broadcasting in your area appear in the list.

2. If necessary, check the box for "Enable Wireless Connection".

3. Select the wireless network you want to use or set up.

4. Press **Connect** from the bottom of the Configuration tool. If prompted, enter the correct settings for this wireless network.

   If the connection is successful, the status bar Active Wireless LAN indicator will no longer have a red "X".

NOTE: *If the WLAN fails to connect, review and/or recreate the Wireless connection on the Security Tab.*

Network and Spooler Status Icons

The following icons identify network and spooler statuses:

Table 13-103:   Network and Spooler Status Icons

Network and Spooler Status Icons				
Ethernet Active	Ethernet Error	Ethernet Active Spooler Active	Ethernet Active Spooler Error	Mobile
Mobile Error	Mobile Bluetooth	Mobile Wifi	Spooler Active	Spooler Active Error
Spooler Inactive	Spooler Inactive Error	Wifi 1 Bar	Wifi 2 Bars	Wifi 3 Bars
Wifi 4 Bars	Wifi Alert	Wifi Spooler Active	Wifi Spooler Error	Wifi Error

Adding a Wireless Network

To add a WLAN profile (even for a network which is not yet available),

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Security. The Wireless Network Configuration tool appears. Available Wireless Networks appear.

2. Select the *Security* tab.

3. Select *Add...*

NOTE: *If the security features implemented at your facility require signing onto the wireless network using a user name and password on your network, then you will need to contact GE Service to access maintenance mode if you have not purchased a service license.*

4. Add the following information to the Wireless Network Properties page:

   a. Enter a Network Name (SSID), then press OK.

      A new window appears so you can enter the settings for this network.

   b. On the connection page, check the appropriate boxes based on how you want the LOGIQ P8/P9/P10 to connect to this network.

      The LOGIQ P8/P9/P10 attempts to connect to available wireless networks based on the options you enable. If multiple networks are available, connection attempts begin with the network appearing topmost on the list.

   c. Select the Security page.

   d. Select the Security Type from the available options.

NOTE: *Dialog boxes vary, depending on the Security Type selected.*

   e. Select the Encryption Type from the available options.

   f. For Personal networks, enter the Network key.

Adding a Wireless Network (continued)

g. For Enterprise networks, choose the network authentication method and press Settings.

Detailed settings for Enterprise networks are complex and must be correct for the connection to succeed. Ensure you have all the required information/settings and work with your site's IT Network Administrator as needed.

NOTE: *Credentials must be entered at this time. The LOGIQ P8/P9/P10 does not support automatic prompting for user credentials.*

•   For Microsoft PEAP networks, press Advanced and enter User authentication credentials (user name and password).

•   For Cisco networks, enter user credentials in the PEAP Properties dialog after pressing the Settings button.

NOTE: *IMPORTANT: User credentials are not validated until you attempt to connect to the network.*

h. When you have correctly entered all required settings, press OK in the Wireless Network Properties dialog.

Your settings will be validated and you may be prompted about certain settings which are not recommended or supported.

Examples: "Automatic connection to unencrypted networks is not recommended. Reminder to enter user credentials for Enterprise networks."

i. If changes are necessary, press Customize. Make corrections, then press OK. Settings will be validated again.

5. After you have filled in all the required information, press *OK*. To cancel adding this profile, press *Cancel*.

NOTE: *If the system is not able to connect to the Enterprise wireless network, please re-enter the user name and password following the steps.*

Removing a WLAN

To remove a WLAN profile (even for a network which is not available),

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Security. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the *Security* tab.
3. Select *Remove*.

Customizing Wireless Network Settings

To customize an existing WLAN profile,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.

2. Select the ***Security*** tab.

3. Select ***Customize...***

4. Obtain and enter the correct information for each wireless network setting:

   a. Enter a Network Name (SSID), then press OK.

      A new window appears so you can enter the settings for this network.

   b. On the connection page, check the appropriate boxes based on how you want the LOGIQ P8/P9/P10 to connect to this network.

      The LOGIQ P8/P9/P10 attempts to connect to available wireless networks based on the options you enable. If multiple networks are available, connection attempts begin with the network appearing topmost on the list.

   c. Select the Security page.

   d. Select the Security Type from the available options.

NOTE: *Dialog boxes vary, depending on the Security Type selected.*

   e. Select the Encryption Type from the available options.

   f. For Personal networks, enter the Network key.

Customizing Wireless Network Settings (continued)

g. For Enterprise networks, choose the network authentication method and press Settings.

Detailed settings for Enterprise networks are complex and must be correct for the connection to succeed. Ensure you have all the required information/settings and work with your site's IT Network Administrator as needed.

NOTE: *Credentials must be entered at this time. The LOGIQ P8/P9/P10 does not support automatic prompting for user credentials.*

- For Microsoft PEAP networks, press Advanced and enter User authentication credentials (user name and password).
- For Cisco networks, enter user credentials in the PEAP Properties dialog after pressing the Settings button.

NOTE: *IMPORTANT: User credentials are not validated until you attempt to connect to the network.*

h. When you have correctly entered all required settings, press OK in the Wireless Network Properties dialog.

Your settings will be validated and you may be prompted about certain settings which are not recommended or supported.

Examples: "Automatic connection to unencrypted networks is not recommended. Reminder to enter user credentials for Enterprise networks."

i. If changes are necessary, press Customize. Make corrections, then press OK. Settings will be validated again.

5. After you have filled in all the required information, press *OK*. To cancel adding this profile, press *Cancel*.

Refreshing a WLAN

Refreshes the list of available Wireless Networks. To refresh the Wireless Network,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.

2. Highlight the wireless network you want to refresh.

3. Press Refresh from the bottom of the Configuration tool.

Managing Connectivity to a Wireless Network

You can control which wireless networks can be connected to and which networks are preferred over other networks.

- Networks appearing on the Security page, Preferred Wireless Networks list are listed in decreasing preference.

  The network listed at the top of the list is the most preferred, and therefore the most likely to get connected.

  The network listed at the bottom of the list is the least preferred, and therefore the least likely to get connected.

- Networks with the check box unchecked for automatic connection will never connect unless you manually press the Connect button.

- Non-broadcasting networks will never connect unless the corresponding checkbox is checked; or, you manually press the Connect button.

- Once connected to a network, the system will not automatically switch over to a more preferred network unless the check box is checked.

Monitoring the WLAN

If there are wireless network communication problems, you can monitor the wireless network events.

To monitor Wireless Networking events,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the Monitor Tab.

WLAN Diagnostics

If the wireless network is connected, you can run diagnostics to determine how well, or poorly, the network itself is working. The diagnostic information displayed can help pinpoint causes of networking problems. Tests which pass are shown in green; tests which fail are shown in red.

To run diagnostics for the Wireless Network,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the Diagnostics Tab.
3. Select *Run Diagnostics*.

Repairing the WLAN

Occasionally you may need to repair a WLAN that has lost its connection to the LOGIQ P8/P9/P10. To repair the Wireless Network,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.

2. Select the Diagnostics Tab.

3. Select *Repair*.

NOTE: *DO NOT cancel the Repair operation after you have selected to repair the Wireless LAN connection.*

If the WLAN is functioning properly, the following message appears. Confirm your decision to repair (Yes), or cancel (No).

Available WLAN Channels

The available WLAN channels show availability of wireless connect points that the scanner can talk to. Each channel supports a finite number of users and has limited signal strength. This may effect the ability to connect, the throughput and the connection dropping out.

To check the available WLAN channels,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears. Available Wireless Networks appear.
2. Select the Properties Tab.
3. Select *Available Channels...*.

Disconnecting from the WLAN

To disconnect from the Wireless Network,

1. Press Utility--> Connectivity--> TCP/IP--> Wireless Network--> Configuration. The Wireless Network Configuration tool appears.
2. Select the WLAN you are connected to.
3. Select *Disconnect*.

Viewing WLAN Online Help

To view the WLAN Online Help, press F1.

Power Assistant

Overview

With Power Assistant, the system power is maintained by the battery when there is an AC power failure or the power cable is unplugged. This can be used to reduce system startup time for portable exams.

While in Power Assistant, the system maintains the current patient. As a result, when power is restored, the current patient's details and stored images are readily available.

NOTE: *Only GE Service personnel have access to the battery. Please contact the technical service department or your local GE representative for replacement.*

Standard battery

Standard battery is housed within the cabinet.

With a fresh battery that is fully charged, the LOGIQ P8/P9/P10 stays powered for approximately 20 minutes when in Power Assistant.

Battery Power mode with the standard battery

Before starting Battery Power mode

| CAUTION | The following operations must be completed before unplugging the AC cable. |

- Any access to the external media, such as CD, DVD, USB HDD via Export, Import, MPEGvue, Save As, EZBackup.
- Any access to the Network device, such as DICOM transfer or Network Storage.
- DVR recording should be stopped.

NOTE: *If the system is switched to Battery Power mode when any of operations above are in progress, the system terminates the operation.*

Starting Battery Power mode

When the AC cable is unplugged or if there is an AC power failure, the system transitions to Battery Power mode. The following dialog displays before entering Battery Power mode.
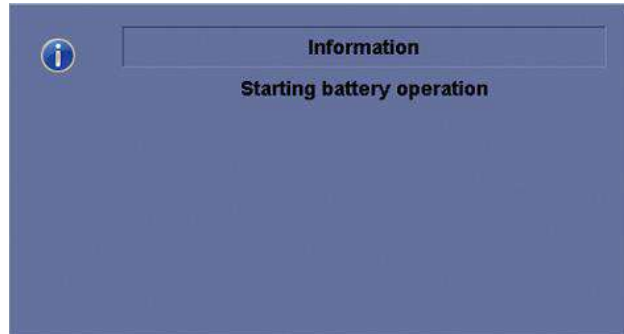
Figure 13-270.   Battery Power mode

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

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

When in Battery Power mode

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

> ⚠️ CAUTION   When in Battery Power mode, DO NOT perform the following operation:
>
> • Connect and disconnect probes.
>
> • Remove peripheral devices.
>
> • Eject or insert CD/DVD media and the external USB storage device.

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

Recovering from Battery Power mode

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

Battery deterioration

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

Figure 13-271.   Battery life message

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

Refreshing the battery

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

1. Plug the AC cable to the wall outlet and turn on the circuit breaker.
2. Wait until the battery is fully charged. It takes about 3 hours (Standard battery)/9 hours (Extended battery) to fully charge the battery (depend on the remaining battery capacity).
3. Remove all probes.
4. Turn on the system.
5. Unplug the AC cable and wait until the system shuts down. It may take at least 30 minutes (Standard battery)/60 minutes (Extended battery) to complete shutdown.
6. Wait at least 5 hours.
7. Plug the AC cable to the wall outlet and turn on the circuit breaker.
8. Wait until the battery is fully charged. It takes about 3 hours (Standard battery)/9 hours (Extended battery) to fully charge the battery.

Battery Disposal

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

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

Video Converter

Video Converter

The LOGIQ P8/P9/P10 Video Converter Option enables the ability for the console to view or record scanning HDMI Cable.
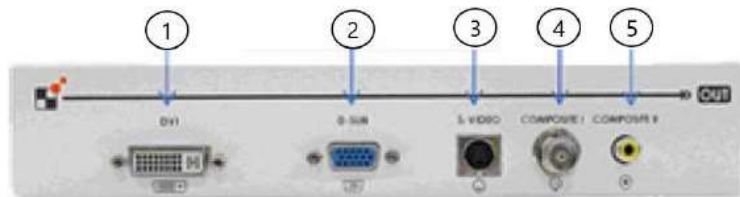
Figure 13-272.   Video Converter

1. DVI Output
2. VGA Output
3. S-Video Output
4. Composite Video output (BNC)
5. Composite Video output (RCA)

NOTE: *The Video Converter can be used with the Mid and High Cabinet.*

Video Converter (External type)

The LOGIQ P8/P9/P10 Video Converter Option enables the ability for the console to view or record scanning via an S-Video Cable.

If the Side cabinet is installed, the external type video converter can be used for the supported countries.

NOTE: *The External type of Video Converter can be used in limited countries: EU, Korea, China, USA, Canada, and Japan.*

Figure 13-273.   Input side configuration

a. Power switch	a. Input HDMI LED
b. Power port	b. Input HDMI
c. Function switch	
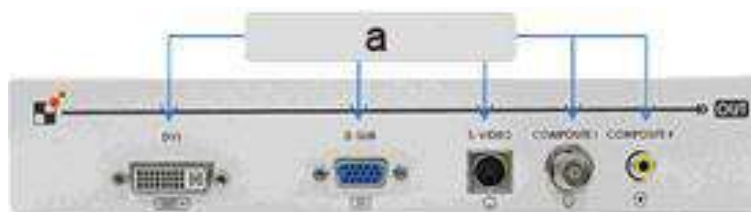
Figure 13-274.   Output side configuration

a.   Output port

CAUTION The provided AC/DC adapter is dedicated to the video converter. Never use this AC/DC adapter for other uses.

Storage Options

Probe holder

Multi purpose probe holder

Figure 13-275.   Multi purpose probe holder (option)

Attachment for small probe

Figure 13-276.   Attachment (Option)

Push the attachment into the probe holder as below.

Figure 13-277.   Push the attachment

Figure 13-278.   Attachment in the proper position

Wired Footswitch

You can attach this Footswitch to the system by connecting it to any USB port on the system.

Figure 13-279.   Footswitch and USB Cable

This is a 3-pedal Footswitch. You can configure its functionality via the Utility -> Applications -> Footswitch parameters.

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

Touch Control

Description   The Touch Control Function provides to make it possible to easily perform frequently used operations without using Front panel and Touch panel Menu.

Activation   There are 2 ways to activate the Touch Control.

- Assign the Touch Control function to User Defined Hard Key or User Defined Touch Button in Utility -> System -> User Configurable Key.
- Swipe Down from the top of the Touch Panel from the light gray bar
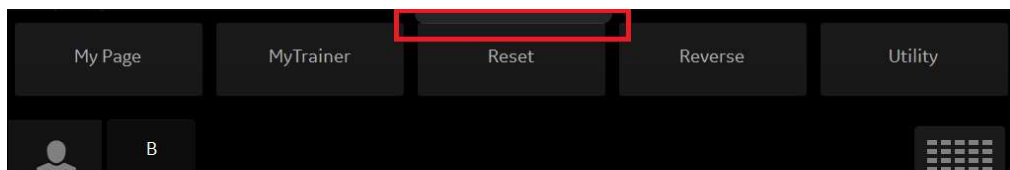
Figure 13-280.   The top of the Touch Panel

Deactivation   There are 2 ways to deactivate the Touch Control.

- Use the Exit icon on the top right of the Touch Panel.
- Swipe Up from the bottom of the Touch Panel from the light gray bar.

Figure 13-281.   The bottom of the Touch Panel

Touch Control Display Layout
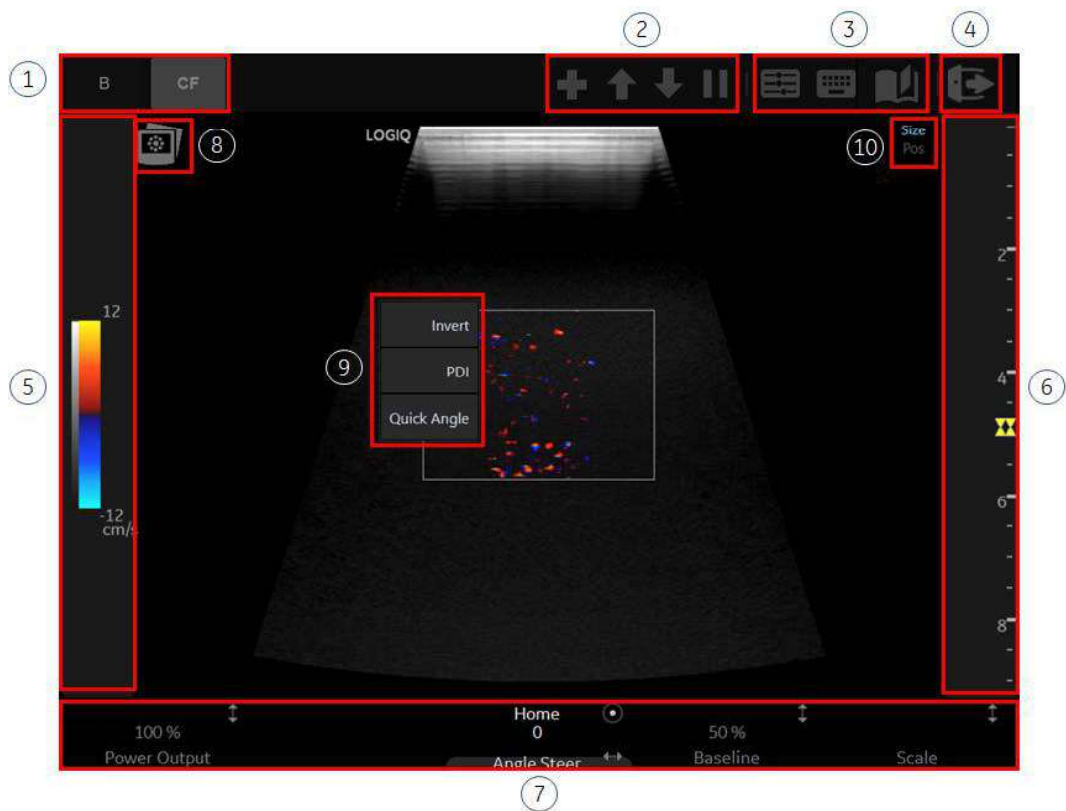
Figure 13-282.   Touch Control Display Layout

1. Mode Tab Control
2. Buttons for Scan Assistant (It only appears in Scan Assistant Mode)
3. Shortcut Icons (TGC, Keyboard, My Page)
4. Exit Icon
5. Gain Control (Scrolling up and down changes the gain value)

6. Depth Control (Scrolling up and down changes the depth value)
7. Mode Rotary (Press & Hold The button at the position will operate)
8. Hide/Unhide Scan Image Icon
9. Quick Menu (Anywhere in the image area Press & Hold displays the menu)
10. Trackball Upper Key Indicator

Touch Control

- Touch Control Trackball Functions

  You can either use one finger to move the CF/PDI ROI, PW cursor or trackball functions. One finger double tap will change the active function of the trackball. This is displayed at the top right of the touch panel.

Figure 13-283. Touch Control

- Two fingers will either zoom-in or zoom-out.
- More than 3 Fingers will Freeze/UnFreeze.

Quick Menu

- Press and Hold one finger for additional mode/function controls.

  B - CHI, Virtual Convex (For example)

  CF- Invert, PDI, Quick Angle (For example)

  PW- Invert, Quick Angle, Update (For example)

  Comments - Comments from MyPage

  Bodypatterns - Bodypatterns from MyPage
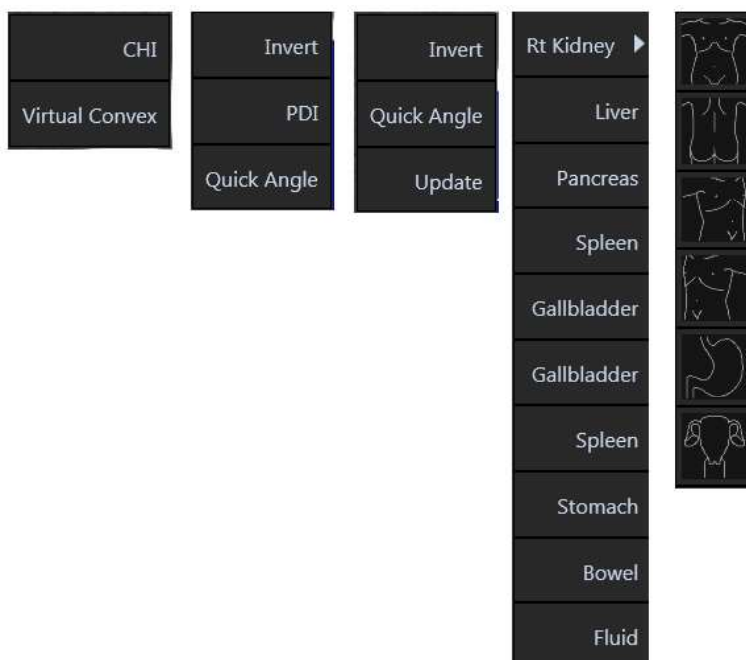
Figure 13-284.   Quick Menu

Smart Device Apps

LOGIQ Apps

Smart Device LOGIQ Apps are available for Android devices (both a phone and tablet) via Bluetooth: LOGIQ Remote Control App and LOGIQ Photo/Barcode Reader App.
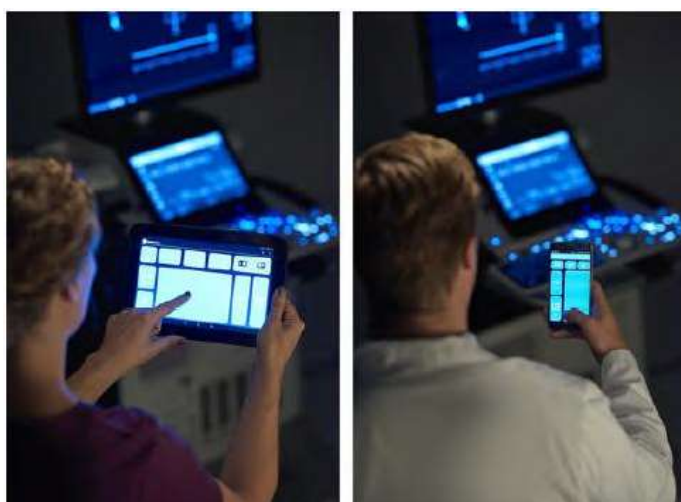
Figure 13-285.   Smart Device Apps Mobile Devices

⚠ WARNING   DO NOT use the Smart Device Apps if the patient has a life-sustaining device, such as a pacemaker or defibrillator, as these devices do have an effect upon the life-sustaining device.

NOTE: *The communication between the LOGIQ Apps and the ultrasound system is Bluetooth which is a wireless, secure transmission. At no time is patient data stored on the device hosting the LOGIQ Apps. For the LOGIQ Photo App, photos are never written to a file, but rather directly transferred to the LOGIQ ultrasound system. Once on the ultrasound system they can be included with the diagnostic images sent to the reviewing/reading physician.*

LOGIQ Apps (continued)

NOTE: DO NOT use the USB Ports on the LOGIQ P8/P9/P10 to charge
         LOGIQ Apps devices as these devices are not approved
         devices to connect to a medical device.

Connecting the Device

To link to the device,

Table 13-104:   Linking the Device to the LOGIQ P8/P9/P10
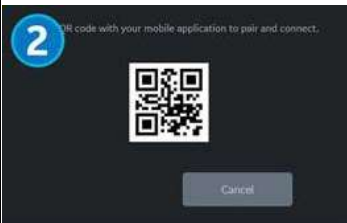
Steps	On LOGIQ P8/P9/P10	On Device
1. Press the Mobile Icon on the LOGIQ P8/P9/P10 that's located on the display.		
2. On the LOGIQ P8/P9/P10, the QR code appears on the display. 3. On the device, press the LOGIQ Remote App.		

Table 13-104:   Linking the Device to the LOGIQ P8/P9/P10 (Continued)
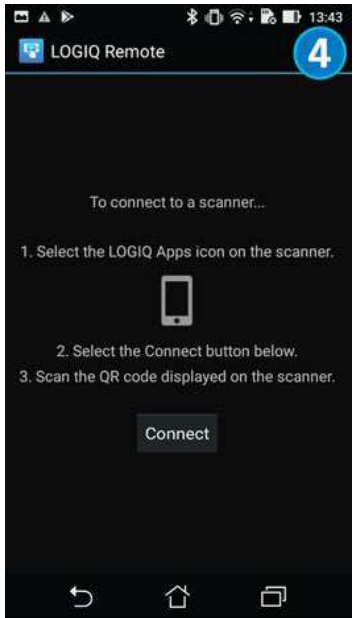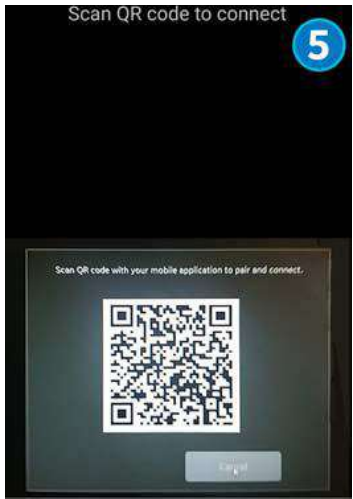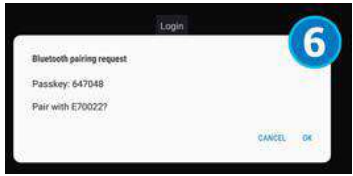
Steps	On LOGIQ P8/P9/P10	On Device
4. Follow the instructions on the device. a. Press "Connect." b. Scan the QR Code with the device.		
5. Place the device in front of the LOGIQ P8/P9/P10 as directed. "Scan QR code with your mobile application to pair and connect." The LOGIQ P8/P9/P10 and the device are now ready to pair.		
6. The device displays the Bluetooth pairing request, "Confirm passkey is ##### to pair with the LOGIQ P8/P9/P10." Press OK.		

Table 13-104:   Linking the Device to the LOGIQ P8/P9/P10 (Continued)

Steps	On LOGIQ P8/P9/P10	On Device
7. The Bluetooth icon on the LOGIQ P8/P9/P10 is now paired to the device. 8. The LOGIQ Remote application appears on the device. The Phone App and Tablet App displays are shown to the right.		
To switch to the LOGIQ Photo App, press the Camera icon located on the top of the remote device's display. Note: The Camera Icon only appears if LOGIQ Photo App is already installed.		

Table 13-104:   Linking the Device to the LOGIQ P8/P9/P10 (Continued)

Steps	On LOGIQ P8/P9/P10	On Device
To disconnect the LOGIQ P8/P9/P10 from the device, click on the "Bluetooth Connected to the Device" icon on the bottom of the display and select to disconnect. Or, You can press "Disconnect" on the Device.		
To Unpair a Device from the LOGIQ P8/P9/P10, press "Unpair Bluetooth Devices" via Utility> Connectivity> Miscellaneous> LOGIQ Apps.		

To completely break the association between the LOGIQ P8/P9/P10 and the device (unpair the device from the LOGIQ P8/P9/P10):

1.   Access the Utility-> Connectivity-> Miscellaneous screen.
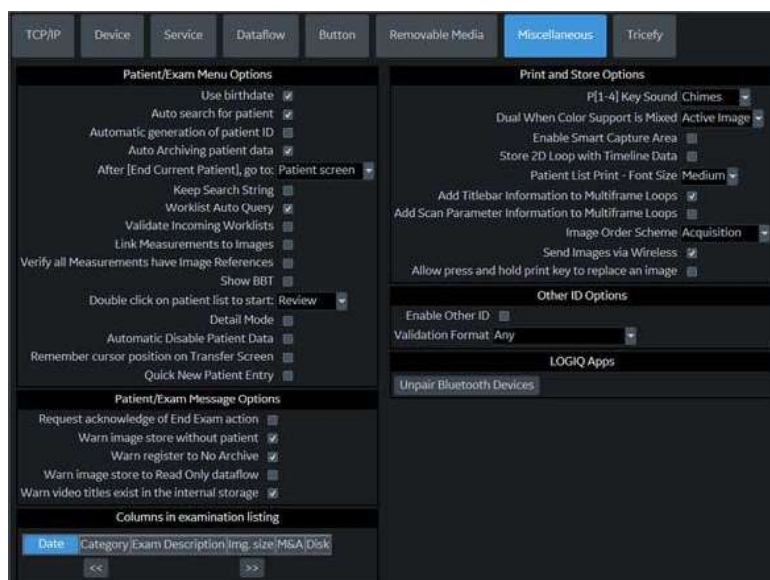
2.   In the LOGIQApps section, select *Unpair Bluetooth Devices*.

Assigning LOGIQ Apps to a BT Key

To assign LOGIQ Apps to a BT key, select "LOGIQ Apps" to a "BT Key (restart needed)" via Utility> System> User Configurable Key.
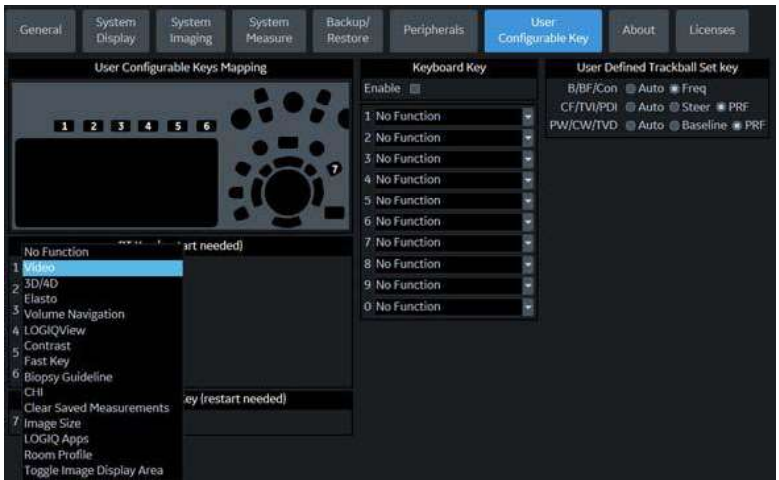
Figure 13-286.   Assign LOGIQ Apps to a BT Key

Using the Apps

Table 13-105:   Using Smart Device LOGIQ Apps

Tablet/Phone Remote Control and Photo/Barcode reader Apps
1. LOGIQ Remote Control App   2. LOGIQ Photo/Barcode Reader App

Table 13-105:   Using Smart Device LOGIQ Apps (Continued)

Tablet/Phone Remote Control and Photo/Barcode reader Apps

LOGIQ Remote Control App:	Photo/Barcode Reader App
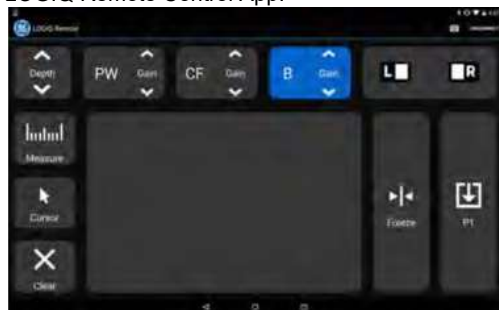
Via the Tablet LOGIQ Remote Control App, you will be able to adjust the following controls:
Depth, Gain (B-Mode, Color Flow Mode, PW Mode), Left/Right, Measure, Comment, Clear, Trackball, Freeze, Store, Color Flow Scale, and Cursor.

Via the Phone LOGIQ Remote Control App, you will be able to adjust the following controls:
Activate PW, CF, or B-Mode, adjust the Cursor, Freeze the image, and sent images to the P1 control.
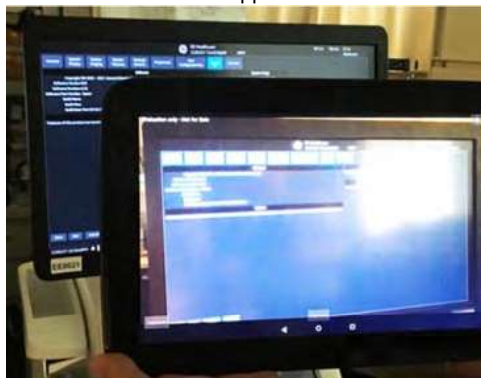
You can use the LOGIQ Photo App to capture photos that will go to the patient's exam and to use as a barcode reader to scan in patient exam information.
Note: The photo does not go directly into the exam; instead the image must be stored from the LOGIQ P8/P9/P10.
Note: The barcode scanner scans the barcode into the Patient ID field on the Patient menu.

IOTA LR2 Worksheet

NOTE: *IOTA LR2 Calculation is an option.*

NOTE: *IOTA LR2 Calculation may not be available in all countries.*

THe IOTA (International Ovarian Tumor Analysis) LR2 Worksheet contains an ovary measurement tool for women with adnexal tumors that have been selected to undergo surgery. The LR2 model is based on published literature and has been tested only on the stated population. The literature states that the LR2 model can help to estimate the probability of an adnexal mass of being malignant. The IOTA group has evaluated other ways including an LR1 model in additional to the LR2 model.

NOTE: *IOTA states that use outside of the intended population can overestimate risk. Users are expected to study the literature and reach their own professional conclusions regarding the clinical utility of the tool. The model cannot replace experience in ultrasonography and cannot compensate for poor quality ultrasound equipment.*

The IOTA mathematical logistic regression model, LR2 is stated in literature as described in the Advanced Reference Manual.

NOTE: *For details see H43122LE LOGIQ P8/P9/P10 R4 Advanced Reference Manual - Chapter IOTA LR2.*

GE Healthcare is passing on this IOTA LR2 worksheet for your convenience based on published literature of one group, but makes no representation of its effectiveness in your practice. This calculation is not to be used as the primary driver in diagnostic decision making on the probability of malignancy. It is secondary information for a physician to use based on recent literature.

Workflow

1. Select IOTA LR2 Model on the Gynecology Worksheet touch panel.

2. Fill in items 1 to 6. The Patient's age is entered by the system if available from the Patient Information Dialog.

3. The IOTA LR2 model result is displayed.

CAUTION The IOTA LR2 model should not be used without an independent clinical evaluation and is not intended to be a screening test or to determine whether a patient should proceed to surgery. Incorrect use of the IOTA LR2 model carries the risk of unnecessary testing, surgery, and/or delayed diagnosis.

IOTA LR2 Model

1	Patient age	years
2	Presence of ascites	☐
3	Presence of blood flow within a papillary projection	☐
4	Maximal diameter of the solid component	mm
	(no increase > 50 mm)	
5	Irregular internal cyst walls	☐
6	Presence of acoustic shadow	☐

IOTA LR2 Model result

Caution: The IOTA LR2 model should not be used without and independent clinical evaluation and is not intended to be a screening test or to determine whether a patient should proceed to surgery. Incorrect use of the IOTA LR2 model carries the risk of unnecessary testing, surgery, and/or delayed diagnosis.

Figure 13-287.   IOTA LR2 model

Hepatic Assistant

Overview

Hepatic Assistant is supported on C1-6-D (Abd(Abdomen)) to measure SWE and UGAP simultaneously.

See 'Shear Wave Elastography' and 'Ultrasound- Guided Attenuation Parameter (UGAP) Option' for detailed workflow.

Activate Hepatic Assistant

1. Configure presets for Hepatic Assistant in Utility -> Imaging -> UGAP -> Abdomen - C1-6 (Hepatic Assistant) if needed.

   - **Visualization:**

     UGAP/SWE (A/E)

     UGAP Q/SWE (A Qual./E)

     B/SWE & UGAP/UGAP A (BE -> A/Att.)

     SWE Q/SWE & UGAP Q/UGAP (E Qual./E -> A/Qual.)

   - **SWE Display Side:** Right or Left.

   - **Frames to store:** UGAP frames to store for Auto Measurement Multi can be configured in increments of 10 from 0 to 300 (0, 10, 20, etc.).

   - **UGAP ROI Display in PreMode:** On or Off.
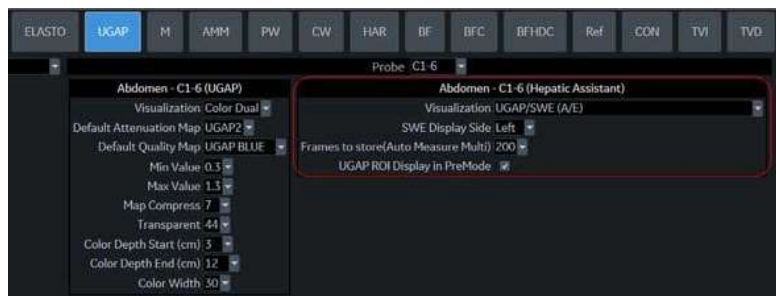
Figure 13-288.   Presets for Hepatic Assistnant

2. Assign Hepatic Assistant to any User Defined key in Utility -> System -> User Configurable key. Press *Save.*

3. Select C1-6-D probe and Abd for application.

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Activate Hepatic Assistant (continued)

4. Press assigned User Defined key. Pre Mode is displayed.
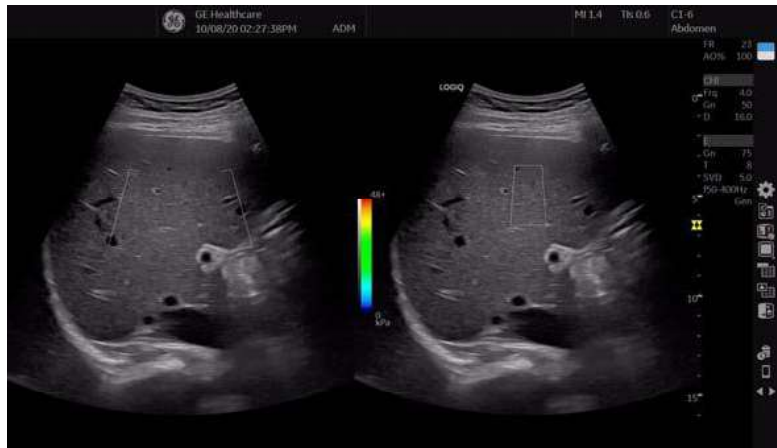
Figure 13-289.   Pre Mode

5. Move SWE ROI to desired position if needed.

6. Press *Start* to start SWE and UGAP live data acquisition. The UGAP measurement is activated when the SWE measurement is completed.

   • LOGIQ P9/P10 acquires one SWE frame data and one UGAP frame data for Auto Measurement Single.

   • LOGIQ P9/P10 acquires SWE frames data until the user press **Freeze** and the specified number of UGAP frames data for Auto Measurement Multi.

   • LOGIQ P9/P10 acquires SWE frames data until the user press **Freeze** and UGAP frames data the user press *Store* for Auto Measurement Off.

7. Press assigned User Defined key to exit Hepatic Assistant.

Visualization

Below Visualizations are selectable in Utility.

• Dual view of UGAP and SWE
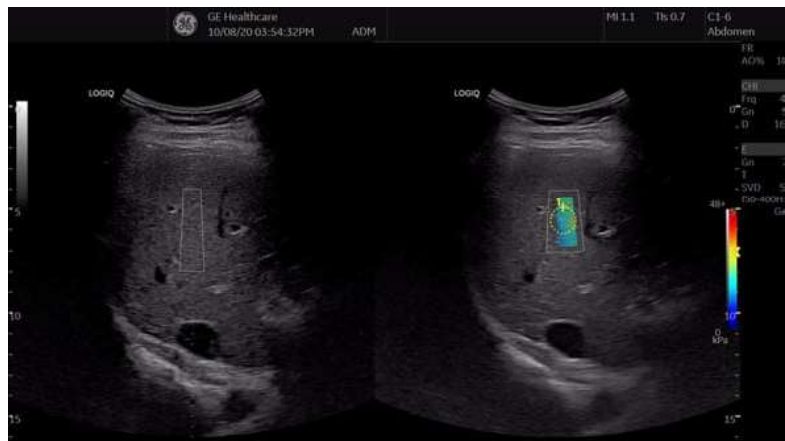
Figure 13-290.   Example - UGAP/SWE (A/E)

• Dual view of UGAP Quality Map and SWE
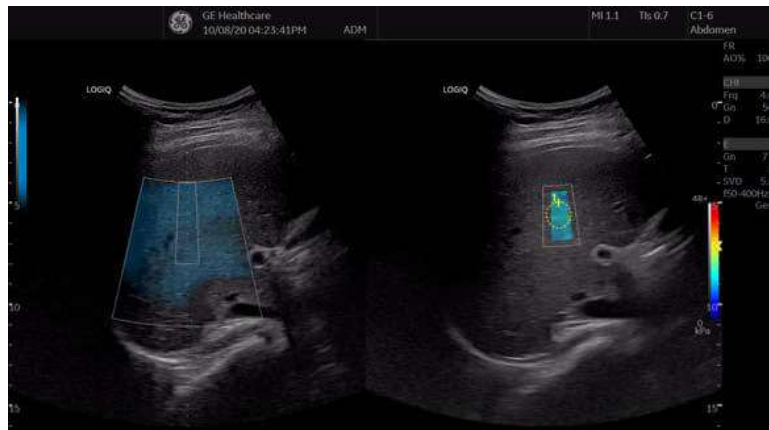
Figure 13-291.   Example - UGAP Q/SWE (A Qual./E)

Visualization (continued)

- • Dual view of B-mode and SWE to UGAP and UGAP Attenuation Map
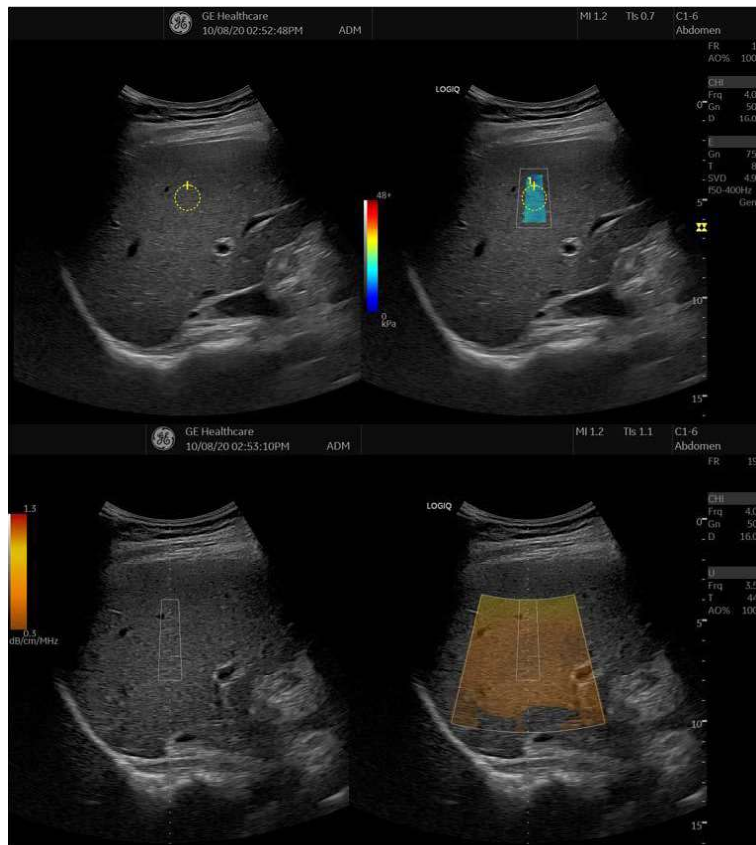
Figure 13-292.   Example - B/SWE & UGAP/UGAP A (B/E A/ Att.)

Digital Expert

Digital Expert Remote Training

Digital Expert is a purchasable option which enables remote training between users and the GE Clinical Applications team, through scheduled and real-time sessions. Digital Expert is a self-contained, app-based companion solution, designed to pair with GE medical devices. Digital Expert utilizes intelehealth software for remote connectivity.

NOTE: *This tool is not for clinical diagnostics purposes.*

Digital expert also enables customer to customer Enterprise Collaboration, where users can connect with each other within their own network. This provides on-demand access for guidance and consultation for clinicians from in-house experts.

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