



User Guide

Volume 1

Terason uSmart3200T and 3200T Plus Ultrasound System User Guide

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Preface Before You Begin

Before you start using the Terason uSmart3200T Ultrasound System, you should review this preface, which discusses the following topics:

- [Prerequisites](#)
- [Getting Help](#)
 - [Terason uSmart3200T Ultrasound System User Guide](#)
 - [Windows Online Help](#)
 - [Volume 2 of the User Guide](#)
 - [Contacting Terason](#)
- [Labels](#)

Prerequisites

Before you use the Terason uSmart3200T Ultrasound System, you should be trained in clinical procedures for conducting ultrasound exams. This guide does not provide guidelines for the clinical aspects of performing exams or for interpreting ultrasound images.

You also need to know how to use the tablet computer. The Terason software runs on the Windows 10 Touch operating system. If you are new to the Windows 10 Touch operating system, see [Controlling Imaging Using Gestures](#) on page 36.

Administrator Rights

Ordinary operation does not require administrator rights. However, running as administrator is required to license or upgrade the software license and to modify the setting, Run Ultrasound at Windows startup under the General Setup tab. For future software upgrades and upgrades, the software licenses are retained, and no additional license steps are required to run the software after the upgrade is complete.

Getting Help

If you have a problem using your Terason uSmart3200T Ultrasound System, you have options for getting help.

- General instructions for use are in the *Terason uSmart3200T Ultrasound System User Guide*. This should be your first action. See [Read This Guide Online](#) on page 11 and [Volume 2 of the User Guide](#) on page 13.
- More technical information is included in *Volume 2* of this guide, which is a PDF file in the directory Programs / Terason / Documentation on the computer.
- A Help file is accessible from the Terason Ultrasound program. See [Online Help](#) on page 11.
- You can contact Terason Technical Support. See [Contacting Terason](#) on page 13.
- Also see [Windows Online Help](#) on page 13 if you need help using Windows or computer functions.

Online Help

To access the help, tap the **Help button**. The Help window has three tabs on the left used to view information on the right:

- Contents** Tap a book (📖) to open it. Tap on a topic (❓) to view it.
- Index** Enter the subject you want, or scroll to find a topic, then double-tap a selection.
- Search** Enter the word to search for, tap **Enter**, and double-tap a topic.

Terason uSmart3200T Ultrasound System User Guide

Read This Guide Online

If you are reading a printed copy of this guide, you can also read the *User Guide* online using Adobe Reader®.

To read the *User Guide* online, complete these steps:

1. **Minimize** the Terason Ultrasound screen.
2. Tap and drag up at the **bottom edge** of the screen to bring up the Windows Task Bar.
3. Tap the **Windows icon** in the lower left corner of the screen.
4. Select **All Programs > Terason > Documentation > Terason User Guide**.

The computer opens the *User Guide* in Adobe Reader.

5. Tap the Bookmarks tab to view a list of topics, or use the Guide's table of contents or index to locate topics.

For information on using Adobe Acrobat Reader, select **Help > Reader Help** from the Reader menu bar.

Warnings, Cautions, and Notes

This Guide uses graphic symbols and special text to alert you to important information.



Warning: Warnings are notices describing actions or conditions that are very likely to cause damage to equipment, injury, or death.



Caution: Cautions are notices describing actions or conditions that may damage equipment or cause injury.



Note: Notes are messages containing useful information that can save time or avoid errors.

Links

If you are viewing this *User Guide* online, you can tap any blue text, or any page number in the text, Table of Contents, or Index to go directly to that topic.

Printing the User Guide

Terason delivers the *User Guide* as a Portable Document Format (PDF) file. Please note that color is key for understanding some of the graphics, and these graphics may be difficult to interpret when printed in black and white or grayscale.

To print the *User Guide*, you must connect your tablet to a printer, or to a network that connects to a printer. This PDF document is set up for single-sided printing to accommodate the greatest number of users, but can also be printed double-sided.



Caution: A printer installed within the patient environment may result in non-conformance to safety standards. See “Intended Use” in *Volume 2* of this guide for a diagram of the patient environment. Use of non-medical grade peripherals will result in non-compliance with safety and EMI standards. Non-conformance to these standards can create risks to the patient and operator of this equipment.

To print a paper copy of the guide from Adobe Reader, complete these steps:

1. Select **File > Print**.
2. Select a **printer** from the Name: menu.
3. Change any **print settings** that you want (optional), including which pages to print (or you can print the entire *User Guide*).
4. Tap **OK**.

Windows Online Help

For help with the Windows operating system, tap Alt-Tab, then tap the **Windows icon** in the lower left of the screen, and tap **Help and Support**. The Windows Help system opens.

Volume 2 of the User Guide

Important safety, maintenance, and technical information about the Terason Ultrasound system is included in Volume 2 of the *User Guide*. To access Volume 2 of the *User Guide*, double-click the User Guide Volume 2 icon on the Windows desktop, or navigate through the Windows / Start button to the Terason folder. The user guide files are in the Terason folder.

Contacting Terason

If you have questions about the Terason uSmart3200T Ultrasound System, you can contact Terason support:

By Mail

Terason Division of Teratech Corporation
77–79 Terrace Hall Avenue
Burlington, MA 01803 U.S.A.

By Telephone

Voice in the U.S.A.: 1-866-TERASON (1-866-837-2766) Ext. 1048
Voice from outside the U.S.A.: 781-270-4143 Ext. 1048

By FAX

1-781-270-4145

By Email

techsupport@terason.com

On The Web

For more information, you can visit our web site at:

www.terason.com

You can view contact information by selecting **Help > Technical Support**.

Labels

Several labels are attached to the Terason system. The following sections describe what each label means.

Refer to the tablet user guide for information about its labels and regulatory compliance

System Label Icons

Manufacturer Mark



Manufacturer -- Terason manufactures the Terason Ultrasound System.

Type BF Equipment Applied Part



The Terason Ultrasound System provides protection against electric shock. Patient applied parts marked with this symbol are tested and approved for Body Floating use.

Type CF Equipment Applied Part



The Terason Ultrasound System provides protection against electric shock. Patient applied parts marked with this symbol are tested and approved for Cardiac Floating use. This includes direct contact with the heart or use in the bloodstream.

Caution: Only the Plus version of the Terason 3200t Ultrasound system is approved for CF use.

Double Insulated



This device is Type 2 (double insulated).

Indoor Use Only



This device is intended for indoor use only.

CE Mark



The Terason Ultrasound System conforms to all applicable European Directives - specifically, the Council Directive Concerning Medical Devices 93/42/EEC. The number adjacent to the CE marking (0413) is the number of the EU-notified body that certified meeting the requirements of Annex II of the Directive.

U.S. and Canada Safety Standards



This certification mark indicates that the Terason Ultrasound System has been tested to and meets the minimum requirements of widely recognized U.S. and Canadian product safety standards. It also means that the manufacturing site has been audited, and that Terason has agreed to a program of periodic factory follow-up inspections to verify continued conformance.

See User Guide



This label indicates that the user should refer to the User Guide for information on using this equipment.

Dispose of Properly



Do not dispose of by dumping in garbage. Use a separate collection for electrical and electronic equipment.

Products bearing this symbol are subject to the European Community directive 2002/96/EC on waste electrical and electronic equipment (WEEE), amended by directive 2003/108/EC. For collection and disposal of the product, its components, or its accessories, contact your local Terason representative.

Shipping Label Icons

The following symbols appear on the shipping label.

Environmental



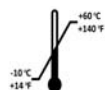
The Terason Ultrasound System must be stored in the original shipping container in environments with 10% to 90% relative humidity and non-condensing.

Air Pressure



The Terason Ultrasound System must be stored in the original shipping container in environments between 70 kPa (525 mmHg) and 106 kPa (795 mmHg) air pressure.

Temperature



The Terason Ultrasound System must be stored in the original shipping container in environments between -10° and 60° C (14° and 140°F).

Terason Probes

Each Terason probe has a label that indicates its model and serial numbers: The following figure is an example of a probe label.



Example Probe Label

1 About the uSmart3200T Ultrasound System

The Terason uSmart Ultrasound System is an easy-to-use, portable ultrasound system that produces high resolution images.

The microminiaturized ultrasound system runs under the Windows 10 Touch interface, for multi-touch operation. You can also connect the computer to a printer for image output.

This section of the *Terason uSmart Ultrasound System User Guide* covers the following topics:

- [Indications For Use](#) on page 18
- [About Ultrasound Modes](#) on page 18
- [Support for Medical Procedures](#) on page 23
- [Terason Probes](#) on page 24
- [Using the Terason Cart](#) on page 24
- [Imaging, Patient, Report, and Review Windows](#) on page 27
- [The Imaging Controls](#) on page 34
- [Using the Tablet](#) on page 36
- [Beep Codes](#) on page 40
- [Equipment List](#) on page 40
- [System Warranty](#) on page 41



Caution: Some actions can expose the Ultrasound System computer to attack by viruses. These actions include: installing non-Terason software, connecting a USB drive, and connecting the system to a network. If you intend to perform any of those actions, or any other action that might expose the computer to a virus, Terason strongly recommends that you install an effective anti-virus software package. Terason has found that Norton AntiVirus v.9 or above and Microsoft Security Essentials are compatible with the Terason uSmart Ultrasound System.



Caution: Do not enable Windows automatic updating. The software that is shipped on the system has been safety tested and approved.

Indications For Use

The Terason Ultrasound System is a general-purpose imaging system intended for use by qualified physicians for analysis by ultrasound imaging or fluid-flow of the human body. Specific clinical applications and exam types include: Fetal, Abdominal, Intra-Operative (abdominal, organs and vascular), Pediatrics, Small Organ (Thyroid, Breast, Testes); Neonatal and Adult Cephalic; Trans-rectal, Trans-vaginal, Musculo-skeletal (Conventional and Superficial); Cardiac (Adult & Pediatric); Peripheral Vascular.

For Diagnostic Ultrasound Indications for Use forms for the probes offered with the Terason ultrasound system, see Volume 2 of the *User Guide*.



Caution: The Terason uSmart3200T is for prescription use only.



Caution: Federal law restricts this device to sale by or on the order of a physician. The Terason system should only be used in a medical facility under the supervision of a trained physician.



Caution: Do not use the Terason Ultrasound System during an MRI exam, when using a defibrillator, or near other strong sources of EMI.



Warning: To avoid injury, make sure the Ocular preset is selected before beginning any scan of the eye. The FDA has established lower acoustic energy limits for ophthalmic use (see [Indications For Use](#) on page 18), and if the Ocular preset is selected, the system will not exceed those limits.



Note: The Terason system normally provides clear and undistorted ultrasound images. If the images are not clear and undistorted, an external source of electromagnetic interference may be the cause. Move the ultrasound system away from other electrical and RF-emitting devices. It is also possible for unregulated power supplies to degrade performance. Power the system only from a properly regulated supply. If these remedies do not result in acceptable performance, cease using the system and contact Terason Technical Support.

About Ultrasound Modes

Ultrasound is primarily an operator-dependent imaging technology. The quality of images and the ability to make a correct diagnosis based on scans depend on precise image adjustments and adequate control settings applied during the exam. The Terason software provides tools to optimize the image quality during a patient scan for all image modes.

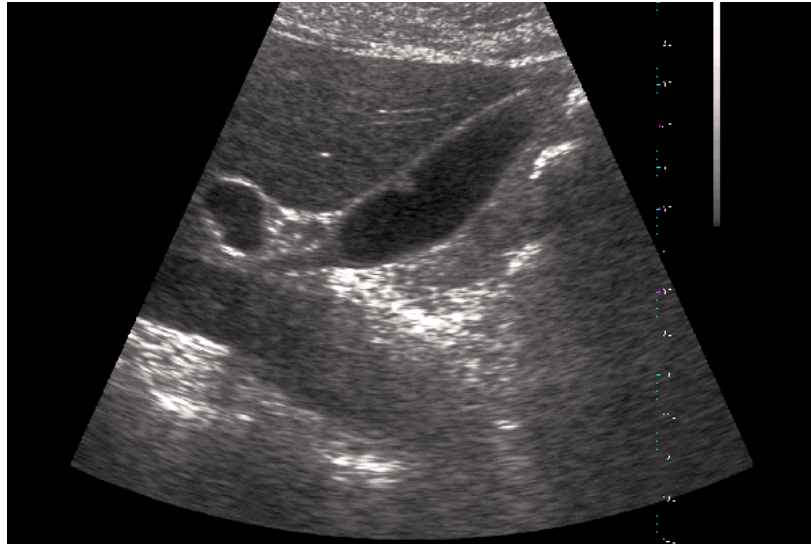
The Terason software supports the following scan modes:

- [2D Mode](#)
- [M-Mode \(Motion Mode\)Color Doppler](#)
- [Triplex](#)
- [Continuous-Wave Doppler](#)
- [Omni Beam](#)
- [TeraVision](#)

2D Mode

The Terason uSmart Ultrasound System delivers 2-dimensional digital imaging using 256 digital beam-forming channels. This imaging mode delivers excellent image uniformity, tissue contrast resolution, and steering flexibility in frequencies from 2 MHz to 12 MHz. The high channel count supports true phased array and high-element count imaging probes.

The 2D scan data displays in the 2D Imaging window. The figure below shows a sample 2D obstetrical scan.



Example 2D Scan

To use 2D, see:

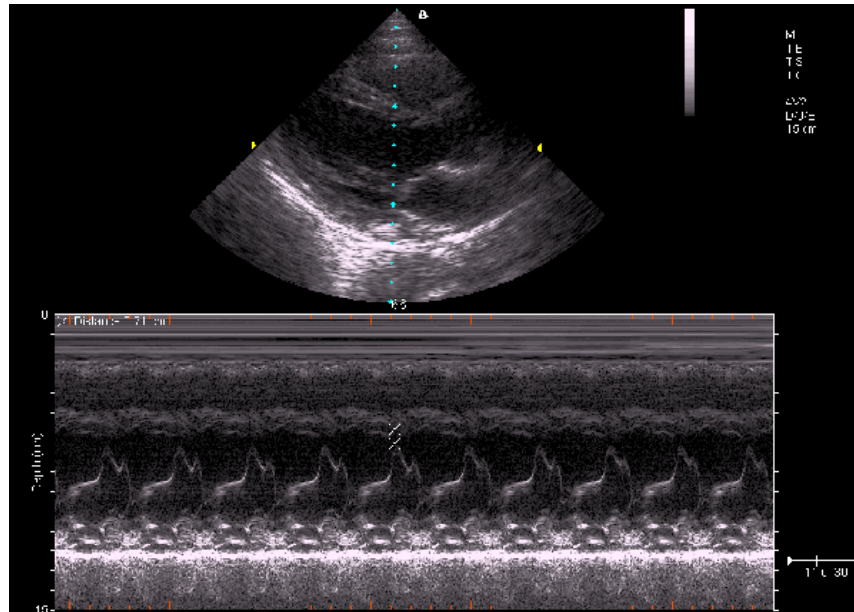
- [Acquiring Images](#) on page 55
- [Using the Image Control Buttons](#) on page 75
- [Using 2D Image Controls](#) on page 76
- [Measuring in the 2D Window](#) on page 116

M-Mode (Motion Mode)

The Terason uSmart Ultrasound System provides simultaneous 2-dimensional (2D mode) and M-Mode imaging. This combination is valuable for the efficient assessment of moving structures.

Use M-Mode to determine patterns of motion for objects within the ultrasound beam. Typically, this mode is used for viewing motion patterns of the heart.

M-Mode displays scan data of the anatomy in the 2D Imaging window, and the motion scan in the Time Series window. The following figure shows a sample M-Mode scan.



Example M-Mode Scan

For more information on using M-mode, see:

- [Acquiring Images](#) on page 55
- [Using M-Mode Image Controls](#) on page 83

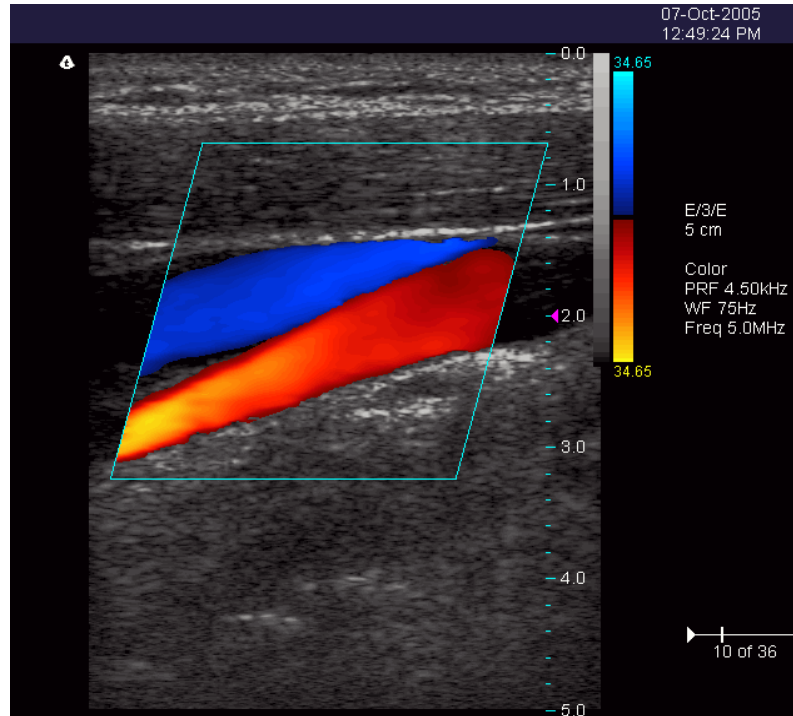
Color Doppler

Color Doppler mode is used to detect the presence, direction, and relative velocity of blood flow by assigning color-coded information to these parameters. The color is depicted in a region of interest (ROI) that is overlaid on the 2D image. Non-inverted flow towards the probe is assigned shades of red, and flow away from the probe displays in shades of blue. The mean Doppler shift is then displayed against a grayscale scan of the structures.

All forms of ultrasound-based imaging of red blood cells are derived from the received echo of the transmitted signal. The primary characteristics of this echo signal are its frequency and its amplitude (or power). The frequency shift is determined by the movement of the red blood cells relative to the probe – flow towards the probe produces a higher-frequency signal than flow away from the probe. Amplitude depends on the amount of moving blood within the volume sampled by the ultrasound beam. You can also apply a high frame rate or high resolution to control the quality of the scan.

Higher frequencies generated by rapid flow are displayed in lighter colors, and lower frequencies in darker colors. For example, the proximal carotid artery is normally displayed in bright red and orange, because the flow is toward the probe, and the frequency (velocity) of flow in this artery is relatively high. By comparison, the flow in the jugular vein displays as blue because it flows away from the probe.

The Color Doppler scan data displays in the 2D Imaging window. The following figure shows a sample Color Doppler scan.



Example Color Doppler Scan

For more information on using Color Doppler, see:

- [Acquiring Images](#) on page 55
- [Using Color Doppler Image Controls](#) on page 90

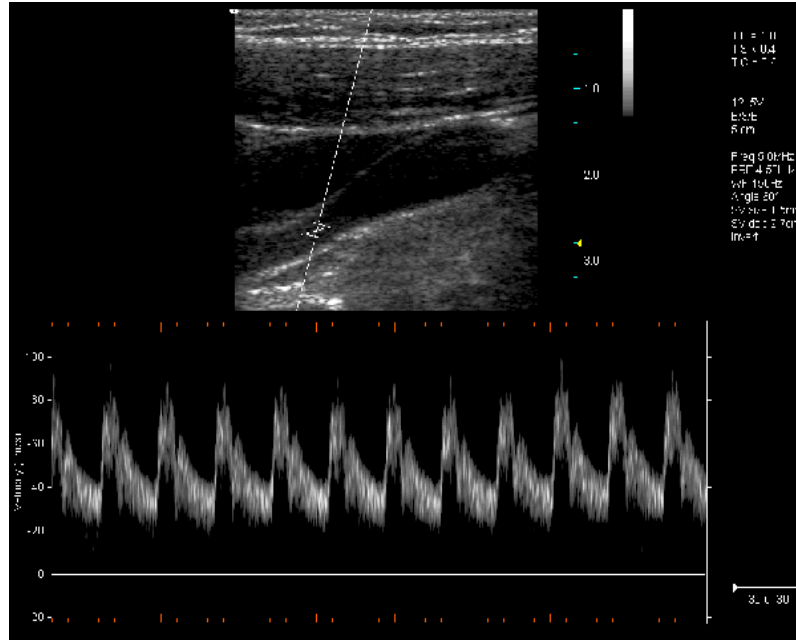
Pulsed-Wave Doppler

A Pulsed-Wave Doppler (PWD) scan produces a series of pulses used to study the motion of blood flow in a small region along a desired ultrasound cursor, called the sample volume or sample gate.

The X-axis of the graph represents time, and the Y-axis represents Doppler frequency shift. The shift in frequency between successive ultrasound pulses, caused mainly by moving red blood cells, can be converted into velocity and flow if an appropriate angle between the insonating beam and blood flow is known.

Shades of gray in the spectral display represent the strength of the signal. The thickness of the spectral signal is indicative of laminar or turbulent flow (laminar flow typically shows a narrow band of blood flow information).

In the Terason uSmart Ultrasound System, Pulsed-Wave Doppler and 2D are shown together in a mixed-mode display. This combination lets you monitor the exact location of the sample volume on the 2D image in the 2D Imaging window, while acquiring Pulsed-Wave Doppler data in the Time Series window.



Example Pulsed-Wave Doppler Scan

In the 2D scan, the long line lets you adjust the ultrasound cursor position, the two parallel lines (that look like =) let you adjust the sample volume (SV) size and depth, and the line that crosses them lets you adjust the correction angle.

For more information on using Pulsed Wave Spectral Doppler, see:

- [Acquiring Images](#) on page 55
- [Using Spectral Doppler Image Controls](#) on page 84
- [Measuring in Spectral Doppler Modes](#) on page 122

Continuous-Wave Doppler

Continuous-Wave Doppler scans display all velocities present over the entire length of the ultrasound cursor. This is useful for imaging very high velocities such as those resulting from a leaking heart valve.

As with [Pulsed-Wave Doppler](#) scans, the X-axis of the graph represents time, and the Y-axis represents Doppler frequency shift.

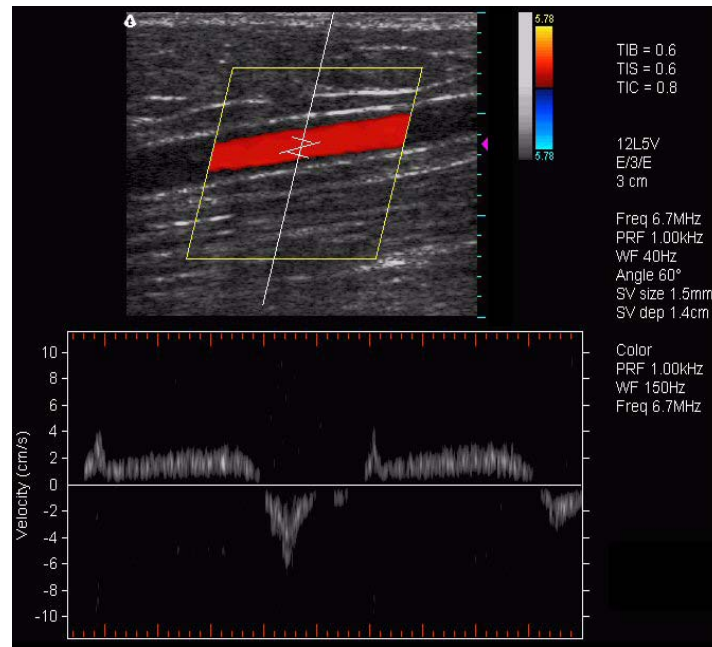
For more information on using Continuous-Wave Spectral Doppler, see:

- [Using Spectral Doppler Image Controls](#) on page 84
- [Measuring in Spectral Doppler Modes](#) on page 122
- [Acquiring Images](#) on page 66
- [Using Spectral Doppler Image Controls](#) on page 112
- [Measuring in the Spectral Doppler Modes](#) on page 167

Triplex

Triplex scan mode combines simultaneous or non-simultaneous Doppler imaging (Color Doppler, Directional Power Doppler, or Power Doppler) with Pulsed-Wave Doppler imaging to view arterial or venous velocity and flow data. Triplex allows you to perform range-gated assessment of flow.

Triplex applications include vascular studies, phlebology, perinatal, and radiology. The following triplex image example shows the greater saphenous vein.



Example Triplex Scan

For more information on using Triplex mode, see:

- [Acquiring Images](#) on page 55
- [Scanning in Triplex Mode](#) on page 94

TeraVision

TeraVision is an optional image-optimization package that sharpens images produced by the Terason uSmart Ultrasound System.

See [Enhancing the Image Using TeraVision™ Optimization](#) on page 64

Support for Medical Procedures

The Terason uSmart Ultrasound System can be configured with needle guides used for tissue biopsy, fluid aspiration, amniocentesis, and catheter placement. The system can also be incorporated into cryoablation (or targeted ablation) and brachytherapy products from other vendors. The Terason uSmart Ultrasound System scans the anatomy or vessel for size, location, and patency, and provides guide lines between which the needle will appear.

For biopsy and vascular puncture applications, a needle guide kit directs needles to the proper location for percutaneous vascular punctures and nerve blocks. The needle guide allows you to direct the needle into the center of a vessel or tissue mass, helping to avoid adjacent vital tissue. You can see the anatomy in real time before, during, and after the procedure, and can save images and Cine loops for future reference.

For cryoablation or brachytherapy applications, the system may include an insertion template and a stepper or stabilizer. The procedure for these applications is defined by the company that provides those systems. The Terason software displays the insertion grid and needles on the scan to show the progress of the procedure.

You can use the needle guides in the following modes:

- [2D Mode](#), see page 19
- [Color Doppler](#), see page 20
- [M-Mode \(Motion Mode\)](#), see page 19

See [Performing Medical Procedures](#) on page 137 for information on using the Terason uSmart Ultrasound System to perform biopsies.

Terason Probes

The Terason uSmart Ultrasound System consists of the probe, electronics envelope, and the Terason software. All of the Terason probes can be used with all scan modes.

For a list and specifications of the probes, see *Volume 2* of this guide.

Using the Terason Cart

Terason offers a special cart to support the uSmart 3200T ultrasound system. To use the cart, the system must be properly mounted to it.

Mounting the System On the Modo Cart

To secure the uSmart 3200T to the cart:

1. Secure the **tablet** to its stand. Be sure to tighten the large thumbscrew on the stand fully into the tablet.
2. Using the screws provided, attach the **cart mounting plate** to the tablet, with the small end of the tapered boss downward.
3. Place the tablet on the cart mounting bracket and slide the boss of the mounting plate down into the **slot of the mounting bracket**.
4. When the mounting plate is fully seated in the bracket, tighten the **small thumbscrew** on the mounting bracket.

To mount the power supply on the cart:

1. Place the **power supply** in the open space under the cart shelf.
2. Pass the DC cable through one of the **round holes** on either side of the column, and the AC cable through the other round grommet, so that the power supply sits in front of the column.

3. Remove the rubber grommets from the **two oval holes** in the cart column.
4. Pass the **DC cable** through one of the removed grommets, then into the oval hole at the rear of the column, and up through the oval hole at the front of the column.
5. Pass the DC cable through the other grommet, and replace both grommets in the oval holes.
6. Connect the DC cable to the tablet.
7. Push all excess length of the DC cable into the space under the shelf.



Warning: To prevent injury and equipment damage, do not overload the cart. No more than 25 Lbs (11.4 Kg) of equipment and other material should be placed on the cart. Do not lean on the cart.

Mounting the Plus System On the GCX Cart

To secure the uSmart 3200T Plus to the cart:

1. Using the screws provided, attach the **cart mounting plate** to the tablet stand, with the small end of the tapered boss downward.
2. Loosen the lock screw on the cart mounting bracket, so that the system mounting bracket can be inserted.
3. Place the tablet on the cart mounting bracket and slide the boss of the mounting plate down into the **slot of the mounting bracket**.
4. When the mounting plate is fully seated in the bracket, tighten the **small thumbscrew** on the mounting bracket. Gently lift on system to test lock screw.

To mount the power supply on the cart:

1. Place the **power supply** in the bracket under the table with two Velcro straps, as shown in the photo below.
2. Place AC power cord into the adapter. Using a #2 Philips screw driver, attach the power cord with provided nylon strain relief and screw, also shown in photo below.



Mounting power supply on GCX cart

3. Pass the **DC cable** through the square opening at back of table and connect to system. Use the two provided plastic clips to hold cable to back of post, shown in photo below.



Mounting power supply on GCX cart

4. Connect power cord to AC power source.

Moving the Cart

Before moving the cart, all parts of the system and any accessories must be securely attached to the cart so that they cannot slide off or drag on the floor.

To prepare the cart for moving:

1. Make sure the **tablet and power supply** are properly secured, as described in [Mounting the System On the Modo Cart](#) on page 24.
2. Disconnect the **AC cable** from the power mains, and coil the cable on the hook at the rear of the cart so that it cannot drag on the ground.
3. Firmly seat **probes** in the holders at the rear of the cart. Coil their cables on the hooks at the sides of the cart so that they cannot drag on the ground.
4. Firmly seat **gel bottles** in the holders at the sides of the cart shelf.
5. Remove all **loose items** from the shelf and place them in the bin below it.
6. Grasp the handle at the front of the cart and release the **wheel brakes**.
7. If using the GCX cart, set the height of the cart to its lowest position by pressing the handles on the side of the tabletop while pushing table fully downward.



Warning: To prevent injury and equipment damage, always grasp the ultrasound cart firmly when moving it. Rolling over an irregular surface could make the cart tip over if it is not firmly held. Do not park the cart on an incline, and when you do park it, set the wheel brakes. Always secure the tablet, power supply, probes, and any accessories to the cart before moving the cart.



Warning: To avoid tipping when moving the card, the cart should be moved to its lowest position. Adjust the height with the handles on the side of the tabletop while pushing table fully downward.

Using the Probe Multiplex Option

If you purchased the cart with the probe multiplex option, you can have up to three probes connected at the same time.

To connect the multiplex unit to the tablet:

1. Make sure the tablet is **shut down**.
2. Connect the **multiplex jumper cord** to the tablet probe port, just as you would a probe cord.
3. Power up the **tablet**.
4. Connect a probe or probes to the multiplex unit **probe ports**.

You do not have to power down the tablet when connecting or disconnecting probes to the multiplex unit.

The system automatically detects probes connected to the multiplex unit. When more than one probe is connected, a Probe button appears on the scanning window.

5. Tap the **Probe** button on the screen to cycle between connected probes.

The selected probe name displays at the top right of the scanning window.

Imaging, Patient, Report, and Review Windows

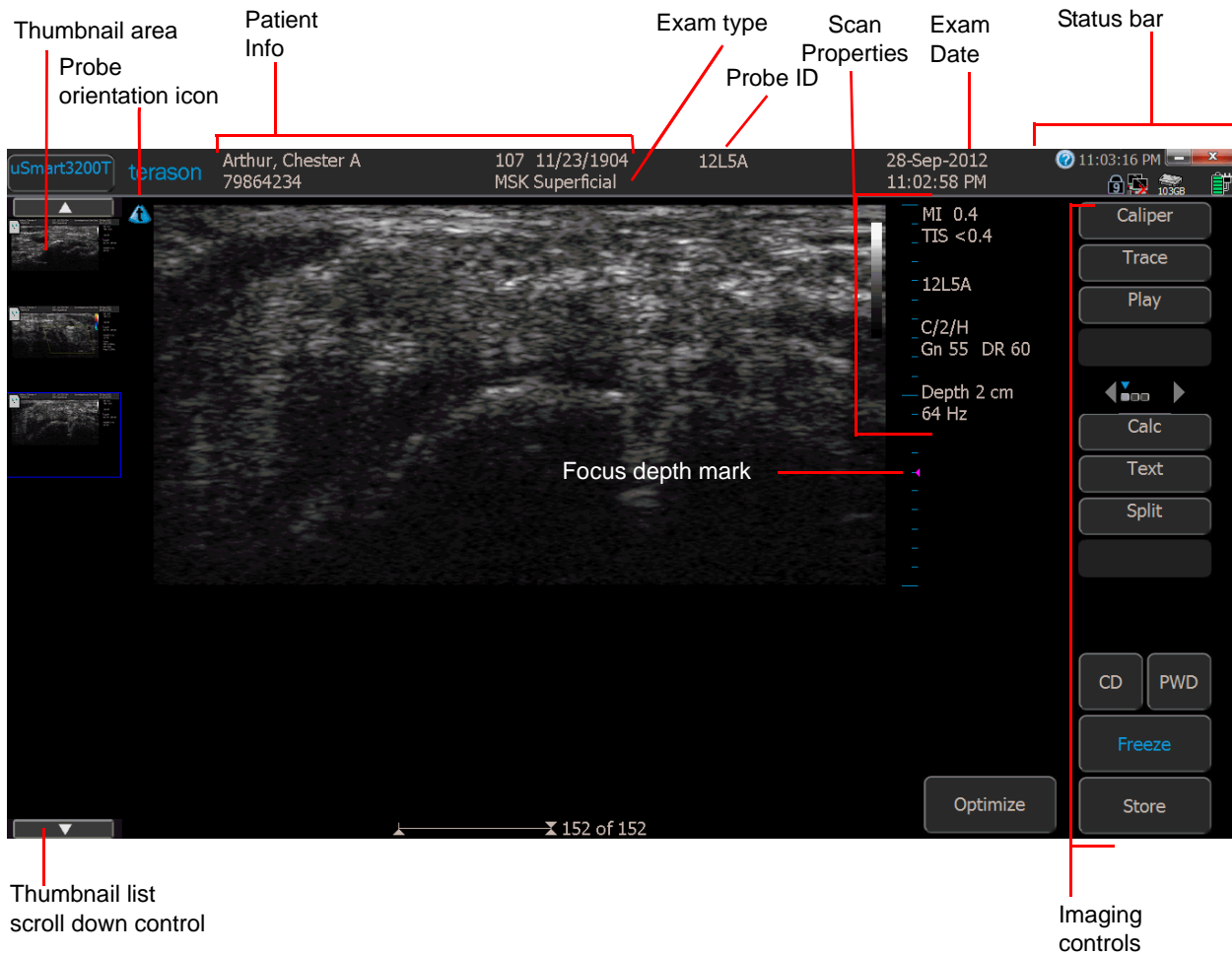
These windows use the same space on the computer screen. Tap a button to open that window.

To use these windows, see:

- [Imaging Window](#) on page 28
- [Status Bar](#) on page 29
- [Report Window](#) on page 31
- [Review Window](#) on page 33
- [Working With Scan Modes](#) on page 75
- [Setting Up Patient Information](#) on page 43
- [Reviewing Patient Studies](#) on page 99

Imaging Window

When you start the Terason software, the Imaging window displays.



Terason Imaging Window

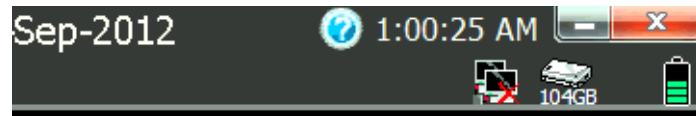
The Imaging window consists of the 2D window above the Time Series window (if the selected scan mode generates a Time Series window). The 2D window displays in all scan modes; the Time Series window displays only when scanning in M-Mode, PWD mode, or Triplex mode.

If a control, button, or menu shows in gray, it usually means that the function is not available for the current circumstances.

For details of the imaging information display, see [Status Bar](#) on page 29 and [Scan Properties Display](#) on page 29.


Status Bar


The Imaging screen includes a status bar at the upper right corner.





Status Bar


The status bar displays the following indicators, from left to right:



 **Help button** - tap this to open the Help file.

 **Network connection** - shows if the computer is connected to a network. If there is no connection, a red X shows on the indicator.

 **Disk free space** - shows how much free space is left on the computer hard drive.

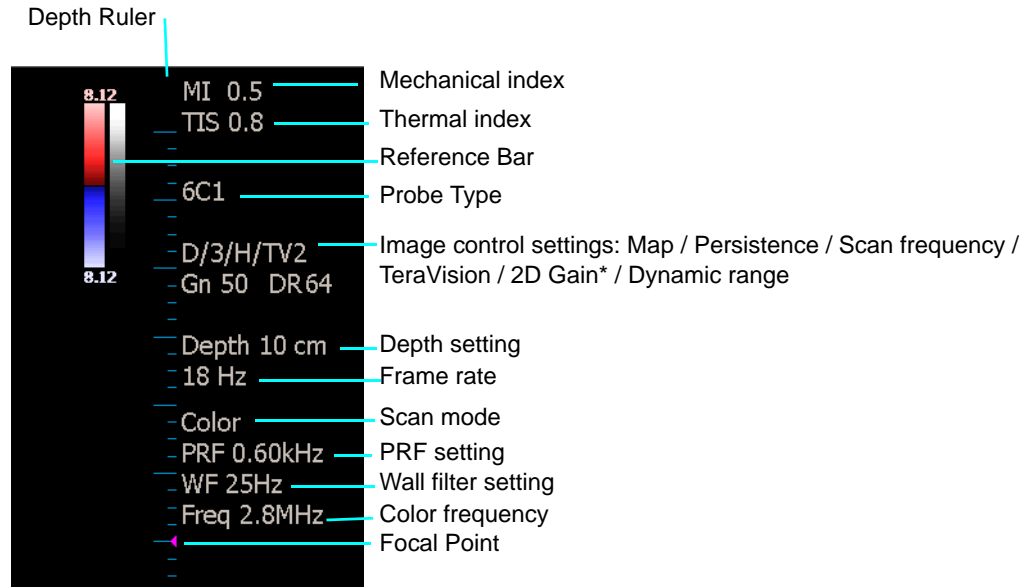
 **Battery charge** - shows the remaining charge of the system battery, when the AC power supply is disconnected. In the illustration, the battery is fully charged. As the battery discharges, the green bands disappear, from the top down. When the battery is almost fully discharged, a single red band shows at the bottom of the indicator. When the battery is partly discharged and the AC power supply is connected, a yellow lightning bolt shows on the battery icon. When the battery is full charged and the AC power supply is connected, a red power plug icon displays in place of the battery icon.

 **Minimize button** - tap this to minimize the Terason Ultrasound screen and view the Windows desktop. To return to the Terason Ultrasound screen, drag the Windows taskbar up from the bottom of the screen and tap the Terason icon.

 **Exit button** - tap this to exit the Terason Ultrasound program. To restart the Terason Ultrasound program, double-tap the ultrasound icon  on the Windows desktop.

Scan Properties Display

The Imaging window includes a text display that shows information about the current scan. The image control settings displayed vary, depending on the scan mode and other factors.



Scan Properties Display (Example)

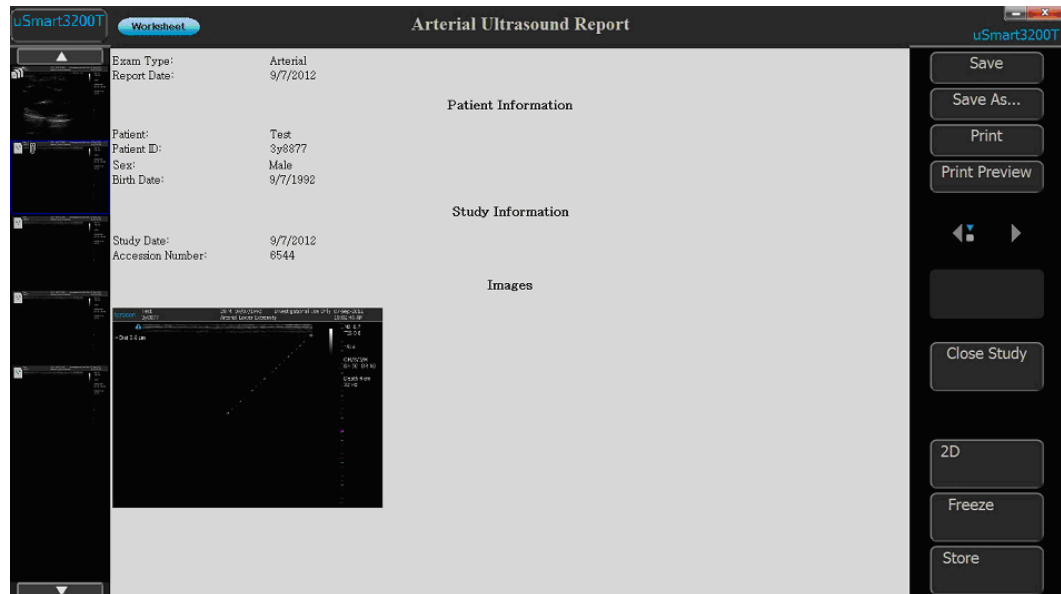
* The 2D gain display is initially 50. This is not an absolute value; the actual gain changes with different presets, but always displays as 50 initially. When you change the gain using the Gain button, the displayed value goes up or down.

See Chapter 4, [Working With Scan Modes](#), on page 75 for explanations of how to change settings.

Report Window

The Report window displays study information including patient data, exam date, exam type, and saved images. The report is generated as patient data and study information is saved.

To open the Report window, tap the uSmart3200t button at the top left corner of the screen, then tap Report.



Report Window

Buttons on the Report window control the following functions:

- **Save** - Saves a file of the report to the study folder on the ultrasound system. The file appears as a thumbnail on the Review window. Taping the thumbnail opens the file. The saved report file does not include images saved to the report.
- **Save As...** - Lets you change the format of the saved Report file. The default format is PDF; this control lets you save the file as PDF or HTML.
- **Print** - Prints the report on a printer connected to the system.
- **Print Preview** - Displays an image of the report as it will print.

A **Worksheet** button at the top left of the window lets you add information to the report. Tapping the button opens the Worksheet window.

Worksheet

Signature: Show signature and signature line.

Institution:

Exam Type: Arterial

Patient Name: Test

Patient ID: 3y8877

Date: 9/7/2012

Accession Number: 8544

Referring Physician:

Interpreting Physician:

Operator:

Blood Pressure: / mm Hg

Indications:

Comments:

Diagnosis: empty

Measurements					
Measurements	Units	Value	Inc. M1	Inc. M2	Inc. M3
Image Display Format					
Number of Columns:	2	<input checked="" type="checkbox"/> Save as default setting for reports			

uSmart3200T

Save

Save As...

Print

Print Preview

Close Study

2D

Freeze

Store

Worksheet Window

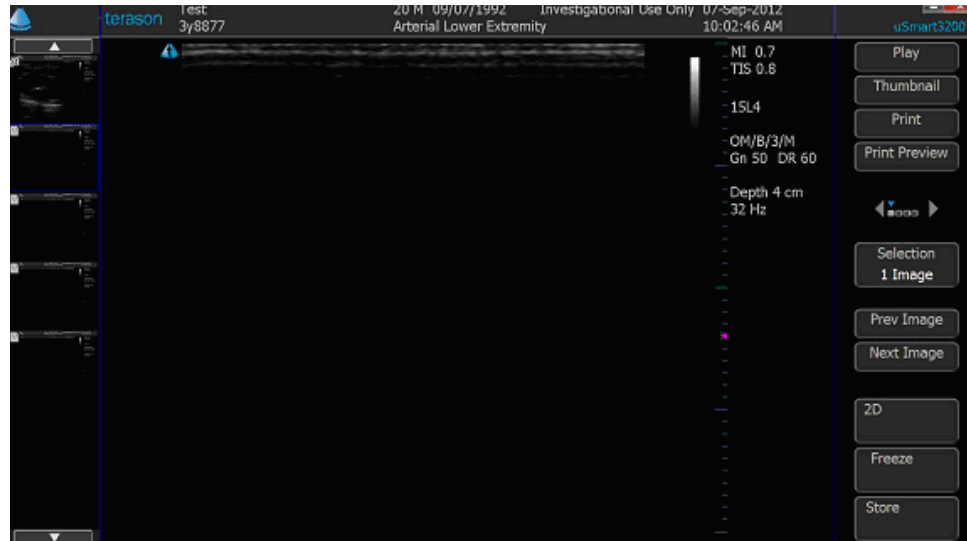
You can enter information in any of the fields on the window. The entered information automatically adds to the report. The Worksheet window has the same buttons as the Report window. Tapping the Report button returns to the Report window.

Review Window

You can view a saved study in the Review window. While reviewing a saved study, you can add annotations and measurements in the same way as on the Imaging window. See [Working with Annotations](#) on page 66 and [Working With Measurements](#) on page 111.



Note: The text home position set in the Imaging window does not apply to the Review window. The text home position set in the Review window does not apply to the Imaging window.



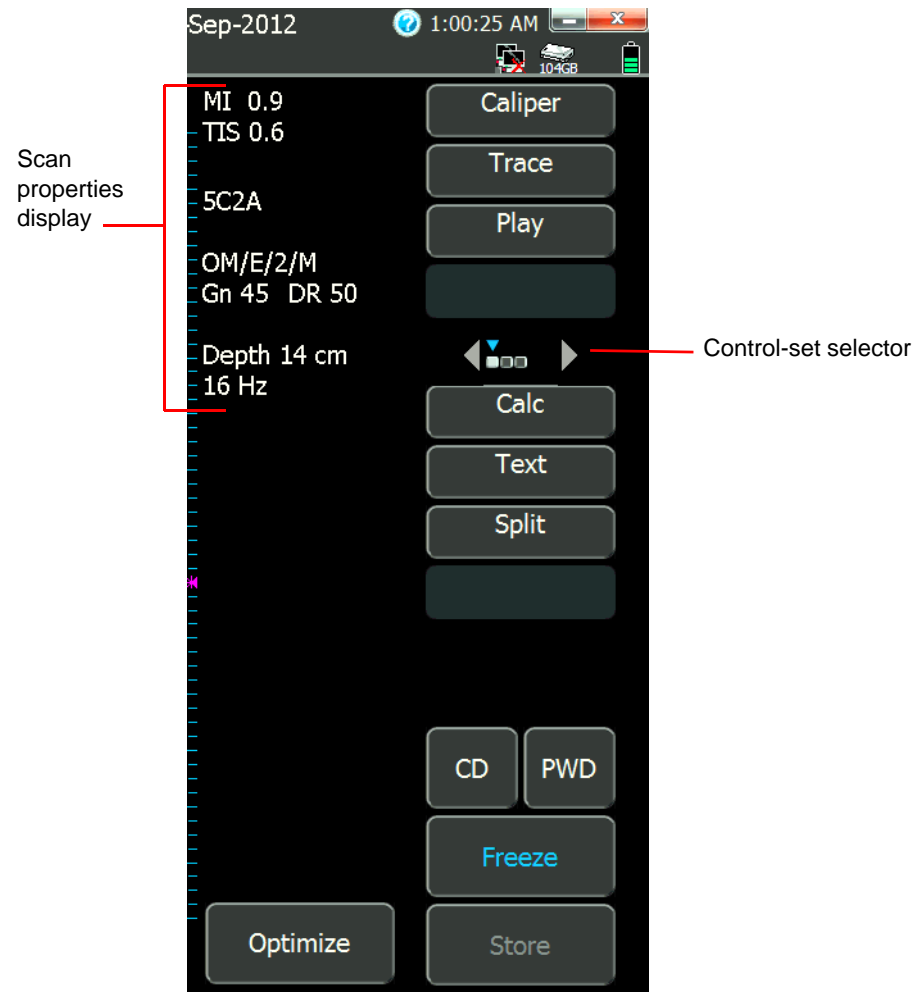
Review Window

To open the review window, tap the uSmart3200t button at the top left corner of the screen, then tap Review.

To display a saved image or report in the Review window, tap the thumbnail in the list at the left side of the screen.

The Imaging Controls

Touch-buttons at the right-hand side of the imaging screen choose and control imaging on the Terason uSmart3200T Ultrasound System.



Terason Imaging Controls


Note: The control array shown above are an example. The controls your system displays may differ from the ones shown.

Imaging Controls


Note: The control array shown above are an example. The controls your system displays may differ from the ones shown.


The controls are arranged in groups. Freezing the image makes a different set of controls available. To cycle the display to another group of available controls, tap the right or left arrow on the control-set selector:




Mode Selection buttons  – These buttons select the scanning mode. The following scanning modes are supported by the uSmart3200T ultrasound system:

- 2D (sometimes called B-mode)
- CD (color Doppler)
- PWD (pulsed-wave Doppler)

Freeze Button  – This button toggles between live imaging and frozen image. When the image is frozen, the word Freeze is blue.

Store button  –This button saves a loop or a single-frame image to a file. When imaging is live, tapping the Store button saves a loop. When imaging is frozen, tapping the Store button saves the displayed frame.

Text button  –This button enables annotation functions. Tapping the button opens a keyboard for entering text, and changes the buttons.

Focus button – This button adjusts the focus depth.

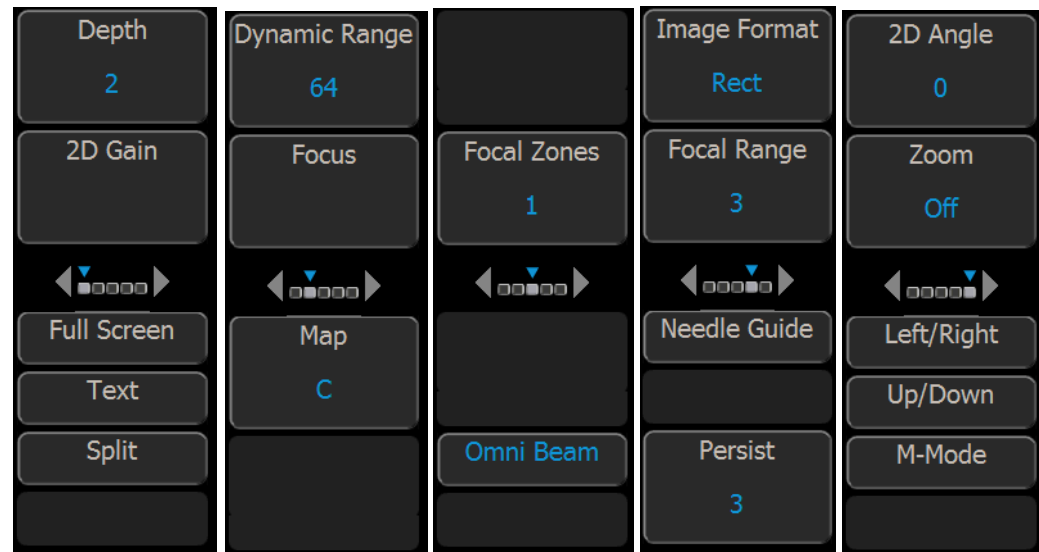
Depth button – This button adjusts the scan depth.

The illustrations below show examples of the buttons when the image is live and frozen.

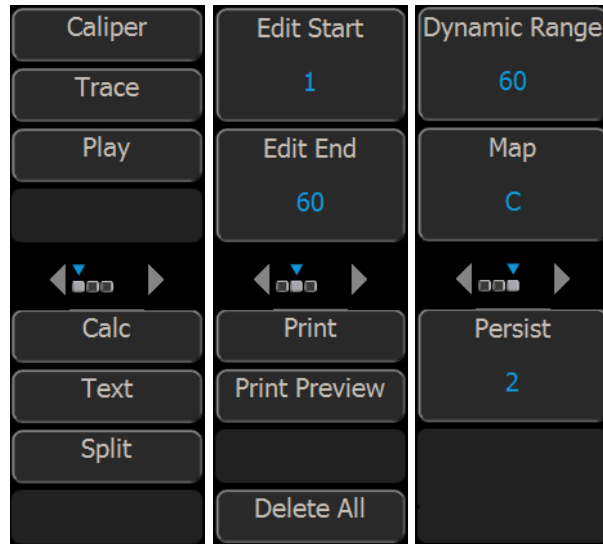


Note: The image control buttons the system displays depend on the probe that is connected, the selected scan mode, and the selected exam. **The display you see may differ from the illustrations in this guide.**

Example Image Control Buttons



Example Live Image Control Buttons



Example Frozen Image Control Buttons

Using the Tablet

The uSmart3200T system does not include a mouse or physical keyboard. You can add these devices if you want by connecting them to the tablet USB ports.

The onscreen controls can be operated with a finger, but using a capacitive-touch stylus allows greater control. Tapping with a fingernail may not work.

When you need to enter text in a text field, tap the field, and a keyboard appears on the screen. Tapping the Text button also opens the onscreen keyboard. See [Onscreen Keyboard](#) on page 39.

To open context menus that would open with a right-mouse-button click in a non-touch system, tap the onscreen item and hold your finger or stylus on it. A circle appears around the item and the context menu opens.

Controlling Imaging Using Gestures

The touch screen software includes numerous functions that are controlled by finger movements called gestures. When your fingers are touching the screen, you can use these functions, according to the following illustration and tables.



Standard Windows Gestures

Gestures for Controlling the Imaging Screen

Command	Gesture
Image Scroll	Use 1 finger to drag left and right to scroll image frame or time series on a frozen image.
Zoom And Pan	Use 2 fingers spread and drag to zoom and pan image at the same time.
*** UnZoom	Use two finger pinch quickly to unzoom.
Steer Ultrasound Cursor	Use 1 finger to flick left and right on B-Mode image when ultrasound cursor is visible.
Steer Color ROI	Use 1 finger to flick left and right outside of Color ROI to steer.
Steer Sample Volume	Use 1 finger to flick left and right in the time series image to steer the sample volume. For 2D/Spectral and Spectral/2D, use 1 finger to flick left and right at the bottom of 2D image to steer.
Steer Ultrasound Cursor	Use 1 finger to flick left and right on 2D or Color image to steer.
Full Screen Image Display	Use 3 or more fingers spread and pinch go in and out full screen.
Freeze/Live	Use 2 fingers tap to freeze. (On fingers up) Use 2 fingers to tap on paused image to unfreeze. (On fingers up)
Play/Pause	Use 1 finger tap on frame slider to toggle play and pause.
Depth	Use one finger flick up and down on image to decrease and increase depth respectively.
Split Screen	Use two finger flick to left to split with right screen active. Use tow finger flick to right to split with left screen active.
Unsplit Screen	When in split screen, use two finger flick left or right will unsplit.
Split Screen Toggle	Tap on image to select active side. Toggle on finger up.
Begin PWD Mode	Double tap on image to go to PWD or Triplex mode from B-Mode or Color with sample volume at the tapped location.

Gestures for Controlling the Imaging Screen (Continued)

ROI	Use one finger to touch and drag the inside of ROI to move to different location. Touch and drag the corner of ROI to resize.
Scale	Tap top and bottom in the velocity axis to increase and decrease scale of PWD.
Spectral Baseline	Drag image up and down to change the baseline position.
Ultrasound Cursor	Press and tap in B-Mode or Color to show cursor. Tap again to keep Cursor on image so that you can flick at bottom of image to steer. Double Tap with second finger to go to PWD or Triplex. Press and tap again to hide ultrasound cursor.
Sample Volume	Touch and drag the sample volume. Touch near the cursor line will also select the sample volume for moving.
Caliper	Use mouse cursor to move caliper. Left click to place caliper marker. Once measurement is done, click on marker again to enable repositioning of marker. Use touch with 1 finger to make measurement. Use second finger tap to place the caliper. Or Release the first finger to place caliper marker. Tap marker again to enable repositioning of marker.
Trace	See Caliper for details.
Ellipse	See Caliper for details. Click on minor axis to resize
Text	Touch near or on text to select and drag to move text. Tap away from text to end text edit.
Text Arrow	While in text mode, use press and tap to show text arrow.
Body Marker	Select button Marker Position then touch and drag body marker to different position.
Body Marker Probe Indicator	Touch body marker to enable probe position. Press and tap gesture to switch to probe orient. Tap away from body marker to end edit.
Arrow Marker	Touch arrow marker to enable marker position. Press and Tap to change to marker rotation. Tap away from Arrow Marker to end edit.
Next/Prev Screen	Use 3 fingers to flick left and right. Limited to change between image and review screen.
Scroll Frame	Tap left side of image to scroll to previous frame of a paused cineloop. Tap right side of image to scroll to next frame
Velocity	Tap on top and bottom half color bar to change velocity.
Auto Scroll Frame	Auto scroll frame of a paused cineloop when finger is down. When down on left side, it is scroll back to previous frame. When down on right side on image, it will scroll to next frame.
Edit Start/End Frame	Press and hold on side of frame slider to set start and end marker.

Gestures for Controlling the Imaging Screen (Continued)

Sector Resize	Touch the marker and drag in a phase or curve image to resize.
Sector Move	Touch the bottom of the image and drag to move the sector.
Unzoom	Use two fingers to pinch quickly together
Pan Zoom Image	Use one finger to pan zoom image.

Gestures for Controlling the Review Screen

Commands	Gestures
Prev/Next image	Use 2 fingers flick left and right to select previous and next image. Tap on left and right side of image to select previous or next image for review. Use 2 fingers tap on left half and right half of image to select previous and next image respectively.
Play/Pause	Use 1 finger tap on frame slider to toggle play and pause. Use two finger tap on image to toggle play and pause.
Caliper, Text and Body Markers	Similar to Image Screen
Scroll To Next Image	Tap left and right of image to next frame in image screen and next image for review screen
Prev/Next Frame	Tap next to frame slider on left and right for previous and next frame.
Fast Forward To Start/End Frame.	Press and hold on end of frame slider to move Start and End edit marker to start and end position.

Gestures for Controlling the Thumbnail Screen

Commands	Gestures
Scrolling	Use 1 finger drag up and down to scroll.
Select	Tap to select image. Image is selected on finger up
Right Click	Use "Press and Hold" or "Press and Tap" gesture in small and large thumbnail windows to bring up context menu.

Onscreen Keyboard

The Terason software includes an onscreen keyboard for entering text and data. The keyboard displays when you tap a data-entry field or the Text button. The keyboard supports languages that can be encoded in Unicode UTF-16. A button on the keyboard opens a menu of the languages that have been configured as available in Windows. Other keyboard configurations are available when you tap the keyboard icon at the top left of the onscreen keyboard.

Beep Codes

The Terason uSmart Ultrasound System produces beeps when certain events occur. The following list explains the meaning of the different beep codes.

- **Two short beeps:** Produced when a probe is connected or disconnected, or when the system is started with a probe already connected.
This is only a notification; it is safe to use the system.
- **Eight beeps:** Produced when communication between the computer and the ultrasound engine is lost.
If the imaging function resumes, it is safe to use the system. If the imaging function does not resume, restart the ultrasound software. If the error persists, stop using the system and contact Terason Technical Support.
- **Two-tone beeps:** Indicates that the system detected and corrected an internal transmitter timing error.
It is safe to continue using the system. Freezing or unfreezing the scan turns the beeping off. If this occurs frequently, contact Terason Technical Support.
- **Continuous short beeps:** Produced when the system reaches an internal temperature of 72° C. The beeping stops when the internal temperature falls to less than 72° C.
It is safe to continue using the system, but if the internal temperature rises to 80° C, the system shuts down.

Equipment List

The Terason uSmart Ultrasound System may be shipped with the following hardware:

- Terason uSmart3200T Ultrasound System, consisting of tablet computer that contains an ultrasound user interface and an ultrasound imaging engine.
- Tablet computer user guide
- Online *Terason uSmart Ultrasound System User Guide* (this document)
- USB drive containing the operating system and Terason ultrasound imaging software
- One (1) power cord
- Medical grade AC/DC power adapter
- ECG module
- ECG lead set - 10 sets of electrodes
- Folding stand
- Mobile cart
- One or more probes



Warning: Using accessories, probes, or cables other than those specified, with the exception of those sold by the manufacturer as replacement parts for internal components, may result in increased electromagnetic emissions or decreased EMI immunity of the Terason uSmart Ultrasound System.

System Warranty

Terason Ultrasound Systems and probes are warranted against defects in materials and workmanship. To obtain warranty service, U.S. customers call Terason at 1-866-TERASON (1-866-837-2766); International customers call 781-270-4143.

The warranty on the Terason Ultrasound System is voided if unauthorized personnel perform service or maintenance on the ultrasound system, except for those service or maintenance actions specifically designated for local service technicians. Unauthorized modification of system equipment by a customer or third party is not allowed. To ensure correct system performance and to protect your warranty, contact Terason for service.

2 Setting Up Patient Information

Patient Information Overview

Although you can scan a patient without entering any information about that patient, you cannot save any images or loops from such an exam, so Terason recommends that you define the patient within the system. The patient data can be displayed on the scan to avoid mix-ups and is used to organize saved images.

When you save an image, the Terason software puts it in a study for the specified patient, along with a report.

To work with patient information, you should understand:

- [Adding a New Patient](#), see page 44
- [Working With Patient Information](#), see page 46
- [Using an Existing Patient Profile](#), see page 49
- [Updating Patient Information](#), see page 49
- [Deleting Patient Studies](#), see page 49
- [Configuring Reports](#), see page 50

The Patient Window

To view the Patient window, tap the uSmart3200T name, then tap the Patient button.

Using Barcodes

If the system has been configured to use barcodes (see [Barcode](#) on page 154), the Patient Info window shows aBarcode button that lets you use a barcode scanner to populate the patient information fields.

uSmart3200T

New Patient New Study Study List... Worklist... Barcode...

Last: Doe First: Jane Middle: A Gender: M

Patient ID: 758493800 Accession: 20201003 DOB: MM/dd/yyyy F

Patient ID	Patient Name	DOB	Gender	Studies

Select

Study Info

Exam Type: Breast Study ID: Date Time: 11/03/2020 14:37:18

Institution: XYZ Hospital Study Description: Breast

Operator: IMO Height: 5 ft 3 in Comment:

Referring Physician: Dr. R Weight: 130 lbs

Interpreting Physician: Dr. I

Series < 2 > Series Description: Breast Laterality: L R None New Series

2:44:08 PM

Accept

Close Study

Print

Print Preview

Cancel

2D

Freeze

Store Record

Patient Window

A patient profile remains loaded until one of these events occurs:

- You load a different patient's information
- You open an image or loop in the Imaging window for a different patient
- You tap the New Patient button

Adding a New Patient

If you need to start the ultrasound exam immediately, the Terason software lets you skip entering patient information. However, you normally cannot save the image. You can enter patient information after starting such an exam (by tapping the Patient button), and images saved after that are associated with the patient info file.

When you add a new patient, the Terason software creates a profile for that patient.

Starting an exam after creating or opening a patient info file creates a new study for the date, and a report. The report file and any saved images are saved in the study.

When you enter a patient name, the total number of characters of the first, last, and middle name is limited to 62 characters. You can type up to 64 alphanumeric or special characters in any one of these fields (not all special characters are supported). However, if the total of the three fields exceeds 62 characters, the Terason software displays an error message when you try to save the patient information.


To add a new patient, complete these steps:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap the **Patient** button.

3. On the Patient window, tap **New Patient**.



Caution: The fields are not case-sensitive. Do not enter data that relies on case-sensitive characters.

4. Tap in a text-entry field, then tap the small **keyboard button**  that appears. A virtual keyboard appears. Drag it to different positions as required to uncover the text-entry fields.
5. Enter the last, first, and middle **names**.
6. Enter a **patient ID** (sometimes called a Medical Record Number).
You can enter up to 64 alphanumeric or special characters. You *cannot* use any of the following characters in the Patient ID field:
* \ | : " < > / ?
7. If appropriate, enter the **accession number** from the Hospital Information System.
You can use up to 16 alphanumeric characters. You cannot use the ‘\’ (backslash) character.
8. Enter the patient’s **date of birth**.
 - a. Tap the **triangle button** at the right side of the DOB display.
A calendar showing the current month appears.
 - b. Tap the **month** in the DOB display, and select the **month** from the drop-down menu.
 - c. Tap the **year** in the DOB display, then tap the up or down arrow until the correct year displays.
 - d. Tap the correct **day** in the calendar.
The calendar disappears, and the date you selected displays in the DOB field.
9. Tap in the checkbox for the patient’s **gender** - **M** for male, or **F** for female.
10. Enter the patient’s **height and weight**.
To change the units of measurements used, see [Patient Info Units](#) on page 159.
11. If appropriate, enter a **study ID** number using up to 16 alphanumeric characters.
12. Enter any **comments**.
You can type directly in the field, or tap **Extended Comment** to type a longer comment.
13. In the **Institution:** field, enter where the exam is taking place, or select the institution name from the drop-down menu.
You can enter as many alphanumeric characters as fit in the field.
14. In the **Operator:** field, enter the name of the clinician performing the exam, or select the name from the drop-down menu.

You can enter as many alphanumeric characters as fit in the field.

15. In the **Study Description:** field, enter a description of the study.

The description can be up to 62 characters long.

16. Enter **series information:**

a. Use the left and right arrow buttons to select the **Series**.

b. Enter the **Series Description**.

Up to 62 characters can be entered for each series in the study.

c. Use the **L**, **R**, or **None** radio buttons to set the laterality of the study.

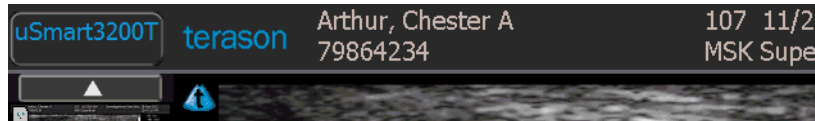
d. To add a new series to the study, tap the **New Series** button:

17. Tap the **Accept** button to save the entered information and open the Imaging window.

The patient information is saved in a study associated with the patient's name. The Imaging window is ready for you to conduct the exam.

After you type in an institution name, an operator name, or a physician name, that name will appear in the associated drop-down list on the Patient window. The last-used institution name automatically fills the field on future patient windows.

The Terason software displays the patient information in the Imaging window, with the last-used scanning mode still selected. The patient information is shown across the top of the window and is saved with scanned images you create for the patient. The calculated age of the patient shows in front of the sex (**M** or **F**) indicator.



Patient Information at the Top of the Imaging Window

Working With Patient Information

You can edit and modify patient information files in several ways. See the following topics:

- [Default Names in Studies and Reports](#) on page 46
- [Modifying Names in Menus](#) on page 48
- [Removing Names From Menus](#) on page 48

Default Names in Studies and Reports

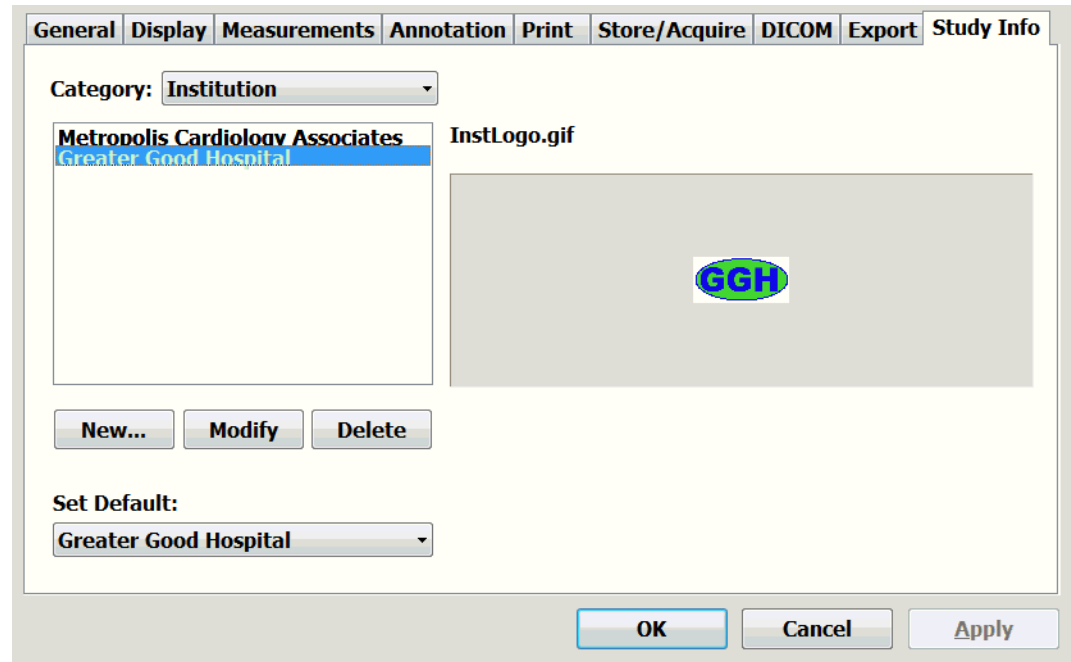
You can set defaults in the Institution, Operator, and Physician fields of Patient windows and reports. When defaults are set, those names will automatically appear in new Patient windows and reports. To change the names in the current report, choose or enter a different name in the Patient window.

Entering a name in one of the fields of the Patient window adds it to the menu of names available for that category in the Setup/Study Info window and in Patient windows.

To set a default name in Patient windows and reports:

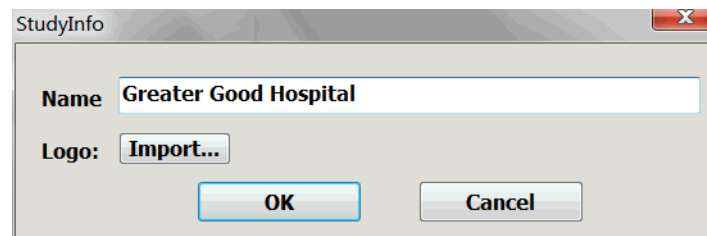
1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap the **Setup** button.
3. Tap the **Study Info** tab.

The Setup/Study Info window opens.

**Setup/Study Info Window**

4. In the **Category:** menu, select the category you want to set a default name for.
5. In the **Set Default:** menu, select the name you want to set as the default.
6. If the **desired name** is not listed in the menu, add it to the menu:
 - a. Tap **New...**

The StudyInfo window opens.

**StudyInfo Window**

- b. In the **Name:** field, enter the desired name..
 - c. Tap **OK**.
 - d. In the **Set Default:** menu, select the name you want to set as the default.
7. Tap **Apply**.
8. Tap **OK**.

The default name shows in green on the list of available names.

Modifying Names in Menus

You can modify an institution physician, or operator name and change the logo associated with the institution name.

To edit a name in the menus of the Patient or Setup/Study Info window:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap the **Setup** button.
3. On the Setup window, tap the **Study Info** tab.
4. On the **Category:** menu, select the **title** of the name you want to delete.
5. On the list of names for that category, select the **name** you want to delete.
6. Tap the **Modify** button.
A confirmation box opens.
7. Tap in the **Name** field and .modify the name.
8. To change the institution logo, tap **Import...**, and see the procedure [Adding a Logo to Reports](#) on page 50.
9. Tap **OK**.
10. On the Setup/Study Info window, tap **OK**.

Removing Names From Menus

You can remove institution names, physician names, and operator names from the Patient and Setup/Study Info window drop-down menus.

To remove a name from a menu:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap the **Setup** button.
3. On the Setup window, tap the **Study Info** tab.
4. On the **Category:** menu, select the **title** of the name you want to delete.
5. On the list of names for that category, select the **name** you want to delete.
6. Tap the **Delete** button.
The StudyInfo window opens.
7. Tap **OK**.
8. On the Setup/Study Info window, tap **OK**.

Using an Existing Patient Profile

If the patient has a profile from a previous study, you can load that profile for use with new exams.

To load a patient profile:

1. On the Patient Info window, tap the **New Patient** button.
2. Double-tap the relevant **patient listing**.
3. Tap the **Accept** button.

Updating Patient Information

To update a patient's information, complete these steps:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap the **Patient** button.
3. If the profile you want to update is not displayed, tap the **New Patient** button, then tap the profile to be updated..
4. Enter the **new information** in the appropriate fields.
5. Tap the **Accept** button to save the changes.

Deleting Patient Studies

You can delete patient's studies.



Note: You cannot recover files deleted using the Terason software as you can when using Windows Explorer. Make sure you want to delete all the information in the profile, including saved scans, before you perform this procedure.

To delete a patient study:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap the **Patient** button.
3. On the Patient window, tap the **Study List...** button.

The Study List. window opens.

4. Tap the **study** you want to delete to select it.
5. Tap **Delete**.

A confirmation request appears.

6. Tap **Yes** to delete the study.
7. When all the unwanted studies are deleted, tap the **Close** button.

To archive the study and its associated images before you delete them, see [Exporting Studies](#) on page 99.

If you delete all the studies associated with a patient, the patient information is lost. To make a new study of that patient, you must re-enter the patient information as with a new patient.

Configuring Reports

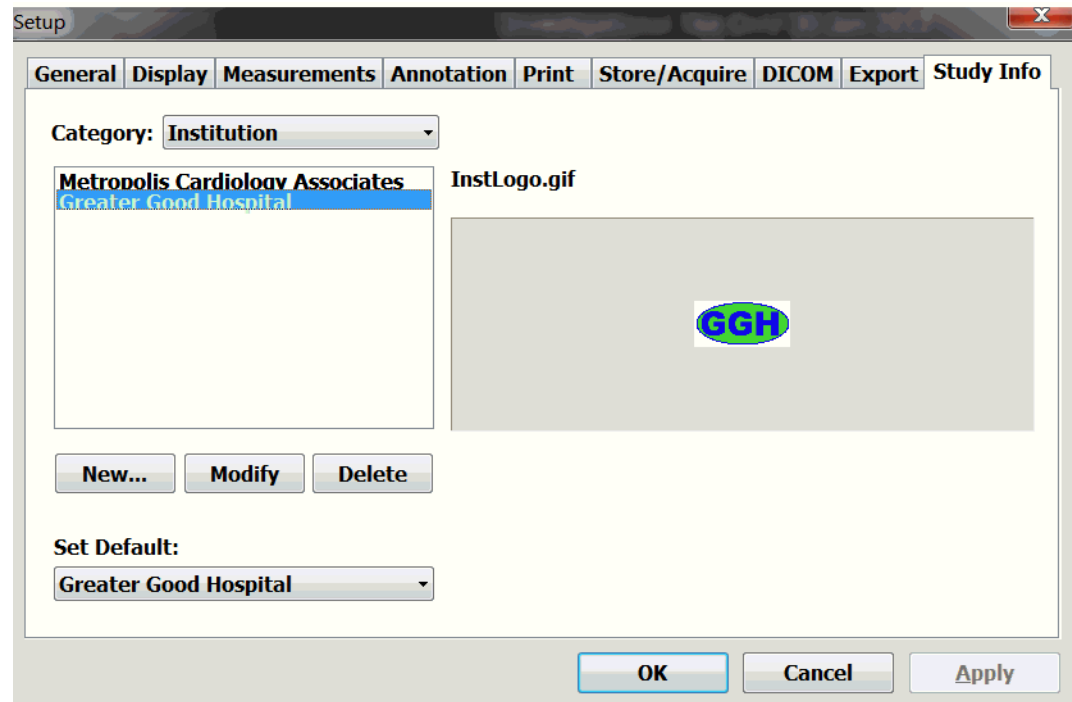
You can set up reports to show the logo of an institution, and to automatically insert the names of an institution, an operator, an attending physician, and a referring physician.. You can also add a signature and a diagnosis to the report. See the following sections:

- [Default Names in Studies and Reports](#) on page 46
- [Adding a Logo to Reports](#) on page 50
- [Adding a Signature to a Report](#) on page 52
- [Diagnoses On Reports](#) on page 52

Adding a Logo to Reports

To add the institution logo:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap **Setup**.
The Setup window opens
3. Tap the **Study Info** tab
The Setup/Study Info window opens.

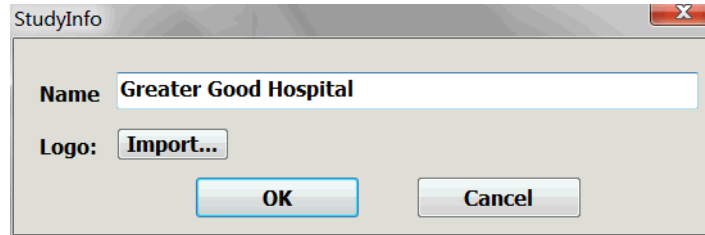


Setup/Study Info Window

4. In the **Category:** menu, select **Institution**.

5. Tap **New...**

The StudyInfo window opens.

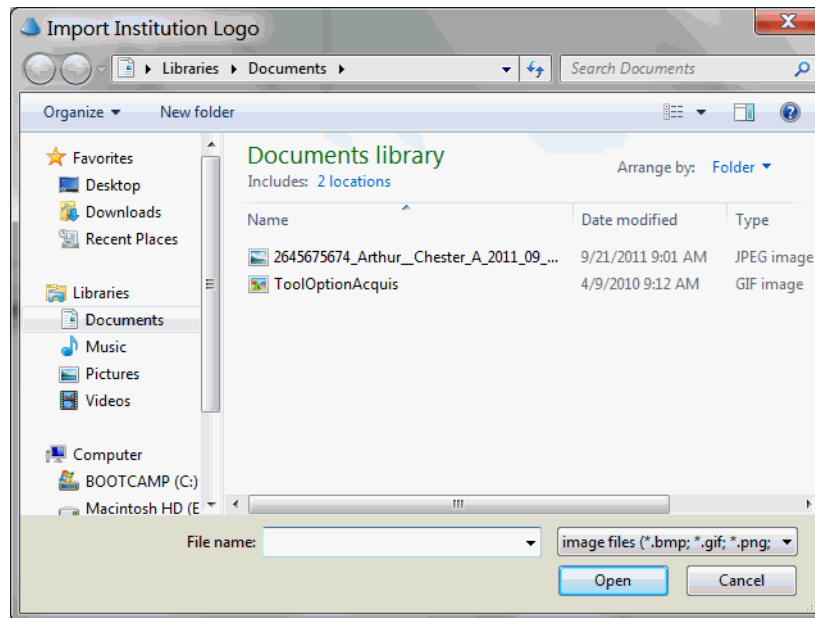


Study Info Window

6. In the Name field, enter the **name of the institution**.

7. Tap **Import...**

The Import Institution Logo window opens.



Import Institution Logo window

8. Navigate to the **logo image file** and select it.

9. Tap **Open**.

The software adds the logo to the report, and associates it with the institution name.

The Import Institution Logo window closes.

10. In the StudyInfo window, tap **Apply**.

When a study is performed and the institution name is chosen, the resulting report will include the institution logo.

To delete a logo, remove the institution name from the drop-down menu on the Worksheet window. See [Removing Names From Menus](#) on page 48.

Adding a Signature to a Report

To add a signature to a report:

1. On the Report window, tap **Worksheet**.

The Worksheet window opens.

Worksheet Window

2. In the **Signature:** field, type the **signature**.
3. Tap **Show signature and signature line** so the checkbox is checked.
4. To return to the report, tap **Report**.

Diagnoses On Reports

A diagnosis can be added to the report using the Worksheet window, which opens when you tap the Worksheet button on the Report window. The diagnoses available in the drop-down **Diagnosis:** menu on the Worksheet window are added by typing in the **.Diagnosis:field**. Diagnoses on the menu can be deleted from the drop-down menu.

Adding a Diagnosis to a Report

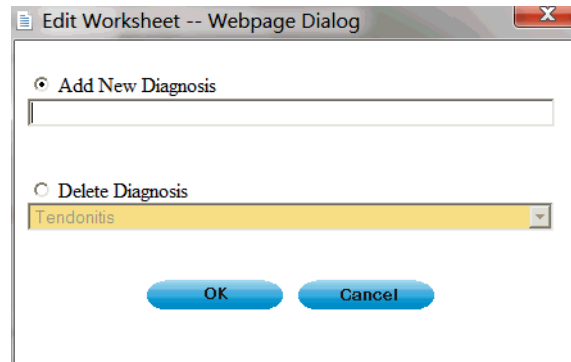
To add a diagnosis to a report:

1. On the Report window, tap **Worksheet**.

The Worksheet window opens.

2. Select the **diagnosis** from the **Diagnosis:** drop-down menu.
3. If the necessary diagnosis is not on the menu, add it to the list:
 - a. Tap the **Edit** button next to the **Diagnosis:** field.

The Edit Worksheet window opens.



Edit Worksheet Window

- b. Make sure the **Add New Diagnosis** radio button is selected.
- c. Type the **new diagnosis** into the **Add New Diagnosis** field.
- d. Tap **OK**.

The new diagnosis is added to the menu.

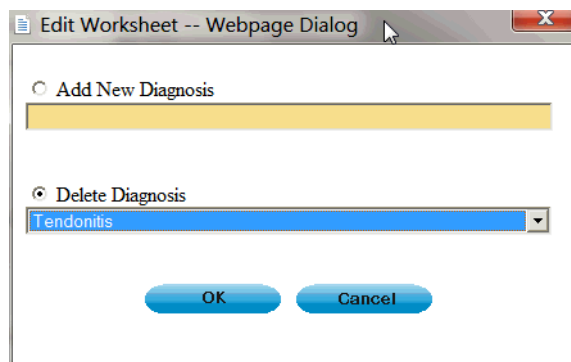
4. To return to the report, tap **Report**.

Removing Diagnoses From the Menu

To remove a diagnosis from the drop-down Diagnosis: menu on the Worksheet window:

1. Tap the **Edit** button next to the **Diagnosis:** field.
The Edit Worksheet window opens.
2. Tap the **Delete Diagnosis** radio button so it is selected.

The drop-down menu is active.



Edit Worksheet Window with Menu Active

3. On the Delete Diagnosis menu, select the **diagnosis** you want to delete.
4. Tap **OK**.
The diagnosis is deleted from the menu.

3 Acquiring Images

Image Acquisition Overview

To support image acquisition, you must understand:

- [Ultrasound Safety](#) on page 55
- [Powering the Ultrasound System On and Off](#) on page 56
- [Starting and Exiting the Software](#) on page 56
- [Connecting a Probe](#) on page 57
- [Switching Probes](#) on page 58
- [Conducting an Ultrasound Exam](#) on page 58
- [Freezing Images](#) on page 61
- [Working with Image Loops](#) on page 61
- [Adjusting the Displayed Image](#) on page 63
- [Adding Guides to the Image Display](#) on page 65
- [Working With Split Screen Mode](#) on page 65
- [Working with Annotations](#) on page 66

To adjust the acquired scan data, see [Chapter 4 - Working With Scan Modes](#).

Ultrasound Safety

The following is a Prudent Use Statement regarding the use of ultrasound:

Use diagnostic ultrasound only when there is a good medical reason. Also, the Terason uSmart3200T Ultrasound System does not provide explicit control of acoustic output. Therefore, to minimize the exposure to ultrasound energy, limit the duration of ultrasound examinations.

Acoustic Output Indices

The Terason uSmart3200T Ultrasound System complies with the *Particular requirements for the basic safety and essential performance of ultrasonic medical diagnostic and monitoring equipment* (IEC 60601-2-37:2007/AMD1:2015) and *Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment* (UD3-2004).

When operating in any mode with the Freeze function disabled, the window displays the acoustic output indices relevant to the currently- active probe and operating mode.

Minimizing the real-time displayed index values, as described in this User Guide, allows the practice of the ALARA principle (exposure of the patient to ultrasound energy at a level that is As Low As Reasonably Achievable).



Warning: Ultrasound procedures should be used for valid reasons, for the shortest period of time, and at the lowest mechanical/thermal index setting necessary to produce clinically acceptable images. The ultrasound system incorporates an output display of Mechanical and Thermal Indices to allow you to monitor, and to limit, the amount of ultrasound energy that is transferred to the patient.

Note: For systems distributed in the United States of America, refer to the Medical Ultrasound Safety ultrasound education program brochure produced by the AIUM.

Infection Control

When performing intraoperative studies or scanning patients with open wounds, you must use a sterile sheath on the probe. See “Infection Control” in the Safety chapter of *Volume 2* of this guide for information on sterile sheaths.

The ultrasound probe should also be cleaned and disinfected between patients. See “Processing Terason Probes Between Uses” in the Maintenance chapter of *Volume 2* of this guide for information on disinfecting probes.


Powering the Ultrasound System On and Off

To power the uSmart3200T Ultrasound System on, press the power button on the top edge of the tablet until the blue power indicator appears at the bottom left corner of the screen. If a probe is connected to the system, the imaging window displays. If no probe is connected, the Patient Information window displays.

To power off the uSmart3200T Ultrasound System, press and hold the same power button on the top edge of the tablet.

Starting and Exiting the Software

The Terason Ultrasound software normally starts as soon as you power up the tablet. If you have exited the Terason software for some reason, you can use either of these methods to start it up:

- Double-tap the Terason shortcut , on the Windows desktop.
- Select Start > Programs > Terason > Terason.



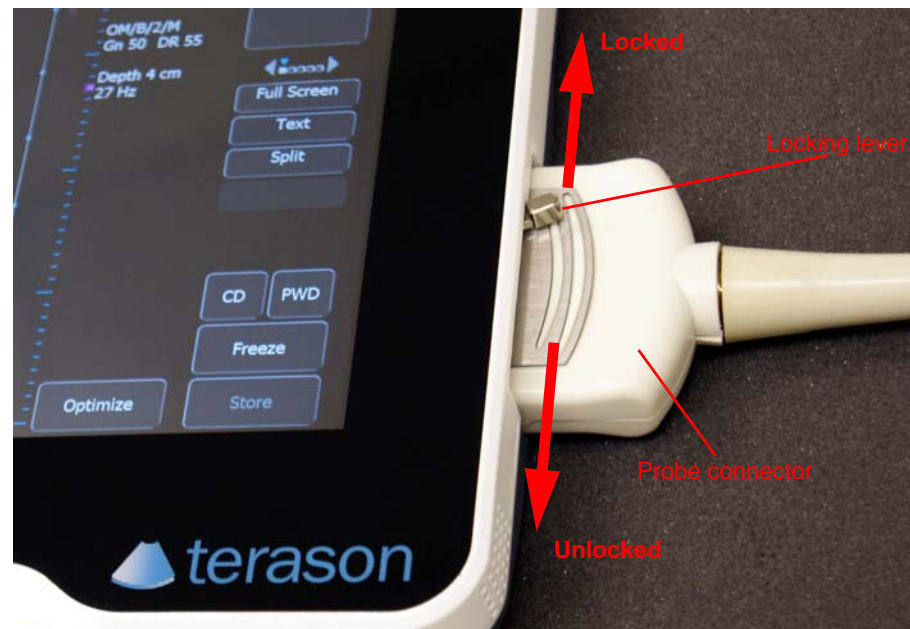
Note: When running a tablet on battery power, always check the amount of power left. To check the battery power status, refer to the charge indicator at the top right of the Terason Ultrasound window (see [Status Bar](#) on page 29.) Since the ultrasound engine also uses the tablet battery for power, running the system on the battery discharges the battery more quickly than running the tablet alone would do. Terason recommends that you be prepared to power the system with the AC power adapter.

Make sure you save or print any needed images or loops before exiting the software.

To exit the Terason software, tap the  icon at the top right of the main screen

Connecting a Probe

Supported probes connect to the system through a special port on the right side of the tablet.



To connect a probe:

1. Make sure the locking lever is in the **unlocked position**.
2. Insert the **probe connector** (with the side that has a short peg facing up) into the port as far as it will go.
3. Move the locking lever to the **locked position**.

If the Terason software is running, it detects the probe and displays its name on the Imaging window. If the software is started after the probe is connected, the Terason software will detect and display the probe name as soon as it starts.

To disconnect a probe:

1. Move the locking lever to the **unlocked position**.
2. Pull the **probe connector** straight out from the probe port.



Warning: To prevent harm to patients, check the outer surface of any insertable transducer assembly before inserting it into a patient, to ensure that there are no rough surfaces, sharp edges or protrusions.

Switching Probes

The Terason uSmart3200T Ultrasound System lets you change probes without exiting the program.

To switch between probes, complete these steps:

1. If necessary, **save** the active image or image loop. See on page 98 for instructions.
2. Rotate the locking lever to the **unlocked position** and carefully unplug the probe.

The Imaging window closes, and the Patient window opens.

3. Plug the new probe in and move the locking lever to the **locked position**.

The Patient window closes, and the Imaging window opens, showing the new probe in the imaging information display (see [Terason Imaging Window](#) on page 28).

Conducting an Ultrasound Exam

To conduct an exam, complete this general procedure:

1. Load or create **patient information**.
See [Setting Up Patient Information](#) on page 43.
2. Start **live imaging**.
3. Select an **exam type** and preset.
(See [Opening an Exam](#) on page 131.)
4. Select a **scan mode** and adjust image controls.
(See [Chapter 4 - Working With Scan Modes](#))
5. When the desired anatomy is shown in the Imaging window, **freeze** the image.
6. Add **annotations** or measurements.
See [Working with Annotations](#) on page 66 and [Working With Measurements](#) on page 111.
7. **Save** or print the image.

For more detailed instructions, complete the steps for the mode you use for the exam. See the following sections:

- [Conducting a 2D, M-Mode, or Color Doppler Exam](#) on page 59
- [Conducting a PWD Exam](#) on page 60
- [Conducting an Exam in Triplex Mode](#) on page 60

Using the Imaging Controls

For information on using the controls to set exam parameters, see [The Imaging Controls](#) on page 34. For information that is specific to a selected mode, see the section on that mode in [Chapter 4 - Working With Scan Modes](#).

Choosing a Scan Mode

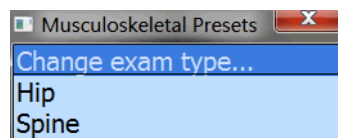
To choose a scan mode, tap the appropriate buttons:

- For 2D, tap the 2D button.
- For M-Mode, tap the 2D button, then tap the M-Mode button.
- For Color Doppler, tap the CD button.
- For Pulsed-Wave Doppler, tap the PWD button.
- For Triplex imaging, tap the CD button, then tap the PWD button

Conducting a 2D, M-Mode, or Color Doppler Exam

To conduct an ultrasound exam in 2D, Color Doppler, or M-mode, complete these steps:

1. Load or create the **patient information**. See [Setting Up Patient Information](#) on page 43 for instructions.
2. Tap the **button** for the required scan mode: See [Choosing a Scan Mode](#) on page 59.
3. Tap the **uSmart3200T** name at the top left of the screen.
4. Tap the **Presets** button, then select a preset from the Presets menu.



Presets Menu (example)

The Terason software loads preset image control settings that are optimized for the selected preset and the connected probe. See [Chapter 7 - Working With Exams](#) for information about exam types and defining your own presets.

You can now use the probe to conduct an ultrasound exam. Refer to the appropriate clinical procedure for the exam you are conducting.

5. If necessary, use the image control buttons to adjust the **image controls**.

- For 2D, See [Using the Image Control Buttons](#) on page 75 for instructions.
 - For M-Mode, see [Using M-Mode Image Controls](#) on page 83.
 - For Color Doppler scan mode, see [Using Color Doppler Image Controls](#) on page 90.
 - For Pulsed-Wave Doppler, see [Using Spectral Doppler Image Controls](#) on page 84
6. Tap the **Freeze** button.
 7. Add **annotations** as needed See [Working with Annotations](#) on page 66.
 8. **Save or print** the ultrasound image. See on page 98 and [Printing Images](#) on page 107.

Conducting a PWD Exam

To conduct an exam in Pulsed-Wave Doppler mode, complete these steps:

1. Conduct an **exam** in 2D mode, as described in [Conducting an Ultrasound Exam](#) on page 58 (do not freeze the scan).
2. Tap the PWD button.
3. Move the **range gate** to the proper location...
4. Use the **image control buttons** to adjust any image control settings as needed.
5. Tap the **Freeze button**.
The button controls change to allow printing, measurements, and other functions.
6. Add **annotations** (see [Working with Annotations](#) on page 66) as needed.
7. **Save** and/or print the ultrasound image. See on page 98 and [Printing Images](#) on page 107.

Conducting an Exam in Triplex Mode

To conduct an exam in Triplex mode, complete these steps:

1. Conduct an **exam** in Color Doppler mode as described in [Conducting an Ultrasound Exam](#) on page 58 (do not freeze the scan).
2. Tap the **PWD** button.
The software launches Triplex mode.
3. Move the **range gate** to the proper location.
4. Use the buttons to adjust any **image control settings** as needed. See [Using Spectral Doppler Image Controls](#) on page 84 for instructions.
5. Tap the **Freeze** button. The control buttons change to allow printing, measurements, and other functions.
6. Add **annotations** (see [Working with Annotations](#) on page 66) as needed.
7. **Save or print** the ultrasound image. See on page 98 and [Printing Images](#) on page 107.

When you switch to Triplex mode, both the original 2D scan mode and PWD mode are active. This depends on whether the options are set to simultaneous mode. See [Updating the Displays](#) on page 90 for more information.

Freezing Images

Live images are recorded by frame and temporarily stored on the computer. Depending on the mode you select, you record a certain number of frames. For example, 2D mode allows you to capture up to 10 seconds in a Cine loop.

Pulsed-Wave Doppler (including Triplex) and M-Mode scans only save a single frame for the 2D image, and you cannot save loops for these scan modes.

When you freeze a real-time image during a scan, all movement is suspended in the Imaging window. The frozen frame can be saved as a single image file or an image loop. For M-Mode, PWD, and Triplex modes, the software saves the Time Series data and a single 2D image.

You can unfreeze the frame and return to the live image display at any time. If you tap the Freeze button without saving the image or image loop, you lose the temporarily-stored frames.

To freeze the displayed image when performing an ultrasound scan, tap the Freeze button. When the scan is frozen, the word Freeze is blue.

To start a new scan, tap the Freeze button.



Note: If you do not save the frozen image or loop, starting live scanning erases the frame data. Make sure you save or print any needed images before you acquire new scan data.

Working with Image Loops

Reviewing an image loop is useful for focusing on images during short segments of a scan session. When you freeze an image, you can use the Gain knob to review an entire loop, frame by frame, to find a specific frame. You can also do this when viewing a saved loop. Turn the Gain knob until the desired frame displays, then press the Store key.

To save the entire loop, you need not select a different frame. All acquired frames are saved in the loop when you press the Store key.

To view a loop, freeze the image and press the Play softkey. The Play softkey label changes to Pause. The loop plays continuously until you press the Freeze key or the Pause softkey. You can track the frames and the number of the current frame in the progress bar at the bottom of the Imaging window.

To stop a playing loop, press the Pause softkey.

Saving Prospective and Retrospective Loops

In 2D and Color modes, the Terason system can acquire loops either prospectively or retrospectively. Prospective acquisition captures a loop of live scan following the acquire command, while retrospective acquisition saves a loop of a frozen scan.

Saving Prospective Loops

During live imaging, pressing the Store key tells the system to acquire and save a loop of the scan following the key click. The loop displays in the Thumbnail window at the side of the Main Screen. The default length of the loop is 3 seconds, but this is adjustable between 1 and 120 seconds in the Acquisition Length section of the Setup Store/Acquire window.

The screenshot shows the 'Setup Store/Acquire' window with the following settings:

- Acquisition Length:**
 - Time: 3 seconds
 - Beat: 2 beats
 - R-Wave delay: 0 ms
 - Max frames: 300
- Cine Length:**
 - Time: 3 seconds
 - Beat: 2 beats
 - R-Wave delay: 0 ms
 - Retrospective acquisition
- Miscellaneous Options:**
 - Beep after completion of acquisition
 - Limit 30 frames per second
- Store Buttons:**
 - Store Only
 - Store and Record
- Disk Free Space:**
 - Highlight if disk free space is below 5 GB
- Export Palette Selection:**
 - Use display palette
- Additional Options:**
 - Store raw data with image when frozen
 - Break long report/worksheet image into pages

Setup Store/Acquire Window

When the Beat radio button on the Store/Acquire tab of the Setup window is selected, and the system detects an ECG signal, the acquired loop is a number of heartbeats. The default is 2 beats, but this is adjustable between 1 and 10 beats in the Acquisition Length section. If no ECG signal is detected, the acquired loop is the length set in the Time field, even if the Beat radio button is selected. The default maximum number of frames in a loop is 300; change this in the Max Frames: field, to any number between 120 and 600.

You can apply an R-wave delay in the Acquisition Length section. You can also enable a beep that sounds when the acquisition is complete.

The default format for loops acquired in this way is .dcm, however, they can also be saved as any of the other available formats. Use the Export tab on the Setup window to choose a different file format.

Saving Retrospective Loops

During live imaging, pressing the Freeze key, then the Store key tells the system to acquire a loop of the frozen scan. The loop displays in the Thumbnail window on the Imaging screen. The default length of the loop is 3 seconds, but this is adjustable between 1 and 10 seconds in the Cine Length section of the Setup Store/Acquire window. (See [Setup Store/Acquire Window](#) on page 62.)

Retrospective loops are modified in the same way as prospective loops. They can be saved as .dcm or .avi files.

Adjusting the Displayed Image

The Terason software lets you adjust the contents of the Imaging window. You can perform the following operations:

- [Enlarging an Area of the Image](#) on page 63
- [Resizing the 2D and Time-series Displays](#) on page 64
- [Enhancing the Image Using TeraVision™ Optimization](#) on page 64

Enlarging an Area of the Image

When you view a frozen or live image, you can use the Zoom tool to enlarge a region of the 2D image. You cannot use the Zoom tool in the Time Series window.

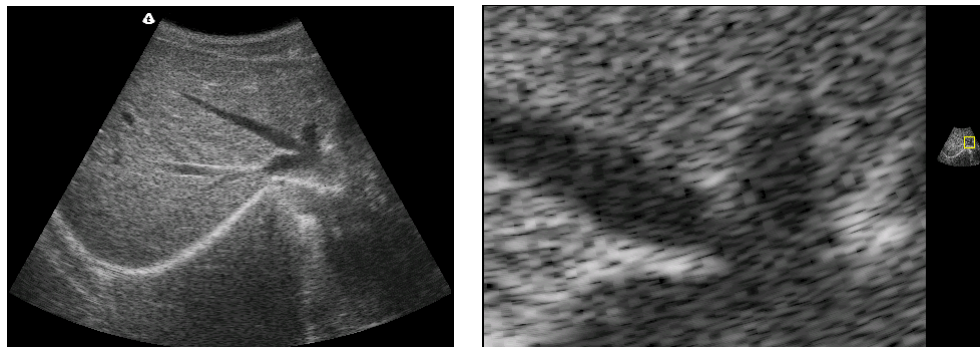
To zoom into the middle of the image, place your thumb and index finger together on the image and spread them apart.

To zoom an area that's away from the middle of the image:

1. Tap the **Zoom Off** button.

The blue word below Zoom on the button shows what zoom function is currently active. The functions are: Box, On, and Off. Repeatedly tapping the button cycles through these functions.

2. Drag the **zoom box** to the area you want large.



Normal Image (Left) and Zoomed Image (Right)

To return to the original image view, use the button to turn Zoom off.

Resizing the 2D and Time-series Displays

In M-mode and Spectral modes, you can make the 2D display larger relative to the Time-Series display, and vice-versa.

To resize the scanning displays:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap the **Setup** button.
3. Tap the **Display** tab.

M-Mode and Time-Series Scanning Display Size Options

- **To make the Time-Series display bigger** and the 2D Imaging display smaller, tap the S/L radio button in the M-Mode Format or Spectral Format area.
 - **To make the 2D display bigger** and the Time-Series Imaging display smaller, tap the L/S radio button in the M-Mode Format or Spectral Format area.
 - **To restore the default sizes of the displays**, tap the Equal radio button in the M-Mode Format or Spectral Format area.
4. Tap **OK** to apply the change.



Note: This selection applies whenever you use the preset that was chosen when you made the change. When you use a different preset, the selection does not apply unless you have also made the change in that preset.

Enhancing the Image Using TeraVision™ Optimization

TeraVision is an optional image-optimization package that sharpens images produced by the Terason uSmart3200T Ultrasound System. TeraVision requires a license.

The default configuration starts TeraVision when the Terason uSmart3200T Ultrasound System starts. To change this so the Terason system starts with TeraVision off, make a preset with the TV Level button control set to 0.

If the system is not licensed for TeraVision, the TeraVision level control does not display. If the control is present but grayed-out, the connected probe is not supported by the TeraVision software. If either of these conditions occurs, call Terason for assistance.

The TeraVision level numbers range from 0 to 3. The 0 setting applies no image processing. The larger the number, the more processing is applied to the image.

To adjust the TeraVision level, when live imaging, tap the left or right side of the TV Level button until the desired level is set.

Adding Guides to the Image Display

The View Options section of the General tab on the Setup window lets you add or remove several guides on the scanned image. These guides provide details about the patient, probe, and image control settings. See [Using General Setup Controls](#) on page 150.

Working With Split Screen Mode

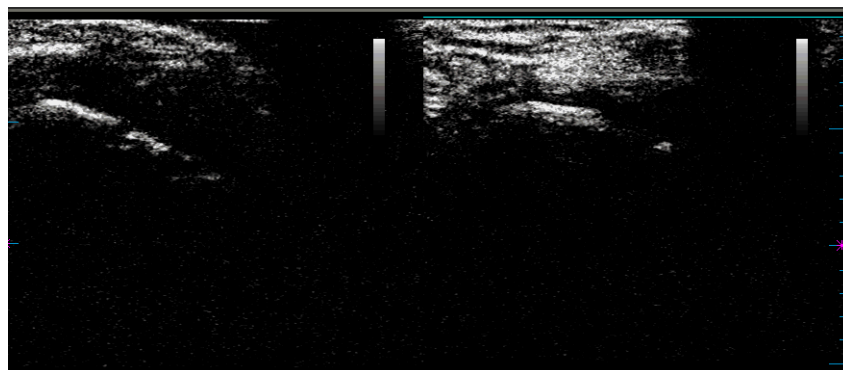
The Terason software lets you split the Imaging screen into two sections to view two current scans for a patient. You can acquire one scan for the patient, select Split Screen, and then acquire another scan from a different angle or location. Split Screen mode works with the 2D scanning modes (2D, Color Doppler).

Using Split Screen Mode

To enter split screen mode, tap the Split button.

When you enter Split Screen mode, the Terason software copies the current settings for the Image Control window to the new screen. You can then apply any Image Control setting independently to either screen. You can go live or freeze either screen (only one screen can be live at a time), and you can use any of the tools and menus with either screen. In addition, you can scan in different modes in each screen. For example, you can acquire a 2D scan, enter split screen mode, then acquire a Color Doppler scan in the second screen.

The following figure shows an example of a split screen.



Split Screen

The active screen has cyan bars at the top and bottom.

To activate the other screen, perform either of these actions:

- Tap the desired screen.
- Tap the Toggle Screen button.

To exit **split screen mode**, use any of these methods:

- Select a different exam
- Select M-Mode, PWD, or Triplex scan modes
- Tap the Split button

When you exit Split Screen mode by tapping the Split button, the Terason software keeps the acquired data for the active screen (the one with the cyan lines at the top and bottom) and discards the acquired data for the other screen.



Note: If you create a custom exam in Split Screen mode, make sure the active window contains the Image Control settings you want to save before you proceed. When finished saving your custom exam, the Terason software displays a single screen in the Imaging window. See [Creating Custom Presets](#) on page 132 for information on saving custom exams.

Saving Split Screen Images and Loops

When you tap the Store button, the software saves both screens as a single image. When you tap the Save Loop button, the software saves the active screen as a loop, and the other screen as a single image.

Working with Annotations

This section explains the following topics:

- [Working with Text](#) on page 66
- [Using Body Markers](#) on page 73

Working with Text

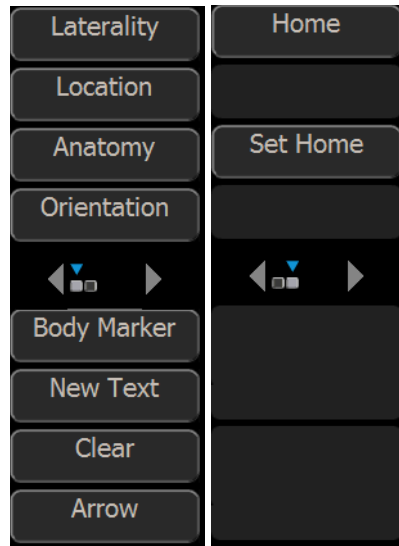
To place text on an image, you must first view the image in the Imaging window. If the image has been saved, retrieve it from the Patient window. See [Reviewing Patient Studies](#) on page 99 for instructions.

To work with text annotation, you should understand:

- [Text Mode](#) on page 66
- [Typing Text on an Image](#) on page 68
- [Predefined Text](#) on page 68
- [Custom Predefined Text](#) on page 68
- [Setting the Text Home Position](#) on page 70
- [Placing Arrows on the Image](#) on page 71
- [Moving Text](#) on page 72
- [Deleting Text from an Image](#) on page 72

Text Mode

Text mode lets you add text and symbols to an image, using the buttons.




Text Mode Buttons

Button controls available in Text mode:

- Laterality places the word Left or Right on the image. Tapping the Laterality button cycles between Left, Right, and no text.
- Location opens a menu of body locations, or increments through a list of body locations. If a menu opens, tap the appropriate item to place it on the image.
- Anatomy opens a menu of names for different anatomies, or increments through a list of anatomies. If a menu opens, tap the appropriate item to place it on the image.
- Orientation opens a menu of patient orientations, or increments through a list of patient orientations. If a menu opens, tap the appropriate item to place it on the image.
- Body Marker opens the Body Marker menu.
- New Text starts a new line of text at the home location.
- Clear deletes all text (including manually typed text and arrows) from the image
- Arrow places an arrow at the text home position, or if there is text on the image, at the middle of the last line of text (see [Placing Arrows on the Image](#) on page 71.)
- Home moves the text cursor or selected text to the text home position.
- Set Home sets the text home position. Move the text cursor to the desired location, then tap the Set Home button.

To enter text mode, use one of the following methods:

- Tap the **Text button**.
- Tap any **text-entry field**, then tap the keyboard  button that appears.

The Terason software opens a virtual keyboard and places a text cursor (I-beam) on the Imaging screen. Drag it to where you want the new text, and either type the text, or use one of the Text-mode buttons. When the text is done, tap the Close button on the virtual keyboard.

If you added custom text using the Annotation tab of the Setup window, (see [Custom Predefined Text](#) on page 68), that text shows in the button list that it was added to.

Typing Text on an Image

To type text on an image:

1. Tap the **Text button**.

The keyboard appears, and the buttons change to controls for text and annotations.

2. If necessary, drag the **keyboard** to uncover the text home position.

If there is already text in the Home position, you can place the new text in another location, or use the Text New button. You can also move the text home position using the Set Home button.

3. If necessary, move the **text cursor** to the desired location.

4. Type the desired **text** using the onscreen keyboard.

The text appears in green.

5. Tap the **Freeze** button to add the typed text to the image and exit Text mode.

The text changes to white, and the system exits Text mode.

6. Tap the **Close button** on the keyboard.

Predefined Text

You can also add predefined text, using the buttons. This lets you easily add labels and messages you need often, without having to type them each time.

To place predefined text on the image:

1. Tap the **Text button**.

2. Tap one of the **buttons** for predefined text:

- Laterality places the word Left or Right on the image. Tapping the Laterality button cycles between Left, Right, and no text.
- Location opens a menu of body locations, or increments through a list of body locations. If a menu opens, tap the appropriate item to place it on the image.
- Anatomy opens a menu of names for different anatomies, or increments through a list of anatomies. If a menu opens, tap the appropriate item to place it on the image.
- Orientation opens a menu of patient orientations, or increments through a list of patient orientations. If a menu opens, tap the appropriate item to place it on the image.

Selecting an item with one of the buttons places it on the image.

3. When all the desired predefined text is in place, tap the **Imaging window**.

Custom Predefined Text

You can add custom predefined text items to the lists accessed by the buttons, using the Setup window.

To add custom predefined text to the button lists:

1. Tap the **uSmart3200T** name at the top left corner of the screen.


2. Tap **Setup**.
3. On the Setup window, tap the **Annotation** tab.
The Setup/Annotation window opens.

Setup/Annotation Window

4. Tap the triangle button to the right of the Category: field, and choose the button you want to add text for.
5. **To add text that's in the** Default List: **area** to the custom list, tap an item to select it, then tap the right-pointing arrow.
6. **To add custom text:**
 - a. Tap **Add**

The Annotation Item window opens.

Annotation Item Window

b. Tap one of the text-entry fields, then tap the **keyboard button**  that appears.

The virtual keyboard appears.

c. In the Label: field, type the **text** you want to have available for the button selected in step 4.

d. Tap **OK**.

e. In the Setup/Annotation window, tap the new **custom text** in the User List: area to select it.

f. Tap the **right-pointing arrow**.

7. When the lists are configured properly, close the keyboard and tap **OK**.

To remove text items from the Custom list, tap the items, then tap the left-pointing arrow.

To delete custom text, remove it from the Custom list, select it, then tap Delete. You cannot delete text items in the Default List: area.

Setting the Text Home Position

You can choose a default location in the Image Display as the text home position. The Terason software uses the specified position as the starting location whenever you enter Text mode.



Note: The text home position set in the Imaging window does not apply to the Review window. The text home position set in the Review window does not apply to the Imaging window.

To set a text home position, complete these steps:

1. Tap the Text **button** to enter Text mode.
2. Drag the **text cursor** to the desired text home position.
3. Tap Set Home.

The Terason software uses this location when adding text from the Annotation Window, and as the text cursor location when typing text. You can always move text after placing it.

Placing Arrows on the Image

You can place two kinds of arrow on a frozen image: marker arrows and text arrows. The default is marker arrows. You can place as many arrows as you want on an image.

Marker Arrows

Marker arrows are short, hollow arrows that indicate a spot on the image. When you place an arrow (see the procedure below), the arrow is green. You can drag the arrow while it is green. You can select an arrow by tapping on it. When an arrow is selected, you can move it by dragging and rotate it with a gesture.

To place a marker arrow on an image, complete these steps:

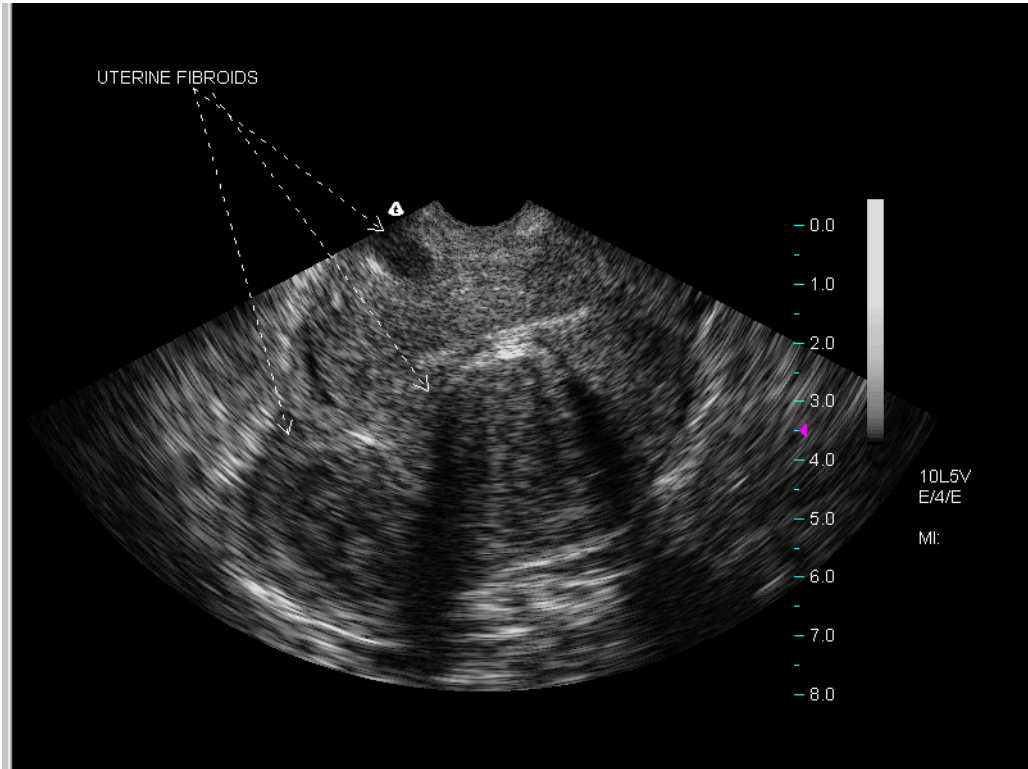
1. Tap the Arrow button.
2. Drag the **arrow** to where you want it
3. To place another arrow on the image, tap the Arrow button.

Text Arrows

Text arrows are dashed-line arrows that you can draw from text to a point on the scanned anatomy. You can also add an arrow without adding text. To use text arrows, you must make a selection on the Setup/Annotation window.

To place a text arrow on an image, complete these steps:

1. Tap the **uSmart3200T name** at the top left corner of the screen.
2. Tap **Setup**.
3. Tap the **Annotation tab**.
4. On the Setup/Annotation window (see [Setup/Annotation Window](#) on page 69), tap the **Use Text Arrow** checkbox.
5. Tap **OK**.
6. Tap the **Text button**.
7. Tap the Arrow button.
8. Drag the **arrowhead** to the feature you want the text to refer to.
9. **To place another arrow:**
 - a. Tap the **Text button**.
 - b. Tap the **New Text** button.
 - c. Drag the **text cursor** to where you want the arrow to start.
 - d. Tap the Arrow button.
10. **To manipulate a previously-set arrow:**
 - a. Tap **one end** of the arrow.
 - b. To move the text, point, or beginning of the arrow, tap and drag.



Adding Arrows to Text

In this example, one arrow is tied to the text, and two arrows were added without accompanying text and positioned as shown.

When working with text arrows, you can:

- Add text before or after adding the arrow
- Move the arrow and text later if needed

Moving Text

After placing text on an image, you can easily move it to any location within the Image Display.

To move text, tap the text and move it to a new location. If an arrow is attached to the text, the origin of the arrow also moves.

Deleting Text from an Image

You can only delete text that you added to an image. You cannot delete any text that is part of an image display property, such as the probe image control values. You can hide that text (see [Adding Guides to the Image Display](#) on page 65), but you cannot delete it.

To delete the last line of text, tap the text to highlight it, then tap the Bksp button on the keyboard to delete the last character entered.

To delete all added text, tap the Text button, then tap the Clear button. This removes all added text and arrows from the image.

Using Body Markers

You can add an icon to the 2D image that identifies the anatomy of the scan. Body Marker in the **Annotation** menu opens a window containing several anatomical views based on the current exam.

To work with body markers, you must understand:

- [Adding a Body Marker](#) on page 73
- [Moving the Body Marker](#) on page 73
- [Changing the Body Marker](#) on page 73
- [Moving the Probe Indicator](#) on page 74
- [Removing Body Markers](#) on page 74

Adding a Body Marker

To add a body marker to an image, complete these steps:

1. Tap the **Text** button .
2. Tap the **Body Marker** button.

A body marker displays on the image.



Shoulder Body Marker

3. If the marker you want is not displayed, tap the **Next Marker** or **Prev Marker** button.
If another marker is available, it replaces the first marker.
4. When the marker you want displays, tap the **screen**.

Changing the Body Marker

To change the body marker, complete these steps:

1. Tap the **body marker**.
The marker turns green and the buttons change to the Body Marker set.
2. Tap the **Next Marker** or **Prev Marker** button.

Moving the Body Marker

You can move the body marker to any location on the image.

To move the body marker, complete these steps:

1. Tap the **body marker** to select it.
2. Tap the **Marker Position** button.
3. Drag the **body marker** to the correct location.

Moving the Probe Indicator

You can move the orange probe indicator to anywhere on the icon to more precisely indicate the scanned anatomy.

To move the orange marker, complete these steps:

1. Tap **Text**.
2. Close the **keyboard**.
3. Tap **Body Marker**.
4. Tap and drag the **probe indicator** to the desired location on the body marker.
5. To rotate the marker, **tap it again** and drag..

Removing Body Markers

To remove the Body Marker from the image

1. Tap the **Text button**.
2. Tap the **Body Marker** button.
3. Tap the **Erase Marker** button.

4 Working With Scan Modes

Scan Modes Overview

All of the information in this chapter pertains to live imaging. Many of the controls and functions change when you freeze the scan. For information on using functions when the scan is frozen, see [Working with Annotations](#) on page 66. and Chapter 6 - [Working With Measurements](#).

Follow these general guidelines to choose which scan mode to use for an exam:

- Select [2D Mode](#) to view a two-dimensional display of the anatomy. 2D controls adjust the depth, focus, overall image gain, brightness, and exam type. See [Using 2D Image Controls](#) on page 76.
- Select [M-Mode \(Motion Mode\)](#) to evaluate motion over time. See [Using M-Mode Image Controls](#) on page 83.
- Select [Pulsed-Wave Doppler \(PWD\)](#) mode when you want obtain frequency or velocity information from a specific point along the ultrasound cursor. See [Using Spectral Doppler Image Controls](#) on page 84.
- Select [Continuous-Wave Doppler \(CWD\)](#) mode when aliasing is a problem, and when depth-specific information is not important. See [Using Spectral Doppler Image Controls](#) on page 84
- Select [Color Doppler \(CD\)](#) when you must view the mean velocity within an assigned region of interest. See [Using Color Doppler Image Controls](#) on page 90
- Use [Triplex](#) to combine Pulsed-Wave Doppler scanning with Color Doppler scanning. See [Scanning in Triplex Mode](#) on page 94.

Using the Image Control Buttons

A set of buttons to the right of the Imaging window displays the currently available imaging controls (for example, see [2D Image Control Buttons](#) on page 77). The buttons operate the various parameters of scanning (see [The Imaging Controls](#) on page 34.) When you select a scan mode, the software configures the buttons for that mode. The controls displayed vary depending on which probe is connected, and on other selections. Tapping the left and right arrow buttons in the middle of the control-button array changes the display to other controls available in the selected mode.

To change a setting, tap the left or right side of the control button, or in some cases, tap the control button repeatedly to cycle through a list of options.

See [Scan Properties Display](#) on page 29 for a description of the display that lists current imaging settings.

Controls Available in Modes

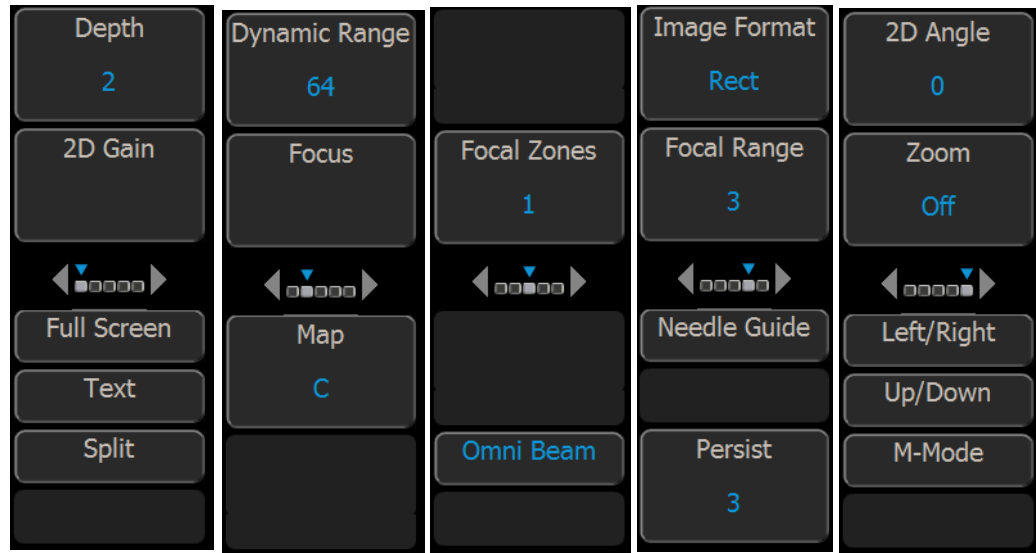
The following table lists the image control settings that are available for different modes.

Image Controls Available With Scan Modes

Mode	Image Control Settings		
2D	Frequency Depth Focus Left/Right invert Up/Down invert Colorization	Gain Sector Width Smoothing Persistence Map Needle guide (when supported)	Dynamic range Noise rejection THI
M-Mode	Sweep Speed	Ultrasound cursor position	
PWD	Scale Sweep Speed Velocity display Wall filter	Invert Correction angle Sample volume size Gain Dynamic range	Noise Rejection Baseline Sound volume Update
CD	Scan area Scale Wall filter Color Invert	Color Gain Color Priority Color Persistence Color Baseline	Color Threshold Spatial Resolution and Frame Rate
Pwr and DirPwr	Scan area Scale Wall filter Directional Power (on/off)	Color invert Color Baseline Color Gain Color Priority	Color Persistence Spatial Resolution and Frame Rate

Using 2D Image Controls

The figure [2D Image Control Buttons](#) shows an example of available 2D image controls. You can only adjust these image controls during live scanning. When you freeze a scan, the Terason software replaces the buttons with a different set, for printing and making annotations and measurements on the scan image. (See [Working with Annotations](#) on page 66 and Chapter 6 - [Working With Measurements](#).)



2D Image Control Buttons



Note: The button display depends on the probe that is connected, the selected scan mode, and the selected exam. The display you see may differ from the illustrations in this guide.

You can adjust the following 2D image controls during live scanning:

- Scan Depth
- Focus depth
- Gain
- Image Format
- Omni Beam
- Left/Right and Up/Down invert
- Persistence
- Image map
- Needle guide
- Dynamic range
- TeraVision

Adjusting the Scan Depth

Scan Depth adjusts the field of view. You can increase the depth to see larger or deeper structures. You can decrease the depth to enlarge the display of structures near the skin line, or to not display unnecessary areas at the bottom of the window.

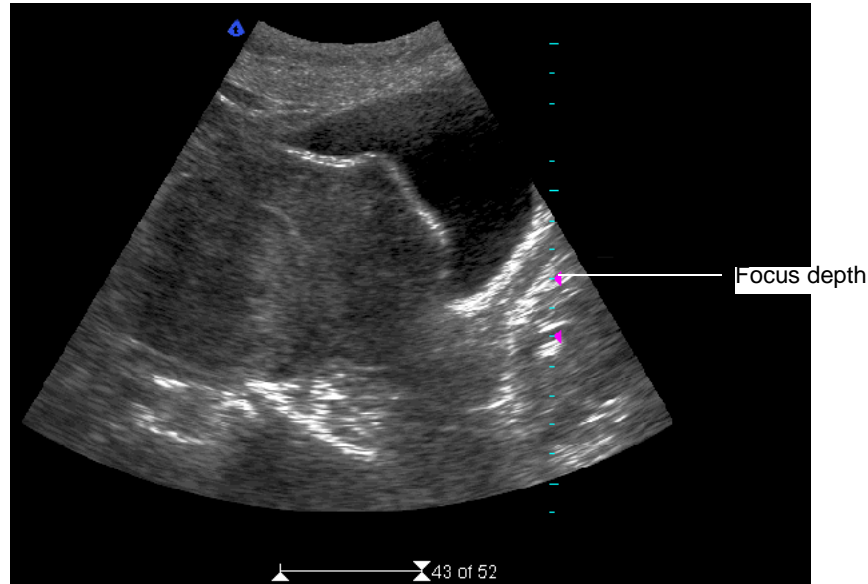
When you select an exam type, the Terason software enters a preset depth value for the specific exam type and probe.

To set the scan depth, tap the left or right side of the Depth button. You can monitor the depth setting in the scan properties area of the imaging screen. After adjusting the depth, you may want to adjust the gain, time gain compensation (TGC) curve, and focus control settings.

You can view a depth ruler on the image by selecting Depth Ruler on the General tab of the Setup window.

Adjusting the Focus Depth

Focus optimizes the image by increasing the resolution for a specific area. The figure below shows the depth ruler along the right side of the image.



Example Depth Ruler

A pink triangle on the depth ruler indicates the focus depth. This indicator is only visible if you show the depth ruler. The depth is also displayed as text in the scan information area (See [Scan Properties Display](#) on page 29).

When you select an exam type, the software updates the focus value to a preset value for the specific exam type, probe, and frequency.

In 2D mode, you can set up to four focus depths. In all the other modes, you can set only one focus depth. When you use more than one focus depth, you can choose the distribution of the focus depths.

To set the focus depth, tap the left or right side of the Focus button.



Note: When using the Nerve General preset, focus depth automatically conforms to the selected scan depth.

To **set multiple focus depths** in 2D, complete these steps:

1. Use the Focal Zones button to select the desired number of focus zones.
Tap the left or right side of the button to change the number of zones.
2. Use the Focal Range button to select a distribution for the focus zones.

The distribution is shown by the spacing of the depth indicators on the depth ruler. The actual spacing of the focus depths depends on the number of points selected and on the depth



Note: Increasing the number of focal zones decreases the frame rate.

Adjusting the Gain

2D gain allows you to increase or decrease amplification of the returning echoes, which increases or decreases the amount of echo information displayed in an image.

Adjusting gain may brighten or darken the image if sufficient echo information is generated.

When you select a preset, the Terason software sets the gain to a preset value for the specific preset and probe.

To increase or decrease the gain, tap the left or right side of the 2D Gain button. You can monitor the gain setting in the scan properties area of the imaging screen.

Adjusting the Image Format

When using a linear probe, the Image Format button lets you choose an image format of rectangular (Rect) or trapezoidal (Trap).

To select the shape of the sectors, tap the Image Format button. It toggles between Rect and Trap.

See [Setting Display Defaults](#) on page 158 for information on choosing defaults associated with sector width and image format.

Omni Beam

Omni permits electronic steering of the ultrasound beam to acquire scans of an ROI from several directions. Omni works with linear and curved-linear array probes.

When Omni is on, the code OM shows in the scan properties display, and the focus markers on the depth ruler change to this:



OM/D/3/M/TV2

Omni Beam Code in Scan Properties Display

To turn Omni Beam on or off, tap the Omni Beam button.

Tissue Harmonic Imaging (THI)

The transmitted ultrasound signal generates harmonics (signals at frequencies that are multiples of the transmitted signal frequency) in tissue. Tissue harmonic imaging processes a returned harmonic signal to enhance the displayed image. The harmonic used for THI is twice the frequency of the transmitted signal.

THI is only available when a 4V2A or 5C2A transducer is connected. When a different type of transducer is connected, the THI button does not display.

THI is most effective at mid-range depths. Shallow and deep scans do not benefit from THI. When scan depth is 4 cm or more, THI is disabled.

To turn THI on or off, tap the **THI** button in 2D mode.

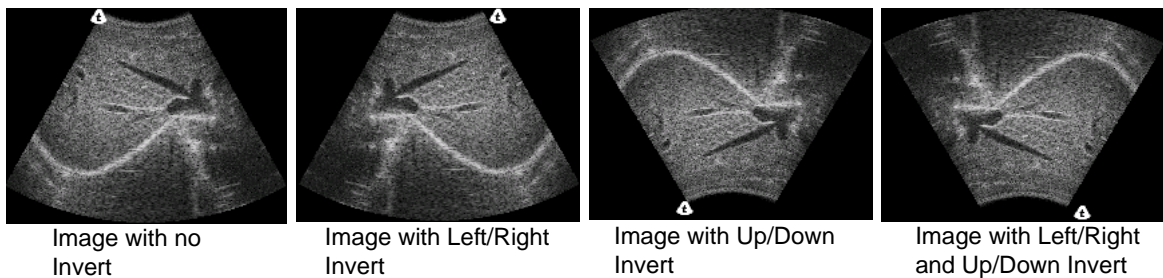


Note: When using the 4V2A probe, THI is on by default, and cannot be disabled.

Inverting Images

The Left/Right and Up/Down buttons control the orientation of the scanned image.

The following figure shows the effect of using the invert buttons.



Effect of Inverting an Image

To invert the scanned image, tap the Left/Right or Up/Down button.

Adjusting Persistence

Persistence refers to image frame averaging of real-time images or loops. When the persistence rate is high, the image appears less speckled and smoother. However, increasing the persistence rate may produce a blurred image if the tissue is moving when you freeze the image. When the persistence is low, the opposite is true.

To change the amount of frame averaging, tap the Persist button to select a value from 0 to 7. The 0 setting represents 0% and 7 represents 100% persistence.

The persistence setting displays onscreen as a character in the scan properties display, as shown in the following figure.



OM/D/3/M/TV2

Persistence Setting in Scan Properties Display

Adjusting the Image Map

The Map control lets you choose how grayscale is distributed across the image. Each map emphasizes certain regions of the signal amplitude range. This feature is useful for close viewing of certain anatomical features and for detecting subtle pathologies.

To change the number of gray levels, tap the Map button. You can choose any of seven maps, labeled from A to I. Tapping the right side of the button increments the setting, and tapping the left side of the button decrements the setting



Note: The change in image quality from one map to the next is not a linear sequence. Observe the reference bar to see the effect of the various maps. (See [Image Map Reference Bar](#), below.)

The current map setting displays on the Map button. The scan properties display on the Imaging window also includes a code for the selected map setting. In the example below, the second item (D) is the map setting.



OM/D/3/M/TV2

Map Setting (D) in Scan Properties Display

Image Map Reference Bar

The effect of your map choice is represented by a reference bar to the left of the depth scale on the image.

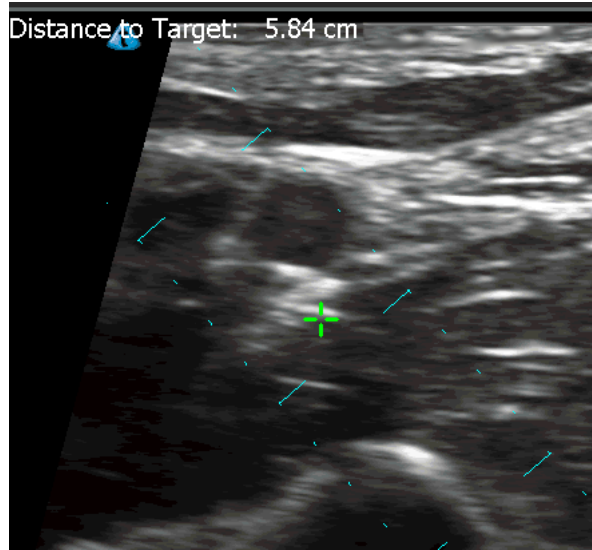
Selecting a Needle Guide

The needle guide button is active only when a probe that supports biopsies or other medical procedures is connected. To display a needle guide, use the button to turn on the needle guide and to select the correct needle guide, if more than one guide is available.


Depending on the connected probe, you may only see one needle guide option. If the bracket for that probe supports more than one angle or depth, options for each supported angle or depth are displayed.

To toggle the needle guide on or off, tap the Needle Guide button. If more than one guide is available, tap the Needle Guide button again to select a different guide.

See [Performing a Biopsy](#) on page 138 for more information on using needle guides.



Needle Guides and Target for a Biopsy

On the 2D image, the cyan dashed lines are the guide lines, and the green  is the needle guide target indicator.

To toggle the target indicator on and off, tap the Target button.

The distance from the probe to the target displays in the upper left corner of the Imaging window.

To change the depth of the target indicator, drag it up or down.

Adjusting Dynamic Range

The Dynamic Range button controls the range of acoustic levels displayed in the image, which affects the contrast of the image. A number on the button indicates the amount of compression, from 0 to 100.

To adjust dynamic range, tap the Dynamic Range button. Tapping the right side of the button increments the setting, and tapping the left side of the button decrements the setting. The 0 setting gives greatest contrast, and 100 gives the least contrast.

TeraVision

TeraVision is an image-enhancement option. See [Enhancing the Image Using TeraVision™ Optimization](#) on page 64.

To enable or disable TeraVision, use the TeraVision button.

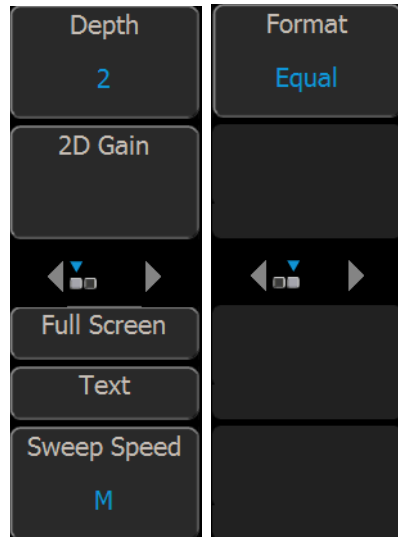
Using Tissue Doppler Imaging

Selecting tissue Doppler imaging (TDI) optimizes the image controls for imaging tissue motion. The control settings vary with the selected scan mode. The control values can be adjusted and preset independently of non-TDI settings. TDI is disabled when the image is frozen. TDI works only with the 4V2A probe.

To apply tissue Doppler imaging, tap the TDI button while in 2D mode.

Using M-Mode Image Controls

When you select M-Mode, the Terason software applies a group of preset image settings and changes the available button controls. When you freeze a scan, the Terason software replaces the imaging button controls with controls for measuring features of the M-mode image and for examining frames and playing loops. (See [Measuring in the M-Mode Window](#) on page 120.)



M-Mode Image Control Buttons

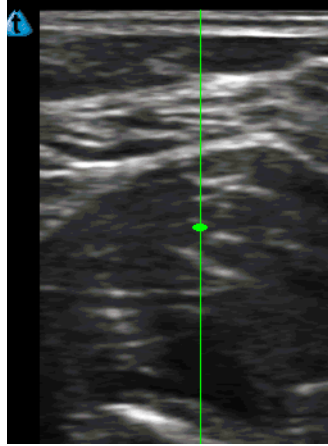
Adjusting the Sweep Speed

The Sweep Speed button sets how fast the timeline is scanned across the Time Series window.

To set the sweep speed, tap the right or left side of the Sweep Speed button to select S (slow), M (medium), or F (fast). The tick marks in the Time Series window are closer or farther apart depending on the speed. Each large tick mark represents one second.

Adjusting the Ultrasound Cursor Position

The following figure shows the ultrasound cursor:



Ultrasound Cursor

To move the ultrasound cursor, tap the ultrasound cursor, then drag it to a new location.

When the ultrasound cursor is selected, it turns green. When locked in position, it returns to its normal color.

Using Spectral Doppler Image Controls

When you select Pulsed-Wave Doppler or Continuous-Wave Doppler, the Terason software applies a group of preset image settings and changes the available image controls. When you freeze a spectral Doppler scan, the Terason software replaces the imaging control buttons with controls for measuring features of the PWD or CWD image and for examining frames and playing loops.

For information on spectral Doppler image controls, see:

- [Adjusting the Sweep Speed](#) on page 85
- [Adjusting Scale](#) on page 85
- [Adjusting the Wall Filter](#) on page 86
- [Adjusting the Steering Angle](#) on page 87
- [Adjusting the Correction Angle](#) on page 87
- [Inverting the Waveform](#) on page 88
- [Adjusting the Ultrasound Cursor Position](#) on page 88
- [Adjusting the Sample Volume \(SV\) Size and Depth](#) on page 88
- [Setting the PWD Gate Position](#) on page 88
- [Adjusting Spectral Gain](#) on page 89
- [Adjusting Noise Rejection](#) on page 89
- [Adjusting the Baseline](#) on page 89
- [Adjusting the Sound Volume](#) on page 89
- [Updating the Displays](#) on page 90

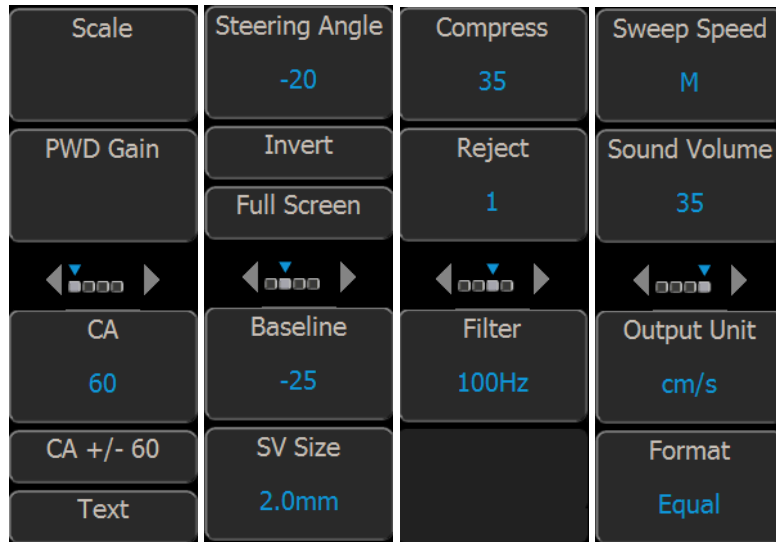


Image Control Buttons



Note: Button displays shown in this manual are examples. The displays on your system may be different.

Adjusting the Sweep Speed

The Terason software lets you choose the sweep speed for Spectral Doppler modes. A slow speed shows more waveforms over time but less detail. A medium speed is suitable for normal use. Fast speed shows fewer waveforms over time but with more detail.

The spacing of the ticks along the top of the Time Series window indicates the sweep speed. Each large tick represents one second. When an image is frozen, you cannot change the setting.

The Sweep Speed button sets how fast the timeline is scanned across the Time Series window.

To set the sweep speed, tap the left or right side of the Sweep Speed button to select S (slow), M (medium), or F (fast).

Setting the Velocity Display Units

The Time Series window shows the velocity of flow in cm/s or kHz. You can change the units at any time, so long as the cursor angle is 70° or less.

To change the velocity display units, tap the Output Unit button. Tapping the button toggles between cm/s and kHz.

Adjusting Scale

Pulse Repetition Frequency defines the velocity range of the display, which manifests as scale. The maximum value (in Hz) for the PRF depends on the specific probe and the location of the sample volume.

The PRF should be set high enough to prevent aliasing, and low enough to provide adequate detection of slow blood flow. It may be necessary to vary the PRF during an exam, depending on the speed of the blood flow, or when pathology is present.

Aliasing occurs when the frequency of what you are observing exceeds one half of the sample rate. If the blood is moving faster than the pulse repetition rate, then the waveform on the display will alias, or wrap around, the baseline.

You can only change this setting when viewing a live image, not when an image is frozen. The Terason software may automatically change the PRF value when you move the region of interest, to ensure that the maximum PRF value does not exceed its limit.

To adjust the PRF value, tap the left or right side of the Scale button. The Velocity (cm/s) or Frequency (kHz) scale to the left of the Time Series window changes in response to the Scale setting.



Note: In Triplex scanning only: the PRF value is tied to the setting in 2D mode (Color Doppler). If you change the PRF value on one mode, the Terason software also changes the PRF value on the other mode. This depends on whether you are scanning in simultaneous or non-simultaneous mode, which is controlled by the Update button.

The increment value for each tap depends on the current range. For example, if the Scale setting is 4000, each time you tap the up or down button, the Terason software adds or subtracts 500 Hz from that value, until the selected value falls into a lower or higher range.

Increasing the PRF also increases the Thermal Index (TI) value (refer to “General Description of Indices” in *Volume 2* of this guide for more information about thermal indices).

Adjusting the Wall Filter

Doppler systems use a wall filter (high pass frequency filter) to eliminate unwanted low-frequency high-intensity signals (known as clutter) from the display. Clutter can be caused by tissue motion or by rapid movement of the probe.

Increasing the wall filter setting reduces the display of low velocity tissue motion. Decreasing the wall filter setting displays more information, but more wall tissue motion.

Use a wall filter setting that is high enough to remove clutter but low enough to display information near the baseline.

To adjust the wall filter value, tap the left or right side of the Filter button.

The wall filter range is from 1% to 25% of the PRF. The increment value for each tap depends on the current range. For example, if the wall filter setting is 40, each time you tap the right or left arrow, the Terason software adds or subtracts 10 Hz from that value, until the selected value falls into a lower or higher range.

Adjusting the Steering Angle

When using Spectral Doppler, be aware of the Doppler angle-to-flow (the angle between the axis of the ultrasound beam and the plane that the blood flows in). When the ultrasound beam is perpendicular to the flow (90° angle-to-flow), an absent or confusing color pattern displays, even when the flow is normal. An adequate Doppler angle-to-flow is required to obtain useful Spectral Doppler information. In most instances, the more nearly parallel to the flow the Doppler beam is (the lower the angle-to-flow), the better the received signal. Angles less than 60° provide the best quality Spectral Doppler.

Electronic steering is useful when the flow is at a poor angle to the Doppler beam. However, it is often also necessary to tap on one end of the probe or the other to improve the Doppler angle-to-flow.

Electronic steering is only available with flat linear-array probes (such as the 12L5A). This option does not display with any other probes. Curved linear probes are not capable of electronic steering, and depending on the clinical situation, may require that you tap down on one corner of the probe to obtain an adequate angle to flow.

The steering angle does not directly affect the calibration of the velocity scale.

To select a different steering angle, tap the left or right side of the Steering Angle button.

You can only use this control when viewing a live image. When an image is frozen, you cannot change the setting.

Adjusting the Correction Angle

To obtain accurate velocities, you must maintain Doppler angles of 60° or less. It is often necessary to tap on one end of the probe or the other to improve the Doppler angle-to-flow.

In the Terason uSmart3200T Ultrasound System, the velocity display in centimeters per second is shown only in the correction angle range between +70° and -70°. At angles greater than 70°, the error in the velocity calculation is too large, and the velocity scale is converted to frequency (in kHz), independent of the correction angle. The flow-direction indicator still shows on the window, for reference.

To adjust the correction angle, tap the CA button on the left side or on the right side to change the angle. The angle setting displays in the scan properties display of the Imaging window, to the right of the depth scale.

To set the correction angle to 0 or 60°, tap the 0/+60 button. This button toggles the correction angle between -60°, and 0, or 60° and 0, whichever value is closer to the current value.

The following figure shows adjustments made to the correction angle and sample volume:



60 Angle, 4.5 mm (Left) and 45 Angle (Right)

Inverting the Waveform

You can invert the Pulsed Doppler waveform. The Doppler scale is separated by a zero baseline across the width of the spectral display. (See [Adjusting the Baseline](#) on page 89.) The data above the baseline is classified as forward flow. The data below the baseline is classified as reverse flow.

When the waveform is inverted, reverse flow displays above the baseline and forward flow is below the baseline.

To invert the waveform, tap the Invert button.

You can only use this control when viewing a live image. When an image is frozen, you cannot change this setting.

Adjusting the Ultrasound Cursor Position

To adjust the ultrasound cursor in the 2D image display, tap and drag the cursor.

Adjusting the Sample Volume (SV) Size and Depth

The sample volume size control adjusts the size of the Doppler region being examined. The lower the value, the narrower the sample size used in the calculation of flow velocity. The sample volume displays along the ultrasound cursor as two parallel lines. The distance between the two parallel lines is the size of the sample volume in millimeters.

To adjust the sample volume (SV) size, tap the left or right side of the SV Size button. The SV Size displays on the button and in the scan properties display to the right of the depth scale on the Imaging window. You can set a value from 0.5 to 20 mm (in 0.5 mm increments).

To adjust the position of the sample volume, tap and drag it to the desired location.

You can only use this control when viewing a live image. When an image is frozen, you cannot adjust the sample volume.

Modifying the depth location of the sample volume affects the Thermal Index (TI) value (refer to “General Description of Indices” in *Volume 2* of this guide for more information about thermal indices).

Setting the PWD Gate Position

The sample volume indicator allows you to start a scan in a 2D scan mode, set the sample volume location, and switch to Spectral Doppler mode. The sample volume locks in position. When scanning in CD, DirPwr, or Pwr scan modes, this procedure switches to Triplex mode (if enabled by your license).

To locate the sample volume, in the 2D window, tap the sample gate, and drag it to the new position.

Adjusting Spectral Gain

The PWD gain setting (not the 2D gain setting) increases or decreases the amplification of the returning signal (live or playback) for the Time Series display. The gain should be adjusted so that the spectral waveform is bright, but not so high that the systolic window fills in, or other artifacts are created.

To adjust the PWD gain, tap the left or right side of the PWD Gain button.

You can adjust gain for live images or saved loops being played. You cannot adjust the gain for frozen images or paused loops.

Adjusting Noise Rejection

Noise Rejection controls rejection of low-level returned signals. Increasing rejection darkens the image background. A number on the button indicates the level of noise rejection.

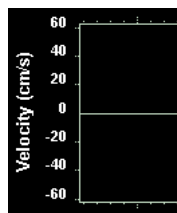
To adjust noise rejection, tap the left or right side of the Reject button. A number on the button indicates the level of noise rejection.

Adjusting the Baseline

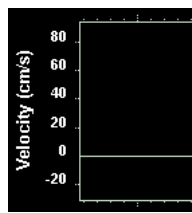
The baseline refers to the zero baseline in the Time Series Display window. Adjusting this control moves the zero baseline up or down. When you adjust the baseline, you can display more forward or reverse flow, taking advantage of the full scale available at that particular PRF value.

To adjust the baseline, tap the left or right side of the Baseline button.

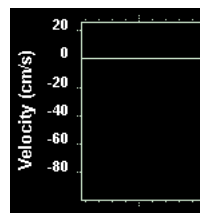
The figure below shows a centered baseline (the default), and adjusted baselines.



Centered Baseline
(default)



Lowered Baseline



Raised Baseline

Effects of Altering the Baseline

You can adjust baseline for live images, but not for frozen images or paused loops.

Adjusting the Sound Volume

The Sound Volume button lets you define the volume of the Doppler signal.

Adjust the sound volume of the signal to a comfortable level. If it is too high, system noise may interfere with the sound produced by the blood flow.

To adjust the volume, tap the left or right side of the Sound Volume button. A number on the button indicates the sound volume level, from 0 to 100.

The computer speaker should be turned on and its volume set to the mid-range. You can also use a high quality headphone or external speaker.

Updating the Displays

The Update button lets you choose whether or not to continue scanning the anatomy (displayed in the 2D window) while acquiring Spectral Doppler scan data (displayed in the Time Series window). When Update is selected, the button text is blue, and the Terason software continuously updates the 2D scan while acquiring Spectral Doppler data. When not selected, the button text is white, and the Terason software freezes the 2D data while acquiring Spectral Doppler data.

The default setting for this button in most exams is *selected* (continuous scanning of the 2D and Spectral Doppler data).

When you de-select the Update button (but do not freeze the scan), you cannot adjust some of the 2D image controls. The following table lists the image controls that can and cannot be adjusted when Update is not selected.

Availability of 2D Image Controls When Update Disabled

Available	Not Available	
Exam	Depth	Sector width
Frequency	Focus	Map
Noise Rejection	Gain	Persistence
	Left/Right invert	
	Up/Down invert	

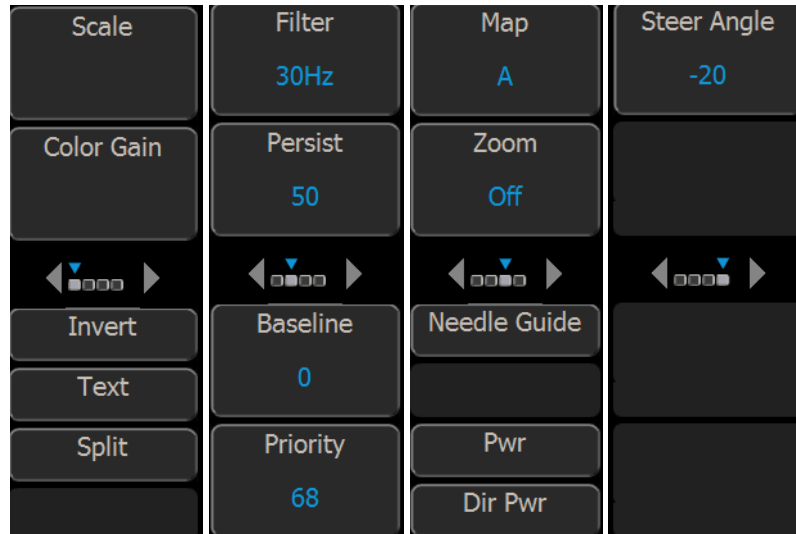
To toggle the 2D window between live and frozen, tap the Update button.

Using Color Doppler Image Controls

When you select Color mode, the Terason software displays buttons for Color mode.

To use Color mode image controls, see the following topics:

- [Adjusting the Scan Area](#) on page 91
- [Adjusting Scale](#) on page 91
- [Inverting the Doppler Display \(Color Invert\)](#) on page 92
- [Adjusting the Color Gain](#) on page 93
- [Adjusting the Color Priority](#) on page 93
- [Adjusting the Color Persistence](#) on page 94
- [Adjusting the Color Baseline](#) on page 94
- [Choosing a Color Map](#) on page 94



Color Doppler Image Control Buttons



Note: Button displays shown in this manual are examples. The displays on your system may be different.

Adjusting the Scan Area

The size of the scan area (also referred to as the region of interest, or ROI) is one of the major controls that affect the frame rate. The smaller the scan area, the faster the frame rate. The larger the scan area, the slower the frame rate.

You cannot move or resize the ROI when the image is frozen.

To move the scan area, complete these steps:

1. Tap the **ROI**.
2. Drag the **ROI** to the preferred location.

To resize the scan area, complete these steps:

1. Tap a corner of the **ROI**.
2. Drag the ROI to the desired size and shape.

The Terason application may automatically adjust the PRF value when you move the region of interest to ensure that the maximum PRF is not exceeded for the new depth.

Adjusting Scale

Pulse Repetition Frequency defines the velocity range of the display, which manifests as scale. The maximum value (in kHz) for the PRF depends on the specific probe, and the location of the region of interest.

The PRF should be set high enough to prevent aliasing, and low enough to provide adequate detection of low flow. It may be necessary to vary the PRF during an exam, depending on the speed of the blood flow, or if pathology is present.

Aliasing occurs when the frequency of what you are observing exceeds one half of the sample rate. If the blood is moving faster than the pulse repetition rate, then the Doppler display will alias, or wrap-around, the baseline.

If the PRF is set too high, low-frequency shifts caused by low-velocity flow may not show.

As PRF increases, the maximum Doppler shift that can display without aliasing also increases.

You can only use this control when viewing a live image. When an image is frozen, you cannot change PRF.

To adjust the PRF value, tap the left or right side of the Scale button.

The increment value for each tap depends on the current range. For example, if the PRF setting is 4000, each time you tap the right or left arrow, the Terason software adds or subtracts 500 Hz from that value, until the selected value falls into a lower or higher range.

Increasing the PRF also increases the Thermal Index (TI) value (refer to “General Description of Indices” in *Volume 2* of this guide for more information about thermal indices).

Inverting the Doppler Display (Color Invert)

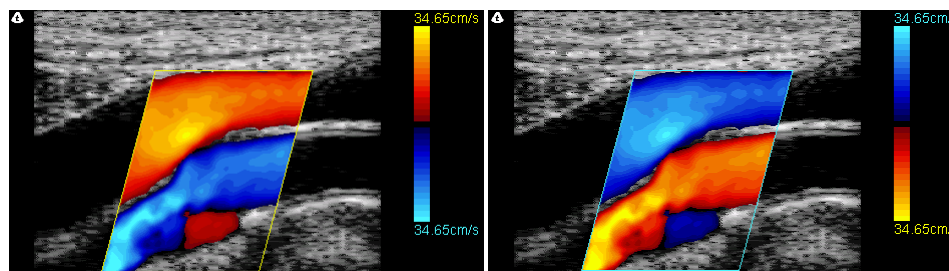
In Color Doppler mode, you can invert the color scale.

Normally, the color red is assigned to positive frequency shifts (flow toward the probe), and blue is assigned to negative frequency shifts (flow away from the probe). This color assignment can be reversed by tapping the Invert button. Flow toward the probe is always assigned the colors of the top half of the color bar, and flow away from the probe is assigned the colors of the bottom half of the color bar.

When you tap the Invert button, the Color Doppler reference bar and the color of the scan data within the Region of Interest are both inverted.

Invert may be used when scanning the internal carotid artery (ICA), for example. In general, flow in this vessel goes away from the probe. If Invert is enabled, the ICA flow displays in shades of red. The color bar displays shades of blue on the top half, and shades of red on the bottom.

To invert the Doppler colors, tap the Invert button:



Color Invert Not Selected

Color Invert Selected

Effects of the Color Invert Button

Notice that the colors on the reference bar are also inverted.

The figure above should be viewed in color; when printed in black and white, the effect may be obscured.

Adjusting the Wall Filter

Doppler systems use a wall filter (high pass frequency filter) to eliminate unwanted low-frequency, high-intensity signals (also known as clutter) from the display. Clutter can be caused by tissue motion or by rapid movement of the probe.

Raising the wall filter setting reduces the display of low velocity tissue motion. Lowering the wall filter setting displays more information. However, more wall tissue motion is also displayed.

The wall filter setting should be set high enough to ensure that Color Doppler flash artifacts from tissue or wall motion are not displayed, but low enough to display slow flow. If the wall filter is set too high, slower flow may be not seen.

Set the wall filter setting higher for applications where there is significant tissue motion, or in instances where the probe is moved rapidly while scanning in Color Doppler mode. Set the wall filter setting lower for small parts or instances where flow is slow but there is not much tissue motion.

Use a wall filter setting that is high enough to remove clutter but low enough to display Doppler information near the baseline.

To adjust the wall filter value, tap the left or right side of the Filter button. The current value displays on the button and on the scan properties display of the Imaging window (as a number following “WF”).

The wall filter range is from 1% to 50% of the Scale value.

Adjusting the Color Gain

Color gain can be increased to correct an inadequate fill of color within a vessel, and decreased to correct an unacceptable amount of color outside of a vessel.

You can adjust the color gain to increase or decrease the amplification of the returning signal being played or displayed.

To change the color gain, tap the left or right side of the Color Gain button.

Adjusting the Color Priority

The color priority of the image defines the amount of color displayed over bright echoes, and helps confine color within the vessel walls. Color priority affects the level at which color information overwrites the 2D information. If you must see more flow in an area of some significant 2D brightness, increase the color priority. To better contain the display of flow within the vessels, decrease the color priority. If the color priority is set to zero, no color is displayed.

To change the color priority, tap the left or right side of the Priority button. The current Color Priority setting shows on the button display.

Adjusting the Color Persistence

The color persistence setting determines the amount to be averaged between frames. Increasing the persistence causes the display of flow to persist on the 2D image. Decreasing the persistence allows better detection of short duration jets, and provides a basis for better flow/no flow evaluations. Adjusting color persistence also produces better vessel contour depiction.

To change the color persistence, tap the left or right side of the Persist button. The current Color Persistence setting shows on the button display.

Adjusting the Color Baseline

Color baseline adjustments are usually unnecessary. The baseline refers to the zero baseline within the Color Doppler image. To adjust it, move the baseline down to display more positive flow (forward) and move the baseline up to display more negative flow (reverse). This adjustment can be used to prevent aliasing in either direction.

This image control works with Color Doppler mode.

To move the color baseline, tap the left or right side of the Baseline button. The current setting of the baseline shows on the Baseline button display.

You can see the effect of your change on the color reference bar. If the bar is not visible, select **Setup > General > Reference Bar** to add it to the image display.

Choosing a Color Map

The Map button chooses which of five color maps is used to show Color Doppler data. You can configure the color map independently for each exam by selecting an exam, then a color map. When you select a different exam, the Terason software loads the color map for the selected exam.

The color maps are designated A through E. Some maps use more colors than others, and some display in a smoother gradient than others.

To select a color map, tap the left or right side of the Map button. The current map letter shows in the button display.

Scanning in Triplex Mode

Triplex scan mode combines Pulsed-Wave Doppler scanning with Color Doppler scanning.

To activate Triplex scanning, tap the CD button, then tap the PWD button.

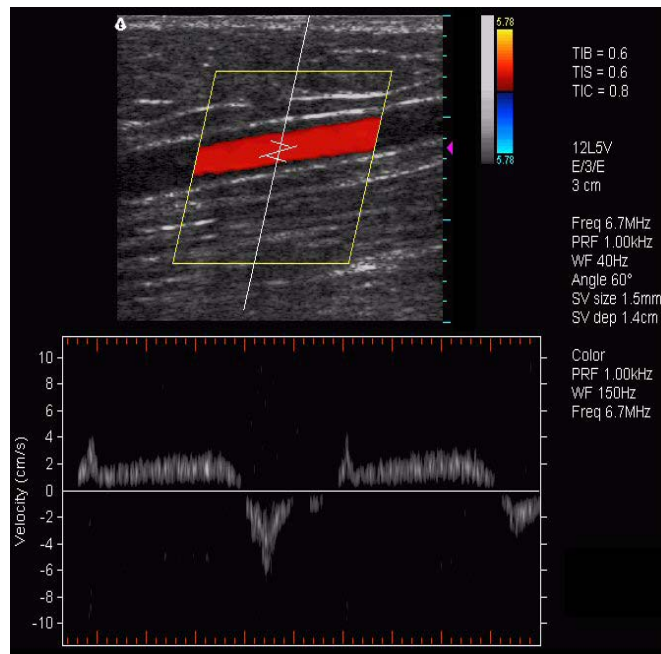


Note: In Triplex scanning only, the PRF value is tied to the setting on the 2D mode (Color Doppler). If you change the PRF value in one mode, the Terason software also changes the PRF value in the other mode. This depends on whether you are scanning in simultaneous or non-simultaneous mode, which is controlled by the Update console button. See [Updating the Displays](#) on page 90.

To adjust image controls for Triplex scanning, first adjust the image controls for the 2D scan mode, then go to the Color Doppler window and tap the PWD button to select the PWD line and Sample Volume location.

Some of the 2D image controls cannot be adjusted when scanning in Triplex, so you must adjust the image controls in 2D mode (described in [Using 2D Image Controls](#) on page 76). You can only adjust these image controls during live scanning. When you freeze a scan, the Terason software replaces the buttons with a different set, for printing, and making annotations and measurements on the scan image. (See [Working with Annotations](#) on page 66 and Chapter 6, [Working With Measurements](#), on page 111).

The application adds the Time Series window for PWD to the 2D image.



Live Triplex Scan

Adjusting the ROI and Range Gate

When scanning in Triplex mode, you can move the region of interest, adjust its size, or move the range gate.

To move the region of interest, complete the following steps:

1. Tap the **ROI**.
2. Drag the ROI to the preferred location.

To adjust the size of the region of interest, complete the following steps:

1. Tap a **corner of the ROI**.
2. Drag the corner to resize the ROI.

To move the range gate, complete the following steps:

1. Tap the **range gate**.
2. Drag the range gate to the preferred location.

Using Image Controls in Triplex

When Triplex scanning, the PWD image control buttons are available. See [Using Spectral Doppler Image Controls](#) on page 84.

The Image Information display shows two PRF values in Triplex mode. The Terason software sets the Color PRF to an integral fraction ($1/2$, $1/3$, $1/4$, etc.) of the PWD PRF. If you change the PRF value in one mode, the Terason software changes the other PRF setting as well.

You can independently set the Wall Filter for the 2D and PWD scans.

5 Working With Studies

Study Overview

The Terason software provides many tools for you to work with studies. These tools allow:

- [Storing Images and Loops](#); see page 97
- [Reviewing Patient Studies](#); see page 99
- [Exporting Studies](#); see page 99
- [Exporting Images and Loops](#); see page 102
- [Deleting Studies and Images](#); see page 105
- [Printing Images](#); see page 107

Storing Images and Loops

You can save acquired images either as individual image files, or as Cine loop files. To store images and loops, you must understand:

- [Monitoring Disk Space](#); see page 97
- [Saving Images and Loops](#); see page 98
- [Viewing saved Images and Loops](#) on page 98

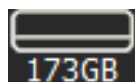
You can also copy the image in the 2D Image window by tapping the F4 button. This saves the image in the Windows clipboard, and you can paste the image into another application on your computer.

Monitoring Disk Space

Be aware of the amount of free space on your C: drive (the default drive where the application is installed). If the hard drive is full, the system cannot save files.

Many factors contribute to the size of an image file, such as the scan mode and measurements or annotations. A single frame (a saved image) can range from 300 KB to 700 KB. An image loop can be from 2 MB to 18 MB.

The Imaging window includes an indicator showing free disk space at the top of the screen.



Disk Free Space Indicator

When free disk space is less than 2 GB, the background of the indicator changes from gray to yellow. You can select a different level for this change on the Store/Acquire tab of the Setup window. If the free disk space becomes smaller than 1 GB, you should move files to a backup CD (see [Exporting Studies](#) on page 99) and delete them from the C: drive, or just delete unimportant files (see [Deleting Studies and Images](#) on page 105).

Saving Images and Loops

Images and loops are saved to the Study directory, in the appropriate patient folder. If no patient is associated with a scan, no images or loops can be saved. All images and loops for a given patient saved on the same day are saved in the same study, unless the New Study button in the Patient window is tapped before a later image is saved. A single study cannot include images and loops saved on different days.

For Split Screen mode, you can save the Split Screen image (as a single frame showing both screens).

You can save the Split Screen image as a loop file. When you do, the Terason software saves the active screen as an image loop, and the other screen as a single frame.

To save an image or loop, complete these steps:

1. Tap the **Freeze button** if viewing a live image.
2. To save a frozen image, tap the **Store button**.
3. To save a loop of a live scan, tap the **Store button**.
4. To add the saved image or loop to the report for the current study, **tap and hold on the thumbnail** of the image or loop and select Add to Report.
5. To delete an image or loop, **tap and hold on the thumbnail** of the image or loop and select Delete.

If you did not load patient information for an exam, you cannot save images or loops.

You can view the saved studies as described in [Finding Studies in the Patient Window](#) on page 99.

If you open an image file and then save it again, the Terason software creates a new file; it does not overwrite the original file.

Viewing saved Images and Loops

When you save an image or loop, a thumbnail of it appears in the area at the right of the Imaging window. When more than 12 images or loops are included in the study, some will be hidden. To view them, tap the scroll arrow at the bottom of the thumbnail area. To scroll back up, tap the scroll arrow at the top of the thumbnail area.

To review a saved image or loop in the current study, double-tap the thumbnail of the image or loop. It displays in the Imaging window.

Reviewing Patient Studies

You can find saved patient studies by using the Study List... button on the Patient window.

Finding Studies in the Patient Window

To find previously-saved studies in the Patient window:

1. Tap the **Patient button**.
2. In the Patient window, tap the **Study List... button**.
The Study List window opens, displaying a list of saved studies.
3. The default is to show all the studies. To find studies done on a specific day or range of days, tap the **Study Date** menu, and select Today, Last 7 days, Last 30 days, or In date range.

If you tap In date range, a box opens where you can select a range of dates to show studies from.

4. Find the desired **study** in the list, and tap it to select it.
5. Tap the **Review button**.

The selected study loads in the Imaging window.

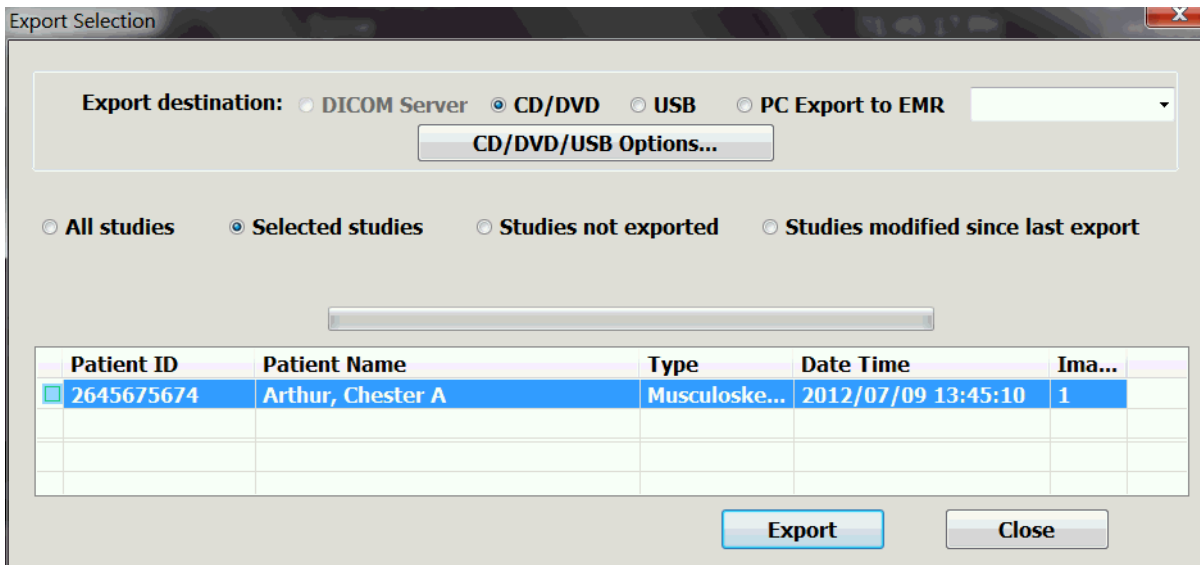
Exporting Studies

You can export studies, images to a CD, a DVD, a USB drive, or another location on a network. When exporting a study, image, or loop, the system creates a uniquely-named subdirectory for each study, image, or loop.

To export a study, complete the following procedure:

1. **Save** the study. See on page 98.
2. Tap the **Patient button**.
3. On the Patient window, tap the **Study List...** button.
4. On the Study List window, select the **study** you want to export
5. Tap the **Export button**.

The Export Selection window opens. A row of radio buttons lets you choose different parameters for selecting studies to export.



Export Selection Window

6. To export to a CD or DVD, configure the image format and other parameters.



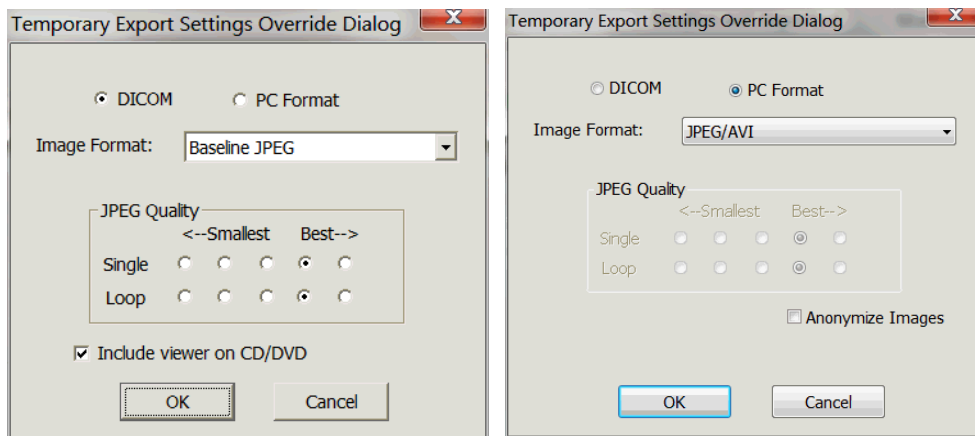
Note: The uSmart3200t does not include a CD or DVD drive. To burn files to those formats, you must connect an external drive to the system.

a. Tap CD/DVD.

The DICOM Server button changes to a CD/DVD/USB Options button.

b. Tap the CD/DVD/USB Options button.

The Temporary Export Settings Override Dialog box opens.



Temporary Export Settings Override Dialog Box

- c. To change the image format, choose a format from the **Image Format**: drop-down menu.



Note: If the PC Format radio button is selected, only the image is exported. None of the patient information is exported.
If the DICOM radio button is selected, the patient information is exported.

- d. To change the JPEG quality, select a **radio button** in the JPEG Quality area.
- e. To copy a DICOM image viewer onto the CD, select **Include viewer on CD/DVD** so the box is checked.
- f. To **remove patient information** from a PC Format study, tap Anonymize Images.
- g. When the selections are correct, tap **OK**.
7. To **export to a USB drive**:
- a. Tap **USB** on the Export Selection window.
- b. Tap the **CD/DVD/USB Options button**.

The Temporary Export Settings Dialog box opens. It has the same controls as the CD/DVD box (see step 6, above), except that it has no option for including a viewer on the target drive.

- c. When the selections are correct, tap **OK**.
8. To export to **an electronic medical records (EMR) location on a network**:
- a. Tap the **PC Export to EMR** radio button.
- b. If no EMR destination is set as a default, or if you want to send to a different destination, select a destination from the drop-down menu.

For information on setting defaults for PC Export, see [PC Export Options](#) on page 155.

9. On the Export Selection window, tap the **Export**. button.
- The Select Path window opens.
10. On the Select Path window, navigate to the **target drive** and select it.
11. Tap **OK**.

The Terason software exports the image or loop to the target drive.

Export Status Indicator

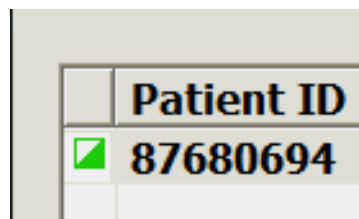
In the left column of the study list in the Export Selection window is a small box that indicates by its color whether the study has been exported. The upper left area of the box refers to exports to USB drives, CDs, and DVDs. The lower right area of the box refers to exports to a PACS system.

.The meanings of the colors are given in the following table.

Export Status Indicator color meanings

USB / CD / DVD	PACS
Blank: study not sent	Blank: study not sent
Green: study sent ^a	Green: study sent
	Yellow: send pending
	Red: sending failed
	Black: study has been modified since being sent (the file on PACS is not up to date)

a. During export to a USB drive or disc, the status indicator turns green. If writing to the target fails, the indicator goes back to blank.



Export Status Indicator

In the illustration above, the indicator shows that the study has been sent to a PACS system, and that it has not been exported to a USB drive, CD, or DVD.

Exporting Images and Loops

You can export an image onto the computer hard drive or an external drive, as a JPEG, BMP, or AVI format. You can also attach an image in one of those formats to an email message.

See:

- [Selecting File Types for Export](#) on page 102
- [Exporting an Image in a PC Format](#) on page 103
- [Attaching an Image to an Email Message](#) on page 104

Selecting File Types for Export

The Terason software allows you to export an image or loop to external media in any of these formats:

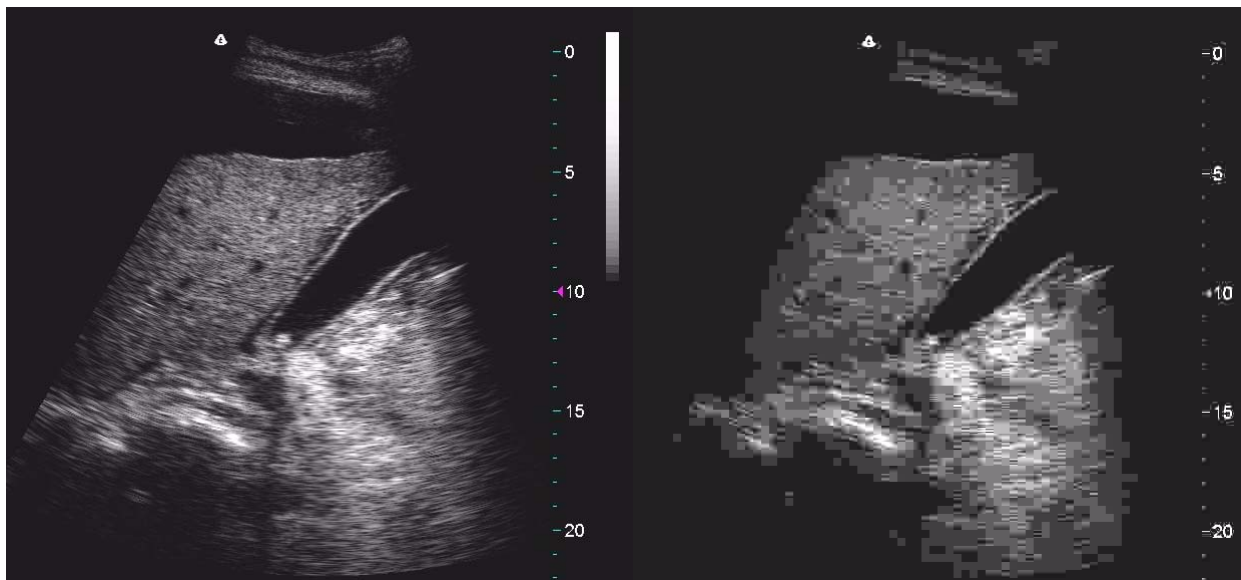
- AVI
- Bitmap
- JPEG

You can email image and loop files or include them as graphics in other applications.

If you save images using the JPEG format, be aware of the effects of data compression. By default, the Terason software uses a lossy JPEG compression algorithm. After compression, some of the image data is gone. When viewed, the compressed image may show artifacts caused by the JPEG compression. The artifacts may also show if you view the image on a medical viewing station that allows you to window and level the image.

The amount of compression on an image cannot be selected or predicted. One scan may compress at a ratio of 10:1, and another may compress at a ratio of 5:1. It is possible that medically-significant structures could be lost as a result of compression, regardless of the amount of compression. In addition, compression may result in artifacts appearing on the image.

To demonstrate what JPEG artifacts look like, the following example shows an uncompressed ultrasound image, and a JPEG compressed image of the same scan. The JPEG version was compressed at a ratio of 2500:1.



Scan Uncompressed (Left) and JPEG compressed (Right)

The compressed scan shows squares throughout. If you see squares like these, or an occasional block, interpret them as JPEG artifacts.

Exporting an Image in a PC Format

To export an image in a PC format:

1. Tap and hold on the **image thumbnail** in the thumbnail area at the right side of the Imaging window.

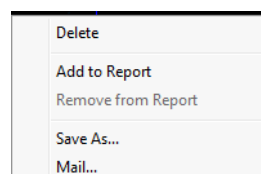
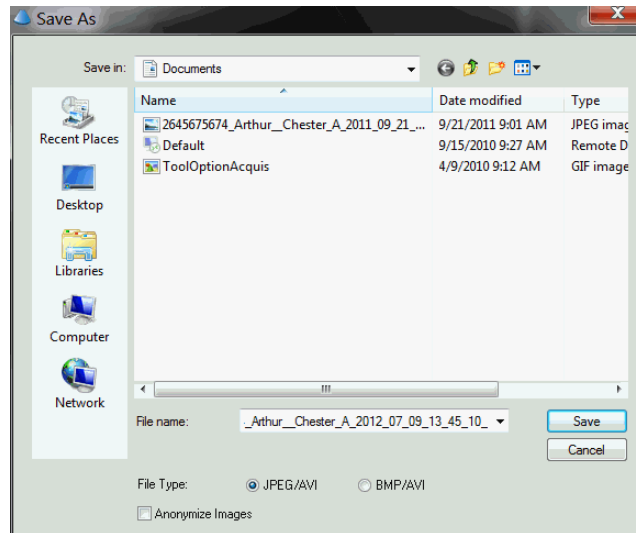


Image Context Menu

2. Select **Save As** from the Image Context menu.

The Save As window opens.



Save As Window

3. To remove the patient identification from the file name, tap **Anonymize Images** so that the box is checked.
4. Tap the radio button for the **format** you want to export as, either JPEG/AVI or BMP/AVI.
5. If you tapped Anonymize Images, enter a **file name** for the image file in the File Name: field.
6. Tap the arrowhead at the right-hand end of the **Save in:** field, and navigate to the directory you want to save the image file in.
7. Tap **Save**.

The system saves the image to the specified drive in the format you selected, in a new directory.

Attaching an Image to an Email Message

When you choose the Mail... option on the image context menu, you can attach the selected image to an email message.



Note: You must have an email program installed on the Terason uSmart3200T Ultrasound System computer to use this feature.

To attach an image to an email message:

1. Tap and hold on the **image thumbnail** in the thumbnail area at the right side of the Imaging window.

The Image Context menu appears.

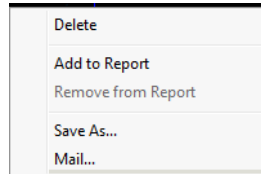


Image Context Menu

2. Tap **Mail**....

The E-mail Options window opens.

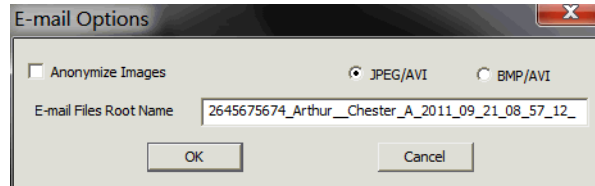


Image E-mail Options Window

3. Configure the **email options**.

- a. To remove the patient identification from the file name, tap **Anonymize Images** so that the box is checked.
- b. Tap the radio button for the **format** you want to export as, either JPEG/AVI or BMP/AVI.
- c. If you tapped Anonymize Images, enter a **file name** for the image file in the E-mail Files Root Name field.
- d. Tap **OK**.

The system launches the email program and opens a new email message with the image attached.

4. Enter the **recipient and title** of the email.
5. Add any desired **text** in the message area of the email.
6. Tap **Send**.

Deleting Studies and Images

Terason recommends that you delete unnecessary studies and images to free up disk space. Files are immediately and permanently removed from the system, and cannot be retrieved.

Deleting Studies Manually

Deleting a study also deletes its component images and loops. Deletion is permanent, and the images and loops cannot be retrieved.

To delete studies, complete these steps:

1. Tap the **Patient** button.
2. Tap the **Study List...** button.

3. If the study was not done today, tap the **Study Date** menu, and select All Dates.
4. Tap to **select the study** you want to delete.
To select multiple studies, drag out the keyboard hidden at the left side of the screen, tap the Ctrl key, then tap the unwanted studies in the list.
5. Tap the **Delete** button.
A dialog asks you to confirm that you want to delete the files.
6. Tap **Yes**.
The studies are permanently deleted, and cannot be retrieved.

Deleting Studies Automatically

You can configure the system to automatically delete studies that have been exported. See [Auto Delete Exported Studies](#) on page 152 to set up auto deletion.

Deleting Images

To delete images, complete these steps:

1. Tap and hold on the **image thumbnail** in the thumbnail area at the right side of the Imaging window.
A menu appears.

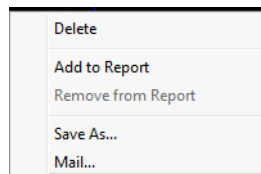


Image Context Menu

2. Tap **Delete**.
3. In the confirmation dialog box, tap **Yes**.
The image is permanently deleted, and cannot be retrieved.

Printing Images

You can print any image file from the Terason system. If you print an image loop, the Terason software only prints the currently displayed frame.



Warning: Non-medical grade report printers cannot be used within a patient environment.

Warning: During use of a non-medical grade report printer or when a non-medical grade report printer is connected to the ultrasound system, the printer must be outside of the patient environment and the ultrasound system cannot in any way be in contact with a patient.

You can use any of the following methods to print images (described in more detail in the subsequent sections):

- [Setting Up Printing](#); see page 107
- [Printing the Displayed Image](#); see page 109
- [Printing in Split Screen Mode](#); see page 109
- [Printing Multiple Images](#); see page 110

Before printing, use Print Setup... on the Print tab of the Setup window to select a default printer and default print settings, such as page size and orientation.

Setting Up Printing

Before printing, you must connect the ultrasound system to a printer and select default print settings.

Connecting a Printer

To physically connect a printer, use a USB cable connected to the printer and to the USB port on the left side of the ultrasound system. Windows automatically recognizes the printer.

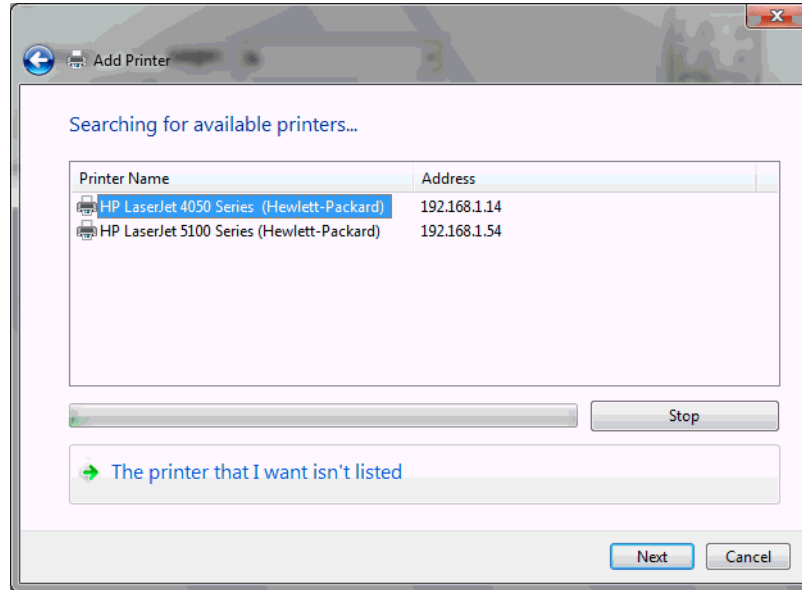
To connect a remote printer on a wired or wireless network, complete these steps:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap **Setup**.
3. On the Setup window, tap the **Print tab**.
4. Tap **Add Printer...**

The Add Printer window opens asking whether you want to connect to a local (non-USB) printer or a network printer.

5. Tap **Add a network, wireless or Bluetooth printer**.

The software begins searching for printers on all networks that the system is connected to.

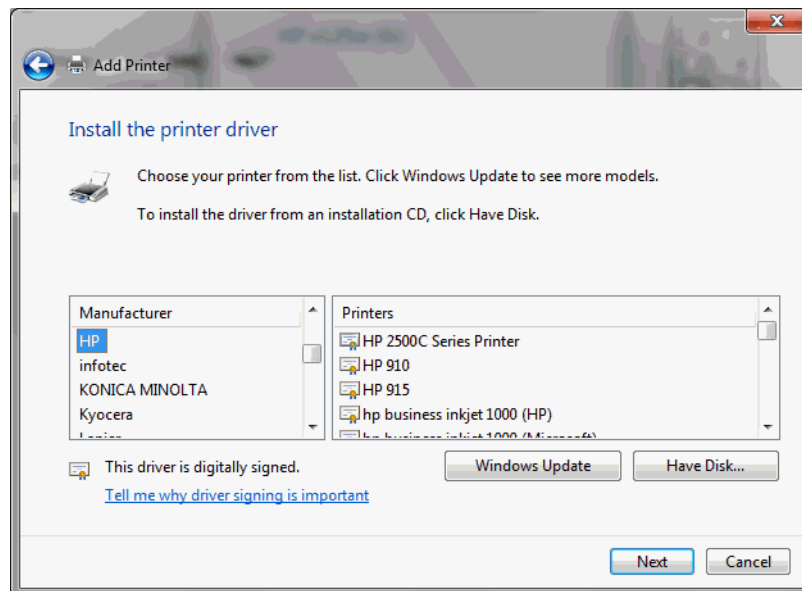


Add Printer Window

When it is done searching, the progress bar below the list turns completely green.

6. Tap the name of the printer you want to connect to, then tap **Next**.

The Add Printer window changes, showing a list of printer manufacturers and a list of models.



Getting the Printer Driver

7. Tap the **printer manufacturer name** in the left pane of the window.
8. Tap the **model of printer** you want to connect to in the right pane of the window.
9. Tap **Next**.

You may see a dialog box saying a driver is already installed, and asking if you want to use that driver or replace it.

10. Tap Next.

A confirmation message box opens.

11. Tap Next.

You may see a dialog box asking about sharing the printer.

12. Tap Next.**13. Tap Print a test page** to verify that the connection to the printer is working.**14. Tap Finish.**

Configuring Printing

You must configure the printer defaults before printing. When you tap a Print button, the image or images are sent to the printer using the defaults.

To configure the printer defaults, complete these steps:

1. Tap the **uSmart3200T** name at the top left of the screen.

2. Tap **Setup**.

3. On the Setup window, tap the **Print tab**.

4. Under **Layout**, select the number of images to print on a page.

Multiple images print only from the Thumbnail window. In all other cases, only one image prints, on one page.

5. Tap **Print Setup...** to configure setting such as Orientation (landscape or portrait), paper size, etc.

The window that opens when you tap Print Setup... is generated by the printer software, and is different for every printer.

Printing the Displayed Image

When viewing an image in the Imaging window, you can print the image. You must freeze live images before you can print them.

To print the displayed image:

1. If the image is not already frozen, tap the **Freeze** button.

2. Tap the **Print** button.

Printing in Split Screen Mode

When in Split Screen mode, the Terason software prints both screens.

To print a split-screen image:

1. Make sure that both screens are **frozen** and that you have added any necessary measurements or annotations.

2. Tap the **Print** button.

The Terason software prints the Imaging window, including both screens.

Printing Multiple Images

You can print more than one image on a page. The images must be saved.

In Setup > Page > Layout, you can set a default number for printing when multiple images are selected. The available options are 1, 2, 4, 6, or 9 images to a page.

To print more than one image on a page, complete these steps:

1. Tap **Review**.
2. Tap the **Thumbnail** button.
3. Select the **images** you want to print, by tapping them.
 - To select a **continuous sequence** of images, drag out the keyboard hidden at the left side of the screen and tap the Shift button, then tap the first and last image in the sequence.
 - To select a group of images that are **not a continuous sequence**, tap the Ctrl button and tap each of the images you want to print.
4. Tap the **Print** button.

The selected images are sent to the default printer, and printed at the number per page previously selected in the Setup window.

6 Working With Measurements

Measurements accompanying ultrasound images supplement other clinical procedures available to the attending physician. Accuracy of the measurements is determined by the Terason Ultrasound software and by proper use of medical protocols.

When you freeze a scan, the Terason software changes the set of available button controls. For example, if you scanned in 2D mode, when you freeze the image, the buttons include Trace, Ellipse, and Caliper.

When you save an image, all measurements are saved with the image.

You can create measurements on the currently acquired image (with frames stored temporarily).

To make measurements on scanned images, you must understand:

- [Measurement Results Display Location](#) on page 111
- [Measurement Sets](#); see page 112
- [Measuring in the 2D Window](#); see page 116
- [Measuring in the M-Mode Window](#); see page 120
- [Measuring in Spectral Doppler Modes](#); see page 122
- [Measuring Cardiac Exams](#); see page 122
- [Using ECG](#); see page 128
- [Deleting Measurements](#); see page 129
- [Restoring All Measurement Groups to Defaults](#); see page 129

You can also make measurements on both screens when using Split Screen mode. See [Split-Screen Measurements](#) on page 120.

To obtain a complete set of measurements, you often have to acquire multiple scans. You can make as many scans and measurements as required for the study without losing any measurements. Measurements remain on the Imaging window until you:

- Select a different exam
- Select a different scan mode
- Load a different patient
- Tap the Delete button
- Tap the Clear All button

Measurement Results Display Location

The default location for the display of measurement results is the top left of the image. To move the results to the bottom of the image, tap the Results button. You can also change the default location to the bottom of the image using the Result Display Location radio buttons on the Setup/Measurements window.

Measurement Sets

When you choose an exam preset, the Terason software makes a default set of measurements available. The default set may vary from one supported probe to another. You can also add custom measurements to the available lists. See:

- [Default Measurement Sets](#) on page 112
- [Customizing Measurement Sets](#) on page 112
- [Setting Measurement Defaults](#) on page 160

Default Measurement Sets

The system loads a set of measurements tailored for the preset you've selected. The measurements are selected using the Calc button.

To select a measurement type, tap the Calc button, and tap the desired measurement.

Customizing Measurement Sets

If the default measurement set does not include a measurement you need, you can customize the set.

To add an available measurement to the Current Measurement List, complete these steps:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap the **Setup** button.
The Setup window opens.
3. Tap the **Measurements** tab.
The Setup/Measurements window opens.

General Display **Measurements** Annotation Print Store/Acquire DICOM Export Study Info P

Configure Measurements...

Automatically measure PS/ED when select PS/ED measurement.
 Keep caliper active for Distance and Diameter measurements.
 Save measurement to report when complete.
 Redisplay Calc menu on measurement complete.

Caliper Size
 Small Large

Result Display Location
 Top Left Bottom Left

Volume Calculation Coefficient
 PI/6 Custom

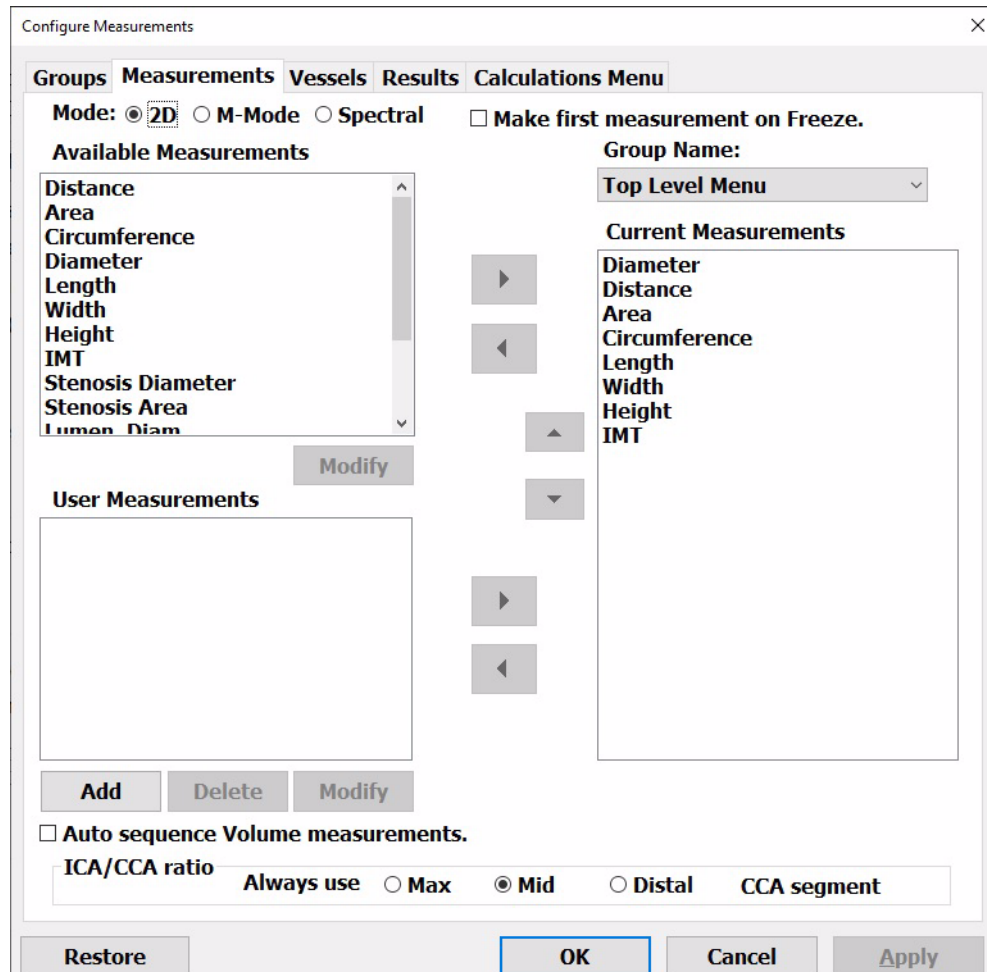
Show Measurement
 All Last Hidden

IMT Measurement
 Wall: Anterior Posterior Both
 ROI: W x H
 Display ROI position instruction.

Setup/Measurements Window

4. Tap Configure Measurements.

The Configure Measurements window opens.



Configure Measurements Window

5. To configure the Spectral Doppler measurement sets, tap **Spectral**. Otherwise, proceed to the next step.
6. In the Available Measurements area, select the desired **measurements**.
 - **To select a sequence of measurements**, drag out the keyboard hidden at the left side of the screen and tap the Shift key, then tap the first and last measurements.
 - **To select multiple measurements that are not in sequence**, drag out the keyboard hidden at the left side of the screen and tap the Ctrl key, then tap the desired measurements.
7. Tap the **right-pointing arrow** button.
The selected measurements are added to the Current Measurement List.
8. Tap **OK**.
9. On the Setup/Measurements window, tap **OK** (or **Apply**, if you need to add custom measurements).

To add a custom measurement to the Current Measurement List, complete these steps:

1. Tap the **uSmart3200T** name at the top left of the screen.

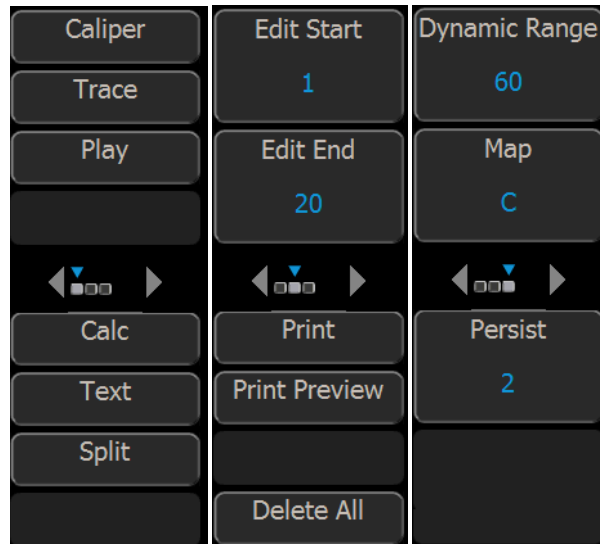
2. Tap the **Setup** button.
The Setup window opens.
3. Tap the **Measurements** tab.
The Setup/Measurements window opens. (See [Setup/Measurements Window](#) on page 113.)
4. Tap **Configure Measurements**.
The Configure Measurements window opens. (See [Configure Measurements Window](#) on page 114.)
5. Tap **Add**.
The Custom Measurement window opens.

Custom Measurement Window

6. In the **Measurement:** menu, select a measurement type.
7. In the **Name:** field, enter a name for the custom measurement.
8. Select the **tool** used for the custom measurement by tapping the appropriate radio button.
9. Tap **OK**.
10. In the User Measurements area of the Configure Measurements window, tap the **new measurement** to select it.
11. Tap the **right-pointing arrow** button.
12. Tap **OK**.
13. On the Setup/Measurements window, tap **OK**.

Measuring in the 2D Window

When you freeze a 2D scan, the Terason software displays buttons for measuring, printing, and playing loops in 2D mode.



2D Mode Measure Buttons (When Scan is Frozen)

The Measure function in the 2D window allows:

- [Measuring Distances](#); see page 116
- [Measuring Elliptical Circumference and Area](#); see page 117
- [Tracing Areas on the Image](#); see page 119
- [Split-Screen Measurements](#); see page 120

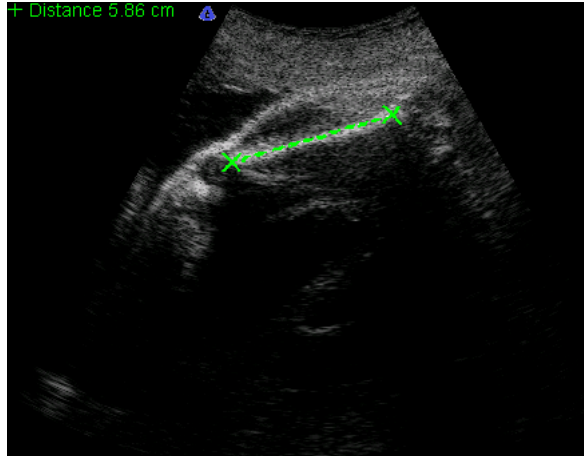
In general, select what you want to measure from the menu of measurements. If you select a specific measurement, such as Area, only the buttons that work with that measurement are available.

Measuring Distances

To measure a distance in the 2D window, complete the following steps:

1. If the image is live, tap the **Freeze** button.
The image freezes and the button controls change.
2. To measure a detailed area with precision, use the **Zoom** function (see [Enlarging an Area of the Image](#) on page 63) to enlarge an area of the 2D scan.
3. Tap the **Caliper** button.
4. Tap where you want to **start** measuring, move the target cursor, and tap where you want to **finish** measuring.

The Terason software displays the results in the top left corner of the 2D window.



Distance Measurement on an Image

If you do not see the measurement value, select Setup > General > Measurement Value.

To make more than one measurement of the same type on an image, tap the appropriate button again, then make the additional measurement.

When making a series of 2D measurements using the Caliper button, you can keep the caliper active by checking the Keep caliper active box on the Setup/Measurements window (see [Setup/Measurements Window](#) on page 113). When the box is checked, a new caliper cursor appears when you set the end point of a caliper measurement. When you finish making measurements, save the image, then tap the Freeze button to turn off caliper measuring.

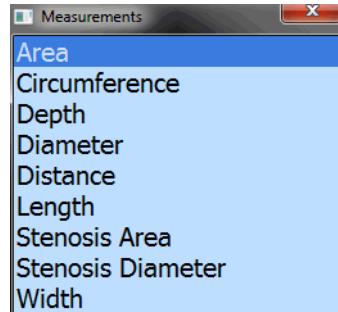
Measuring Elliptical Circumference and Area

You can use either the Ellipse button or the Trace button to measure a circumference on the image. To measure an oval area, use the Ellipse button. To measure the area of an irregular shape, use the Trace button. See [Tracing Areas on the Image](#) on page 119 for instructions on using the trace tool.

To measure a small area, use the Zoom function before you measure.

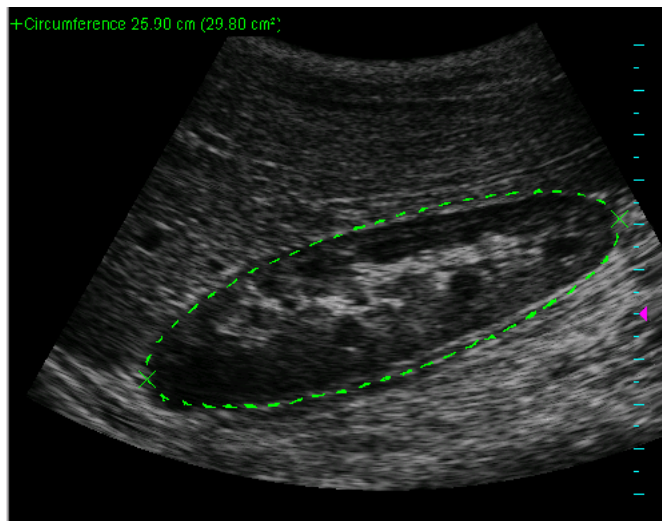
To use the ellipse tool to measure an elliptical area, complete the following steps:

1. If the image is live, tap the **Freeze** button.
The image freezes and the button controls change.
2. Tap the **Calc** button.
The Measurements menu opens.



Measurements Menu

3. Select the **measurement type** by tapping it in the Measurements menu.
If you select Circumference from the Measurement menu, the Ellipse tool is automatically activated.
4. Position the target cursor at **one end** of the area that you want to measure and tap.
5. Move the target cursor to the **other end** of the desired area, and tap.
The Terason software displays a green line and shows the circumference or area values at the top of the image.



Ellipse Measurement on an Image

- If the measurement value does not show on your computer, select Setup > General > Measurement Value.
6. When the measurement is correct, tap the **measurement** to lock it in place.
You cannot change a measurement after locking it in. You can now make another measurement without deleting the measurements you've locked in.
 7. To save the measurements, tap the **Store button**.
The image is saved with all measurements.

Tracing Areas on the Image

The Terason software lets you measure an area by tracing the contour of any shape on an image. You can also use the Ellipse tool to measure an area (see [Measuring Elliptical Circumference and Area](#) on page 117 for instructions.)

You can use the trace tool to:

- Trace an irregular shape by sketching the outline
- Draw a polygon by tapping on corners of the shape

You can also combine these methods to trace an area on the image.

To trace an area on an image, complete the following steps:

1. If the image is live, tap the **Freeze button**.

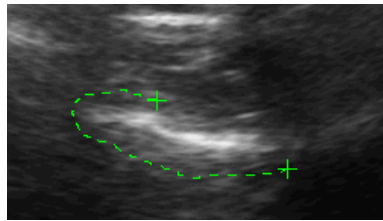
The image freezes and the button controls change.

2. Use one of the following methods to select **the trace tool**:

- Tap the **Trace** button.
- Select **Area** from the Measurement menu.

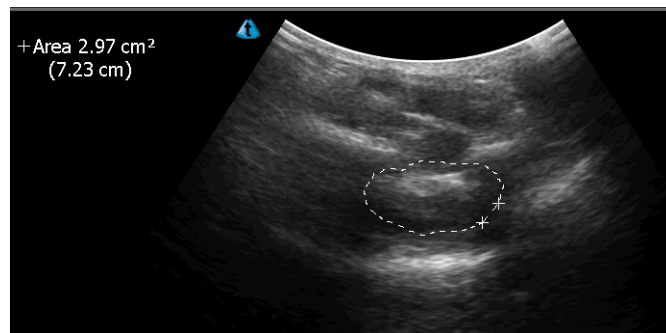
3. To **trace an outline**:

- a. Tap where you want to **start** measuring.
- b. Drag the tracing cursor around the object you want to trace.



Tracing an Outline

- c. When your trace is nearly complete, **lift the stylus**, and the software completes the loop by drawing a straight line from the current cursor position to the starting point.



Trace Measurement on an Image

When you lift the stylus, the trace turns white, and can no longer be edited. Before you lift the stylus, you can reverse the track of the cursor to delete parts of the trace.

Split-Screen Measurements

When measuring in Split Screen mode (see [Working With Split Screen Mode](#) on page 65), all measurements are displayed in a single list, even if both screens contain measurements.

You can make a measurement on either screen or across both screens.

To make alternating measurements on split screens, you must Disable Return to live imaging:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap **Setup**.
3. Tap the **Display tab**.
4. Tap **Return to live imaging on toggle active screen**, so that the box is not checked.
5. Tap **OK**.

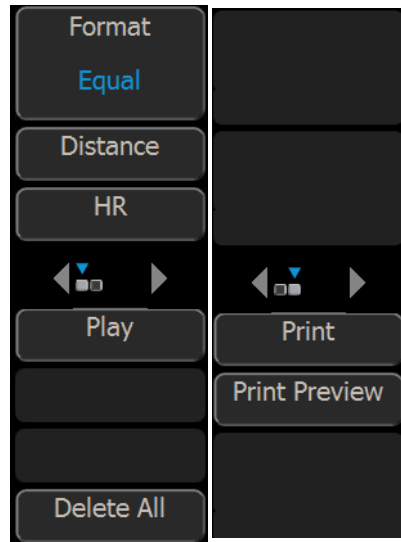
This allows you to make a measurement on one screen, switch to the other screen and make a measurement there, then return to the first screen and make additional measurements. If the box in the Setup/Display window is checked, returning to the first screen makes it live and erases all measurements on it.

To make a measurement across both screens:

1. Disable Return to live imaging, as described above.
2. **Freeze a scan** on one screen.
3. Tap the **Toggle Screen** button.
4. **Freeze a scan** on the other screen.
5. Tap the **measuring tool button** for the tool you need.
6. Tap the **start point** of the measurement.
7. Tap the **end point** of the measurement.
8. **Lift the stylus**.

Measuring in the M-Mode Window

When you freeze an M-mode scan, the Terason software displays buttons for measuring, printing, and playing loops in M-mode.



M-Mode Measure Buttons (When Scan is Frozen)

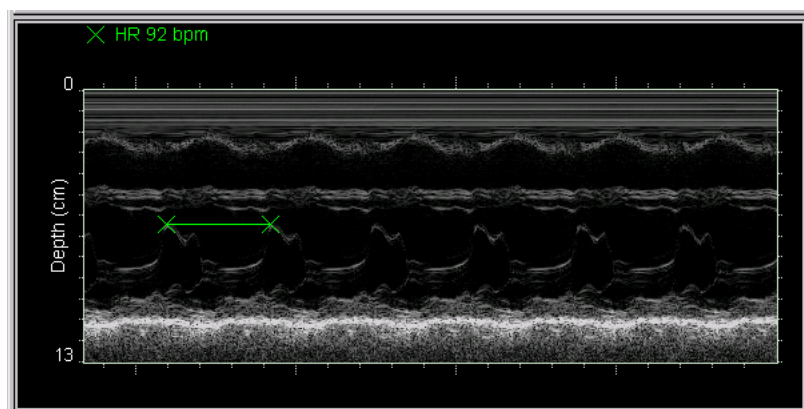
Making M-Mode Measurements

In the Time Series window of an M-Mode scan, you can measure:

- Heart rate (HR)
- Distance (includes time over distance [TD] and Slope values)

To measure in the M-Mode Time Series window, complete the following steps:

1. Tap the **Freeze button**.
2. Use the buttons to select a **measurement type**.
3. Tap the target cursor where you want to **start** measuring.
4. Move the target cursor and tap at the desired **end** location. The measurement displays at the top left of the Time Series window.



M-Mode Measurement

5. **Print and save** the image, if required.

Measuring in Spectral Doppler Modes

When you freeze a Pulsed-Wave Doppler or Triplex scan, the Terason software changes the buttons to allow measurement, printing, and other functions.



PWD Measurement Buttons

The Measurement section of the panel controls the following measurement operations:

- Velocity
- Time
- Slope
- Calc

You can use the CA (correction angle) button and the 0/+60 button to adjust the angle on the frozen scan. This function works the same as the Correction Angle on the PWD tab as described in [Adjusting the Correction Angle](#) on page 87.

If you have added 2D measurements to the Spectral measurement set (see [Customizing Measurement Sets](#) on page 112), you can perform 2D measurements in Spectral Doppler imaging screens.

To make 2D measurements on Spectral Doppler imaging screens, tap the Calc button. Any 2D measurements you have added to the Spectral measurement set appear in a Measurements menu at the top right corner of the imaging screen. See [Measuring in the 2D Window](#) on page 116 for instructions in making 2D measurements.

Measuring Cardiac Exams

You can make any of a number of cardiac measurements and then generate a report. The Terason software provides Cardiac measurements for the 2D Image Display window, the M-Mode Time Series window, and the PWD/CW Time Series window.

When you make a measurement in the 2D Image Display window, the value of the measurement displays at the top left of the window.

Intima Media Thickness (IMT)

IMT measurements are useful for diagnosing atherosclerosis, by measuring the thickness of an arterial inner wall.

To measure the carotid artery inner wall:

1. Connect a **linear probe** to the system.
2. In 2D mode, select the **Carotid preset**.
3. Scan the **carotid artery**.
4. **Freeze** the scan.
5. Tap the **uSmart3200T button**.
The Measurements menu appears.
6. From the menu, select **IMT**.
A green box displays on the image.
7. Drag the **green box** or tap a corner of the box to resize it so that it covers both walls of the artery.



Note: For correct measurements, the green box must include both walls of the artery. It need not be closely sized, so long as both wall are included.

The width of the box displays at the top left of the Imaging window.

The measurements display at the top left of the Imaging window.

Cardiac Measurement Groups

The Terason software includes default groups of commonly-used measurements that are available in the Measurements menu when an image is frozen. You can add or remove measurements from groups, and create or delete groups.

Auto Ejection Fraction

Auto Ejection Fraction (Auto EF) is a licensed option that automatically measures the amount of blood ejected by the left ventricle with each contraction, expressed as a percentage. Auto EF is available on both the Imaging and Review windows, by tapping either the EF4CH or EF2CH button. Measuring both 4EFCH and EF2CH generates biplane results.

Available Cardiac Measurements

The following tables list the measurements that are available for the various scan modes.

Cardiac Measurements in the 2D Image Display Window

Measurement Group	Measurement	Definition	Tool Used
LV Volume	LVd Ap4C	Left ventricle area, apical 4 chamber in end-diastole	MOD Trace
	LVs Ap4C	Left ventricle area, apical 4 chamber in end-systolic	MOD Trace
	LVd Ap2C	Left ventricle area, apical 2 chamber in end-diastole	MOD Trace
	LVs Ap2C	Left ventricle area, apical 2 chamber in end-systolic	MOD Trace
LV Mass	LVAAd SAX Epi	Left ventricle short-axis epicardial, in end-diastole	Trace
	LVAAd SAX Endo	Left ventricle short-axis endocardial, in end-diastole	Trace
	LVAAs SAX Endo	Left ventricle short-axis endocardial, in end-diastole	Trace
	LVLd	Left ventricle length in end-diastole	Caliper
Ventricle Dimensions	RVAWd	Right ventricle anterior wall thickness in end-diastole	Caliper
	RVIDd	Right ventricle internal dimension in end-diastole	Caliper
	IVSd	Interventricular septal thickness in end-diastole	Caliper
	LVIDd	Left ventricle internal dimension in end-diastole	Caliper
	RVAWs	Right ventricle anterior wall thickness in end-systolic	Caliper
	RVIDs	Right ventricle internal dimension in end-systolic	Caliper
	IVSs	Interventricular septal thickness in end-systolic	Caliper
	LVIDs	Left ventricle internal dimension in end-systolic	Caliper
	LVPWs	Left ventricle posterior wall thickness in end-systolic	Caliper
Valves and Atria	LVOT diam	Left ventricle outflow tract diameter	Caliper
	Ao Root diam	Aortic root diameter	Caliper
	RVOT diam	Right ventricle outflow tract diameter	Caliper
	PA diam	Pulmonary artery diameter	Caliper
	AV diam	Aortic valve diameter	Caliper
	AV area	Aortic valve area	Trace
	MV diam	Mitral valve diameter	Caliper
	MV area	Mitral valve area	Trace
	PV diam	Pulmonic valve diameter	Caliper
	TV diam	Tricuspid valve diameter	Caliper
	LA diam	Left atrium diameter	Caliper
	RA diam	Right atrium diameter	Caliper

Cardiac Measurements in the 2D Image Display Window (Continued)

Measurement Group	Measurement	Definition	Tool Used
Shunts	ASD Qp diam	Atrial septal defect pulmonic diameter	Caliper
	ASD Qs diam	Atrial septal defect systemic diameter	Caliper
	VSD Qp diam	Ventricular septal defect pulmonic diameter	Caliper
	VSD Qs diam	Ventricular septal defect systemic diameter	Caliper
	Gen Qp diam	Pulmonic diameter	Caliper
	Gen Qs diam	Systemic diameter	Caliper

Cardiac Measurements in the M-Mode Time Series Window

Measurement Group	Measurement	Definition	Tool Used
Ventricle Dimensions	RVAWd	Right ventricle anterior wall thickness in end-diastole	Depth Caliper
	RVAWs	Right ventricle anterior wall thickness in end-systole	Depth Caliper
	RVIDd	Right ventricle internal dimension in end-diastole	Depth Caliper
	RVIDs	Right ventricle inside diameter in end-systole	Depth Caliper
	LVPWd	Left ventricle posterior wall thickness in end-diastole	Depth Caliper
	LVPWs	Left ventricle posterior wall thickness in end-systole	Depth Caliper
	LVIDs	Left ventricle internal dimension in end-systole	Depth Caliper
	LVIDd	Left ventricle internal dimension in end-diastole	Depth Caliper
	IVSd	Interventricular septal thickness in end-diastole	Depth Caliper
	IVSs	Interventricular septal thickness in end-systole	Depth Caliper
Ao / LA	Ao Root Diameter	Aortic root diameter	Depth Caliper
	LA Diameter	Left atrium diameter	Depth Caliper
	MM R-R interval	M-Mode R-wave-to-R-wave interval	Time Caliper
Valves	AV R-R interval	Aortic valve R-wave-to-R-wave interval	Time Caliper
	AV Cusp	Aortic valve cusp separation	Depth Caliper
	MV D-E	Mitral valve D-to-E	Depth Caliper
	TV D-E	Tricuspid valve D-to-E	Depth Caliper
	MV E-F slope	Mitral valve E-to-F slope	Slope Caliper
	MV EPSS	Mitral valve E point septal separation	Depth Caliper
	MV excursion	Mitral valve excursion	Depth Caliper

Cardiac Measurements for PWD/CW Time Series Window

Measurement Group	Measurement	Definition	Tool Used
AV	AV Mean	Aortic valve mean velocity	Velocity Trace
	AV Peak	Aortic valve peak velocity	Velocity Point
	AV PHT	Aortic valve pressure half-time	Slope Caliper
	AV HR	Aortic valve heart rate	Heart Rate
	AI Peak	Aortic insufficiency peak velocity	Velocity Point
	LVOT Velocity	Left ventricle outflow tract mean velocity	Velocity Trace
	LVOT Peak	Left ventricle outflow tract peak velocity	
MV	MV Mean	Mitral valve mean velocity	Velocity Trace
	MV E Peak	Mitral valve E peak velocity	Velocity Point
	MV A Peak	Mitral valve A peak velocity	Velocity Point
	MV PHT	Mitral valve pressure half-time	Slope Caliper
	MV IVRT	Mitral valve isovolumetric relaxation time	Time Caliper
	MV HR	Mitral valve heart rate	Heart Rate
	MR Peak	Mitral regurgitation peak velocity	Velocity Point
	LVOT Mean	Left ventricle outflow tract mean velocity	Velocity Trace
	LV dp/dt ^a	Left ventricular contractility	Velocity Point
	PA Mean	Pulmonary artery mean velocity	Velocity Trace
PV	PV Mean	Pulmonic valve mean velocity	Velocity Trace
	PV Peak	Pulmonic valve peak velocity	Velocity Point
	PV HR	Pulmonic valve heart rate	Heart Rate
	PI Peak	Pulmonic insufficiency peak velocity	Velocity Point
TV	TV Mean	Tricuspid valve mean velocity	Velocity Trace
	TV E Peak	Tricuspid valve E peak velocity	Velocity Point
	TV A Peak	Tricuspid valve A peak velocity	Velocity Point
	TV PHT	Tricuspid valve pressure half-time	Slope Caliper
	TV HR	Tricuspid valve heart rate	Heart Rate
	TR Peak	Tricuspid regurgitation peak velocity	Velocity Point
	RV dp/dt ^b	Right ventricular contractility	Velocity Point
RVSP	TR Peak	Tricuspid regurgitation peak velocity	Velocity Point
	RA Pressure	Right atrium pressure	Entry
	VSD Peak	Ventricular septal defect peak velocity	Velocity Point
	Sys BP	Systolic blood pressure	Entry
ASD Shunt	ASD Qp TVI	Atrial septal defect pulmonic time-velocity integral	Velocity Trace
	ASD Qp HR	Atrial septal defect pulmonary heart rate	Heart Rate
	ASD Qs TVI	Atrial septal defect systemic time-velocity integral	Velocity Trace
	ASD Qs HR	Atrial septal defect systemic heart rate	Heart Rate
VSD Shunt	VSD Qp TVI	Ventricular septal defect pulmonary time-velocity integral	Velocity Trace
	VSD Qp HR	Ventricular septal defect pulmonary heart rate	Heart Rate
	VSD Qs TVI	Ventricular septal defect systemic time-velocity integral	Velocity Trace
	VSD Qs HR	Ventricular septal defect systemic heart rate	Heart Rate
General Shunt	Gen Qp TVI	Pulmonic time-velocity integral	Velocity Trace
	Gen Qp HR	Pulmonary heart rate	Heart Rate
	Gen Qs TVI	Systemic time-velocity integral	Velocity Trace
	Gen Qs HR	Systemic heart rate	Heart Rate

- a. This calculation is available in CW mode. The Time-Series window must display a velocity range that includes -300 cm/s. Use the Scale softkey to achieve this.
- b. This calculation is available in CW mode. The Time-Series window must display a velocity range that includes -200 cm/s. Use the Scale softkey to achieve this.

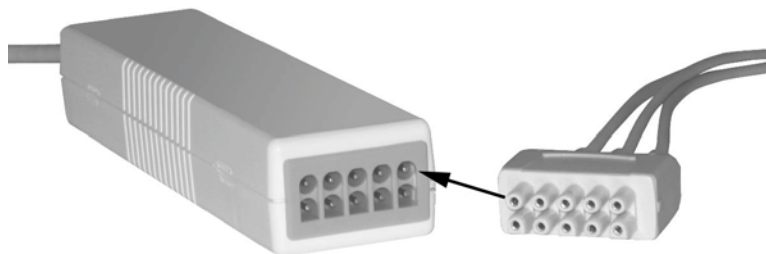
Using ECG

The uSmart3200T supports ECG measurements.

Connecting ECG

To connect ECG electrodes to the uSmart3200T ultrasound system:

1. Visually **inspect** the ECG connectors and cables. Do not use the ECG function if a connector or cable is damaged.
2. Couple the **connector** from the ECG 3-lead wireset to the ECG cable connector.



ECG Cable connectors

3. Connect the ECG cable to the **EKG port** on the right side of the ultrasound system.



ECG Cable Connection to uSmart3200T

Connecting Leads to the Patient

In keeping with existing international standards, the ECG leads for systems that operate at 115V (for example, North and South America) are red, white, and black. They are labeled RA (right arm), LA (left arm), and LL (left leg). Leads for systems that operate at 230V (for example, Europe) are green, red, and yellow. They are labeled R (right arm), L (left arm), and F (left leg).

ECG Lead Color Coding

Patient Location	100V	115V	230V
Left leg	Green	Red	Green
Right arm	Red	White	Red
Left arm	Yellow	Black	Yellow



Note: Only use ECG leads that comply with the requirements of your country.

To connect the leads to the patient:

1. Attach the **ECG electrode patches** to the patient in the locations specified above.
2. Connect each **lead** to the appropriate patch.

Deleting Measurements

You can delete the most-recent measurement, or you can delete all measurements on the current image.

To delete the most recent measurement, tap the Delete button.

To delete all measurements, tap the Clear All button.

Restoring All Measurement Groups to Defaults

To restore all measurement groups to the defaults:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap **Setup**.
3. Tap the **Measurements** tab.
4. Tap the **Configure Measurements...** button.
5. Tap the **Restore** button.
6. Tap **OK**.

7 Working With Exams

Choosing an exam loads optimized presets for many image control settings, based on the anatomy to be scanned, the probe used, and the scanning mode. The exam presets also specify the measurements appropriate for the exam. You can use these optimized presets as is, or you can adjust any of the image control settings as necessary for the specific patient and the specific exam.

You can create additional presets to store sets of image control settings for specific kinds of exams. Customized presets can minimize the number of settings you must change each time you perform a specific ultrasound exam.

To work with exams, you must understand:

- [About Exams and Presets](#); see page 130
- [Opening an Exam](#); see page 131
- [Creating Custom Presets](#); see page 132
- [Deleting Custom Presets](#); see page 133
- [Working With uSmartScan](#) on page 133

About Exams and Presets

The Terason uSmart3200T Ultrasound System provides predefined presets for all supported probes. Although several probe models may support the same exam types, the preset image control settings are unique to each probe model.

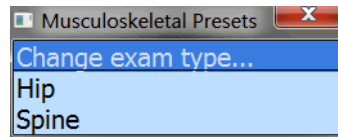
An exam includes predefined image control settings used for high, medium, and low frequencies. When you select a frequency range on the console, the Terason software loads other exam settings optimized for that frequency. When you select a different frequency, you need not reload the preset or load a different preset; the Terason software automatically updates the settings for the selected frequency.

To see a list of available presets, tap the uSmart3200T name at the top left corner of the screen, then tap Presets.

Choosing a Preset

Terason provides customized exam presets for scanning different anatomies. When you choose a preset, the Terason software loads image controls settings that are customized for that anatomy, the chosen scanning mode, and the connected probe.

To select a preset, choose it from the Presets menu by tapping it. If you do not see a preset name that corresponds to the kind of study you want to perform, you can create a custom preset. See [Creating Custom Presets](#) on page 132.



Choosing a Preset

The software displays only those exams supported by the connected probe. If you created any custom exams, they show at the bottom of the Exam menu.

Opening an Exam

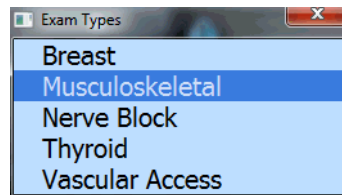
When you select an exam and preset, the Terason software loads the optimal scan settings for that preset, determined by the probe, the frequency, and the selected scan mode. If you select a different frequency or scan mode, the Terason software updates the scan settings.

You cannot open a preset when viewing a saved image.

To choose an exam type:

1. Tap the **Presets** button.
2. Tap **Change exam type...** in the Presets menu.

The Exam Types menu opens.



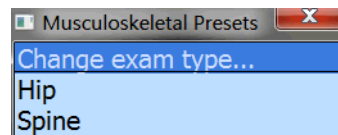
Exam Types Menu

3. Tap an **exam** in the Exam Types menu to select it.

You must also choose a preset from the Presets menu for the selected Exam type.

To select a preset:

1. Tap the **Presets** button.
2. Tap a **preset** in the Presets menu to select it.



Example Presets Menu

Creating Custom Presets

In addition to using the provided exam presets, you can create custom presets. Custom presets include your own specific modifications to the preset image control settings. You can then load the custom preset and skip setting the image control parameters. You can customize any preset to include your specific control settings.

You cannot change the default settings for a system preset. However, you can edit the image control settings of a system preset, then save it with a different name.

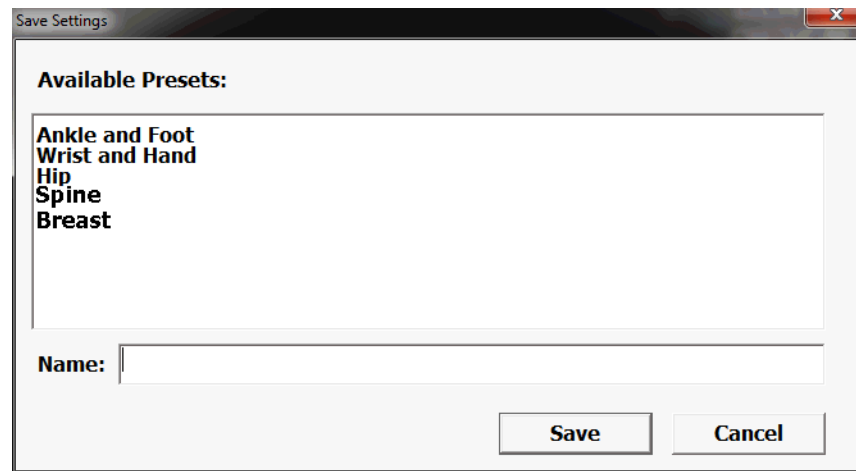
Creating a New Preset

Before you start, make sure that the probe you want to use for the new preset is connected. (If a different probe is connected, see [Switching Probes](#) on page 58 for instructions.)

To create a preset or to modify an existing custom preset, complete these steps:

1. Select the **system preset** or custom preset that has settings close to the one you want to create. See [Opening an Exam](#) on page 131.
2. Modify the image control **settings** as required. See [Working With Scan Modes](#) on page 75 for instructions.
3. Tap the **uSmart3200T** name at the top left corner of the screen.
4. Tap **Presets**.
5. Tap the **Save Settings** button at the top right corner of the screen.

The Save Settings window opens. It contains a list of presets, with system presets at the top and custom presets at the bottom.



Save Settings Window

6. Enter a name for the custom preset in the **Name:** field.

The name can be up to 16 characters long. If you are modifying an existing custom preset, make sure that name is in the field.

7. Tap **Save**.

The Terason software saves the image control settings.

The new preset is now available for use whenever the current probe is connected to the computer. If you connect a different probe, this new preset is not available.

Deleting Custom Presets

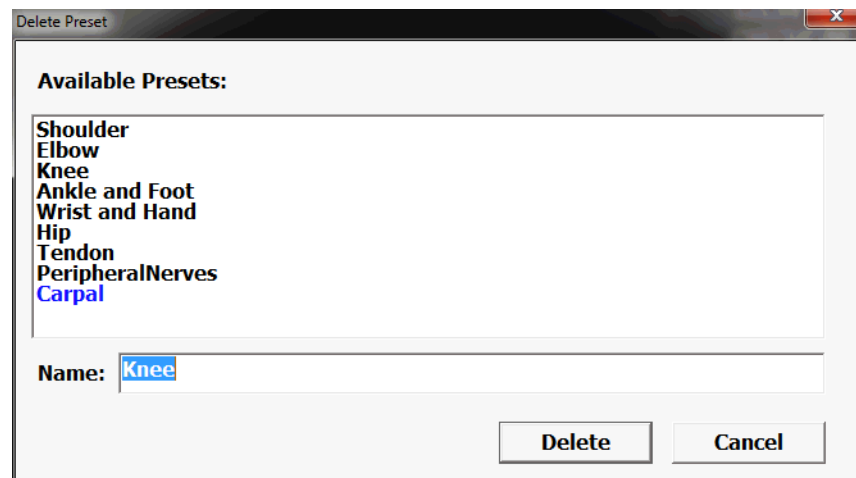
If you no longer want a particular preset, you can delete it. You can only delete custom presets; you cannot delete any of the system presets.

You cannot delete a currently-loaded preset. If the unwanted preset is loaded, select a different preset before you start this procedure.

To delete a preset, complete these steps:

1. Tap **Presets**.
2. Tap the **Delete** button.

The Delete Preset window opens



Delete Preset Window

3. Tap the preset that you want to delete from the list, and tap **Delete**.

The Terason software prompts you to confirm that you want to delete this preset.

4. Tap **Yes** to confirm the deletion.

If you select the active preset, a message box opens to tell you that you cannot remove the current preset. If that happens, tap **OK**, then open a different preset. Now you can delete the previous preset.

Working With uSmartScan

uSmartScan is a licenced option that lets you create and run scripts that automatically apply presets, imaging mode, annotations, vessel assignment and up to three measurements to an exam. This section includes [Using Existing uSmartScan Scripts](#) on page 134, [Editing a Script](#) on page 135, and [Creating New uSmartScan Scripts](#) on page 136. Also see [Setting Up uSmartScan](#) on page 166.

Using Existing uSmartScan Scripts

Not all scripts can be executed with all probes.

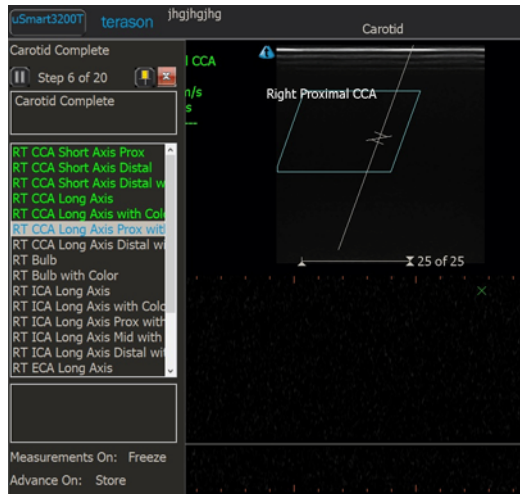
To use a uSmartScan script:

1. Tap **uSmartScan** on the system menu.

The uSmartScan menu displays a list of available scripts.


2. Tap the desired **script name** in the menu.

The chosen script begins to run, and the uSmartScan control panel opens. Completed steps show green. The step currently being executed shows blue. At the bottom of the panel, messages show whether measurements for the current step are on, and whether the script will advance to the next step when the current one is complete. When the script reaches a measurement step, the uSmartScan control panel closes, unless it is pinned (see below.)



uSmartScan Control Panel

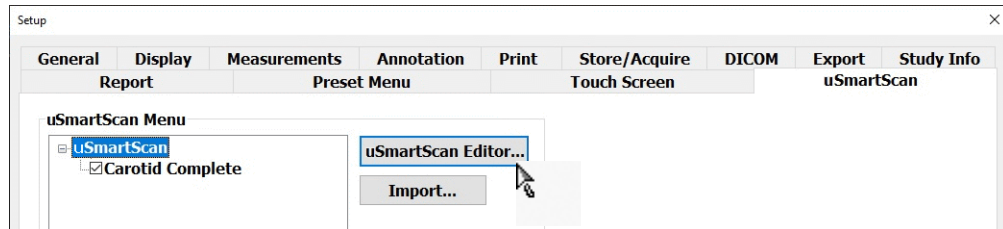
To use the uSmartScan Control Panel:

- To **stop the script** and exit uSmartScan, tap the  close button.
- To **pause the script**, tap the || pause button. Tap the first uncompleted step to resume.
- To **pin the uSmartScan Panel so it doesn't close**, tap the pushpin icon.
- To **continue to the next step** when the script does not advance, tap the next step in the list.

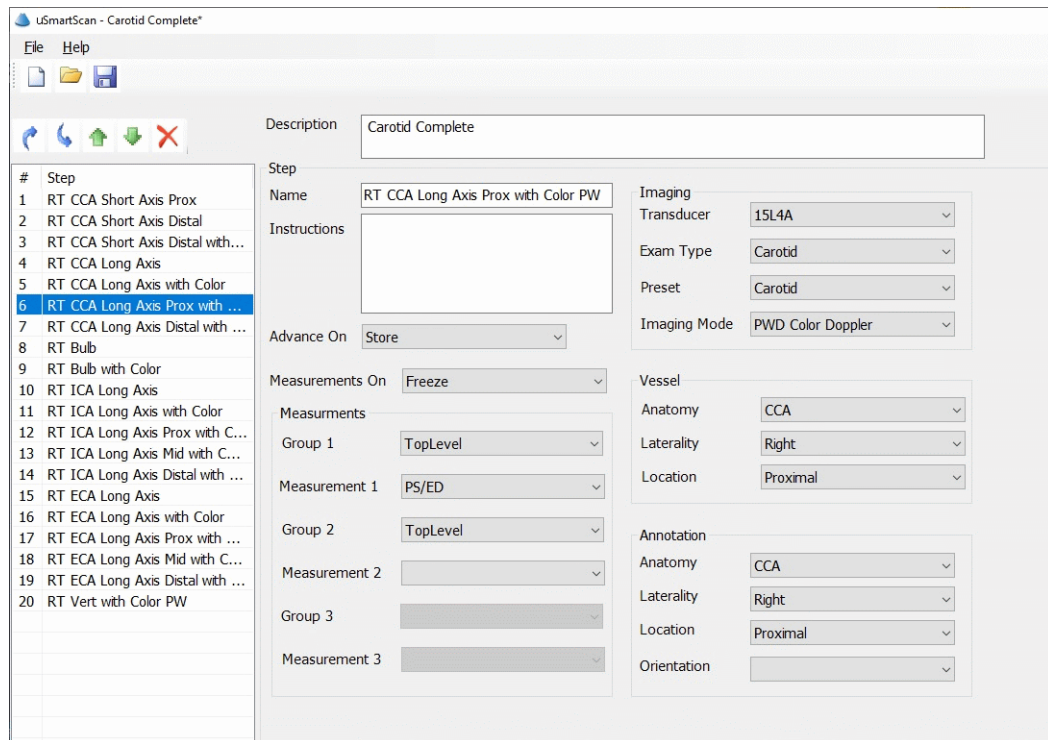
Editing a Script

To edit an existing uSmartScan script:



1. On the uSmartScan Setup Window, tap **uSmartScan Editor...**




The uSmartScan Editor window opens.








uSmartScan Editor Window

The Editor window is blank until you tap either the  New button or the  Open button.

2. Tap the  **Open button**.
3. **Select a script** from the list shown.


The panel at the left side of the Editor window lists all the steps in the Script.

4. Use the controls above the list of steps to modify the list.
 - The  Insert Above button copies the selected step above that step. To make it a new step, edit it using the fields and menus in the main part of the Editor window.

- The  Insert Below button copies the selected step below that step. To make it a new step, edit it using the fields and menus in the main part of the Editor window.
- The  Move Up button moves the selected step up one place in the list.
- The  Move Down button moves the selected step down one place in the list.
- The  Delete button deletes the selected step from the list.

Creating New uSmartScan Scripts

To create a new uSmartScan script:

1. On the uSmartScan Setup Window, tap **uSmart Scan Editor...**
2. Tap the  **New button**.
3. Use the fields and menus in the Editor window to create a new script.

8 Performing Medical Procedures

The Terason uSmart3200T Ultrasound System can aid in performing medical procedures such as biopsies. Depending on whether you purchased the additional equipment required for these procedures, you may have to understand:

- [Performing a Biopsy](#); see page 138
- [Verifying the Alignment](#); see page 145
- [Calibrating Needle Guide Positioning for Biopsies](#); see page 146
- [Cleaning the Probes and Brackets](#); see page 148

Equipment Description

To perform a biopsy, you need a probe, needle, needle guide kit, and bracket. The biopsy feature can be used with the following probes:

- 5C2A
- 8EC4A
- 9MC3
- 10EC4
- 12L5A
- 15L4
- 15L4A



Warning: Percutaneous procedures always involve heightened risk to the patient and to the operator handling biopsy needle guides. Clinicians using Terason recommended biopsy devices under ultrasound guidance should be trained and must observe proper needle insertion sequencing with the needle guide in order to avoid undue discomfort and unnecessary risk and injury to the patient.



Warning: The biopsy guidelines that display on the system monitor are not intended as an absolute reference. It is the user's responsibility to verify correct positioning of the needle during a biopsy or puncture procedure.



Warning: To reduce the risk of injury to the patient, conduct a biopsy procedure during real-time imaging. When an image is frozen, the correct positioning of the needle cannot be assured.



Warning: Ensure the accessories for a probe are properly cleaned, sterilized, or disinfected as appropriate before each use to avoid possible patient contamination.



Warning: For needle guides in sterile packaging:
The needle guide is packaged sterile and is a single-use item. Do not use if the packaging indicates signs of tampering or if the expiration date has passed.



Warning: For needle guides not in sterile packaging:
Needle Guide Bracket kits are packaged non-sterile. Sterilize these products prior to their first use.



Warning: If a needle guide becomes contaminated with tissue or fluids of a patient known to have Creutzfeld-Jacob disease, then the needle guide should be destroyed. Sterilization is not effective against Creutzfeld-Jacob contamination

Performing a Biopsy

When all of the preparatory steps are complete, and you have recently verified the alignment (see [Verifying the Alignment](#) on page 145), perform the biopsy on the patient. Note the following warnings that pertain to the biopsy procedure.



Warning: For each procedure, use a straight, new needle. Using a bent needle, or re-using a needle, can injure or infect the patient.

If the needle does not follow the expected path, discontinue the biopsy and contact a Terason representative.

The biopsy guide lines indicate only the expected path of the needle. Verify the actual needle position by identifying the echoes from the needle.



Note: If the needle strays outside of the guide lines, no warning displays.

Performing a biopsy requires that you understand:

- [Assembling the Bracket and Guide](#) on page 140
- [Biopsy Procedure](#) on page 141

Needle Guide Display

The Terason software displays guide lines for the specific probe, bracket, and needle gauge used in a biopsy or other medical procedure.

The needle guides work only in these modes:

- 2D
- Color Doppler mode

You cannot use the needle guides in:

- M-Mode
- Pulsed-Wave Doppler mode
- Triplex
- Zoom mode
- Split Screen mode

The Terason software freezes the Target Indicator when you freeze the image.

Needle Guide Kits

A needle guide kit contains several parts that fit together to attach the needle to the probe and provide a guide that directs the needle into the patient.

There are two types of needle guide kits, which are ordered directly from Civco (www.civco.com) or Protek (www.protekmedical.com):

- Starter needle guide kit
- Replacement needle guide kit

Starter needle guide kits contain both disposable and reusable parts that you need to perform a biopsy. Replacement needle guide kits contain only disposable parts. After the first time, you must use a new replacement needle guide kit each time you perform a biopsy. Refer to the manufacturer's instructions and recommendations for using needle guides. Contact the manufacturer for replacement needle guide kit ordering information.

Different needle guide kits are required for each type of probe. The following table lists the Terason probes that can be used to perform biopsies, and lists the needle guide kits that are recommended for each probe.

Terason Needle Kit Numbers

Model	Guide Kit #	Manufacturer	Type	Angle
5C2A rev.1	7138	Protek	In-plane	Single angle
5C2A rev.2	7138	Protek	In-plane	Single angle
8EC4A	610-604	Civco	In-plane	Single angle
9MC3 rev.1	7490	Protek	In-plane	Multi-angle

Terason Needle Kit Numbers (Continued)

Model	Guide Kit #	Manufacturer	Type	Angle
9MC3 rev.2	7490	Protek	In-plane	Multi-angle
10EC4	610-1274	Civco	In-plane	Single angle
12L5A	683-002	Civco	Out-of-plane	Single angle
12L5A	612-085	Civco	In-plane	Single angle
15L4	683-002	Civco	Out-of-plane	Single angle
15L4	612-085	Civco	In-plane	Single angle
15L4A	7491	Protek	In-plane	Single angle

Observe the following warnings with regard to the needle guide kits and their contents.



Warning: Do not attempt to use a needle guide kit until you have read the instructions for selecting the settings and verifying the alignment of the guide lines. Improper use of biopsy needles can cause injury to the patient.

If a needle guide kit is open when you receive it, or if it has been damaged or has condensation inside, do not use it. Contaminated medical equipment can cause patient infection.



Caution: Prevent heat damage to needle guides. Keep them below 50°C (122°F).



Warning: To eliminate the possibility of exposing patients, operators, or third parties to hazardous or infectious materials, always dispose of hazardous or infectious materials according to local, state, and regional regulations.

Assembling the Bracket and Guide

Each probe works with only one bracket.

You can also follow the procedure provided in the biopsy kit to assemble the bracket and needle guide.

Before performing a biopsy, you must assemble the needle guide parts and prepare the probe for the biopsy by completing the following steps:

1. Place an appropriate amount of **gel** inside the cover or on the probe face. Poor imaging may result if no gel is used.



Caution: Use only water-based ultrasound gel. The system is not approved for use with other types of gel.

2. Insert the probe into the **cover**, making sure to use proper sterile technique. Pull the cover tightly over the probe face to remove wrinkles and air bubbles, taking care to avoid puncturing the cover.
3. Secure the cover with the **bands** packaged with the cover.
4. **Inspect** the cover to ensure there are no holes or tears.
5. Using proper sterile technique, snap the unlocked **needle guide** onto the attachment area of the bracket.
6. Push the **lock** into the locked position.
7. Select the appropriate size needle guide **insert** and slide it into position.
8. Use the appropriate length **needle** to reach the target area.

Biopsy Procedure

The Terason Ultrasound software provides two types of needle guides, which are used with different physical needle guides. A needle guide is only available when a probe that supports that guide is connected to the ultrasound system. If more than one needle guide is available for the connected probe, you must verify that the selected guide matches the hardware installed on the probe.

The in-plane guides work with the standard needle guide hardware. These guides are two parallel lines that indicate the path of the needle when the appropriate hardware is used. Use the procedure [Using In-Plane Needle Guides](#) on page 143.

The transverse guide is a circle that indicates the depth obtained when guide hardware that includes clips to set the angle and depth of insertion is used. Use the procedure [Using Transverse Needle Guides](#) on page 144.

To turn off the needle guides, tap the lower Needle Guide button. If you were using the transverse needle guide, you may have to tap the lower Needle Guide button several times.

Using Needle Image Enhancement

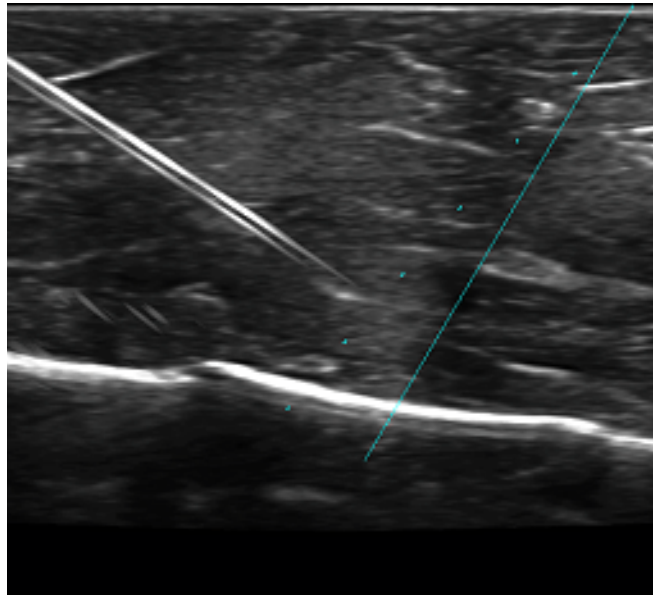
If your system is licensed for needle enhancement, the system brightens the needle image if all of the following conditions are met:

- 2D mode is selected
- A 15L4 probe, a 15L4A probe, a 16L5 probe, or a 12L5A probe is connected to the system
- A patient profile is selected
- The ENT button is pressed

Pressing the ENT button displays a solid blue line and a diverging dotted blue line on the scanning window, which mark the limits of needle enhancement. If the point of the needle goes beyond these limits, the part of the needle image that is beyond the limit is not brightened. The dotted line applies to steeper needle insertions.

A button labeled Needle Lt/Rt toggles between lines angled from upper left to lower right and lines angled from upper right to lower left.

When needle enhancement is active, the legend ENV (for Enhanced Needle Visualization) appears in the scan information area at the right side of the imaging window.

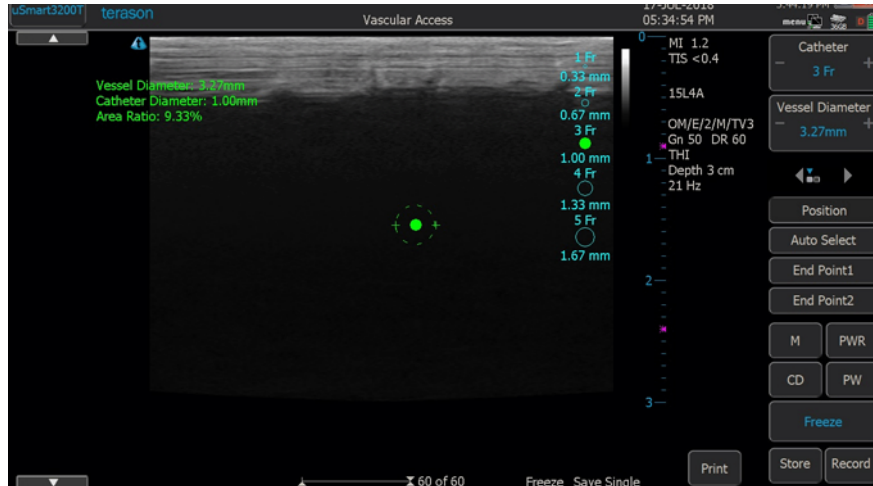


Scanned Image With Needle Enhancement

To activate needle image enhancement, press the ENT button.

Catheter Sizing

Catheter Sizing is a measurement that aids in selecting the correct size catheter for PICC line placement. A circular graphic on the display represents the vessel and catheter diameters, and is linked to a list of catheter sizes at the right side of the image. The vessel diameter, catheter diameter, and area ratio (of the catheter to vessel) display on the left side of the image.



Catheter Sizing

To use catheter sizing:

1. During a vascular exam, select **Catheter Sizing** from the measurements menu.
2. Move the circular catheter size graphic onto the **target vessel**.
3. **Drag the outer circle** to match the vessel diameter.
4. Select **Auto Select** to learn the system's recommendation for a catheter size, as shown in the list to the right of the image.

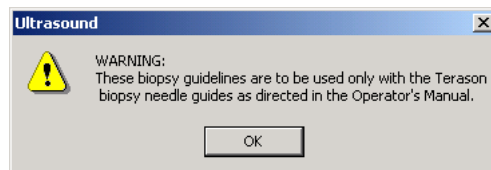
To select a different catheter size, tap it on the list, and the size graphic and description change to show that size. When you select a different size, a thin blue circle in the graphic indicates the size of the recommended catheter.

Using In-Plane Needle Guides

To perform a biopsy using the in-plane needle guides, complete these steps:

1. Start **live imaging**.
2. Tap the **Needle Guide** button.

The needle guide lines show in the Imaging window, along with a warning message.

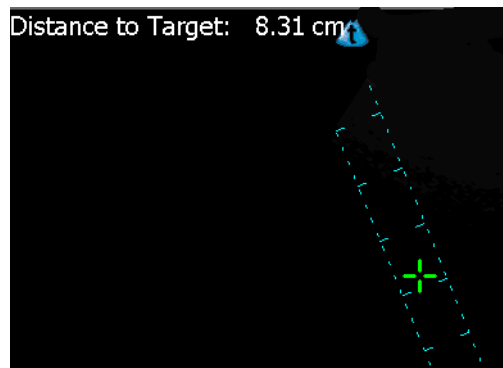


Biopsy Warning

3. Tap **OK**.

The warning closes and the Terason software displays the needle guides and target indicator. The guide lines show you where the needle should be inserted into the patient. The green target indicator can be moved within the guidelines to the exact

location of the biopsy target. The Distance to Target: value then shows exactly how deep the needle must be inserted to reach that target.



Needle Guides and Target Indicator

The large tick marks on the guide lines are at 1 cm intervals, and the distance between the guide lines is fixed at 1 cm.

4. If the green Target Indicator does not show within the guides, tap the **Target button**.
The Terason software adds the “Distance to Target” value at the top of the image.



Warning: If the message “Uncalibrated” displays next to the “Distance to Target” text, the probe may be uncalibrated, or your calibration file may be missing or corrupted. Uncalibrated probes can apply harmful levels of energy to the patient. Contact your Terason representative.

5. Drag the **target indicator** to the correct depth.
You cannot move the target outside of the guide lines.

6. Follow the **proper medical protocol** to complete the biopsy.

The target distance is measured in centimeters and is calculated as the distance from the bottom of the clip to the patients’ skin (as indicated by the top of the needle guide lines) plus the distance from the skin line to the target as indicated by the location of the green target indicator.

When you insert the needle, it should be located near the center of the guidelines. If the needle appears outside of the lines, verify that you have selected the appropriate needle guide. If you have, stop the procedure immediately and contact a Terason representative.

Using Transverse Needle Guides

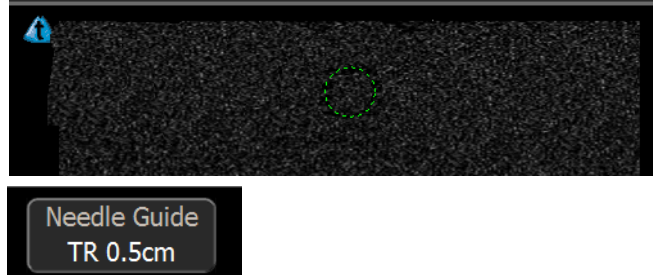
To perform a biopsy using the transverse needle guides, complete these steps:

1. Start **live imaging**.
2. Tap the **Needle Guide button**.

The needle guide lines show in the Imaging window, along with the warning message. (See [Biopsy Warning](#) on page 143.)

3. Tap **OK**.
4. Tap the **Guide Type** button.

A transverse needle guide circle replaces the in-plane needle guides on the Imaging window, and the Needle Guide button displays the identification of the guide.



Transverse Needle Guide and Button

5. If the guide is not the correct one for the clip you have attached to the hardware guide, tap the **Guide Type** button until the correct guide displays.
6. Follow the **proper medical protocol** to complete the biopsy.

Verifying the Alignment

To ensure that the probe and biopsy attachment are accurately aligned, and that the needle path is within the stated specification, Terason strongly recommends that you periodically conduct a simulation test. To conduct this test, you must have an assembled biopsy bracket, needle guide, and a water tank.

Use 2D to verify the alignment, and do not use the Zoom tool. The needle guides do not show in zoomed displays.

To verify the alignment of the probe and biopsy attachment, complete these steps:

1. If the needle guides are not visible, tap the **Needle Guide** button. The biopsy guides appear in the Imaging window.
2. Tap the **Guide Type** button to select the needle guide to use for the test.
There may be only one guide available for the installed probe.
3. Assemble the **bracket, needle guide clip, and gauge insert pin** as described in [Assembling the Bracket and Guide](#) on page 140.
4. Insert the needle into the **gauge insert pin**.
5. Place the needle in a **water tank**, ensuring that you do not touch the side or bottom of the water tank (which can bend the needle and produce an inaccurate reading).
6. Verify that the **needle** appears clearly between the two guidelines.
7. Remove the **needle** from the biopsy bracket and safely dispose of the needle.
8. Detach the **biopsy bracket** from the probe.

Calibrating Needle Guide Positioning for Biopsies

The Terason software lets you make small adjustments to the positioning of the needle guides (used in biopsies) and the insertion grid (used for cryoablation or brachytherapy).

When you receive needle guides, they are already configured and tested for angle and depth. The angle is the number of degrees between the X-axis and the Y-axis (the needle axis). The depth, shown in millimeters, is the point at which the biopsy needle and guide lines intersect the vertical center line of the 2D image.

You can make marginal changes to the upper and lower limits for angle and depth on the Needle Guide Error Correction dialog box. Your changes to these settings are visible in the needle guidelines, and are saved by the system and used for all biopsies until you change them again.

You can change the value within these ranges:

- Angle: -2° to 2°
- Depth: -1 mm to 1 mm

To change the needle guide error correction values for any probe except the biplanar probe, complete these steps:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap **Setup**.
3. Tap the **Display** tab.

The Setup Display window opens.

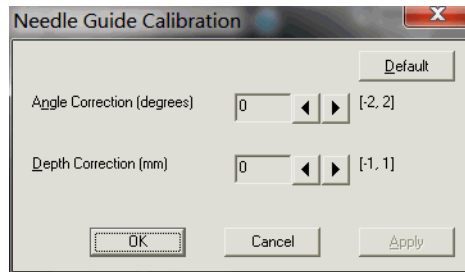
Setup

Report		Preset Menu		Touch Screen		SmartScan	
General	Display	Measurements	Annotation	Print	Store/Acquire	DICOM	Export
<input checked="" type="checkbox"/> Center ROI at Spectral Gate <input type="checkbox"/> Scale linear images for maximum width <input type="checkbox"/> Scale linear images for maximum height PW Update Mode <input type="radio"/> Non-Simultaneous <input checked="" type="radio"/> Simultaneous		Split Screen <input checked="" type="checkbox"/> Combine image <input checked="" type="checkbox"/> Crop image <input checked="" type="checkbox"/> Return to live on toggle screen <input type="checkbox"/> Sync image settings when toggle screen		TI Selection <input checked="" type="radio"/> TIS <input type="radio"/> TIB <input type="radio"/> TIC		Needle Guide <input type="checkbox"/> Show Target Indicator when turn on Needle Guide Calibration... <input type="checkbox"/> Use single line Needle Guide Date Format MM/dd/yyyy	
M-Mode Format <input type="radio"/> S/L <input checked="" type="radio"/> Equal <input type="radio"/> L/S <input type="radio"/> 2D/MMode		Spectral Format <input type="radio"/> S/L <input checked="" type="radio"/> Equal <input type="radio"/> L/S <input type="radio"/> 2D/Spectral		Transducer Center Marker <input type="checkbox"/> Show using <input checked="" type="radio"/> Line or <input type="radio"/> Arrow		Patient Info Units <input checked="" type="radio"/> English <input type="radio"/> Metric <input type="checkbox"/> Show both on Patient screen	
<input type="checkbox"/> Show horizontal ruler <input type="checkbox"/> Use High PRF <input checked="" type="checkbox"/> Show number on Depth Ruler <input type="checkbox"/> Center Image Vertically <input type="checkbox"/> Depth Dependent Optimization <input type="checkbox"/> Enable Secondary Monitor Image							

Setup Display Window

- In the Needle Guide section, tap the **Calibration...** button.

The Needle Guide Calibration dialog box opens.



Needle Guide Calibration Dialog Box

You can tap the **Apply** button to see the effects of your choices without closing the dialog box. tap the **Default** button to reset the values to the factory-set values.

- Next to the **Angle Correction** field, tap the left and right arrows to correct the angle by one or two degrees.
- Next to the **Depth Correction** field, tap the left and right arrows to correct the depth by plus or minus one millimeter.
- Tap **OK** to save your entries and close the dialog box.

Cleaning the Probes and Brackets

The probe must be cleaned and high-level disinfected between patients. For instructions, refer to “Processing Terason Probes Between Uses” in *Volume 2* of this guide.

9 Working With Setup Tools

Setup Tool Overview

The **Setup** window allows you to set defaults and control various functions of the Terason software. The Setup window tabs display sets of controls for defaults and other settings.

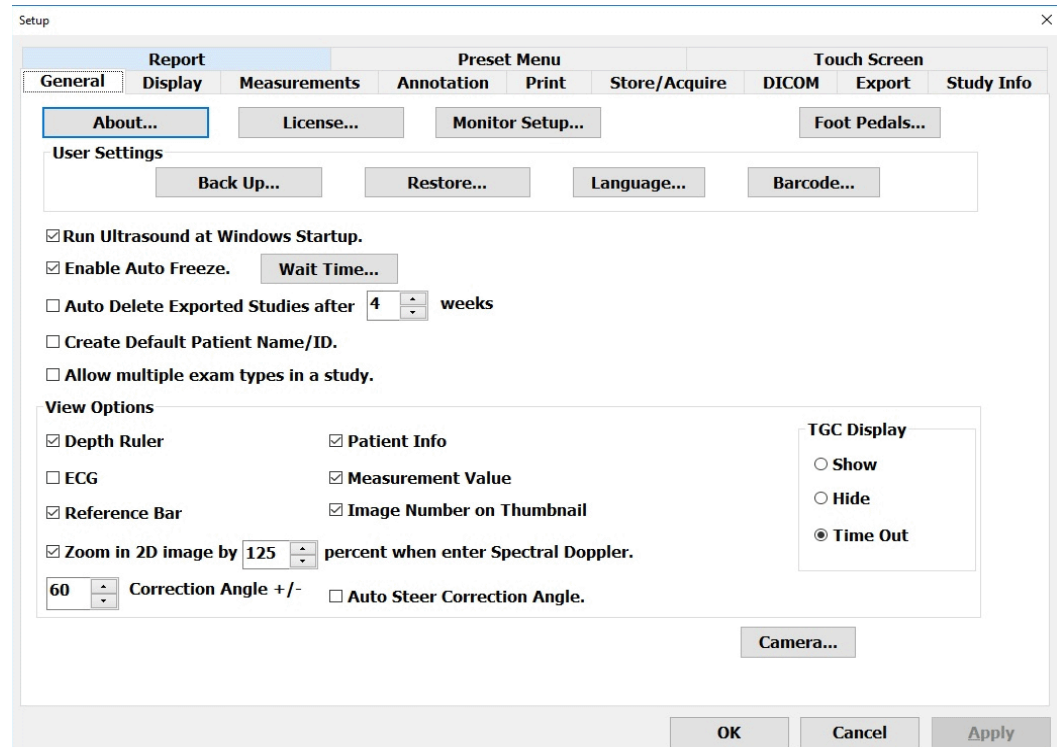
To access the Setup tools, tap the uSmart3200T name at the top left corner of the screen, then tap Setup.

The controls are described in these sections:

- [Using General Setup Controls](#), see page 150
- [Setting Export Defaults](#), see page 154
- [Setting Display Defaults](#), see page 158
- [Setting Measurement Defaults](#), see page 160
- [Using Annotation Setup Controls](#) on page 161
- [Setting Print Defaults](#) on page 161
- [Setting Storage and Acquisition Defaults](#) on page 163
- [Setting DICOM Defaults](#) on page 165
- [Setting Up uSmartScan](#) on page 166

Using General Setup Controls

When you tap **Setup**, then tap the **General** tab, the Setup window offers several controls for different actions and defaults.



Setup General Window

About

The About button opens a message box that includes the version number of the Terason Ultrasound software.

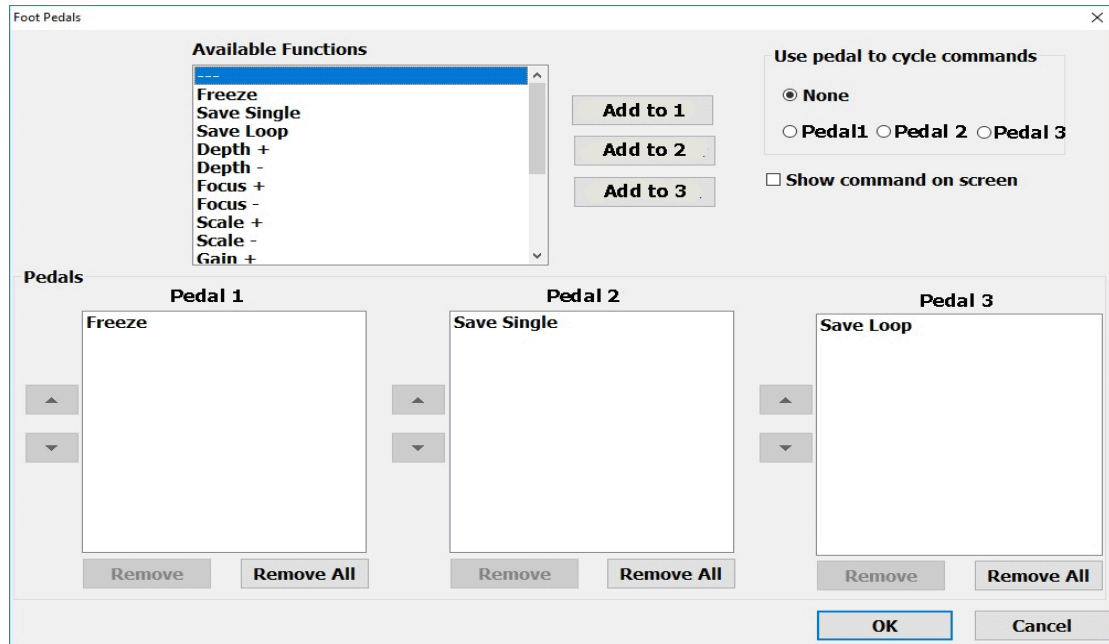
License

The License button opens the Ultrasound License Registration window, where you can enable optional features you have purchased.

Monitor Setup

The Monitor Setup button opens a window where you can change the default monitor profile (useful if you're using a separate monitor), and run different tests on the selected monitor.

Foot Pedals



Foot Pedal Configuration Screen

This button opens a screen for configuring foot pedals. You can select actions from the Available Functions menu and add them to as many as three pedals. If more than one action is added to a pedal, you can cycle through the actions if the cycle commands button for that pedal is selected. If Show commands on screen is selected, the currently active pedal actions display at the bottom of the imaging screen.

Disable Touch Screen

The Disable Touch Screen button shuts off the touch functions so you can clean the screen without compromising data or settings.

To disable the touch screen: Tap the Disable Touch Screen button.

To enable the touch screen: Press and hold the Close button for 5 seconds.

Startup

The Run Ultrasound at Windows Startup box is checked by default. This makes the ultrasound system start automatically when the computer is started. Unchecking the box means you have to manually start the Terason Ultrasound software.

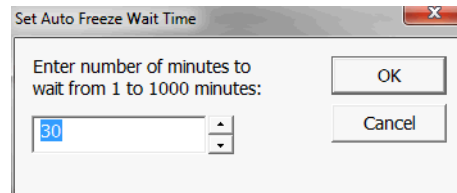
Auto Freeze

The Terason software lets you set a time value that shuts off power to the probe and freezes the scan if the system has been inactive for the specified period. This feature is especially useful when you run a tablet on battery power.

To set the **Auto Freeze time**, complete these steps:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap **Setup**.
3. On the Setup/General window, make sure the checkbox next to **Enable Auto Freeze** is checked.
4. Tap the **Wait Time...** button.

The Set Auto Freeze Wait Time window appears.



Setting the Auto Freeze Time

5. Tap the up and down arrows to select a different value.
6. Tap **OK**.

When the specified number of minutes elapses, the computer shuts off power to the probe and displays the following message:

Program has automatically suspended.

The Terason title bar changes to **Terason - Suspended**, to indicate that probe power is shut down. When you tap anywhere on the screen, the Terason software sends power to the probe and removes the message box.

Auto Delete Exported Studies

When you check this box, exported studies are automatically deleted from the ultrasound system when the selected number of weeks have passed since the study was created. If a study was created at a time that is further in the past than the number of weeks selected, it is immediately deleted when it is exported. You can select any number of weeks from 0 to 99.

Studies that have not been exported are not automatically deleted.

View Options

Several checkboxes that toggle different features of the Imaging window on and off are offered in the View Options area. Tap the check boxes to enable or disable the feature. When the box has a checkmark, the feature is enabled.

Depth Ruler sets whether or not to show the depth ruler.

ECG sets whether output from ECG leads is displayed.

Reference Bar sets whether the color doppler reference bar displays.

Patient Info sets whether the patient information is shown at the top of the Imaging window.

Measurement Value sets whether the values of measurements on the Imaging window are displayed.

TGC Display

You can choose whether and for how long the Time Gain Compensation display appears on the Imaging window.

- **Show** sets the TGC display to always show.
- **Hide** sets the TGC display to never show.
- **Time Out** sets the TGC display to show for a few seconds after an adjustment affecting TGC is made.

Zoom in 2D image by

You can set the ratio used to zoom in on 2D images when entering Spectral Doppler modes. Click the up or down buttons to change the zoom ratio. You can also tap in the

number field, then tap the keyboard button  that appears, then enter the desired zoom ratio using the keyboard number keys.

Correction Angle

You can set the angle applied by the CA +/-60 button in PWD mode. Tap the up or down arrow to change the setting. You can also tap in the number field, then tap the keyboard button that appears, then enter the desired angle using the keyboard number keys.

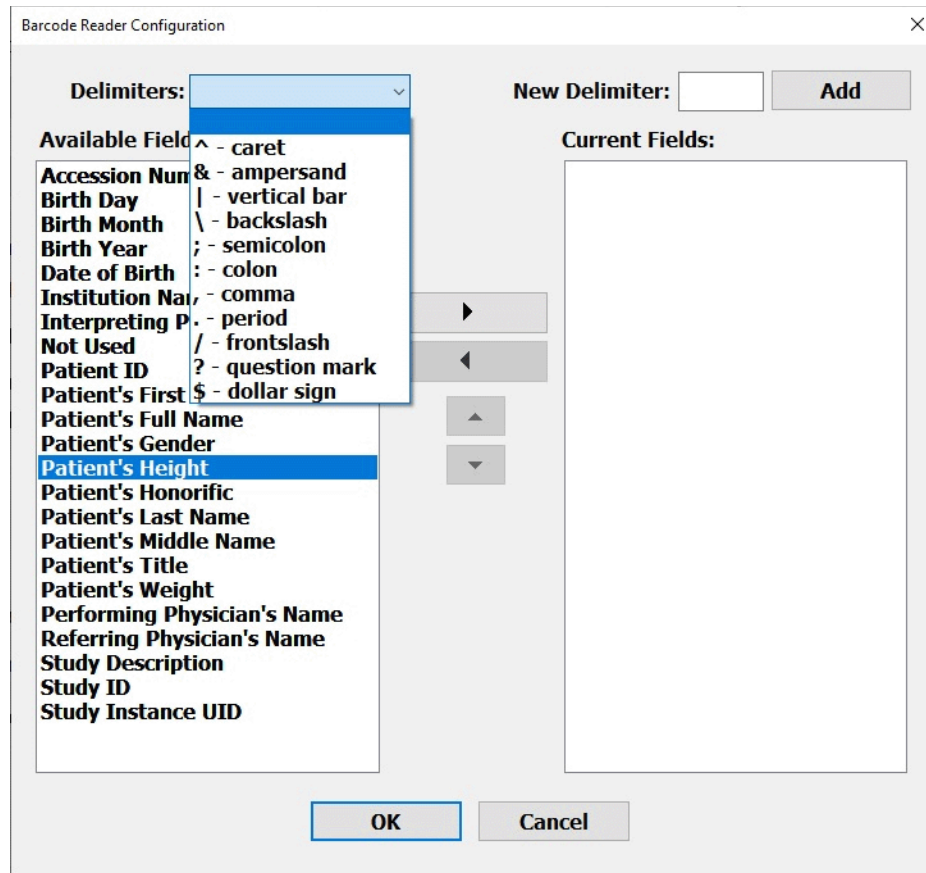
When you change the angle setting, the number on the button changes to match. For instance, if you change the angle to 50, the button reads CA +/-50.

Auto Steer Correction Angle

This checkbox toggles the correction angle auto steer on and off.

Barcode

This opens a window that lets you configure barcode data entry.

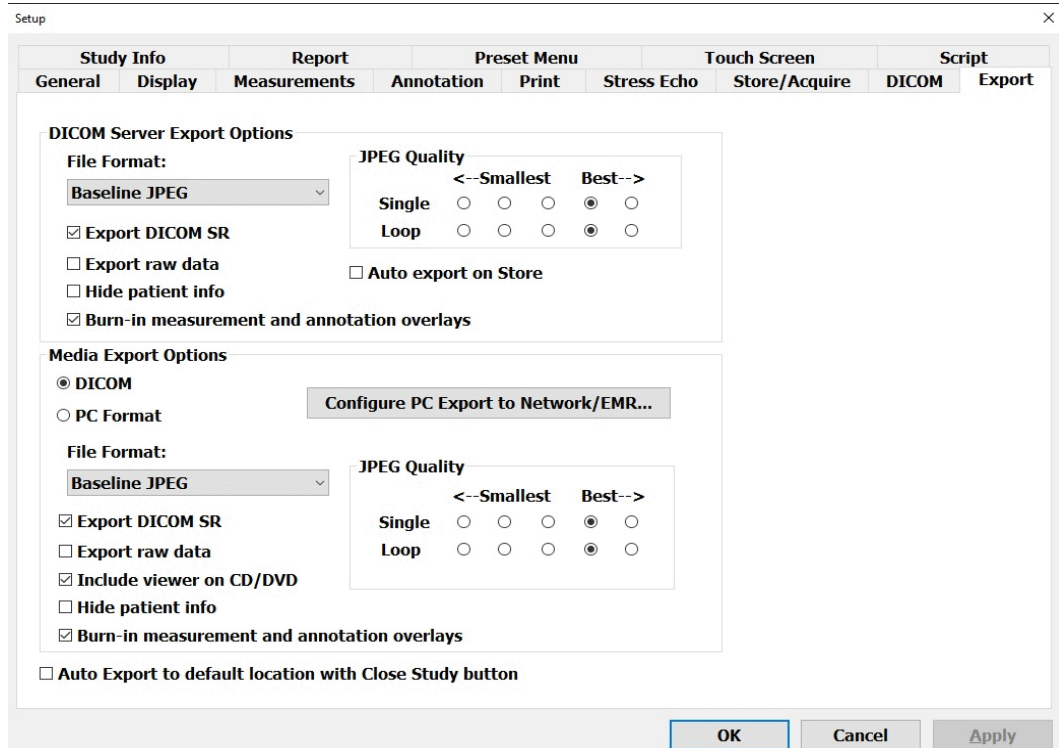


Barcode Configuration Window

Setting Export Defaults

When you tap **Setup**, then tap the **Export** tab, the Setup window offers several controls for different actions and defaults.

You can choose a different format for exporting images or loops to a CD, DVD, USB, or other network location.



Setup Export Window

Media Export Options

Choices in this section affect the format of files exported to a CD, DVD, or USB drive.

Selecting the **PC Format** radio button lets you choose a different format for export. You can choose any of the following formats:

- Palette Color (8-bit color)
- RGB (24-bit color)
- Palette Color RLE (Palette Color with run-length encoding applied)
- RGB, RLE (RGB with run-length encoding applied)
- Baseline JPEG

Selecting the **Include viewer on CD/DVD** checkbox includes a DICOM image viewer on CDs and DVDs burned with the Terason Ultrasound software. This lets DICOM loops play on systems that do not have the Terason software installed.

Selecting **Export raw data** includes raw data for images stored with that data. Such images can be reprocessed after export.

PC Export Options

The PC Export button on the Setup/Export window opens a dialog box that lets you set defaults for exporting to other locations on a network. PC Export does not work with DICOM.

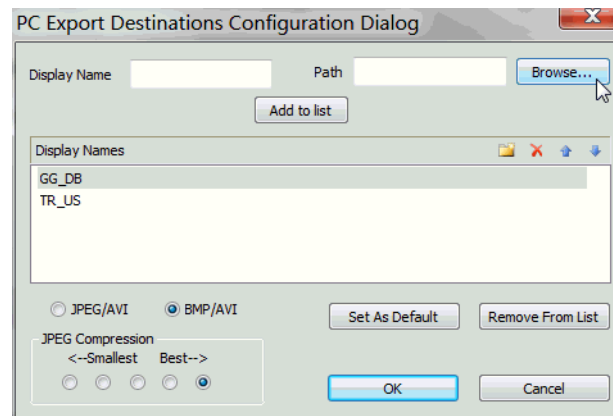
Locations added as export destinations appear in a drop-down menu on the Export Selection window. If more than one destination is added to the menu, you can select one as a default. If only one destination is added, or if a destination is designated the default, the

Export button on the Export Selection window immediately sends the image to that destination. If more than one destination is added, and no destination is designated the default, tapping the Export button on the Export Selection window opens a notification box with a message saying you must choose a destination EMR.

To add a destination EMR:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap **Setup**.
3. In the Setup window, tap the **Export** tab.
4. On the Setup/Export window, tap the **Configure PC Export to Network/EMR** button.

The PC Export Destinations Configuration Dialog box opens.



PC Export Destinations Configuration Dialog Box

5. Tap **Browse...**

The system searches the network, and displays a list of possible destinations in a Select Path window.

6. Select the **export destination** from the Current Path list on the Select Path window.
7. Tap **OK**.
8. On the PC Export Destinations Configuration Dialog box, tap in the **Display Name** field, and enter a name for the destination.
9. Tap **Add to list**.

The destination is added to the Display Names list, and will appear in the drop-down menu on the Export Selection window.

To set defaults for PC Export:

1. To set a destination as the default, select it in the Display Names list, then tap **Set As Default**.
2. Select either **JPEG/AVI** or **BMP/AVI**.
3. Select the **JPEG compression** level.
4. Tap **OK**.

The selected defaults are set.

Burning Measurements and Annotations for Export

Some servers do not allow overlays on images. If the images you export are stripped of measurements and annotations, you must burn those into the images when exporting.

To configure export to burn measurements and annotations into images:

1. Tap the **uSmart3200T** name at the top left of the screen.
2. Tap **Setup**.
The Setup window opens.
3. Tap the **Export tab**.
The Setup/Export window opens. (See [Setup Export Window](#) on page 155.)
4. Tap the **Burn-in measurement and annotation overlays** checkboxes.

Setting Display Defaults

When you tap **Setup**, then tap the **Display** tab, the Setup window offers several controls for different actions and defaults.

The Display tab on the Setup window controls how certain features of the Imaging window are displayed.

Setup Display Window

Return to live on toggle screen

The checkbox controls whether toggling between split screens makes the active screen live or not.

When the box is **unchecked**, toggling between the screens leaves them both frozen. Tapping the Freeze button makes the active window live. Toggling to the other screen and back freezes both screens again.

When the box is **checked**, toggling between windows makes the active window live, even if it was previously frozen using the Freeze button.

Center ROI at Spectral Gate

When this box is checked, the feature centers the region of interest around the spectral gate.

Scale linear images for maximum width

When this box is checked, the feature widens the display for shallow scans.

Scale linear images for maximum height

When this box is checked, the scan display size increases when the scan depth is set to 2 cm.

Patient Info Units

You can choose to have the height and weight values in patient information sets display as either Metric or English units. When you change from one to the other, the software automatically calculates the equivalent value in the new units. For example, if the patient's height was entered as 2 meters, when you change to English units, that value is changed to 6 feet 7 inches.

You can also have both units display on the Patient window.

Update Mode

When they are selected, Spectral Doppler modes normally open updating both the Time Series display and the 2D display simultaneously. This is the default, and is the Simultaneous selection on the Setup Display window. Selecting Non-Simultaneous causes Spectral Doppler modes to open with the 2D display frozen.

Whichever radio button is selected, tapping the Update button toggles the 2D display between live and frozen.

Needle Guide

This section includes a checkbox that shows or hides the Target Indicator and a button that opens the Needle Guide Calibration window.

Needle guide calibration is used exclusively with the biopsy/medical procedures options. See [Calibrating Needle Guide Positioning for Biopsies](#) on page 146 for information on correcting the needle guide position.

M-Mode Format and Spectral Format

These radio buttons set the relative sizes of the 2D display and the Time-Series display on the Imaging window.

- **S/L** makes the 2D display half the height of the Time-Series display
- **Equal** makes the 2D display the same height as the Time-Series display
- **L/S** makes the 2D display twice the height of the Time-Series display

See [Resizing the 2D and Time-series Displays](#) on page 64.

TI Selection

This chooses the thermal index that is displayed on the scanning window. Refer to “General Description of Indices” in *Volume 2* of this guide for more information about thermal indices.

- TIS is the Soft Tissue index.
- TIB is the Bone index.
- TIC is the Cranial index.

Combine Image

Allows measurement across both images in split-screen mode.

Crop Image

When checked, this cuts the edges of trapezoidal or sector images in split-screen mode to increase the image size.

Return to live on toggle screen

When this box is checked, toggling from one split-screen view to the other makes the selected view live.

When the box is not checked, both views remain frozen when toggling from one to the other, until the Freeze button is tapped.

Show horizontal ruler

When this is selected, a ruler displays across the top of the scan window.

Show number on depth ruler

When this is selected, the depth ruler displays numbers corresponding to the selected depth.

Use High PRF

Selecting this enables High PRF in Pulse-Wave Doppler mode.

Depth Dependent Optimization

This option lets you set focus parameters separately for each depth.

Enable Secondary Monitor Image

This option enables the display of the image on a second monitor, using a separate monitor calibration from the system display.

Setting Measurement Defaults

When you tap **Setup**, then tap the **Measurement** tab, the Setup window lets you choose which measurements appear on the menu accessed by the Calc button on frozen images. See [Measurement Sets](#) on page 112 for instructions on how to do that.

The Setup Measurement window also includes controls for choosing the size of the measurement cursor, the tables used in calculating obstetric measurements, and the port used to send measurements to another location.

The Volume Calculation Coefficient selection chooses either the standard $\text{PI}/6$ ellipsoid coefficient, or a custom value. The default for the Custom selection is 0.479, another commonly used value, but you can enter any value.

General	Display	Measurements	Annotation	Print	Store/Acquire	DICOM	Export	Study Info	P
Configure Measurements...									
<input type="checkbox"/> Automatically measure PS/ED when select PS/ED measurement. <input type="checkbox"/> Keep caliper active for Distance and Diameter measurements. <input checked="" type="checkbox"/> Save measurement to report when complete. <input type="checkbox"/> Redisplay Calc menu on measurement complete.									
Caliper Size <input type="radio"/> Small <input checked="" type="radio"/> Large					Result Display Location <input checked="" type="radio"/> Top Left <input type="radio"/> Bottom Left				
Volume Calculation Coefficient <input checked="" type="radio"/> PI/6 <input type="radio"/> Custom <input type="text" value="0.479000"/>					Show Measurement <input checked="" type="radio"/> All <input type="radio"/> Last <input type="radio"/> Hidden				
IMT Measurement Wall: <input type="radio"/> Anterior <input type="radio"/> Posterior <input checked="" type="radio"/> Both ROI: W <input type="text" value="1.0000"/> x H <input type="text" value="1.0000"/> <input checked="" type="checkbox"/> Display ROI position instruction.									

Setup Measurements Window

Caliper Size

To change the size of the measurement cursor, tap the Small or Large radio button.

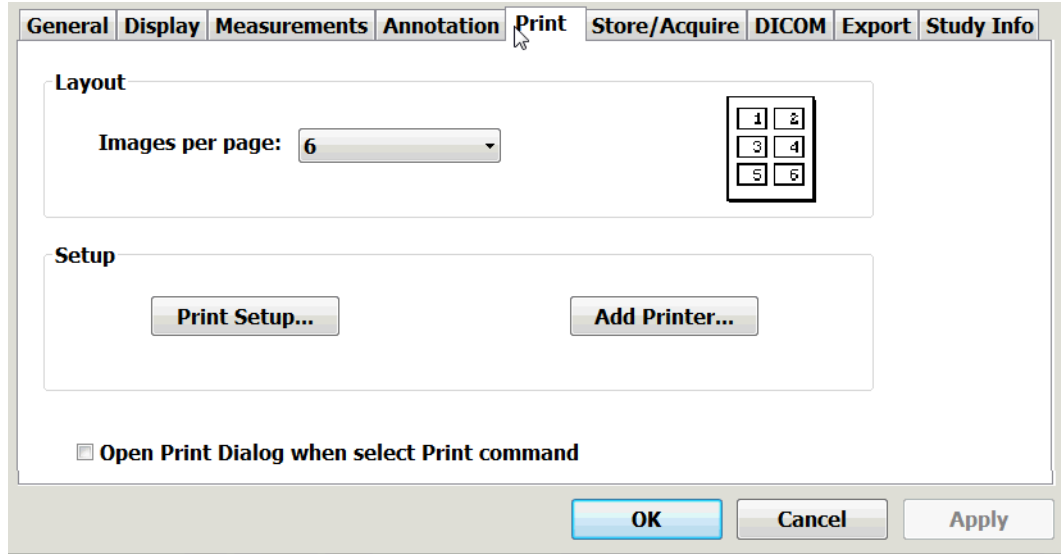
Using Annotation Setup Controls

When you tap **Setup**, then tap the **Annotation** tab, the Setup window offers several controls for different actions and defaults. The Setup Annotation window lets you control which anatomy labels are available when you tap the Text button. This is explained in detail in [Predefined Text](#) on page 68 and [Custom Predefined Text](#) on page 68.

The Setup Annotation window also lets you control which body markers are available when you tap the Body Marker button. This is explained in detail in [Using Body Markers](#) on page 73.

Setting Print Defaults

When you tap **Setup**, then tap the **Print** tab, the Setup window lets you add and configure printers and choose how many images will print on a page.



Setup Print Window

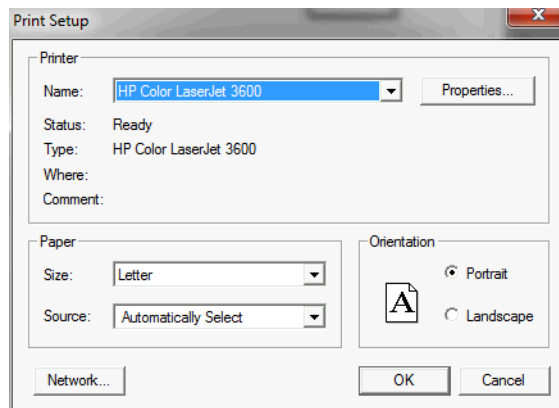
To set the number of images that print on a page, tap the triangle next to the Images per page: field, then select a number from the menu.

To add a printer:

1. Tap the **Add Printer...** button.
The Windows Add printer window opens.
2. Select the printer you want to use, then tap **Add**.

To Set the printing defaults:

1. Tap the **Print Setup...** button.
The Print Setup window opens.



Print Setup Window

(This illustration is an example; the details of the window depend on the printer you have selected.)

2. Select the **paper size**, orientation, etc.
For detailed instructions, refer to the printer manufacturer's documentation.

Setting Storage and Acquisition Defaults

When you tap **Setup**, then tap the **Store/Acquire** tab, the Setup window offers several controls for different actions and defaults.

Report		Preset Menu		Touch Screen			
General	Display	Measurements	Annotation	Print	Store/Acquire	DICOM	Ex
Acquisition Length <input type="radio"/> Time 3 seconds <input checked="" type="radio"/> Beat 2 beats R-Wave delay: 0 ms Max frames: 300		Cine Length <input type="radio"/> Time 3 seconds <input checked="" type="radio"/> Beat 2 beats R-Wave delay: 0 ms <input type="checkbox"/> Retrospective acquisition		Miscellaneous Options <input checked="" type="checkbox"/> Beep after completion of acquisition <input checked="" type="checkbox"/> Limit 30 frames per second		Store Buttons <input type="radio"/> Store Only <input checked="" type="radio"/> Store and Record	
Disk Free Space Highlight if disk free space is below 5 GB		Export Palette Selection Use display palette					

- Store raw data with image when frozen
- Break long report/worksheet image into pages

Setup Store/Acquire Window

Prospective Acquisition Length

This lets you set the length for prospective loops. See [Saving Prospective Loops](#) on page 62.

Cine and Retrospective Length

This lets you set the length for loops captured when the image is frozen.

Disk Free Space Warning

When the unused space on the computer hard disk becomes less than the value set with this control, the Disk free space indicator on the Imaging window turns yellow. You should delete unneeded files to make more room on the disk for new studies.

To set the disk free space warning threshold, tap the up or down arrow next to the GB field until the desired value displays, then tap OK or Apply.

Export Palette

You can choose the export palette to match the computer, but this is seldom necessary. The correct palette is set at the factory.

Store raw data with image when frozen

This lets you store RAW image data. When a RAW file is selected in the Review window, a Reprocess Data softkey appears, which will send the data to the Image window for reprocessing.

Break long report/worksheet into pages

This saves long reports and worksheets in multiple DICOM files as separate pages.

Miscellaneous Options

Acquisition Beep

You can enable and disable a beep sound triggered by the completion of an image or loop acquisition.

To enable or disable the acquisition-complete beep, tap the Beep after completion of acquisition checkbox.

Frame-Rate Limit

This control toggles a 30 frames per second limit on the frame rate. Enabling the limit results in smaller study files.

Setting DICOM Defaults

When you tap **Setup**, then tap the **DICOM** tab, the Setup window offers controls for connecting to and using DICOM networks.

Connecting and configuring DICOM networks requires the involvement of your System Administrator.

Setup DICOM Window

Server Edit

This set of controls lets you define the DICOM server identity.

Server Role Selections

This section is where you define SCPs.

Local Host Setup

This button opens a dialog box where you can enter data required for communication with a DICOM server.

Manage Jobs

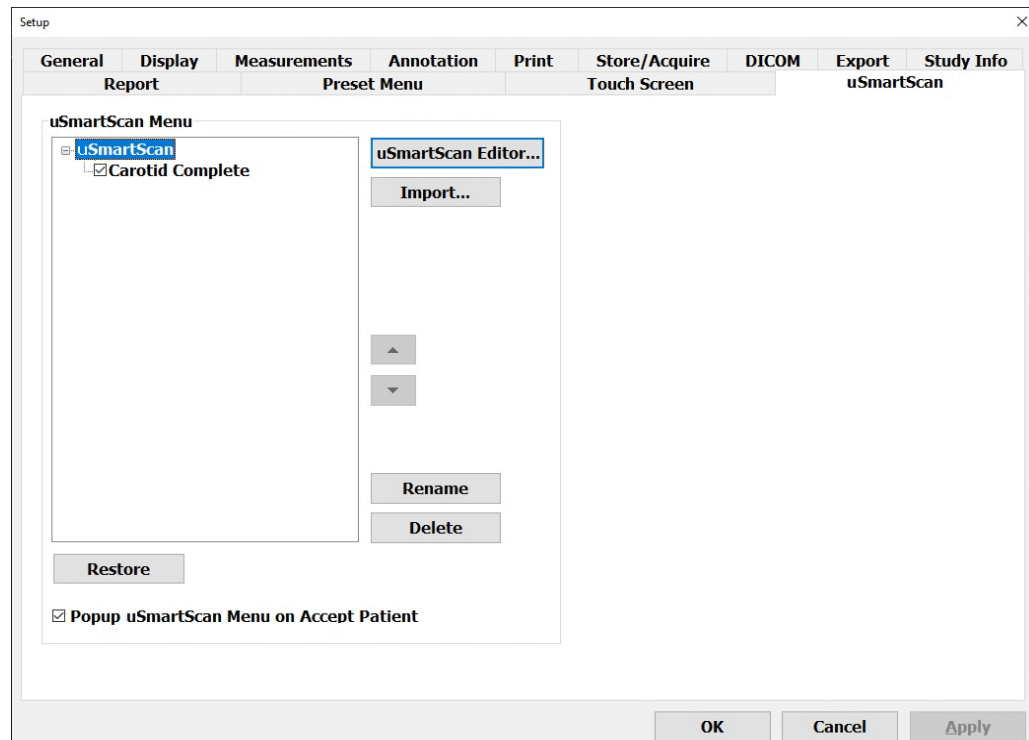
This button opens a window where you can monitor the status of items sent to the DICOM network.

Setting Study Information Defaults

You can configure the default entries for institution and doctor names, as well as other types of information that appear on study reports. These operations are described in [Working With Patient Information](#) on page 46.

Setting Up uSmartScan

uSmartScan is an optional feature that, when licensed, lets you write scripts to manage scanning. If you have the license, the uSmartScan tab is on the Setup window. Tap the tab to open the open the Setup uSmartScan window. .



Setup uSmartScan Window

10 Solving Problems

You can resolve many Terason uSmart3200T Ultrasound System problems yourself. Use these guidelines to help you determine what the problem is, and how to fix it. Refer to the section for your specific problem:

- [Installation Problems](#) on page 167
- [Startup Self-Test](#) on page 167
- [Problems with Scanning](#) on page 168
- [Interference on the Scan](#) on page 168
- [Network Problems](#) on page 169

If you complete the procedures and the problem persists, contact Terason as described in [Contacting Terason Technical Support](#) on page 169.

Installation Problems

When installing the Terason software, you cannot have any other applications open on the tablet, especially Microsoft Outlook. A conflict exists in the InstallShield software (the installation utility that installs the Terason software) with the Microsoft Outlook application. Make sure you exit from all applications before you start installing the Terason software.

Startup Self-Test

When the Terason ultrasound system powers up, the software runs the following tests to assure proper operation:

- Verifies communication between the computer and the ultrasound engine
- Verifies that external electronic noise is below the specified limits
- Verifies that the probe is within specifications for sensitivity and signal-to-noise ratio

If any of the tested conditions are outside specifications, the system displays an error message that indicates which condition is at fault and includes suggestions for remedying the fault. If the suggestions are not effective, contact Terason Technical Support.

The system also monitors electronic noise levels during use, and displays an alert if it detects excessive noise. If this alert appears, remove any noise sources that have been introduced in the examining area or relocate the exam to another area.

Problems with Scanning

If the software does not show a scan image, the problem could be:

- The probe is not plugged in
- The device driver is not installed

To determine how to proceed, check whether the image is frozen, then refer to the following table:

Terason Probe States

If the Image Status is...	Then...
Frozen Image	Either you have frozen an image, or the probe has not been used in several minutes and has shut down to conserve power. Tap the screen to activate the system.
Live Imaging	The probe is functioning. Try adjusting the 2D Gain.

Plugging in the Probe

If you have used the probe before, the driver is already installed, so it is probably a connection problem. Make sure all connections between the probe and computer are secure.

Reconnecting Components

If the problem still exists, usually the cause is that a component connection has become loose. You must unplug the component and plug it in again, following these steps:

1. **Quit** the Terason software.
2. Shut down the **computer**.
3. Unplug the **probe**.
4. Start the **computer**.
5. When the hourglass icon is gone, plug in the **probe**.
6. Wait **15 seconds**.
7. If you see a “Digital Signature not Found” or a “Found New Hardware” message, contact **Terason Technical Support**.
8. If no digital signature message displays, start the **Terason software**.

Interference on the Scan

If the probe or the Terason electronics envelope is too close to an electronic device, such as a computer, you may see interference patterns in the scan image.

To resolve this problem, move the probe and electronics away from all power sources.

Network Problems

Terason cannot provide network assistance. Only a system administrator at your site can resolve network issues. The tablet comes with a network card and internal modem. However, the required network settings (such as IP address) are determined by your network system administrator.

Contacting Terason Technical Support

If you have followed the suggestions provided and still cannot resolve your problem, contact Terason Technical Support at:

Voice from the U.S.A.: 1-866-TERASON (1-866-837-2766) X 1048

Voice from outside the U.S.A.: 781-270-4143 X 1048

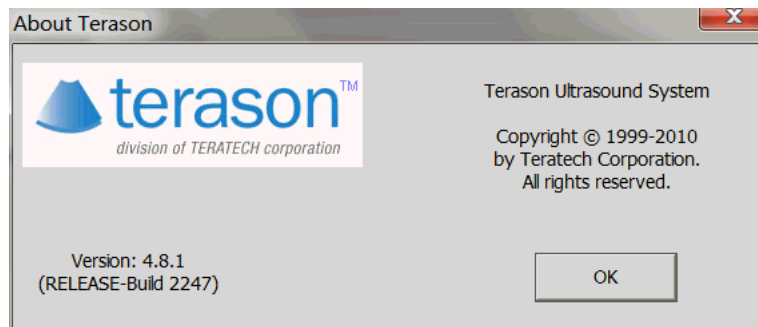
FAX: 1-781-270-4145

Email: techsupport@terason.com

Before you call, make sure you have the following information on hand:

- Serial number of the probe/electronics envelope
- Operating system (Windows 10) service pack number
- Terason software version number*
- If available, sales order number
- Name of the organization that purchased the Terason uSmart3200T Ultrasound System

* You can find the Terason software version by tapping the About... button on the Setup/General window.



About Terason Message Box

Tap **OK** to close the box.

You can find your system serial number by tapping the License... button on the Setup/General window.

Ultrasound License Registration

License Details

License Status: LICENSED

Serial Number: 40MGOPIEIPDR

Unlock Level: 7 - Bmode, Mmode, DirPwr, Pwr, PWD, CD, Triplex, CWD, EKG, THI, StressEcho

Options: DICOM worklist AcuNav
OmniBeam

License Actions

Upgrade Unlock Code:

Transfer Transfer PC Serial Number:

Transfer Continue Ultrasound

Ultrasound License Registration Window

Copy the serial number, then tap **Continue Ultrasound** to close the message box.

If you call Terason and a support specialist is not available, please leave the following information, and we will return your call as soon as possible:

- Name
- Phone number
- Description of the problem
- Probe serial number
- Terason software version number
- Operating system (Windows 10) and service pack #

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