

Terason t3000™ / Echo™ Ultrasound System User Guide



Terason Ultrasound System User Guide

Copyright © 1999-2009 by Terason[™], a division of Teratech Corporation. All rights reserved.

Information in this document is subject to change without notice and should not be construed as a commitment by Terason.

Terason[™] is a trademark. Other trade names, trademarks, or registered trademarks are property of their respective holders. FireWire[®] is a registered trademark of Apple Computer, Inc.

Reproduction, adaptation, or translation without prior written permission is prohibited, except as allowed under copyright laws.

November 2009
Part number 16-3031-12

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

Contents

Preface	Before You Begin	10
	About this Guide	10
	Online User Guide	11
	Warnings, Cautions, and Notes	11
	Links	11
	Printing the User Guide	12
	Terason Online Help	12
	Prerequisites	12
	Safety Cautions and Warnings	13
	Cautions	13
	Warnings	15
	Labels	18
	Shipping Label Icons	19
	Getting Help	20
	Terason Online Help	20
	Terason Ultrasound System User Guide	20
	Windows Online Help	20
	Your Laptop or Desktop Computer	20
	Contacting Terason	21
Chapter 1	About the Terason Ultrasound System	
	About Ultrasound Modes	22
	2D Mode	23
	M-Mode (Motion Mode)	23
	Power Doppler	24
	Color Doppler	25
	Directional Power Doppler	26
	Pulsed-Wave Doppler	27
	Continuous-Wave Doppler	28
	Triplex	28
	TeraVision	29
	Support for Medical Procedures	29
	Terason Transducers	30
	About the Terason Main Screen	32
	Terason Explorer Window	33
	Image Display, Patient Info, and Review Windows	33
	Toolbars	33
	Image Control Bar/Measure Tabs	34
	The Terason Console	34
	Console Controls	35
Chapter 2	Installing Software	
	Installing Terason Software	37
	Upgrading Terason Software	39

Uninstalling Terason Software	41
Installing the FireWire Terason Transducer Driver	42
Installing the Terason DICOM Utility	44
Installing the DICOM Utility	44
Configuring the DICOM Utility	47
Licensing the Terason Software	50
Entering the License or Evaluation Unlock Code	51
Extending the Evaluation Period	52
Transferring the License	52
Upgrading the License	54

Chapter 3 Setting Up Patient Information

Using the Patient Info Window	57
Adding a New Patient	57
Preparing Patient Info for an Exam	60
Updating Patient Information	61
Deleting a Patient Folder	61

Chapter 4 Acquiring Images

Powering the Laptop On and Off	63
Starting and Exiting the Software	63
Connecting a Transducer	64
Switching Transducers	65
Conducting an Ultrasound Exam	65
Using the Console	65
Choosing a Scan Mode	66
Conducting a 2D, M-Mode, or Color Doppler Exam	66
Special Controls Used With the 4V2A Transducer	68
Conducting a PWD Exam	68
Conducting a CWD Exam	68
Conducting an Exam in Triplex Mode	69
Freezing Images	70
Working with Image Loops	70
Saving Prospective and Retrospective Loops	71
Determining Image Status	72
Adjusting the Displayed Image	73
Enlarging an Area of the Image	73
Resizing the Window	74
Displaying the Image in Full Screen	75
Hiding Windows	75
Enhancing the Image Using TeraVision™ Optimization	76
Adding Guides to the Image Display	77
Changing the Text Size	78
Using Split Screen Mode	79
Working with Annotations	81
Working with Text	81
Using Body Markers	86

Chapter 5 Working With Scan Modes

Scan Modes Overview	89
---------------------------	----

Using 2D and I.Q. Controls	90
Controls on the I.Q. Image Control Window	100
Using the Console	105
Using M-Mode Image Controls	105
Adjusting the Sweep Speed	106
Adjusting the Ultrasound Cursor Position	106
Using Anatomical M-Mode	107
Using the Console	108
Using Spectral Doppler Image Controls	109
Adjusting the Sweep Speed	109
Setting the Velocity Display Units	110
Adjusting Pulse Repetition Frequency (PRF)	110
Adjusting the Wall Filter	111
Adjusting the Steering Angle	112
Adjusting the Correction Angle	112
Inverting the Waveform	113
Adjusting the Ultrasound Cursor Position	113
Adjusting the Sample Volume (SV) Size and Depth	114
Setting the PWD Gate Position	114
Adjusting Spectral Gain	115
Compression	115
Adjusting Noise Rejection	116
Adjusting the Baseline	116
Adjusting the Sound Volume	116
Updating the Displays	117
Using the Console	118
Using Color and Power Doppler Image Controls	118
Adjusting the Scan Area	119
Adjusting Pulse Repetition Frequency (PRF)	120
Inverting the Doppler Display (Color Invert)	121
Adjusting the Wall Filter	122
Adjusting the Color Gain	122
Adjusting the Color Priority	123
Adjusting the Color Persistence	123
Adjusting the Color Baseline	124
Choosing a Color Map	125
Special Cardiac Image Controls	125
Using the Console	125
Scanning in Triplex Mode	126
Region of Interest	127
Image Controls	127
Updating the Displays	127

Chapter 6 Working With Image Files

Storing Images and Loops	131
Monitoring Disk Space	131
Selecting File Types	132
Saving Images and Loops	133
Exporting a File	135
Finding Stored Images and Loops	136

Finding Files in the Terason Explorer	136
Finding Files in the Review Window	139
Browsing to Find Files	140
Managing Files	141
Copying Files	141
Backing Up Files on a CD	142
Moving Files	142
Renaming Files	143
Deleting Files	143
Editing Images and Loops	145
Printing Images	146
Printing the Displayed Image	146
Printing from the File Menu	147
Printing from the Review Window	147
Printing from the Print Preview Window	148
Printing in Split Screen Mode	149

Chapter 7 Working With Measurements

Measuring in the 2D Window	151
Measuring Distances	151
Measuring Volume	153
Measuring Elliptical Circumference and Area	154
Tracing Areas on the Image	155
Calculating Percent Stenosis	157
Working with Measurements on an Obstetrical Exam	158
Making Gynecological Measurements	164
Measuring in the M-Mode Window	165
Making M-Mode Measurements	165
Measuring in the Spectral Doppler Modes	166
Measuring Vessel Blood Velocities	171
Calculating Arterial Ratios	172
Measuring Heart Rate and Rise Time	173
Measuring Flow Volume	174
Measuring Vascular Exams	175
Vascular Measurement Lists	175
Available Vascular Measurements	180
Working with Vascular Reports	181
Measuring Cardiac Exams	184
Cardiac Measurement Groups	184
Available Cardiac Measurements	188
Formulas Used in Echocardiography Measurements	191
Working With Cardiac Reports	196
Selecting Measurements	200
Deleting Measurements	201
Restoring All Measurement Groups to Defaults	201
Stress Echo	202
Performing a Stress Echo Study	202
Closing a Stress Echo Study	207
Saving and Sending Studies	208
Pausing and Resuming a Stress Study	208

Editing Stress View Labels	208
Features of the Stress Echo Scanning Window	209
Features of the Stress Echo Review Window	210

Chapter 8 Working With Exams

About Exams	212
Opening an Exam	215
Creating Custom Exams	215
Creating a New Exam	216
Creating Size-Specific Versions	216
Deleting Custom Exams	216

Chapter 9 Performing Medical Procedures

Equipment Description	218
Performing a Biopsy	219
Assembling the Bracket and Guide	222
Biopsy Procedure	222
Verifying the Alignment	224
Setting the Error Correction	224
Correcting Needle Guide Positioning for Biopsies	225
Cleaning the Transducers and Brackets	225

Chapter 10 Working With DICOM

Using Images with a DICOM Printer or Server	227
Printing Files to a DICOM Printer	227
Sending Files to a DICOM Server	228
Using DICOM Worklist	228
Worklist Queries	229
Configuring Worklist	229
Configuring Broad Queries	230
Making a Query	232
Applying a Patient Info Set	234
Customizing the Worklist	234
DICOM Network Service	236

Chapter 11 Using System Tools

Testing the Monitor Display	237
Correcting the Position of the Needle Guides	241
Restoring the Default Layout	241
Keeping the Terason Software on Top	242
Setting a Time-Out Value	242
Enabling or Disabling the Color Doppler Message	243
Specifying Optional Settings	243
Setting Image Save and Print Defaults	243
Changing the Display Mode Defaults	247
Setting Measurement Defaults	250
Adding Custom Text to the Annotation Window	251

Chapter 12 System Safety and Maintenance

Safety Standards	252
------------------------	-----

Ultrasound Safety	253
Electrical Safety	253
Surface Heating of Invasive Transducers	253
Indications For Use	254
Acoustic Output Indices	268
General Description of Indices	268
MI: The Mechanical Index	269
TIS: The Soft Tissue Thermal Index	269
TIB: The Bone Tissue Thermal Index	269
TIC: The Cranial (Bone) Thermal Index	270
Relevant Acoustic Output Indices	270
Acoustic Output Index Displays	271
Relationship of Index to Display Accuracy	278
Display Precision of TI Values	278
Display Precision of MI Values	278
Acoustic Output Tables	280
Accuracy Measures	281
Distance Accuracy	281
Area	281
Circumference	281
Volume	282
Processing Terason Transducers Between Uses	282
General Cleaning	283
Precleaners and Low-Level Disinfectants	284
High-Level Disinfectants	284
Compliance and Approvals	285
System Warranty	285
Recommended Maintenance	286
Equipment List	286
System Specifications	288
Optional	289
Environmental Protection	289
Product Recycling and Disposal	289
Caring for Batteries	290
Recycling Batteries	290
Disposing of the Packaging Materials	291
Disposing of Components and Accessories	291
Energy Conservation	291
Appendix A Working With Microsoft Windows	293
The Windows Desktop	293
Application Windows	295
Windows Terms	296
Using the Touchpad or a 2-Button Mouse	297
Starting/Exiting Programs	298
Resizing Windows	299
Moving Windows and Toolbars	300
Appendix B Menu and Toolbar Reference	301
Shortcut Keys	301

Menu Reference	302
Shortcut Menu Reference	309
Toolbar Reference	313
Appendix C Solving Problems	315
Installation Problems	315
Problems with Scanning	315
Plugging in the Transducer	316
Reconnecting the Components	316
Determining if the Driver Is Installed	316
Interference on the Scan	318
Printing Problems	318
Print Quality	318
The Print Output is Too Small	318
Display Problems	319
VCR/TV Problems	319
CD Writing or Reading Problems	319
Network Problems	320
Contacting Terason Technical Support	320
Appendix D Gestational Tables	322
Appendix E Electromagnetic Compatibility Tables	329
Compatibility for All Equipment	329
Compatibility for Non-Life-Supporting Equipment	331
Appendix F Acoustic Output Reporting for Track 3	333
Acoustic Output Tables for t3000 Transducers	334
Acoustic Output Tables for Echo Transducers	385
Index	411

Preface Before You Begin

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

- [About this Guide](#) on page 10
- [Terason Online Help](#) on page 12
- [Prerequisites](#) on page 12
- [Safety Cautions and Warnings](#) on page 13
- [Labels](#) on page 18
- [Shipping Label Icons](#) on page 19
- [Getting Help](#) on page 20

For an introduction to the Terason Ultrasound System, see Chapter 1, [About the Terason Ultrasound System](#), on page 22.

About this Guide

This guide describes how to use the Terason software to conduct an ultrasound exam using a Terason transducer, and defines how to use the software to control and capture the ultrasound image. This guide **does not**:

- Teach how to perform an ultrasound exam or any other medical procedures
- Present medical protocols for ultrasound exams or medical procedures
- Discuss interpretation of acquired scans

You must follow the required clinical procedure for the specific exam you need to conduct.

The figures in this guide that show scanned images were captured using a variety of transducers. Depending on the transducer you use, the images on your computer may differ from the ones in this book.

This guide applies to both the Terason t3000 and Terason Echo families of ultrasound systems and accessories. Where a section refers to the t3000, the feature discussed does not apply to Echo systems. Where a section refers to the Echo, the feature discussed does not apply to t3000 systems.

The Terason software runs on both the Windows 2000 and the Windows XP operating systems. In this book, “Windows” refers to both of these operating systems.

In this manual, the name for two-dimensional imaging is 2D; the term “B-Mode” is not used.

In this section:

- [Online User Guide](#) on page 11
- [Warnings, Cautions, and Notes](#) on page 11
- [Links](#) on page 11
- [Printing the User Guide](#) on page 12

Online User Guide

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

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

1. Click the **Start** button in the lower left of the screen.
2. Select **Programs > Terason > Terason User Guide**.
The computer opens the User Guide in the Adobe Reader software.
3. Click 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 Reader or Acrobat Reader, select **Help > Reader Guide** (for Acrobat Reader 4.0) or **Help > Reader Help** (for Adobe Reader) from the 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 click 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 on a black-and-white printer.

To print the User Guide, you must connect your laptop 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. Use of non-medical grade peripherals will result in non-compliance of safety and EMI standards. Non-conformance to these standards can result in 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. Click **OK**.

Terason Online Help

To access the help, select the **Help > Help Topics** menu. The Help window has three tabs on the left used to view information on the right:

- | | |
|-----------------|---|
| Contents | Double-click a book (📖) to open it. Click on a topic (🔍) to view it. |
| Index | Enter the entry you want, or scroll to find a topic, then double-click a selection. |
| Search | Enter the word to search for, press Enter , and double-click a topic. |

Prerequisites

Before you use the Terason 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 laptop or desktop computer. If you are new to the Windows 2000 or XP operating system, Appendix A, “Working With Microsoft Windows,” on page 293 describes the Windows features used with the Terason software.

Safety Cautions and Warnings

Cautions

Closely review the following cautions before using the Terason Ultrasound System for the first time.

Sale and Use

The Terason Ultrasound System is designed for medical ultrasound imaging. 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 or when using a defibrillator.

Terason Transducers

Each transducer model has indications for use (see [Indications For Use](#) on page 254) concerning specific applications.

Laptop

Always position the laptop on a stable surface where it cannot fall on the patient.



Caution: Do not lift the laptop by the power cable or transducer. If either disconnects, the laptop could fall on the patient.

Allergies

Metals used in some of the decorative exterior plates may contain nickel. If persons using the system are allergic to nickel, avoid handling the exterior decorative metal.

System Covers

Do not remove any system covers or cables. Only qualified Terason personnel should service the Terason Ultrasound System.

Electrical Shock Hazard

Transducer cables have strain relief at terminations. Inspect cables regularly, to detect damaged, frayed, or broken cables that might contact a patient.



Caution: Do not use a transducer if the transducer or cable is damaged. Return damaged equipment to Terason for replacement. See [Contacting Terason](#) on page 21 for instructions on contacting Terason Support.

Shock hazards exist if the AC power adapter is damaged or is not properly grounded. Use only the supplied medical grade power cord and power adapter, and connect the adapter only to a receptacle marked “Hospital Only”, “Hospital Grade,” or equivalent.



Caution: Do not remove or try to circumvent the grounding wire. If the protective grounding of the system is questionable, disconnect the laptop from the power source and run it on its internal battery.

Before cleaning the system, always disconnect the AC power adapter from the system.

The Terason Ultrasound System is a Type BF Class I product suitable for continuous operation when connected as a system to a Medical Grade AC/DC Power Adapter or operated from the laptop battery.



Caution: Use only Medical-Grade peripherals in the patient environment. See [Intended Use](#) on page 15 for a diagram of the patient environment.

Caution: Failure to follow the warnings in this guide may cause the system to no longer comply with regulatory requirements.

Electrical Fast Transients (EFT)

The FireWire components used to connect the Terason ultrasound transducer to the computer are susceptible to electrical fast transients on the power line. If these components are subjected to transients, it may cause the FireWire hub and repeaters to lock up and no longer operate as specified. If that happens, communications between the computer and the transducer will fail. To remedy this situation, remove power from the FireWire hub by unplugging the medical-grade power adaptor for a few seconds. When the power supply is plugged back in, the FireWire components reset and begin to function normally. You must also exit the Terason software and restart it.

Surges to AC Power Mains

If the system is powered from AC mains that could experience surges above 1 Kv (for example, from extreme lightning conditions), additional surge suppression is recommended.

RF Interference

The unit should be operated in a location that is no closer than listed in [Compatibility for Non-Life-Supporting Equipment](#) on page 331 to any part of RF communications equipment that may disturb its functions. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the equipment. The Terason Ultrasound System should be separated by at least the distances specified in the table referenced above.

The Terason Ultrasound System is intended for use in an electromagnetic environment where radiated RF disturbances are controlled. The customer or the user of the Terason Ultrasound System can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment

(transmitters) and the Terason Ultrasound System according to the maximum output power of the communications equipment. See Appendix E, “Electromagnetic Compatibility Tables,” on page 329 for recommended separation distances.

Explosive

This equipment is not suitable for use in the presence of FLAMMABLE ANESTHETIC MIXTURE WITH AIR OR WITH OXYGEN OR NITROUS OXIDE.

Battery Pack Usage/Disposal

Lithium-ion battery packs are labeled with cautions indicating that the device could present a fire or chemical burn hazard if mistreated.



Caution: Do not disassemble, heat above 60°C (140°F), crush, puncture, short external contacts, or incinerate the battery pack.

Caution: Keep the battery pack away from children. Dispose of used battery packs according to the manufacturer's instructions. For safety information, refer to the user guide that was shipped with your computer.

Recycling/Disposal After Useful Life

This equipment can contain environmentally hazardous materials such as, but not limited to: heavy metals, general recyclable metals, and plastics. This product should be recycled according to local and national guidelines for recycling electronic equipment.

Warnings

Observe the following safety precautions when using the Terason Ultrasound System.

Intended Use

The Terason Ultrasound System is designed for use as a diagnostic tool and should only be operated by someone who has received proper training in the use and operation of an ultrasound system. This system produces images derived from sound echoes; those images must be interpreted by a qualified medical professional. This system in no way interprets these images or provides a medical diagnosis of the patient being examined.

The Terason Ultrasound System has successfully completed compliance tests for IEC 60601-1, IEC 60601-1-1 2nd edition, IEC 60601-1-2, and IEC 60601-2-37 medical standards for the configuration as originally installed. To maintain compliance with the stated safety and EMI standards, Terason recommends use of MEDICAL GRADE PERIPHERALS ONLY. Use of non-medical grade peripherals will result in non-compliance of safety and EMI standards. Non-conformance to these standards can produce risks to the patient and operator of this equipment. Terason cannot be held liable for changes to the system topology that no longer conform to the stated safety and EMI standards. Changes to the system topology may make it necessary to retest the complete system for compliance to these standards. The *Terason Ultrasound System User Guide* refers to the potential for connecting the Terason Ultrasound System to peripherals such as VCRs, TVs, and printers. Note that Terason has not performed compliance tests to the

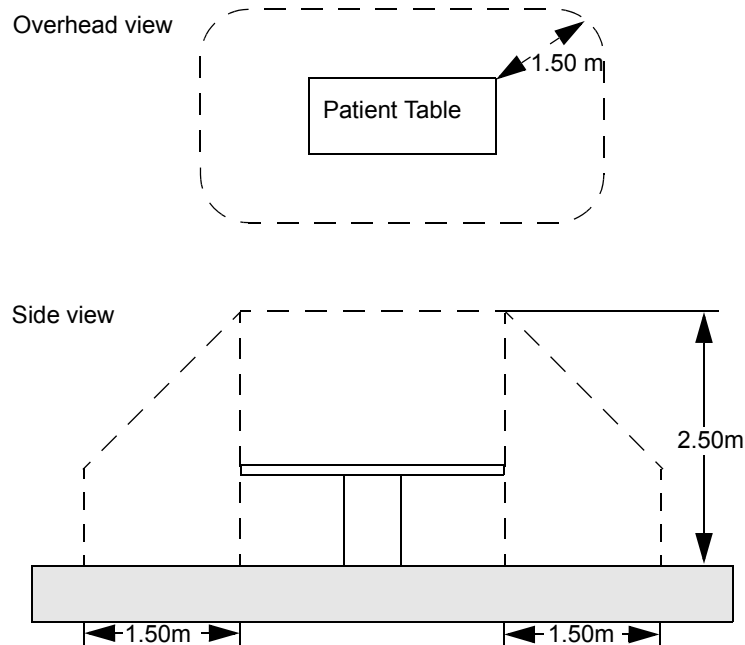
stated standards with these types of devices connected to the system. Any peripheral device, such as a network connection, etc. connected to the Terason Ultrasound System must conform to the IEC standards outlined above (i.e., IEC 60601-1, IEC 60601-1-1 2nd edition, IEC 60601-1-2, and IEC 60601-2-37).

The Terason Ultrasound System (without peripherals) is suitable for use within the patient environment, as defined by the following:



Warning: The user should never simultaneously make contact with the patient and the inside of any equipment where a protective cover of any kind is removed. This includes the protective covers for the probe holders containing the ultrasound probe and power modules located at the patient table.

The patient environment is defined as shown in the following figure.



Patient Environment

Portable and mobile RF communications equipment can affect medical electrical equipment such as the Terason Ultrasound System and should not be used in the patient environment.



Caution: The Terason Ultrasound System should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the system should be observed to verify normal operation in the configuration in which it will be used.

Electromagnetic Interference (EMI)

Medical electrical equipment such as the Terason Ultrasound System requires special precautions regarding electromagnetic compatibility, and must be installed and put into service according to the tables in [Appendix E, Electromagnetic Compatibility Tables](#).

To limit exposure to electromagnetic interference from nearby equipment that can degrade image quality, you should operate the Terason Ultrasound System under EMI conditions that minimize power supply transients, mechanical interactions, vibration, and thermal, optical, and ionizing radiation.

Electrostatic Discharge (ESD)

ESD, or static shock, is caused by rapid discharge of electrical energy from one body to another. ESD is common in conditions of low humidity, such as those resulting from heating or air conditioning. To avoid damage to transducers, electronics or system, use anti-static spray on carpets and linoleum, and anti-static mats.

The Terason Ultrasound System complies to a level of $\pm 2\text{kV}$ ESD. The latch for locking the ultrasound transducer and the FireWire port is sensitive to ESD and should not be touched when operating the system. In cases where an ESD shock discharges to one of these points, the computer program may freeze or windows may open unexpectedly. In these cases, the Terason software may require restarting, and you may have to close extra windows. In extreme cases, the computer may require restarting. These events are not dangerous to the patient or to the operator.

Liquids

The Terason transducer, electronics envelope, and computer are not protected from spilled liquids. The transducer array is watertight up to the strain relief, as specified in [Pre-Cleaning](#) on page 284. If the computer is exposed to liquids or moisture, purchase a keyboard drape. In addition, the Terason Ultrasound System electronics must be draped if exposed to liquids or moisture.

Couplants

Use only couplants specifically designed for ultrasound examinations. Do not use mineral-oil or vegetable-based couplants, which can damage transducers.

Heat

Do not expose transducers to direct heat such as strong sunlight or local heat sources. Heat ages the crystal and causes loss of sensitivity.

Latex

Terason strongly recommends that health-care professionals identify their latex-sensitive patients, and refer to the FDA's March 29, 1991 Medical Alert on Latex products. Be prepared to treat allergic reactions promptly.

Care

Ultrasound transducers and your Terason Ultrasound System are fragile. Handle with care. If the transducer appears damaged, or misuse of the electronics envelope causes a malfunction, please return the equipment to Terason for service or replacement.



Warning: Do not drop the ultrasound transducer! If you accidentally drop the transducer, check it carefully for damage. Perform a sample scan to make sure it operates correctly. If not, contact Terason for service or replacement.

Immersion

Do not immerse the transducer connector. If the cable connector is immersed, **do not** plug the connector into the system. Rinse the connector under running water and dry it thoroughly. If necessary, contact Terason for service.

HF (High Frequency) Surgical Equipment



Warning: The Terason Ultrasound System is not approved for use with HF surgical equipment. Use of the Terason Ultrasound System in HF surgical procedures could result in failure of the electrical isolation, resulting in injury or death.

Labels

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

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

Type BF Equipment Applied Part



The Terason Ultrasound System provides protection against electric shock. It is a Type BF applied part that has a lower leakage current than for non-BF applied parts.

Terason Ultrasound System Emits Ultrasound Energy



This device complies with FDA Track 3 guidelines on acoustic output labeling for the intended uses of the transducers.

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.

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 15% to 90% relative humidity and non-condensing.

Air Pressure



The Terason Ultrasound System must be stored in the original shipping container in environments between 63 kPa (472.5 mmHg) and 101.3 kPa (759.8 mmHg) air pressure.

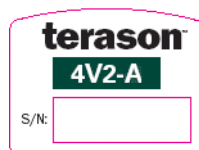
Temperature



The Terason Ultrasound System must be stored in the original shipping container in environments between 0° and 40° C (32° and 104°F).

Terason Transducers

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



Example Transducer Label

Getting Help

Terason Online Help

To access the help, select the **Help > Help Topics** menu. The Help window has three tabs on the left used to view information on the right:

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

Terason Ultrasound System User Guide

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

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

1. Click the **Start** button in the lower left of the screen.
2. Select **Programs > Terason > Documentation > English > Terason User Guide**.
The computer opens the User Guide in the Adobe Reader software.
3. Click 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 Guide** (for Acrobat Reader 4.0) or **Help > Reader Help** (for Acrobat Reader 5.0) from the menu bar.

Windows Online Help

For help with the Windows operating system, click the **Start** button in the lower left of the screen, and click **Help**. The Windows Help system opens. This help works the same as the [Terason Online Help](#); see page 12.

Your Laptop or Desktop Computer

If you have questions or need more information about the computer itself, refer to the user guide that came with your specific system.

Contacting Terason

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

By Mail

Terason™, a 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

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

On The Web

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

www.terason.com

1 About the Terason Ultrasound System

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

The microminiaturized ultrasound system runs under the standard Windows interface for easy navigation. The Terason software can run on a desktop or laptop computer. You can also connect the computer to a VCR or a printer for image output.

This section of the Terason User's Guide includes the following topics:

- [About Ultrasound Modes](#) on page 22
- [Support for Medical Procedures](#) on page 29
- [Terason Transducers](#) on page 30
- [About the Terason Main Screen](#) on page 32
- [The Terason Console](#) on page 34

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 Ultrasound System can be licensed with different levels of features. The following table lists which scan modes come with each version.

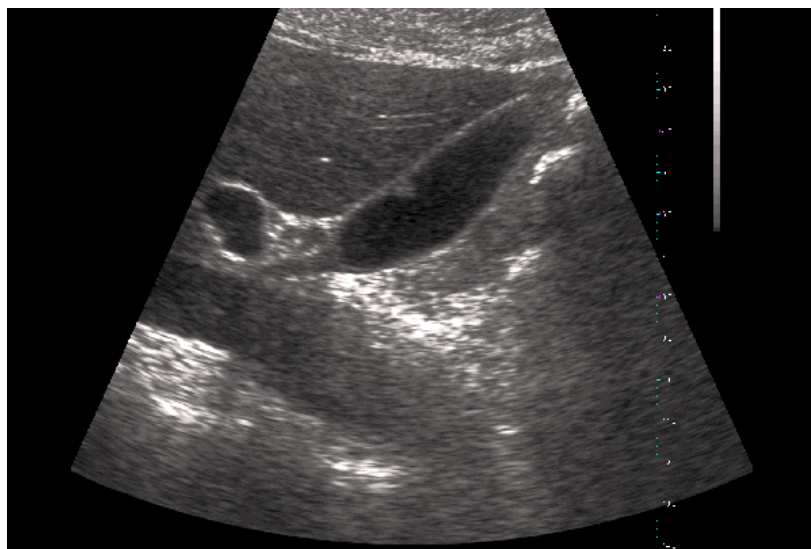
Terason Scan Mode Availability

Mode	Standard	Advanced	Optional
2D Mode	X	X	
M-Mode (Motion Mode)	X	X	
Directional Power Doppler	X	X	
Power Doppler	X	X	
Color Doppler		X	
Pulsed-Wave Doppler		X	
Continuous-Wave Doppler		X	
Triplex			X
TeraVision			X
Omni Beam			X

2D Mode

The Terason 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 transducers.

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



Example 2D Scan

To use 2D, see:

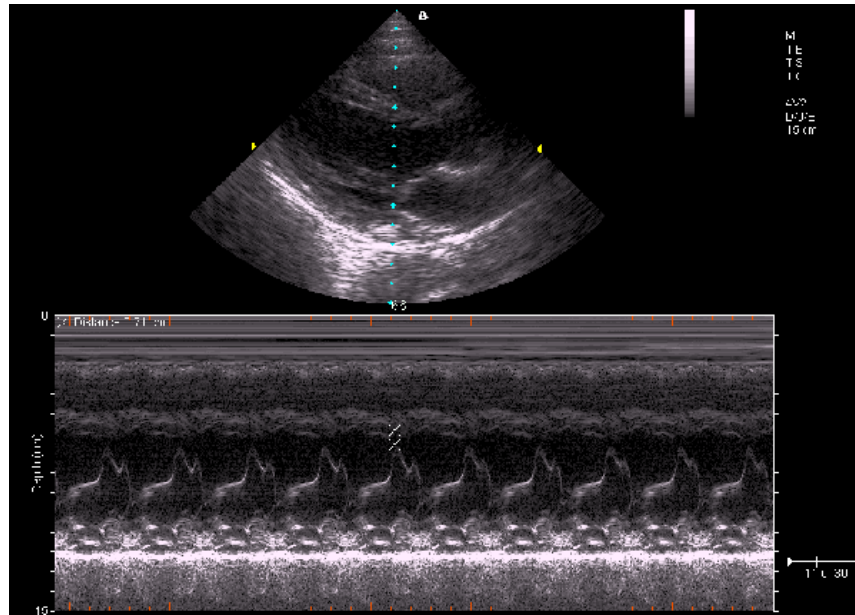
- [Acquiring Images](#) on page 63
- [Using 2D and I.Q. Controls](#) on page 90
- [Measuring in the 2D Window](#) on page 151

M-Mode (Motion Mode)

The Terason Ultrasound System provides simultaneous 2-dimensional (B-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 Image Display 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 63
- [Using M-Mode Image Controls](#) on page 105
- [Measuring in the M-Mode Window](#) on page 165

When using a 4V2 transducer in a Cardiac exam, a special M-Mode feature is available. See [Using Anatomical M-Mode](#) on page 107.

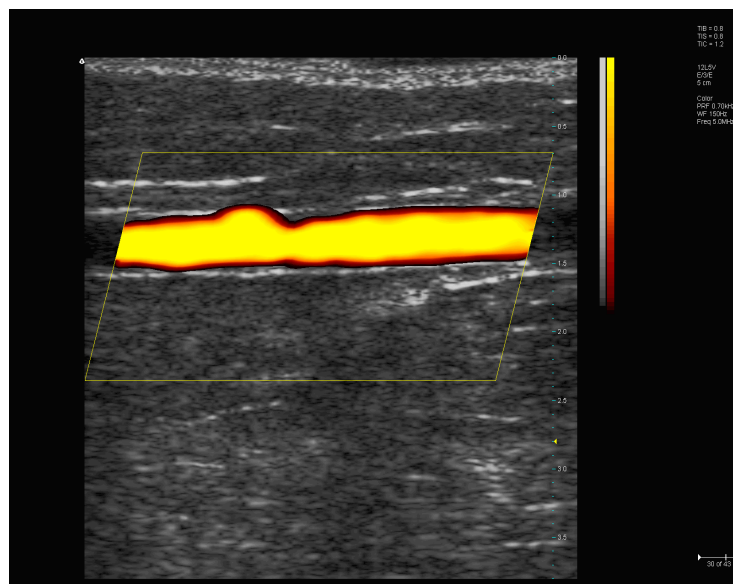
Power Doppler

Conventional Power Doppler shows blood flow by displaying the density of red blood cells, as opposed to their velocity. Large amplitude signals are assigned a bright hue, and weak signals are assigned a dim hue. For example, the jugular vein is shown in brighter colors than the carotid artery because the jugular vein contains more red blood cells at any given time than does the carotid artery. All flows display in shades of the same color; no directional information is provided. You also can choose to apply a high frame rate or high resolution to control the quality of the scan.

In general, Power Doppler is more sensitive than Color Doppler. Amplitude estimation is less noisy than a mean frequency estimate. Therefore, Power Doppler detects and displays more real signal. Power Doppler is more sensitive to low flow than Color or Directional Power Doppler. The increased sensitivity means that Power Doppler is less angle-dependent than Color Doppler, and does not alias.

Power Doppler is the preferred mode to show perfusion and contour of vessel lumen.

The Power Doppler scan data displays in the 2D Image Display window as shown in the following figure.



Example Power Doppler Scan

For more information on using Power Doppler mode, see:

- [Acquiring Images](#) on page 63
- [Using Color and Power Doppler Image Controls](#) on page 118

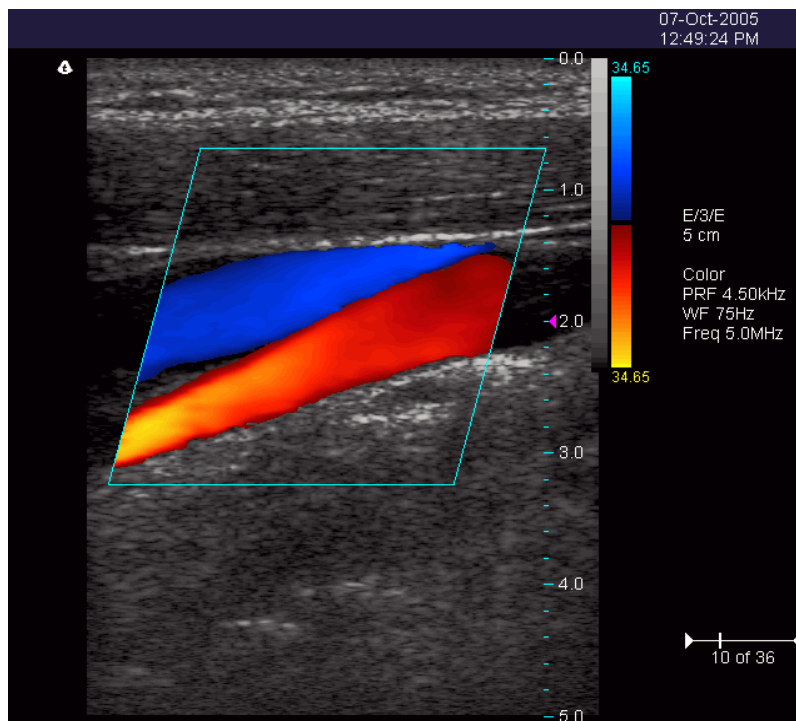
Color Doppler

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 transducer is assigned shades of red, and flow away from the transducer 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 transducer – flow towards the transducer produces a higher-frequency signal than flow away from the transducer. 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 transducer, 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 transducer.

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



Example Color Doppler Scan

For more information on using Color Doppler, see:

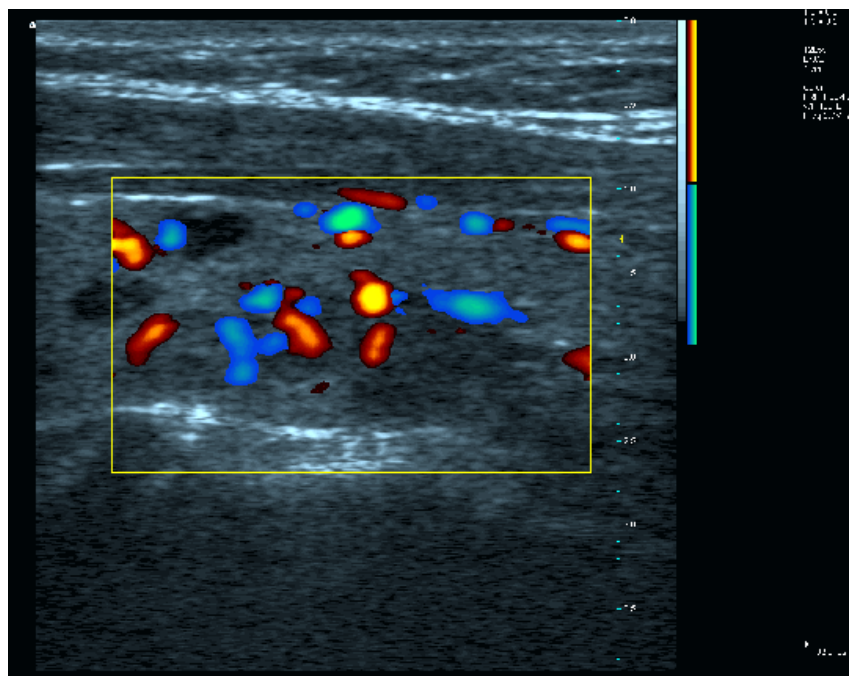
- [Acquiring Images](#) on page 63
- [Using Color and Power Doppler Image Controls](#) on page 118

Directional Power Doppler

Directional Power Doppler (DirPwr) is a combination of some features of conventional Power Doppler and of Color Doppler. It provides the increased sensitivity of conventional Power Doppler, plus the directional information derived from Color Doppler.

Directional Power Doppler does not provide an estimate of blood flow velocity. The color palette is proportional to the strength of the Doppler signal. This mode allows you to obtain good-quality images of deep arteries and other tissue. You can also apply a high frame rate or high resolution to control the quality of the scan.

The Directional Power Doppler scan data displays in the 2D Image Display window.



Example Directional Power Doppler Scan

For more information on using Directional Power Doppler, see:

- [Acquiring Images](#) on page 63
- [Using Color and Power Doppler Image Controls](#) on page 118

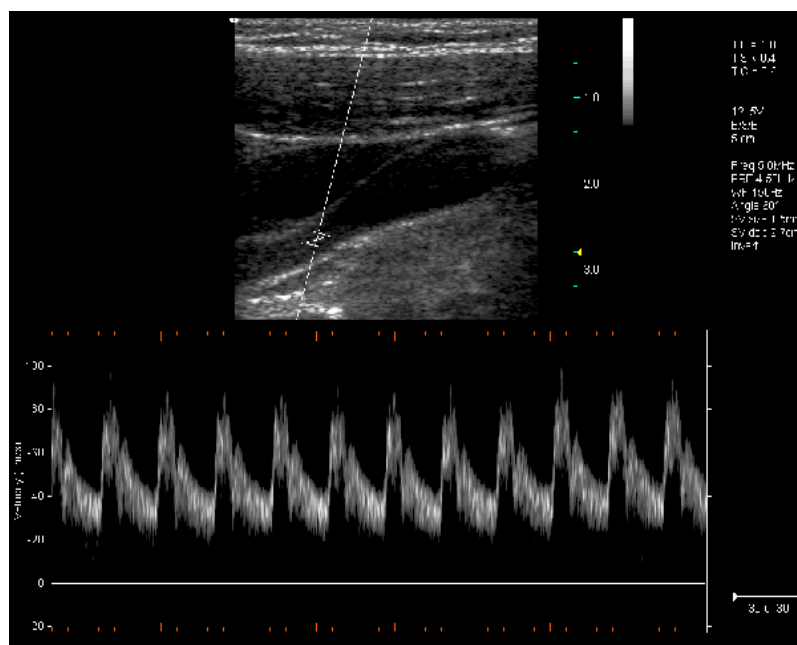
Pulsed-Wave Doppler

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 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 Image Display 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 63
- [Using Spectral Doppler Image Controls](#) on page 109
- [Measuring in the Spectral Doppler Modes](#) on page 166

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.

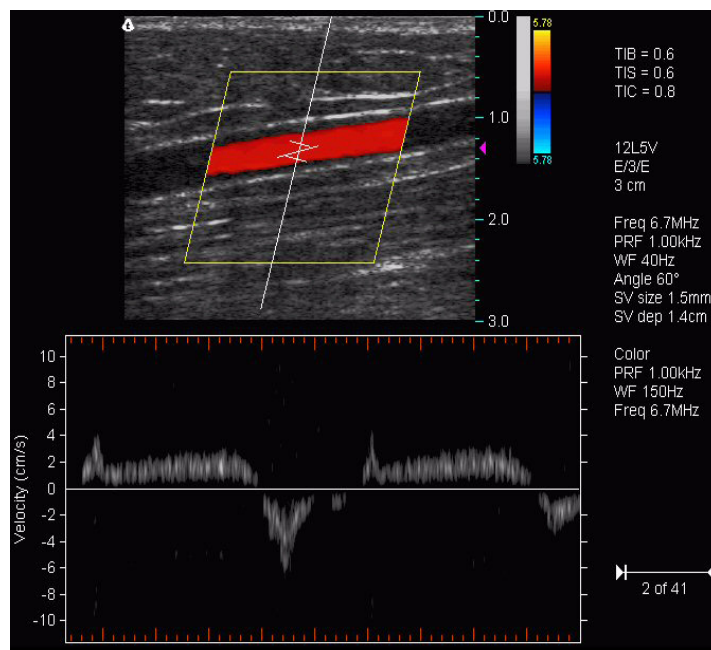
For more information on using Continuous-Wave Spectral Doppler, see:

- [Acquiring Images](#) on page 63
- [Using Spectral Doppler Image Controls](#) on page 109
- [Measuring in the Spectral Doppler Modes](#) on page 166

Triplex

Triplex scan mode is available only with the AD version. 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 63
- [Scanning in Triplex Mode](#) on page 126
-

TeraVision

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

See [Enhancing the Image Using TeraVision™ Optimization](#) on page 76

Support for Medical Procedures

The Terason 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 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 23
- [Color Doppler](#), see page 25
- [Directional Power Doppler](#), see page 26
- [M-Mode \(Motion Mode\)](#), see page 23

See [Performing Medical Procedures](#) on page 218 for information on using the Terason Ultrasound System to perform biopsies.

Terason Transducers

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

The following table describes the supported transducers. Also see [System Specifications](#) on page 288, and [Indications For Use](#) on page 254.

Terason Transducer Specifications

Transducer	Elements	Description	Applications	
PDOF (Echo only)	1	Single-element transducer with a maximum depth of 340 mm and a single-point field-of-view	Cardiac	
4V2S (t3000 only)	64	Phased-linear array transducer with a maximum depth of 240 mm and a user-controllable field-of-view	Adult abdominal OB/GYN Cardiac	Abdominal vascular Fetal heart Renal
4V2A	64	Phased-linear array transducer with a maximum depth of 240 mm and a user-controllable field-of-view	Adult abdominal OB/GYN Cardiac	Abdominal vascular Fetal heart Renal
5C2A	128	Curved linear array transducer with a maximum depth of 200 mm and a user-controllable field-of-view	Adult abdominal OB/GYN Fetal heart	Abdominal vascular Renal
7L3V	128	Linear wideband array transducer with a maximum depth of 130 mm and a user-controllable field-of-view	Dialysis access Small parts Musculoskeletal Peripheral vascular	Cerebrovascular Medium depth arterial and venous studies Breast
8BP4 (t3000 only)	128 X 128	Biplanar: Curvilinear and linear	Prostate (cryoablation and brachytherapy therapeutic procedures)	

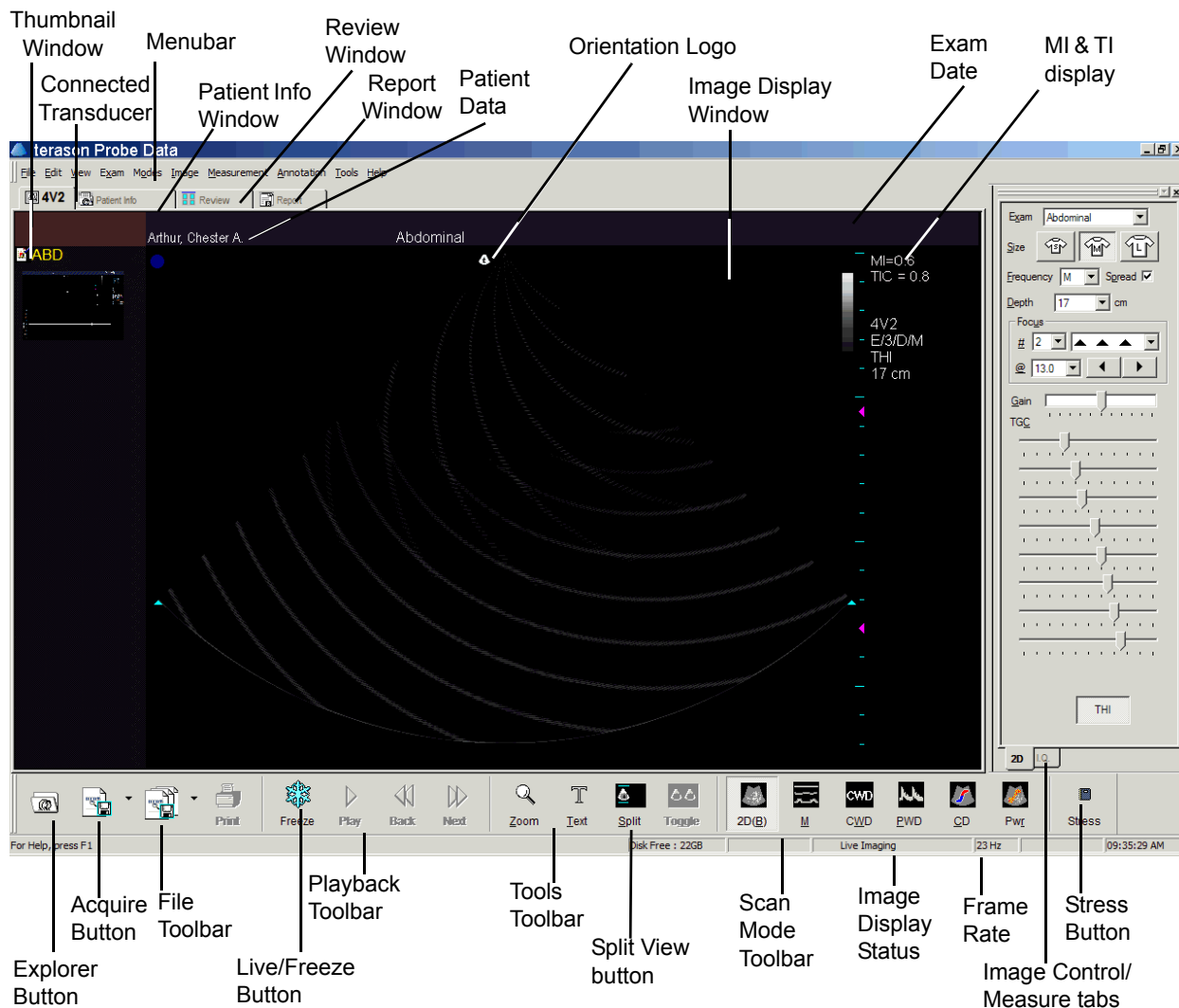
Terason Transducer Specifications (Continued)

Transducer	Elements	Description	Applications	
8EC4A	128	Convex-linear endocavity array transducer with a maximum depth of 140 mm and a 130° field-of-view	Endovaginal Infertility Early OB	General GYN Prostate
8MC3 (t3000 only)	128	Curved-linear transducer with a maximum depth of 160 mm	Fetal Pediatric Small Organ Peripheral vascular	Neonatal Cephalic Adult Cephalic Cardiac
10V5S (t3000 only)	96	Phased-array-sector transducer with a maximum depth of 120 mm and a 90° field of view	Vascular access	
12HL7	128	Angled-head linear wideband array transducer with a maximum depth of 70 mm and a user-controllable field of view	Intra-operative Vascular Intra-operative (Neuro) Laparoscopic	Pediatric Small Organ
12L5V	128	Linear wideband array transducer with a maximum depth of 80 mm and a user-controllable field of view	Dialysis access Small parts Musculoskeletal Peripheral vascular	Extracranial vascular Medium depth arterial and venous studies Breast

The Terason Ultrasound System also allows you to connect more than one transducer to a hub, and then connect the hub to a laptop or desktop computer. This configuration lets you switch transducers without having to disconnect any cables. Refer to the Configuration Guide that came with your system for instructions.

About the Terason Main Screen

When you start the Terason software, the main screen displays.



Terason Main Screen

If a control, button, or menu shows in gray, it usually means that the function is not available for the current circumstances. For example, you cannot use the save, print, or playback tools with a live image, so those items are gray. You can add additional toolbars to the window using View on the Toolbars menu.




Note: The gray-unavailable condition does not apply to the tabs at the bottom of the Image Control window; visible tabs are always available. The tabs are gray when they are not selected.

For complete descriptions of the menus and toolbars available in the Terason software, see Appendix B - [Menu and Toolbar Reference](#).

Terason Explorer Window

The **Terason Explorer** window lets you find patient or image files. This window shows the directory structure of the Patient and Image folders that store all patient information files and saved images and image loops.

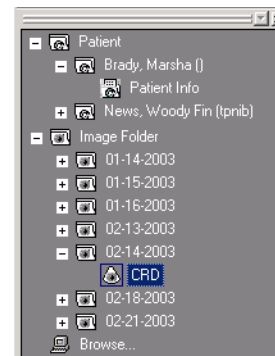
To open the Terason Explorer window, click the Explorer button .

The files listed in Terason Explorer window are stored at the following default location on your computer's hard disk:

C:\Program Files\Teratech\Terason 3000

This directory includes the following folders:

- Patient
- Image







To expand a folder and view its contents, click the . The  changes to a  and shows a list of files. To hide the contents of a folder, click the . You can also double-click a folder name to open or close it. For information on using the Terason Explorer window to locate patient and image files, see [Finding Files in the Terason Explorer](#) on page 136.

Image Display, Patient Info, and Review Windows

These windows use the same space on the computer screen. Click a tab to open that window. The tab for the Image Display window shows the name of the connected transducer (4V2 in the example). You might see any Terason transducer model as the name of this tab (if that transducer is connected). If you have more than one transducer connected to the computer, there is a tab for each transducer.

The Image Display 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, CWD mode, or Triplex mode.

To use these windows, see:

- [Working With Scan Modes](#) on page 89
- [Setting Up Patient Information](#) on page 56
- [Finding Stored Images and Loops](#) on page 136
- [Finding Files in the Review Window](#) on page 139

Toolbars

The toolbar at the bottom of the Terason main screen provides quick access to menu items. For example, there are buttons for selecting scan mode without using the Modes menu, and for saving images and loops. See [Toolbar Reference](#) on page 313 for a quick description of each toolbar control.

Image Control Bar/Measure Tabs

The Image Control bar shows tabs that let you configure settings to adjust the scanned image and make measurements on frozen images.

Live Imaging Control Tabs

For live imaging, the Image Control bar shows the following tabs:

- 2D and I.Q. tabs for 2D imaging
- Additional tab for the selected scan mode

Frozen Image Control Tabs

When the image is frozen or when a ULT file is loaded, following the Image Control bar tabs are available:

Tabs Displayed When Image Frozen or ULT File Loaded

Mode	Tabs Available	
2D	I.Q. 2D Measure	
M-Mode	I.Q. 2D Measure	M Measure
CWD	I.Q. 2D Measure	CWD CWD... (CWD Measure)
PWD	I.Q. 2D Measure	PWD PWD... (PWD Measure)
CD	I.Q. 2D Measure	CD
Pwr	I.Q. 2D Measure	Pwr

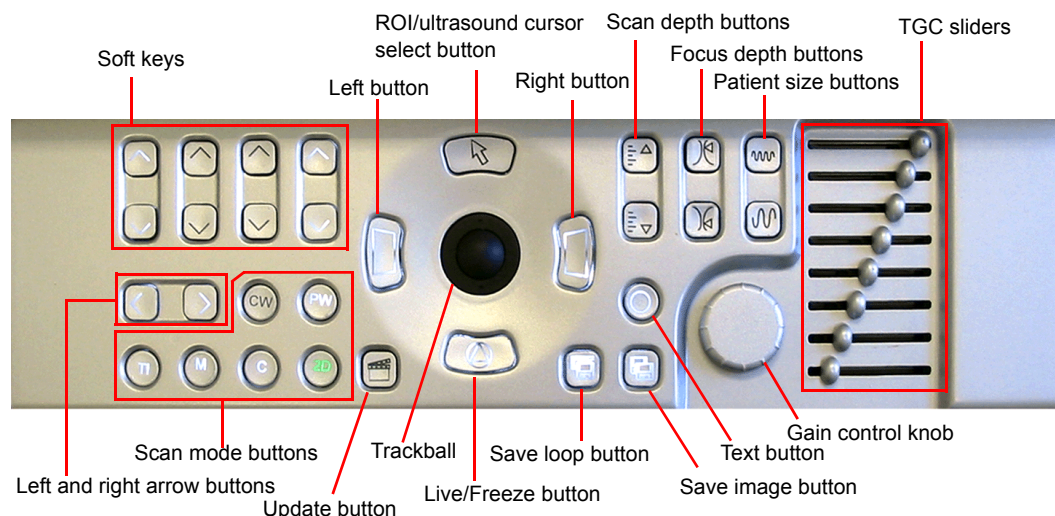
For a loaded file in a format other than ULT, this window shows an Info tab. See [Storing Images and Loops](#) on page 131 for information about viewing saved files.

For information about how the image controls for the scan modes work, see Chapter 5, [Working With Scan Modes](#), on page 89.

For information about using the Measure tabs, see Chapter 7, [Working With Measurements](#).

The Terason Console

A slide-out console houses controls that configure and operate the Terason Ultrasound system without using a mouse.



Terason Console

Console Controls

The controls on the console are arranged in three groups: left, center, and right.

Left Control Group

Soft Keys $\wedge \vee$ – Four sets of up and down arrow buttons control the settings displayed in the four boxes at the left end of the onscreen Scan Mode toolbar.

Left and Right Arrow Buttons $< >$ – A pair of left and right arrow buttons change the parameters displayed in the four boxes at the left end of the onscreen Scan Mode toolbar. Pressing one of the buttons populates the boxes with a different set of parameters.


Mode Buttons – Six buttons select the scan mode.


Center Control Group


Trackball – The trackball in the middle of the console takes the place of a computer mouse. It moves the onscreen cursor or a selected feature in the same way a mouse would.


Left Button – The button just to the left of the trackball performs the same functions as the left button on a mouse. When the ultrasound cursor is selected, clicking this button deselects the cursor.


Right Button – The button just to the right of the trackball performs the same functions as the right button on a mouse. Clicking this button during live scanning selects the ultrasound cursor.


Live/Freeze Button  – The button just below the trackball toggles between live imaging and frozen image.

ROI/Ultrasound Cursor Select Button  – The button just above the trackball moves the cursor to the ROI or the ultrasound cursor, and selects it. In PWD mode, it selects the sample volume depth marker. When these features are selected, moving the trackball manipulates them.


Save Loop Button  – The button below and to the right of the Live/Freeze button saves a loop to a file. This button is disabled during live imaging

Save Image Button  – The button to the right of the Save Loop button saves a frozen image to a file. This button is disabled during live imaging.

Text Button  – The button just above the Save Image button toggles the text entry functions on and off.

Update Button  – The button to the left of the Live/Freeze button toggles the update function on and off. See [Updating the Displays](#) on page 117.

Right Control Group

Gain Control Knob – The knob near the bottom right of the console controls gain. If the selected scan mode has different gain functions, pushing the knob down toggles it to control other available gain functions. A legend next to the gain knob icon  at the bottom right of the imaging display says which gain is currently controlled by the Gain knob.


Example: in Color mode, the Gain knob normally controls color gain, and the onscreen legend reads Color Gain. Pushing the button down changes the control to 2D gain, and the legend reads BMode Gain.


When you press the Gain knob down for two seconds during live imaging, all settings revert to the presets.


When the scan is frozen in Doppler modes, the Gain knob normally scrolls the Time-Series loop, and the onscreen legend reads Time Scroll. Pushing the knob down changes it to scroll the 2D loop, and the onscreen legend reads Frame Scroll.

Sliders – Eight sliders at the right end of the console control time gain compensation (TGC) at various scan depths. See [Adjusting Time Gain Compensation](#) on page 96.

When you turn the system on, select an exam, or press the Gain knob to reset, the presets are applied, independent of the slider positions. If you have a slider all the way to the right or left when the presets are applied, you will only be able to adjust that TGC value in one direction.

Patient Size Buttons  – Two buttons just to the left of the TGC sliders select different sets of presets, depending on the scan mode and exam type.

Focus Depth Buttons  – Two buttons just to the left of the Frequency buttons set the focus depth.

Scan Depth Buttons  – Two buttons just to the left of the Focus Depth buttons set the scan depth.

2 Installing Software

When you purchase the Terason Ultrasound System, it comes with all the required software already installed on the laptop. You may never need the information in this chapter unless you upgrade your system, or if you want to install the Terason Ultrasound System on a computer that was not provided by Terason.

If you must install, uninstall, or configure part of the Terason Ultrasound System, instructions for the following operations are included in this chapter:

- [Installing Terason Software](#) on page 37
- [Upgrading Terason Software](#) on page 39
- [Uninstalling Terason Software](#) on page 41
- [Installing the FireWire Terason Transducer Driver](#) on page 42
- [Installing the Terason DICOM Utility](#) on page 44
- [Licensing the Terason Software](#) on page 50

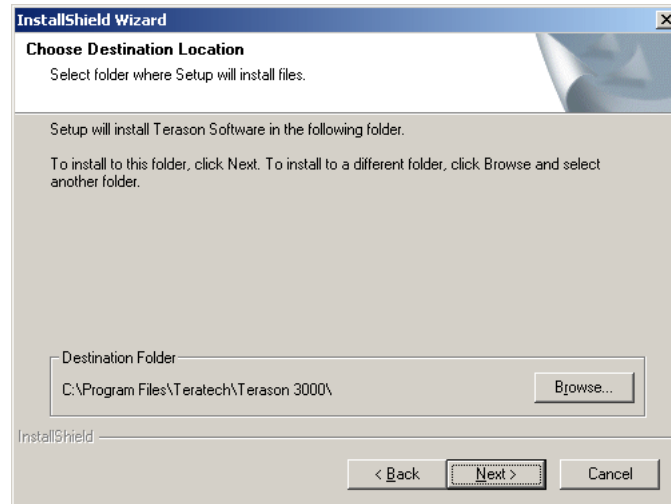
For information on connecting hardware components, or if you must reinstall the computer's operating system, refer to the Configuration Guide that came with your system.

Installing Terason Software

Terason Ultrasound System are shipped with all required software installed on the laptop. You do not need to complete the following procedure unless you want to install the Terason Ultrasound System on a computer that was not provided by Terason.

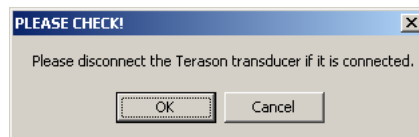
When ready, complete these steps:

1. Exit all applications including email, and **unplug** the Terason engine from the laptop if it has already been installed.
2. Insert the **Terason CD** into the CD-RW drive. An InstallShield message displays as it prepares to install the software, then the Welcome dialog box opens.
3. Click **Next>**. The License Agreement dialog box appears. Read the License Information carefully.
4. Click **Yes**. The Choose Destination Location dialog box opens.



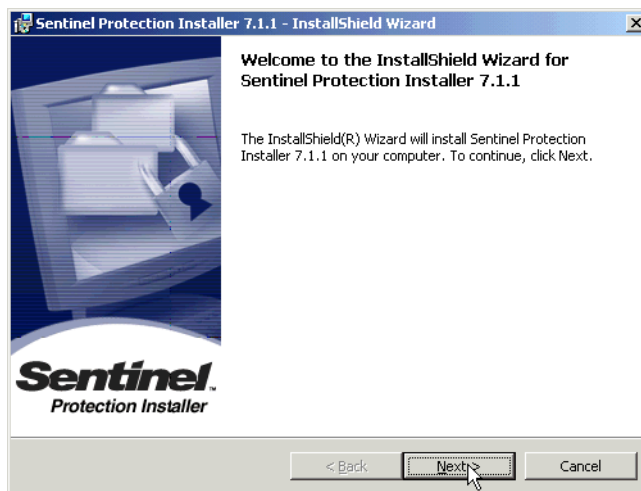
InstallShield Wizard for Choosing the Destination

5. Click **Next>** to install the application in the default location. To select a different location, click Browse and navigate to a different directory (not recommended). The wizard reminds you to unplug the Terason Transducer.



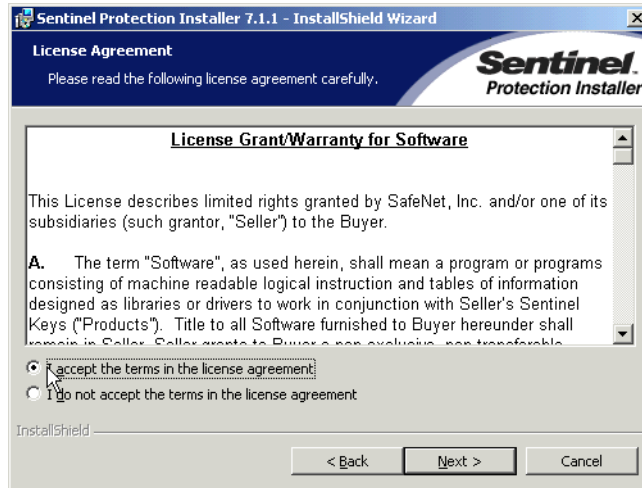
Reminder to Unplug the Transducer

6. Click **OK**. The installer copies files from the CD to the computer.
7. The Install shield opens again, to install the Sentinel Protection Installer. When the Welcome dialog box opens, click **Next >**.



Sentinel Installer Welcome

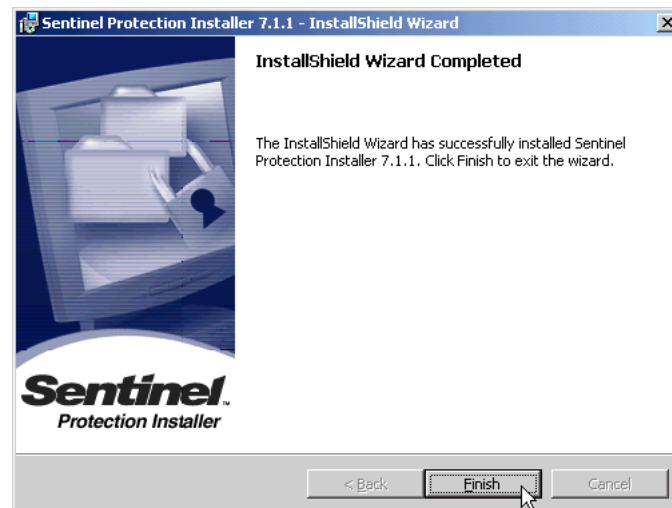
8. On the License dialog box, read the license agreement, then click the **I accept...** radio button and Next >.



9. On the Setup Type dialog box, click **Next >**.

10. On the Ready to Install dialog box, click **Install**.

When finished, the installer displays a setup complete message.



Installation Complete Message

If you see “Rebooting is required,” you must restart your computer before you use the Terason software.

11. Click **Finish**.

Upgrading Terason Software

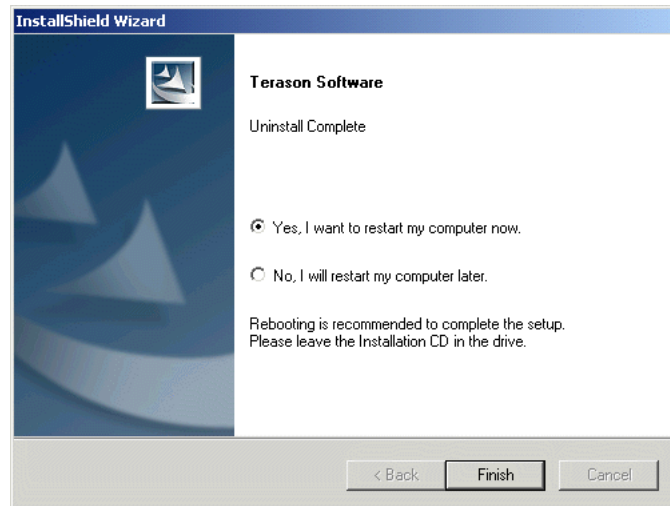
When upgrading software, the Terason installer first removes the existing version, and then installs the new version.

To upgrade to a newer version of the Terason software, complete these steps:

1. Exit all applications and **unplug** the Terason transducer from the engine.
2. Insert the **Terason CD** into the CD-RW drive. The Uninstall dialog opens.

3. Click **Next>**. The Confirm Uninstall dialog box opens.
4. Click **OK** to confirm. If you see a dialog box that includes a check box, select the Don't display this message again check box and click **Yes**.

The installer removes all of the previous Terason software and displays a completion message, recommending that you reboot.



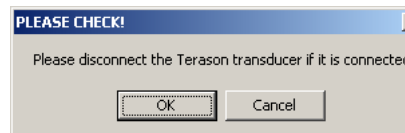
Uninstall Complete Dialog Box

5. Click **Finish**. Keep the Terason CD in the drive and wait while the computer reboots (restarts).

After the computer finishes starting up, you may have to log on before proceeding.

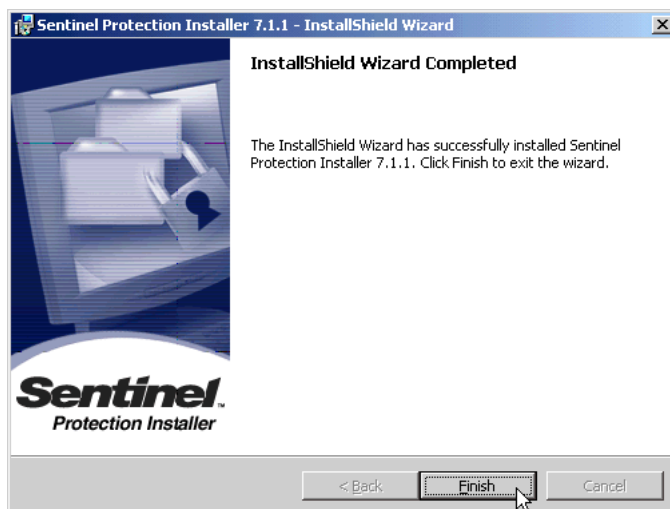
When you are logged in, the Welcome dialog for the new Terason application opens.

6. Click **Next>**. The License Agreement dialog appears. Read the License Information carefully.
7. Click **Yes**. The Choose Destination Location dialog box opens.
8. Click **Next>** to install the application in the default location. You can click Browse to select a different location (not recommended). The wizard reminds you to unplug the Terason Transducer.



Reminder to Unplug the Transducer

9. Click **OK**. The installer copies the files to the selected location. When finished, the installer displays a setup complete message.



Installation Complete Message

If you see “Rebooting is required,” you must restart your computer before you use the Terason software.

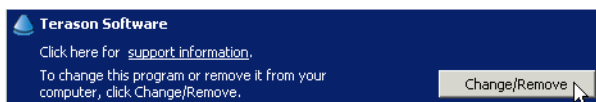
10. Click **Finish**.

Remember to connect the transducer.

Uninstalling Terason Software

You do not need to manually uninstall the current version of software when you upgrade software. To permanently remove the Terason application, complete these steps:

1. Click **Start** in the Windows task bar.
2. Select **Settings > Control Panel**. The Control Panel window opens.
3. Double-click **Add/Remove Programs**
4. Scroll down the list of programs and click to select **Terason Software**.



Uninstalling the Terason Software

When you select an application, the listing expands to show the size of the files, frequency of use and the date the program was last used.

5. Click **Change/Remove**.
6. Click **Next>** to proceed with the uninstall.
7. Click **OK** to confirm.
8. Click **Finish** to complete the uninstall process.

Installing the FireWire Terason Transducer Driver

If you purchased the laptop from Terason, all the required drivers are already installed and you need not perform the procedure in this section. If you installed the Terason software on a computer or laptop purchased from another source, the steps you must take vary, depending on the system configuration of the specific computer.

If you start the Terason software and do not see any messages about the Terason transducer, the driver software is already installed and you need not perform this procedure. Complete this procedure only if you see a “Digital Signature Not Found” or “New Hardware Found” message.

When the Terason transducer is connected to your PC, you may have to install the device driver for the operating system to recognize the new hardware. After you plug in the Terason transducer for the first time, make sure your computer is turned on, and wait approximately one minute.

Use these guidelines to determine how to install the driver:

- If you do not see any messages about the Terason transducer, the driver is already installed, and you can skip this procedure
- If you see a Found New Hardware message box, start with Step 1, below.

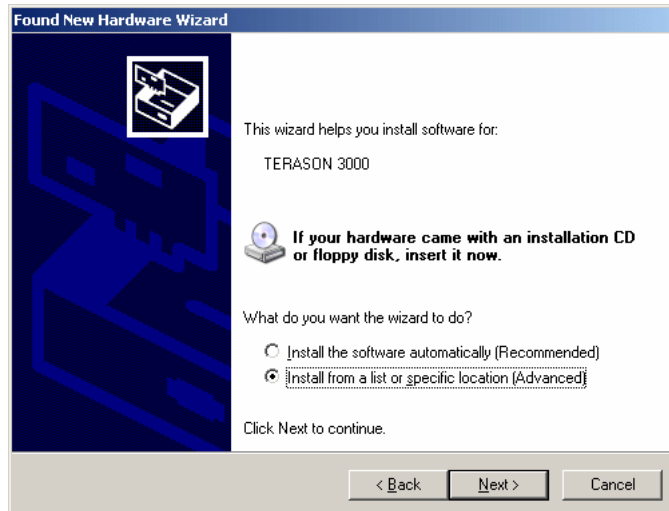


Found New Hardware Wizard

Complete these steps to install the driver (starting from the Found New Hardware window):

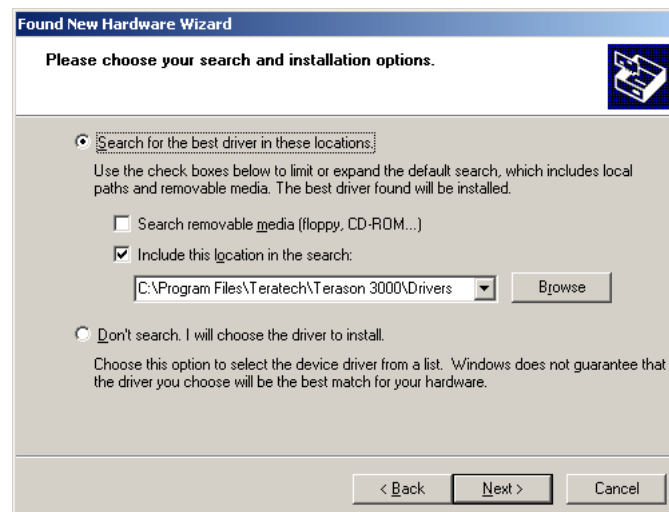
1. Click **Next>**.

The New Hardware Wizard window changes to allow you to install hardware device drivers.



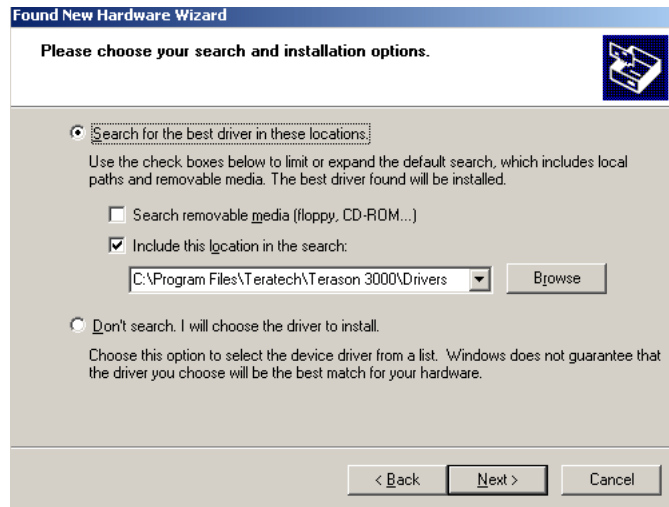
Selecting From a List or Location

2. Select **Install from a list or specific location (Advanced)** and click **Next>**.



Including a Location

3. Clear the **Search removable media (floppy, CD-ROM...)** check box.
4. Select the **Include this location in the search:** check box.
5. Click **Browse**.
6. Navigate to the **Program Files** folder on the C:\ drive.
7. Double-click the **Teratech** folder, then double-click the Terason 3000 folder. The complete path to the required folder is:
C:\Program Files\Teratech\Terason 3000\Drivers
8. Click the Drivers folder to select it, then click **Open**.



Insert Disk With Path to Drivers

9. Click **Next>**. The drivers install.
10. Click **Finish**.



Installing the Terason DICOM Utility

The Terason software must be installed before you can install the DICOM Send/Print utility or use the DICOM Worklist utility. See [Installing Terason Software](#) on page 37 for instructions on installing the Terason software.

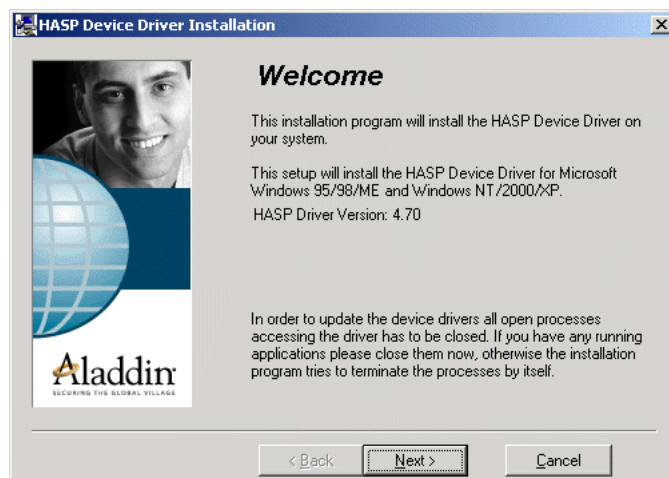
After installing the driver, you must configure it to set up the destination DICOM server and printer. After the utility is configured, follow the instructions in [Printing Files to a DICOM Printer](#) on page 227 or [Sending Files to a DICOM Server](#) on page 228 to use the DICOM print and export functions. See [Using DICOM Worklist](#) on page 228 for instruction on using Worklist to retrieve patient information.

Installing the DICOM Utility

To install the DICOM utility, complete these steps:

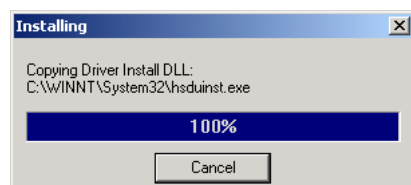
1. If necessary, **save** the active image or image loop. See [Saving Images and Loops](#) on page 133 for instructions.
2. **Exit** the Terason software using one of these methods:
 - Click  on the toolbar at the bottom of the window
 - Click  in the upper right corner of the window
 - Select **File > Exit**
3. Install the HASP Dongle Driver:
 - a. Insert the **installation disk** into the CD drive.
 - b. Open the HASP Dongle **Driver folder**.

- c. Double-click the **hdd32.exe** file. The Welcome box opens.



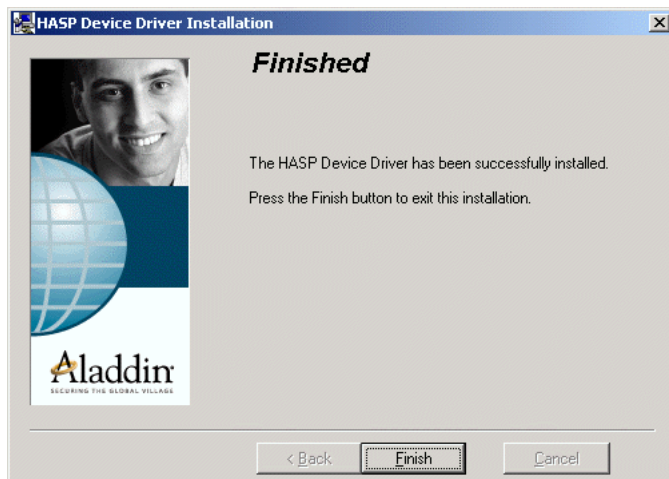
HASP Welcome

- d. Click **Next>**. The installation program installs the driver and displays a status message.



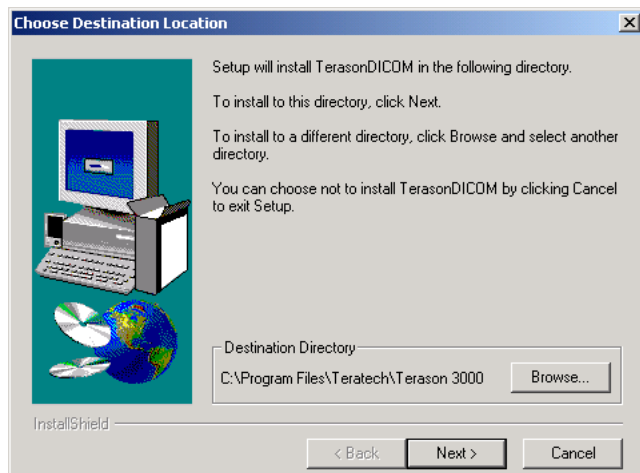
HASP Installing Message

When complete, the installation program displays the Finished message.



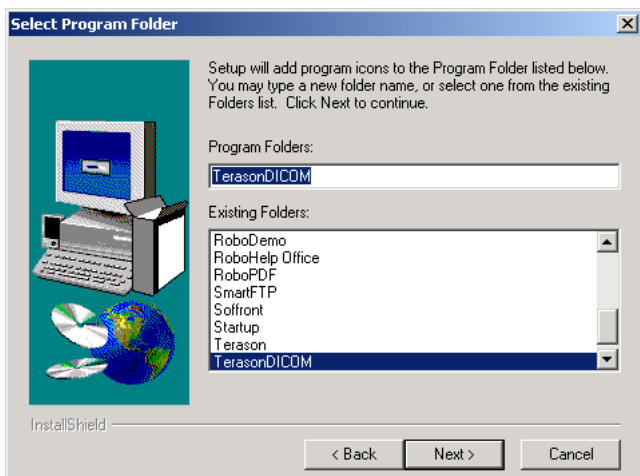
HASP Installation Finished Screen

- e. Click **Finish**.
4. Install the DICOM Utility:
- With the same installation disk in the CD drive, change to the **Install Disk** folder.
 - Double-click the **Setup.exe** file. The installation program prompts you to choose where to install the utility.



Choosing Directory for Installation

- c. Click **Next>**. The installation program prompts you to select a program folder (for using the Start button to access the application).



Selecting Program Folder (Accessed from the Start Button)

- d. Click **Next>**. The installation program prompts you to confirm your choices.



Confirm Choices and Start Installation

e. Click **Next>**. The installation program copies all required files, then exits.


5. Restart the computer.

When configuring the DICOM utility, you must enter network names, addresses, and other network details. Contact your network system administrator to get the needed information.

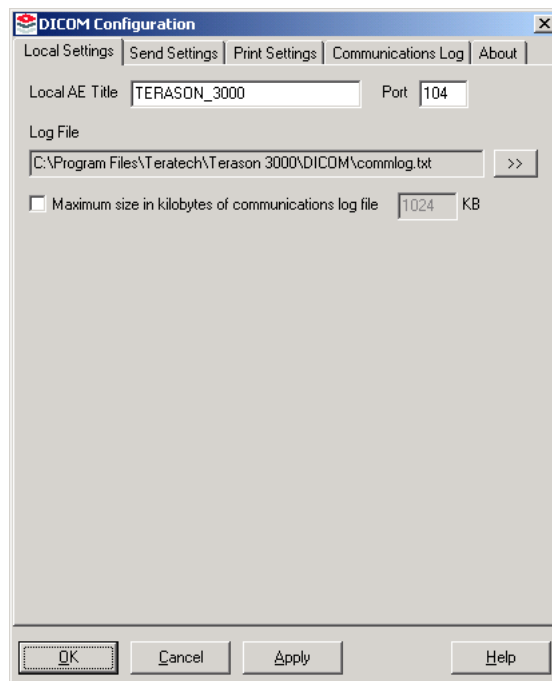
Configuring the DICOM Utility

To configure the DICOM utility, complete these steps:

1. Start the **configuration utility** using one of these methods:


- Double-click the DICOM icon  in the taskbar
- Select **Start > Programs > TerasonDICOM > Terason**.

The system opens the DICOM Configuration Window.

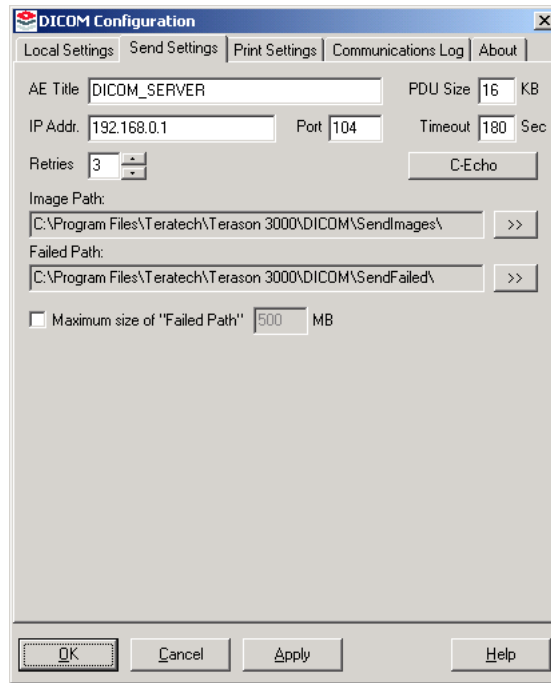


DICOM Configuration Window / Local Settings Tab

2. Configure the **Local Settings** tab:

- Verify that the Local AE Title and port number are correct for your DICOM server. The default values are TERASON_3000 and 104, respectively. Your server or network configuration may require different values, especially if your facility has more than one Terason Ultrasound System.
- If necessary, select a different path and file name for the communication log by clicking the  button and using the Windows dialog boxes to select a different location.
- To limit the size of the communications log file, select the check box and enter a value in the KB text box. When the maximum size is reached, the system overwrites the oldest entries.

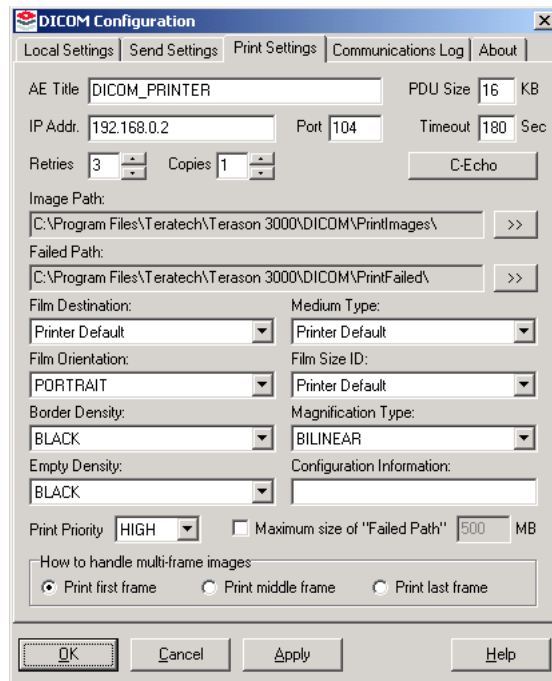
- d. Click **Apply**.
3. Configure the **Send Settings** tab (settings apply to a server where DICOM files are stored):
 - a. Click the **Send Settings** tab to bring it to the front.



DICOM Configuration Window / Send Settings Tab

- b. Enter the name of your DICOM server in the **AE Title** field.
- c. Enter the IP address or DNS node name of the DICOM server in the **IP Addr.** field.
- d. Enter the DICOM server's port number in the **Port** field.
- e. If your DICOM server requires different values, **edit** the PDU size, Timeout, and Number of Retries boxes as necessary.
- f. Click the **C-Echo button** to test whether or not the server is active on the network.
- g. If necessary, you can change the **image path** (where the computer temporarily stores DICOM files) by clicking the **>>** button and browsing to a different location.
- h. If necessary you can change the **failed path** (where the DICOM files are moved if they cannot be successfully sent after the indicated number of retries) by clicking the **>>** button and browsing to a different location.
- i. To limit the disk space consumed by DICOM files in the Failed Path, you can select the check box and enter a **MB value**. If you do, the system overwrites oldest files first when the maximum size is reached.
- j. Click **Apply**.

4. Configure the **Print Settings** tab (settings apply to a printer that will print DICOM files):
 - a. Click the **Print Settings** tab to bring it to the front.



DICOM Configuration Window / Print Settings Tab

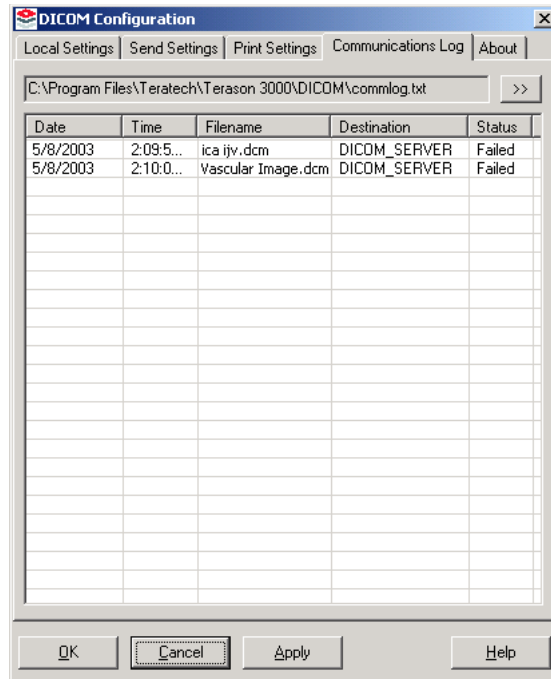
- b. Enter the name of your DICOM printer in the **AE Title** text box.
- c. Enter the IP address or DNS node name of the DICOM printer in the **IP Address** text box.
- d. Enter the DICOM printer's port number in the **Port** field.
- e. If your DICOM printer requires different values, edit the PDU size, Timeout, and Number of Retries boxes as necessary.
- f. Click the **C-Echo** button to test whether or not the printer is active on the network.
- g. If necessary, edit the number of copies to print (default value is 1).
- h. If necessary, change the image path (where the computer temporarily stores DICOM files) by clicking the **>>** button and browsing to a different location.
- i. If necessary, change the failed path (where DICOM files are moved if they cannot be successfully sent after the number of retries) by clicking the **>>** button and browsing to a different location.
- j. To limit the disk space consumed by DICOM files in the Failed Path, select the check box and enter a MB value. If you do, the system overwrites oldest files first when the maximum size is reached.
- k. Change the default values for the Film Destination, Medium Type, Film Orientation, File Size ID, Border Density, Empty Density, Magnification Type, Configuration Information, and Print Priority to meet your requirements or if needed by the DICOM printer.

1. Do not change the “How to handle multi-frame images” setting (the Terason software does not print multi-frame images).

m.Click Apply.

5. Click OK.

You need not configure the Communications log. You can click the Communications Log tab to review the contents of the log file:



DICOM Configuration Window / Communications Log Tab

Each line in log file contains this information about a file sent to a DICOM server or printer:

- Date
- Time
- File name
- Destination
- Status

If you see Failed images in the Status column, you should use the Terason software to resend those files to the server or printer, as appropriate. See [Sending Files to a DICOM Server](#) on page 228 for instructions.

Licensing the Terason Software


When installed, the Terason software can be used for a 30-day evaluation period without entering a license number. You can obtain the license number by phone or email. While waiting for the number, you can use the Terason software, however, you must enter the license number before the evaluation period expires.

This section explains the following operations:

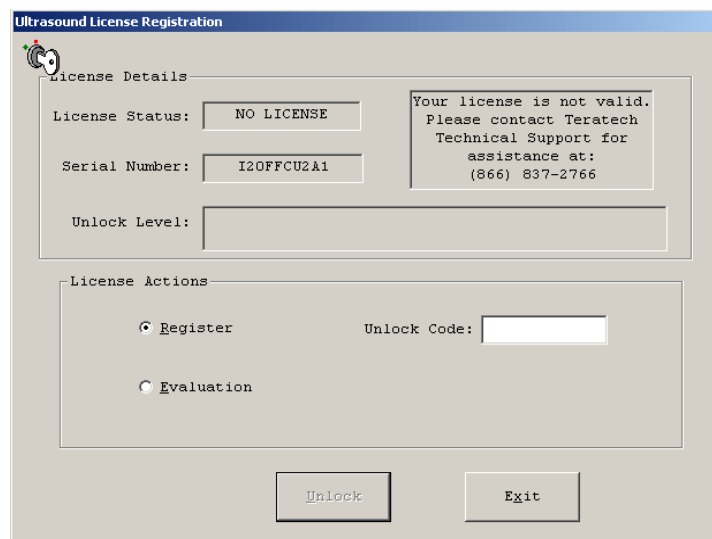
- [Entering the License or Evaluation Unlock Code](#) on page 51
- [Extending the Evaluation Period](#) on page 52
- [Transferring the License](#) on page 52
- [Upgrading the License](#) on page 54

Entering the License or Evaluation Unlock Code

To license the Terason software, complete these steps:

1. Start up the Terason software using either of these methods:
 - Double-click the shortcut **icon**  on your computer desktop
 - Click the **Start** button, and select **Programs > Terason > Terason**.

The Ultrasound License dialog box opens.



The dialog box is titled "Ultrasound License Registration". It contains two main sections: "License Details" and "License Actions".

License Details:

- License Status:** A text box containing "NO LICENSE".
- Serial Number:** A text box containing "I20FFCU2A1".
- Unlock Level:** An empty text box.
- Message:** A text box on the right stating: "Your license is not valid. Please contact Teratech Technical Support for assistance at: (866) 837-2766".

License Actions:

- Register:** A radio button that is selected.
- Evaluation:** A radio button that is not selected.
- Unlock Code:** An empty text box.

At the bottom, there are two buttons: "Unlock" and "Exit".

Ultrasound License Dialog Box


2. To register by **phone**, call Terason at 1-866-TERASON (1-866-837-2766) and give the Terason Support Representative the Serial Number shown in the dialog box.
3. To register by email, send an **email** message to **techsupport@Terason.com** and provide these details:
 - Serial number (see the Terason Ultrasound License Registration dialog box)
 - Computer serial number (on a label on the bottom of the laptop)
 - Company name

You will receive, by phone or return email, a 10-digit unlock code.

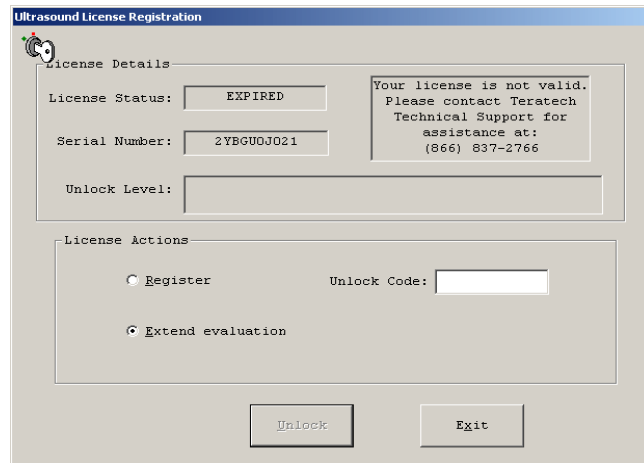
4. To use the software without entering the code, click **Continue Ultrasound**.
5. To enter the code, type the unlock code into the text field and click **Unlock**. The Terason software updates the status to Licensed.
6. Click **Continue Ultrasound**. The Terason software starts up.

Extending the Evaluation Period

If your evaluation period expires and Terason has agreed to extend the evaluation period, you must enter a new unlock code. To do so, complete these steps:

1. Contact Terason **Technical Support** at 1-866-837-2766. During this procedure, you must give a serial number to Technical Support and receive a new unlock code.
2. Start up the Terason software using either of these methods:
 - Double-click the shortcut **icon**  on your computer desktop
 - Click the **Start** button, highlight **Programs > Terason > Terason**.

The Ultrasound License dialog opens.



Ultrasound License Dialog Box

3. Click in the option box for **Extend Evaluation**.
4. Read the new **Serial Number** to Terason Technical Support. Technical Support will give you a new 10-digit unlock code.
5. Type the unlock code into the text field and click **Unlock**. The Terason software updates the status to Evaluation.
6. Click **Continue Ultrasound**. The Terason software starts up.

Transferring the License

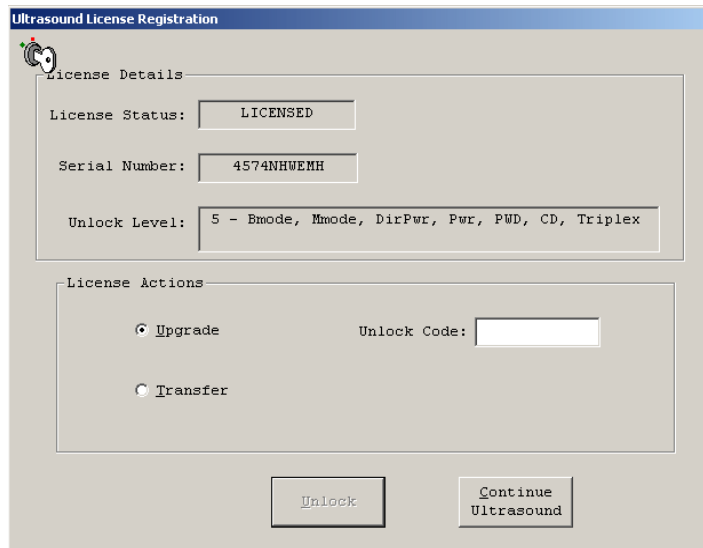
You can transfer the Terason software license from one computer to a second computer. In this section, “first” refers to the computer where the software was initially installed and “second” refers to the computer to which you will transfer the license.

Before you start this procedure, you must determine the serial number of the destination PC. This number is not the serial number on the PC, but an application serial number assigned by Terason.

To transfer the license, complete these steps:

1. On the second computer, install the Terason **software** as described in [Installing Terason Software](#) on page 37.

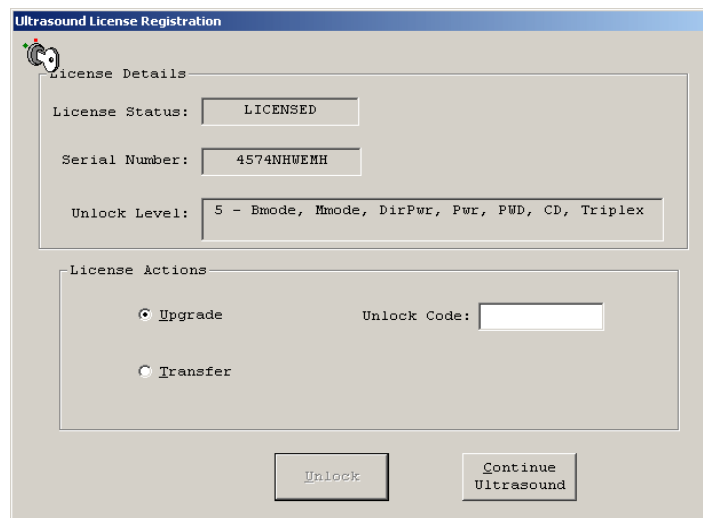
2. Double-click the Terason **shortcut**  on the second computer's desktop. The Ultrasound License Registration window opens.



Ultrasound License Registration Window

3. Write down the **Serial Number**. Do *not* close the window.
4. On the first computer, start the Terason software.
5. Select **Help > License**.

The Ultrasound License Registration window opens.



License Registration Window

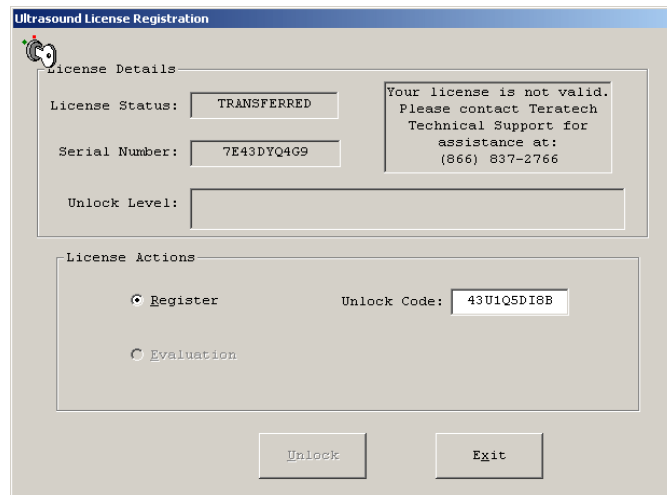
6. Click the **Transfer** radio button.
7. Enter the **number** you wrote down in step 3 in the Transfer PC Serial Number field. The Transfer button remains gray until you enter the correct number of digits in the field.
8. Click **Transfer**. The Terason software displays this warning message:

Transferring the license to another computer will remove the license from this computer. Ultrasound will no longer be able to run on this computer until the license is transferred back or another license is purchased. Do you want to continue?

9. Click **Yes**. The Terason software displays this instruction:

Enter the unlock code on the transferred computer.

10. Click **OK**. The Terason software displays the unlock code you must enter on the second computer.



Unlock Code to Transfer to a Second Computer

11. Write down the **Unlock Code**.
12. Click **Exit**. The Terason software quits.

If you start the Terason software on the first computer again, you will see the License dialog shown here. Note that the unlock code shown above will not enable the software on this computer. You must contact Terason for a different unlock code.

13. On the second computer, enter the **unlock code** you wrote down in Step 11. The Unlock button remains gray until you type the correct number of characters.
14. Click **Unlock**.


You can no longer use the Terason software on the first computer. If you try to start it, you will see the License Registration dialog box showing the License Status as transferred, and you cannot run the software.

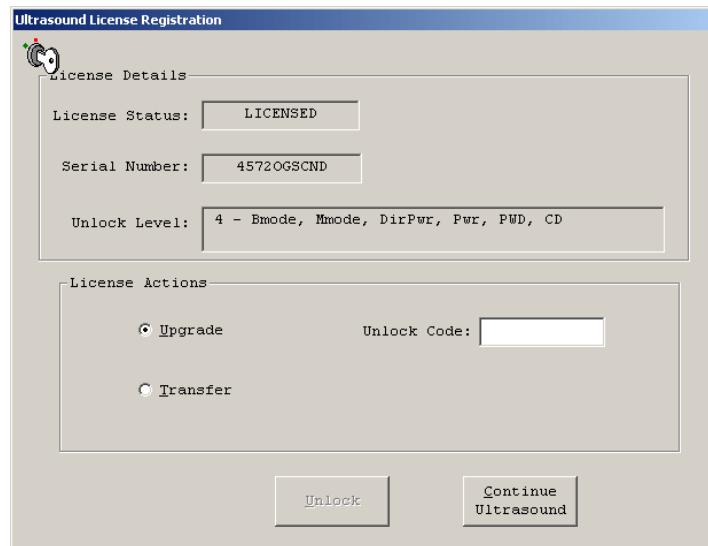
See [Uninstalling Terason Software](#) on page 41 for instructions on removing the Terason software from the first computer.

Upgrading the License

You can purchase additional options for the Terason Ultrasound System. For example, if you originally bought the ST (standard) version of the system, you can later upgrade to the AD (advanced) version. To upgrade the software, you must contact Terason Technical Support to obtain a new unlock code.

To upgrade the Terason Ultrasound System, complete these steps:

1. Double-click the short-cut icon  on your computer desktop to start the application.
2. Select **Help > License**. The software shows the license dialog box.



Evaluation Period Dialog Box

3. Click the **Upgrade** radio button.
4. Contact Terason **Technical Support** and read the serial number to the Support Representative. The Representative will give you an unlock level number and an 10-digit unlock code.
5. Enter the **Unlock Code**.
6. Click **Unlock**. The Terason software upgrades the features of your Terason Ultrasound System.
7. Click **Continue Ultrasound**.

3 Setting Up Patient Information

Although you can scan a patient without entering any information about that patient, 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 folder for the specific patient, along with a patient information file. If you do not enter patient details, the image is stored in a folder with other images and is not associated with a specific patient.

To work with patient information, you should understand:

- [Using the Patient Info Window](#), see page 57
- [Adding a New Patient](#), see page 57
- [Preparing Patient Info for an Exam](#), see page 60
- [Updating Patient Information](#), see page 61
- [Deleting a Patient Folder](#), see page 61

To view the Patient Info window, click the Patient Info tab.

The screenshot shows the 'Patient Info' window with the following data entered:

- Last: Ronni, First: Mark, Middle: A
- Patient ID: 010-00-1111
- Study ID: (empty), Accession Number: (empty)
- DOB: 6/22/1985
- Gender: ☒ M, ☐ F
- Height: 6 ft, 2 in, Weight: 190 lbs
- Comment/History: abdomen pain
- Location: (empty), Clinician: (empty)

Patient Info Window

These examples show loaded information. Double-click the Patient Info file in any patient's folder to load existing data.

Patient information remains loaded until one of these events occurs:

- You load a different patient's information
- You open an image or loop in the Image Display window for a different patient
- You click the **New Patient** button or select **File > New Patient**

Using the Patient Info Window

When entering text in this window, you can use these **Edit** menu items:

Edit Menu Items for the Patient Info Window


Menu Name	What it Does
Undo	Undoes the most recent cut, text typing, or deletion
Cut	Removes the selected text from the field and stores it in a system clipboard. Clipboard text can be pasted into any field in this window, or as text into another document
Copy	Copies the selected text without removing it and stores it in a system clipboard. Clipboard text can be pasted into any field in this window, or as text into another document
Paste	At the location of the text cursor, inserts the last text cut or copied
Delete	Removes the highlighted text

The buttons at the bottom of the window provide these functions:

Description of Buttons in the Patient Info Window

Button	What It Does
Save	Saves new or modified patient information
New Patient	Clears the Patient Info window so you can add a new patient
Cancel	Undoes any edits or entries you made
Help	Provides access to the online Terason Help system

You can also use the **File** menu to access the Save Patient and New Patient functions.

You can print the contents of the Patient Info window by clicking  , or selecting **File > Print**.

If an exam of the patient was saved to a DICOM server that the Terason ultrasound system has access to, you can use DICOM Worklist to automatically fill in the Patient Info window fields. See [Using DICOM Worklist](#) on page 228.

Adding a New Patient

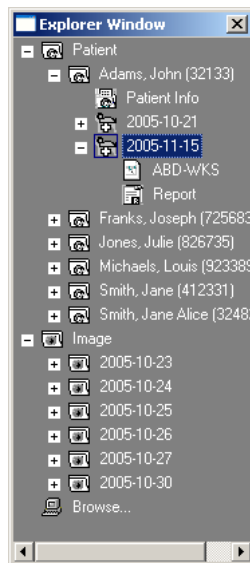
If you need to start the ultrasound exam immediately, the Terason software lets you skip entering patient information. However, if you save the image it will not be associated with this patient, and no patient information will be saved with or displayed on the scan. The

system saves unassociated scans in the Terason Explorer Image directory. You can enter patient information after starting such an exam (by clicking the Patient Info tab), and saved images will then be associated with the patient info file. You can also enter the patient info later, after opening the saved image. When you save the image again, a copy is associated with the patient info file. This only works with .ult-format images.



Caution: Do not save scans of two different patients without patient info on the same day. That makes scans for both patients in that day's directory, with no indication of which scan is of which patient.

When you add a new patient, the Terason software creates a folder in the Patient folder with the patient's name. In that folder, the Terason software stores the Patient Info file and all saved scans for that patient.



Patient Info File in the Terason Explorer Window

The folder in the Patient list for John Adams contains the Patient Info file and two dated folders, each containing one or more scans that were saved on the indicated date. Starting an exam after creating or opening a patient info file creates a new date folder and a report file. The report file and any saved images are saved in the date folder.

The Terason software uses the Image folder to store all images that were saved without entering patient information. Each folder in the Image folder contains all images that were saved without patient information on the indicated date.

When you enter a patient name, the total number of characters of the first, last, and middle name is limited to 64 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 64 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. Click the **Patient Info** tab.
2. Click **New Patient**.

Clicking the Save button or clicking the Image Display tab saves entered information and opens the scanning window.



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

3. Enter the **last name**.
4. Enter the **first name**.
5. Enter the **middle name**.
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 a **study ID** number using up to 16 alphanumeric characters.
8. 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.
9. Enter the patient’s **date of birth** in this format: MM/DD/YYYY.
 - a. Click the month field in the DOB display, and type the **month** as one or two numerals.

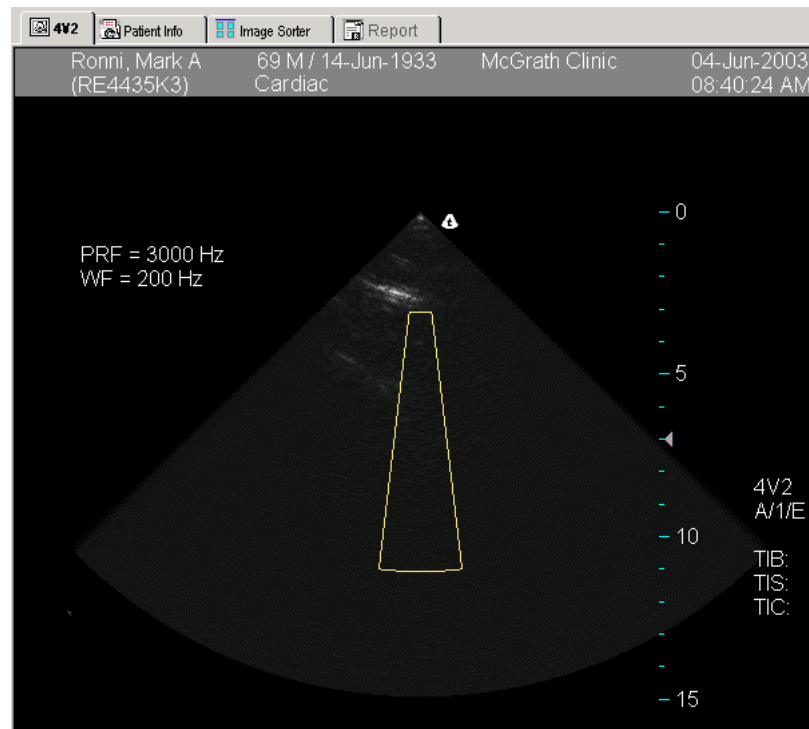
01 displays as 1, 02 as displays as 2, etc.
 - b. Type the **day** as one or two numerals.
 - c. Type the **year** as two or four numerals.

02 displays as 2002, 84 displays as 1984, etc.
10. Click in the check box for the patient’s **gender**: M for male or F for female.
11. Enter the patient’s **height and weight**. To change the units of measurements used, see [Setting the Units for Patient Measurements](#) on page 249.
12. Enter any **comments**. You can type directly in the field, or click Extended Comment to type a longer comment.
13. In the **Location**: field, enter where the exam is taking place. You can enter up to 46 alphanumeric characters.
14. In the **Clinician**: field, enter the name of the clinician performing the exam. You can enter up to 46 alphanumeric characters.
15. Click the Save button or click the Image Display tab to save the entered information and open the scanning window.

The patient information is saved in a Patient Info file and displays in the Terason Explorer window in a folder with that patient’s name. The Image Display window is ready for you to conduct the exam.

The Terason software displays the patient information in the Image Display 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.

If you do not see the patient information, select **View > Image Display Properties > Patient Information**.



Patient Information at the Top of the Image Display Window

This scan shows an empty scan in Power Doppler mode. You are now ready to conduct the ultrasound exam.

Preparing Patient Info for an Exam

Before you perform an ultrasound exam, you should load the patient information, and enter details about the exam.

To prepare the Patient Info window for an exam, complete these steps:

1. Find the **patient** in the Terason Explorer window.
2. Click the **+** in front of the patient's name. The folder expands and you can see the Patient Info file, and any image folders for that patient.



Patient Info File

3. Double-click the **Patient Info file**. The Terason software loads the saved patient information into the Patient Info window and at the top of the Image Display window.




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

4. If necessary, click the **Patient Info tab** to make it active.
5. Optional: In the **Location:** field, enter where the exam is taking place. You can enter up to 46 alphanumeric characters. If you previously entered a location for this patient, you can click the down-arrow and choose an existing location (by default, the site for the most recent exam displays in the field).
6. Optional: In the **Clinician:** field, enter the name of the clinician performing the exam. You can enter up to 46 alphanumeric characters. If you previously entered a clinician for this patient, you can click the down-arrow and choose an existing clinician (by default, the clinician for the most recent exam displays in the field).
7. Enter any needed **comments**.
8. Click **Save**.

You are now ready to scan the patient.

Updating Patient Information

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

1. Click  in front of the patient's name in the Patient folder in the Terason Explorer window.
2. Double-click the **Patient Info file**.
3. If necessary, click the **Patient Info tab** to make it active.
4. Enter the **new information** in the appropriate fields.
5. To edit the comment, click **Extended Comment** and make any needed changes.
6. Click **Save**.

Deleting a Patient Folder

You cannot directly delete a Patient Info file, however, you can delete a patient's folder and the Terason software will delete all Patient Info files within that folder. If the folders contain any saved images, those files are also deleted.

To archive the patient information file and its associated images before you delete them, see [Backing Up Files on a CD](#) on page 142.



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 folder, including saved scans, before you perform this procedure.

To delete a patient folder, complete these steps:

1. In the Terason Explorer window, locate the **patient's name**.
2. Right-click the patient's folder and select **Delete**.

The Terason software prompts you to verify that you really want to delete the Patient Info file.

3. Click **Yes**.

The Terason software prompts you to verify that you really want to delete the folder and all its contents.

4. Click **Yes**.


4 Acquiring Images

To support image acquisition, you must understand:

- [Powering the Laptop On and Off](#) on page 63
- [Starting and Exiting the Software](#) on page 63
- [Connecting a Transducer](#) on page 64
- [Switching Transducers](#) on page 65
- [Conducting an Ultrasound Exam](#) on page 65
- [Freezing Images](#) on page 70
- [Working with Image Loops](#) on page 70
- [Determining Image Status](#) on page 72
- [Adjusting the Displayed Image](#) on page 73
- [Adding Guides to the Image Display](#) on page 77
- [Changing the Text Size](#) on page 78
- [Using Split Screen Mode](#) on page 79
- [Working with Annotations](#) on page 81

To adjust the acquired scan data, see [Chapter 5 - Working With Scan Modes](#).


Powering the Laptop On and Off

To power the laptop on, press the power button  at the top right of the keyboard. This does not power up the console; you must start the ultrasound software and extend the console out from the system to power-on the console.

To power off the laptop, either press the power button or select Shut Down from the Windows Start menu. Using either method also shuts down the console.

Starting and Exiting the Software


You can use either of these methods to start up the Terason software:

- Double-click the Terason shortcut  on your computer desktop
- Select **Start > Programs > Terason > Terason**



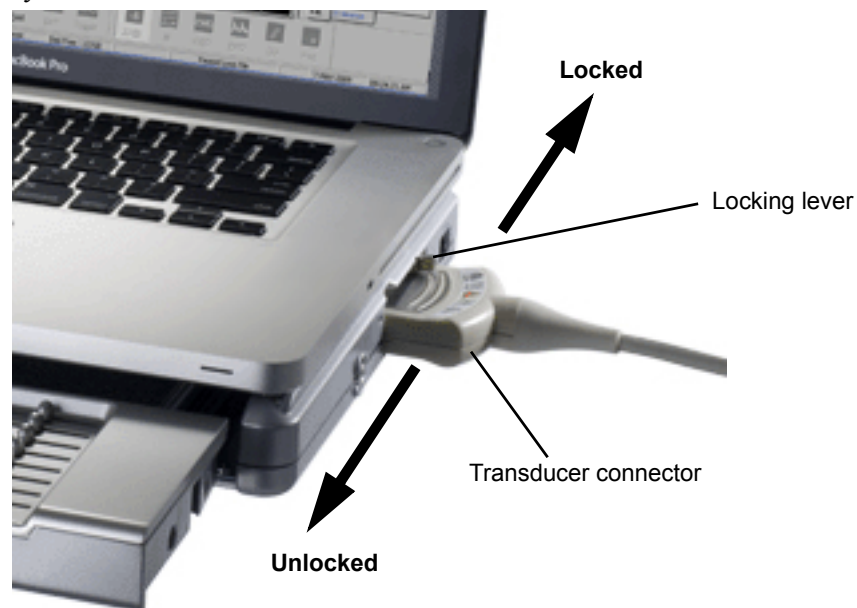
Note: When running a laptop on battery power, always check the amount of power left. The system beeps when the battery is getting very low. For information on checking the battery power status for your computer, refer to the computer manual

Make sure you save or print any images or loops before exiting the software. You can use either of these methods to exit the Terason software:

- Click the  icon at the top right of the menu bar
- Select **File > Exit** from the menu bar

Connecting a Transducer

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



To connect a transducer:

1. Make sure the locking lever is in the **unlocked position**.
2. Insert the **transducer connector** 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 transducer and displays its name on the imaging window. If the software is started after the transducer is connected, the Terason software will detect and display the transducer name as soon as it starts.

To disconnect a transducer:

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

Switching Transducers

The Terason ultrasound system lets you change transducers without exiting the program.

Complete these steps to switch between transducers:

1. If necessary, **save** the active image or image loop. See [Saving Images and Loops](#) on page 133 for instructions.
2. Rotate the locking lever to the **unlocked position** and carefully unplug the transducer.
3. Plug the new transducer in and move the locking lever to the **locked position**.

Conducting an Ultrasound Exam

In general, complete these steps to conduct an exam:

1. Load or create **patient information**.
2. Start **live imaging**.
3. Select an **exam type**.
(See [Working With Exams](#) on page 212.)
4. Select a **scan mode** and adjust image controls.
(See [Scan Modes Overview](#) on page 89)
5. **Freeze** the image.
6. Add **annotations** or measurements.
(See [Working With Measurements](#) on page 150)
7. **Save** or print the image.

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







- [Conducting a 2D, M-Mode, or Color Doppler Exam](#) on page 66
- [Conducting a PWD Exam](#) on page 68
- [Conducting a CWD Exam](#) on page 68
- [Conducting an Exam in Triplex Mode](#) on page 69

Using the Console

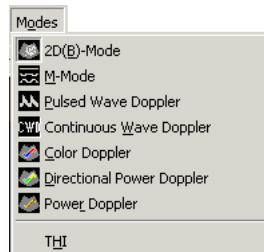
For information on using the console to control exam parameters, see [The Terason Console](#) on page 34.

Choosing a Scan Mode

To choose a scan mode, click the appropriate button on the toolbar:

- For 2D, click 
- For M-Mode, click 
- For Color Doppler, click 
- For Pulsed-Wave Doppler, click 
- For Continuous-Wave Doppler, click 
- For Power Doppler, Click 

You can also select a scan mode from the **Modes** menu.



Scan Modes in the Modes Menu

You can also use shortcut keys to start scanning:







- **B** for 2D
- **M** for M-Mode
- **C** for Color Doppler
- **P** for Pulsed-Wave Doppler
- **W** for Continuous-Wave Doppler
- **D** for Directional Power Doppler
- **R** for Power Doppler

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

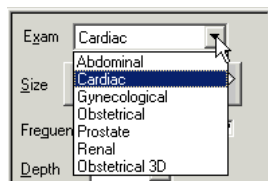
If you are using the 4V2A transducer in 2D mode, see [Special Controls Used With the 4V2A Transducer](#).

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

1. If you use more than one Terason transducer, click the Image Display tab for the needed transducer.
2. Load or create the patient information. See Chapter 3, [Setting Up Patient Information](#), on page 56 for instructions.
3. Click the icon for the needed scan mode:

- For 2D, click 
- For M-Mode, click 
- For Color Doppler, click 
- For Power Doppler, Click 
- For Directional Power Doppler, Click  , then click  on the Pwr Image Control window.


4. In the 2D Image Control tab, select an exam type from the Exam menu.



Choosing an Exam Type

The Terason software loads preset image control settings that are optimized for the selected exam and the connected transducer. See Chapter 8, [Working With Exams](#), on page 212 for information about exam types and defining your own exams.

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

5. If necessary, adjust the **2D image controls**. See [Using 2D and I.Q. Controls](#) on page 90 for instructions.
6. If necessary, adjust the **I.Q. image controls**. See [Controls on the I.Q. Image Control Window](#) on page 100 for instructions.
7. If necessary, adjust the **image controls** for the selected scan mode:
 - For M-Mode, see [Using M-Mode Image Controls](#) on page 105.
 - For Color Doppler and Power Doppler scan modes, see [Using Color and Power Doppler Image Controls](#) on page 118.
8. Click  . The Terason software automatically adds measure tabs to the Image Control window. The measure tabs include measuring tools for the selected scan mode (see Chapter 7, [Working With Measurements](#), on page 150 for instructions on using the measurement tools).
9. Add **annotations** (see [Working with Annotations](#) on page 81) as needed.
10. Save or print the ultrasound image. See [Saving Images and Loops](#) on page 133 and [Printing Images](#) on page 146.

Special Controls Used With the 4V2A Transducer

When conducting an exam in 2D mode with the 4V2A transducer connected, some special controls are available.

Sector Position and Width Controls

To select the sector position handle at the bottom of the sector display, press the Select button on the console two times. You can then drag the sector left or right using the trackball. Press the Select button two more times to release the sector position handle.


To select the sector width handles, press the Select button on the console three times. Rolling the trackball to the left then narrows the sector, while rolling it to the right widens the sector. Press the Select button again to release the sector width handles.

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 65 (do not freeze the scan).
2. Position the Windows pointer in the 2D image where you want to set the range gate, then double-click.

You can also use any of these methods:

- Click 
- Select **Modes > Pulsed-Wave Doppler**
- Right click and select **Set PWD Gate**
- Type **P** when not in text mode

Click in the range gate and move it to the proper location.


3. Adjust any image control settings on the PWD tab as needed. See [Using the Console](#) on page 108 for instructions.
4. Click . The Terason software automatically adds the 2D Measure and PWD Measure tabs to the Image Control window (see Chapter 7, [Working With Measurements](#), on page 150 for instructions on using the measurement tools).
5. Add annotations (see [Working with Annotations](#) on page 81) as needed.
6. Save and/or print the ultrasound image. See [Saving Images and Loops](#) on page 133 and [Printing Images](#) on page 146.

Conducting a CWD Exam


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

1. Conduct an exam in 2D mode, as described in [Conducting an Ultrasound Exam](#) on page 65 (do not freeze the scan).

2. Go to CWD mode, using any of these methods:

- Click 
 - Select **Modes > Continuous Wave Doppler**
 - Type **W** when not in text mode

Click in the range gate and move it to the proper location.


3. Adjust any image control settings on the CWD tab as needed. See [Using Spectral Doppler Image Controls](#) on page 109 for instructions.
4. Click . The Terason software automatically adds the 2D Measure and CWD Measure tabs to the Image Control window (see Chapter 7, [Working With Measurements](#), on page 150 for instructions on using the measurement tools).
5. Add annotations (see [Working with Annotations](#) on page 81) as needed.
6. Save and/or print the ultrasound image. See [Saving Images and Loops](#) on page 133 and [Printing Images](#) on page 146.

Conducting an Exam in Triplex Mode


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

1. Conduct an exam in Color Doppler, Directional Power Doppler, or Power Doppler **mode** as described in [Conducting an Ultrasound Exam](#) on page 65 (do not freeze the scan).
2. Position the Windows pointer in the 2D image where you want to set the **range gate**, then double-click.

You can also use one of these methods:

- Click 
 - Select **Modes > Pulsed-Wave Doppler**
 - Type **P** when not in text mode

Click in the range gate and move it to the proper location.

3. Adjust any **image control settings** on the PWD tab as needed. See [Using Spectral Doppler Image Controls](#) on page 109 for instructions.
4. Click . The Terason software automatically adds the 2D Measure and PWD Measure tabs to the Image Control window (see Chapter 7, [Working With Measurements](#), on page 150 for instructions on using the measurement tools).
5. Add **annotations** (see [Working with Annotations](#) on page 81) as needed.
6. Save or print the ultrasound image. See [Saving Images and Loops](#) on page 133 and [Printing Images](#) on page 146.

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 [Using Spectral Doppler Image Controls](#) on page 109 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 Image Display window. The frozen frame can be saved as a single image file or an image loop. For M-Mode, PWD, CWD, 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 click Live without saving the image or image loop, you lose the temporarily-stored frames.

When performing an ultrasound scan, click  to freeze the displayed image (or select **Image > Freeze** from the menubar). You can then use the Playback toolbar or the arrow keys to move through the frames acquired during the scan (see [Working with Image Loops](#) on page 70).

To start a new scan, you can:

- Click 
- Select **Image > Live**
- Press the space bar



Note: If you do not save the frozen image or loop, the frame data is lost when new data is acquired. When you start live imaging, all previous frames are erased. Make sure you save or print any needed images before you acquire new scan data.





You can use the spacebar to freeze images and start live scanning when Text mode is not active. See [Typing Text on an Image](#) on page 84 for information on Text mode.



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 buttons on the Playback toolbar or the arrow keys to review an entire loop, frame by frame, to find a specific frame. You can also use the Playback buttons when viewing a saved loop.



Playback Toolbar Buttons

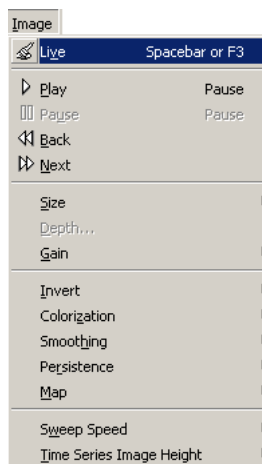
To select a specific frame to save as an image (not as a loop), make sure the image has focus. To do this the image area should have a blue dot in the upper left hand corner of the image area. Click  or  or the left and right arrow keys until the needed frame displays, then click . You need not select a different frame to save the scan as a loop: all acquired frames are saved in the loop when you click .

For 2D images the  and  are both active, and allow you to review the loop both forwards and backwards. For Color Doppler modes, you can only move the image forward.

To view a loop, click . The Play button changes to the Pause button. The loop plays continuously until you click the Live or Pause buttons. You can track the frames and the number of the current frame in the progress bar next to the Next button.

To stop a playing loop, click the Pause button.

You can also use the **Image** menu to implement the Play, Pause, Back, and Next functions.



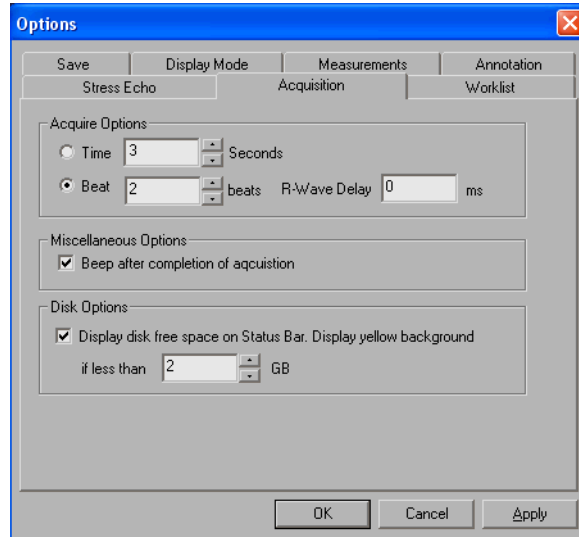
Playback Functions on the Image Menu

Saving Prospective and Retrospective Loops

In 2D, Color, and Power Doppler 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, clicking the Save Loop button tells the system to acquire and save a loop of the scan following the button click. The loop displays in the Thumbnail window at the left of the Main Screen. The default length of the loop is 3 seconds, but this is adjustable between 1 and 10 seconds on the Acquisition tab of the Options menu (Tools > Options > Acquisition).



Acquisition Tab on Options Window

When the Beat radio button on the Acquisition tab of the Options window is selected (as shown above), 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 on the Acquisition tab. 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.

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

Loops acquired in this way cannot be saved as .ult files. The default format for these loops is .dcm, however, they can also be saved as any of the other available formats except .ult. Use the Save Loop File Type menu on the Save tab (Tools > Options > Save) to choose a different file format. (If .ult is selected, the system saves prospectively acquired loops as .dcm.)

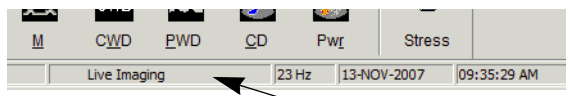
Saving Retrospective Loops

During live imaging, clicking the Freeze button then the Save Loop button tells the system to acquire a loop of the frozen scan. The loop displays in the Thumbnail window at the left of the Main Screen. The default length of the loop is 3 seconds, but this is adjustable between 1 and 10 seconds on the Acquisition tab of the Options menu (Tools > Options > Acquisition).

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

Determining Image Status

The Terason software continually displays an image status message at the bottom right of the main window, next to the frame rate (if displayed) for the Image Display window. In the example below, the message shows beneath the Modes toolbar. There is also a bar next to the status message. When this bar is green, the image is live. When the bar is gray, the image is frozen.



Location of Image Status Message

You could see any of the statuses in the following table:

Terason Status Messages

Image Display Window Status	Description
Initializing...	Starting up and verifying the connection to the transducer
Live Imaging	Actively acquiring scan data from the transducer
Frozen Image	Stopped acquiring data
Playing Loop	An acquired loop is playing
Paused Loop	An acquired loop was playing and is now paused
Single Image File	A Terason format (ULT) image file has been loaded
Playing Loop File	A loaded ULT file is playing
Paused Loop File	A loaded ULT file was playing and is now paused
BMP Image File	A bitmap file has been loaded
JPEG Image File	A JPEG file has been loaded
TIFF Image File	A TIFF file has been loaded
DICOM Image	A DICOM file (image or loop) has been loaded
Playing DICOM Loop	A loaded DICOM loop is playing
Paused DICOM Loop	A loaded DICOM loop was playing and is now paused
Playing AVI Video Clip	A loaded AVI file is playing
Paused AVI Video Clip	A loaded AVI file is paused

Adjusting the Displayed Image


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

- [Enlarging an Area of the Image](#) on page 73
- [Resizing the Window](#) on page 74
- [Displaying the Image in Full Screen](#) on page 75
- [Hiding Windows](#) on page 75
- [Enhancing the Image Using TeraVision™ Optimization](#) on page 76

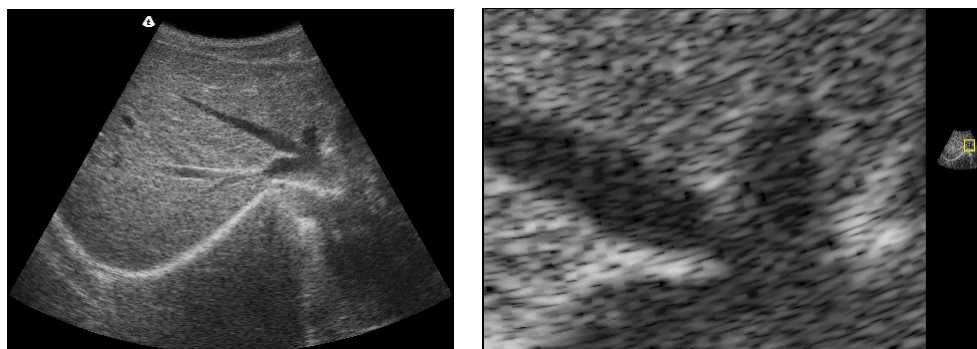
Enlarging an Area of the Image

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 in on a portion of an image, complete these steps:

1. Click , click Z, or select **View > Zoom**.
2. Move the target cursor to a corner of the area you want to magnify, click, move the cursor to the diagonal corner, and click.

The selected area is magnified and a small reference image called a thumbnail appears on the right to show which part of the image is enlarged.



Normal Image (Left) and Zoomed Image with Thumbnail (Right)

To return to the original image view, click  again.

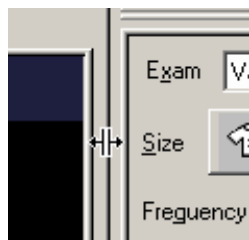
If you do not see the thumbnail or if you want to hide it, select **View > Image Display Properties > Zoom Thumbnail**. Clicking on this menu item toggles between showing and hiding the thumbnail. The Large Thumbnail option in this menu works with the Review tab, not with the zoom function.

Use the scroll bars if you must view obscured areas of the scan. Click the Zoom button to return the image display to normal view.


Resizing the Window

You can change the size of the image by changing the size of the Image Display window. You can increase the size of the Image Display window by hiding the Terason Explorer or Image Control windows.

You can also drag the border between the Image Display window and an adjacent window to show less of the other window.



Changing the Window Size

When you place the Windows pointer exactly between the two windows, the pointer changes to . You can then click the left mouse button and move that border in either direction to change the relative sizes of the two windows. When you resize a window, the Image Display window expands or contracts to fill the space available.

Displaying the Image in Full Screen

You can set the Image Display window to encompass the entire display area of your monitor, including the area usually reserved for the menu and Windows task bar. You can use any of these methods:

- Press the F11 key
- Select View > Full Screen

To return the Image Display window to its original size, press the F11 key. Alternatively, slide the Windows pointer to the extreme top of the window. The menu display and you can select View > Full Screen to revert the Image Display window to its original size.

Hiding Windows

When you show all of the Terason windows, you have access to all of the software's functions. You can locate a patient's information, choose an image mode, save or print images, and all of the other Terason functions.

However, the windows take up room. To have more room for the actual scanned image, you can hide any of the windows. You do not lose access to those functions; you can use the menus to select them.


For example, if you hide the Terason Explorer window, you can use **Open** on the File menu to open a saved image.

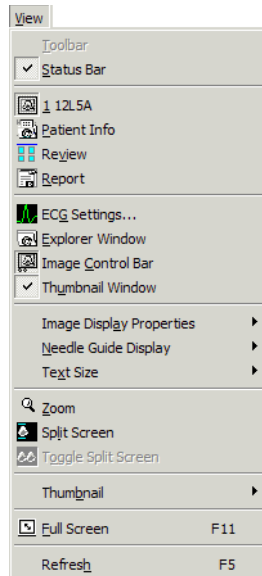
When you hide windows, the Image Display window expands to fill the additional area.

To hide or show the Status bar, select **View > Status Bar**.

- Right-click in the Image Control window or on a toolbar and select the toolbar

You can hide windows using any of these methods:

- Click the  at the top right corner of the window
- From the **View** menu, select **Explorer Window**, **Image Control Bar**, or **Thumbnail Window**
- Right-click in the Image Control window or on a toolbar and select Terason Explorer or Image Control



Showing or Hiding Windows

The menus work as toggles: each time you select or click it, the TeraVision software hides or shows the window depending on its current state.

The **Status Bar** menu item hides or shows the status bar at the bottom of the imaging window.

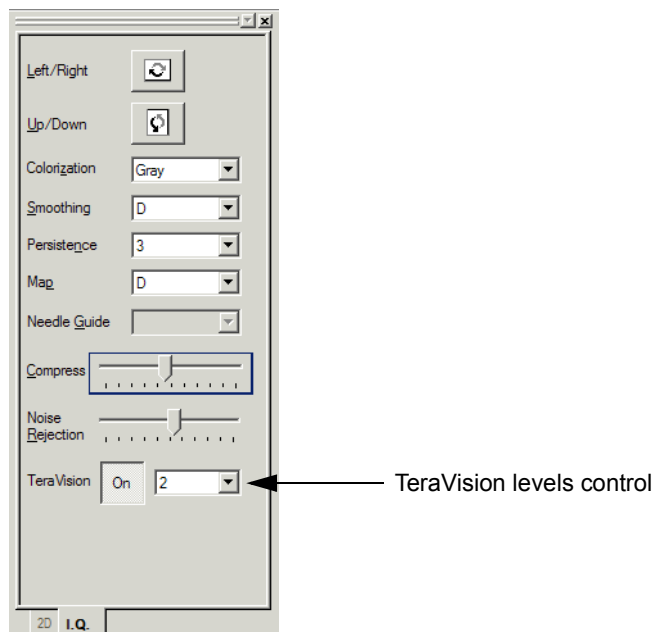
The **Image Display** (indicated by the transducer model number), **Patient Info**, **Review** and **Report** menu items show the selected window in front of the other two windows; you cannot close these windows.

Enhancing the Image Using TeraVision™ Optimization

TeraVision is an optional image-optimization package that sharpens images produced by the TeraVision ultrasound system. TeraVision requires a license. See the *TeraVision Image Enhancement Installation Guide* for instructions on installing the TeraVision software.

The default configuration starts TeraVision when the TeraVision ultrasound system starts. To change this so the TeraVision system starts with TeraVision off, see [Starting the System with TeraVision Off](#) on page 250.

The following figure shows the Image Control window with TeraVision installed.



I.Q. Controls With TeraVision Levels Control

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 transducer 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 6 or 8. All currently supported transducers have level numbers 0 through 6, except for the 4V2, which has 0 through 8. The 0 setting applies no image processing. The larger the number, the more processing is applied to the image. With the 4V2, levels 7 and 8 are intended for cardiac imaging.

Adding Guides to the Image Display

Image Display Properties on the View menu lets you add several guides to the scanned image. These properties provide details about the patient, transducer, and image control settings. The figure below shows an image with all of the available guides.

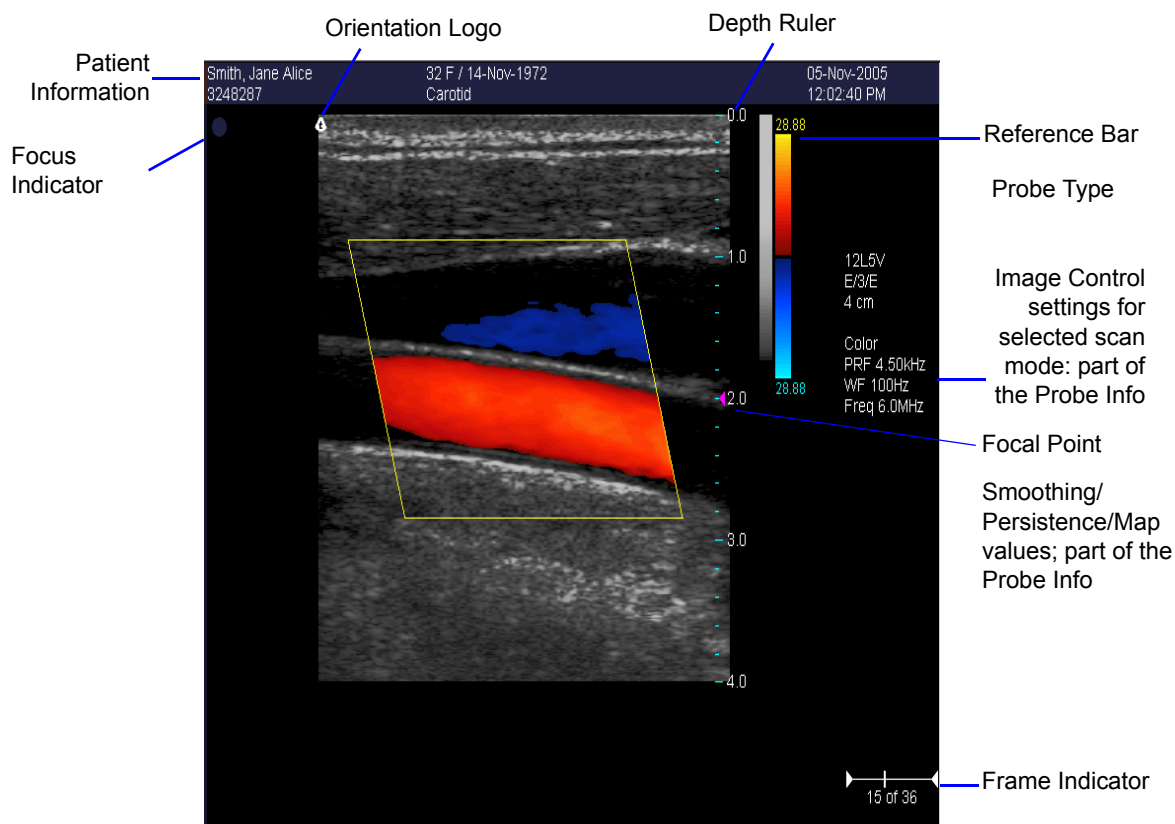
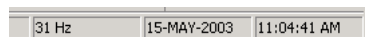


Image Display Properties

The Zoom thumbnail only displays with the image is zoomed. The Frame Rate (in Hz) displays at the bottom right of the Terason window.



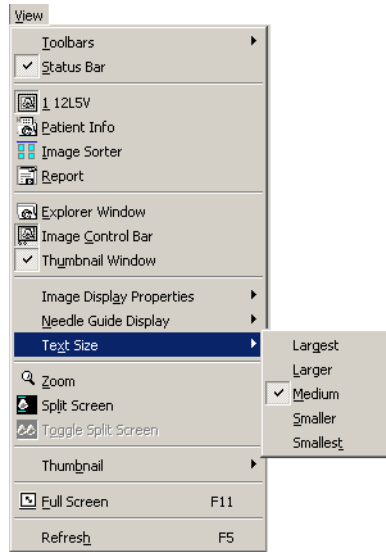
Frame Rate (Hz value)

See Chapter 5, [Working With Scan Modes](#), on page 89 for details about the information provided by each of these image guides.

Changing the Text Size

The Terason software lets you choose the font size for the text displayed in the Image Display window. If you choose a large text size, the text may overlap the image. If you choose a small text size, the text may be difficult to read.

To choose a text size, select **View > Text Size**, and then the specific size you want to set.




Changing the Text Size

Using Split Screen Mode

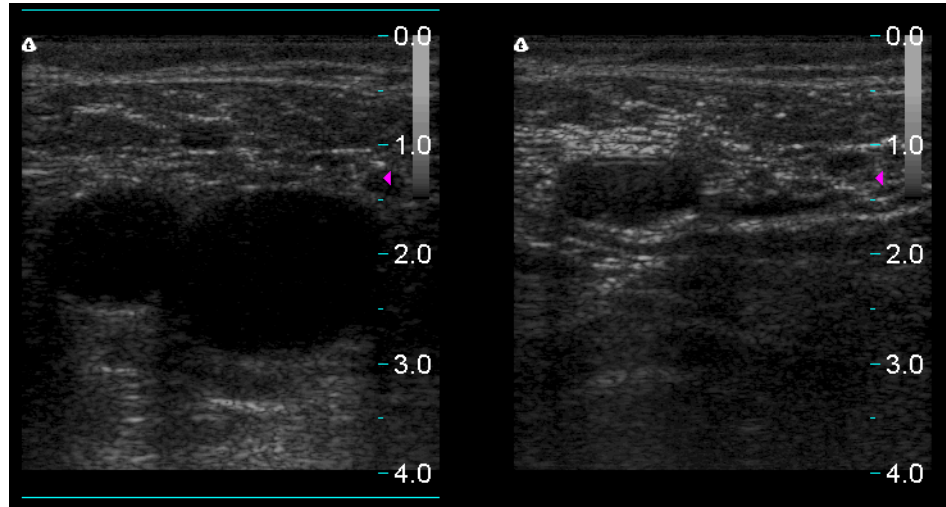
The Terason software lets you split the Image Display screen into two sections to view two current scans for a patient. For example, you can acquire a scan for the patient, select Split Screen, and then acquire another scan from a different angle or location. Split Screen mode works with the 2D scanning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

You can use any of the following methods to enter split screen mode:

- Click  Split
- Select **View > Split Screen**
- Type **S** when not in Text mode

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 cyan bars at the bottom and top of a screen indicate the active screen.

To **switch** between the two screens, perform any of these actions:

- Click  Toggle
- Click in the screen
- Select **View > Toggle Split Screen**
- Type **G** when not in Text mode

You can **exit** split screen mode using any of these methods:

- Click  Split
- Select a different exam
- Select M-Mode, PWD, or Triplex scan modes
- Select **View > Split Screen**
- Type **S** when not in Text mode

When saving .ult images in Split Screen mode, only the active window is saved. If you wish to save an image with both windows visible, save the image in a format other than .ult. See [Working With Image Files](#) on page 131 for information on saving images and loops.

When you exit Split Screen mode, 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 Image Display window. See [Working With Exams](#) on page 212 for information on saving custom exams.

Working with Annotations

This section explains the following topics:

- [Working with Text](#) on page 81
- [Using Body Markers](#) on page 86

Working with Text

To place text on an image, you must first view the image in the Image Display window. If the image has been saved, retrieve it from the Terason Explorer window. See [Finding Stored Images and Loops](#) on page 136 for instructions.


You can only add text to the 2D Image Display window. You cannot add text to the Time Series window.

To work with text annotation, you should understand:

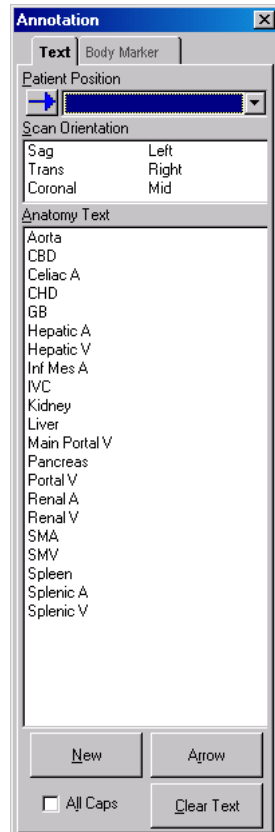
- [Adding Text to an Image](#) on page 81
- [Setting the Text Home Position](#) on page 83
- [Placing Arrows on the Image](#) on page 83
- [Moving Text](#) on page 84
- [Typing Text on an Image](#) on page 84
- [Editing Text](#) on page 85
- [Deleting Text from an Image](#) on page 85

Adding Text to an Image

Use one of these methods to enter Text mode:

- Click 
- Select **Annotation > Text**
- Type **T** when not in Text mode

The Terason software opens the Text tab in the Annotation Window listing patient positions, scan orientations, and anatomy specific to the current exam.



Annotation Window (Abdominal Exam)

If you added custom text using the Option dialog box (see [Adding Custom Text to the Annotation Window](#) on page 251, that text shows in the anatomy list.

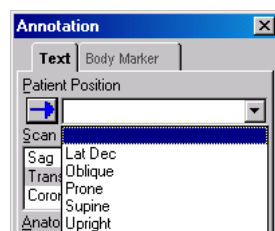
In this window:

- The **New** button starts a new line of text beneath the last line
- The **Arrow** button places an arrow next to the text (see [Placing Arrows on the Image](#) on page 83)
- The **Clear Text** button deletes all text (including manually typed text) from the image

You can also choose to use all caps (ALL CAPS) by clicking in the check box *before* you select the text. This check box has no affect on text already added to the image.

Click any text to add it to the image.

To add the Patient Position, select the appropriate position from the pull-down menu.



Patient Position Choices (Abdominal Exam)

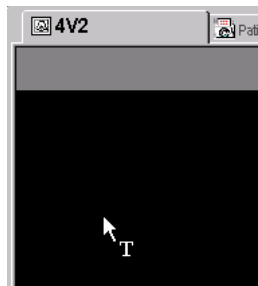
When you click a position, the Terason software adds that text at the home position. When you add a Patient Position, you can then click the blue arrow to add the shown patient position to the image (usually used for subsequent scans during an exam).

Setting the Text Home Position

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

To set a text home position, complete these steps:

1. Select **Annotation > Set Text Home Position**. The Windows pointer changes to an arrow with the Text symbol.



Setting the Text Home Position

2. Click the **location** on the Image Display tab where you want to set the home position.

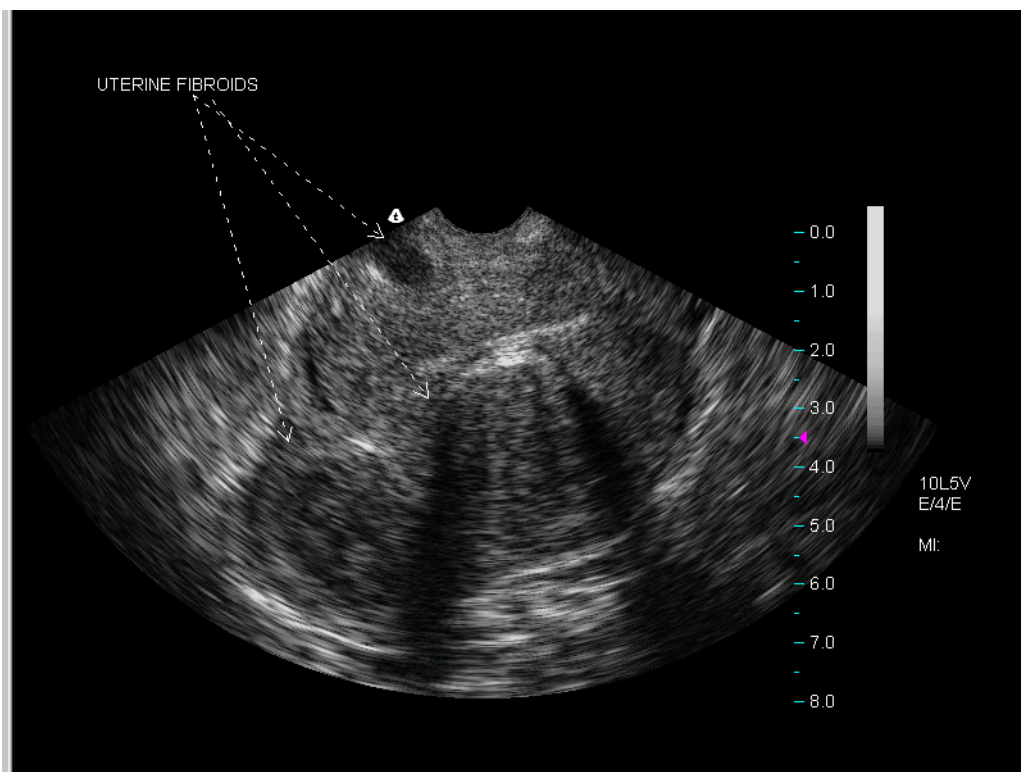
The Terason software uses this location when adding text from the Annotation Window, and as the text cursor location when typing text. You can always move text after placing it.

Placing Arrows on the Image

You can draw an arrow from text to the scanned anatomy. You can also add an arrow without adding text.

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

1. Add the **text** you need.
2. Click the **Arrow** button in the Annotation window. The Terason software draws a short arrow from the text toward the scan area.



Adding an Arrow to Text

3. Click the **arrowhead** and drag it to the proper location on the scanned image, and release the button.

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 arrows, you can:

- Add text before or after adding the arrow
- Move the arrow and text later if needed
- Add an arrow to existing text by right-clicking on the text and selecting Show Arrow from the pop-up menu
- Remove an arrow by deleting the text, or right-clicking on the text and selecting Show Arrow to toggle the check mark off

Moving Text


After placing text on an image, you can easily move it to any location within the Image Display tab. Just click the text, move it to a new location, and click where you want to place it.

Typing Text on an Image

In addition to choosing from the provided text phrases, you can type any text you want onto an image. You can only add text to the 2D Image Display window. You cannot add text to the Time Series window.


To add text to an image, complete these steps:

1. Use one of these methods to select the text tool:

- Click 
- Right-click the image and select **Text**
- Select **Annotation > Text** from the menu bar
- Type **T** when not in Text mode

The Terason software displays a text cursor at the text home position.

2. Begin **typing**. The text displays in blue while you type.
3. To start a new line, hold the Shift key down and press the Enter key.

4. When finished, press the **Enter** key or click  to exit Text mode. The Terason software shows the text in white.

Editing Text

The Terason software lets you edit text added to the image using the Annotation window, or that you manually typed onto the image.

1. Double-click the **text** you want to edit. The Terason software places the text cursor at the end of the text and opens the Annotation window showing the Text tab.
2. Use the backspace key to delete text, or the arrow keys to move the text cursor to where you want to delete or insert text.
3. Right-click the text and select **New Text** to add a new line.
4. Double-click any text **phrases** in the Text tab that you want to include on the image.
5. Use the **keyboard** to add or delete text.
6. Press the **Enter** key when finished.

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 77), but you cannot delete it.

To delete text, perform one of these actions:

- Click the text to highlight it and press the Del key on your keyboard
- Right-click top of the text and select **Delete Text**

To remove all text from the 2D window, perform one of these actions:

- Double-click the text and click the **Clear All** button in the Text tab of the Annotation Window
- Select **Edit > Clear All**
- Select **Annotation > Clear Text Annotation**
- Right-click in the 2D window and select **Clear Text Annotation**

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.

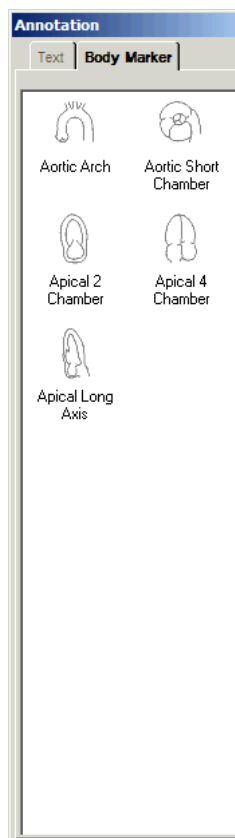
To work with body markers, you must understand:

- [Adding a Body Marker](#) on page 86
- [Changing the Icon in the Body Marker](#) on page 87
- [Moving the Indicator](#) on page 87
- [Changing the Indicator's Direction](#) on page 87
- [Rotating the Indicator](#) on page 88
- [Removing the Body Marker](#) on page 88

Adding a Body Marker

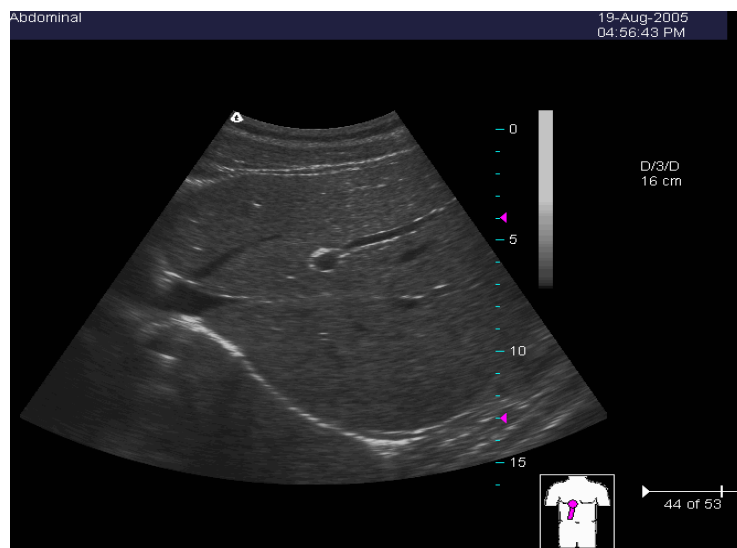
To add a body marker to an image, complete these steps:

1. Select **Annotation > Body Marker**. The Terason software opens the Annotation window.



Adding a Body Marker to a Scan

2. Click the view for the body marker you want. The Terason software adds the icon to the scan and closes the Annotation window. The pink rectangle within the marker icon indicates the precise location.



Scan with an Abdomen Supine Body Marker

Changing the Icon in the Body Marker

To change the icon shown in the body marker, complete these steps:

1. Right-click the body marker and select **Body Marker**. The Terason software opens the Annotation window showing the Body Marker tab.
2. Click the an **icon** in the Body Marker pane. The Terason software updates the icon shown in the body marker and closes the Annotation window.

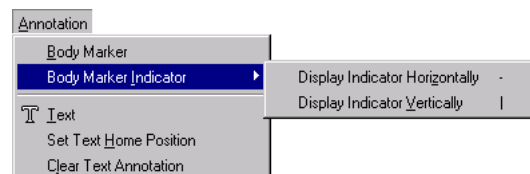
Moving the Indicator

You can move the pink marker to anywhere on the icon to more precisely indicate the scanned anatomy. To move the pink marker, complete these steps:

1. Move the Windows pointer over the rectangular end of the pink indicator. When the pointer changes to a circle with four arrows, click the left mouse or console button.
2. Move the pointer to the desired location on the body marker.
3. Click to lock the indicator in position.

Changing the Indicator's Direction

You can use **Body Marker Indicator** on the **Annotation** menu if you must adjust the orientation of the pink rectangle.



Changing the Orientation of the Body Marker Indicator

Click the direction (horizontal or vertical) that you want.

Rotating the Indicator

You can rotate the pink rectangle to more positions by completing these steps:

1. Move the Windows pointer over the round end of the pink rectangle.

The pointer changes to a circular arrow.



Rotating the Body Marker

2. Click and move the pointer until the pink rectangle is in the desired orientation.
3. Click to lock the rectangle in position.

Removing the Body Marker

To remove the Body Marker from the image, right-click the body marker and select **Remove Body Marker**.

5 Working With Scan Modes

Scan Modes Overview

When you select a scan mode, the Image Control bar shows as many as four tabs. The **2D** and **I.Q.** tabs associated with 2D imaging are always displayed. All other modes available in the Terason Ultrasound System software include the 2D functions, and also include an additional tab or tabs with image controls for the selected scan mode.

In general, follow these 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 size, depth, focus, overall image gain, brightness, and exam type. See [Using 2D and I.Q. Controls](#) on page 90.
- Select **M-Mode (Motion Mode)** to evaluate motion over time, such as viewing motion patterns of the heart. See [Using M-Mode Image Controls](#) on page 105.
- Select **Pulsed-Wave Doppler (PWD)** mode when you want obtain frequency or velocity information from a specific point along a ultrasound cursor. See [Using Spectral Doppler Image Controls](#) on page 109.
- 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 109.
- Select **Color Doppler (CD)** when you must view the mean velocity within an assigned region of interest. See [Using Color and Power Doppler Image Controls](#) on page 118.
- Select **Power Doppler (Pwr)** to view the density of blood, but not the velocity. Power Doppler is more sensitive to low flow than either color Doppler or Directional Power Doppler, and is often used to evaluate perfusion and vessel patency. See [Using Color and Power Doppler Image Controls](#) on page 118.
- Select **Directional Power Doppler (DPD)** to combine the density information provided by Power Doppler with the directional information of Color Doppler. See [Using Color and Power Doppler Image Controls](#) on page 118.
- Use **Triplex** to combine Pulsed-Wave Doppler or Continuous Wave Doppler scanning with Color Doppler, with Power Doppler, or with Directional Power Doppler scanning. See [Scanning in Triplex Mode](#) on page 126.

You can adjust image controls for these tabs, depending on the selected scanning mode:

- 2D tab
- IQ tab
- M-Mode tab
- PWD tab
- CWD tab
- CD, DirPwr, or Pwr tabs

Using 2D and I.Q. Controls

Controls on the 2D Image Control window begin on this page. For discussion of IQ image controls, see [Controls on the I.Q. Image Control Window](#) on page 100.

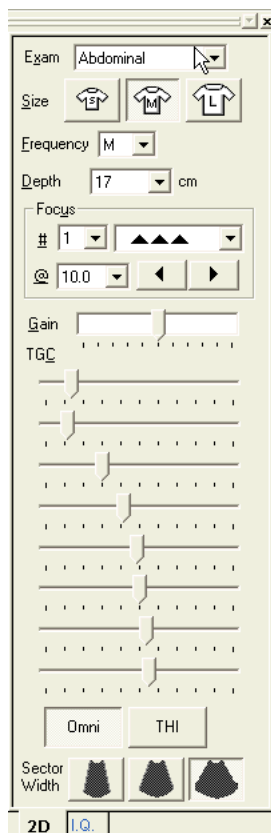
Controls on the 2D Image Control Window

The figure [2-D Tab in the Image Control Window](#) on page 91 shows the available 2D image controls. You can only adjust these image controls during live scanning. When you freeze a scan, the Terason software replaces the 2D tab with a 2D Measure tab, for making measurements on the scan image. (See Chapter 7 - [Working With Measurements](#).)

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

- [Exam](#)
- [Patient size](#)
- [Frequency](#)
- [Depth](#)
- [Focus depth](#)
- [Gain](#)
- [Time Gain Compensation \(TGC\)](#)
- [Lateral Gain Compensation \(LGC\)](#)
- [Line Density or Image Format](#)
- [Tissue Harmonic Imaging \(THI\)](#)
- [Omni Beam](#)

When you freeze a scan, the Terason software replaces the 2D tab with a 2D Measure tab.

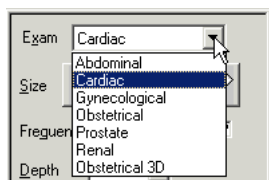


2-D Tab in the Image Control Window

Choosing an Exam

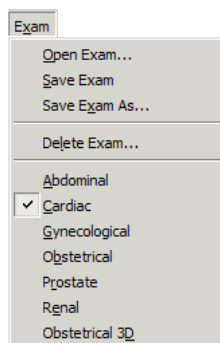
Terason provides customized exams for scanning different types of anatomy. When you choose an exam, the Terason software loads image controls settings on the 2D and I.Q. tabs that are customized for that anatomy and the connected transducer.

To select an exam, choose it from the Exam menu at the top of the 2D Image Control window. You can highlight the exam type box in blue and then either press the first letter of the exam type name or use the right and left arrow keys to cycle through the exam types. For example, if you are using a 12L5 probe and want the Carotid exam, click the exam control and type *C*.



Choosing an Exam

The software displays only those exams supported by the connected transducer. You can also select an exam from the **Exam** menu.



Selecting an Exam from the Menu Bar

The top group of menu items are used to work with custom exam types. The next group of menu items load the presets for the indicated exam type. If you created any custom exams, they show at the bottom of the Exam menu. See Chapter 8 - [Working With Exams](#) for more details about exam types and defining custom exams.

Adjusting the Size

The “T-shirt” Size buttons on the 2D Image Control window load preset values that optimize the scan for the size of the patient or for the structured anatomy. Click the size button that matches the patient size for small, medium, or large (or for superficial, moderately deep, and deep areas of interest).

The Size setting applies a preset 2D transmit frequency. In general, Choosing the small size sets the highest transmit frequency, to yield the best 2D resolution, while the medium size sets a mid-range frequency, and the large size sets a lower frequency for the best penetration.

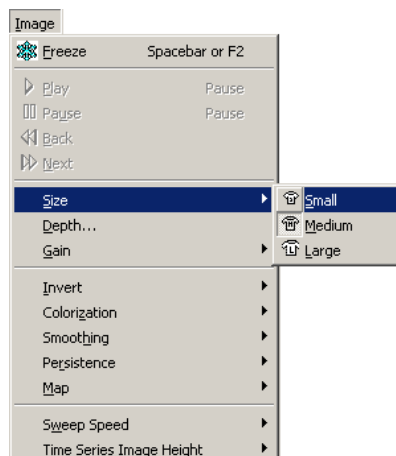
Choosing a Size setting also sets other 2D and Doppler settings. When you choose a size, you also load baseline settings for the other controls.

To set a patient size, click the appropriate T-shirt symbol.



Patient Size Controls

You can also click **Size** on the Image menu and choose a size from the menu.



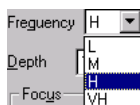
Using the Image Menu to Set the Patient Size



Note: After selecting the size that suits the clinical situation, you can modify any available controls to further optimize the image.

Adjusting the Frequency

When you select an exam, the Terason software sets an appropriate frequency for that exam and patient size (see [Adjusting the Size](#) on page 92). You can select an alternate frequency to better suit specific circumstances.



Frequency Control

In the Frequency list:

- L = Low
- M = Medium
- H = High
- VH = Very High (available only with the 12L5 transducer)

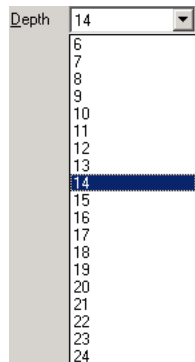
The exact frequencies vary, depending on the connected transducer.

Adjusting the Depth

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, transducer, and patient size.

Select a depth (in cm) from the menu.

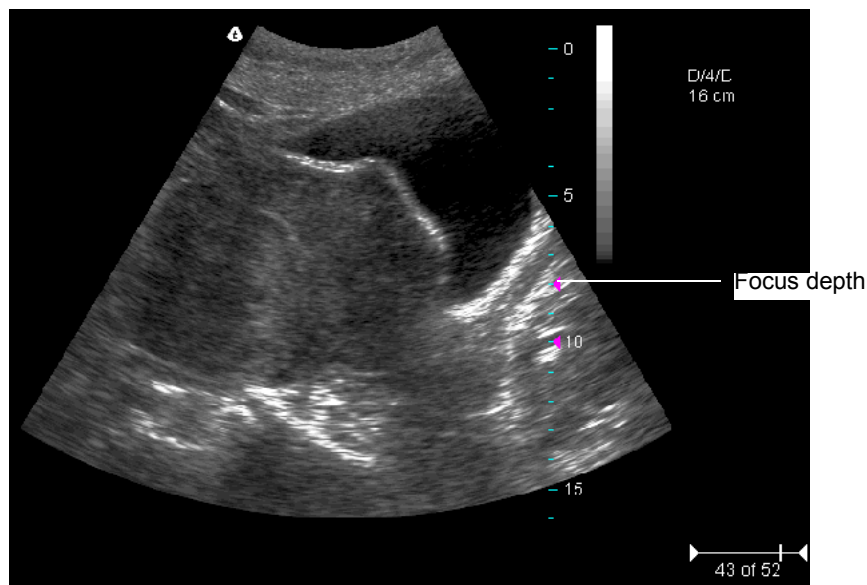


Choosing the Depth (Values in cm)

The values displayed in the menu depend on the transducer.

After adjusting 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 **View > Image Display Properties > Depth Ruler**. The figure below shows the depth ruler along the right side of the image.

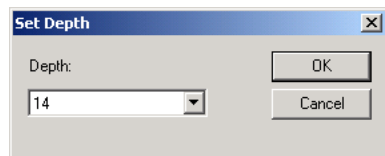


Example Depth Ruler

The pink triangle on the depth ruler indicates the focus depth.

You can also use the Image menu to set the depth. To do so, complete these steps:

1. Select **Image > Depth**. The Set Depth dialog box opens.



Set Depth Dialog Box

2. Select a **depth value** from the menu.
3. Click **OK**.

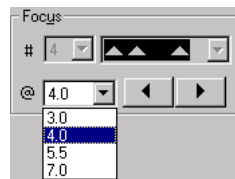
Adjusting the Focus

Focus optimizes the image by increasing the resolution for a specific area. The depth ruler uses a pink triangle to indicate the focus depth. This indicator is only visible if you show the depth ruler.

When you select an exam type, the software updates the focus value to a preset value for the specific exam type, transducer, and patient size.

In 2D, 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 for any mode other than 2D, or for a single focus point in 2D, select a value (in cm) from the @ pull-down menu.

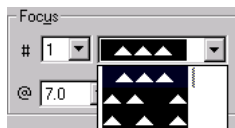


Setting the Focus (Non-2D)

You can also use the left and right arrow buttons to increase or decrease the focus depth.

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

1. From the @ menu, select the **primary** focus depth. You can also use the left and right arrow to increase or decrease the depth.
2. From the # menu, select the **number** of focus points.
3. From the focus distribution menu, select a **distribution method**.



Focus Distribution List

In the focus distribution menu:

- spaces the focus depths densely, centered on the primary focus depth
- spaces all but the deepest focus depth densely
- spaces the focus depths widely, centered on the primary focus depth

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 adjust the gain, the Terason software increases or decreases the overall gain while maintaining the shape of the TGC curve. See [Adjusting Time Gain Compensation](#) on page 96 for more information on TGC settings.

When you select an exam type, the Terason software sets the gain to a preset value for the specific exam type, transducer, and patient size.

To decrease the gain, click the slider and drag it to the left. To increase the gain, click the slider and drag it to the right.



Changing the Gain

You can also adjust the gain by clicking in the 2D window and pressing the left (to decrease gain) and right (to increase gain) arrow keys. Or you can use the Image menu to move the gain one setting higher (Image > Gain > Up) or one setting lower (Image > Gain > Down).



Changing the Gain from the Image Menu

When you adjust the gain setting, the Terason software automatically adjusts the Time Gain Compensation curve to support the new gain setting.

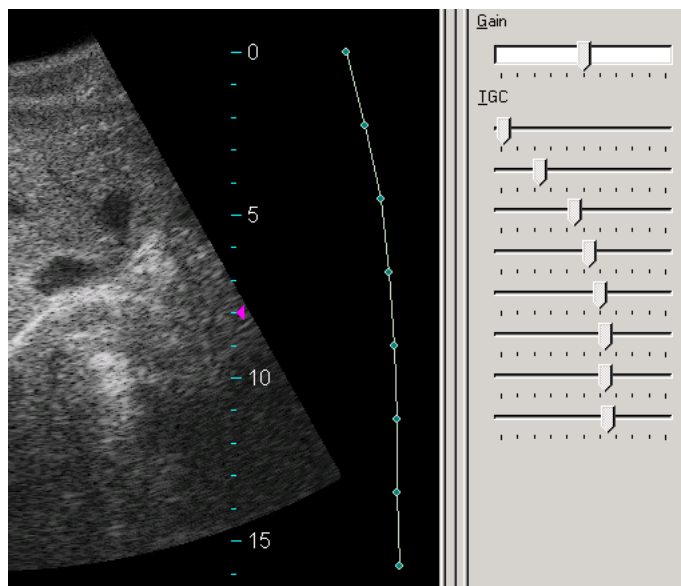
Adjusting Time Gain Compensation

Scanning tissues at increasing depths causes attenuation of the returned signal. The TGC sliders adjust amplification of returning signals to correct for the attenuation. TGC balances the image to equalize the brightness of echoes from near field to far field.

The Terason software rescales the TGC settings when you do any of the following:

- Change the depth
- Load a new exam type
- Select a different patient size
- Adjust the gain setting

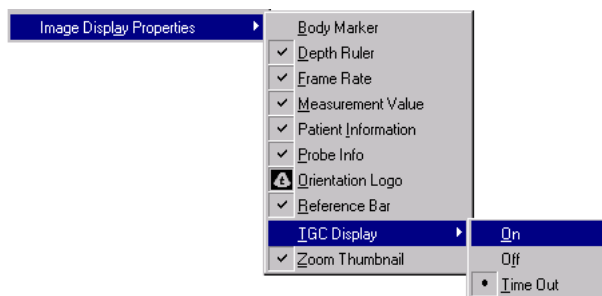
The TGC slider bar spacing is proportional to the depth. The TGC curve on the image display represents the TGC settings.



Example TGC Curve on an Image

Each slider controls one dot on the curve. You can adjust the TGC sliders individually as needed. Drag a slider to the left to decrease the gain, or drag it to the right to increase the gain. You can also use the keyboard arrow keys; after clicking the 2D tab to select the Gain control, press the down arrow key to select a TGC slider, then use the left and right arrow keys to adjust it.

To show or hide the TGC curve, select View > Image Display Properties > TGC Display.



TGC Curve Display Options

Select **On** to show the curve, or select **Off** to hide the curve. If you select **Time Out** (the default setting), the curve displays briefly when you start the application, adjust the gain, or adjust an individual TGC slider.

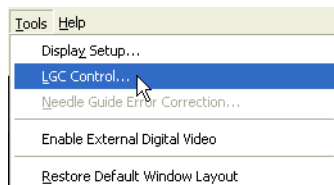
The optional console houses physical sliders that control TGC. See [Console Controls](#) on page 35.

Adjusting Lateral Gain Compensation (LGC)

A set of LGC sliders increase or decrease the gain of segments of the returned signal, when using some transducers. (Linear transducers do not support LGC.) These segments are arcs one eighth of the full width of the scan. Adjusting LGC can enhance imaging of the cardiac wall with some scanning orientations.

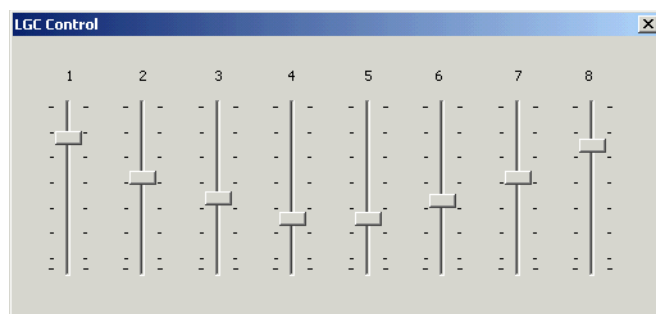
To use the LGC controls:

1. On the Tools menu, select **LGC Control...**



Opening the LGC Controls

The LGC Control window opens.



LGC Control Window

2. To increase the gain on a sector, slide the **control** for that sector *up*.



Note: When the Cardiac exam is selected, lower-numbered sliders (at the left side of the LGC Control window) control segments at the *left* side of the display. When any other exam is selected, the left-right relationship between the LGC window controls and the scan is reversed (lower-numbered controls affect the *right* side of the display.)

3. To close the LGC Control window, click the **close box** ☒.

Adjusting the Image Format

The Image Format control lets you choose an image format of *linear* or *trapezoid*.



Image Format Choices

To select the shape or size of the sectors, click the associated button.

See [Changing the Display Mode Defaults](#) on page 247 for information on choosing defaults associated with sector width and image format.

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 4V2 or 5C2A transducer is connected. When a different type of transducer is connected, the THI button does not display, and the THI menu item is grayed out on the Modes menu.

THI is most effective at mid-range depths. Shallow and deep scans do not benefit from THI.

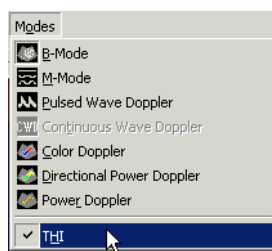
To turn THI on or off, use one of the following methods:

- Click the **THI** button at the bottom of the 2D Image Control window.



THI Button

- Select **THI** in the Modes menu.



THI in Modes Menu

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 transducers, but not with phased-array and endocavity transducers. It is not available in Stress Echo exams.

Transducers Supporting Omni Beam	Transducers Not Supporting Omni Beam
12L5	4V2A
5C2A	4V2S
7L3V	8EC4A
8BP4	
8MC3	
12HL7	
12L5V	
PDOF	

When Omni is on, the word *Omni* shows in the scan information display, and the focus markers on the depth ruler change to this:



To turn Omni on or off, click the Omni button on the 2D Image Control window.



Omni Button

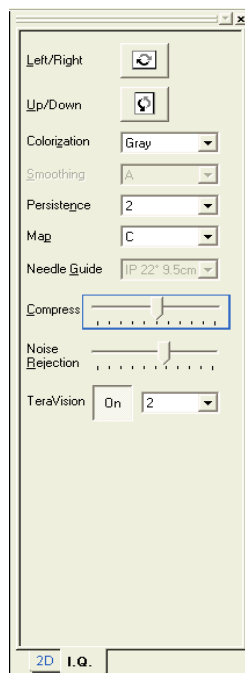
Controls on the I.Q. Image Control Window

The preset values that load when you choose an exam are optimized for that exam using the selected ultrasound mode and transducer. You can use these optimized presets, or you can make individual adjustments as necessary for the current exam.

You can use these optimized presets, or you can make individual adjustments to these image controls as necessary for the current exam:

- Left/Right and Up/Down invert
- Color palette
- Image smoothing
- Persistence
- Image map
- Needle guide
- Compression
- Noise Rejection
- TeraVision

The following figure shows the I.Q. controls.

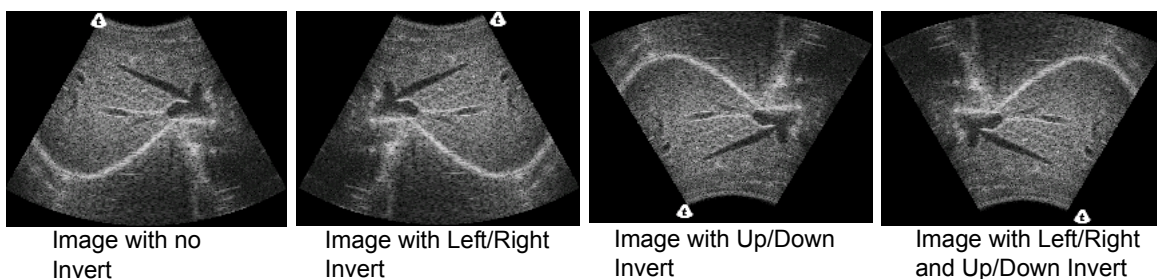


I.Q. Controls

Inverting Images

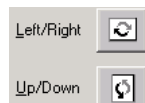
The Left/Right and Up/Down buttons control the orientation of the scanned image.

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



Effect of Inverting an Image

To invert the scanned image, click the Left/Right or Up/Down button as needed.



Inverting Images

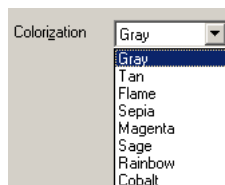
You can also select Image > Invert > Left/Right or Image > Invert > Up/Down to invert the image. You can use the invert options with live or frozen images, or with images saved in the ULT format.

Adjusting Colorization

By default, the Terason software uses the Gray color scheme for 2D images. the Gray scheme displays images as shades of gray over a range from white to black. The Terason software provides several alternate schemes. To determine if another scheme improves visibility of the anatomy being scanned, cycle through the available options. Which scheme produces the best image depends on the anatomy that is being scanned.

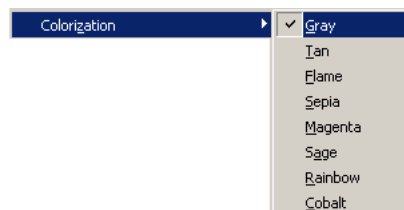
To select a different scheme, use one of the following methods:

- Click the down arrow next to the Colorization field in the I.Q. tab and select a colorization scheme from the menu.



Selecting Colorization on the I.Q. Window

- Select Image > Colorization and choose a color scheme



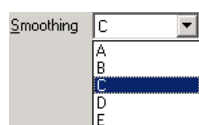
Selecting a Colorization scheme from the Image Menu

Adjusting Smoothing

Changing the value in the smoothing field can make an image appear smoother. The smoothing values are letters from A to E and represent different algorithms. Generally, the amount of smoothness increases as you select higher letters. Note that smoothness is subjective, and other image control settings affect how the smoothing algorithms work. Choosing a higher smoothing level may not always result in a visibly smoother image.

When you increase the value in the field, the software increases the amount of interpolation between scan lines, to make the image appear smoother. This also decreases the frame rate. When you decrease the amount of smoothing, the amount of interpolation between scan lines is decreased, making the image appear rougher, and the frame rate increases.

To adjust the smoothness of the image, click the down arrow to the right of the Smoothing field and select a value from the menu.



Selecting a Smoothing Option

You can also select **Image > Smoothing** to choose a different smoothing option.

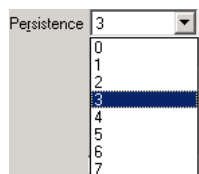


Selecting a Smoothing Option from the Image Menu

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 also increases the possibility of a blurred image if the tissue is moving when you freeze the image. When the persistence is low, the opposite is true.

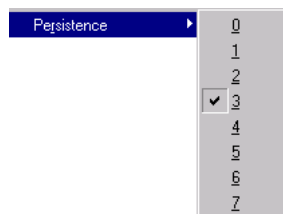
To indicate the amount of frame averaging you want, click the down arrow to the right of the persistence field and select a value from 0 to 7.



Choosing a Persistence Value

The 0 setting represents 0% and 7 represents 100% persistence.

You can also select **Image > Persistence** to choose a different setting.



Choosing Persistence from the Image Menu

To view the persistence setting on the image display, select View > Image Display Properties > Probe Info from the menu bar. The probe information includes a code such as C/2/A, where the middle item (2 in this example) is the Persistence value.

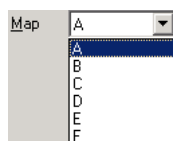
Adjusting the Image Map

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, click the down arrow next to the Map field. You can choose any of eight maps, labeled from A to H.



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.)



Choosing an Image Map in the I.Q. Window

You can also select Image > Map to choose a different image map setting.



Choosing an Image Map from the Image Menu

Image Map Reference Bar

The effect of your map choice is represented by a reference bar to the right of the depth scale on the image. Enable the reference bar by selecting View > Image Display Properties > Reference Bar.

The image information display on the scan window includes a code such as C/2/A below the transducer identification. In the C/2/A example, the third item (A) is the Map value.

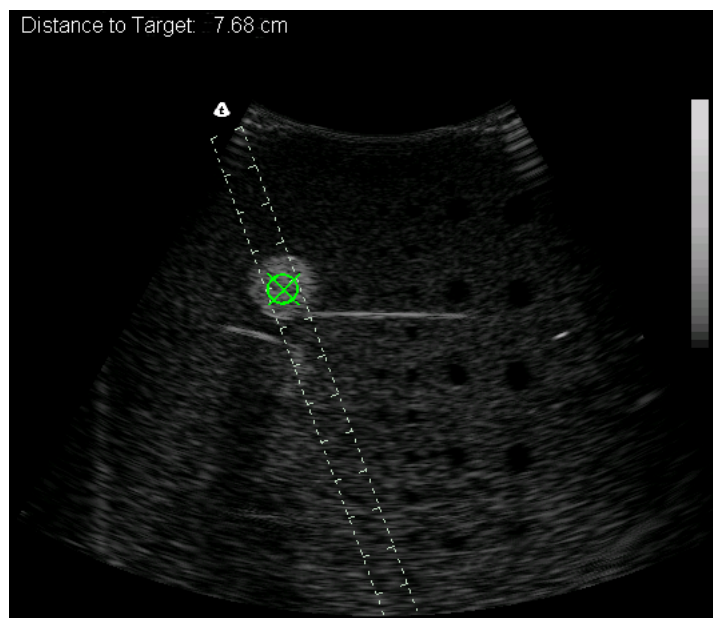
Selecting a Needle Guide

The needle guide control is available only when a transducer that supports biopsies or other medical procedures is connected. To perform the procedure, select the correct needle guide from the menu.



Selecting the Needle Guide

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



Needle Guides and Target for a Biopsy

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

If you do not see the needle guides in the Image Display window, click  or select View > Needle Guide Display > Guide Lines.



Viewing Needle Guides

Adjusting Compression

The Compress slider controls signal compression, which affects the contrast of the image. A number to the left of the slider indicates the amount of compression, from -50 to 50.

Drag the slider to the right to increase compression, which darkens the image, or drag the slider to the left to decrease compression.

**Compress Slider**

Adjusting Noise Rejection

The Noise Rejection slider controls rejection of low-level returned signals. Increasing rejection darkens the image background. A number to the left of the slider indicates the level of noise rejection, from -50 to 50.

Drag the slider to the right to increase noise rejection, or drag the slider to the left to decrease it.

**Noise Rejection Slider**

TeraVision

TeraVision is an image-enhancement option. See [Enhancing the Image Using TeraVision™ Optimization](#) on page 76.

Using the Console

When the console is extended while live imaging in 2D mode, the Scan Mode toolbar changes to include four boxes that display the current settings of a group of controls. The control-settings displayed vary depending on which transducer is connected, and on other selections. Pressing the left and right arrow buttons at the left-center of the console changes the controls displayed in the four boxes.

To change a setting, use the up and down arrow buttons at the top left corner of the console. Each pair of up and down arrow buttons controls the setting in one of the four boxes in the Scan Mode toolbar. The position of the button set corresponds to the position of the box – the leftmost up and down buttons control the setting in the leftmost box, and so on.

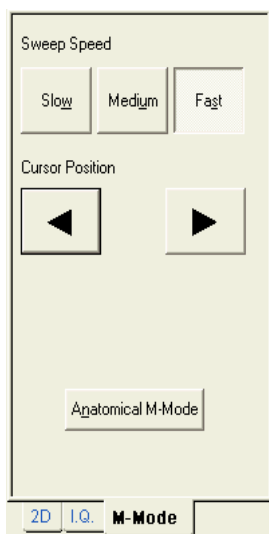
See [Console Controls](#) on page 35 for more information on using the console.

Using M-Mode Image Controls

When you select M-Mode, the TeraSon software adds the M-Mode tab to the Image Controls window. When you freeze a scan, the TeraSon software replaces the M-Mode tab with an M Measure tab. (See [Measuring in the M-Mode Window](#).)

For information on the M-Mode image controls, see:

- [Adjusting the Sweep Speed](#) on page 106
- [Adjusting the Ultrasound Cursor Position](#) on page 106
- [Using Anatomical M-Mode](#) on page 107
- [Using the Console](#) on page 108

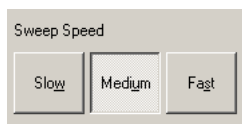


M-Mode Image Controls

Adjusting the Sweep Speed

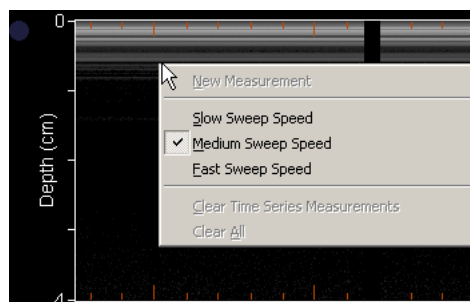
The speed buttons set how fast the timeline is scanned across the Time Series window.

To set the sweep speed, click the Slow, Medium, or Fast button.



Sweep Speed Controls

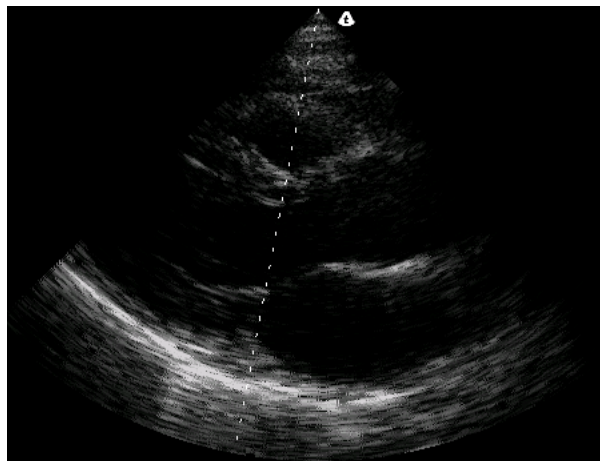
You can also choose the speed by selecting **Image > Sweep Speed** and choosing a speed, or by right-clicking in the M-Mode window and choosing a speed. The tick marks in the Time Series window are closer or farther apart depending on the speed. Each large tick mark represents one second.



Shortcut Menu in the Time Series Window of an M-Mode Scan

Adjusting the Ultrasound Cursor Position

The following figure shows the ultrasound cursor:



Ultrasound Cursor

You can move the ultrasound cursor using these methods:

- Click the ultrasound cursor, drag it to a new location, and click again.
- Type a period (.) to select the ultrasound cursor, then use the keyboard left and right arrows to move it
- Click the ultrasound cursor and use the keyboard left and right arrows to move it
- Double-click the image where you want to move the ultrasound cursor (in 2D mode, this also starts PWD-mode scanning)

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

Using Anatomical M-Mode

Anatomical M-Mode is a feature available when you select the Cardiac exam with a 4V2 transducer connected. It is not available with other transducers or exams. Anatomical M-Mode lets you manipulate the ultrasound cursor by clicking and dragging it. You can change the angle of the ultrasound cursor, and offset the line in the scan area.

Adjusting the Ultrasound Cursor Angle

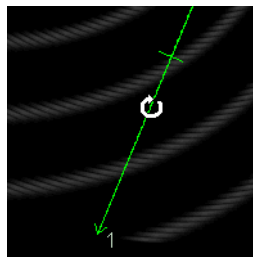
To change the scan-line angle using Anatomical M-Mode:

1. Click **Anatomical M-Mode** to enable it.

The software adds a crossbar and arrowhead to the ultrasound cursor.

2. Click on the **ultrasound cursor**.

The ultrasound cursor turns green, and a curved arrow replaces the finger pointer.



Rotating the Ultrasound Cursor With Anatomical M-Mode

3. Move the **cursor** to the left or right, and click again when the ultrasound cursor angle is correct.

Adjusting the Ultrasound Cursor Offset

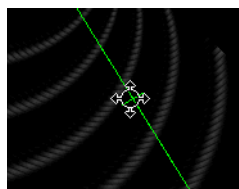
To offset the ultrasound cursor in the scan area:

1. Click **Anatomical M-Mode** to enable it.

The software adds a crossbar and arrowhead to the ultrasound cursor.

2. Click on the **crossbar**.

The ultrasound cursor turns green, and a circle with four arrowheads replaces the standard pointer.



Offsetting the Ultrasound Cursor With Anatomical M-Mode

3. Move the ultrasound **cursor**, and click again when the ultrasound cursor offset is correct.

Using the Console

When the console is extended while live imaging in M-mode, the Scan Mode toolbar changes to display the current settings of a group of controls. The specific control settings displayed vary, depending on which transducer is connected and on other selections.

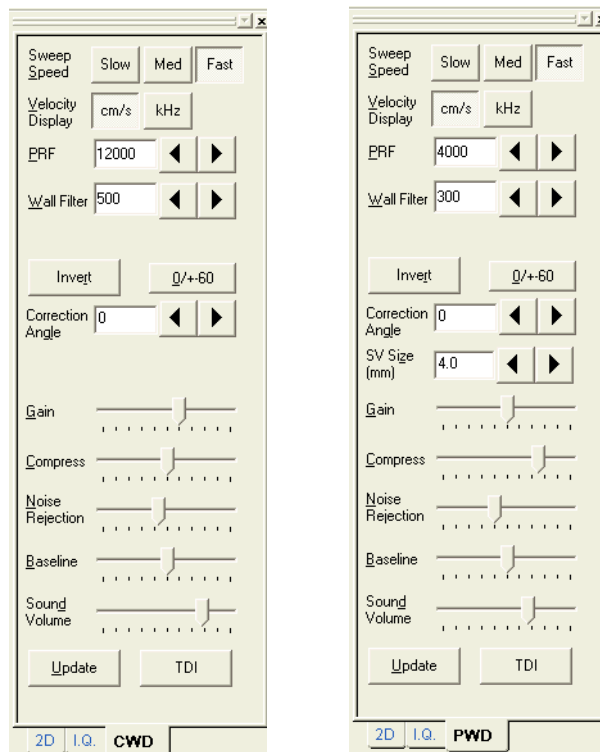
Pressing the left and right arrow buttons at the left-center of the console changes the controls displayed in the four boxes.

To change a setting, use the up and down arrow buttons at the top left corner of the console. Each pair of up and down arrow buttons controls the setting in one of the four boxes in the Scan Mode toolbar. The position of the button set corresponds to the position of the box – the leftmost up and down buttons control the setting in the leftmost box, and so on.

See [Console Controls](#) on page 35 for more information on using the console.

Using Spectral Doppler Image Controls

When you select Pulsed-Wave Doppler, the Terason software adds the PWD tab to the Image Controls window. When you select Continuous-Wave Doppler, the Terason software adds the CWD tab to the Image Controls window.



Continuous-Wave and Pulsed-Wave Doppler Image Controls



Note:

- Continuous Wave Doppler mode is only available with the 4V2 transducer.
- CWD is not available when the Pwr mode is selected.
- Pwr mode is not available when CWD is selected.

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 tick represents one second. When an image is frozen, you cannot change the setting.

To choose a speed, click the Slow, Medium, or Fast Sweep Speed button.



Sweep Speed Controls

You can also select Image > Sweep Speed and then choose a speed, or right-click in the Time Series window and select a speed.

Setting the Velocity Display Units

The Time Series window shows the velocity of flow in cm/s or kHz. You can change the units any time. Centimeters per second (cm/s) is available only when the correction angle (see [Adjusting the Correction Angle](#) on page 112) is between 0 and $\pm 70^\circ$. If you set a higher angle, the Terason software automatically changes the units to KHz.

To change the velocity display units, click the button for the units you want to use: cm/s or kHz.

Adjusting Pulse Repetition Frequency (PRF)

Pulse Repetition Frequency defines the velocity range of the display. The maximum value (in Hz) for the PRF depends on the specific transducer 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, click the right or left arrows next to the PRF field.



PRF Control



Note: In Triplex scanning only: the PRF value is tied to the setting on the 2D mode (Color Doppler, Directional Power Doppler, or Power Doppler). If you change the PRF value on one tab, the Terason software also changes the PRF value on the other tab. 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 click depends on the current range, as defined in the following table. For example, if the PRF setting is 4000, each time you click 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

PRF Ranges

Range (Hz)	Increment (Hz)
200-1000	100
1000-5000	500
5000-up	1000

Increasing the PRF also increases the Thermal Index (TI) value (refer to [General Description of Indices](#) on page 268 for more information about thermal indices).

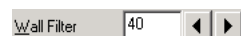
Adjusting the Wall Filter

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 transducer.

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, click the right or left arrows next to the wall filter field.



Wall Filter Control

The wall filter range is from 1% to 25% of the PRF. The increment value for each click depends on the current range, as defined in the table below. For example, if the wall filter setting is 40, each time you click 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.

Wall Filter Ranges

Range (Hz)	Increment (Hz)
2-10	2
10-50	10
50-100	25
100-300	50
300-up	100

Adjusting the Steering Angle

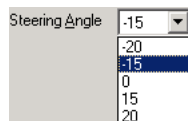
When using Spectral Doppler, be aware of the Doppler angle-to-flow (the angle between the axis of the ultrasound beam and the plane that the blood flows in). When the ultrasound beam is perpendicular to the flow (90° angle-to-flow), an absent or confusing color pattern displays, even when the flow is 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 press on one end of the transducer or the other to improve the Doppler angle-to-flow.

Electronic steering is only available with flat linear-array transducers (the 7L3, 12HL7, and 12L5). This option does not display with any other transducers. Curved linear and phased array transducers are not capable of electronic steering, and depending on the clinical situation, may require that you press down on one corner of the transducer 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, select an angle from the menu.



Steering Angle Menu

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

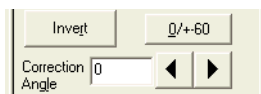
You can also adjust the steering angle by typing a slash (/). When you type this character, the Terason software highlights the Steering Angle value and you can use the left and right arrow keys to change the value. If you press the key twice quickly, the Terason software highlights the Correction Angle.

Adjusting the Correction Angle

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

In the Terason 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, independent of the correction angle. The flow-direction indicator still shows on the window, for reference.

To adjust the correction angle, click the right arrow to increase the angle, or the left arrow to decrease the angle.



Correction Angle Controls

You can also press the slash (/) key twice to select the Correction Angle value, then use the right and left arrow keys to select a different value.

To set the correction angle to 0 or 60°, click the Q/+60 button. This button sets the correction angle to -60, 0, or 60, whichever value is closer to the current value. The correction angle control is active on frozen and live images.

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 116) 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, click 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, move the Windows pointer to the new position and double click. The ultrasound cursor and Sample Volume move to the new position. You can also click the ultrasound cursor, move it to the left or right as needed, and click again to lock it in position. Or, you can click the ultrasound cursor and use the keyboard left and right arrows to move it. The keyboard up and down arrow keys move the Sample Volume along the ultrasound cursor. You can also type a period (.) to select the ultrasound cursor, and then use the keyboard left and right arrows to move it.

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, click the SV Size right arrow to increase the volume or the left arrow to decrease the volume.



Sample Volume Size Control

You can set a value from 0.5 to 20 mm (in 0.5 mm increments). The value shows on the image display if Probe Info is enabled. You can also use the indicator to move the depth of the sample volume along the ultrasound cursor. To do so, click the indicator and move it up or down until it is located properly, then click to lock the indicator in position.

You can adjust the position of the sample volume using the touch pad or mouse. Left-click the sample volume (the line turns green), move it to the desired location, and left-click again to anchor it.

If the sample volume is not moved for five seconds, it is anchored in position. You can also use the left and right arrow keys to move the ultrasound cursor, and the up and down arrow keys to move the sample volume indicator.

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](#) on page 268 for more information about thermal indices).

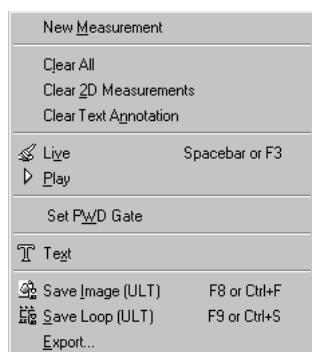
Setting the PWD Gate Position

The sample volume indicator allows you to start a scan in a 2D scan mode, set the sample volume at the indicator 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 and switch to PWD or Triplex mode, you can double-click at the location in the 2D window to automatically set the gate position and switch to PWD or Triplex scanning.

The following procedure also sets the gate position and switches to PWD or Triplex scanning:

1. Select the scan mode and adjust all Image Control settings appropriate for the current exam.
2. Place the Windows pointer inside the vessel of interest. You can use the Zoom tool (see [Enlarging an Area of the Image](#) on page 73) for more precise pointer placement.
3. Right-click the vessel of interest. The shortcut menu opens.



Shortcut Menu

4. Select Set PWD Gate.

The Terason software locks the sample volume indicator in the position where you right-clicked and adds the Time Series window for PWD mode. You can now adjust the SV size, depth, or correction angle as needed for the scan. If you are already in PWD mode, moving the gate position does not interrupt the Time Series window display.

Adjusting Spectral Gain

The gain setting on the PWD or CWD tab (not the gain setting on the 2D tab) 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 gain, click the slider and drag it to the left to decrease the gain, or drag it to the right to increase the gain.



Spectral Doppler Gain Control

You can also adjust the gain by clicking on the slider (a blue box displays around the slider) and using the left and right arrow keys.

The **Image > Gain** menu adjusts the 2D gain, not the CWD or PWD gain.

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

Compression

The Compress slider controls signal compression, which affects the contrast of the image. A number to the left of the slider indicates the amount of compression, from – 50 to 50.

Drag the slider to the right to increase compression, which darkens the image, or drag the slider to the left to decrease compression.



Compress Slider

Adjusting Noise Rejection

The Noise Rejection slider controls rejection of low-level returned signals. Increasing rejection darkens the image background. A number to the left of the slider indicates the level of noise rejection, from – 50 to 50.

Drag the slider to the right to increase noise rejection, or drag the slider to the left to decrease it.



Noise Rejection Slider

Adjusting the Baseline

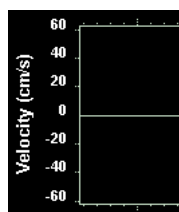
The baseline refers to the zero baseline in the Time Series Display window. Adjusting this control moves the zero baseline up or down. When you adjust the baseline, you can display more forward or reverse flow, taking advantage of the full scale available at that particular PRF value.

Drag the slider to the left to move the baseline down. Drag the slider to the right to move the baseline up.

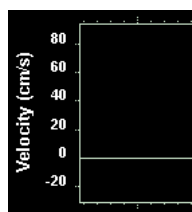


Baseline Control

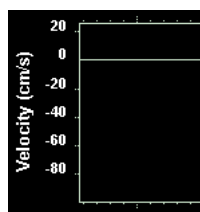
You can also adjust the baseline by clicking on the slider (a blue box displays around the slider) and using the left and right arrow keys. The figure below shows a centered baseline (the default), and adjusted baselines.



Centered Baseline
(default)



Lowered Baseline



Raised Baseline

Effects of Altering the Baseline

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

Adjusting the Sound Volume

The Sound Volume control 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. Drag the slider to the left to lower the volume. Drag the slider to the right to raise the volume.



Volume Control

You can also adjust the volume by clicking on the slider (a blue box displays around the slider) and using the left and right arrow keys.

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 Terason software continuously updates the 2D scan while acquiring Spectral Doppler data. When not selected, the Terason software freezes the 2D data while acquiring Spectral Doppler data. When Update is selected, the button appears pressed in and is a lighter shade than its surroundings.

The default setting for this button in most exams is *selected* (continuous scanning of the 2D and Spectral Doppler data). In The Cardiac and Renal exams, the default is *not selected*.

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 Image Controls When Update Disabled

Image Control Tab	Available	Not Available	
2D	Size Exam	Frequency Depth Focus Gain	TGC curve Sector width THI
IQ	Left/Right invert Up/Down invert Colorization Smoothing Map Compression Noise Rejection	Persistence	

All image control settings on the PWD or CWD tab remain available.

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



Update Button

Using the Console

When the console is extended while live imaging in Spectral Doppler modes, the Scan Mode toolbar changes to display the current settings of a group of controls. The specific control settings displayed vary, depending on which transducer is connected and on other selections.

Pressing the left and right arrow buttons at the left-center of the console changes the controls displayed in the four boxes.

To change a setting, use the up and down arrow buttons at the top left corner of the console. Each pair of up and down arrow buttons controls the setting in one of the four boxes in the Scan Mode toolbar. The position of the button set corresponds to the position of the box – the leftmost up and down buttons control the setting in the leftmost box, and so on.

Special Trackball Responses to Mode

When Pulse-Wave Doppler mode is chosen, the Terason software automatically selects the Sample Volume Gate, and moving the trackball controls the SVG position. A click of the Select button above the trackball changes to the Windows pointer. Clicking the Select button toggles between the Windows pointer and the ultrasound cursor with SVG selected.

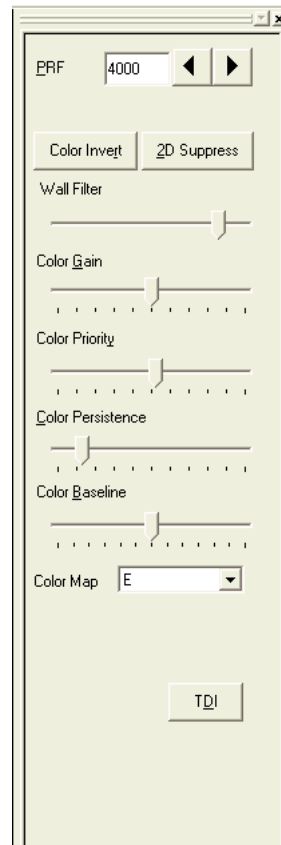
See [Console Controls](#) on page 35 for more information on using the console.

Using Color and Power Doppler Image Controls

When you select Color Doppler, Power Doppler, or Directional Power Doppler, the Terason software adds a tab for the selected mode to the Image Control bar.



Note: CWD is not available when the Pwr mode is selected.
Pwr mode is not available when CWD is selected.



Doppler Image Controls (Color Doppler Shown)

Although each mode adds a tab with the specific name of the selected mode, all the Doppler modes except Power Doppler use the same image controls. When in Power Doppler, a button enables Directional Power Doppler.

Adjusting the Scan Area

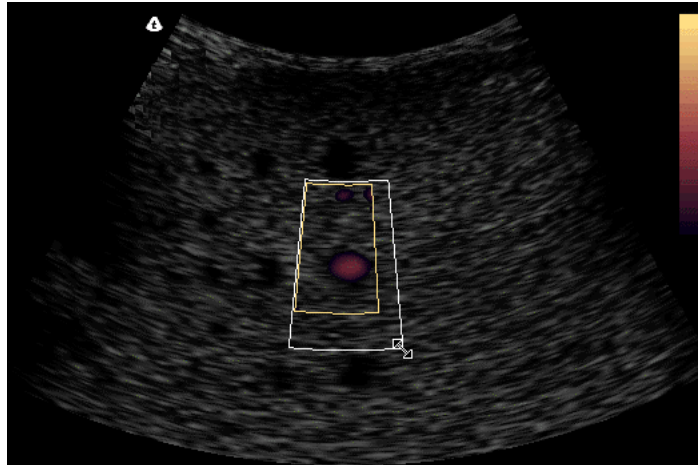
The size of the scan area (also referred to as the region of interest, or ROI) is one of the major controls that affect the frame rate. The smaller the scan area, the faster the frame rate. The larger the scan area, the slower the frame rate.

For cardiac or arterial applications, use a small scan area to accurately visualize the flow dynamics. A medium or large scan might also be used for applications where the blood flow dynamics do not change rapidly, or to get a larger overall view of blood flow.

You can move the scan area by clicking on the region of interest border, moving the ROI to a new position, and clicking to anchor it. You can also type a period (.) to select the region of interest and use the keyboard arrows to move the region.

You can precisely resize the scan area by completing these steps:

1. Position the Windows pointer over one of the corners of the border defining the scan area.
2. Click a corner.
3. Move the mouse or trackball until the scan area is the desired size.



Resizing the Scan Area

4. Click to anchor the region of interest.

You can also type a period (.) twice to select the region of interest. Then use the left/right arrow keys to decrease or increase the width, or the up and down arrow keys to increase or decrease the height.

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 Pulse Repetition Frequency (PRF)

Pulse Repetition Frequency (PRF) defines the velocity range of the display. The maximum value (in Hz) for the PRF depends on the specific transducer, 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. Aliasing may occur for Color Doppler or Directional Power Doppler, but does not occur with Power Doppler.

If the PRF is set too high, low-frequency shifts caused by low-velocity flow may not show. Typically, the PRF is set higher for cardiac and arterial applications than it is for venous or small-parts applications.

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 this control setting.

To adjust the PRF value, click the right or left arrows next to the PRF field.



PRF Control

The increment value for each click depends on the current range, as defined in the table below. For example, if the PRF setting is 4000, each time you click 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.

PRF Ranges

Range (Hz)	Increment (Hz)
200-500	50
500-1000	100
1000-3000	250
2000-5000	500
5000-up	1000

Increasing the PRF also increases the Thermal Index (TI) value (refer to [General Description of Indices](#) on page 268 for more information about thermal indices).

Inverting the Doppler Display (Color Invert)

In Color Doppler and Directional Power Doppler modes, you can invert the color scale. This feature is not available with the Power Doppler mode.

Normally, the color red is assigned to positive frequency shifts (flow toward the transducer), and blue is assigned to negative frequency shifts (flow away from the transducer). However, this color assignment can be reversed by clicking the Color Invert button. Whether the display is inverted or not, flow toward the transducer is assigned the colors of the top half of the color bar, and flow away from the transducer is assigned the colors of the bottom half of the color bar.

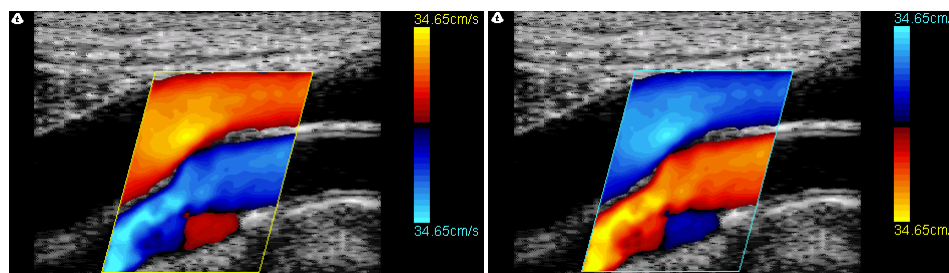
When you click the Color Invert button, the Color Doppler reference bar and the color of the scan data within the Region of Interest are both inverted.

Invert may be used when scanning the internal carotid artery (ICA), for example. In general, flow in this vessel goes away from the transducer. 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, click the Color Invert button:



Color 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 transducer.

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 (such as cardiac), or in instances where the transducer 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, drag the slider to the right for increased filtering, or drag the slider to the left for decreased filtering.

**Wall Filter Control**

The wall filter range is from 1% to 25% of the PRF.

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 increase the color gain, drag the slider to the right. To decrease the color gain, drag the slider to the left.



Color Gain Control

You can also adjust the color gain by clicking on the slider (a blue box displays around the slider) and using the left and right arrow keys.

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 all the way to the left, no color is displayed.

To increase the color priority, drag the slider to the right. To decrease the color priority, drag the slider to the left.



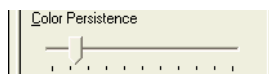
Color Priority Control

You can also adjust the color priority by clicking on the slider (a blue box displays around the slider) and using the left and right arrow keys.

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 increase the color persistence, drag the slider to the right. To decrease the color persistence, drag the slider to the left.



Color Persistence Control

You can also adjust the color persistence by clicking on the slider (a blue box displays around the slider) and using the left and right arrow keys.

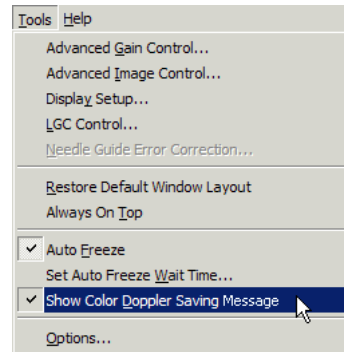
When color persistence is set high, a recalled saved image (single frame) may not look exactly the same as when the image was saved. When you save a Color Doppler image with a high color persistence setting to the local computer, this message displays:

Due to the current high level of color persistence, when saved images are reviewed, they will not appear exactly as saved.

This message does not display when you send images to a DICOM server, only when you save images on the local computer.

If you do not want to see this message when you save Color Doppler images with high persistence settings, you can select the check box in the message above before you click OK to clear the message.

You can also use Show Color Doppler Save Message on the Tools menu to enable or disable the message. In the figure below, the message is enabled.



Tools Menu

Click the Show Color Doppler Saving Message menu item to toggle its setting between enabled (check mark) and disabled (no check mark).

Adjusting the Color Baseline

In general, color baseline adjustments are 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 and Directional Power Doppler scan modes. It does not work with the Power Doppler scan mode.

To move the color baseline up, drag the slider to the right. To move the color baseline down, drag the slider to the left.



Color Baseline Control

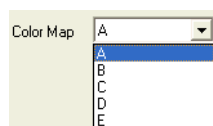
You can also adjust the color baseline by clicking on the slider (a blue box displays around the slider) and using the left and right arrow keys.

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

Choosing a Color Map

The Color Map menu 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. You do not need to click Save or Apply to set the 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 F in the menu. Some maps use more colors than others, and some display in a smoother gradient than others.



Color Map Menu

Special Cardiac Image Controls

Two controls on the CD Image Control window are only active when using the 4V2A transducer with the Cardiac exam presets.

2D Suppress

Selecting 2D Suppress narrows the width of the displayed image to the region of interest. This increases the Color Doppler frame rate.

To apply 2D Suppress, click the 2D Suppress button on the CD Image Control window.



2D Suppress Control

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.

To apply tissue Doppler imaging, click the TDI button on the CD Image Control Window.



Tissue Doppler Imaging Control

Using the Console

When the console is extended while live imaging in Color mode, the Scan Mode toolbar changes to display the current settings of a group of controls. The specific control settings displayed vary, depending on which transducer is connected and on other selections.

Pressing the left and right arrow buttons at the left-center of the console changes the controls displayed in the four boxes.

To change a setting, use the up and down arrow buttons at the top left corner of the console. Each pair of up and down arrow buttons controls the setting in one of the four boxes in the Scan Mode toolbar. The position of the button set corresponds to the position of the box – the leftmost up and down buttons control the setting in the leftmost box, and so on.

Special Trackball Responses to Mode

When Color mode, Directional Power Doppler mode, or Power Doppler mode is chosen, the Terason software automatically selects the ROI, and moving the trackball controls the ROI position. A click of the Select button above the trackball changes control to the ROI size; rolling the trackball shrinks or expands the ROI. A second click of the Select button changes to the Windows pointer. Another click of the Select button returns to controlling the ROI position.

See [Console Controls](#) on page 35 for more information on using the console.

Scanning in Triplex Mode

Triplex scan mode combines Pulsed-Wave Doppler or Continuous Wave Doppler scanning with Color Doppler, with Power Doppler, or with Directional Power Doppler scanning. You can enable Triplex scanning using any of the following methods:

- Select a Doppler mode (CD, PD, or DPD), then select Pulsed-Wave Doppler or Continuous Wave Doppler mode.
- Select a Doppler mode, then right-click in the scan window, and select Set PWD Gate from the shortcut menu.
- Select a Doppler mode, then type **P** (for PWD), or **W** (for CWD).
- Position the Windows pointer in the 2D image where you want to set the range gate, then double-click.



Note: Continuous Wave Doppler mode is only available with the 4V2 transducer.

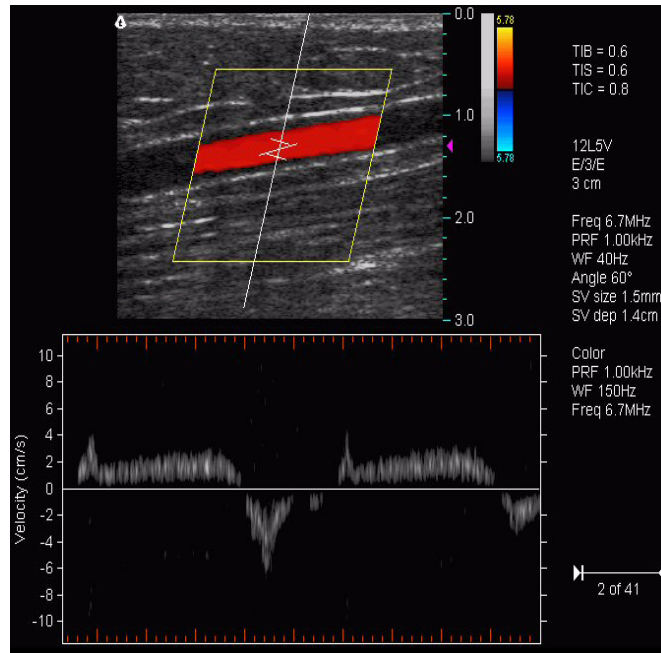


Note: In Triplex scanning only: the PRF value is tied to the setting on the 2D mode (Color Doppler, Directional Power Doppler, or Power Doppler). If you change the PRF value on one tab, the Terason software also changes the PRF value on the other tab. This depends on whether you are scanning in simultaneous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

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

Some of the 2D image controls cannot be adjusted when running in Triplex, so you must adjust the image controls (described in [Using 2D and I.Q. Controls](#) on page 90) before you initiate Triplex scanning.

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



Live Triplex Scan

Region of Interest

When scanning in Triplex mode, you cannot directly move the region of interest or adjust its size. However, you can move the range gate, as follows: position the Windows pointer in the 2D image where you want to set the range gate, then double-click. When you set the new location for the range gate, the Terason software centers the region of interest around the new location.

Image Controls

The Terason software does not provide a unique Image Control tab for Triplex scanning. Use the 2D scan mode controls (CD, DirPwr, or Pwr tab) and the PWD tab to set image controls for Triplex scanning.

Notice that the Probe Info shows two sets of PRF values. The Terason software requires the same PRF value for both PWD and the 2D scan. If you change the PRF value on one tab, the Terason software matches the other tab to that value.

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

Updating the Displays

The **Update** button allows you to freeze the 2D window while acquiring PWD scan data. This may provide a clearer signal and allows using a higher Doppler PRF.

The default setting for this button is enabled (continuous scanning of the 2D and PWD data).

When you disable the **Update** button, you cannot adjust some of the image controls on tabs other than the PWD tab. The table below lists the image controls that can and cannot be adjusted when the 2D image is frozen in Triplex scanning.

Availability of Image Controls When Update Disabled

Image Control Tab	Available	Not Available	
2D	Size Exam	Frequency Depth Focus Gain	TGC curve Sector width THI
IQ	Left/Right invert Up/Down invert Colorization Smoothing Map Compression Noise Rejection	Persistence	
CD/DirPwr/Pwr		Scan Area PRF Wall filter Color Invert Color Gain Color Priority	Color Persistence Color Baseline High Spatial Resolution vs. High Frame Rate

6 Working With Image Files

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

- [Storing Images and Loops](#); see page 131
- [Finding Stored Images and Loops](#); see page 136
- [Managing Files](#); see page 141
- [Editing Images and Loops](#) on page 145
- [Printing Images](#); see page 146
- [Using Images with a DICOM Printer or Server](#) on page 227

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 131
- [Selecting File Types](#); see page 132
- [Saving Images and Loops](#); see page 133
- [Exporting a File](#); see page 135

By default, images and loops are saved in the Terason format and have a file extension of **.ult**.

You can also copy the image in the 2D Image window by selecting **Edit > Copy Image** (or pressing the F4 key), and pasting the image into another application on your computer.

Monitoring Disk Space

You should 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, measurements or annotations, and image size. 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 Terason Main Screen includes a display showing free disk space, next to the Image Status indicator at the bottom of the screen.



Disk Free Space Display

When there is more than 2 GB of free disk space, the area to the right of the Disk Free field is green. When free space is between 1 GB and 2 GB, the area is yellow. When there is less than 1 GB of free space, the area turns red.

If the free disk space gets smaller than 1 GB, you should move files to a backup CD (see [Backing Up Files on a CD](#) on page 142) or delete unimportant files (see [Deleting Files](#) on page 143).

Selecting File Types

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

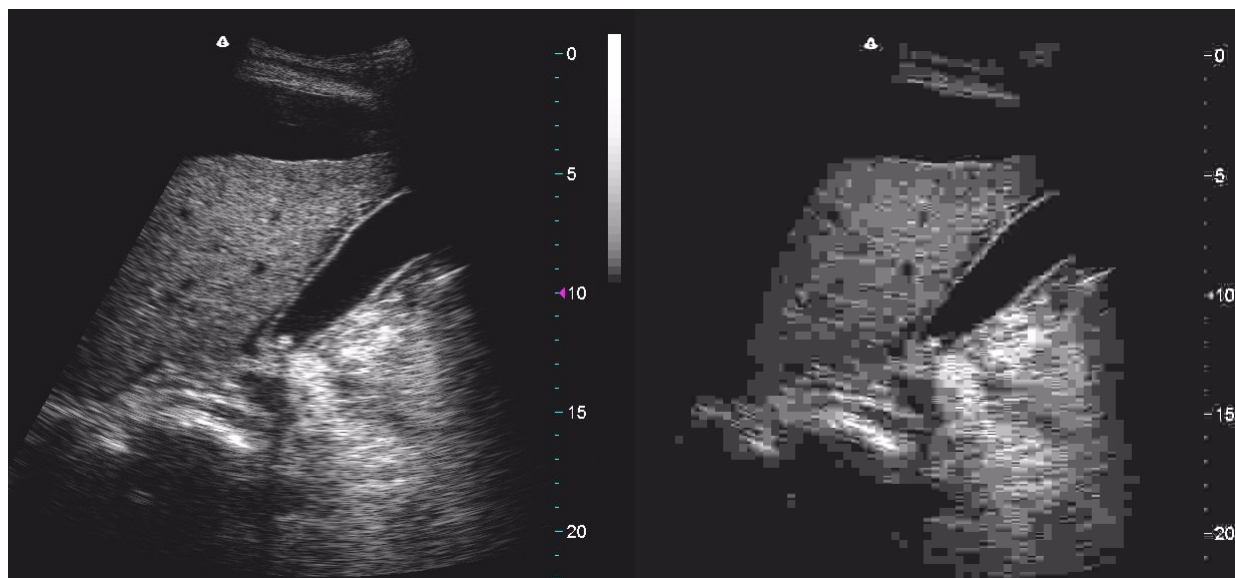
- ULT Terason image file
- AVI
- Bitmap
- DICOM
- JPEG
- TIFF

To create images that can be viewed by others who do not have the Terason software, use a format other than the Terason format (.ult). 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.

Saving Images and Loops



Images and loops are saved to the Patient directory in the appropriate patient folder, or in the Image directory, if not associated with a patient.

When you save a file, the image or loop is assigned a filename based on the exam type and any additional text. For example, if you are saving an image with a Cardiac exam type, and added the text, “new exam”, the default filename would be “CAR NEW EXAM.ULT.”

For Split Screen mode, you can save the Split Screen image (as a single frame showing both screens) when you save to the DICOM, TIF, JPEG, or BMP file formats. If you save to the Terason format (ULT), only the active screen is saved.

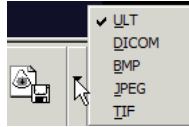
You can save the Split Screen image as a loop file using the DICOM or AVI formats. When you do, the Terason software saves the active screen as an image loop, and the other screen as a single frame. When you save a Split Screen image to the Terason format (ULT), only the loop in the active screen is saved. The frame data for the other screen is discarded.

To save an image or loop with a default name, complete these steps:

1. Click  if viewing a live image.
2. To save an image, Click  (Save Image).

You can also use one of these methods to save an image:

- Press the F8 key
 - Select **File > Save Image (ULT)**
3. To save the file as a different format, click the **arrow** on the Save Image button and click a file type:



You can also select **File > Save Image As** and click a file type

4. To save an image loop, click the **Save Loop** button .

You can also use one of these methods to save a loop:

- Select **File > Save Loop (ULT)**
 - Press F9
5. To save the loop as a different format, click the **arrow** on the Save Loop button and click a file type:



You can also select **File > Save Image As** and click a file type

The application displays a message indicating that the image or loop is being saved.

The Save and Save Loop icons may look different if you changed the default format (see [Setting Image Save and Print Defaults](#) on page 243).

Saved files are located in this folder in the computer's file system:

C:\Program Files\Teratech\Terason 3000

The Terason software uses the Patient folder to store all images when the patient is known (patient information was loaded as part of the exam). Within the Patient folder, the Terason software creates a folder for each patient. Each patient's folder contains their patient info file, and one or more dated folders that contain saved images for the indicated date.

If you did not load patient information for an exam, the Terason software uses the Image folder to store files. This folder contains one or more dated folders, and each folder contains all of the saved images for all unidentified patients on that date.

To save a file to a destination other than the Patient folder (for files that are associated with patient data) or the Image folder (for files without patient data), you must use the **Export** item on the **File** menu (see [Exporting a File](#), below).


You can view the contents of these folders in the Terason Explorer window as described in [Finding Files in the Terason Explorer](#) on page 136.

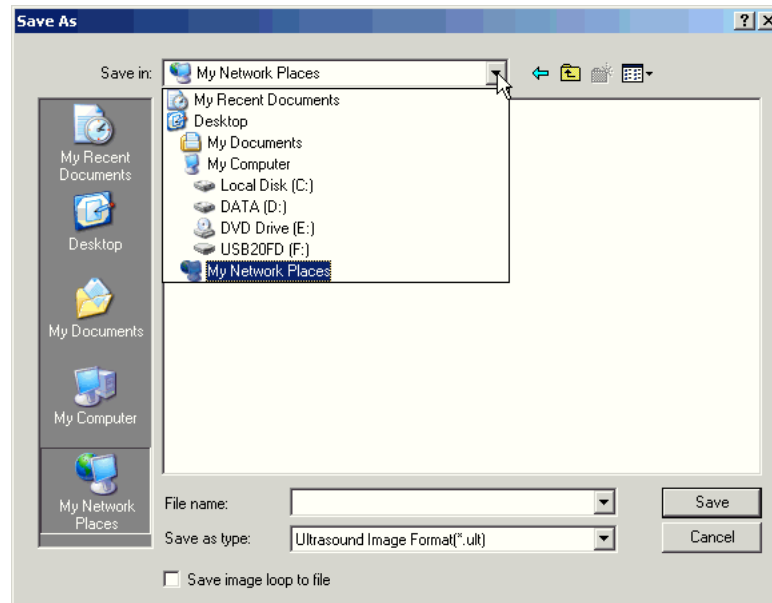
If you open an image file and then save it again, the Terason software creates a new file; it does not overwrite the original file. To overwrite the original file, use the **Export** item on the **File** menu option and select the original file before you click the Save button.

Exporting a File

To save the image or loop in a different location or with a specific name, you must use the **Export** item on the **File** menu.

You can save the file anywhere on your computer, or on a network server that your computer can access. To export an image or loop, complete these steps:

1. Click  if viewing a live image.
2. Select **File > Export**.



Save As Dialog Box

3. Choose a location from the **Save in:** menu.
4. Enter a filename in the **File name:** field.
5. Select a file format from the **Save as type:** menu.
6. To save the file as a loop file, click the **check box**.

You can only select the check box if you choose Terason Image File, AVI, or DICOM file as the format.

7. If you selected a file format other than the Terason format, choose an **Image Size** from the menu.

More pixels in an image produce a larger file. Fewer pixels produce a lower-quality and smaller file.

8. Click **Save**.

Finding Stored Images and Loops

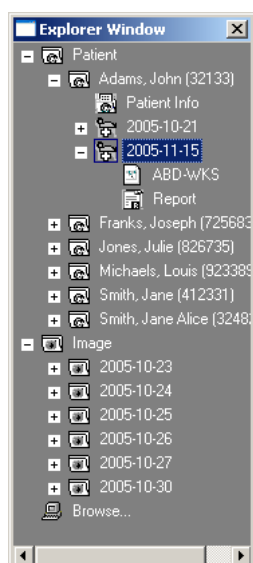
You can use these tools to perform the following operations:

- [Finding Files in the Terason Explorer](#)
- [Finding Files in the Review Window](#)
- [Browsing to Find Files](#)


For archived images, insert the required CD and select **File > Open**.

Finding Files in the Terason Explorer

If you must view a saved image or loop, you can use the Terason Explorer window to find it and open it.



Locating Saved Images and Loops

To open a folder, click the  symbol or double-click the folder name. To open an image file, you can either:





- Double-click the file name

or










- Right-click the file and select **Open**

Images and loops have different icons in the Terason Explorer, so you can distinguish them. If you save files in formats other than the Terason ultrasound format, the icon shows the file format. The following table shows what each icon in the Terason Explorer represents.

Terason Explorer File Icons

Icon	Description	Icon	Description
	Patient Folder		DICOM Image
	Patient Data file		DICOM Loop

Terason Explorer File Icons

Icon	Description	Icon	Description
	Image folder in a Patient Folder		AVI Loop
	Image folder		Bitmap Image
	Terason Ultrasound Image		JPEG Image
	Terason Ultrasound Image Loop		TIFF Image
	Report File		

To find a specific image or loop:

- If you loaded patient information before saving the file, look in the **Patient** folder for the patient's name, and then in the dated folder under that patient's name.
- If you did not load or enter patient information when you saved the file, look in the **Image** folder, in a folder with the date of the exam.
- If you used the File > Export menu, double-click **Browse** and use the Windows dialog box to locate the image.
- If you do not know the date of an image, or there are several that could be the one you are looking for, view the folder in the **Review** window (see [Finding Files in the Review Window](#) on page 139).
- If you have moved, deleted, or renamed files using Windows Explorer while the Terason software is running, right-click in the Terason Explorer window and select **Refresh** to update.

The Terason software loads the selected image file into a new tab in the Image Display window. When finished with the image file, select **File > Close Image** and the Terason software removes the tab.

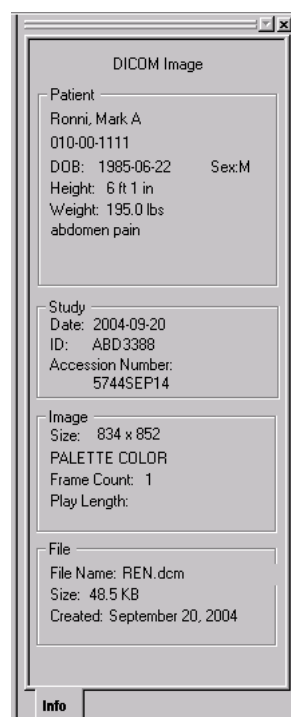
For .ult files (Terason ultrasound format), the image control settings are also loaded. You can edit those settings as described in [Editing Images and Loops](#) on page 145.

For AVI, Bitmap, JPEG, or TIFF file types, an Info tab replaces the Image Control tabs. The Info tab shows the file type, size, and the dates it was created and last modified.



Info Tab for a Non-ULT Image

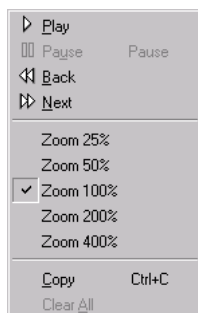
For DICOM files, the Info tab displays the data saved as part of the DICOM image.



Info Tab for a DICOM Image

If the image is larger than the Image Display window, the window includes scroll bars along the right and bottom edges. These bars let you see the parts of the image that do not fit within the window. Click and drag in a scroll bar to see a different part of the image.

For non-ULT files, the Terason software provides a shortcut menu that lets you use the Playback functions (for AVI or DICOM loops), resize the image to a selected percentage, or copy the image for pasting into an external application.

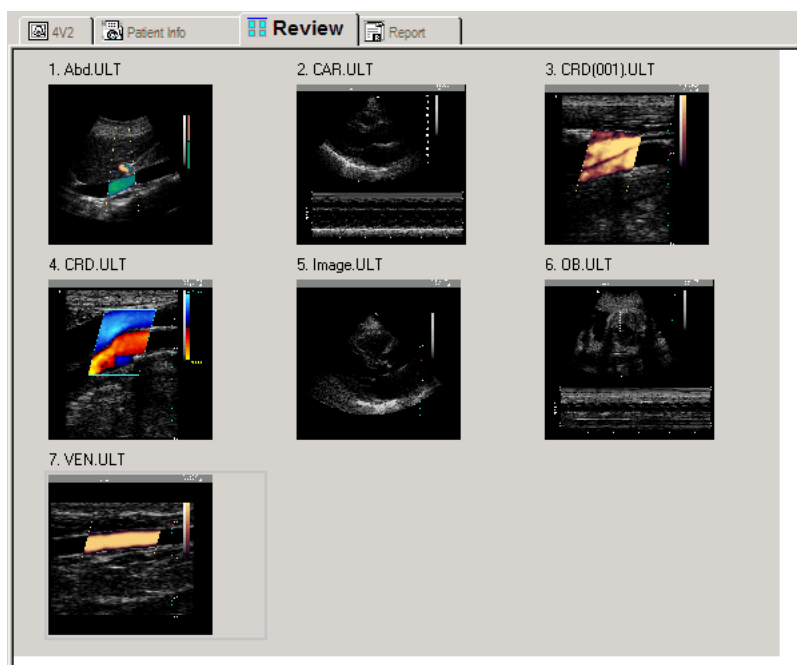


Shortcut Menu for non-ULT Image Files

Finding Files in the Review Window

The Review window lets you display thumbnail images for a specific date. When you select a dated folder in the Terason Explorer (either for a specific patient or in the Image folder), the Review window automatically displays thumbnail images for all files in the selected folder.

To view the Review window, click the Review tab.



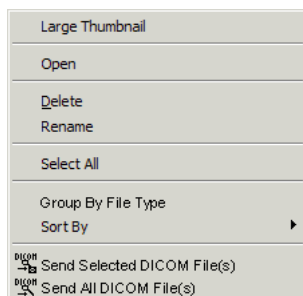
Review Tab (Large Thumbnails)

You can also use this window to print all of a set of ultrasound images instead of printing them one at a time (see [Printing Images](#) on page 146 for instructions).

To open an image or loop, double-click the thumbnail.

You can view large thumbnails (which makes it easier to tell what the images are) or small thumbnails (which makes more thumbnails visible). Select **View > Thumbnail > Large Thumbnail** to toggle between large and small thumbnail images. The large thumbnail is 160 by 120 pixels. The small thumbnail is 100 by 75 pixels.

You can also right-click in the Review window to choose large or small thumbnails.



Shortcut Menu for the Review Window

The **Delete** item in the shortcut menu deletes selected images from the folder. Make sure you do not need an image before you delete it.

The **Group By File Type** and **Sort By** items let you change the order in which the thumbnails display in the window. By default, this window shows files sorted by Creation Time (earliest first). **Group By File Type** sorts the files based on file type. You can also choose **Sort By** and then **Name** (sorts them alphabetically) or **Creation Time** (earliest first).

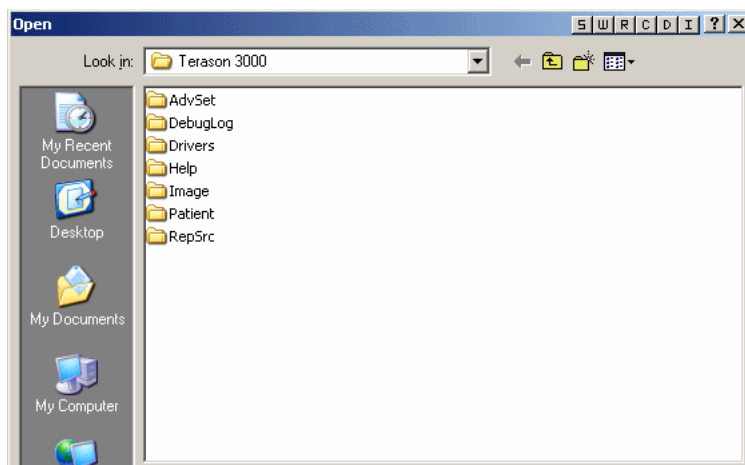
If you use Windows Explorer to rename or delete files, you can select **Refresh** from the shortcut menu (or **View > Refresh**) to update the thumbnails displayed in the Review window.

Browsing to Find Files

Terason recommends that you save all patient and image files in the default folders. However, if you have archived images, or if the images are stored elsewhere for any reason, you can still use the Terason Explorer or the File menu to locate those files.

To locate files that were not saved in the Terason default folder, complete these steps:

1. Double-click **Browse** in the Terason Explorer window, or select File > Open. The default folder or the last folder viewed opens in the Open dialog box.



Browsing for a File

2. Use the Windows **navigation tools** to find the image you need.
3. Click the **file name** to highlight it.
4. Click **Open**.

The file displays in the Image Display window.

Managing Files

Using the Terason Ultrasound System produces hundreds of image files. To manage those files, you should understand:

- [Copying Files](#); see page 141
- [Backing Up Files on a CD](#); see page 142
- [Moving Files](#); see page 142
- [Renaming Files](#); see page 143
- [Deleting Files](#); see page 143

Copying Files

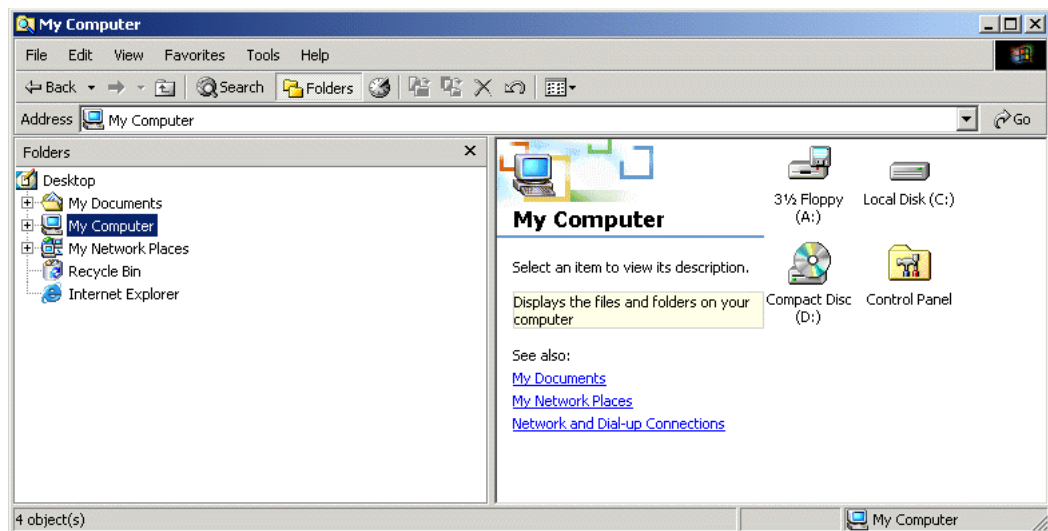
You can copy files to another folder or directory. The method described here is only one of the many ways you can use Windows to copy files from one location to another.



Note: Do not use this procedure to copy files to a CD. Always use the CD writing software on your computer when writing to a CD.

To copy a Terason image or patient file, complete these steps:

1. Click the **Start** button at the bottom left of the screen, and choose **Programs > Accessories > Windows Explorer**.



Windows Explorer

2. In the left pane of the window, open **folders** by clicking them until the folder or file that you want to copy displays.
3. In the right pane of the window, click the **file or folder** to copy.
4. Select **Edit > Copy**.

5. On the left pane of the window, locate and highlight the **folder** where you want to store the folder or file.
6. Select **Edit > Paste**.

Windows copies the file or folder to that folder. You now have two copies of that file or folder.

Backing Up Files on a CD

Backing up, or archiving, files saved by the Terason software is important. It ensures that you do not lose medical records. You can also archive files for later retrieval if needed. You should back up files at regularly scheduled intervals, such as weekly or at the end of each day.

Backing-up files is copying the files to another place, such as a CD or another computer on a network. The backup copies can be used if your computer is infected with a computer virus or develops a hard drive problem that makes it impossible to access files on the Terason system.

You can use Windows Explorer or another file management program to back up your files. If you do not already have these activities scheduled, talk to the computer administrator at your site about setting-up a schedule. If your site does not support automatic backups, you may have to perform the backups yourself.

Use the CD writer software on your computer to back up files to a CD. Refer to the different CD-writer software user guide or online help for instructions.

Follow these guidelines to choose what to copy:

Guidelines for Item Selection

To copy...	Do this...
All patient folders	Highlight the Patient directory
An individual patient folder	Open the Patient directory and highlight the folder with the patient's name
An Image directory	Open the Image directory and highlight the folder with the needed date
A single image or loop file	Highlight the file name

Moving Files

Terason does not recommend that you move files out of the default location. Only files in the default directory display in the Terason Explorer window, and you may have difficulty locating other files. Typically, you only move files when you are archiving older files that you do not need on your computer.

To move a file, complete these steps:

1. Click the Start button at the bottom left of the screen, and choose **Programs > Accessories > Windows Explorer**.

2. In the left pane of the window, open folders by clicking them until the file or folder that you want to move displays.
3. In the right pane of the window, click the file or folder you want to move.
4. Select **E**dit > **C**ut.
5. In the left pane of the window, open the **folder** where you want to store the file or folder.
6. Select **E**dit > **P**aste.

Renaming Files

You can rename files using the Terason Explorer or using Windows Explorer.

Renaming Files in the Terason Explorer, Review, and Thumbnail window

You can use these to edit the name of any image file, but not to edit the name of a Patient Info file. To edit a file name, complete these steps:

1. Click the **file name** to highlight it.
2. Right-click and select **R**ename.
3. Type the new name and press **E**nter.

The Terason software changes the name of the file.

Renaming Files in Windows Explorer

You can rename both image and patient info files using Windows Explorer. To rename files from Windows Explorer, complete these steps:

1. Click the **S**tart button at the bottom left of the screen, and select **P**rograms > **A**ccessories > **W**indows Explorer.
2. Open folders by clicking them until the file or folder you want to rename is highlighted.
3. Right-click the file or folder and select **R**ename.
4. Type a new name and press **E**nter.

Deleting Files

Terason recommends that you delete unnecessary files to free up disk space. You cannot directly delete patient info files using the Terason Explorer; you can only delete folders and image or loop files.

You can delete files using:

- [Terason Explorer, Review, or Thumbnail window](#): files are immediately and permanently removed from the system, freeing disk space
- [Windows Explorer](#): files are moved to the Windows Recycle bin

If you used Windows Explorer, you can:

- [Retrieve files from the Recycle bin](#) before they are permanently deleted
- [Empty the Recycle bin](#) to permanently delete the files

Deleting Files Using the Terason Explorer, Review, and Thumbnail window

To delete files from the Terason Explorer, Review or Thumbnail window, complete these steps:

1. Click the **file** that you want to delete, or click a folder to delete all files within the folder.
2. Press the Del key, or right-click the file name and select **Delete** from the shortcut menu. The software prompts you to verify that you want to delete your selection.
3. Click **Yes** to delete the file.

Deleting Files Using Windows Explorer

Files deleted from Windows Explorer go into the Recycle bin, where you can retrieve them if necessary, until the Recycle bin is emptied. Emptying the Recycle bin permanently removes all files from the system; they cannot be recovered. You can use Windows Explorer to delete Patient Info files.

To delete files from Windows Explorer, complete these steps:

1. Click the **Start** button at the bottom left of the screen, and select **Programs > Accessories > Windows Explorer**.
2. Open **folders** by clicking them until the file or folder you want to delete is highlighted.
3. Click the file or folder to delete, and press the **Del** key.
4. To confirm the deletion, click **Yes**.

Retrieving Files from the Recycle Bin

If you mistakenly delete a file using Windows Explorer, you can retrieve it from the Recycle bin if you have not emptied the bin yet.

To retrieve a file from the Recycle bin, complete these steps:

1. Double-click the **Recycle bin** on the Desktop.
2. Select the **file** to restore, noting its path on the right (the file will be restored to this location) in the Recycle bin window.

To restore multiple files at the same time, press the Ctrl key while clicking each file name.

3. Select **File > Restore**.

The file is returned to its original location.

Emptying the Recycle Bin

Emptying the Recycle bin permanently deletes all of the files in it from your hard disk; they cannot be retrieved.

To empty the Recycle bin, complete these steps:

1. Double-click the **Recycle bin** on the Desktop.
2. To permanently remove only a few **files** from the system, click them while holding down the Ctrl key, then press the Del key.
3. To permanently remove all files listed, select **File > Empty Recycle Bin**.
4. Click **Yes** to confirm deletions.

Editing Images and Loops

The Terason Ultrasound System lets you modify saved images and loops. Before making modifications, you must first retrieve the image or loop. The types of modifications you can make depend on whether you are working with an image or a loop. The Terason software can edit only Terason Image Format files and loops (.ult). You can use the Terason software to view images saved in other formats, but not to edit them.

For a retrieved image, you can edit any of these image controls:

- Add or delete measurements
- Add or delete text
- Zoom in on an image (if the image is re-saved, the new zoom setting is not saved)
- Invert Left/Right
- Invert Top/Bottom
- Select a different image map
- Adjust the brightness
- Adjust the contrast
- For Color Doppler and Directional Power modes only:
 - Invert the color
- For Pulsed-Wave Doppler/Triplex only:
 - Correction angle
 - Pulsed-Wave Doppler gain
 - Pulsed-Wave Doppler baseline
 - Wall filter

For a retrieved loop, you can edit any of the above image controls, plus these image controls (depending on the scan mode of the saved loop):

- Color gain
- Color priority
- Color persistence
- Color baseline (not available for Power Doppler)
- Color threshold (Color Doppler only)
- Wall filter

The loop must be in playback mode to make modifications.

You can re-save the file by clicking the Save Image or Save Loop button (depending on the file type). The Terason software creates a new file. To replace the original file with the one you edited, select **File > Export**, locate the original file and select it, then click **Save**. A message indicates that the file already exists, and asks if you want to overwrite it. Click **Yes**.

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. To print an entire image loop, you must use the DICOM option. See [Printing Files to a DICOM Printer](#) on page 227 for instructions.



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):

- Click 
- Select **File > Print**
- Select thumbnails in the Review window, then click 
- Select **File > Print Preview**, then click the Print button
- Print a split screen image
- Select **File > Print DICOM Image** (see [Printing Files to a DICOM Printer](#) on page 227)

You can also use **Print Setup** on the File menu to select a default printer and default print settings, such as page size and orientation.

Printing the Displayed Image

When viewing an image in the Image Display or Review windows, you can click  to print the image or images. When you click the Print button, the Terason software immediately sends selected images to your system's default printer. You cannot set up any custom options, such as number of copies or paper size.

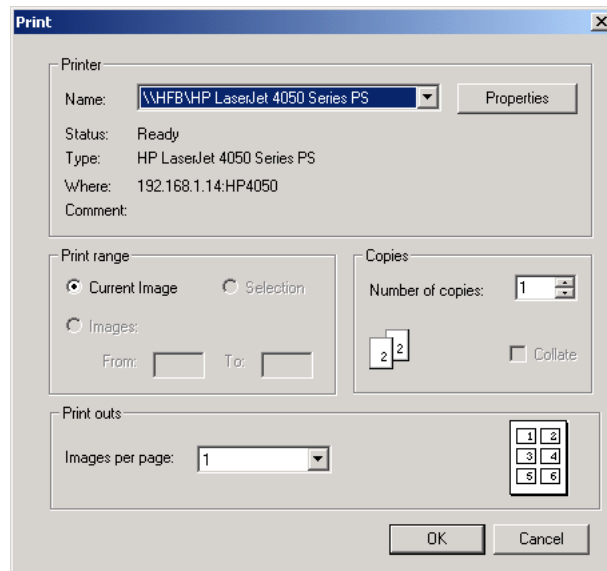
You must freeze live images before you can print them.

If you used **Options** on the **Tools** menu to change the Toolbar Print handling to Send to DICOM Printer, the Terason software sends the image directly to the DICOM printer. See [Setting Image Save and Print Defaults](#) on page 243 to make this change.

Printing from the File Menu

To send the image to a printer other than your default, or to set up specific print options, complete these steps:

1. Use one of these methods to select an image to print:
 - Load an image into the Image Display window
 - Freeze a live image or pause a loop image
 - Select the images in a folder in the Review window
2. Select **File > Print**. The Terason software opens the Windows Print dialog box.



Windows Print Dialog Box

3. Choose a **printer**, and change options as needed.


The Images per page and Print Range options only work when printing from the Review window.

If you highlighted specific images in the Review window, the print range is Selection.

To print the image to see details, choose a smaller value for Images per page. To print many images on a page, choose a larger value.

4. Click **OK**.

Printing from the Review Window

To print all of the images shown in the Review window, click . The Terason software sends the print job to your default printer with a default layout of six images per page.

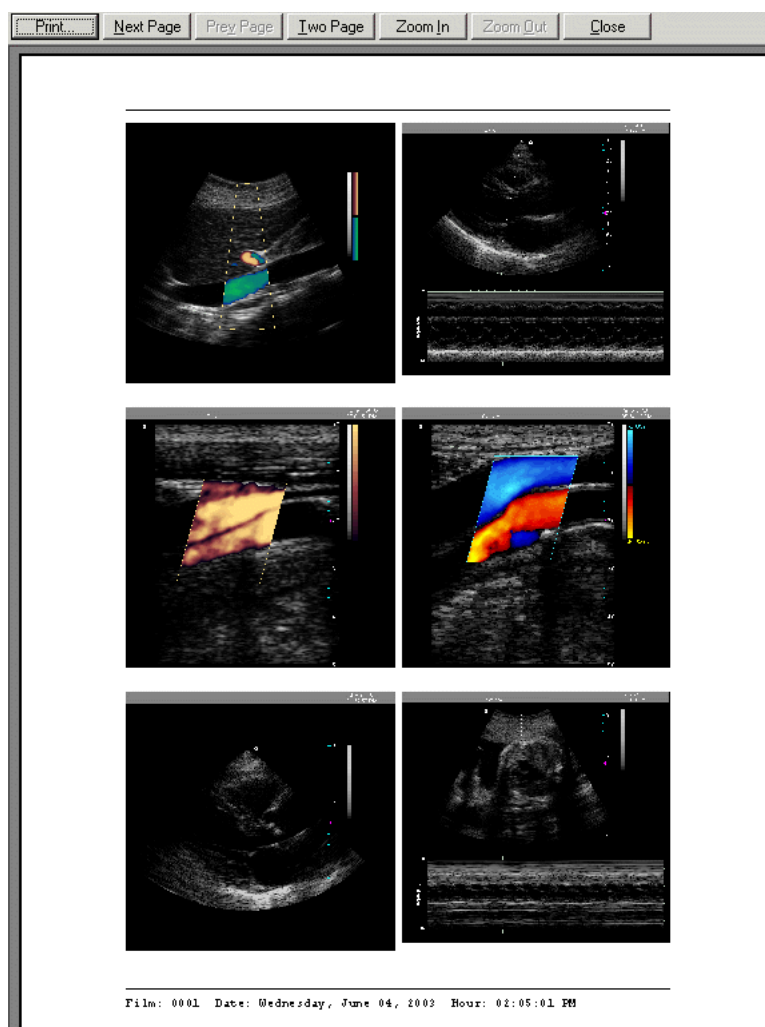
The Terason software scales the images to fit the selected number on the page. The smaller the number of images, the larger each image prints. To change the number of images per page, use the **File** menu as described in [Printing from the File Menu](#) on page 147.

If you only want to print some of the images, hold the Ctrl key down and click the images you want to print. The Terason software draws a blue line around selected images, and when you click the **Print** button, the software prints only the selected images.

Printing from the Print Preview Window

Print Preview on the **File** menu lets you see the expected printout for the image or images in the Image Display or Review window, whichever window is active.

When you select **File > Print Preview**, the Terason software opens the Print Preview window.



Print Preview Window (Selected with Review Window Active)

Click the **Print** button at the top to send the job to your default printer.

This example shows the Print Preview window opened with the Review window active and showing a folder containing seven images, using the six images per page layout.


The buttons at the top of this window perform the functions listed in the following table:

Buttons on the Print Preview Window

Button	Result
Print	Prints all pages on your computer's default printer
Next Page	Displays the next page of images (if there are at least two pages)
Prev Page	Displays the previous page of images (if at least two pages)
Two Page	Displays two pages of images at the same time
Zoom In	Enlarges the preview so you can see more details
Zoom Out	Reduces the preview; only active if you have zoomed in
Close	Closes the Print Preview window and shows the Terason window

Printing in Split Screen Mode

When in Split Screen mode, the Terason software prints both screens. For the best quality print, use the Full Screen function before printing.

1. Make sure that both screens are **frozen** and that you have added any necessary measurements or annotations.
2. Press the **F11** key. The Terason software enlarges the Image Display window to cover the entire screen.
3. Click  .

The Terason software prints the Image Display window, including both screens.

7 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 adds one or two measure tabs to the Image Control window. For example, if you scanned in M-Mode, a 2D Measure tab and an M Measure tab display. Each tab provides tools specific to the measurements for the selected scan mode.

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) or a loaded image or loop if it was saved using the ULT format.

To make measurements on scanned images, you must understand:

- [Measuring in the 2D Window](#); see page 151
- [Measuring in the M-Mode Window](#); see page 165
- [Measuring in the Spectral Doppler Modes](#); see page 166
- [Measuring Vascular Exams](#); see page 175
- [Measuring Cardiac Exams](#); see page 184
- [Selecting Measurements](#); see page 200
- [Deleting Measurements](#); see page 201
- [Restoring All Measurement Groups to Defaults](#); see page 201
- [Stress Echo](#); see page 202

You can also make measurements on both screens when using Split Screen mode.

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

- Select a different exam
- Select a different scan mode (except for an Obstetrical exam*)
- Load a different patient

* Measurements made in an Obstetrical exam remain on the 2D image when you select a different scan mode. See [Working with Measurements on an Obstetrical Exam](#) on page 158.

Measuring in the 2D Window

The Measure function in the 2D window allows:

- [Measuring Distances](#); see page 151
- [Measuring Volume](#); see page 153
- [Measuring Elliptical Circumference and Area](#); see page 154
- [Tracing Areas on the Image](#); see page 155
- [Calculating Percent Stenosis](#); see page 157
- [Working with Measurements on an Obstetrical Exam](#); see page 158
- [Making Gynecological Measurements](#); see page 164



In general, select what you want to measure from the menu of Measurements. If you select a specific measurement, such as FL, only the button that works with that measurement is available. If you select a default measurement, such as Distance, you can click any button to choose a different default measurement.

You can also make a measurement by right-clicking and selecting **New Measurement** from the pop-up menu. This starts a measurement of the type currently selected in the 2D Measure tab.

-
-

Measuring Distances

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


1. Click . If playing a loop, click .

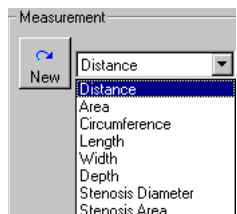
The measure tabs for the selected scan mode are added to the Image Control window.



2D Measure Tab

2. If necessary, click the **2D Measure** tab or click in the 2D window.
3. To measure a detailed area with precision, use the **Zoom** function (see [Enlarging an Area of the Image](#) on page 73) to enlarge an area of the 2D scan.

4. Select the **type of measurement** you want to make from the menu, or click . The software uses the Measurement selection to label the completed measurement.




Measurements for the 2D Window

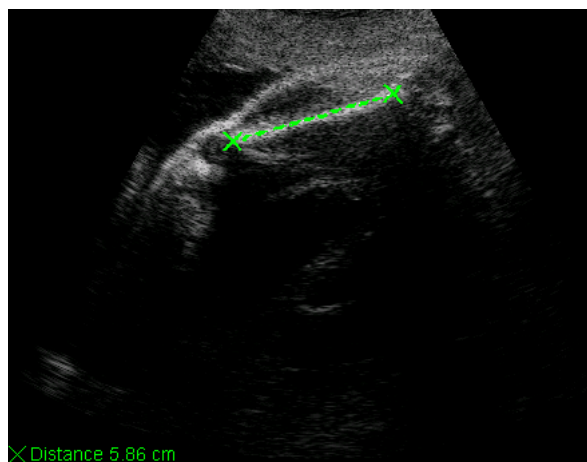
The Fetal Cardiac, Cardiac, Obstetrical, and Gynecological exams allow additional measurements, which display in the list.

The Area, Circumference and stenosis Area measurements do not use the Distance tool.

5. Click where you want to **start** measuring, move the target cursor, and click where you want to **finish** measuring.

Selecting a measurement type enables the start-point target cursor. If you did not select a measurement type, click New  to enable the target cursor.


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



Distance Measurement on an Image

6. To move the start or end point of a measurement, click one of the anchors (calipers), move the target cursor to a new position, and click.

If you do not see the measurement value, select **View > Image Display Properties > Measurement Value**.


To make more than one measurement of the same type on an image, click **New** , then make the additional measurement. You can also double-click the image pane to get another caliper to make another measurement of the same type.

When measuring in Split Screen mode, the measurements are displayed in a single list, regardless of which screen contains that measurement. You must make the specific screen (left or right) active by clicking in the screen or clicking the Toggle button before you can make a measurement.

Measuring Volume

When you measure length, width, and depth, the Terason software automatically calculates the volume in cubic centimeters. Because you must make two scans to properly measure volume, these instructions use the Split Screen option so you can retain both scans.

Complete the following steps (you can make the length, width, and depth measurements in any order that make sense for the specific scan):

1. Click . The measure tabs for the selected scan mode are added to the Image Control window.
2. If necessary, click the **2D Measure** tab or click in the 2D window.
3. Select **Length** from the Measurement list.
4. Click at the **starting point** of the area's length, then click at the **ending point** of the area's length.


The Terason software displays the *length* measurement.

5. Select **Width** from the Measurement list.
6. Click at the **starting point** of the area's width, then click at the **ending point** of the area's width.

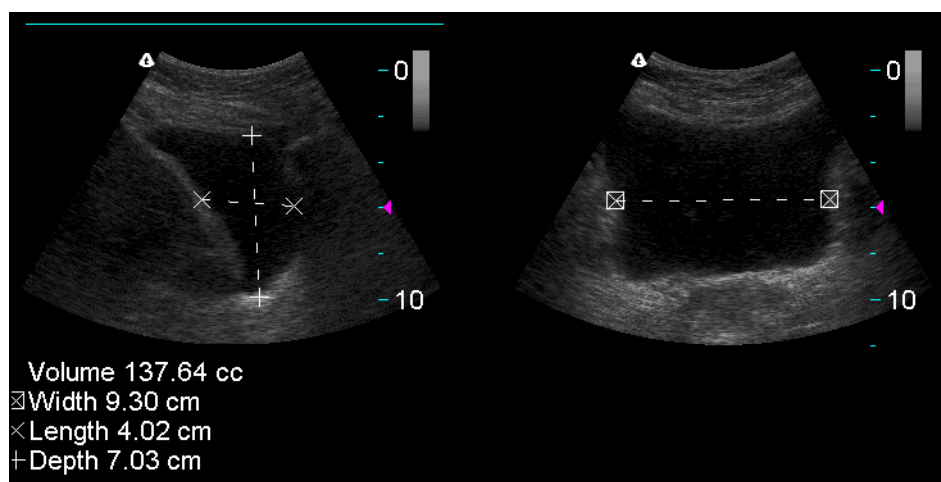
The Terason software displays the *width* measurement.

7. Click .

The Terason software adds a new live scan adjacent to the frozen scan.



8. Click .
9. Select **Depth** from the Measurement list.
10. Click at the **starting point** of the area's depth, then click at the **ending point** of the area's depth.

The Terason software displays the depth measurement and the volume calculation.







Split Screen Volume Measurements

Measuring Elliptical Circumference and Area

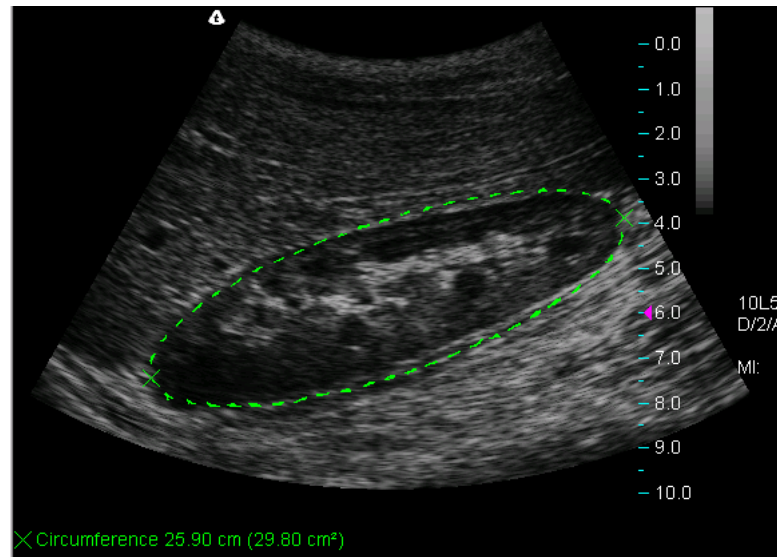
You can use either the  (ellipse) tool or the  (trace) tool to measure a circumference on the image. To measure an oval area, use the Ellipse tool. To measure the area of an irregular shape, use the Trace tool. See [Tracing Areas on the Image](#) on page 155 for instructions on using the trace tool.

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. Click . If playing a loop, click .
- The measure tabs for the selected scan mode are added to the Image Control window.
2. If necessary, click the 2D Measure tab or click in the 2D window.
3. Use one of the following methods to activate the ellipse tool:
 - Click the **Ellipse button** 
 - Select **Circumference** from the Measurement menu
 - Select **Area** from the Measurement menu, then click 
4. Position the target cursor at **one end** of the area that you want to measure and click.
5. Move the target cursor to the **other end** of the desired area, and click.

The Terason software displays a green line and shows the circumference and area values at the bottom of the image.



Ellipse Measurement on an Image

If the measurement value does not show on your computer, select **View > Image Display Properties > Measurement Value**.

6. To change the shape of an ellipse:
 - a. Move the Windows pointer along the perimeter until it changes to a target pointer



- b. Click to select the **ellipse**.
 - c. Move the **trackball or mouse** to change the shape of the ellipse.
 - d. Click when **finished**.

You can also click the caliper and move it to a new location, which changes the shape of the ellipse.

Tracing Areas on the Image



The Terason software lets you trace the contour of any shape on an image to measure the circumference and area. You can also use the Ellipse tool to measure a circumference or area (see [Measuring Elliptical Circumference and Area](#) on page 154 for instructions.)

You can use the trace tool to:



- Trace an irregular shape by sketching the outline
- Draw a polygon by clicking 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:

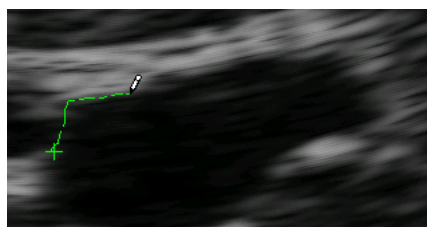
1. Click . If playing a loop, click . The measure tabs for the selected scan mode are added to the Image Control bar.
2. If necessary, click the **2D Measure** tab or click in the 2D window.

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

- Click  on the 2D Measure tab
- Select **Area** from the Measurement menu.
- Select **Circumference** from the Measurement menu then click 

4. To trace an outline:

- a. Click where you want to **start** measuring.
- b. Hold the **left mouse button** down, and drag the tracing cursor around the object you want to trace. The tracing cursor looks like a pencil.

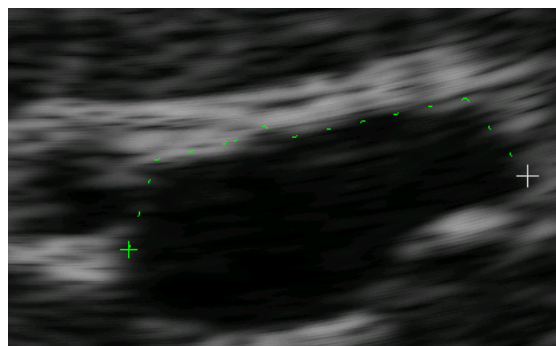


Tracing an Outline

- c. To erase part of the tracing, release the mouse button and press the **Backspace** key to delete line segments, then press the left mouse button and continue tracing.

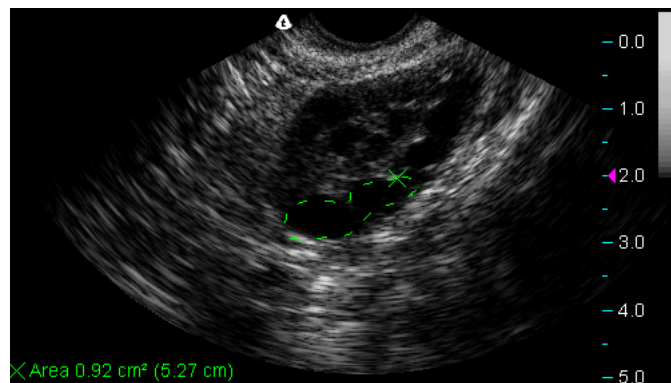
5. To draw a polygon:

- a. Click where you want to **start** measuring.
- b. Click the **next corner** of the shape. The target cursor looks like + while you draw the polygon.



Tracing a Polygon

- c. Continue clicking on **corners**.
 - d. To erase part of the polygon, press the **Backspace** key to remove unwanted line segments, then continue clicking on corners.
6. To complete the trace, double-click the **starting point**. The Terason software displays the circumference and area of the measured area. If you right-click or double-click at a location other than the starting point, the trace tool draws a straight line from that location to the starting point to complete the tracing.



Trace Measurement on an Image



Calculating Percent Stenosis

If the 2D scan shows stenosis, you can measure the percent diameter or area stenosis depending on the protocol in use.

To calculate the percentage, you must make two measurements: the full area or diameter of the vessel and the residual lumen. When you complete the second measurement, the Terason software calculates the percent of the area or diameter stenosis.

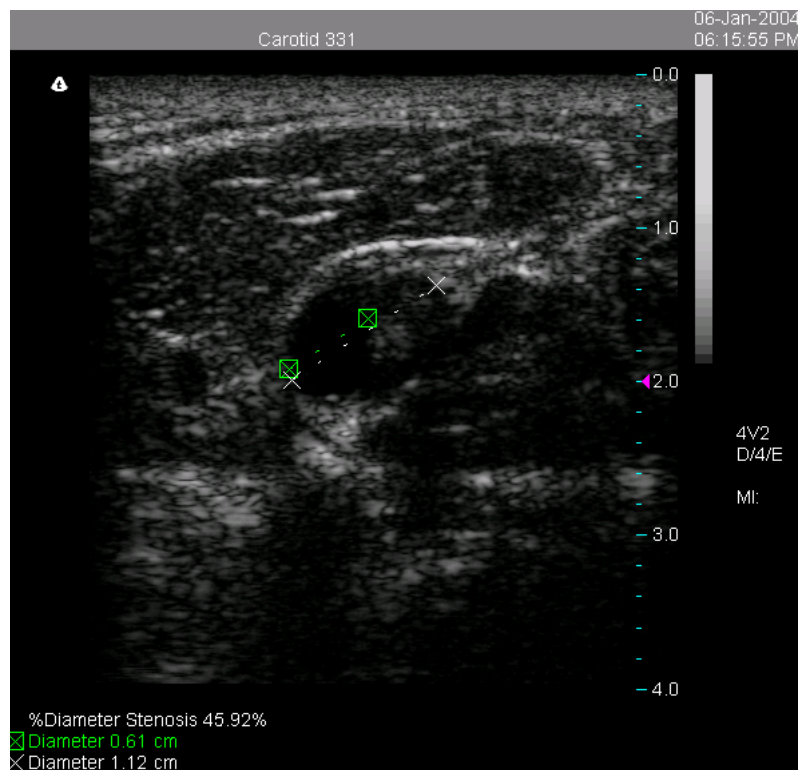
You can make these measurements in any order; the Terason software always uses the largest measurement as the diameter or area of the vessel.

This procedure shows you how to measure the percentage of stenosis based on the diameter:

1. Click Freeze . If playing a loop, click Pause . The measure tabs for the selected scan mode are added to the Image Control window.
2. If necessary, click the **2D Measure** tab or click in the 2D window.
3. Select **Stenosis Diameter** from the Measurement menu.
4. Click at the start and end points of the **vessel**.

The Terason software calculates the length of the line and displays the Diameter value.

5. Click at the start and end points of the **residual lumen**. The Terason software displays the second Diameter value and calculates the percentage stenosis.



Calculated % Diameter Stenosis

You can use the same procedure to calculate the % Area Stenosis. Select Stenosis Area from the measurement menu and use the Trace tool to measure the vessel and the residual lumen.

If you wish to see either Stenosis Diameter or Stenosis area on a report, see [Working with Vascular Reports](#) on page 181.

Working with Measurements on an Obstetrical Exam

The Obstetrical exam allows you to measure anatomy on up to six fetuses labelled A through F. You can make any combination of measurements on any fetus during an exam. When you freeze an Obstetrical exam, the following operations are enabled:

- [Making Obstetrical Measurements](#); see page 159
- [Calculating Estimated Fetal Weight](#); see page 162
- [Calculating Gestational Sac Size and Age](#); see page 163



Caution: An additional computer or connection installed within the patient environment may result in non-conformance to safety standards. Use of non-medical grade peripherals will result in non-compliance of safety and EMI standards. Non-conformance to these standards can result in risks to the patient and operator of this equipment.

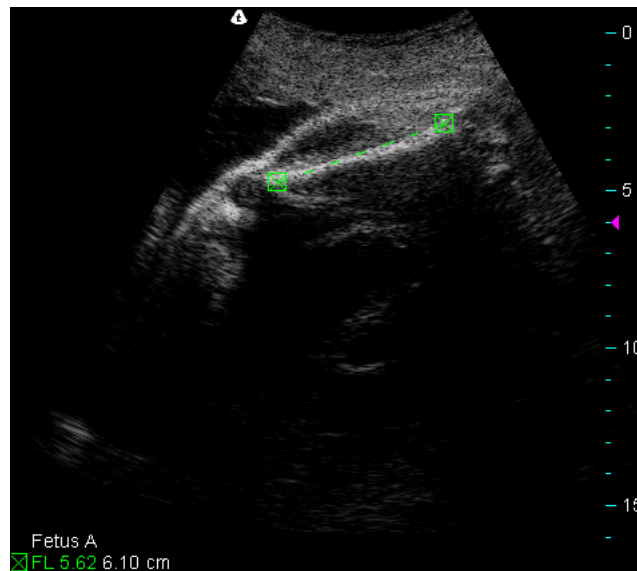
See [Setting Measurement Defaults](#) on page 250 for instructions on setting with port on your computer is connected to the other computer.

Making Obstetrical Measurements

When there are multiple fetuses, only the measurements for the selected fetus display on the 2D image. For example, if you made three measurements for Fetus A and two measurements for Fetus B, you only see the measurements for whichever Fetus is selected in the 2D Measure tab.

All measurements use the distance tool (see [Measuring Distances](#) on page 151), except that abdominal circumference (AC) and head circumference (HC) use the Ellipse or Trace tools (see [Measuring Elliptical Circumference and Area](#) on page 154 or [Tracing Areas on the Image](#) on page 155).

You can make multiple measurements of one type, on multiple scans, to acquire all the needed measurements. For example, the following scan shows a femur length (FL) measurement.



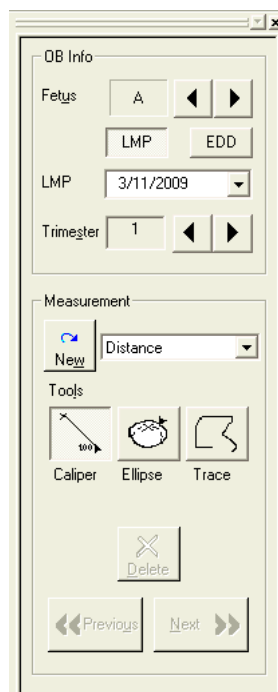
FL Measurement on an Image

In this example, the 6.10 cm FL measurement was made on a prior scan. If both measurements are made on the same scan, you can click the value to highlight the measurement.

The Terason software adds an OB information section to the 2D Measure tab when you freeze an Obstetrical scan. When you make any of the measurements in the following list, the software estimates the average ultrasound age (AUA), and from that, an estimated due date (EDD), and displays them in the OB information section.

The measurements that generate an AUA and an EDD are:

- AC
- BPD
- CRL
- FL
- HC
- A mean gestational sac measurement (See [Calculating Gestational Sac Size and Age](#) on page 163.)



2D Measure Tab for the Obstetrical Exam

The OB Info section lets you select the Fetus (from A to F) and identify the trimester of the fetus. You can directly set the trimester to 1, 2, or 3 using the right and left arrows, or you can click either the LMP (last menstrual period) or EDD (estimated due date) button and enter the date. To choose the date, click the down arrow and use the calendar tool to click the date of the LMP or EDD (depending on which button is selected). When you enter a date, the Terason software updates the Trimester accordingly.

The trimester setting determines which measurements are available. When you select the trimester (using LMP, EDD, or the Trimester arrows), the Terason software updates the list of measurements to show only those measurements applicable to that trimester.

The following table lists the measurements for each trimester. The label shows on the 2D Image Display, and in the menu to select the measurement. When selecting a measurement, if you do not see the needed measurement, check the Trimester value. You may need to set the trimester to access the needed measurement.

OB Measurements

First Trimester Measurement	Label	Second & Third Trimester Measurement	Label
Abdominal Circumference	AC	Abdominal Circumference	AC
Bi-Parietal Diameter	BPD	Amniotic Fluid Index Quadrant 1	AFI Q1
Crown Rump Length	CRL	Amniotic Fluid Index Quadrant 2	AFI Q2
Femur Length	FL	Amniotic Fluid Index Quadrant 3	AFI Q3
Gestational Sac Diameter Width	GSDW	Amniotic Fluid Index Quadrant 4	AFI Q4
Gestational Sac Diameter Height	GSDH	Abdominal Anterior-Posterior Diameter	APD
Gestational Sac Diameter Length	GSDL	Abdominal Transverse Diameter	APTD
Head Circumference	HC	Bi-Parietal Diameter	BPD
Nuchal Translucency	NT	Cerebellum Size	CER
Yolk Sac Size	YS	Cis Magnum Size	CMAG
		Crown Rump Length	CRL
		Fibula Length	FIB
		Femur Length	FL
		Head Circumference	HC
		Humerous Length	HL
		Lateral Ventricular Width	LV
		Nuchal Skin Fold Thickness	NSF
		Nuchal Translucency (second trimester only)	NT
		Occipital Frontal Diameter	OFD
		Outer Orbital Diameter	OOD
		Inner Orbital Diameter	IOD
		Right Foot Length	RFT
		Left Foot Length	LFT
		Radius Length	RAD
		Tibia Length	TIB
		Ulna Length	ULN


If you make all four AFI measurements, the Terason application shows the AFI total.

AFI Q1, AFI Q2, AFI Q3, and AFI Q4 are used to calculate the amniotic fluid index (AFI), and the OFD measurement is used to calculate the cephalic index (CI).

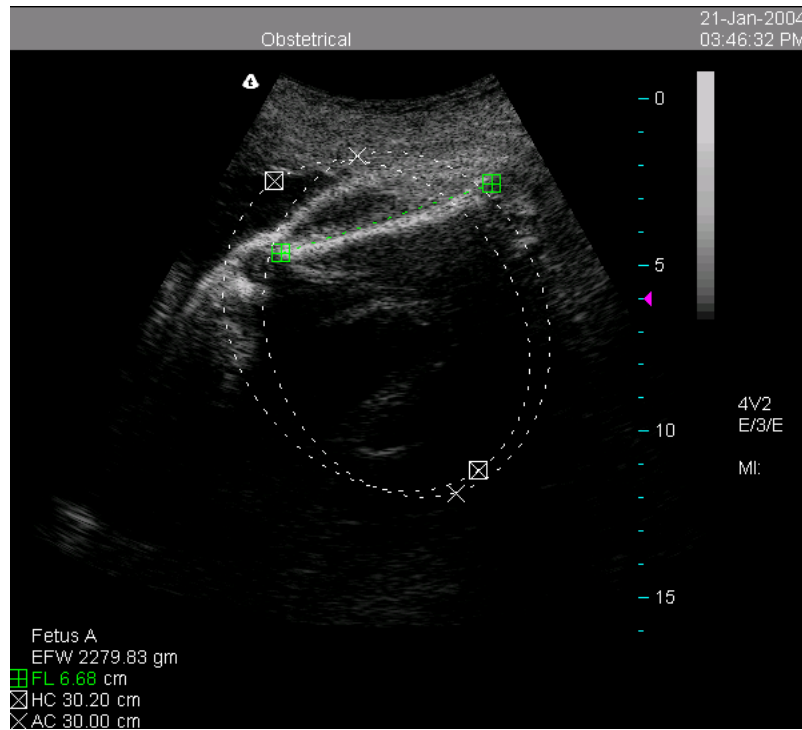
Calculating Estimated Fetal Weight

The Terason software can estimate the weight of a fetus. Terason uses the Hadlock formula (see Appendix D - [Gestational Tables](#)) based on the abdominal circumference, head circumference, and femur length measurements. To use a measurement setup other than Hadlock, see [Setting Measurement Defaults](#) on page 250. If you choose a different setup, the selected setup may not support the EFW calculation.

To calculate the estimated fetal weight, complete the following steps:

1. Perform an obstetrical **exam**.
2. Click  .
3. Select **AC** from the Measurement menu and use the Ellipse tool to measure the abdominal circumference.
4. If necessary, click **Live** and acquire a view for the head circumference measurement, then click **Freeze**.
5. Select **HC** from the Measurement menu and use the **Ellipse** tool to measure the head circumference.
6. If necessary, click **Live** and acquire a view for the femur length measurement, then click **Freeze**.
7. Select **FL** from the Measurement menu and use the Distance tool to measure the femur length.

When the Terason software places AC, HC, and FL on an obstetrical exam, it automatically calculates the estimated fetal weight (EFW).






Estimated Fetal Weight Calculation

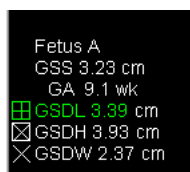
Calculating Gestational Sac Size and Age

For a first trimester obstetrical exam, the Terason software can calculate the mean gestational sac size (GSS), and based on that size, provide the estimated gestational age (GA). Terason uses the Hadlock formula and tables (see Appendix D - [Gestational Tables](#)). To use a measurement setup other than Hadlock, see [Setting Measurement Defaults](#) on page 250. If you choose a different setup, the selected setup may not support the GSS and GA calculation.

To measure the mean gestational sac size, complete the following steps:

1. Perform an obstetrical exam.
2. Click .
3. Select **GSDH** from the Measurement menu and measure the gestational sac diameter height.
4. If necessary, click  and acquire a view for the gestational sac diameter width measurement, then click the Freeze button .
5. Select **GSDW** from the Measurement menu and measure the gestational sac diameter width.
6. If necessary, click **Live** and acquire a view for the gestational sac diameter length measurement, then click **Freeze**.
7. Select **GSDL** from the Measurement menu and measure the gestational sac diameter length.

When all three labels are assigned, the application calculates the gestational sac age.



Gestational Sac Measurements

The GSS value is the mean of the three measurements. The GA value is the age retrieved from lookup tables.

If the GA value does not display, follow the instructions in [Setting Measurement Defaults](#) on page 250 to select the Terason default measurement setup.


Making Gynecological Measurements

All gynecological measurements use the distance tool (see [Measuring Distances](#) on page 151). When you freeze a Gynecological exam, the Terason software lets you choose any of the default 2D measurements, plus the measurements in the following table.

Available Gynecological Measurements

Gynecological Measurement	Label
Uterus Length	UTL
Uterus Width	UTW
Uterus Height	UTH
Endometrial Thickness	ENDO
Right Ovary Length	ROVL
Right Ovary Width	ROVW
Right Ovary Height	ROVH
Left Ovary Length	LOVL
Left Ovary Width	LOVW
Left Ovary Height	LOVH

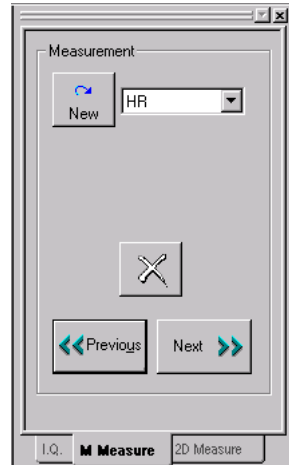
To make a gynecological measurement, complete the following steps:

1. Perform an gynecological **exam**.
2. Click  .
3. Select the needed **measurement** from the Measurement list. The Terason software selects the Caliper tool.
4. Click at the **beginning and end points** of what you want to measure. The Terason software displays the measurement value.

Measuring in the M-Mode Window

When you freeze an M-Mode scan, the Terason software adds the 2D Measure and M Measure tabs to the Image Control bar, with the M Measure tab active.

See [Making M-Mode Measurements](#).



M Measure Tab

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)

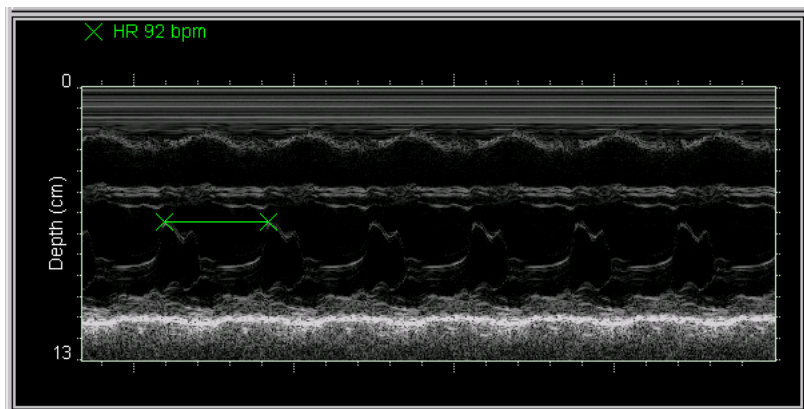


Note: To make more than one measurement of the same type on a scan, click the New button to make the second and any subsequent measurements.

When you save an image to the ULT format, measurements in the M-Mode window are saved. You can edit those measurements when you view the file.

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

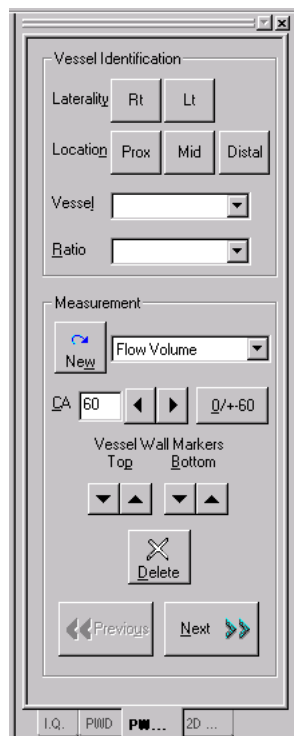
1. Click . If playing a loop, click . The measure tabs for the selected scan mode are added to the Image Control bar.
2. Select a **measurement type** from the drop-down menu on the M Measure tab.
3. Click the target cursor where you want to **start** measuring.
4. Move the target cursor and click at 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 needed.

Measuring in the Spectral Doppler Modes

When you freeze a Pulsed-Wave Doppler, Continuous-Wave Doppler, or Triplex scan, the Terason software adds the 2D Measure and PWD Measure (or CWD Measure) tabs to the Image Control bar. The controls on the CWD Measure tab are identical to those on the PWD Measure tab. The graphics in this section show the PWD Measure tab, and any reference to the PWD Measure tab functions also applies to the CWD Measure tab.

**PWD Measure Tab**

The Measurement section of the panel controls the following operations:

- [Measuring Vessel Blood Velocities](#); see page 171
- [Calculating Arterial Ratios](#); see page 172
- [Measuring Heart Rate and Rise Time](#); see page 173
- [Measuring Flow Volume](#); see page 174



Note: You can only make one measurement of each type on a scan. For example, you cannot have two Flow Volume measurements on the same scan. If you need to edit a measurement, you can move one or both of the endpoints, or you can delete it and start over.

You can use the CA (correction angle) arrows 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 112.

The Vessel Info section lets you label the scanned vessel. When you make a measurement, you can identify what is being measured by selecting:

- Laterality (right or left)
- Location (prox, mid, or distal)
- Vessel

Ratio is used to indicate whether the selected vessel will be used as Artery 1 or Artery 2 in an arterial ratio calculation (see [Calculating Arterial Ratios](#) on page 172).

The vessel wall markers move the top and bottom of the gate along the ultrasound cursor when measuring flow volume as described in [Measuring Flow Volume](#) on page 174.

The available vessels depend on the selected exam. In the following tables, the Menu/Label column lists the abbreviation used to select the vessel from the menu and to label the vessel on the image.

Available Vessels Based on Exam

Exam	Menu/Label	Vessel
Abdominal	Aorta	Aorta
	Celiac	Celiac Trunk
	Hepatic A	Hepatic Artery
	Hepatic V	Hepatic Vein
	Int Mammary A	Internal Mammary Artery
	IVC	Inferior Vena Cava
	Main Portal V	Main Portal Vein
	Portal Vein	Portal Vein
	Renal A	Main Renal Artery
	Renal V	Renal Vein
	SMA	Superior Mesenteric Artery
	SMV	Superior Mesenteric Vein
	Splenic A	Splenic Artery
	Splenic V	Splenic Vein
Arterial	ATA	Anterior Tibial Artery
	Axillary A	Axillary Artery
	Brachial A	Brachial Artery
	CFA	Common Femoral Artery
	CIA	Common Iliac Artery
	DPA	Dorsalis Pedis Artery
	Ext Iliac A	External Iliac Artery
	Innominate A	Innominate Artery
	Peroneal A	Peroneal Artery
	PFA	Profunda Femoral Artery
	Popliteal A	Popliteal Artery
	PTA	Posterior Tibial Artery
	Radial A	Radial Artery
	SFA	Superficial Femoral Artery
	Subclavian A	Subclavian Artery
	Ulnar A	Ulnar Artery
Breast	Axillary A	Axillary Artery
	Int Mammary A	Internal Mammary Artery
	Intercostal A	Intercostal Artery
	Lat. Thoracic A	Lateral Thoracic Artery
	Sup. Epigastric A	Superior Epigastric Artery

Available Vessels Based on Exam (Continued)

Exam	Menu/Label	Vessel
Carotid	Bulb	Bulb
	CCA	Common Carotid Artery
	ECA	External Carotid Artery
	ICA	Internal Carotid Artery
	Innominate A	Innominate Artery
	Subclavian A	Subclavian Artery
	Vertebral A	Vertebral Artery
Dialysis Access	Anastomosis	Anastomosis
	Fistula	Fistula
	Graft	Graft
	Shunt	Shunt
Fetal Cardiac	Ao	Aorta
	AV	Aortic Valve
	LVOT	Left Ventricular Outflow Tract
	MV	Mitral Valve
	PV	Pulmonic Valve
	RVOT	Right Ventricular Outflow Tract
	TV	Tricuspid Valve
Musculoskeletal	Artery	Artery
	Vein	Vein
Obstetrical	Ext Iliac A	External Iliac Artery
	Fetal Ao	Fetal Aorta
	Fetal ICA	Fetal ICA
	Fetal MCA	Fetal MCA
	Fetal RA	Fetal Renal Artery
	Int Iliac A	Internal Iliac Artery
	Ovarian A	Ovarian Artery
	Placental	Placenta
	Radial A	Radial Artery
	Umbilical A	Umbilical Artery
	Umbilical V	Umbilical Vein
	Uterine A	Uterine Artery
Prostate	IPA	Inferior Pudendal Artery
	IVA	Inferior Vesical Artery
	MHA	Middle Hemorrhoidal Artery
	MVA	Middle Vesical Artery
	SRA	Superior Rectal Artery

Available Vessels Based on Exam (Continued)

Exam	Menu/Label	Vessel
Renal	Aorta	Aorta
	Arcuate A	Arcuate Artery
	Interlobar A	Interlobar Artery
	IVC	Inferior Vena Cava
	Renal A	Renal Artery
	Renal V	Renal Vein
	Segmental A	Segmental Artery
Testes	Cremasteric A	Cremasteric Artery
	Spermatic Artery	Spermatic Artery
	Testicular A	Testicular Artery
	Testicular V	Testicular Vein
Thyroid	Inf. Thyroid A	Inferior Thyroid Artery
	Sup. Thyroid A	Superior Thyroid Artery
	Thyroidal A	Thyroidal Artery
Vascular Access	Antecubital V	Antecubital Vein
	Axillary A	Axillary Artery
	Axillary V	Axillary Vein
	Basilic V	Basilic Vein
	Brachial A	Brachial Artery
	Cephalic V	Cephalic Vein
	CFA	Common Femoral Artery
	CFV	Common Femoral Vein
	GSV	Greater Saphenous Vein
	LSV	Lesser Saphenous Vein
	Med. Basilic V	Median Basilic Vein
	PFA	Profunda Femoral Artery
	Popliteal A	Popliteal Artery
	Popliteal V	Popliteal Vein
	SFA	Superficial Femoral Artery
	SFV	Superficial Femoral Vein
	Subclavian V	Subclavian Vein

Available Vessels Based on Exam (Continued)

Exam	Menu/Label	Vessel
Venous	Antecubital V	Antecubital Vein
	ATV	Anterior Tibial Vein
	Axillary V	Axillary Vein
	Basilic V	Basilic Vein
	Brachial V	Brachial Vein
	Cephalic V	Cephalic Vein
	CFV	Common Femoral Vein
	Com Iliac V	Common Iliac Vein
	Ext Iliac V	External Iliac Vein
	GSV	Greater Saphenous Vein
	Innominate V	Innominate Vein
	IJV	Internal Jugular Vein
	LSV	Lesser Saphenous Vein
	Med Antecubital V	Median Antecubital Vein
	Peroneal V	Peroneal Vein
	PFV	Profunda Femoral Vein
	Popliteal V	Popliteal Vein
	PTV	Posterior Tibial Vein
	Radial V	Radial Vein
	SFV	Superficial Femoral Vein
	Subclavian V	Subclavian Vein
	Ulnar V	Ulnar Vein



Measuring Vessel Blood Velocities

When you select PS/ED to measure an arterial velocity, the Terason software calculates the following measurements:

- Peak Systole
- End Diastole
- Peak Systole/End Diastole ratio (S/D)
- Resistance Index (RI)

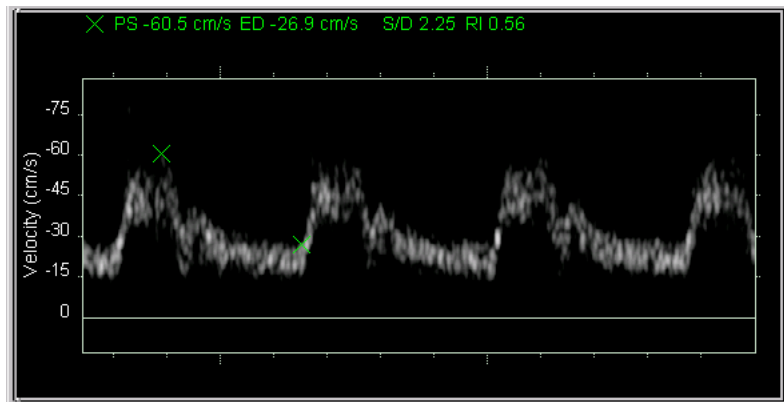
You can measure PS/ED for a scan that uses frequency (kHz) or velocity (cm/s) as the velocity display units (the Y-axis of the Time Series window).

Complete the following steps to measure the PS/ED values for an artery:

1. Click . If playing a loop, click . The 2D and PWD measure tabs are added to the Image Control bar.
2. Click the Rt (right) or Lt (left) button to specify the **Laterality** of the scanned artery.
3. Click the Prox, Mid, or Distal button to specify the **Location** of the scanned artery.

4. Select the scanned **vessel** from the Vessel list.
5. Select **PS/ED** from the Measurement menu.
6. In the Time Series window, click where you want to **start** measuring, move the target cursor to the **end** location and click.

When you click the second time, the Terason software enters the measurements in the Time Series window.





Pulsed-Wave Doppler Measurements

Calculating Arterial Ratios



When scanning in PWD mode and Triplex mode, you can calculate the ratio between two arteries for selected exams. When using the Carotid, Abdominal, or Arterial exams, you can measure two arteries (different scans) and the Terason software calculates the S and D ratios between those arteries. You can use this feature to measure internal carotid artery to common carotid artery (ICA to CCA) ratios, or systolic renal artery to aorta ratio.

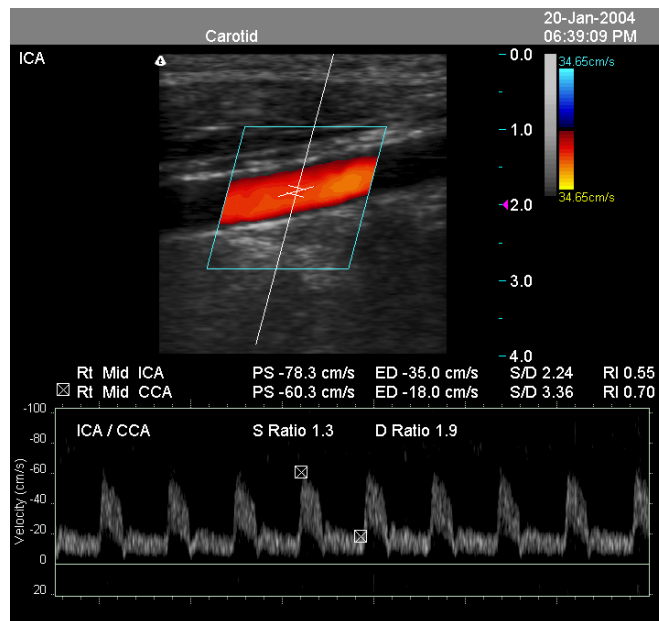
Before you make a PS/ED measurement, select Artery 1 (denominator) or Artery 2 (numerator) from the Ratio menu. This selection determines the order of calculation for the ratio. For example, if you scanned the ICA as Artery 2 and CCA as Artery 1, then the S and D ratios represent the ICA/CCA ratios. You do not need to select Artery 1 or Artery 2 to get an ICA/CCA or Renal Artery/Aorta ratio. The software automatically selects them for you.

To measure velocities for two arteries and calculate ratios, complete the following steps:

1. Click  and select the needed **exam** from the Exam menu of 2D tab (Carotid, Arterial, or Abdominal).
2. Scan an **artery** and click .
3. Complete steps 1-5 in [Measuring Vessel Blood Velocities](#) on page 171.
4. Select the **artery** to use as the denominator (Artery 1) from the Ratio menu.
5. In the Time Series window, click where you want to **start** measuring, move the target cursor to the **end** location, and click to complete the measurement.

The Terason software shows the PS and ED measurements.

- Click  and scan the **second artery**, then click .
- Repeat steps 3 to 5, selecting the other Artery label (Artery 2) from the Ratio menu.





PS/ED Ratio for Two Arteries

If the ratio does not display, check the two PS/ED measurements for the following items:

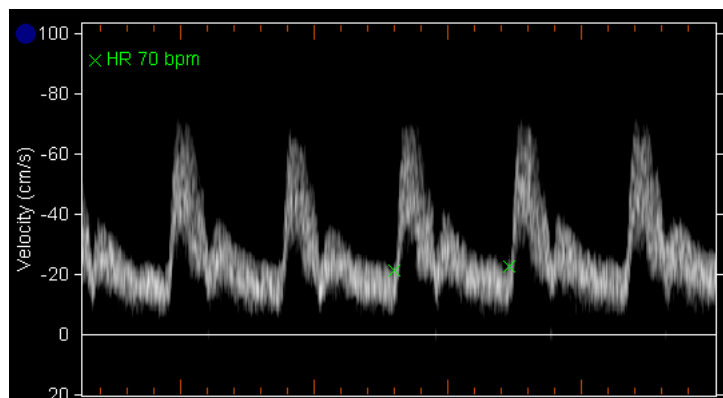
- Both measurements have a vessel name
- You selected opposite sides, but they used different vessels or different locations

Measuring Heart Rate and Rise Time

Complete the following steps to measure the heart rate or rise time values for an artery:

- Click . If playing a loop, click . The 2D and PWD measure tabs are added to the Image Control bar.
- Click the Rt (right) or Lt (left) button to specify the **Laterality** of the scanned artery. This is not required.
- Click the Prox, Mid, or Distal button to specify the **Location** of the scanned artery.
- Select the scanned **vessel** from the Vessel menu.
- Select **HR** (for Heart Rate) or **RT** (for Rise Time) from the Measurement menu.
- In the Time Display window, click where you want to **start** measuring, move the target cursor to the **end** location and click.

When you click the second time, the Terason software enters the measurements in the Time Series window.



Heart Rate Measurement on PWD Scan

Measuring Flow Volume

The Terason software automatically calculates flow when you select the Flow Volume measurement. The following values are included in this calculation:


- FV: flow volume (milliliters/minute)
- TMV: time mean velocity (centimeters/second)
- DIA: diameter (millimeters)

The formula used is:

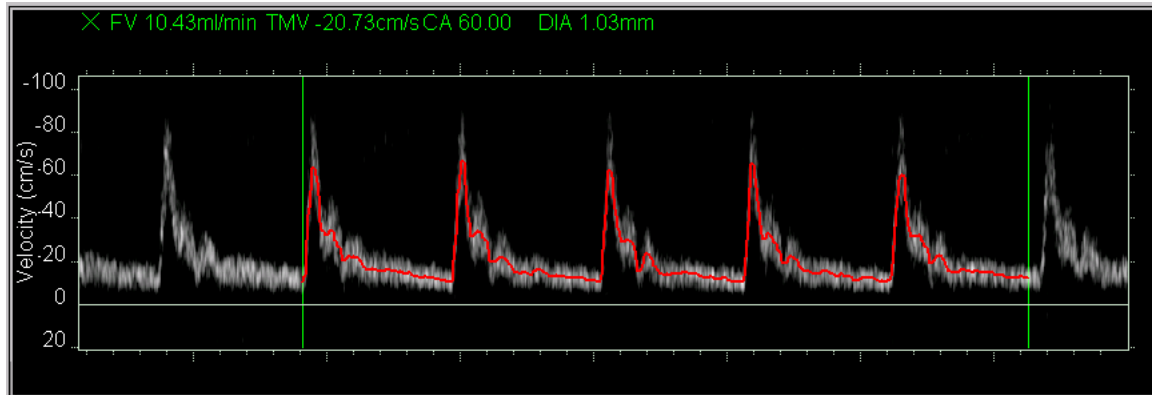
$$FV = TMV \times \pi/4 \times DIA^2$$

To accurately measure flow volume, the range gate must be open from wall-to-wall within a vessel. The following procedure shows you how to adjust the size of the range gate for a frozen scan.

To measure flow volume, complete the following steps:

1. Set the sample volume size (**SV Size**) and location and acquire image data.
2. Click . The 2D Measure and PWD Measure tabs are added to the Image Control bar.
3. On the PWD Measure tab, select **Flow Volume** from the Measurement menu.





The Terason software measures the flow volume.



Flow Measurement on a PWD Scan

The red tracing indicates the waveform used to calculate these values. The measurement is calculated from the diastolic end of one cycle to the diastolic end of another cycle as indicated by the green vertical bars. The blue = on the ultrasound cursor in the 2D window indicates the size and location of the range gate.



4. Use the arrows,    , to adjust the size of the **range gate** to encompass the entire vessel from wall-to-wall. The Terason software updates the DIA and FV calculations for each change of size of the range gate.
5. To adjust the start or end locations of the measurement to include fewer or more cycles on the waveform, click the **green bar**, move to another end diastolic location, and click.

Measuring Vascular Exams

When you make a measurement in the 2D Image Display window, the measurement value displays at the bottom left of the window. If you make a series of measurements that result in the Terason software calculating another value, the calculated values display at the bottom left of the window.

The Terason software provides Vascular measurements for the 2D image display window, the M-Mode Time series window, and the Spectral window. These measurements can then be viewed in a report (see [Working with Vascular Reports](#) on page 181.)

Vascular Measurement Lists

The Terason software includes default lists of commonly-used measurements that are available in the Measurement pull-down menu on the Image Control panel when an image is frozen, and the measurements included in the selected list display in the field below that menu. The lists for each exam include different measurements. You can add or remove measurements from lists.

Vascular Measurement List Options

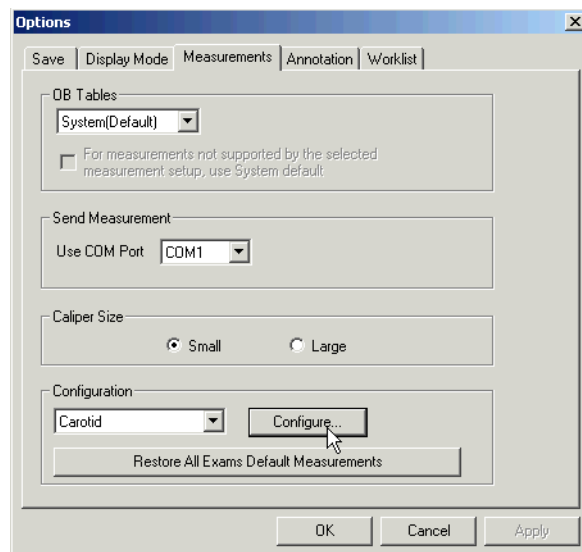
The Configure Vascular Measurements windows include controls for several configuration options:

- The Mode: radio buttons select which measurements display in the Available Measurements and Vessels lists, and the Current Measurement and Vessel lists, based on the selected scan mode.
- The Up and Down arrows move a selected measurement up or down the Current Measurement and Vessel lists.
- You can modify existing lists. See [Modifying Vascular Measurement Lists](#) on page 176.
- You can create custom measurement labels, called *vessels*. See [Creating Vessel Labels](#) on page 177.
- You can restore the system default groups. See [Restoring Vascular Measurement List Defaults](#) on page 179.

Modifying Vascular Measurement Lists

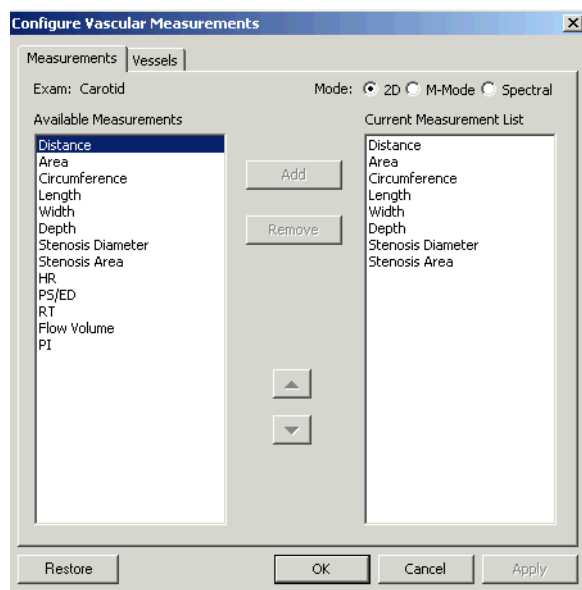
To add or remove measurements in a list:

1. Open the **Options/Measurements** window (Tools > Options > Measurements).
2. In the Configuration pull-down menu, select the **type of exam** you want to modify the measurement list for.
3. Click **Configure...**



Options/Measurements Window

The Configure Vascular Measurements window opens, and the Current Measurement List field displays the measurements currently included in the selected exam's list.



Configure Vascular Measurements Window

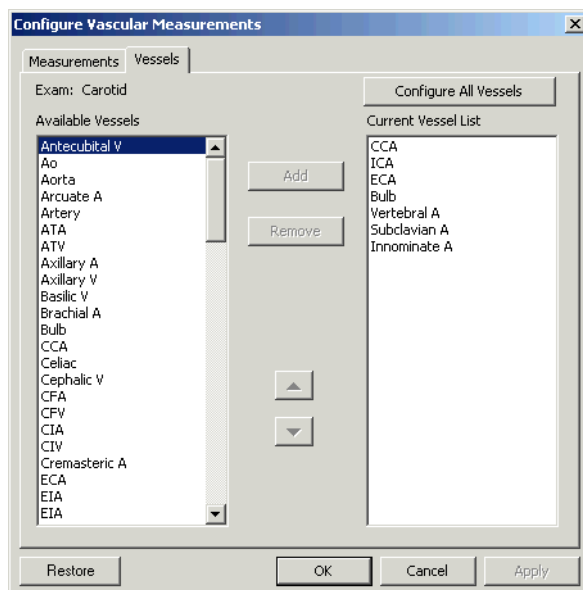
4. Use the radio buttons to select the applicable **scan mode** (2D, M-Mode, or Spectral).
5. To add a measurement to the Current Measurement list, click its name in the list at the left, then click **Add**.
6. To remove a measurement from the group, click its name in the Current Measurement list, then click **Remove**.
7. Click **OK**.

Creating Vessel Labels

To create a vessel label:

1. Open the **Options/Measurements** window (Tools > Options > Measurements).
2. In the Configuration pull-down menu, select the **exam type**.
3. Click **Configure....**
4. On the Configure Vascular Measurements window, click the **Vessels tab**.

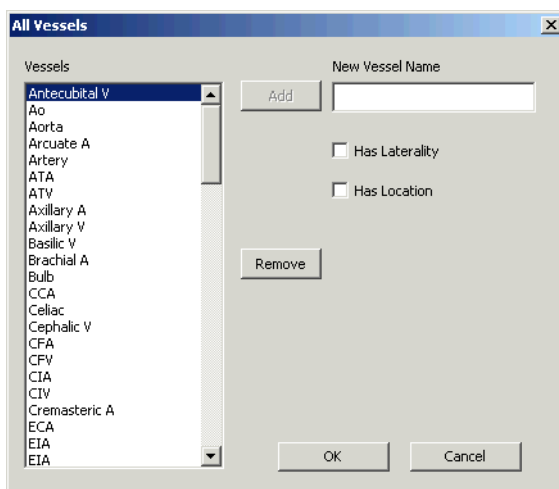
The window changes to allow adding and removing vessels from the Current Vessel List.



Vessels Tab on Vascular Measurements Window

5. Use the radio buttons to select the applicable scan mode (2D, M-Mode, or Spectral).
6. To create a new vessel:
 - a. Click **Configure All Vessels**.

The All Vessels window opens.



All Vessels Window

- b. Enter the **name** in the New Vessel Name field.
Each vessel name must be unique.
- c. If the new vessel has **laterality**, check the Has Laterality checkbox.
- d. If the new vessel has **location**, check the Has Location checkbox.
- e. Click **OK** to create the new vessel.
- f. In the Configure Vascular Measurements window, click the **Measurements** tab.

7. **Add** the new vessel to the selected measurement group.
8. Click **OK**.

Restoring Vascular Measurement List Defaults

You can restore a Current Measurement list or a Current Vessel list to the default settings.

To restore a Current Measurement list to the default set of measurements:

1. Open the **Options window** (click Tools > Options.)
2. Click the **Measurements tab**.
3. In the Configuration drop-down menu, select the **exam type** that you want to restore.
4. Click **Configure**.

The Configure Vascular Measurements window opens.

5. Use the radio buttons to select the applicable scan mode (2D, M-Mode, or Spectral).
6. Click **Restore** to restore the selected group to the default.

To restore a Current Vessel list to the default set of vessels:

1. Open the **Options window** (click Tools > Options.)
2. Click the **Measurements tab**.
3. In the Configuration drop-down menu, select the **exam type** that you want to restore.
4. Click **Configure**.

The Configure Vascular Measurements window opens.

5. Use the radio buttons to select the applicable scan mode (2D, M-Mode, or Spectral).
6. Click the **Vessels tab**.
7. Click **Restore** to restore the Current Vessel list to the default set of vessels.

Available Vascular Measurements

The following table lists the measurements available in each scan mode. Also see [Available Vessels Based on Exam](#) on page 168.

Vascular and Cardiac Measurements by Window

Measurement Group	Measurements	Tool Used
Vascular Measurements in the 2D Image Display Window		
Stenosis Diameter	%Diameter Stenosis	Caliper
Stenosis Area	%Area Stenosis	Trace
Vascular Measurements in the M-Mode Time Series Window		
HR	HR	Time Caliper
Cardiac Measurements for PWD/CD Time Series Window		
PS/ED	PS	Velocity Point
	ED	Velocity Point
RT	RT	Time Caliper
HR	HR	Time Caliper
Flow Volume	FV	Flow Volume
	TAMV	Derived
	DIAM	Derived
PI	TAPV	Pulsatility Index
	PI_Vmax	Derived
	PI_Vmin	Derived

Working with Vascular Reports

After making the appropriate vascular measurements, you can generate a worksheet. The worksheet includes all stenosis measurements with text annotation and all spectral measurements that have an anatomy. Up to three measurements can be stored per vessel or location. If RT or LT are not selected, the measurement is categorized as “Other”. If more than three are saved, the first is deleted and the last is added to the worksheet. The user can edit by checking or unchecking a measurement on the worksheet. Measurements cannot be deleted from the report; the report is not editable.

The highest velocity of each vessel/location is displayed in the report and the highest velocity of each vessel is used for ratios. The only exception would be if Always use mid CCA for ICA/CCA ratio is checked on the worksheet.

You can enter pertinent vascular history to the worksheet in the Blood pressure, Indications and Comments fields.

The following page shows an example of a worksheet.

To produce a report you must:

1. Enter or load **Patient information**
2. Make the needed **measurements**.
3. With stenosis measurements, text annotation must be added to the image for the measurement to appear on the report, see [Working with Annotations](#) on page 81. With all Spectral measurements, anatomy must be applied to the measurement, see [Measuring Vessel Blood Velocities](#) on page 171.
4. Save the image with the measurements to store them to the worksheet.

Institution:
 Select Exam Type:
 Patient:
 Patient Id:
 Date:
 Accession Number:
 Referring Physician:
 Interpreting Physician:
 Blood Pressure: / mm Hg

Indications:

Comments:

Vascular Measurements

☐ Always use Mid CCA for ICA/CCA ratio

Spectral Measurements				
	Units	Value	Inc M1	Inc M2
Rt Prox ICA				
PS	cm/s	-72.4	✓ -72.4 (60°)	
ED	cm/s	-20.7	-20.7 (60°)	
S/D		3.50		
RI		0.71		
Lt Prox ICA				
PS	cm/s	-64.3	✓ -64.3 (60°)	
ED	cm/s	-20.2	-20.2 (60°)	
S/D		3.19		
RI		0.69		
Rt Mid ICA				
PS	cm/s	-72.4	✓ -72.4 (60°)	
ED	cm/s	-27.2	-27.2 (60°)	
S/D		2.66		
RI		0.62		
Lt Mid ICA				
PS	cm/s	-64.8	✓ -64.8 (60°)	
ED	cm/s	-20.2	-20.2 (60°)	
S/D		3.21		
RI		0.69		
Rt Distal ICA				
PS	cm/s	-72.4	✓ -72.4 (60°)	
ED	cm/s	-25.6	-25.6 (60°)	
S/D		2.83		
RI		0.65		
Lt Distal ICA				
PS	cm/s	-66.5	✓ -66.5 (60°)	
ED	cm/s	-20.7	-20.7 (60°)	
S/D		3.21		
RI		0.69		
Rt Mid CCA				
PS	cm/s	-64.8	✓ -64.8 (60°)	
ED	cm/s	-20.7	-20.7 (60°)	
S/D		3.13		
RI		0.68		
Lt Mid CCA				
PS	cm/s	-59.7	✓ -59.7 (60°)	
ED	cm/s	-21.3	-21.3 (60°)	
S/D		2.81		
RI		0.64		
Rt CCA				
PS	cm/s	-60.8	✓ -60.8 (60°)	
ED	cm/s	-24.0	-24.0 (60°)	
S/D		2.54		
RI		0.61		
Lt CCA				
PS	cm/s	-44.3	✓ -44.3 (60°)	
ED	cm/s	-15.3	-15.3 (60°)	
S/D		2.89		
RI		0.65		
Rt ECA				
PS	cm/s	-49.9	✓ -49.9 (60°)	
ED	cm/s	-13.1	-13.1 (60°)	
S/D		3.80		
RI		0.74		
Lt ECA				
PS	cm/s	-43.7	✓ -43.7 (60°)	
ED	cm/s	-18.0	-18.0 (60°)	
S/D		2.43		
RI		0.59		
Rt Vertebral A				
PS	cm/s	-34.0	✓ -34.0 (60°)	
ED	cm/s	-14.2	-14.2 (60°)	
S/D		2.39		
RI		0.58		
Lt Vertebral A				
PS	cm/s	-31.8	✓ -31.8 (60°)	
ED	cm/s	-13.7	-13.7 (60°)	

Film: 0001 Date: Monday, November 21, 2005 Hour: 02:21:26 PM

Vascular Worksheet

On the worksheet, the INC column lets you select which measurements you wish to include on the report. If there is a measurement that you do not wish to include, remove the checkmark for that particular measurement.

When you have examined the information on the worksheet, click the report button at the top of the worksheet to display the report.

Institution: Pasadena Vascular Lab			
Report Date: 2005-11-5			
Patient Information			
Patient:	Carotid Report		
Study Information			
Study Date:	2005-11-05		
Referring Physician:	Dr. Steve Smith		
Interpreting Physician:	Dr. John Jones		
Indications:	High cholesterol Possible TIA - episode of being unable to speak/say the right words		
Vascular Summary			
Vessel	Right	Left	Other
Prox ICA			
PS(cm/s):	-72.4 (60°)	-64.3 (60°)	
ED(cm/s):	-20.7 (60°)	-20.2 (60°)	
S/D:	3.50	3.19	
RI:	0.71	0.69	
Mid ICA			
PS(cm/s):	-72.4 (60°)	-64.8 (60°)	
ED(cm/s):	-27.2 (60°)	-20.2 (60°)	
S/D:	2.66	3.21	
RI:	0.62	0.69	
Distal ICA			
PS(cm/s):	-72.4 (60°)	-66.5 (60°)	
ED(cm/s):	-25.6 (60°)	-20.7 (60°)	
S/D:	2.83	3.21	
RI:	0.65	0.69	
Mid CCA			
PS(cm/s):	-64.8 (60°)	-59.7 (60°)	
ED(cm/s):	-20.7 (60°)	-21.3 (60°)	
S/D:	3.13	2.81	
RI:	0.68	0.64	
CCA			
PS(cm/s):	-60.8 (60°)	-44.3 (60°)	
ED(cm/s):	-24.0 (60°)	-15.3 (60°)	
S/D:	2.54	2.89	
RI:	0.61	0.65	
ECA			
PS(cm/s):	-49.9 (60°)	-43.7 (60°)	
ED(cm/s):	-13.1 (60°)	-18.0 (60°)	
S/D:	3.80	2.43	
RI:	0.74	0.59	
Vertebral A			
PS(cm/s):	-34.0 (60°)	-31.8 (60°)	
ED(cm/s):	-14.2 (60°)	-13.7 (60°)	
S/D:	2.39	2.33	
RI:	0.58	0.57	
Vascular Ratios			
	Right	Left	
Systolic			
Distal ICA / CCA	1.19	1.45	
Diastolic			

Film: 0001 Date: Monday, November 21, 2005 Hour: 02:59:00 PM

Vascular Report

After viewing the report, you can save the report or worksheet to a Bitmap, JPEG or DICOM file. To save a report or worksheet to a file, click the Save button and select the type of file you wish to save.

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 left bottom of the window. If you make a series of measurements that result in the Terason software calculating another value, the calculated values display at the top left of the 2D Image Display window.

-
-

There are two sets of tables in this section:

- [Available Cardiac Measurements](#); see page 188
- [Formulas Used in Echocardiography Measurements](#); see page 191

There is also a sample Echocardiography Report; see [Working With Cardiac Reports](#) on page 196.

Cardiac Measurement Groups

The Terason software includes default groups of commonly-used measurements that are available in the Measurement pull-down menu on the Image Control panel when an image is frozen, and the measurements included in the selected group display in the field below that menu. You can add or remove measurements from groups, and create or delete groups.

Cardiac Measurement Group Options

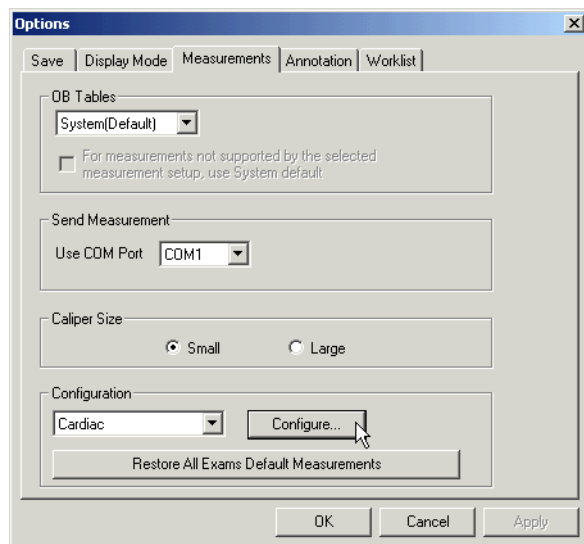
The Configure Cardiac Measurements windows include controls for several configuration options:

- The Mode: radio buttons select which sets of measurements and groups display in the Available Measurements: and Groups: lists, based on the selected scan mode.
- The Up and Down arrows move a selected group in the Groups: list up or down the list.
- You can restore the factory default groups or delete any groups you have created. See [Restoring Cardiac Measurement Group Defaults](#) on page 187.
- You can modify existing groups. See [Modifying Cardiac Measurement Groups](#) on page 185.
- You can create custom measurement groups. See [Creating and Deleting Cardiac Measurement Groups](#) on page 186.

Modifying Cardiac Measurement Groups

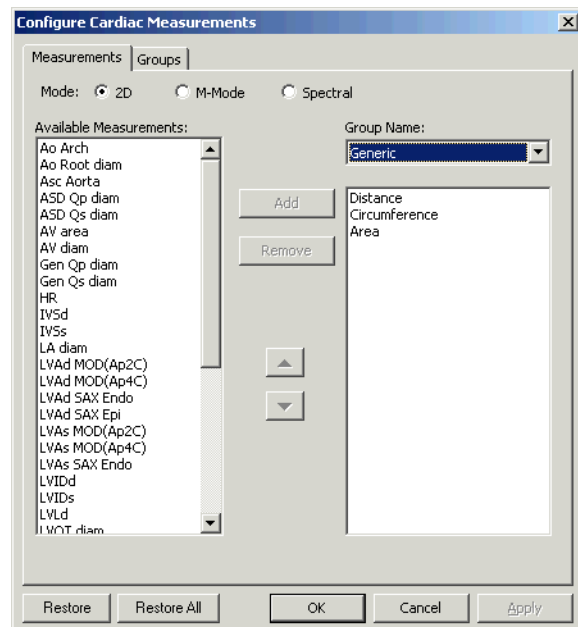
To add or remove measurements in a group:

1. Open the **Options/Measurements** window (Tools > Options > Measurements).
2. In the Configuration pull-down menu, select **Cardiac**.
3. Click **Configure....**



Options/Measurements Window

The Configure Cardiac Measurements window opens.



Configure Cardiac Measurements Window

4. Click the **radio button** (2D, M-Mode, or Spectral) that corresponds to the scan mode you want to modify a group for.
5. To choose a group for modification, select it in the **Group Name:** pull-down menu.

The field below the Group Name: pull-down menu displays the measurements in the selected group.

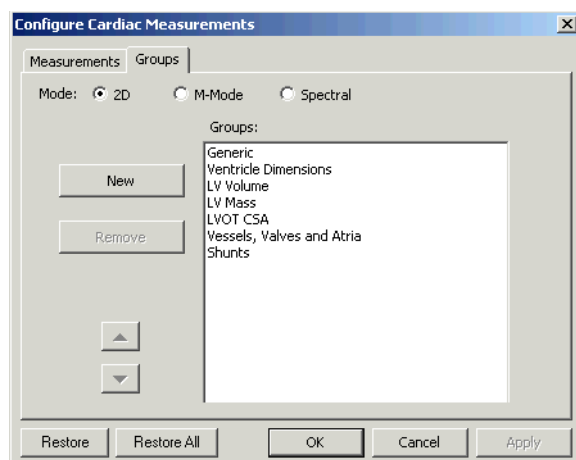
6. To add a measurement to the group, click its name in the list at the left, then click **Add**.
7. To remove a measurement from the group, click its name in the list at the right, then click **Remove**.
8. When all the modifications are made, click **OK**.

Creating and Deleting Cardiac Measurement Groups

To create or delete a measurement group:

1. Open the **Options/Measurements** window (Tools > Options > Measurements).
2. In the Configuration pull-down menu, select **Cardiac**.
3. Click **Configure...**
4. On the Configure Measurements window, click the **Groups** tab.

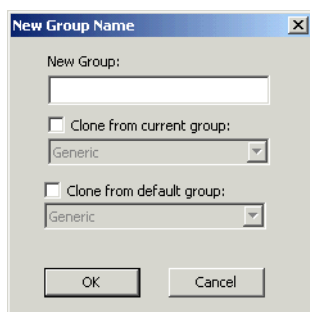
The window changes to allow creation and deletion of groups.



Configure Cardiac Measurements Groups Window

5. To delete a group, select it in the list and click **Remove**.
6. To create a new group:
 - a. Click **New**.

The New Group Name window opens.



New Group Name Window

- b. If there is an existing group that has some of the measurements you want in the new group, click one of the **Clone from...** checkboxes and select that existing group in the associated pull-down menu.

The selected group name displays in the New Group: field.

- c. Enter or edit the **name** in the New Group: field.

Each group name must be unique; if you cloned an existing group, you cannot exit the New Group Name window without changing the name in the New Group: field.

- d. Click **OK** to create the new group.

- e. In the Configure Measurements Groups window, click the **Measurements tab**.

- f. Modify the contents of the **new group**, as described in [Modifying Cardiac Measurement Groups](#) on page 185.

- 7. Click **OK**.

Restoring Cardiac Measurement Group Defaults

You can restore a measurement group or set of measurement groups to the default group.

To restore a measurement group to the default set of measurements:

1. Open the **Options window** (click Tools > Options.)
2. Click the **Measurements tab**.
3. In the Configuration drop-down menu, select **Cardiac**.
4. Click **Configure**.

The Configure Measurements window opens.

5. Use the radio buttons to select the applicable scan mode (2D, M-Mode, or Spectral).
6. In the Group Name: drop-down menu, select the **name of the group** you want to restore.
7. Click **Restore** to restore the selected group to the default, or **Restore All** to restore all of the groups for the selected exam type.

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
	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
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

Formulas Used in Echocardiography Measurements

Formulas Used for Measurements in the 2D Window

2D Formulas

Name	Variables	Formula	Units
LV Volume: Method of Disks, Biplane	a_{di} : i^{th} disk diameter of LV apical 2-chamber (cm) b_{di} : i^{th} disk diameter of LV apical 4-chamber (cm) L: chamber length from the longer of A4c or A2c (cm) 20: number of disk segments in ventricle	$V = \frac{\pi}{4} \sum_{i=1}^{20} a_{di} b_{di} \cdot \frac{L}{20}$	ml
LV Volume: Method of Disks, Single Plane	a_{di} : i^{th} disk diameter of LV apical 2- or 4-chamber (cm) L: chamber length of cavity	$V = \frac{\pi}{4} \sum_{i=1}^{20} a_{di}^2 \cdot \frac{L}{20}$	ml
Ejection Fraction	Vs: LV volume systolic (ml) Vd: LV volume diastolic (ml)	$EF = \left(\frac{Vd - Vs}{Vd} \right) \cdot 100$	%
Stroke Volume	V: LV volume (ml) s: systole d: diastole	$SV = Vd - Vs$	ml
Cardiac Output	SV: stroke volume (ml) HR: heart rate (bpm)	$CO = \frac{SV \cdot HR}{1000}$	l/min
Cardiac Index	CO: Cardiac Output BSA: body surface area (m ²)	$CI = \frac{CO}{BSA}$	l/min/m ²
LV Mass	A_1 : SAX epicardial diastolic area (cm ²) A_2 : SAX endocardial diastolic area (cm ²) L: apical length in diastole (cm) t: mean myocardial thickness	$VMass = 1.05 \left(\frac{5}{6} (A_1(L + t)) - \frac{5}{6} (A_2 \cdot L) \right)$ $t = \left(\left(\sqrt{\frac{A_1}{\pi}} \right) - \left(\sqrt{\frac{A_2}{\pi}} \right) \right)$	g cm
LV Mass Index	LV: (g) BSA: body surface area	$LVMI = \frac{LVMass}{BSA}$	m ²
Body Surface Area	W: weight (range: 0.5–160 kg) H: height (range: 150–204 cm)	$BSA = 0.007184 (W_{kg}^{0.425} H_{cm}^{0.725})$	m ²
Fractional Area Change%	LVd: LV diastolic area (cm ²) LVs: LV systolic area (cm ²)	$\%FAC = \left(\frac{LVd - LVs}{LVd} \right) \cdot 100$	%
Flow Area	d: diameter (cm)	$FlowArea = \pi \cdot \left(\frac{d^2}{4} \right)$	cm ²

2D Formulas (Continued)

Name	Variables	Formula	Units
Fractional Shortening%	LVd: diastolic dimension (cm) LVs: systolic dimension (cm)	$\%FS = \left(\frac{LVd - LVs}{LVd} \right) \bullet 100$	%
Fractional Thickening% - Interventricular Septum	IVSs: interventricular septum in systole IVSd: interventricular septum in diastole	$\%FT = \left(\frac{IVSs - IVSd}{IVSd} \right) \bullet 100$	%
Fractional Thickening% - Left Ventricular Posterior Wall	LVPWs: left ventricular posterior wall in systole LVPWd: left ventricular posterior wall in diastole	$\%FT = \left(\frac{LVPWs - LVPWd}{LVPWd} \right) \bullet 100$	%

Formulas Used for Measurements in the M-Mode Window**M-Mode Formulas**

Name	Variables	Formula	Units
Fractional Shortening%	LVd: diastolic dimension (cm) LVs: systolic dimension (cm)	$\%FS = \left(\frac{LVd - LVs}{LVd} \right) \bullet 100$	%
Fractional Thickening% - Interventricular Septum	IVSs: interventricular septum in systole IVSd: interventricular septum in diastole	$\%FT = \left(\frac{IVSs - IVSd}{IVSd} \right) \bullet 100$	%
Fractional Thickening% - Left Ventricular Posterior Wall	LVPWs: left ventricular posterior wall in systole LVPWd: left ventricular posterior wall in diastole	$\%FT = \left(\frac{LVPWs - LVPWd}{LVPWd} \right) \bullet 100$	%
Volume Cubed	LVID: left ventricle inside diameter	$V = LVID^2$	ml
Volume Teichholz	LVID: left ventricle inside diameter	$V = \left(\frac{7}{2.4 + LVID} (LVID^3) \right)$	ml
Ejection Fraction Cubed	Vs: systolic volume cubed (ml) Vd: diastolic volume cubed (ml)	$EF = \left(\frac{Vd - Vs}{Vd} \right) \bullet 100$	%
Ejection Fraction Teichholz	Vs: systolic volume Teichholz (ml) Vd: diastolic volume Teichholz (ml)	$EF = \left(\frac{Vd - Vs}{Vd} \right) \bullet 100$	%
Stroke Volume Cubed	Vs: systolic volume cubed (ml) Vd: diastolic volume cubed (ml)	$SV = Vd - Vs$	ml

M-Mode Formulas (Continued)

Name	Variables	Formula	Units
Stroke Volume Teichholz	Vs: systolic volume Teichholz (ml) Vd: diastolic volume Teichholz (ml)	$SV = Vd - Vs$	ml
Cardiac Output Cubed	SV: stroke volume cubed (ml) HR: heart rate (bpm)	$CO = \frac{(SV \bullet HR)}{1000}$	l/min
Cardiac Output Teichholz	SV: stroke volume Teichholz (ml) HR: heart rate (bpm)	$CO = \frac{(SV \bullet HR)}{1000}$	l/min
Cardiac Index Cubed	CO: Cardiac Output cubed (l/min) BSA: body surface area (m ²)	$CI = \frac{CO}{BSA}$	l/min/m ²
Cardiac Index Teichholz	CO: Cardiac Output Teichholz (l/min) BSA: body surface area (m ²)	$CI = \frac{CO}{BSA}$	l/min/m ²
LV Mass	IVSd: interventricular septum diastole (cm) LVIDd: left ventricle inside diameter diastole LVPWd: left ventricle posterior wall diastole	$LVMass = 0.8(1.04) \\ ((IVSd + LVIDd + LVPWd)^3 - LVIDd^3) + 0.6$	g
LV Mass Index	LV Mass: (g) BSA: body surface area	$LVMl = \frac{LVMass}{BSA}$	g/m ²
Body Surface Area	W: weight (range: 0.5–160 kg) H: height (range: 150–204 cm)	$BSA = 0.007184(W_{kg}^{0.425} H_{cm}^{0.725})$	m ²

Formulas Used for Measurements in Doppler Windows

Doppler Formulas

Name	Variables	Formula	Units
Pressure Gradient	V: velocity	$PG = 4V^2$	mmHg
Mean Velocity	V: average velocity between two successive velocity trace points (m/s) N: number of velocity trace points Δt_i : time between two successive velocity trace points (sec)	$V_{mean} = \frac{\sum_{i=1}^{N-1} V_i \Delta t_i}{\sum_{i=1}^{N-1} \Delta t_i}$	m/s
Mean Pressure Gradient	V: average velocity between two successive velocity trace points (m/s) N: number of velocity trace points Δt_i : time between two successive velocity trace points (sec)	$P_{mean} = \frac{\sum_{i=1}^{N-1} 4V_i^2 \Delta t_i}{\sum_{i=1}^{N-1} \Delta t_i}$	mmHg
Time Velocity Integral		$TVI = \text{area under curve}$	cm
Stroke Volume	TVI: time velocity integral (cm) Flow Area: derived from the flow diameter (cm ²)	$SV = TVI \cdot \text{Flow Area}$ <div style="display: flex; justify-content: space-between;"> <div> <u>TVI</u> Aortic: AoV TVI Mitral: MV TVI Pulmonic: PV TVI Tricuspid: TV TVI </div> <div> <u>Flow Area</u> LVOT FA Mitral FA Pulmonic FA Tricuspid FA </div> </div>	ml
Cardiac Output	SV: stroke volume (ml) HR: heart rate (bpm)	$CO = \frac{(SV \cdot HR)}{1000}$	l/min
Cardiac Index	CO: Cardiac Output BSA: body surface area (m ²)	$CI = \frac{CO}{BSA}$	l/min/ m ²
Pressure Half Time	Vmax: Maximum velocity (m/s) Deceleration Slope (ms ²)	$PHT = \left(\frac{V_{max} \cdot \left(1 - \frac{1}{\sqrt{2}}\right)}{\text{Deceleration Slope}} \right) \cdot 1000$	ms
Valve Area by PHT	PHT: Pressure half time (msec)	$VA = \frac{220}{PHT}$	cm ²

Doppler Formulas (Continued)

Name	Variables	Formula	Units
Aortic Valve Area by Continuity Equation Using Vmax	AVA: aortic valve area (cm ²) CSA _{LVOT} : cross-section area of LVOT (cm ²) Vmax _{LVOT} : maximum velocity in LVOT (m/s) Vmax _{AoV} : maximum velocity across aortic valve (m/s) LVOT: left ventricular outflow tract	$AVA = CSA_{LVOT} \cdot \frac{Vmax_{LVOT}}{Vmax_{AoV}}$	cm ²
Aortic Valve Area by Continuity Equation Using TVI	AVA: aortic valve area (cm ²) CSA _{LVOT} : cross-section area of LVOT (cm ²) TVI _{LVOT} : time velocity integral in LVOT (m) TVI _{AoV} : time velocity integral across aortic valve (m) LVOT: left ventricular outflow tract	$AVA = CSA_{LVOT} \cdot \frac{TVI_{LVOT}}{TVI_{AoV}}$	cm ²
Flow Area	d: diameter (cm)	$FlowArea = \pi \cdot \left(\frac{d^2}{4}\right)$	cm ²
Mitral Valve Area by Continuity Equation Using Aorta	MVA: mitral valve area (cm ²) CSA _{LVOT} : cross-section area of LVOT (cm ²) TVI _{LVOT} : time velocity integral in LVOT (m) TVI _{MV} : time velocity integral of mitral valve (m) LVOT: left ventricular outflow tract	$MVA = CSA_{LVOT} \cdot \frac{TVI_{LVOT}}{TVI_{MV}}$	cm ²
Mitral Valve Area by Continuity Equation Using Pulmonary Artery	MVA: mitral valve area (cm ²) CSA _{PA} : cross-section area of pulmonary artery (cm ²) TVI _{PA} : time velocity integral of pulmonary artery (m) TVI _{MV} : time velocity integral of mitral valve (m)	$MVA = CSA_{PA} \cdot \frac{TVI_{PA}}{TVI_{MV}}$	cm ²
Right Ventricular Systolic Pressure from Tricuspid Regurgitation	P _{RA} : estimated right arterial pressure (mmHg) V _{max} : regurgitant velocity of tricuspid valve (m/s)	$RVSP = P_{RA} + 4V_{max}^2$	mmHg

Doppler Formulas (Continued)

Name	Variables	Formula	Units
Right Ventricular Systolic Pressure from Ventricular Septal Defect	BP _{sys} : systolic blood pressure (mmHg) V _{max} : maximum velocity of ventricular septal defect (m/s)	$RVSP = BP_{sys} - 4V_{max}^2$	mmHg
Shunt Ratio	CO _{Qp} : pulmonic cardiac output (l/min) CO _{Qs} : systemic cardiac output (l/min)	$\frac{Qp}{Qs} = \frac{CO_{Qp}}{CO_{Qs}}$	—
Shunt Difference	CO _{Qp} : pulmonic cardiac output (l/min) CO _{Qs} : systemic cardiac output (l/min)	$Qp - Qs = CO_{Qp} - CO_{Qs}$	l/min

Working With Cardiac Reports

After making the appropriate measurements, you can generate a report. The report includes several calculations based on the measurements. The following pages show the format for the cardiac report. The x's represent data either measured in the scan, or calculated from those measurements.

Example Echocardiography Report

Exam Type:			
Report Date:			
Patient Information			
Patient:			
Patient Id:			
Sex:		Height:	
Birth Date:		Weight:	
BP:		BSA:	
Study Information			
Study Date:			
Accession Number:			
Referring Physician:			
Interpreting Physician:			
Indications	[Freeform text entered on worksheet]		
Comments	[Freeform text entered on worksheet]		
2D & M-Mode Measurements			
<u>Ventricle Dimensions</u>			
	Diastole	Systole	
RVAW:	x.xx cm	x.xx cm	
RVID:	x.xx cm	x.xx cm	
IVS:	x.xx cm	x.xx cm	
LVID:	x.xx cm	x.xx cm	xx % FT
LVPW:	x.xx cm	x.xx cm	xx % FS
RVAW:	x.xx cm	x.xx cm	xx % FT

Example Echocardiography Report (Continued)

	Cubed	Teichholz	
EDV	x.x ml	x.x ml	
ESV	x.x ml	x.x ml	
EF:	xx %	xx %	
SV:	x.x ml	x.x ml	
CO:	x.xx l/min	x.xx l/min	
CI:	x.xx l/min/m ²	x.xx l/min/m ²	
HR:	xx bpm		
LV Mass:	x.x g	LVMI: x.x	g/m ²
<u>Left Ventricle Volume</u>			
	Area	Length	Volume
Ap4c (Dias):	x.xx cm ²	x.xx cm	x.x ml
Ap4c(Sys):	x.xx cm ²	x.xx cm	x.x ml
Ap2c (Dias):	x.xx cm ²	x.xx cm	x.x ml
Ap2c (Sys):	x.xx cm ²	x.xx cm	x.x ml
Biplane (Dias):			x.x ml
Biplane (Sys):			x.x ml
Ap4c FAC:	xx %	Ap2c FAC:	xx %
HR:	xx bpm		
EF:	xx %	SV: x.x	ml
CO:	x.xx l/min	CI: x.xx	l/min/m ²
<u>Left Ventricle Mass</u>			
SAX Epi (Dias):	x.xx cm ²		
SAX Endo (Dias):	x.xx cm ²		
SAX Endo (Sys):	x.xx cm ²		
FAC:	xx%		
Apical Length:	x.xx cm		
LV Mass:	x.x g	LVMI	x.x g/m ²
<u>Valves and Atria</u>			
2D			
	Diameter	Area	
LVOT:	x.xx cm		
Ao Root:	x.xx cm		
RVOT:	x.xx cm		
PA:	x.xx cm		
AV:	x.xx cm	x.xx cm ²	
MV:	x.xx cm	x.xx cm ²	
PV:	x.xx cm		
TV:	x.xx cm		
LA:	x.xx cm		
RA:	x.xx cm		
M-Mode			

Example Echocardiography Report (Continued)

MM R-R interval	xxx ms			
Aortic Root Diameter:	x.xx cm			
Left Atrium Diameter:	x.xx cm			
Ao / LA:	x.xx			
AV R-R interval	xxx ms			
AV Cusp Sep:	x.xx cm			
Mitral Valve D-E:	xxx mm			
Tricuspid Valve D-E:	xxx mm			
Mitral Valve EPSS	xxx mm			
Mitral Valve E-F slope:	x.xx cm/s			
Mitral Valve E-F excursion:	x.xx cm			
Spectral Measurements				
<u>Aortic Valve</u>				
	Velocity	Gradient	TVI	Time
AV Mean:	x.xx m/s	x.x mmHg	x.xx m	xxx ms
AV Peak:	x.xx m/s	x.x mmHg		
AI Peak:	x.xx m/s	x.x mmHg		
PHT:	xxx ms			
LVOT Diameter:	x.xx cm	LVOT CSA:	x.xx cm ²	
Mitral SV:	x.x ml			
Stroke Volume:	x.x ml			
Regurg Fraction:	xx %			
HR:	xx bpm			
Cardiac Output:	x.xx l/min	Cardiac Index:	x.xx l/min/m ²	
	Velocity	Gradient	TVI	Time
LVOT Mean:	x.xx m/s	x.x mmHg	x.xx m	xxx ms
LVOT Peak:	x.xx m/s	x.x mmHg		
AV Area (TVI):	x.xx cm ²	AV Area (Peak):	x.xx cm ²	
<u>Mitral Valve</u>				
	Velocity	Gradient	TVI	Time
MV Mean:	x.xx m/s	x.x mmHg	x.xx m	xxx ms
MV Peak E:	x.xx m/s	x.x mmHg		
MV Peak A:	x.xx m/s	x.x mmHg		
MR Peak:	x.xx m/s	x.x mmHg		
E/A Ratio:	x.xx			
Decel. Time:	xxx ms	IVRT:	xxx ms	
PHT:	xxx ms	PHT Area:	x.xx cm ²	
MV Diameter:	x.xx cm	MV CSA:	x.xx cm ²	
Stroke Volume:	x.x ml			
HR:	xx bpm			

Example Echocardiography Report (Continued)

Cardiac Output:	x.xx l/min	Cardiac Index: x.xx l/min/m ²			
	Velocity	Gradient	TVI	Time	
LVOT Mean:	x.xx m/s	x.x mmHg	x.xx m	xxx ms	
PA Mean:	x.xx m/s	x.x mmHg	x.xx m	xxx ms	
MV Mean:	x.xx m/s	x.x mmHg	x.xx m	xxx ms	
LVOT Diameter:	x.xx cm	LVOT CSA:	x.xx cm ²		
PA Diameter:	x.xx cm	PA CSA:	x.xx cm ²		
MV Area (LVOT):	x.xx cm ²	MV Area (PA): x.xx cm ²			
<u>Pulmonic Valve</u>					
	Velocity	Gradient	TVI	Time	
PV Mean:	x.xx m/s	x.x mmHg	x.xx m	xxx ms	
PV Peak:	x.xx m/s	x.x mmHg			
PI Peak:	x.xx m/s	x.x mmHg			
PV Diameter:	x.xx cm	PV CSA:	x.xx cm ²		
Stroke Volume:	x.x ml				
HR:	xx bpm				
Cardiac Output:	x.xx l/min	Cardiac Index: x.xx l/min/m ²			
<u>Tricuspid Valve</u>					
	Velocity	Gradient	TVI	Time	
TV Mean:	x.xx m/s	x.x mmHg	x.xx m	xxx ms	
TV Peak E:	x.xx m/s	x.x mmHg			
TV Peak A:	x.xx m/s	x.x mmHg			
E/A Ratio:					
TR Peak:	x.xx m/s	x.x mmHg			
PHT:	xxx ms				
TV Diameter:	x.xx cm	TV CSA:	x.xx cm ²		
Stroke Volume:	x.x ml				
HR:	xx bpm				
Cardiac Output:	x.xx l/min	Cardiac Index: x.xx l/min/m ²			
<u>RVSP</u>					
TR Peak:	x.xx m/s	x.x mmHg			
RA Pressure:	xx.x mmHg				
RVSP (TR):	xx.x mmHg				
VSD Peak:	x.xx m/s	x.x mmHg			
Sys BP:	xx.x mmHg				
RVSP (VSD):	xx.x mmHg				
<u>Shunts</u>					
	ASD Qp	ASD Qs			
TVI:	x.xx m	x.xx m			

Example Echocardiography Report (Continued)



HR:	xx bpm	xx bpm
Diameter:	x.xx cm	x.xx cm
CSA:	x.xx cm ²	x.xx cm ²
Stroke Volume:	x.x ml	x.x ml
Cardiac Output:	x.xx l/min	x.xx l/min
Cardiac Index:	x.xx l/min/m ²	x.xx l/min/m ²
Qp / Qs:	x.xx	
Qp - Qs:	x.xx l/min	
	VSD Qp	VSD Qs
TVI:	x.xx m	x.xx m
HR:	xx bpm	xx bpm
Diameter:	x.xx cm	x.xx cm
CSA:	x.xx cm ²	x.xx cm ²
Stroke Volume:	x.x ml	x.x ml
Cardiac Output:	x.xx l/min	x.xx l/min
Cardiac Index:	x.xx l/min/m ²	x.xx l/min/m ²
Qp / Qs:	x.xx	
Qp - Qs:	x.xx l/min	
	Gen Qp	Gen Qs
TVI:	x.xx m	x.xx m
HR:	xx bpm	xx bpm
Diameter:	x.xx cm	x.xx cm
CSA:	x.xx cm ²	x.xx cm ²
Stroke Volume:	x.x ml	x.x ml
Cardiac Output:	x.xx l/min	x.xx l/min
Cardiac Index:	x.xx l/min/m ²	x.xx l/min/m ²
Qp / Qs:	x.xx	
Qp - Qs:	x.xx l/min	
Qp / Qs:	x.xx	

If you want to review the formulas used to make the calculations for this report, refer to Appendix G - [Formulas used to Calculate Values for the Cardiac Report](#).

Selecting Measurements


If you have multiple measurements in the 2D or Time Series window, the Terason software provides tools to help you select a specific measurement. Selecting a measurement highlights both the measurement and the value.



To select a measurement, you can:

- Click  or  until the desired measurement is highlighted
- Click the measurement
- Click the value

Deleting Measurements

You can use any of the following methods to delete a highlighted measurement:

- Click  on a Measure tab
- Press the Del key on the keyboard
- Right-click a 2D measurement and click **Delete Measurement**

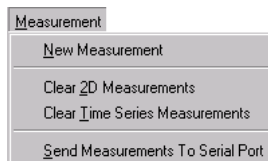
To delete a measurement other than the highlighted one, click  or  until the measurement is highlighted. These buttons cycle through the measurements in the same sequence that they were created in the active window.

You can also right-click and select:

- **Clear Time Series Measurements** to delete all measurements in the Time Series window
- **Clear 2D Measurements** to delete all measurements in the 2D window
- **Clear All** to delete all measurements in the 2D and Time Series windows

Clear All on the Edit menu deletes all text and measurements in both Image Display windows.

The **Measurement** menu lets you clear all measurements made in the specified window (2D or Time Series):



Measurements Menu

Send Measurements To Serial Port on the Measurement menu works with Obstetrical and Gynecological exams as described in [Working with Measurements on an Obstetrical Exam](#) on page 158.

Restoring All Measurement Groups to Defaults

To restore all measurement groups to the defaults, open the Tools menu, select Options, select the Measurements tab, and click **Restore All Exams Default Measurements**.

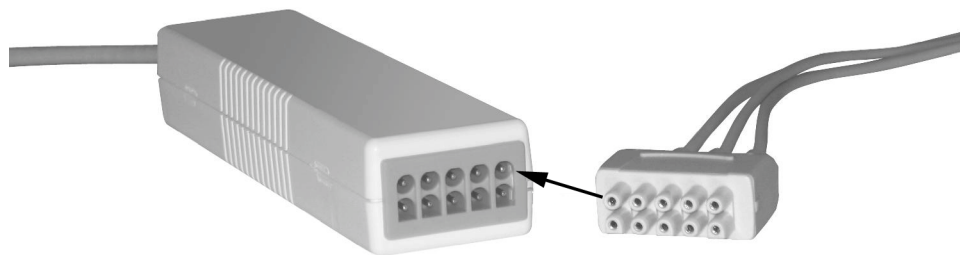
Stress Echo

The Terason Echo system license level 7 includes tools for performing cardiac stress studies. These features are not available on t3000 systems.

Performing a Stress Echo Study

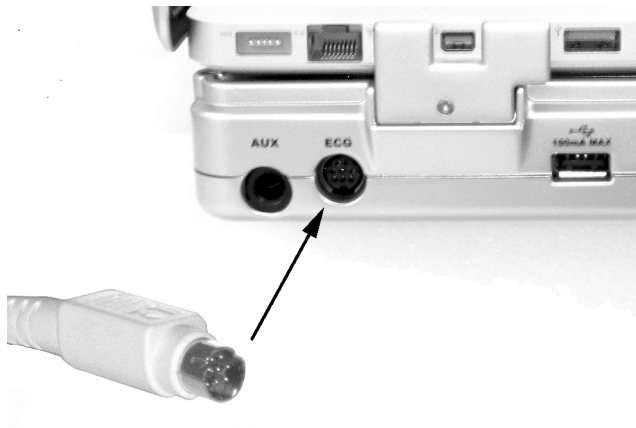
To perform a stress echo study:

1. **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 dock.

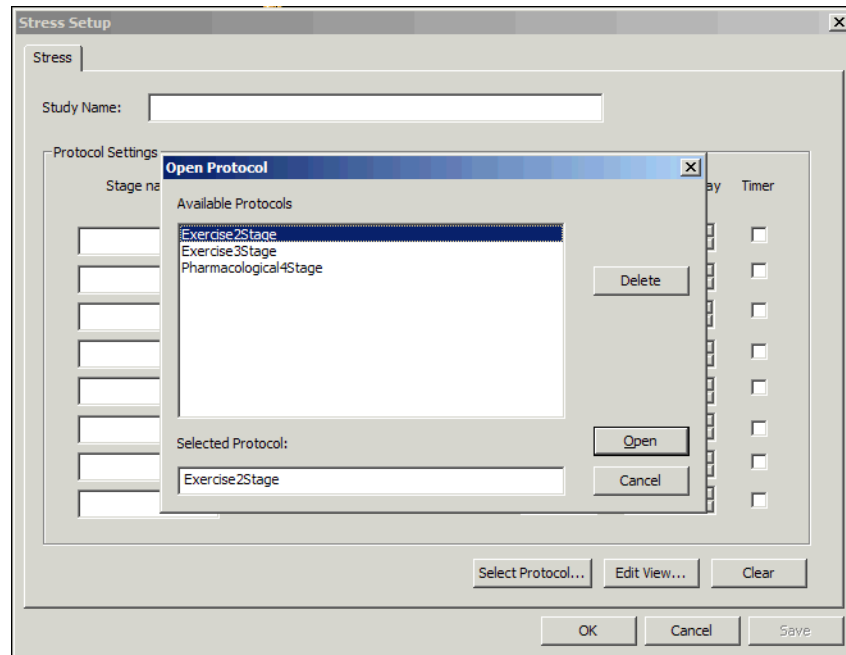


Connecting ECG

4. Choose a **Cardiac exam**.
5. In the Terason Explorer, double-click the **Patient Info** file for the patient.
This enables the Stress button on the scanning window toolbar.

6. Click the **Stress button** .

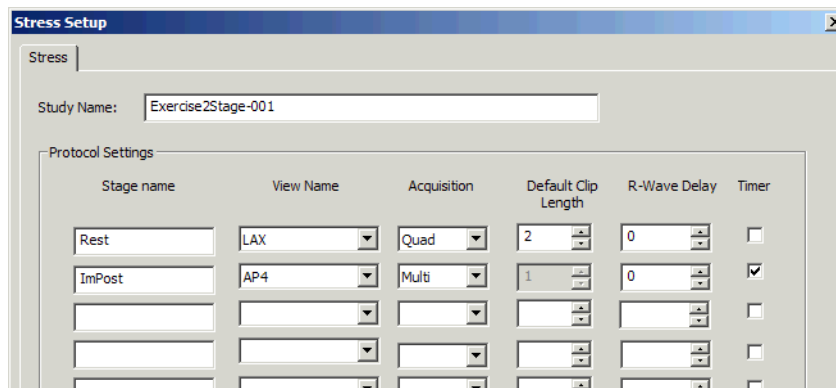
The Open Protocol window opens in front of the Stress Setup window.



Open Protocol Window and Stress Setup Window

7. Click one of the protocols in the list to select it, then click **Open**.

The Open Protocol window closes, and the Stress Setup window displays the default settings for the selected protocol.



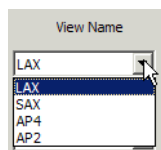
Stress Setup Window With Settings Loaded

The default acquisition type is Quad. This records four complete heart-cycle loops.

8. Select **Multi** to record more than four heart cycle loops.

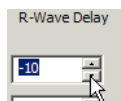
When Multi is selected, the software continues to record heart cycles until it reaches 200, or until you stop the acquisition.

9. Open the View Name menu to select a different view name.

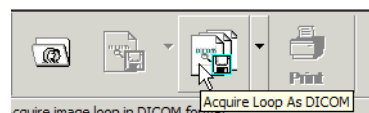
**View Name Menu**

Note: You can rename the views. See [Editing Stress View Labels](#) on page 208.

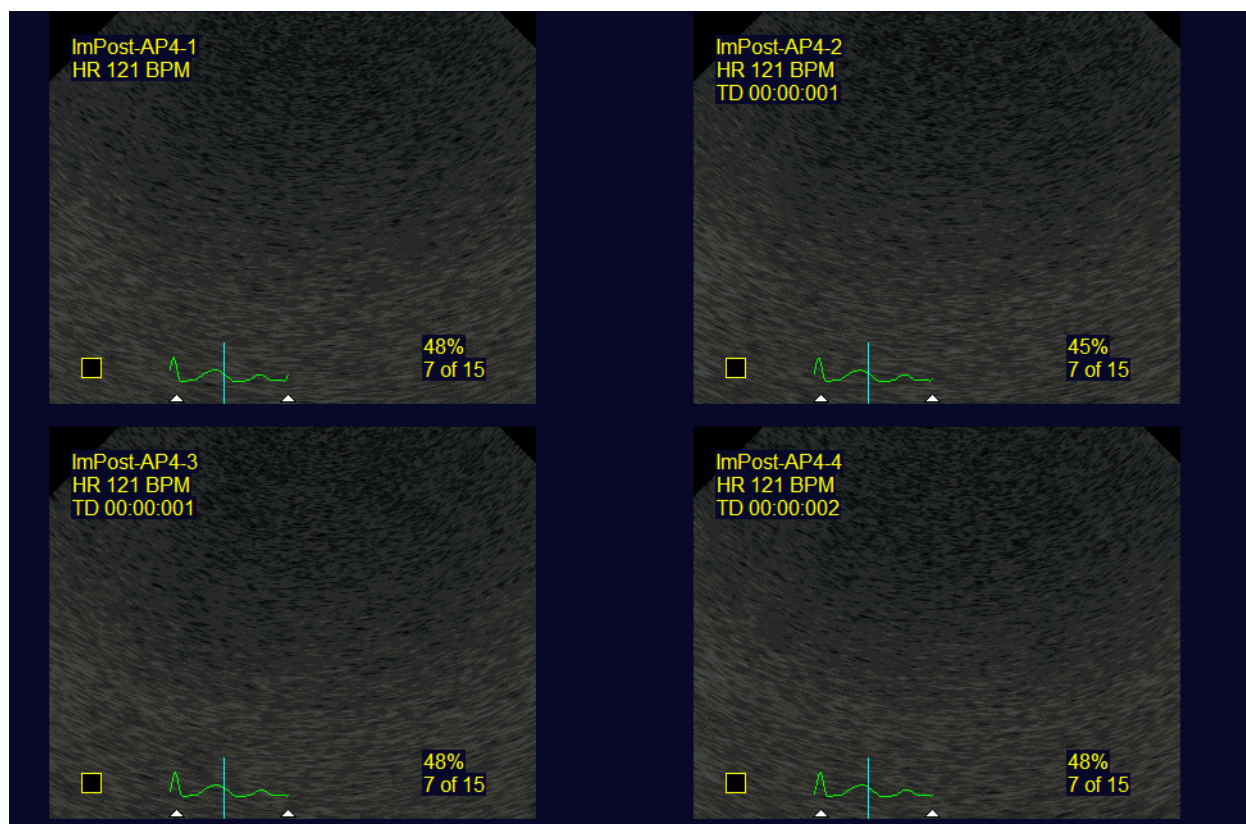
10. To advance or delay the **loop start** relative to the R-wave peak, click the R-Wave Delay up or down arrow.

**R-Wave Delay Adjustment**

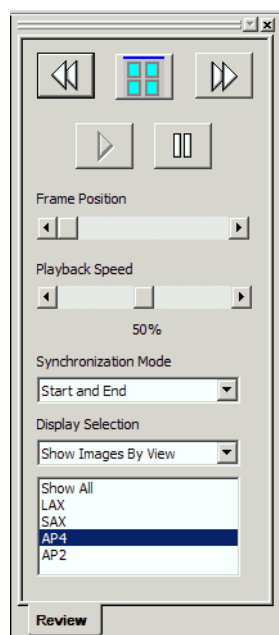
- 0 (zero) starts the loops at the R-wave peak.
 - Entering a positive number delays the loop start by the entered number of milliseconds.
 - Entering a negative number advances the loop start by the entered number of milliseconds.
11. When the study settings are correct, click **OK**.
The Stress Setup window closes.
 12. Click inside the ROI rectangle (or select it with the console), drag it to the left ventricle, and click again.
 13. Acquire the **Rest loops**.
 - a. Click the **Acquire button**.

**Acquire Button**

The software captures loops of the heart cycle and displays them in the Review screen. If Multi is selected in the Stress Setup window, the software captures consecutive heart cycle loops until the acquisition is stopped. If Multi is not selected, the software captures four loops.

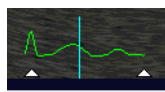
**Heart Cycle Loops on Review Screen**

- b. Use the Review **control panel** to control the loop playback. (See [Features of the Stress Echo Review Window](#) on page 210.)

**Review Controls**



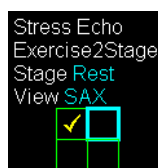
Note: You can change the recorded portion of the heart cycle by dragging the white triangles in the loop image. Only the portion of the cycle that is between the triangles is recorded.



Loop Image

- c. Select the loop for a particular view by clicking the **checkbox** ☐ in that loop's pane of the Review window (see [Heart Cycle Loops on Review Screen](#) on page 205).
- d. Click **2D** to return to the scanning window.

The software advances the Acquire view indicator to the next view, and places a checkmark in the completed view's square in the indicator. Live thumbnail images of selected loops display in the column at the left of the scanning window.



Acquire View Indicator

- e. Reposition the **transducer** to scan another view.
- f. Repeat **steps a through e** until all the Rest loops are selected.
- g. Click **2D** to return to the scanning window.

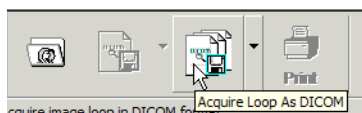
The software advances to the Impost loop acquisition phase, and the Acquire view indicator displays empty squares.

14. Acquire the **Impost loops** (immediate post-exercise loops).




Note: The imaging settings chosen during the Rest portion of the study are automatically loaded during the Impost portion.

- a. Click the **Acquire button**.



Acquire Button

The software captures loops of the heart cycle and displays them in the Review screen.

- b. Select the loop for a particular view by clicking the **checkbox**  in that loop's pane of the Review window.
- c. Click **2D** to return to the scanning window.

The software advances the Acquire view indicator to the next view, and places a checkmark in the completed view's square in the indicator. Live thumbnail images of selected loops display in the column at the left of the scanning window.


- d. Reposition the **transducer** to scan another view.
- e. Repeat **steps aa through d** until all the Impost loops are selected.

15. To change the selected loops:

- a. Use the Stage Selector and View Selector buttons on the Stress Echo Scanning window (see [Stress Echo Scanning Window](#) on page 209) to **select the view** you want to choose a different loop for.
- b. Click **Acquire**.
- c. Click the **checkbox** in the pane of the Review window that includes the desired loop.

Selected images display in the Review window.

Closing a Stress Echo Study

To close a stress echo study, open the Review window and click the Close Study button  on the toolbar. (See [Stress Echo Review Window](#) on page 210.)

Saving and Sending Studies

You can save the study with only the selected loops, or with all the acquired loops.

To save a study:

1. Open the **Review window**.
2. To save a study or selected loops from a study, use the **Save** or **Save Sel.** buttons on the toolbar. (See [Stress Echo Review Window](#) on page 210.)
3. To send all saved DICOM files or selected saved DICOM files to a DICOM storage server, use the **Send** or **Send Sel.** buttons on the toolbar. (See [Stress Echo Review Window](#) on page 210.)

Pausing and Resuming a Stress Study

You can pause a stress study by clicking the Pause/Resume Study button on the scanning window toolbar. When the study is paused, you can make other examinations and save them. Clicking the Pause/Resume Study button again resumes the stress study.

Editing Stress View Labels

You can edit the names of the stress views.

To edit the stress view labels:

1. In the Stress Setup window, click **Edit View...**

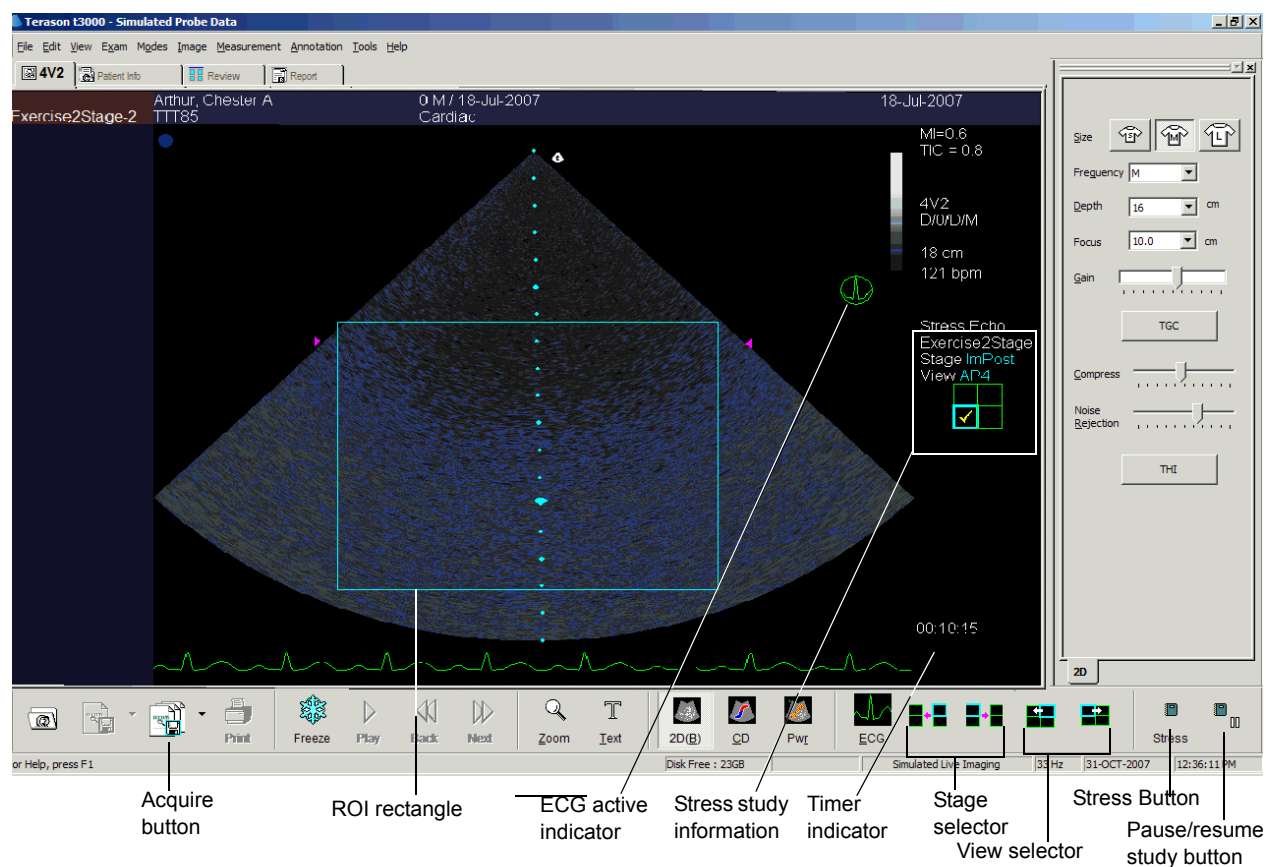
The Edit Stress View Labels window opens.



Edit Stress View Labels Window

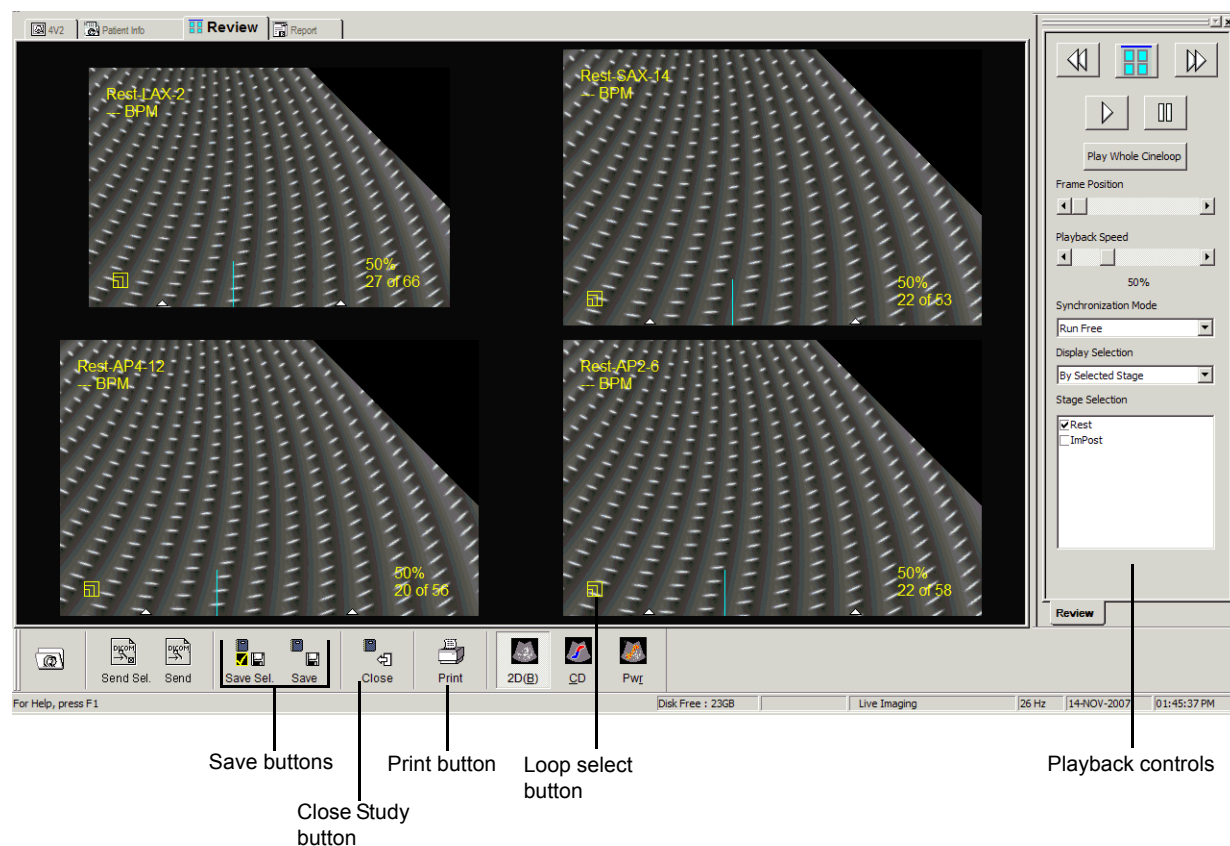
2. Select the label you want to rename, then enter a **new label**.
3. Click **OK**.

Features of the Stress Echo Scanning Window



Stress Echo Scanning Window

Features of the Stress Echo Review Window



Stress Echo Review Window

Play and Pause Buttons



Play and Pause Buttons

When playback is paused, you can use the Frame Position slider to show specific frames of a loop.

Playback Navigation Controls

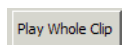


Playback Navigation Controls

When more than four loops are displayed (so that a scroll bar appears), the double-arrow buttons move back and forth between groups of loops.

The windowpane button toggles between thumbnail view of all the loops in the study and selected loops, or when selecting, between the selection and the set of loops already selected.

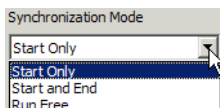
Play Whole Clip Button



Play Whole Clip Button

Clicking this button makes the playback ignore the playback-limit triangles in the loop windows. To show only a portion of a loop, set the playback-limit triangles, and make sure the Play Whole Cineloop button is not enabled.

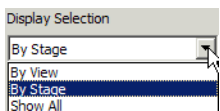
Synchronization Mode



Synchronization Mode Menu

This drop-down menu selects whether to synchronize the displayed loops as they play, and whether they all start together or end together. When they are synchronized, loops of different lengths will either start at the same time (and shorter loops will pause at their ends until longer loops finish), or end at the same time (and longer loops will start before shorter ones).

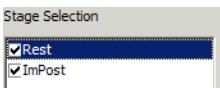
Display Selection



Display Selection Menu

This drop-down menu lets you view either individually selected loops, all the loops in a stage of the study, or all the loops in the study. Use this menu in conjunction with the playback navigation controls. The selection you make here determines what appears in the Stage Selection menu.

Stage Selection



Stage Selection Menu

Use this menu to choose which selected loops or stage of the study to display.

8 Working With Exams

Exams contain optimized preset values for many image control settings based on the anatomy to be scanned, the transducer used, the patient size, and the scanning mode. The exam presets also specify the measurements appropriate for the exam. You can use these optimized preset exams 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 exams to store sets of image control settings for specific kinds of exams. Customized exams let you 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](#); see page 212
- [Opening an Exam](#); see page 215
- [Creating Custom Exams](#); see page 215
- [Deleting Custom Exams](#); see page 216

About Exams

The Terason Ultrasound System provides pre-defined exams for all supported transducers. Although several transducer models may support the same exam, the preset image control parameters are unique to each transducer model.

An exam includes predefined image control settings used for small, medium, and large patients, or for superficial, moderately deep, and deep areas of interest. When you select a size on the 2D image control tab, the Terason software loads presets of other exam parameters for that size. When you select a different size, you need not reload the exam or load a different exam; the Terason software automatically updates the preset values for the selected size.

The following table lists the preset exams available for each transducer.

Terason Transducers and Preset Exams

Transducer	Exams		
4V2S	Abdominal Cardiac Gynecological	Obstetrical Obstetrical 3D Pelvic	Prostate Renal
4V2A	Abdominal Cardiac Gynecological	Obstetrical Pelvic	Prostate Renal
5C2A	Abdominal Fetal Cardiac Gynecological	Nerve Block Obstetrical Obstetrical 3D	Prostate Renal
7L3V	Arterial Breast Carotid	Dialysis Access Musculoskeletal Nerve Block Testes	Thyroid Vascular Access Venous
8BP4 (t3000 only)		Prostate	
8EC4A	Gynecological	Obstetrical Obstetrical 3D	Prostate
8MC3 (t3000 only)	Arterial Carotid	Nerve Block Pelvic	Renal Venous
10V5S (t3000 only)	Vascular access		
12HL7	Intraoperative	Musculoskeletal Nerve Block	Vascular Access
12L5V	Arterial Breast Carotid	Dialysis Access Musculoskeletal Neonatal Hip Nerve Block	Testes Thyroid Vascular Access Venous
PDOF (Echo only)	Cardiac		

The following table lists the image control settings that are preset in an exam.

Exam Presets Provided with Scan Modes

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

When you use the Save or Save Loop buttons (see [Saving Images and Loops](#) on page 133), the Terason software uses a default file name based on the selected exam. The following table shows the abbreviation used for each exam.

Exam Abbreviations Used in File Names

Exam Name	Abbreviation	Exam Name	Abbreviation
Abdominal	ABD	Musculoskeletal	MUS
Arterial	ART	Obstetrical	OB
Breast	BRT	Prostate	PRO
Cardiac	CAR	Renal	REN
Carotid	CRD	Testes	TES
Dialysis Access	DIA	Thyroid	THY
Fetal Cardiac	FET	Vascular Access	VAS
Gynecological	GYN	Venous	VEN
Laparoscopic	LAP		

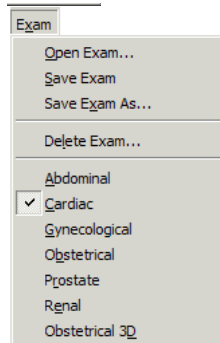
Opening an Exam

When you select an exam, the Terason software loads the preset values for that exam, determined by the transducer, the patient size, and the selected scan mode. If you select a different patient size or scan mode, the Terason software updates the preset values.

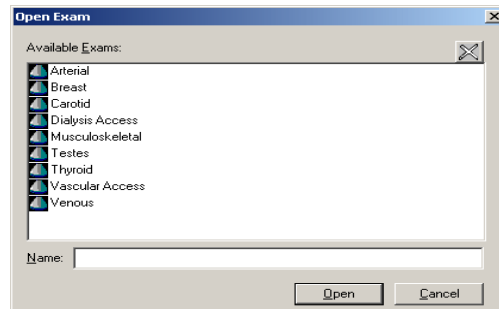
You cannot open an exam when viewing a frozen or saved image. If the Image Display window is frozen, you must click Live before you can change the exam.

You can open an exam using any of these methods:

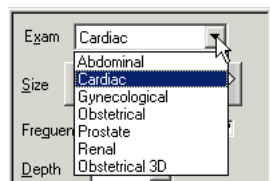
- Select the exam from the Exam menu (the checked exam indicates the open exam).



- Select **Exam > Open Exam**, click an exam, and click **Open**.



- Select an exam type from the pull-down menu on the 2D Image Control tab.



Creating Custom Exams

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

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

Creating a New Exam

Before you start, make sure that the transducer you want to use for the new exam is connected. (If a different transducer is connected, see [Switching Transducers](#) on page 65 for instructions.)

To create an exam, complete these steps:

1. Select the **system exam** or custom exam that has settings close to the one you want to create. See [Opening an Exam](#) on page 215.
2. Modify the Image Control **settings** as needed. See [Working With Scan Modes](#) on page 89 for instructions.
3. To overwrite the settings for a *custom* exam, select **Exam > Save Exam**. The Terason software saves the image control settings, and you can skip the rest of this procedure.

To create a *new* exam, select **Exam > Save Exam As**.

4. Enter the **filename** for the new exam. You can use up to 15 alphanumeric characters for the filename.
5. Click **Save**.

The new exam is now available for use whenever the current transducer is connected to the computer. If you connect a different transducer, this new exam is not available.

Creating Size-Specific Versions

When you create a custom exam for a specific size, a preset exam is created for the size that is selected when the exam is saved. To use the parameters you defined in the preset for other sizes, you must create customized exams for each size.

Use the same name for each size you modify, when saving the exam. The Terason software saves the presets as part of the same exam, so when you load an exam, the Terason software can use the correct preset values for the selected size. If you use different names for different size settings in the same exam, you must remember to load the size-specific exam, because the Terason software cannot update the preset values based on the size setting.

To create size-specific versions of an exam, complete these steps:

1. Click the **2D** tab in the Image Control window.
2. Choose a different **Size** button.
3. Adjust all Image Control **settings** as necessary.
4. Select **Exam > Save Exam**.

Do not use the Save Exam As item.

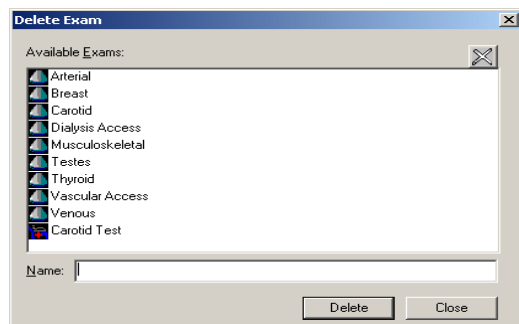
Deleting Custom Exams

If you no longer want a particular exam, you can delete it. You can only delete custom exams; you cannot delete any of the system exams.

You cannot delete a currently-loaded exam. If the unwanted exam is loaded, select a different exam before you start this procedure.

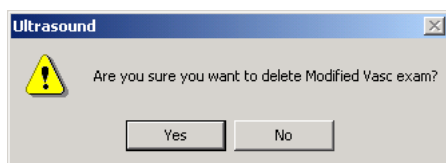
To delete an exam, complete these steps:

1. Select **Exam > Delete Exam**. The Terason software opens the Delete Exam dialog box.



Deleting an Exam

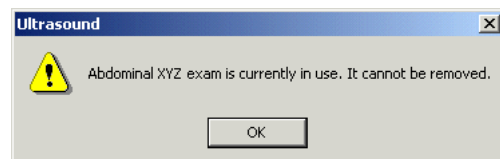
2. Click the exam that you want to delete from the list, and click **Delete**. The Terason software prompts you to confirm that you want to delete this exam.



Confirm Delete Dialog Box

3. Click **Yes** to confirm the deletion.
4. Click **Close**.

If you select the active exam, the following message displays:



Error Message If Delete Active Exam

Click **OK**, then open a different exam. Now you can delete the previous exam.

9 Performing Medical Procedures

The Terason Ultrasound System can aid in performing medical procedures such as biopsies, brachytherapy, and cryoablation. Depending on whether you purchased the additional equipment required for these procedures, you may have to understand:

- [Performing a Biopsy](#); see page 219
- [Verifying the Alignment](#); see page 224
- [Setting the Error Correction](#); see page 224
- [Cleaning the Transducers and Brackets](#); see page 225

Equipment Description

To perform a biopsy, you need a transducer, needle, needle guide kit, and bracket. The biopsy feature can be used with the following transducers:

- 7L3V
- 5C2A
- 8EC4A
- 12L5V



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 transducer 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 224), 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 222
- [Biopsy Procedure](#) on page 222

The Terason software displays guide lines for the specific transducer, bracket, and needle gauge used in a biopsy or other medical procedure.

The needle guides work only in these modes:

- 2D
- Color Doppler mode
- Directional Power Doppler
- Power Doppler mode
- THI

You cannot use the needle guides in:

- M-Mode
- Pulsed-Wave Doppler mode
- Continuous-Wave Doppler mode
- Triplex
- Zoom mode
- Split Screen mode

You can only see the target indicator on a live image; the Terason software removes it when you freeze the image.

Needle Guide Kits

A needle guide kit contains several parts that fit together to attach the needle to the transducer and provide a guide that directs the needle into the patient.

There are two types of needle guide kits, both of 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.

Different needle guide kits are required for each type of transducer. The following table lists the Terason transducers that can be used to perform biopsies, and lists the contents of the starter and replacement needle guide kits that must be ordered for each transducer.

Terason Needle Kit Numbers

Model	Starter Kit Contents	Replacement Kit
5C2A	Protek #7138 • Reusable biopsy bracket #6138 • (2) 16 Ga biopsy kits* #4216 • (2) 18 Ga biopsy kits* #4218 • (2) 22 Ga biopsy kits* #4222 • Guideline verification kit #4200	16 Ga biopsy kit #4216 18 Ga biopsy kits #4218 22 Ga biopsy kits #4222 Biopsy kits include needle guide, probe cover and gel
8EC4A	• Disposable 610-590 needle guide • Disposable sterile cover	Civco 657-014 Civco 610-588 Civco 657-014 Civco 610-543

Terason Needle Kit Numbers

Model	Starter Kit Contents	Replacement Kit
12L5V	Civco 612-085 <ul style="list-style-type: none"> • Non-sterile L5-9EC single-angle bracket (2.5cm) • Ultra-Pro II needle guide • CIV-Flex cover (14 x 91.5cm 3D)(5) • Cleaning brushes (5) 	Civco 610-608 Sterile Ultra-Pro II guide with 14x91.5 cm CIV-Flex cover (24)
	Civco 683-002 <ul style="list-style-type: none"> • Non-sterile single-angle bracket • 14 x 147cm (5.5" x 58") CIV-Flex cover (3D)-21/22 gauge only 	Civco 610-1017, (18 gauge) Civco 610-1018, (20 gauge) Civco 610-1019, (21-22 gauge)
7L3	Civco 612-085 <ul style="list-style-type: none"> • Non-sterile L5-9EC single-angle bracket (2.5cm) • Ultra-Pro II needle guide • CIV-Flex cover (14 x 91.5cm 3D)(5) • Cleaning brushes (5) 	Civco 610-608 Sterile Ultra-Pro II guide with 14x91.5 cm CIV-Flex cover (24)

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 hazardous or infectious materials according to local, state, and regional regulations.

The following figure shows the correct bracket for the 12L5V transducer:



12L5V Transducer and Civco Bracket for Use With the 12L5V

Assembling the Bracket and Guide

Each transducer works with only one bracket. These instructions describe how to assemble the bracket for the 5C2A transducer. The brackets attach to 8EC4A transducers in the same way as for the 12L5.

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 transducer for the biopsy by completing the following steps:

1. Place an appropriate amount of gel inside the cover or on the transducer face. Poor imaging may result if no gel is used.
2. Insert the transducer into the cover, making sure to use proper sterile technique. Pull the cover tightly over the transducer 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

To perform a biopsy using the Terason Ultrasound System as a guide, complete these steps:


1. Start **live imaging**.

On the I.Q. tab, select the **needle guide** that corresponds to the guide attached to the transducer (you might only have one option, depending on the transducer).

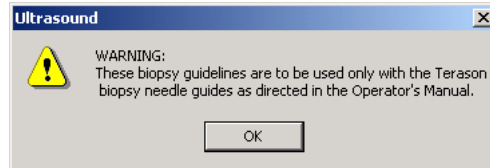


Needle Guide Choices (I.Q. Tab)

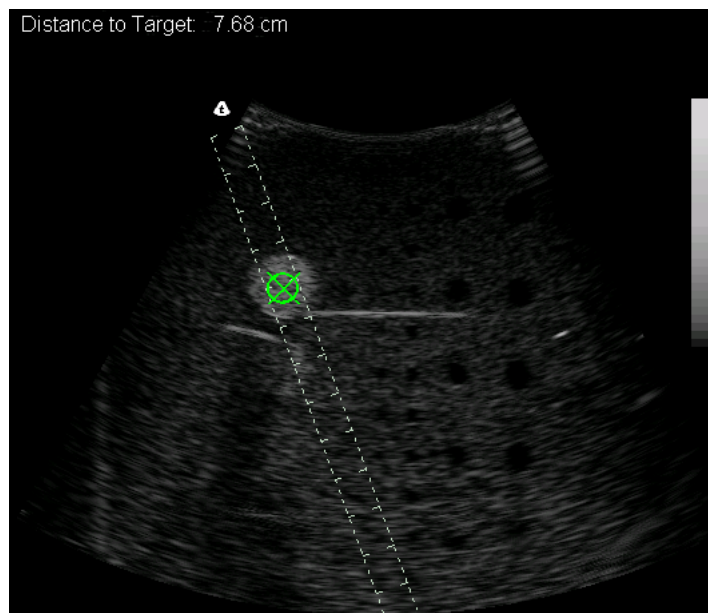
2. If the guides do not display, use one of these methods to display the needle guides:

- Click  on the Tools toolbar.
- Select **View > Needle Guide Display > Guide Lines**
- Type **N** to show the needle guide

The needle guide lines show in the Image Display window, along with the following message:

**Biopsy Warning**

3. Click **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 target indicator (green circle with an X) 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 ticks on the guide lines are at 1 cm intervals, and the distance between the guide lines is fixed at 1 cm.

4. If the Target Indicator (green circle with an X) does not show within the guides, select **View > Needle Guide Display > Needle Guide Target Indicator**.


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 transducer may be uncalibrated, or your calibration file may be missing or corrupted. Uncalibrated transducers can apply harmful levels of energy to the patient. Contact your Terason representative.

5. Move the Windows pointer within the lines to highlight the target of the biopsy or other procedure and determine the depth of that target. 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.

To turn off the needle guides, click .

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 on the I.Q. tab. If you have, stop the procedure immediately and contact a Terason representative.

Verifying the Alignment

To ensure that the transducer 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 transducer and biopsy attachment, complete these steps:

1. If the needle guides are not visible, select **View > Needle Guide Display > Guide Lines**. The biopsy guides appear in the Image Display window.
2. From the Needle Guide menu on the I.Q. tab, select the needle guide that you want to use for the test.
3. Assemble the bracket, needle guide clip, and gauge insert pin as described in [Assembling the Bracket and Guide](#) on page 222.
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 transducer.

Setting the Error Correction

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 select **Needle Guide Error Correction** from the **Tools** menu, the Terason software displays the correct dialog box for the current transducer.

Correcting Needle Guide Positioning for Biopsies

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.

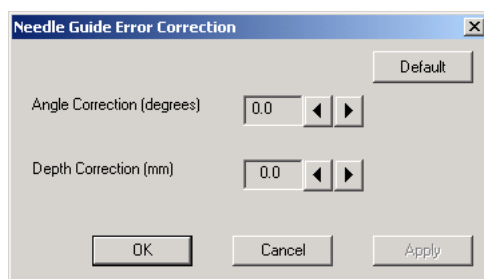
You can make marginal changes to the upper and lower limits for angle and depth on the Needle Guide Error Correction dialog box. Your changes to these settings are visible in the needle guidelines, and are saved by the system and used for all biopsies until you change them again.

You can enter a value within these ranges:

- Angle: -2° to 2°
- Depth: -1 mm to 1 mm

To change the needle guide error correction values for any transducer except the biplanar transducer, complete these steps:

1. Click **Tools > Needle Guide Error Correction**. The Needle Guide Error Correction dialog box opens.



Needle Guide Error Correction Dialog Box

You can click the **Apply** button to see the effects of your choices without closing the dialog box. click the **Default** button to reset the values to the factory-set values.

2. Next to the Angle Correction field, click the left and right arrows to correct the angle by the number of degrees.
3. Next to the Depth Correction field, click the left and right arrows to correct the depth by the number of millimeters.
4. Click **OK** to save your entries and close the dialog box.

Cleaning the Transducers and Brackets

The transducer must be cleaned and high-level disinfected between patients. For instructions, refer to [Processing Terason Transducers Between Uses](#) on page 282.

To sterilize the brackets, complete the procedure recommended by Civco or Protek.


10 Working With DICOM

DICOM (Digital Imaging and Communications in Medicine) is a format created by NEMA (National Electrical Manufacturers Association) to aid in the distribution and viewing of medical images such as ultrasound scans.

If you have the DICOM utility installed on your Terason Ultrasound System, you can:

- [Print images on a DICOM printer](#)
- [Send images or loops to a DICOM server](#) where they can be used by other applications that support DICOM files
- [Use DICOM Worklist](#) to search the archive of patient information sets on the DICOM server, and copy patient info sets to the Terason Ultrasound system so that exams on the system are identified with the correct patients.

Before you can use the Terason DICOM utility, you must install the software and configure the DICOM utility. See [Installing the Terason DICOM Utility](#) on page 44 for installation and configuration instructions. If the DICOM utility is not installed, the DICOM menu items are not accessible.

The DICOM utility starts when the computer is powered on, and is added to the controls section of the task bar using this icon: .

Using Images with a DICOM Printer or Server

When you send or print a DICOM image, the Terason software saves the image in a temporary location on your computer. The images are then sent to the server.

To view log messages about images exported to a DICOM server or printed to a DICOM printer, open the DICOM utility (select Start > Programs > TerasonDICOM > Terason) and click the Communications Log tab.

You can change the default button for Save Image to Send DICOM Image, the default button for Save Image Loop to Send DICOM Loop, and the default button for Print to Print DICOM Image. See [Setting Image Save and Print Defaults](#) on page 243 for instructions.

Printing Files to a DICOM Printer

You can configure your Print button to automatically send an image file to the DICOM printer. For instructions on how to change DICOM configuration options, see [Installing the Terason DICOM Utility](#) on page 44.

To send an image to a DICOM printer, complete these steps:

1. Load the **image** (if it was previously saved) or acquire a new scan.

2. Select **File > Print DICOM Image**.

Sending Files to a DICOM Server

To send an image or loop to a DICOM server, complete these steps:

1. Load the **image** (if it was previously saved) or obtain a new scan.
2. Select either:
 - **File > Send DICOM Image**
 - or
 - **File > Send DICOM Loop**

The Terason software uses the configuration settings in the DICOM utility to locate the DICOM server and transfer the file. For instructions on configuring the DICOM utility for your server, see [Installing the Terason DICOM Utility](#) on page 44.

To send a saved DICOM file or loop to the server, complete these steps:

1. In the Terason Explorer, click the **folder** (either in the Patient folder or in the Image folder) that contains the needed DICOM files.
2. Click the **Review** tab.
3. Select the **files** to send.
4. Select **File > Send DICOM File(s)**.

The Terason application sends the files to the configured DICOM server.

Using DICOM Worklist

DICOM Worklist is a function of the Terason Ultrasound software that connects to a DICOM server using a network service, and generates a list of patient information sets that meet chosen criteria. Worklist finds patient records based on parameters set in the Tools > Options window.

To prepare for an ultrasound exam, the ultrasound technician queries Worklist using parameters that include the patient's information. The query reruns a worklist of all the patient information sets that meet the criteria. The ultrasound technician selects a patient's record on the worklist, and the exam is automatically attached to that patient's information (the Patient Info window is populated with the selected patient's information.) The technician can also use Worklist to obtain the patient information from the DICOM server and apply the information to a current exam. Worklist cannot attach patient information to a saved exam.

To use DICOM Worklist, see:

- [Worklist Queries](#); see page 229
- [Configuring Worklist](#); see page 229
- [Configuring Broad Queries](#); see page 230
- [Making a Query](#); see page 232
- [Applying a Patient Info Set](#); see page 234
- [Customizing the Worklist](#); see page 234
- [DICOM Network Service](#); see page 236

Worklist Queries

There are two available types of Worklist queries: *auto* queries and *manual* queries.

Auto queries run periodically when the ultrasound system is on, and return a list of patient info sets that match the criteria set in the Query window as a broad query (see [Configuring Broad Queries](#) on page 230.) For example, an auto query can be set up to return a list of ultrasound exams that are scheduled on the current date. The facility's scheduling administrator enters an ultrasound exam for a patient into DICOM, and when the scheduled date arrives, the Worklist auto query collects the patient info and adds it to the worklist.

Manual queries can take two forms: *broad* queries, and *patient-based* queries.

Broad queries search all records on the DICOM server, using the parameters chosen in the Options window. Broad queries are preset groups of parameters. They can be used as they are, or modified with different parameters, or applied to patient-based queries. See [Configuring Broad Queries](#) on page 230, and [Making a Broad Query](#) on page 232.

Patient-based queries search the records using a patient name, access number, date of birth, or other patient-specific parameter. They can be further limited to the parameters in a broad query. See [Making a Patient-Specific Query](#) on page 233.

Configuring Worklist

To configure Worklist to communicate with a DICOM server:

1. With the Terason software running, click **Tools** in the menubar, and select **Options**.

The Options window opens.

2. Click the **Worklist tab**.

The Options window shows the Worklist options.

Options > Worklist Window

3. Enter the DICOM server name in the **Name:** field.
4. Enter the other relevant information in the **AE Title:**, **IP Address:**, and **Port:** fields.
The site system administrator can supply these values.



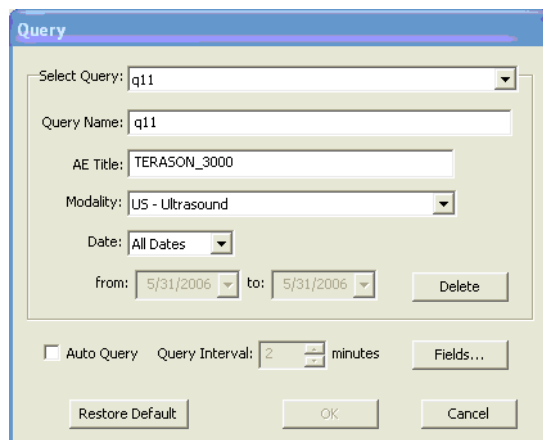
Note: The software can find the IP address automatically. To make it search for the IP address, leave the IP Address: field blank.

5. When all the values are entered, click **Verify**.
The software runs a test that checks whether the entered values enable communication with the DICOM server, then opens a message box that says whether the configuration passed or failed the test.
6. To make the Query window open whenever the Patient Info screen displays, click **Auto-Popup Worklist** so the box is checked.
7. Click **OK** to save the entered values.
The Options window closes.

Configuring Broad Queries

To configure a query so that it is available in the Broad Query menu on the Worklist window:

1. In the Options > Worklist window, click **Query**.
The Query window opens.



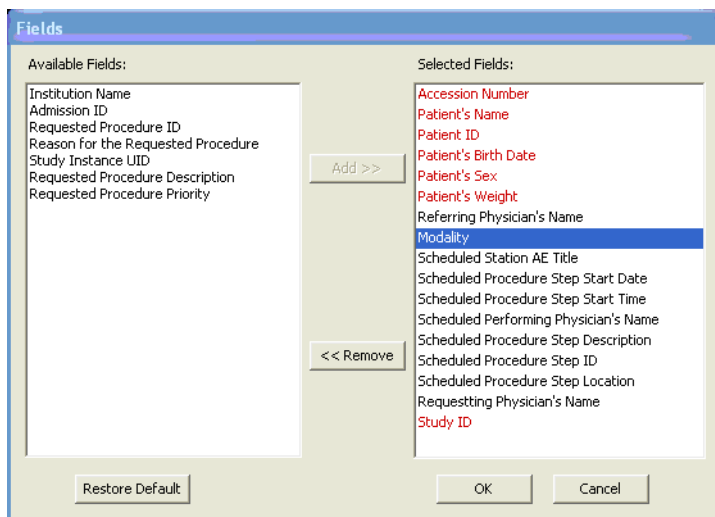
The Query Window dialog box contains the following fields and controls:

- Select Query:** A dropdown menu showing 'q11'.
- Query Name:** A text field containing 'q11'.
- AE Title:** A text field containing 'TERASON_3000'.
- Modality:** A dropdown menu showing 'US - Ultrasound'.
- Date:** A dropdown menu showing 'All Dates'.
- from:** A date field showing '5/31/2006'.
- to:** A date field showing '5/31/2006'.
- Delete:** A button.
- Auto Query:** An unchecked checkbox.
- Query Interval:** A spinner box set to '2'.
- minutes:** A text label.
- Fields...:** A button.
- Restore Default:** A button.
- OK:** A button.
- Cancel:** A button.

Query Window

2. To create a new query, enter a descriptive name for the query in the **Query Name:** field.
The name must be unique.
3. To modify an existing query, pull down the **Select Query:** menu and select the query name.
4. Enter the **AE title** of the Terason ultrasound computer in the AE Title: field.
5. To search for info sets of patients who have not had an ultrasound exam before, pull down the **Modality:** menu and choose a different exam type.
6. In the **Date:** menu, choose All Dates, Today, or a range of dates to search.
7. To make the query repeat at intervals, click **Auto Query** so the box is checked, and select a Query Interval: using the up and down arrows.
8. To change the parameters that are selectable for queries:
 - a. Click **Fields....**

The Fields window opens.



The Fields Window dialog box contains the following fields and controls:

- Available Fields:** A list box containing: Institution Name, Admission ID, Requested Procedure ID, Reason for the Requested Procedure, Study Instance UID, Requested Procedure Description, Requested Procedure Priority.
- Selected Fields:** A list box containing: Accession Number, Patient's Name, Patient ID, Patient's Birth Date, Patient's Sex, Patient's Weight, Referring Physician's Name, Modality (highlighted), Scheduled Station AE Title, Scheduled Procedure Step Start Date, Scheduled Procedure Step Start Time, Scheduled Performing Physician's Name, Scheduled Procedure Step Description, Scheduled Procedure Step ID, Scheduled Procedure Step Location, Requesting Physician's Name, Study ID.
- Add >>:** A button.
- << Remove:** A button.
- Restore Default:** A button.
- OK:** A button.
- Cancel:** A button.

Fields Window

- b. To add a search parameter to the Selected Fields: list, click its name in the Available Fields: list, then click **Add >**.
- c. To remove a search parameter from the Selected Fields: list, click its name in the Available Fields: list, then click **< Remove**.



Note: Parameters listed in red are defaults that cannot be removed from the Selected Fields: list.

- d. Click **OK**.
9. When all the fields are populated with the correct data, click **OK**.
- The new or modified query is saved, and is available in the Broad Query: menu of the Worklist window.

Making a Query

You can make a broad query that searches all the patient records and returns all the patient info sets that match the criteria, or a patient-specific query that searches for a specific patient's info set. A patient-specific query can use the same criteria as a broad query, returning only those info sets that match both the criteria in the broad query and some data specific to the patient.

Making a Broad Query

To make a broad Worklist query:

Patient Info Window

1. In the Patient Info window, click **Worklist**.

The Worklist window opens.

The screenshot shows the 'Worklist' window with a table of patient data and query options below it.

Accession Num...	Patient's...	Patient ID	Patient's Birth Date	Patient's Sex	Patient's Weight
3016	EDWARD MI...	678	09/16/1976	F	144
244	KEARNEY N...	PID52132	06/23/1968	M	152.5
235	OLIVER THO...	PID00100	09/02/1970	M	140

Below the table are query options:

- Broad Query:** All Date match with US modality for TERASON_3000
- AE Title:** TERASON_3000
- Modality:** US - Ultrasound
- Date Type:** All Dates, **from:** 5/31/2006, **to:** 5/31/2006
- Patient Based Query:**
 - Patient Name:** []
 - Accession Number:** []
 - Patient ID:** []
 - ☒ Use Broad Query Criteria

Buttons: Restore Default, Query, Customize List..., Select, Cancel.

Worklist Window

2. Pull down the **Broad Query:** menu, and select the query that uses the parameters you want.

If there is no appropriate query in the menu, create one, using the procedure described in [Configuring Broad Queries](#) on page 230.

3. If the patient you are searching for has not had an ultrasound exam before, pull down the **Modality:** menu and select **All**.

If the patient's information was saved to the DICOM server during a previous exam of any type, the query will return that information.

4. To limit the search to specific dates, pull down the **Date:** menu, and choose Today or a range of dates to search.
5. Click **Query**.

Worklist searches the DICOM server, and lists the results in the top part of the Worklist window.

Making a Patient-Specific Query

To make a patient-specific query:

1. In the Patient Info window, click **Worklist**.
The Worklist window opens.
2. Enter the patient's name, or ID, or accession number in the **appropriate field**.
3. To apply the parameters in a broad query to the patient-specific query (this further narrows the query results):
 - a. Click **Use Broad Query Criteria** so the box is checked.

- b. Pull down the **Broad Query:** menu, and select the query that uses the parameters you want.

If there is no appropriate query in the menu, create one, using the procedure described in [Configuring Broad Queries](#) on page 230.

- c. You can also search using different **modality and date** parameters, using those functions in the Broad Query section.

4. Click **Query**.

Worklist searches the DICOM server, and lists the results in the top part of the Worklist window.

Applying a Patient Info Set

Worklist makes it easy to apply a patient info set to an exam.

To apply a patient info set to a new exam:

1. In the top part of the Worklist window, click the appropriate **patient info set** to select it.
2. Click **Select**.

Worklist populates the Patient Info window fields with the data in the selected info set. The current exam is associated with that patient.



Note: When a patient info set is applied to an exam, and the exam is saved, that exam is permanently associated with that patient. If the wrong patient info set was selected, a new exam is required for the correct patient association.

Customizing the Worklist

The categories-of-patient-information header on the worklist is wider than the Worklist window. To see all the categories, you must use the scroll bar at the bottom of the list area. You can set the left-to-right listing order of the patient info values, to reduce the amount of left-to-right scrolling required to read information you commonly use. See [Setting the Value List Order](#), below.

If a query returns a large number of patient info sets, you must use the scroll bar at the right side of the list area to see them all. You can sort the listed results by field (sort by Patient ID, or sort by Patient's Name, for instance), so the ones you're most interested in are at the top. See [Sorting the Results](#) on page 235.

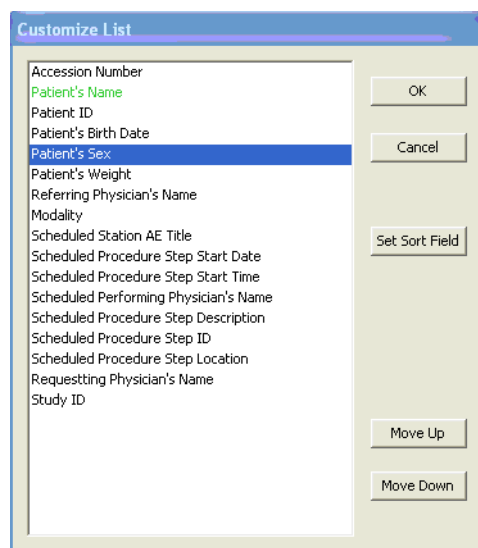
Changes you make to the listing order and result sorting become the defaults; new lists will use those parameters when displaying the results of queries.

Setting the Value List Order

To set the left-to-right listing order of the patient info values:

1. On the Worklist window, click **Customize List...**

The Customize List window opens.



Customize List Window

2. To move a value type to the left on the worklist, select the name of the field in the list and click **Move Up** until the name is in the desired place on the vertical list in the Customize List window.

The top of the list in the Customize List window corresponds to the left side of the patient-information header on the Worklist window. The bottom of the list in the Customize List window corresponds to the right side of the patient-information header on the Worklist window.

3. To move a value type to the right on the worklist, select the name of the field in the list and click **Move Down** until the name is in the desired place.
4. **Repeat** with any other fields you want to move.
5. Click **OK**.

Worklist displays the values in the patient info sets in the order you specified. When you make a new query, the worklist displays the values in the order you set with this procedure.

Sorting the Results

To sort the list of results using a specific value type:

1. On the Worklist window, click **Customize List...**
The Customize List window opens. (See [Customize List Window](#), above.)
2. Click to select the **field name** you want to use for sorting the results.
In the figure, Patient's Sex is selected.
3. Click **Set Sort Field**.
4. Click **OK**.

Worklist sorts the patient info sets in its list using the value type you selected. It sorts alphabetically starting with A, or numerically starting with 0. When you make a new query, the worklist uses the value type you set with this procedure to sort the results.

DICOM Network Service

When the computer starts, a network service called DcmNetService.exe runs automatically. This service allows automatic worklist queries to execute on schedule, even if the Terason software is stopped. If the service stops or does not start automatically, you can launch it manually. You can also stop the network service manually.

Starting the Network Service Manually

To start the network service manually:

1. Open Windows Explorer and navigate to the **Terason** directory.
2. Double-click **DcmNetService.exe**.

The network service launches and connects to the DICOM server.



Note: Only one instance of the network service can run at a time.

Stopping the Network Service

To stop the network service:

1. Right-click the **network service icon** on the Windows status bar at the lower right corner of the screen.



Network Service Icon

A dialog box opens.

2. Click **Exit** in the dialog box.

The network service stops.

Checking the Connection Status

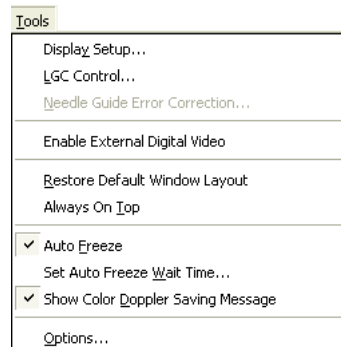
When you hover the Windows pointer over the network service icon, a tooltip appears that describes the network connection status. There are six possible messages:

- Connect Valid - Successfully connected to the server
- Connect Failed - Did not connect to the server
- Query Error - Error in query and retrieve
- Verify Failed - Failed to verify the connection to the server (for manual query only)
- Timeout - Communication timeout
- Undefined - There is no server defined

If the icon is red, not blue, there is no connection to the DICOM server.

11 Using System Tools

The **Tools** menu provides utilities that support various functions of the Terason software.



Tools Menu

The tools control the following operations:

- [Testing the Monitor Display](#), see page 237
- [Correcting the Position of the Needle Guides](#), see page 241
- [Restoring the Default Layout](#), see page 241
- [Keeping the Terason Software on Top](#), see page 242
- [Setting a Time-Out Value](#), see page 242
- [Enabling or Disabling the Color Doppler Message](#), see page 243
- [Specifying Optional Settings](#), see page 243

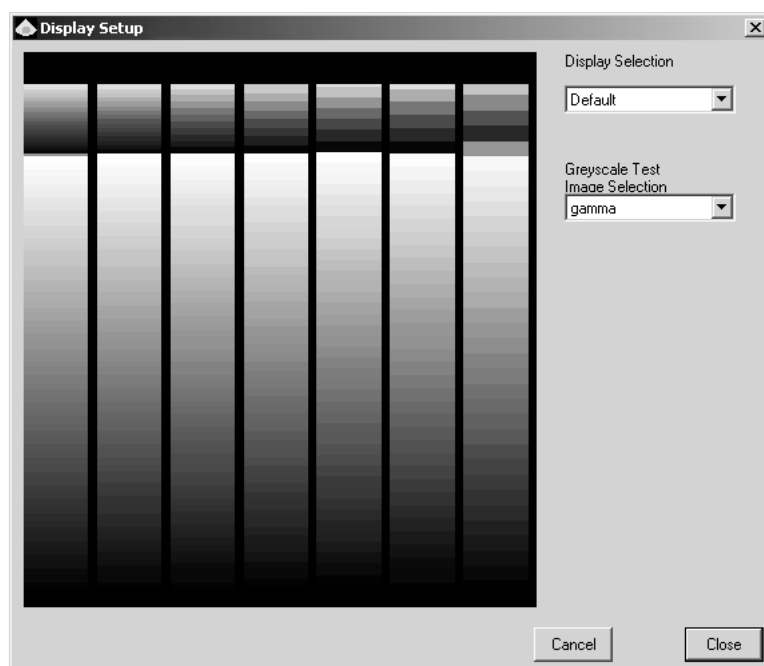
Testing the Monitor Display

When you purchase a laptop from Terason as part of the Terason Ultrasound System, the monitor is already adjusted for proper display.

Gamma refers to the monitor's ability to display accurate colors. If you think the colors on your monitor are no longer accurate, you can perform the tests in this section to verify that the display is correct. The Display Setup window includes four industry-standard tests. You can use any combination of these tests to test your monitor's display. The procedure shows you how to use all of the tests; you can skip any of them.

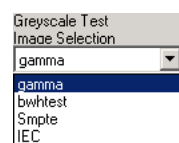
To test the gamma for your display, complete these steps:

1. In the I.Q. Image Control window, select **Gray** from the Colorization menu.
2. Select **Tools > Display Setup**. The Display Setup window opens.



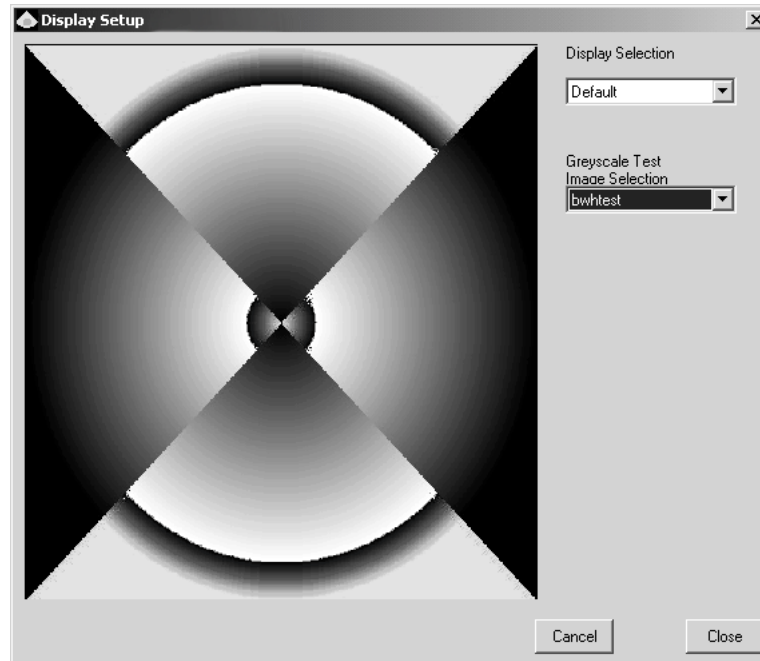
Gamma Correction Dialog Box - Gamma Test

3. From the Display Selection menu, select your **monitor**. If you do not see any monitors listed, select Default.
4. Verify that the **gray bars** in each column are increasingly difficult to distinguish as you look from right to left.
5. Select **bwhtest** from the Greyscale Test Image Selection menu.



Greyscale Tests

The following figure shows the BWHtest:



Gamma Correction Dialog Box - BWHTest
(BWH: Brigham and Women's Hospital)

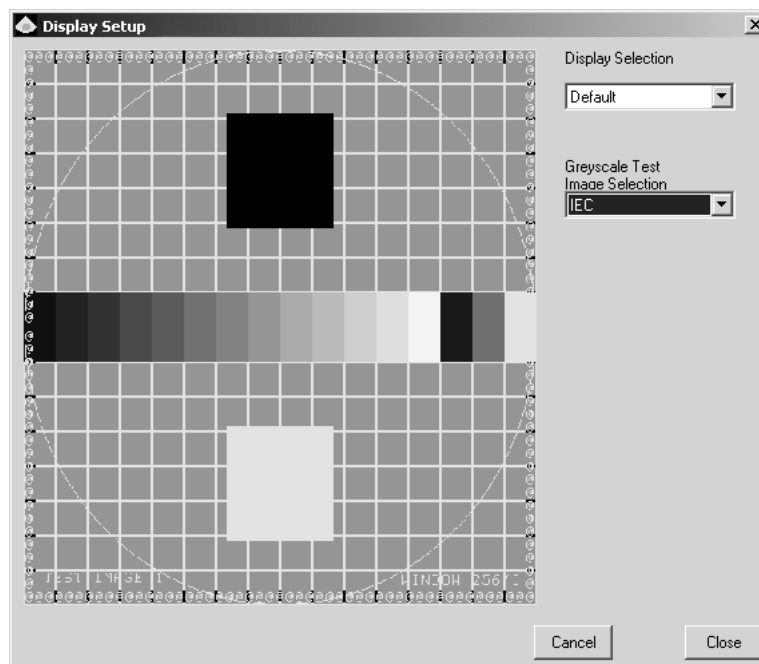
6. Verify that the test pattern shows a **continuous grayscale image** from the center of the pattern. You should not see any concentric ring-like features.
7. Select **SMPTE**.



Gamma Correction Dialog Box - SMPTE Test

(SMPTE: Society of Motion Picture and Television Engineers)

- a. Verify that the 0% and 100% squares contain smaller squares that represent signal level steps of 5% (in the 0% square) and 95% (in the 100% square). You should be able to differentiate the inner square from the larger square that contains it.
 - b. Verify that the high-contrast bar patterns in the test image are distinct, simple patterns of black and white bars. In each corner and the center of the image, inspect the lines, from fat to narrow, horizontally and vertically, and make sure you can see all the lines.
8. Select **IEC**.



Gamma Correction Dialog Box - IEC Test

You should be able to differentiate between the gray bars along the center of the image. The large black square (top) should be black, and the large white square (bottom) should be white.

9. Click **Close**.

Correcting the Position of the Needle Guides

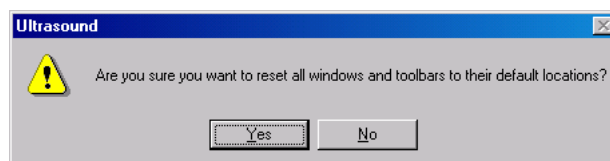
Needle Guide Error Correction in the Tools menu is used exclusively with the biopsy/medical procedures options. See [Correcting Needle Guide Positioning for Biopsies](#) on page 225 for information on correcting the needle guide position.

Restoring the Default Layout

You can easily reset the layout of the toolbars and windows to their default locations. To do so, complete these steps:

1. Select **Tools > Restore Default Window Layout**.

The Terason software prompts you to confirm this choice.



Confirmation Before Resetting the Layout

2. Click **Yes**.

The Terason software opens the Terason Explorer and Image Control windows (if they were closed), and shows only the default toolbars. You can use the toolbars shortcut menu (right-click in the toolbar area) to hide any of the toolbars or to show other toolbars.

Keeping the Terason Software on Top

Terason recommends that you not use other applications while the Terason software is running. Although computer systems can simultaneously run multiple applications, you get the best performance if the Terason software does not share resources with other applications.

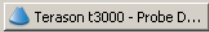
If you use more than one application on your computer, Windows automatically places the active application at the front in the desktop. Depending on the size of that application's window, you may not be able to see windows for other applications, such as the Terason window.

To make sure that the Terason window is never hidden beneath another application, select Tools > Always on Top from the Terason menu bar. This menu item shows a check mark when it is selected.

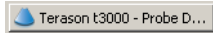
When Always on Top is selected, no other application blocks your view of the Terason application.

To view a different application window:

1. Minimize the **Terason window** (click  at the top right of the Terason window).

Windows adds a  button on the taskbar at the bottom of the screen, and displays another application on the desktop.

2. Use **other applications** as needed.

3. When you are ready to use the **Terason software** again, click the  button.

Windows displays the Terason window.



Note: The usual Windows method of pressing Alt-Tab to change views does not work when Always on Top is selected.

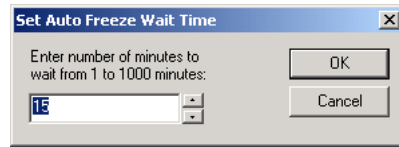
Setting a Time-Out Value

The Terason software lets you set a time-out value that shuts off power to the transducer if it has been inactive for a specified period. This feature is especially useful when you run a laptop on battery power.

To enable this feature, select Tools > Auto Freeze. The menu shows a check mark when this feature is enabled. The default time-out value is 15 minutes, but you can change it to any value between 1 and 1000 minutes.

To set the time-out value, complete these steps:

1. Select **Tools > Set Auto Freeze Wait Time**. The Terason software opens the Set Auto Freeze Wait Time dialog box.



Setting the Time Out Value

2. Type the **number of minutes** you want to specify as the time-out value, or click the up and down arrows to select a different value.
3. Click **OK**.

When the specified number of minutes elapses, the computer shuts off power to the transducer and displays the following message:

Terason has automatically suspended. Hit any key or move mouse to resume.

The Terason title bar changes to Terason - Suspended, to indicate that transducer power is shut down. When you move the mouse or press any key on the keyboard, the Terason software sends power to the transducer and removes the message box.

Enabling or Disabling the Color Doppler Message

The Show Color Doppler Message item in the Tools menu lets you control whether or not the application displays a message when you try to save an image file with a high color persistence setting. See [Adjusting the Color Persistence](#) on page 123 for information on the color persistence setting.

You can use the Tools > Show Color Doppler Save Message menu item to enable or disable the message. Click the menu item to toggle its setting between enabled (check mark) and disabled (no check mark).

Specifying Optional Settings

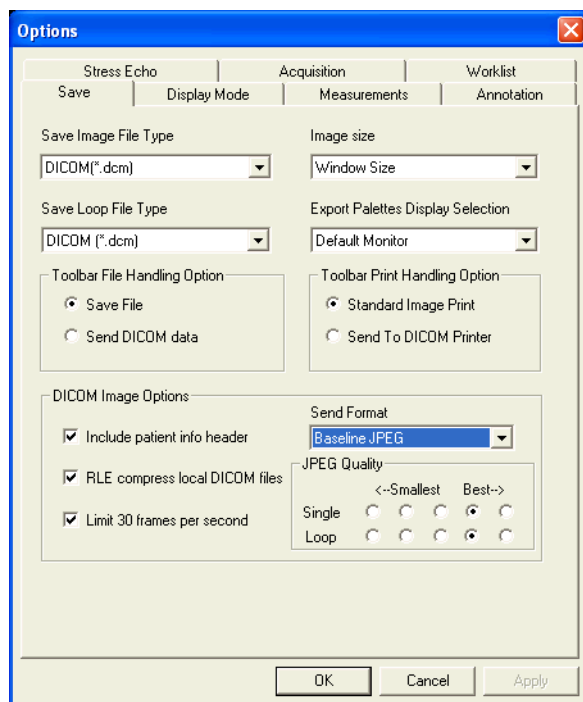
The Terason software lets you specify several optional settings. You can change defaults that affect:

- [Setting Image Save and Print Defaults](#), see page 243
- [Changing the Display Mode Defaults](#), see page 247
- [Setting Measurement Defaults](#), see page 250

The following sections describe the defaults you can set. To change options, select **Tools > Options**, then make any changes necessary to the tabs and click OK.

Setting Image Save and Print Defaults

When you select **Tools > Options**, the Options window opens showing the Save tab.



Save Tab on Options Window

These options let you set defaults for:







- [Save Image File Type](#), see page 244
- [Toolbar File and Print Handling Options](#), see page 245
- [DICOM Image Format](#), see page 246

Save Image File Type



By default, the Terason software uses its own file format when saving image files and loops. You can choose a different format as the default for images or loops

When you set a different file type as the default, the Terason software changes the Save Image and Save Loop buttons to show the file type that will be used. You can select a different default file type for images and loops. The following table shows the icons for all file types.

Available File Types for Saving Images and Loops

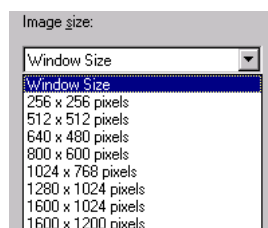
Image Format	Save Image Button	Save Loop Button
Terason (.ult)		
AVI	Not available	
Bitmap		Not Available
DICOM		

Available File Types for Saving Images and Loops

Image Format	Save Image Button	Save Loop Button
JPEG		Not Available
TIFF		Not Available

If you change the default file type, you can use Export on the File menu to select the Terason Image Type (or any other format) to save the file.

When you select a file type for image files other than ULT, you can choose the default Image size from the Window Size menu.

**Image Sizes for non-ULT File Types**

Your choice becomes the new default. You can change the image size when you save the file by using Export on the File menu instead of the **Save** button.

Toolbar File and Print Handling Options

If you use the DICOM utility, you can replace the Save Image and Save Image Loop buttons on the File toolbar with Send DICOM Image and Send DICOM Loop buttons, and the Print button with a Print DICOM button. To save an image or loop to your computer in a format other than DICOM or to print to a printer other than the DICOM printer when the DICOM options are selected, use the File menu. The Toolbar File and Print handling options are enabled only if the DICOM utility is installed on the computer.

If you choose to use the DICOM file and print buttons, the File toolbar shows the DICOM buttons.

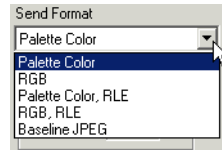
**File Toolbar Setup with DICOM Buttons**

See [Using Images with a DICOM Printer or Server](#) on page 227 for information on using these buttons.

DICOM Image Format

You can choose whether or not patient data is sent with the DICOM image, and can choose the color format used for sending a DICOM image. 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



DICOM Send Formats

This setting only affects files sent to a DICOM server; DICOM files saved in the Terason Image or Patient folders always use the Palette color format.

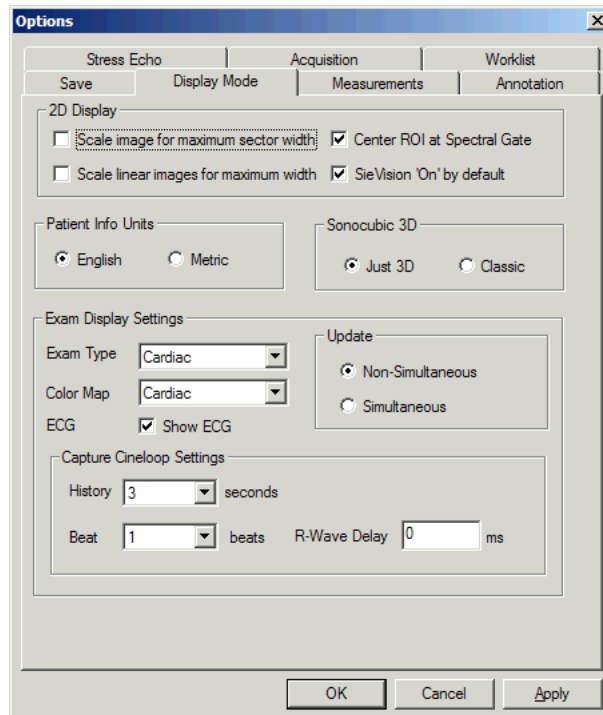
Choosing Baseline JPEG enables the JPEQ Quality controls. Selecting a higher number in the JPEQ Quality fields produces a higher-quality image with fewer artifacts, and a larger file. Selecting a lower number produces a lower-quality image and a smaller file.

The RLE compress local DICOM files checkbox lets you choose whether or not to compress DICOM files when saving them in the Terason Image or Patient folders. By default, DICOM files are compressed using the DICOM RLE syntax, and then uncompressed and converted to the chosen Send format when exported or sent to a DICOM server.

If you need to access the DICOM files using an application that cannot read the DICOM RLE syntax, you can disable compression by clearing the RLE compress local DICOM files checkbox. Changing the default causes longer image save and load times and larger image files.

Changing the Display Mode Defaults

The Display Mode options are shown in the Options/Display Mode window.



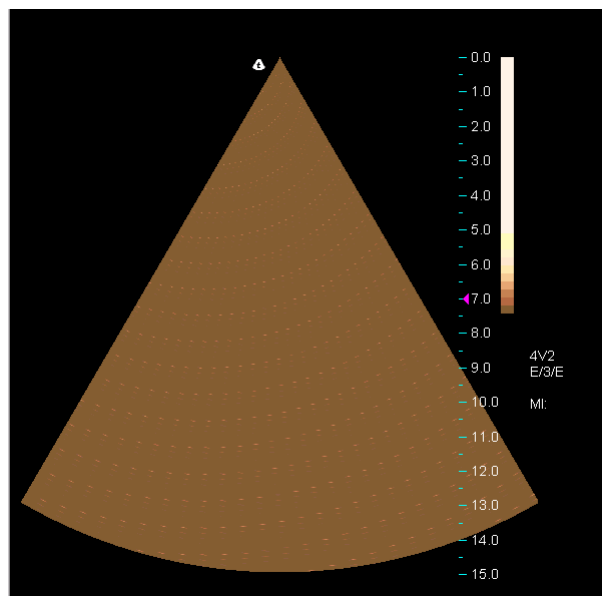
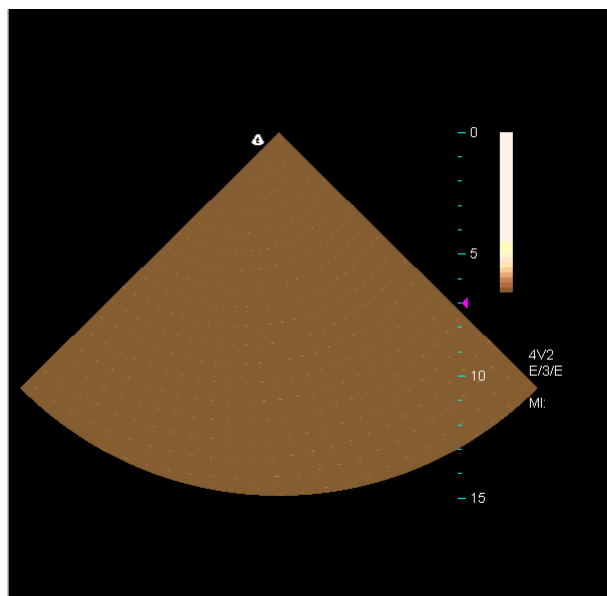
Options: Display Mode Options

The Display Mode window controls the following operations:

- [Scaling Curved Transducers](#) on page 247
- [Scaling Linear Transducers](#) on page 249
- [Setting the Units for Patient Measurements](#) on page 249
- [Choosing Color Maps for Exams](#) on page 249
- [Starting the System with TeraVision Off](#) on page 250
- [Scanning in Non-Simultaneous or Simultaneous Mode](#) on page 250

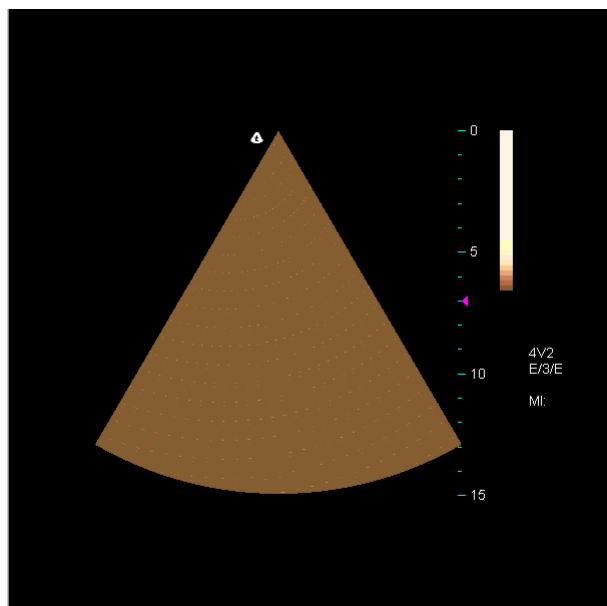
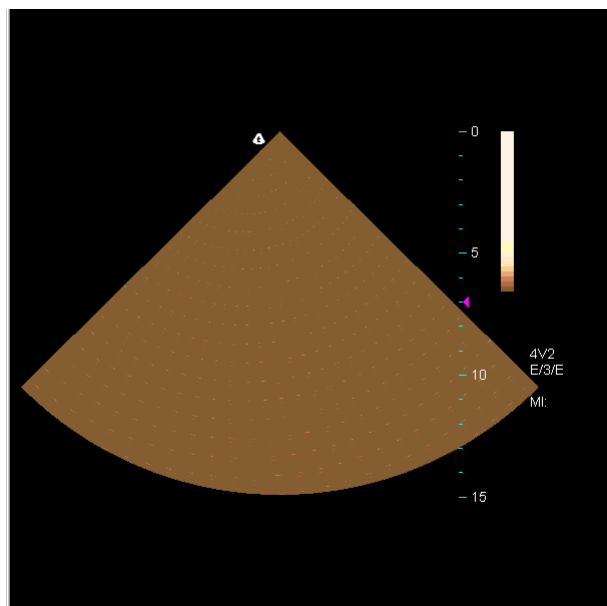
Scaling Curved Transducers

This option works with curved array transducers; it does not work with linear array transducers. You can choose whether the TeraSon software scales the image when you choose the narrow sector width, or expands it to fill the entire available area. By default, the TeraSon software expands the 2D scan data to fill the available space. Perceptually, if you change from a wide sector width to a narrow sector width, it looks like the narrow sector width is larger than the wide sector width, as shown in the following figure.

**Wide Sector Width vs. Narrow Sector Width**

If you compare the scale, you can see that the scales are different. The Terason software expanded the narrow sector image to fill the available space.

To retain the same scale when you switch sector widths, you can set the default to scale the narrow image. You can then see the affect of switching sector widths, as shown in the following figure.

**Wide Sector vs. Scaled Narrow Sector**

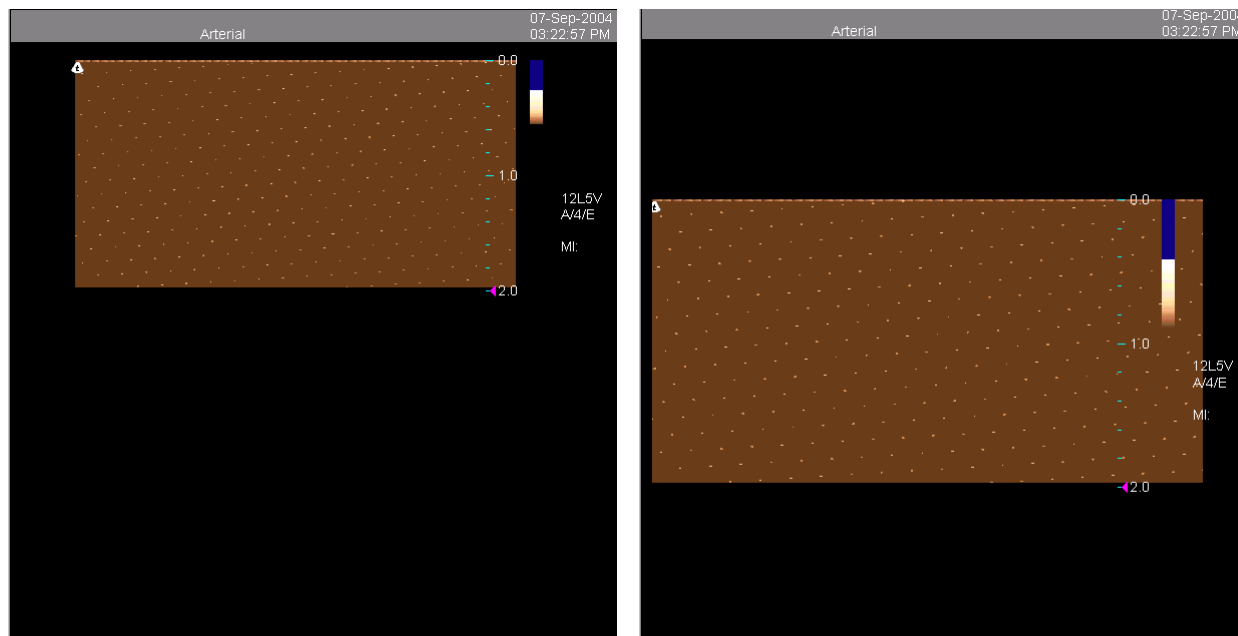
The scales are the same, and you can see that the narrow width really is narrower than the wide width. However, the window contains unused space that could be used to show image data.

Scaling Linear Transducers

This option works with linear transducers; it does not work with curved transducers. When you select a small depth, the Terason software retains the same width as the original scan, and removes the scan data from greater depths.

To scale the image to take advantage of the full width of the Image Display tab, you can select the Scale linear images for maximum width checkbox. When you do, the Terason software scales the image (while maintaining the same aspect ratio) to fill as much of the window as possible.

The following figure shows the difference between unscaled and scaled linear arrays.



Unscaled (Left) and Scaled (Right) Linear Scan Images

Setting the Units for Patient Measurements

When entering a patient's height and weight, you can choose English units (feet, inches, and pounds), or metric units (meters and kilograms).

Choosing Color Maps for Exams

For Color Doppler mode, you can choose whether Color Doppler data is shown in the standard Rainbow color map, or a Red-Blue color map. You can configure the color map independently for each exam by selecting an exam, then a color map. You do not need to click Save or Apply to set the color map. When you select a different exam, the Terason software loads the color map for the selected exam.

The Dialysis Access exam uses the Red-Blue color map as its default; all other exams use the Rainbow color map as the default.

Scanning in Non-Simultaneous or Simultaneous Mode

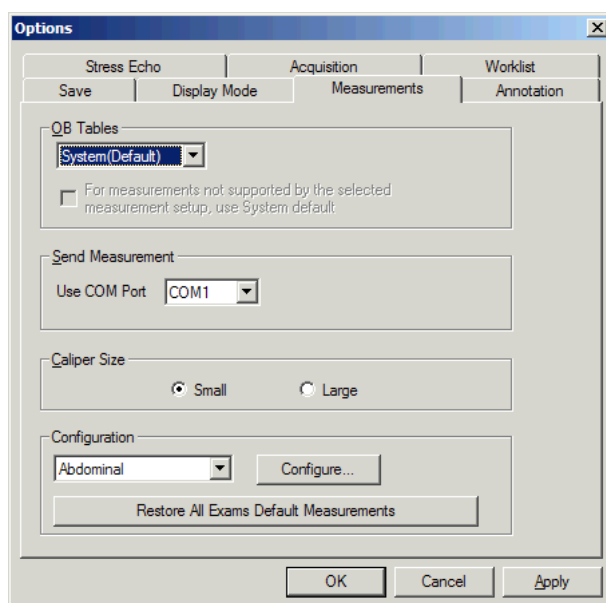
With PWD and Triplex modes, you can choose whether to scan in non-simultaneous mode. When you are scanning in non-simultaneous mode either the 2D or the time series window receives data. This lets you independently change the PW and Color Doppler PRFs. When scanning in simultaneous mode, both the 2D and the time series window receive data. This feature lets you define which method is used, based on the exam type.

Starting the System with TeraVision Off

TeraSon ultrasound systems that have the optional TeraVision image-enhancement package normally start TeraVision when the system starts. To change this default so that clicking the I.P. Filter button on the IQ tab is required for TeraVision to run, go to Tools > Options > Display Mode, and uncheck the box next to TeraVision ON by Default, then click Apply.

Setting Measurement Defaults

The measurement defaults include the system used to make obstetrical calculations, and the COM port used to export obstetrical measurements to another computer.



Options: Measurements Tab

The TeraSon Ultrasound System uses the Hadlock measurement setup as the system default to make obstetrical calculations. If needed, you can use a different measurement setup. Not all measurement setups provide the full list of measurements included with the Hadlock setup. If you choose a different setup, you can also choose to use the default setup for measurements not included in the one you selected.

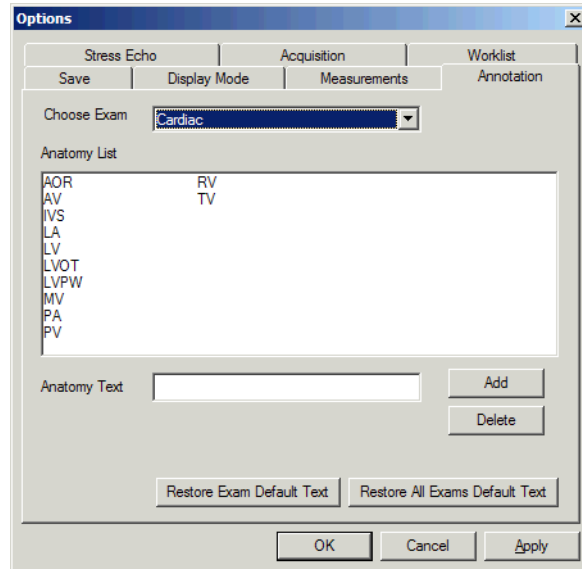
See [Working with Measurements on an Obstetrical Exam](#) on page 158 for more information.

Adding Custom Text to the Annotation Window

The Text tab in the Annotation window provides text you can quickly add to an image without having to type it. You can add additional text to this window. The text displayed in the Annotation window depends on the selected exam. To have a text phrase available for multiple exams, you must add it to each exam.

To add custom text, complete these steps:

1. Select **Tools > Options**.
2. In the Options window, click the **Annotation tab**.



Options: Annotation Tab

3. From the Choose Exam menu, choose the **exam** for which you want this text to be available.
4. Type the text into the **Add anatomy field**.
5. Click **Add**. The Terason software adds the text to the list.
6. Repeat **steps 3 to 5** for all exams and text you want to enter.
7. Click **OK**.

The text you add shows at the bottom of the list in the Text tab of the Annotation window. For instructions on using this text, see [Adding Text to an Image](#) on page 81.

12 System Safety and Maintenance

To use the Terason Ultrasound System successfully and safely, Terason provides the following information:

- [Safety Standards](#), see page 252
- [Indications For Use](#), see page 254
- [Acoustic Output Indices](#), see page 268
- [Relationship of Index to Display Accuracy](#), see page 278
- [Acoustic Output Tables](#), see page 280
- [Accuracy Measures](#), see page 281
- [Processing Terason Transducers Between Uses](#), see page 282
- [Compliance and Approvals](#), see page 285
- [System Warranty](#), see page 285
- [Recommended Maintenance](#), see page 286
- [Equipment List](#), see page 286
- [System Specifications](#), see page 288

Safety Standards

According to the American Institute of Ultrasound in Medicine (AIUM) *Official Statement of the Clinical Safety of Diagnostic Ultrasound* (March 1993):

Diagnostic ultrasound has been in use since the late 1950s. Given its known benefits and recognized efficacy for medical diagnosis, including use during human pregnancy, the American Institute of Ultrasound in Medicine herein addresses the clinical safety of such use: No confirmed biological effects on patients or instrument operators caused by exposure at intensities typical of present diagnostic ultrasound instruments have ever been reported. Although the possibility exists that such biological effects may be identified in the future, current data indicate that the benefits to patients of the prudent use of diagnostic ultrasound outweigh the risks, if any, that may be present.

This section addresses the following topics:

- [Ultrasound Safety](#), see page 253
- [Electrical Safety](#), see page 236
- [Surface Heating of Invasive Transducers](#), see page 253

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 Ultrasound System does not provide explicit control of acoustic power output. Therefore, to minimize the exposure to ultrasound energy, limit the duration of ultrasound examinations.

Electrical Safety

The Terason Ultrasound System conforms to the UL 60601-1 electrical safety standard.

Each transducer is insulated from the patient to minimize patient exposure in the presence of a system fault or a fault in other patient-connected equipment. The type of protection against electric shock is Class I. The degree of protection is Type BF, per safety standard IEC 60601-1.

To maintain compliance with electrical safety and emissions standards, the Terason Ultrasound System must be used *only* with the supplied Medical Grade Power Adapters.

Surface Heating of Invasive Transducers

The average and peak radiated acoustic powers of all Terason transducers are limited by detection circuitry, to insure that the surface heating of the transducer array is less than 43°C.

To limit the average acoustic power output, the maximum pulse repetition frequency (PRF) is tested in hardware by comparing a PRF counter to a preset value. Exceeding the maximum allowable PRF triggers an error message that displays on the host computer, and the Terason Ultrasound System acoustic output is disabled. The preset maximum PRF is chosen to limit the transducer case temperature to less than 43°C when the transducer is touching a patient.

The peak acoustic power is constrained by the maximum voltage applied to the transducer-array elements. In hardware, peak power is monitored by a watchdog device that measures instantaneous power and compares it to two thresholds. The first threshold is a non-programmable four-watt limit. The second threshold is a programmable limit that Terason has set in accordance with IEC 60601-2-37 and AIUM Nema UD2 and UD3 (1998 and 2004).

Indications For Use

This section provides Diagnostic Ultrasound Indications for Use forms for the transducers offered with the Terason ultrasound system. The first table provides indications for use for the system. The remaining tables list the indications for use for the following transducers:

- [Indications for Use - 4V2S Transducer](#), see page 256
- [Indications for Use - 4V2A Transducer](#), see page 257
- [Indications for Use - 5C2A Transducer](#), see page 258
- [Indications for Use - 7L3V Transducer](#), see page 259
- [Indications for Use - 8BP4 Transducer](#), see page 260
- [Indications for Use - 8EC4A Transducer](#), see page 261
- [Indications for Use - 8MC3 Transducer](#), see page 262
- [Indications for Use - 8TV4 Transducer](#), see page 263
- [Indications for Use - 12HL7 Transducer](#), see page 265
- [Indications for Use - 12L5V Transducer](#), see page 266
- [Indications for Use - PDOF Transducer](#), see page 267

Indications for use - Diagnostic Ultrasound System

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM								
System: Terason Ultrasound System								
Transducer: See Comments								
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:								
Clinical Application		Mode of Operation						
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	CWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic							
Fetal Imaging and Other	Fetal	X ^h	X ^h	X ^h		X ^h	X ^h	X ^h
	Abdominal ^k	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Intra-operative ^e	X	X	X		X	X	X
	Intra-operative (Neuro)	X	X	X		X	X	X
	Laparoscopic	X	X	X		X	X	X
	Pediatric	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Small Organ (Thyroid, Breast, Testes, etc.)	X ^d	X ^d	X ^d		X ^d	X ^d	X ^d
	Neonatal Cephalic	X	X	X	X	X	X	X
	Adult Cephalic	X	X	X	X	X	X	X
	Trans-rectal	X ^f	X ^f	X ^f		X ^f	X ^f	X ^f
	Trans-vaginal	X ^g	X ^g	X ^g		X ^g	X ^g	X ^g
	Trans-urethral							
	Trans-esoph. (non-Cardiac)							
	Musculo-skel. (Conventional)	X ^d	X ^d	X ^d		X ^d	X ^d	X ^d
	Musculo-skel. (Superficial)	X ^d	X ^d	X ^d		X ^d	X ^d	X ^d
	Intra-luminal							
	Other (Specify)							
Cardiac	Cardiac Adult	X	X	X	X	X	X	X
	Cardiac Pediatric	X	X	X	X	X	X	X
	Trans-esoph. (Cardiac)							
	Other (specify)							
Peripheral Vessel	Peripheral vessel	X ^d	X ^d	X ^d		X ^d	X ^d	X ^d
	Other (specify)							

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PD; B+CD+PWD.

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^dIncludes ultrasound guidance for placement of needles, catheters.

^eAbdominal organs and peripheral vessels.

^fIncludes ultrasound guidance for placement of needles, catheters, cryosurgery, and brachytherapy.

^gIncludes ultrasound guidance of transvaginal biopsy.

^hIncludes ultrasound guidance of amniocentesis, infertility monitoring of follicle development.

^jIncludes ultrasound guidance for placement of needles.

^kAbdominal includes GYN/Pelvic.

^lOther use includes Urology/Prostate.

Includes uses in military field settings in addition to hospital/clinic settings.

Indications for Use - 4V2S Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM								
System: Terason Ultrasound System								
Transducer: 4V2S								
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:								
Clinical Application		Mode of Operation						
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	CWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic							
Fetal Imaging and Other	Fetal	X ^h	X ^h	X ^h		X ^h	X ^h	X ^h
	Abdominal	X ^d	X ^d	X ^d		X ^d	X ^d	X ^d
	Intra-operative (Specify)							
	Intra-operative (Neuro)							
	Laparoscopic							
	Pediatric	X ^d	X ^d	X ^d		X ^d	X ^d	X ^d
	Small Organ (Thyroid, Breast, Testes, etc.)							
	Neonatal Cephalic	X	X	X		X	X	X
	Adult Cephalic	X	X	X		X	X	X
	Trans-rectal							
	Trans-vaginal							
	Trans-urethral							
	Trans-esoph. (non-Cardiac)							
	Musculo-skel. (Conventional)							
	Musculo-skel. (Superficial)							
	Intra-luminal							
	Other (Specify)							
Cardiac	Cardiac Adult	X	X	X	X	X	X	X
	Cardiac Pediatric	X	X	X		X	X	X
	Trans-esoph. (Cardiac)							
	Other (Specify)							
Peripheral Vessel	Peripheral vessel							
	Other (Specify)							

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PD; B+CD+PWD.

^cTissue Harmonic Imaging (THI).

^dIncludes ultrasound guidance for placement of needles, catheters.

^eAbdominal organs and peripheral vessels.

^fIncludes ultrasound guidance for placement of needles, catheters, cryosurgery, and brachytherapy.

^gIncludes ultrasound guidance of transvaginal biopsy.

^hIncludes ultrasound guidance of amniocentesis, infertility monitoring of follicle development.

Includes uses in military field settings in addition to hospital/clinic settings.

Indications for Use - 4V2A Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM								
System: Terason Ultrasound System								
Transducer: 4V2A								
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:								
Clinical Application		Mode of Operation						
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	CWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic							
Fetal Imaging and Other	Fetal	X ^h	X ^h	X ^h		X ^h	X ^h	X ^h
	Abdominal	X ^d	X ^d	X ^d		X ^d	X ^d	X ^d
	Intra-operative (Specify)							
	Intra-operative (Neuro)							
	Laparoscopic							
	Pediatric	X ^d	X ^d	X ^d		X ^d	X ^d	X ^d
	Small Organ (Thyroid, Breast, Testes, etc.)							
	Neonatal Cephalic	X	X	X		X	X	X
	Adult Cephalic	X	X	X		X	X	X
	Trans-rectal							
	Trans-vaginal							
	Trans-urethral							
	Trans-esoph. (non-Cardiac)							
	Musculo-skel. (Conventional)							
	Musculo-skel. (Superficial)							
	Intra-luminal							
	Other (Specify)							
Cardiac	Cardiac Adult	X	X	X	X	X	X	X
	Cardiac Pediatric	X	X	X		X	X	X
	Trans-esoph. (Cardiac)							
	Other (Specify)							
Peripheral Vessel	Peripheral vessel							
	Other (Specify)							

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PD; B+CD+PWD.

^cTissue Harmonic Imaging (THI).

^dIncludes ultrasound guidance for placement of needles, catheters.

^eAbdominal organs and peripheral vessels.

^fIncludes ultrasound guidance for placement of needles, catheters, cryosurgery, and brachytherapy.

^gIncludes ultrasound guidance of transvaginal biopsy.

^hIncludes ultrasound guidance of amniocentesis, infertility monitoring of follicle development.

Includes uses in military field settings in addition to hospital/clinic settings.

Indications for Use - 5C2A Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM							
System: Terason Ultrasound System							
Transducer: 5C2A							
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:							
Clinical Application		Mode of Operation					
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic						
Fetal Imaging and Other	Fetal	X ^h	X ^h	X ^h	X ^h	X ^h	X ^h
	Abdominal ^k	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Intra-operative (Specify)						
	Intra-operative (Neuro)						
	Laparoscopic						
	Pediatric	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Small Organ (Thyroid, Breast, Testes, etc.)						
	Neonatal Cephalic						
	Adult Cephalic						
	Trans-rectal						
	Trans-vaginal						
	Trans-urethral						
	Trans-esoph. (non-Cardiac)						
	Musculo-skel. (Conventional)						
	Musculo-skel. (Superficial)						
	Intra-luminal						
	Other (Specify)						
Cardiac	Cardiac Adult						
	Cardiac Pediatric						
	Trans-esoph. (Cardiac)						
	Other (Specify)						
Peripheral Vessel	Peripheral vessel	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Other (Specify)						

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PD; B+CD+PWD.

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^dIncludes ultrasound guidance for placement of needles, catheters.

^eAbdominal organs and peripheral vessels.

^fIncludes ultrasound guidance for placement of needles, catheters, cryosurgery, and brachytherapy.

^gIncludes ultrasound guidance of transvaginal biopsy.

^hIncludes ultrasound guidance of amniocentesis, infertility monitoring of follicle development.

^kAbdominal includes GYN/Pelvic.

^lOther use includes Urology/Prostate.

Includes uses in military field settings in addition to hospital/clinic settings.

Indications for Use - 7L3V Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM							
System: Terason Ultrasound System							
Transducer: 7L3V							
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:							
Clinical Application		Mode of Operation					
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic						
Fetal Imaging and Other	Fetal						
	Abdominal ^k	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Intra-operative ^e						
	Intra-operative (Neuro)						
	Laparoscopic						
	Pediatric	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Small Organ (Thyroid, Breast, Testes, etc.)	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Neonatal Cephalic	X	X	X	X	X	X
	Adult Cephalic	X	X	X	X	X	X
	Trans-rectal						
	Trans-vaginal						
	Trans-urethral						
	Trans-esoph. (non-Cardiac)						
	Musculo-skel. (Conventional)	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Musculo-skel. (Superficial)	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Intra-luminal						
	Other (Specify)						
Cardiac	Cardiac Adult						
	Cardiac Pediatric						
	Trans-esoph. (Cardiac)						
	Other (Specify)						
Peripheral Vessel	Peripheral vessel	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Other (Specify)						

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PDV

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^dIncludes ultrasound guidance for placement of needles, catheters.

^eAbdominal organs and peripheral vessels

^kAbdominal includes GYN/Pelvic.

^lOther use includes Urology/Prostate.

Indications for Use - 8BP4 Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM								
System: Terason 8BP4								
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:								
Clinical Application		Mode of Operation						
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	CWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic							
Fetal Imaging and Other	Fetal							
	Abdominal							
	Intra-operative (Specify)							
	Intra-operative (Neuro)							
	Laparoscopic							
	Pediatric							
	Small Organ (Thyroid, Breast, Testes, etc.)							
	Neonatal Cephalic							
	Adult Cephalic							
	Trans-rectal	X ^f	X ^f	X ^f		X ^f	X ^f	X ^f
	Trans-vaginal							
	Trans-urethral							
	Trans-esoph. (non-Cardiac)							
	Musculo-skel. (Conventional)							
	Musculo-skel. (Superficial)							
	Intra-luminal							
Other (Specify)								
Cardiac	Cardiac Adult							
	Cardiac Pediatric							
	Trans-esoph. (Cardiac)							
	Other (Specify)							
Peripheral Vessel	Peripheral vessel							
	Other (Specify)							

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PD; B+CD+PWD.

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^fIncludes ultrasound guidance for placement of needles, catheters, cryosurgery, and brachytherapy.

^gIncludes ultrasound guidance of transvaginal biopsy.

^lOther use includes Urology/Prostate.

Includes uses in military field settings in addition to hospital/clinic settings.

Indications for Use - 8EC4A Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM								
System: Terason Ultrasound System								
Transducer: 8EC4A								
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:								
Clinical Application		Mode of Operation						
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	CWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic							
Fetal Imaging and Other	Fetal	X	X	X		X	X	X
	Abdominal							
	Intra-operative (Specify)							
	Intra-operative (Neuro)							
	Laparoscopic							
	Pediatric							
	Small Organ (Thyroid, Breast, Testes, etc.)							
	Neonatal Cephalic							
	Adult Cephalic							
	Trans-rectal	X ^f	X ^f	X ^f		X ^f	X ^f	X ^f
	Trans-vaginal	X ^g	X ^g	X ^g		X ^g	X ^g	X ^g
	Trans-urethral							
	Trans-esoph. (non-Cardiac)							
	Musculo-skel. (Conventional)							
	Musculo-skel. (Superficial)							
	Intra-luminal							
	Other (Specify)							
Cardiac	Cardiac Adult							
	Cardiac Pediatric							
	Trans-esoph. (Cardiac)							
	Other (Specify)							
Peripheral Vessel	Peripheral vessel							
	Other (Specify)							

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PD; B+CD+PWD.

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^fIncludes ultrasound guidance for placement of needles, catheters, cryosurgery, and brachytherapy.

^gIncludes ultrasound guidance of transvaginal biopsy.

^lOther use includes Urology/Prostate.

Includes uses in military field settings in addition to hospital/clinic settings.

Indications for Use - 8MC3 Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM								
System: Terason Ultrasound System								
Transducer: 8MC3								
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:								
Clinical Application		Mode of Operation						
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	CWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic							
Fetal Imaging and Other	Fetal	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Abdominal							
	Intra-operative (Specify)							
	Intra-operative (Neuro)							
	Laparoscopic							
	Pediatric	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Small Organ (Thyroid, Breast, Testes, etc.)	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Neonatal Cephalic	X	X	X	X	X	X	X
	Adult Cephalic	X	X	X	X	X	X	X
	Trans-rectal							
	Trans-vaginal							
	Trans-urethral							
	Trans-esoph. (non-Cardiac)							
	Musculo-skel. (Conventional)							
	Musculo-skel. (Superficial)							
	Intra-luminal							
	Other (Specify)							
Cardiac	Cardiac Adult	X	X		X	X	X	X
	Cardiac Pediatric	X	X		X	X	X	X
	Trans-esoph. (Cardiac)							
	Other (Specify)							
Peripheral Vessel	Peripheral vessel	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d	X ^d
	Other (Specify)							

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PD; B+CD+PWD.

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^fIncludes ultrasound guidance for placement of needles, catheters, cryosurgery, and brachytherapy.

^gIncludes ultrasound guidance of transvaginal biopsy.

^lOther use includes Urology/Prostate.

Includes uses in military field settings in addition to hospital/clinic settings.

Indications for Use - 8TV4 Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM								
System: Terason Ultrasound System								
Transducer: 8TV4								
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:								
Clinical Application		Mode of Operation						
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	CWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic							
Fetal Imaging and Other	Fetal	X	X	X		X	X	X
	Abdominal							
	Intra-operative (Specify)							
	Intra-operative (Neuro)							
	Laparoscopic							
	Pediatric							
	Small Organ (Thyroid, Breast, Testes, etc.)							
	Neonatal Cephalic							
	Adult Cephalic							
	Trans-rectal	X ^f	X ^f	X ^f		X ^f	X ^f	X ^f
	Trans-vaginal	X ^g	X ^g	X ^g		X ^g	X ^g	X ^g
	Trans-urethral							
	Trans-esoph. (non-Cardiac)							
	Musculo-skel. (Conventional)							
	Musculo-skel. (Superficial)							
	Intra-luminal							
	Other (Specify)							
Cardiac	Cardiac Adult							
	Cardiac Pediatric							
	Trans-esoph. (Cardiac)							
	Other (Specify)							
Peripheral Vessel	Peripheral vessel							
	Other (Specify)							

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PD; B+CD+PWD.

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^fIncludes ultrasound guidance for placement of needles, catheters, cryosurgery, and brachytherapy.

^gIncludes ultrasound guidance of transvaginal biopsy.

^lOther use includes Urology/Prostate.

Includes uses in military field settings in addition to hospital/clinic settings.

Indications for Use - 10V5S Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM							
System: Terason Ultrasound System							
Transducer: 10V5S							
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:							
Clinical Application		Mode of Operation					
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic						
Fetal Imaging and Other	Fetal						
	Abdominal						
	Intra-operative Vascular						
	Intra-operative (Neuro)						
	Laparoscopic						
	Pediatric						
	Small Organ (Thyroid, Breast, Testes, etc.)						
	Neonatal Cephalic						
	Adult Cephalic						
	Trans-rectal						
	Trans-vaginal						
	Trans-urethral						
	Trans-esoph. (non-Cardiac)						
	Musculo-skel. (Conventional)						
	Musculo-skel. (Superficial)						
	Intra-luminal						
	Vascular access	X	X	X	X	X	X
	Cardiac	Cardiac Adult					
Cardiac Pediatric							
Trans-esoph. (Cardiac)							
Other (Specify)							
Peripheral Vessel	Peripheral vessel						
	Other (Specify)						

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PDV

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^dIncludes ultrasound guidance for placement of needles, catheters.

^eAbdominal organs and peripheral vessels

^kAbdominal includes GYN/Pelvic.

Indications for Use - 12HL7 Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM							
System: Terason Ultrasound System							
Transducer: 12HL7							
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:							
Clinical Application		Mode of Operation					
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic						
Fetal Imaging and Other	Fetal						
	Abdominal						
	Intra-operative Vascular	X	X	X	X	X	X
	Intra-operative (Neuro)	X	X	X	X	X	X
	Laparoscopic	X	X	X	X	X	X
	Pediatric	X	X	X	X	X	X
	Small Organ (Thyroid, Breast, Testes, etc.)	X	X	X	X	X	X
	Neonatal Cephalic						
	Adult Cephalic						
	Trans-rectal						
	Trans-vaginal						
	Trans-urethral						
	Trans-esoph. (non-Cardiac)						
	Musculo-skel. (Conventional)	X	X	X	X	X	X
	Musculo-skel. (Superficial)	X	X	X	X	X	X
	Intra-luminal						
	Other (Specify)						
Cardiac	Cardiac Adult						
	Cardiac Pediatric						
	Trans-esoph. (Cardiac)						
	Other (Specify)						
Peripheral Vessel	Peripheral vessel	X	X	X	X	X	X
	Other (Specify)						

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PDV

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^dIncludes ultrasound guidance for placement of needles, catheters.

^eAbdominal organs and peripheral vessels

^kAbdominal includes GYN/Pelvic.

^lOther use includes Urology/Prostate.

Indications for Use - 12L5V Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM							
System: Terason Ultrasound System							
Transducer: 12L5V							
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:							
Clinical Application		Mode of Operation					
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic						
Fetal Imaging and Other	Fetal						
	Abdominal	Xd	Xd	Xd	Xd	Xd	Xd
	Intra-operative						
	Intra-operative (Neuro)						
	Laparoscopic						
	Pediatric	Xd	Xd	Xd	Xd	Xd	Xd
	Small Organ (Thyroid, Breast, Testes, etc.)	Xd	Xd	Xd	Xd	Xd	Xd
	Neonatal Cephalic	X	X	X	X	X	X
	Adult Cephalic	X	X	X	X	X	X
	Trans-rectal						
	Trans-vaginal						
	Trans-urethral						
	Trans-esoph. (non-Cardiac)						
	Musculo-skel. (Conventional)	Xd	Xd	Xd	Xd	Xd	Xd
	Musculo-skel. (Superficial)	Xd	Xd	Xd	Xd	Xd	Xd
	Intra-luminal						
	Other (specify)						
Cardiac	Cardiac Adult						
	Cardiac Pediatric						
	Trans-esoph. (Cardiac)						
	Other (specify)						
Peripheral Vessel	Peripheral vessel	Xd	Xd	Xd	Xd	Xd	Xd
	Other (specify)						

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^bB+M; B+PWD; B+CD; B+DPD; B+PD; B+CD+PWD.

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^dIncludes ultrasound guidance for placement of needles, catheters.

^eAbdominal organs and peripheral vessels.

^kAbdominal includes GYN/Pelvic.

^lOther use includes Urology/Prostate.

Indications for Use - PDOF Transducer

DIAGNOSTIC ULTRASOUND INDICATIONS FOR USE FORM								
System: Terason Ultrasound System								
Transducer: PDOF								
Intended Use: Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:								
Clinical Application		Mode of Operation						
General (Track 1 Only)	Specific (Tracks 1 and 3)	B	M	PWD	CWD	Color Dopp ^a	Comb. Modes ^b	Other ^c
Ophthalmic	Ophthalmic							
Fetal Imaging and Other	Fetal							
	Abdominal							
	Intra-operative (Specify)							
	Intra-operative (Neuro)							
	Laparoscopic							
	Pediatric							
	Small Organ (Thyroid, Breast, Testes, etc.)							
	Neonatal Cephalic							
	Adult Cephalic							
	Trans-rectal							
	Trans-vaginal							
	Trans-urethral							
	Trans-esoph. (non-Cardiac)							
	Musculo-skel. (Conventional)							
	Musculo-skel. (Superficial)							
	Intra-luminal							
	Other (Specify)							
	Cardiac	Cardiac Adult				X		
Cardiac Pediatric					X			
Trans-esoph. (Cardiac)								
Other (Specify)								
Peripheral Vessel	Peripheral vessel							
	Other (Specify)							

^aIncludes Color Doppler (CD), Directional Power Doppler (DPD), and (non-directional) Power Doppler (PD).

^b2D+M; 2D+PWD; 2D+CD; 2D+DPD; 2D+PDV

^cTissue Harmonic Imaging (THI), Tissue Doppler Imaging (TDI).

^dIncludes ultrasound guidance for placement of needles, catheters.

^eAbdominal organs and peripheral vessels.

^kAbdominal includes GYN/Pelvic.

^lOther use includes Urology/Prostate.

Acoustic Output Indices

The Terason Ultrasound System complies with the *Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment* (UD3-98). When the relevant output index is below 1.0, the index value is not displayed.

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

As described in this User Guide, minimizing the real-time displayed index values 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.

General Description of Indices

For a detailed explanation of the clinical significance and proper use of the real-time acoustic output indices displayed on the Terason image display, consult relevant literature and educational materials available from industry and professional organizations concerned with medical ultrasound. To help understand how adjustment of the controls may affect the display of indices during an exam, read the following overview.

In general, indexes are described in terms of the following factors.

- **Potential bioeffect of concern:** Mechanical (cavitation or other non-thermal mechanical effects), or thermal (heating of tissue through absorption of the ultrasound energy) -for all indices, an index value less than 1.0 indicates relatively low risk for harm to the patient when the index is applied properly.
- **Type of operating mode:** Generally, mechanical effects are a greater concern during 2D-only operation, while thermal effects are a greater concern during any non-2D operation. Thermal effects of non-scanned modes (M-Mode and Pulsed-Wave Doppler modes) are calculated separately from effects of scanned modes (Color Doppler and Power Doppler modes).
- **Type of and location of tissue of concern:** Bone or soft tissue, located either at the tissue surface nearest the transducer, or at or near the beam focus.
- **Measured acoustic parameters:** Ultrasound power, time average intensity, or instantaneous peak pressure used in calculating the index value. All calculations assume an attenuation (or “derating”) rate of 0.3 dB/cm/MHz.

MI: The Mechanical Index

MI is of possible clinical interest if the beam focus is close to the surface of lung tissue. MI has the following characteristics:

- **Potential bioeffect:** Any possible mechanical or non-thermal mechanisms - although the likelihood of adverse consequences from these causes is not well understood, such risk may be highest in the presence of gas-saturated structures such as lung tissue.
- **Mode type:** Calculated for 2D only operation.
- **Tissue type and location:** Soft tissue at all locations in the scan field.
- **Acoustic parameter:** Maximum negative (rarefactional) ultrasound pressure at focus.

TIS: The Soft Tissue Thermal Index

TIS is of interest in the absence of bone, either at the tissue surface or near the beam focus. Applications of clinical interest include general abdominal examinations, first-trimester scanning before fetal bone has ossified, and cardiology. TIS has the following characteristics.

- **Potential bioeffect:** Thermal heating of soft tissue due to absorption of ultrasound. The TIS value is the ratio of the current transducer power to the reference level that would cause a 1°C temperature rise in soft tissue.
- **Mode type:** Relevant for all non-2D only modes, in both scanned and non-scanned modes.
- **Tissue type and location:** In scanned modes, soft tissue at the surface is of concern. In non-scanned modes, heating of soft tissue along the beam axis between the surface and focus is considered.
- **Acoustic parameters:** For scanned modes, the associated intensity at the surface is usually related to surface tissue heating. For unscanned modes, the maximum derated power through a 1-cm² area anywhere along the beam axis is the basis for estimating tissue heating: unscanned beams less than 1cm² in area at the surface are assumed to contribute only to surface heating, and the calculated effects are combined with those of scanned modes to estimate total soft-tissue heating at the surface. Unscanned beams larger than 1 cm² at the surface are assumed to heat tissue only near the focus. Total heating effects at the surface and focus are compiled separately, and the larger value is reported as TIS.

TIB: The Bone Tissue Thermal Index

TIB is of concern when bone is near the beam focus. Applications of clinical interest include second- and third-trimester Doppler (when the beam focus is near fetal bone), and Neonatal Cephalic Doppler (when the beam focus is near cranial bone). TIB has the following characteristics.

- **Potential bioeffect:** Thermal heating of bone (and indirect heating of adjacent soft tissue) due to absorption of ultrasound at the bone surface. The TIB value indicates the

ratio of the current power level from the transducer to the reference power level that would cause a 1°C steady-state temperature rise in bone located at the beam focus.

- **Mode type:** Calculated for all non-2D only operation, in both scanned and non-scanned modes.
- **Tissue type and location:** In scanned modes, the model for soft tissue at the surface is also used to calculate the maximum possible heating of bone at the beam focus. For non-scanned modes, possible heating of bone near the beam focus is considered directly.
- **Acoustic parameters:** For scanned modes, the time-average intensity at the transducer surface is closely related to estimated heating effects. For unscanned modes, the maximum product along the beam axis of both derated power and intensity is the basis for calculating possible bone heating. Total heating effects for scanned and unscanned modes are compiled separately, and the larger value is reported as TIB.

TIC: The Cranial (Bone) Thermal Index

TIC is of concern when bone is near the tissue surface and in close proximity to the transducer aperture. Clinical applications of interest are specific to those involving transcranial scanning. General information about the Cranial Thermal Index follows.

- **Potential bioeffect:** Thermal heating of cranial bone (with indirect heating of adjacent brain tissue) due to absorption of ultrasound by the cranial bone. TIC is defined as the ratio of the current transducer power level to the reference power level that would cause a 1°C steady-state temperature rise in cranial bone located at the transducer surface.
- **Mode type:** Calculated for all non-2D only operation, in both scanned and non-scanned modes.
- **Tissue type and location:** Cranial bone, located near the tissue surface and near the transducer aperture.
- **Acoustic parameter:** For each active mode, the product of estimated power and intensity at the transducer surface is the basis for calculating cranial bone heating. Heating effects of all modes are combined to calculate the TIC.

Relevant Acoustic Output Indices

When operating in any mode with the Freeze function disabled, the window displays the indices relevant to the active transducer and operating mode. The definition of relevant indices is as follows:

Acoustic Output Indices for Modes and Transducers

Mode Type Currently Active	Allowed Transducer Applications	Relevant Indices
2D only	Include <i>neither</i> Adult Cephalic <i>nor</i> Neonatal Cephalic	MI, TIS, TIB
2D only	Include <i>either</i> Adult Cephalic <i>or</i> Neonatal Cephalic	MI, TIS, TIB, TIC
Any mode, other than 2D-only	Include <i>neither</i> Adult Cephalic <i>nor</i> Neonatal Cephalic	TIS, TIB

Acoustic Output Indices for Modes and Transducers

Mode Type Currently Active	Allowed Transducer Applications	Relevant Indices
Any mode, other than 2D-only	Include <i>either</i> Adult Cephalic <i>or</i> Neonatal Cephalic	TIS, TIB, TIC

Acoustic Output Index Displays

This section describes the acoustic output display in various modes.

Only certain transducers used with the Terason Ultrasound System are intended for transcranial examinations (Neo-natal Cephalic uses). If the transducer used does not support transcranial exams, the index display does not include TIC.



Warning: For neonatal head imaging, Terason recommends that you exercise special care during neonatal cephalic scanning to avoid possible damage to the posterior region of the eye. The ultrasound energy emitted by the transducer easily penetrates the fontanelles of the infant.

Index Display in 2D

In 2D only, with the Freeze control off, a value for MI (the Mechanical Index) displays. When the maximum value of a relevant acoustic for a particular transducer is less than 1.0, the 2D image display always shows the label for the Mechanical Index in standard video, with no current MI value displayed.

MI:

Since 2D operation under such conditions is considered without significant risk from non-linear acoustic effects, the Terason Ultrasound System can be used in 2D with all available transducers, for all intended applications, without concern for monitoring and minimizing a displayed MI value. However, in keeping with ALARA, the system should generally be operated in the shallowest depth control setting that yields the desired image quality (to minimize the MI value).

Index Display for Modes Other Than 2D

When any mode other than 2D is active, the MI display is replaced by a display showing the thermal indices relevant to the transducer in use. The indices are TIS (soft tissue), TIB (bone), and TIC (cranial). When control settings for the active transducer do not allow TIS, TIB, or TIC to exceed 1.0, the indices are shown without any value. In those cases, the Thermal Index display is as follows:

TIB:

TIS:

TIC:

For these transducers, operation in the intended clinical applications is without significant tissue-heating risk from ultrasound energy. No real-time monitoring of TI values is required, and the transducer can be used without concern for minimizing any displayed TI value.



Note: In M-mode, some transducers also show the mechanical index. If the transducer in use is one of those, MI is displayed. Otherwise, MI does not display.

Some other transducers used with the Terason Ultrasound System may produce the following thermal index display:

TIB: 0.8
TIS:
TIC:

Since the label for TIS and TIC is still shown in standard video format and no value is displayed, no real-time monitoring of TIS or TIC values is required. The TIB index display, however, indicates that the controls for the transducer in use can be set so that the Bone Thermal Index exceeds 1.0. (In the example shown, the current real-time TIB value is approximately 0.8).

Another group of transducers used the Terason Ultrasound System might produce the following thermal index display:

TIB: 0.8
TIS: 0.6
TIC: 0.4

The display of the Thermal Index labels indicates that the controls for the transducer in use may sometimes be set so that either the TIS, the TIB, the TIC, or any combination may exceed 1.0.

Control of Acoustic Index Parameters

For any transducer used with the Terason Ultrasound System in which all relevant acoustic indices are displayed in standard video (without an associated real-time value), operation in the intended clinical applications of the active transducer is considered normally without significant risk due to mechanical effects or heating of tissues by ultrasound energy. No real-time MI or TI values need be monitored, and the transducer may be used without concern for minimizing the displayed value of any index.

For any transducer in which one or more relevant indices are displayed, some control settings may produce an index value greater than 1.0. For those indices, real-time values are displayed, to allow monitoring and control. The displayed indexes may take on the following values (shown along with the corresponding labels, where x indicates the actual calculated index value):

Acoustic Index Parameters

Display of TI Values	
Range of calculated value $x_{\text{Calc.}}$	Displayed value x_{Display}
$x < 0.4$	< 0.4
$0.4 \leq x < 0.5$	0.4
$0.5 \leq x < 0.7$	0.6
$0.7 \leq x < 0.9$	0.8
$0.9 \leq x < 1.1$	1.0
$1.1 \leq x < 1.3$	1.2
$1.3 \leq x < 1.5$	1.4
$1.5 \leq x < 1.7$	1.6
$1.7 \leq x < 1.9$	1.8
$1.9 \leq x < 2.25$	2.0
$2.25 \leq x < 2.75$	2.5
$2.75 \leq x < 3.25$	3.0
Etc.	Etc.

Display of MI Values	
Range of calculated value $x_{\text{Calc.}}$	Displayed value x_{Display}
$x < 0.4$	< 0.4
$0.4 \leq x < 0.5$	0.4
$0.5 \leq x < 0.7$	0.6
$0.7 \leq x < 0.9$	0.8
$0.9 \leq x < 1.1$	1.0
$1.1 \leq x < 1.3$	1.2
$1.3 \leq x < 1.5$	1.4
$1.5 \leq x < 1.7$	1.6
$1.7 \leq x < 1.9$	1.8
$x = 1.9$	1.9

In all operating modes with the Terason Ultrasound System, control of acoustic exposure is available indirectly. For a description of the indirect effects that certain control adjustments may have on displayed index values, consult Chapter 5 - [Working With Scan Modes](#) for information on the particular operating modes.

Accuracy of Acoustic Output Display

The acoustic output display indices are calculated on the basis of measured values of acoustic parameters (acoustic power, intensity, pressure, etc.). The accuracy of the indices (discussed in the *Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment*) described below refers to accuracy of the measurement of the acoustic parameters and the effect of these errors on the estimated index values. (For a discussion of statistical considerations in acoustic measurement, refer to “Measurement Uncertainty in Ultrasonic Exposimetry”, in *Ultrasonic Exposimetry*, M. C. Ziskin and P. A. Lewin, eds., CRC Press).

The remainder of this section lists the relative errors for the following items:

- Intensity measurements
- Spatial-peak derated pulse-intensity integral, defined as $\epsilon_{\text{SPPA.3}}$
- Spatial-peak derated temporal average intensity for unscanned modes
- Spatial-peak derated temporal average intensity for scanned modes
- Peak derated rarefactional pressure
- Mechanical Index
- Soft-Tissue Thermal Index for scanned modes, total acoustic power at the scan/beam entrance to the body
- Soft-Tissue Thermal Index for unscanned modes, when the beam-entrance dimension is less than 1 cm² in area
- Soft-Tissue Thermal Index for unscanned modes, when the beam-entrance dimension is greater than 1 cm² in area
- Bone Thermal Index for unscanned modes
- Cranial Thermal Index

The **relative error in intensity measurements due to uncertainty in the hydrophone calibration**, defined as ϵ_k , is approximately:

$$\epsilon_k = (\epsilon_{\text{Cal}}^2 + \epsilon_A^2 + \epsilon_{V^2}^2)^{\frac{1}{2}} = 10.2\%$$

where the following are defined:

- ϵ_{Cal} Calibration error, as supplied by the National Physical Laboratory; 8% at the frequency range of the transducers tested.
- ϵ_A Relative error in the reproducibility of positioning the hydrophone at the point of the spatial peak of the pulse intensity integral, estimated as 5%
- ϵ_{V^2} Relative error resulting from errors in reading peak squared voltage in the recorded waveform, estimated as 4%

The **relative error in the spatial-peak derated pulse-intensity integral, defined as $\epsilon_{\text{SPPA.3}}$** , is approximately:

$$\epsilon_{\text{SPPA.3}} = (\epsilon_k^2 + \epsilon_{\text{TI}}^2 + \epsilon_{\text{stab}}^2 + \epsilon_{.3}^2 + \epsilon_{\text{lin}}^2 + \epsilon_v^2 + \epsilon_{\text{PD}}^2)^{1/2} = 12.8\%$$

where the following is defined:

- ϵ_{TI} Relative error due to hydrophone positioning and temporal integration of the waveform, estimated as 4%
- ϵ_{stab} Relative error due to temporal instability of the hydrophone, estimated as 1%
- $\epsilon_{.3}$ Relative error in estimating derating factor, due to uncertainties in estimating frequency and reproducibility in determining derating location, estimated as 4%

ε_{lin}	Relative error due to the effects of non-linearities in the pressure waveform upon the hydrophone and integral amplifier, estimated as 0% for this transducer set
ε_{PD}	Relative error in estimate of pulse duration, estimated as 5%

The **relative error in the spatial-peak derated temporal average intensity for unscanned modes**, defined as $\varepsilon_{SPTA.3-unc.}$, is approximately:

$$\varepsilon_{SPTA.3-unc.} = (\varepsilon_{SPPII.3}^2 + \varepsilon_{prf}^2)^{1/2} = 11.3\%$$

where the following is defined:

ε_{prf}	Relative error in prf estimation for operating condition giving actual peak ISPTA.3-unc., estimated as 1%
---------------------	---

The **relative error in estimating spatial-peak derated temporal average intensity for scanned modes**, defined as $\varepsilon_{SPTA.3-scan.}$, is approximately:

$$\varepsilon_{SPTA.3-scan.} = (\varepsilon_{SPPII.3}^2 + \varepsilon_{srf}^2 + \varepsilon_{BOF}^2)^{1/2} = 12.8\%$$

where the following are defined:

ε_{srf}	Relative error in estimating srf (scan repetition frequency) for operating condition giving actual peak $I_{SPTA.3-scan.}$, estimated as 1%
ε_{BOF}	Relative error in estimating BOF (beam-overlap factor) for operating conditions giving actual peak $I_{SPTA.3-scan.}$, estimated as 5%

The **relative error in the peak derated rarefactional pressure**, defined as $\varepsilon_{pr.3}$, is approximately:

$$\varepsilon_{pr.3} = \left(\frac{1}{2}\right) \varepsilon_{SPPII.3} = 5.9\%$$



Note: In accordance with Subsection 6.4.3 (Measurement of Precision of Peak Rarefactional Pressure, p_r) of the *Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment*, a series of ten independent measurements on the specified standard test transducer/driver combination yielded a relative standard deviation of W of less than 1% for the sample measurements.

The **relative error in the Mechanical Index**, defined as ε_{MI} , is approximately:

$$\varepsilon_{MI} = \left(\varepsilon_{pr.3}^2 + \left(\frac{\varepsilon_{fc}}{2} \right)^2 \right)^{1/2} = 6.4\%$$

where the following is defined:

ε_{fc} Relative error in estimating center frequency, estimated as 5%.



Note: In accordance with Subsection 6.4.1 (Measurement of Precision of Center Frequency f_c) of the *Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment*, a series of ten independent measurements on the specified standard test transducer/driver combination yielded a relative standard deviation of f_c of less than 1% for the sample measurements.

The **relative error in the Soft-Tissue Thermal Index for scanned modes**, defined as $\varepsilon_{TISscan}$, is approximately:

$$\varepsilon_{TISscan} = (\varepsilon_{W01}^2 + \varepsilon_{fc}^2)^{1/2} = 11.2\%$$

where the following is defined:

ε_{W01} Relative error in estimating the peak acoustic power from a 1 cm width of the active scanned aperture, estimated as 10%



Note: In accordance with Subsection 6.4.2 (Measurement of Precision of Power, W) of the *Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment*, a series of ten independent measurements on the specified standard test transducer/driver combination yielded a relative standard deviation of W of less than 1% for the sample measurements.

The **relative error in total acoustic power at the scan/beam entrance to the body**, defined as ε_{W0} , is approximately:

$$\varepsilon_{W0} = \varepsilon_{FB} = 10\%$$



Note: In accordance with Subsection 6.4.2 (Measurement of Precision of Power, W) of the *Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment*, a series of ten independent measurements on the specified standard test transducer/driver combination yielded a relative standard deviation of W of less than 1% for the sample measurements.

The **relative error in the Soft-Tissue Thermal Index for unscanned modes, when the beam-entrance dimension is less than 1 cm² in area**, defined as $\varepsilon_{\text{TISunc-A} < 1}$, is approximately:

$$\varepsilon_{\text{TISunc-A} \leq 1} = (\varepsilon_{W0}^2 + \varepsilon_{fc}^2)^{1/2} = 11.2\%$$

The **relative error in the Soft-Tissue Thermal Index for unscanned modes, when the beam-entrance dimension is greater than 1 cm² in area**, defined as $\varepsilon_{\text{TISunc-A} > 1}$, is approximately:

$$\varepsilon_{\text{TISunc-A} > 1} = (\varepsilon_{W0}^2 + \varepsilon_{fc}^2 + \varepsilon_{\text{ITA.6}}^2)^{1/2} = 16.2\%$$

where the following is defined:

$\varepsilon_{\text{ITA.6}}$ Relative error in estimating the spatial peak intensity, when derated at 0.6 dB/cm/MHz, estimated to be:

$$\varepsilon_{\text{ITA.6}} = \varepsilon_{\text{SPTA.3-unc.}} = 11.8\%$$

The **relative error in the Bone Thermal Index for unscanned modes**, defined as $\varepsilon_{\text{TIBunc.}}$, is approximately:

$$\varepsilon_{\text{TIBunc.}} = (1/2)(\varepsilon_{W0}^2 + \varepsilon_{\text{ITA.6}}^2)^{1/2} = 7.7\%$$

The **relative error in estimating the Cranial Thermal Index**, defined as ε_{TIC} , is approximately:

$$\varepsilon_{\text{TIC}} = (\varepsilon_{W0}^2 + \varepsilon_{\text{Deq}}^2)^{1/2} = 10.2\%$$

where the following is defined:

ε_{Deq} Relative error in estimating the equivalent diameter of the active aperture, estimated as 2%

The **estimated relative errors of the calculated indices** are as follows.

$$\varepsilon_{\text{MI}} = 6.4\%$$

$$\varepsilon_{\text{TISscan}} = 11.2\%$$

$$\varepsilon_{\text{TISunc-A} < 1} = 11.2\%$$

$$\varepsilon_{\text{TISunc-A>1}} = 16.2\%$$

$$\varepsilon_{\text{TIBunc}} = 7.7\%$$

$$\varepsilon_{\text{TIC}} = 10.2\%$$

Relationship of Index to Display Accuracy

The discussion above concerns the relationship between the calculated index value ($x_{\text{Calc.}}$), and the “true” value (x_{Actual}), which would be obtained under conditions without measurement uncertainty. Display precision is the relationship between the displayed index value (x_{Display}) and ($x_{\text{Calc.}}$). The displayed values (shown in reverse video along with the corresponding labels) may take on the following values (where x indicates the actual calculated index value ($x_{\text{Calc.}}$)).

Display Precision of TI Values

The following table indicates the precision of the display for TI values.

TI Value Precision

Range of calculated value $x_{\text{Calc.}}$	Displayed value x_{Display}
$x < 0.4$	<0.4
$0.4 \leq x < 0.5$	0.4
$0.5 \leq x < 0.7$	0.6
$0.7 \leq x < 0.9$	0.8
$0.9 \leq x < 1.1$	1.0
$1.1 \leq x < 1.3$	1.2
$1.3 \leq x < 1.5$	1.4
$1.5 \leq x < 1.7$	1.6
$1.7 \leq x < 1.9$	1.8
$1.9 \leq x < 2.25$	2.0
$2.25 \leq x < 2.75$	2.5
$2.75 \leq x < 3.25$	3.0
Etc.	Etc.

Display Precision of MI Values

The following table indicates the precision of the display for MI values.

MI Value Display Precision

Range of calculated value $x_{\text{Calc.}}$	Displayed value x_{Display}
$x < 0.4$	< 0.4
$0.4 \leq x < 0.5$	0.4

MI Value Display Precision (Continued)

Range of calculated value $x_{\text{Calc.}}$	Displayed value x_{Display}
$0.5 \leq x < 0.7$	0.6
$0.7 \leq x < 0.9$	0.8
$0.9 \leq x < 1.1$	1.0
$1.1 \leq x < 1.3$	1.2
$1.3 \leq x < 1.5$	1.4
$1.5 \leq x < 1.7$	1.6
$1.7 \leq x < 1.9$	1.8
$x = 1.9$	1.9

When the effects of calculation errors are combined with the effects of display precision, overall Display Accuracy can be defined as follows:

$$\text{DisplayAccuracy} = \frac{x_{\text{Display}} - x_{\text{Actual}}}{x_{\text{Actual}}}$$

The following table lists the values of Display Accuracy that are estimated to occur with the Terason Ultrasound System. These values of Display Accuracy are given in conjunction with the values of relevant indices that may be displayed with transducers available with the system.

Items in the following table correspond to index values actually displayed with the Terason Ultrasound System. For those indices for which no values are displayed, all calculated values of the index are less than 1.0 when the given index is considered relevant to the operating mode and possible intended use of the transducer.

Estimated Display Accuracy Values

Display Value	MI	TIS _{scan}	TIS _{unsc-A<1}	TIS _{unsc-A>1}	TIB _{unsc}	TIC
<0.4	(a) (b)	(a) (b)	(a) (b)	(a) (b)	(a) (b)	(a) (b)
0.4	0% to -18%	0% to -18%	0% to -18%	0% to -18%	0% to -18%	0% to -18%
0.6	20% to -13%	20% to -13%	20% to -13%	20% to -13%	20% to -13%	20% to -13%
0.8	14% to -10%	14% to -10%	14% to -10%	14% to -10%	14% to -10%	14% to -10%
1.0	11% to -8%	11% to -19%	11% to -19%	11% to -19%	11% to -19%	11% to -19%
1.2	9% to -7%					
1.4	8% to -6%					
1.5		20% to -14%	20% to -14%	20% to -14%	20% to -14%	20% to -14%
1.6	7% to -5%					
1.8	6% to -10%					
2.0	(c)	14% to -11%	14% to -11%	14% to -11%	14% to -11%	14% to -11%
2.5						
3.0		33% to -14%	33% to -14%	33% to -14%	33% to -14%	33% to -14%

Estimated Display Accuracy Values (Continued)

Display Value	MI	TIS _{scan}	TIS _{unsc-A<1}	TIS _{unscA>1}	TIB _{unsc}	TIC
3.5						
4.0		14% to -11%	14% to -11%	14% to -11%	14% to -11%	14% to -11%

- a. Display Accuracy is not defined for actual index values (x_{Actual}) of zero.
b. $x_{\text{Display}} - x_{\text{Actual}}$ is always greater than zero.
c. Mechanical Index (MI) values greater than 1.9 exceed FDA Guideline levels.

Acoustic Output Tables

Terason tests all transducers it sells for use on humans, to determine their maximum acoustic outputs in the scanning modes supported by the transducers. When the results of those tests require reporting, a table is generated and included in Appendix F, [Acoustic Output Reporting for Track 3](#). The following table lists which combinations of transducer and mode can produce acoustic outputs that exceed the reporting thresholds. There are also tables for some combinations that do not produce outputs exceeding the thresholds.

Track 3 Transducer/Mode Combination Summary

Transducer Model	Mode						
	2D	M	PWD	CWD	Color Doppler ^a	Combined ^b	Other
4V2A	X	X	X	X	X	X	
4V2S	X	X	X	X	X	X	
5C2A			X		X	X	
7L3V			X		X	X	
8BP4	X	X	X		X		
8EC4A	X	X	X		X	X	
8MC3	X	X	X		X	X	
8TV4 (t3000 only)	X	X	X		X	X	
10V5S (t3000 only)	X	X	X		X	X	
12HL7	X	X	X		X	X	
12L5V	X	X	X		X	X	
PDOF				X			

- a. Includes Directional Power Doppler (DPD), Non-Directional Power Doppler (PD), and Color Doppler (CD).
b. 2D+PWD: refer to acoustic output tables for PWD in Appendix F, [Acoustic Output Reporting for Track 3](#).

Accuracy Measures

The following general assumptions can be made about the accuracy of any ultrasound system:

- Velocity of sound uncertainty = 5%
- Tissue shape is modeled as an ellipse or an ellipsoid
- Caliper placement accuracy is one pixel (operator dependent)
- Measurement accuracy is based on the root-mean-square combination of all independent sources of error
- RMS errors are due to velocity of sound uncertainty, pixel error, and typical transducer geometry

Distance Accuracy

Distance accuracy measures are as follows:

Formula:

$$D = \sqrt{(x_1 + x_2)^2 + (y_1 + y_2)^2}$$

where (x₁,y₁) and (x₂,y₂) are the coordinates of the end points.

Range: 0-20 cm

Accuracy: For a 20 cm measurement, a 1 pixel error is 0.2 mm.

RMS errors:

- For D = 10mm, accuracy = 9%
- For D = 20mm, accuracy = 6%
- For D > 50mm, accuracy = 5%

Area

Area accuracy measures are as follows:

Assumptions: Circular cross section, length of axes: 2a, 2b

Formula: K=πab

Range: 0-300 cm²

Accuracy: Determined by two independent distance measurements. The derivation of a particular tissue shape from the circular model cannot be quantified.

RMS errors: For A=3.1 cm², accuracy=4%

Circumference

Circumference accuracy measures are as follows:

Assumptions: Elliptical cross section, length of axes: 2a, 2b

Formula: $C = 2\pi \sqrt{\frac{a^2 + b^2}{2}}$

Range: 0-60 cm

Accuracy: Determined by two independent distance measurements

RMS errors: For C=6.3 cm, accuracy=6%

Volume

Volume accuracy measures are as follows:

Assumptions: Cylinder, length of axes: 2a, 2b, 2c (height)

Formula: $V = 4/3(\pi abc)$

Range: 0-3000 ml

Accuracy: Determined by three independent distance measurements. The deviation of a particular shape from the ellipsoid cannot be quantified.

RMS errors: For V=16 ml, accuracy=8%

Reference information for the above accuracy measures was obtained from the following source:

Standard Mathematical Tables, 24th Edition, (Cleveland: CRC Press, 1976), 12, 17.

Processing Terason Transducers Between Uses

Each transducer must be processed between uses according to the type of tissue it will contact during use:

- Non-critical applications in which the device contacts only intact skin –clean and low-level disinfect the transducer.
- Semi-critical use, such as endocavity applications (where the device may contact mucous membranes) – clean and high-level disinfect the transducer. Use of a sheath is recommended. The sheath can be surgically clean for transvaginal or transrectal uses, but must be sterile for endoscopic use.
- Critical use, in which the device contacts blood, compromised tissue, or is used in a sterile field – clean and at least high-level disinfect the transducer. Use of a sheath is required.



Warning: In addition to the instructions in this guide, follow the instructions provided by the manufacturer of cleaners and disinfectants.



Warning: Never place the electronics casing on the floor when cleaning the transducer. The cable connection to the electronics must always be higher than the lowest point of the cable, to prevent fluid from flowing down the cable to the electronics.

For information on cleaning the laptop computer, refer to the laptop's user guide.

General Cleaning

After use that involves only contact with intact skin, cleaning and low-level disinfection are generally sufficient. If high-level disinfection is required (as in semi-critical or critical uses), the transducer must be first be cleaned and then processed using one of the high-level disinfectants listed in [High-Level Disinfectants](#) on page 284.

Between patient exams, perform the following steps to clean the transducer:

1. Wipe all ultrasound transmission **gel** off the transducer.
2. Wipe the **transducers and cable** with a dry, water-moistened or precleaner-moistened soft cloth.
3. To clean the transducer, wipe it with a cloth moistened with a (typically) **low-level disinfectant** from the list on page 284.
4. To prevent the solution from air-drying on the transducer and cable, immediately wipe them with a soft cloth moistened with **sterile water**.



Warning: Some cleaning techniques can damage transducers. Do not sterilize a transducer with autoclave, ultraviolet, gamma radiation, gas, or dry-heat sterilization techniques. Transducers can be submerged up to, but not including, the strain relief of the transducer array. Do not immerse or soak any other part of a transducer in any cleaning material.



Warning: The cable and connector are not waterproof. Do not immerse the cable or allow liquid to contact the connector.



Warning: The Terason Ultrasound System (electronics), the laptop, and the AC/DC adapter are not protected from spills or splashes. Protect them with a drape as needed when cleaning the transducers.

Precleaners and Low-Level Disinfectants

The following precleaners and disinfectants have been tested and found compatible with transducers used with the Terason Ultrasound System:

- Enzol
- Klenzyme
- Alkazyme

High-Level Disinfectants

The following high-level disinfectants have been tested, found compatible with transducers used with the Terason Ultrasound System, and are cleared for use by the United States Food and Drug Administration (FDA):

- Cidex 2%
- Cidex OPA
- Cidex Plus

For more information on infection control, refer to the following articles:

- *Design Testing and Labeling of Reusable Medical Devices for Reprocessing in Healthcare Facilities: A Guide for Manufacturers*, AAMI Publishing Company, 1995
- *Disinfections and Preservation*, Block, Seymour S., Lea and Febiger, 1991
- *Sterilants and High Level Disinfectants Cleared by FDA in a 510(k)*, <http://www.fda.gov/cdrh/ode/germlab.html>

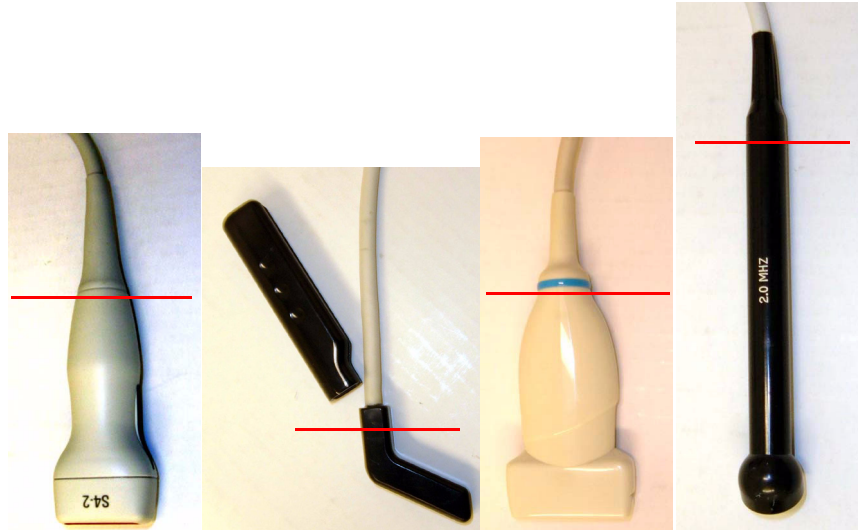
Pre-Cleaning

Immerse the transducer in an enzymatic antiseptic detergent solution, using one of the precleaners previously listed.

Soak the transducer in the enzymatic detergent for at least 30 minutes to remove all visible soil and dried protein.



Warning: Transducers can be submerged to, but not including, the strain relief of the transducer array. Do not immerse or soak any part of a transducer in any cleaning material not listed in the recommended list of disinfectants. The following figure defines how much of the transducer can be submerged.



Do Not Submerge Transducers Above Line

Compliance and Approvals

The Terason Ultrasound System is in compliance with the following:

- CE Marking: Medical Device Directive, 93/42/EEC (Annex II)
- EN 60601-1 Medical Electrical Equipment – General Requirements for Safety
- IEC 60601-1 Medical Electrical Equipment – General Requirements for Safety
- IEC 60601-1-1 Collateral Standard: Safety Requirements for Medical Electrical Systems
- UL Std. 60601-1, “Medical Electrical Equipment General Requirements for Safety”;
- CAN/CSA C22.2 No. 601.1-M90 “Medical Electrical Equipment, General Requirements for Safety.”
- Electromagnetic Compatibility: EN60601-1-2, (CISPR11) Group 1, Class B
- Electric Shock: IEC 60601-1, Class I, Type BF

System Warranty

The warranty period for the Terason Ultrasound System is twelve (12) months, but you can purchase an extended warranty. 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. To ensure correct system performance and to protect your warranty, contact Terason for service.

Recommended Maintenance

Terason transducers require very little maintenance. Transducers should be inspected monthly. If the transducer is dropped, immediately examine it for signs of damage. Check for these potential problems:

- Cracks or damage to the handle, nose piece, or connector
- Cuts or gouges on lens material
- Swelling of lens material
- Cuts or cracks in the cable

Do not expose transducers to direct heat such as strong sunlight or a local heat source, as heat can cause crystal aging and loss of sensitivity.

When storing the Terason Ultrasound System in environments between 0° and 50°C, the original shipping container must be used.

All components of the Terason Ultrasound System should be checked monthly for these potential problems:

- Cuts, cracks or damage to the power cables
- Dents or cracks in the electronics housing

Refer to the laptop manual for information on laptop maintenance.



Warning: Do not use any equipment that is cut, cracked, dented, or displays any other damage. Use of damaged equipment can create shock hazards for the operator and patient. Contact Terason Customer Support for help.

Equipment List

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

- Laptop computer with operating system and ultrasound imaging software. Refer to the user guide that came with your computer for details about your particular computer system.
- Computer user guide
- Online *Terason Ultrasound System User Guide* (this document)
- CD-ROMs containing the operating system and Terason ultrasound imaging software
- Two (2) power cords (wall-to-transformer and transformer-to-adapter)
- Computer AC/DC adapter
- ECG
- ECG lead set - 10 sets of electrodes
- Docking Base
- Cart
- Monitor
- Printer
- DVD recorder
- One or more transducers:
 - 4V2A phased-array transducer

- 4V2S phased-array transducer
- 5C2A convex-linear transducer
- 7L3 linear-array transducer
- 8BP4 biplanar linear- and curved-array endocavity transducer
- 8EC4A convex-linear endocavity transducer
- 8MC3 tightly-curved-array transducer
- 8TV4 convex-linear endocavity transducer
- 10V5S transducer
- 12HL7 linear-array transducer
- 12L5V linear-array transducer
- PDOF single-element transducer



Warning: Using accessories, transducers, 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 Ultrasound System.

System Specifications

The following table lists the system specifications for the Terason Ultrasound System. Gray blocks signify that the category does not apply to that component.

terason Ultrasound System Specifications

Category	Specification	Terason Ultrasound System	Power Adapter
Frequency	AuxCW	2MHz	
	4V2	2-4 MHz	
	7L3	3-9 MHz	
	AccuNav 8F; 10F	4-10 MHz	
	12L5; 10V5S	5-10 MHz	
	12HL7	6-10 MHz	
Frame Rate	2D Imaging (based on input data rate)	124 Hz Maximum	
Ultrasound Lines/Frame		256	
Display		15.4" LED backlit wide-screen	
Size	Width	14.63" (37.2 cm)	3.63" (9.2 cm)
	Height	2.4" (6.cm)	2.25" (5.7 cm)
	Depth	9.88" (25.1 cm)	6.5" (16.5 cm)
Weight	Weight	11.1 lbs (5.03 kg)	1 lbs. (0.45 kg)
Power Adapter	Input		100V~/250 V~
	Output		18 VDC @ 5 A
Laptop Battery	Input	Lithium-Polymer Battery (73 Whr)	
	Leakage Current		
	Primary Breakdown Voltage		
Safety Standards		IEC 60950-1:2001 IEC 60950:1999, Edition 3 IEC 60825-1:1993 +A2:2001 EN 60950-1:2000 EN 60825:1994 +A2:2001	UL60601-1 UL60950-1, C22.2 No. 601-1, C22.2 No. 60950.1 EN 60601-1 EN 60950-1
Drop Test	(to concrete)	3 Feet	
Operating Temperature		10-35°C (50-95°F)	0-40°C (32-104°F)
Humidity		20-80% RH, non-condensing	10-95% RH, on-condensing

terason Ultrasound System Specifications (Continued)

Category	Specification	Terason Ultrasound System	Power Adapter
Water Resistance		Transducer array watertight to the strain relief	
Operating Altitude	Pressure	63 kPa to 101.3 kPa (472.5 to 759.8 mmHg)	70 kPa to 106 kPa (525 to 795 mm/Hg)
Storage	Temperature	-24 to 45°C (-13 to 113°F)	-40 to 75°C (-40 to 167°F)
	Humidity	15-90% RH, non-condensing	< 95% RH, non-condensing

Optional

The following table lists the system specifications for optional equipment that may be shipped with the Terason Ultrasound System:

Optional Equipment Specifications

Category	Specification	ECG	ECG Lead Set
Size	Width	1.5" (3.8 cm)	
	Height	1" (2.5 cm)	
	Depth	6" (15.2 cm)	
	Cable Length	10' (3 Meters)	29" (74 cm)
Weight	Weight	8 oz (0.2 kg)	
Power	Input	650 mW	

Environmental Protection

Product Recycling and Disposal

Terason has programs for return of used products. For more information, contact your local Terason representative.

Terason provides disassembly instructions to treatment facilities for the safe and proper removal and recycling of electronic components in this product. For more information, contact your local Terason representative.

Caring for Batteries



Warning: Do not strike or drop batteries, allow batteries to contact water or other fluids, disassemble batteries, allow conductive object to contact a battery's terminals, cause a battery to become short-circuited, heat batteries, or expose batteries to fire. Any of these actions can compromise the structural integrity of a battery. Compromising the structural integrity of a battery can result in battery leakage, heat generation, fire, or explosion, causing possible personal injury.



Warning: Do not use a battery if it leaks fluid or has changed shape. If skin or clothing comes in contact with fluid from the battery, thoroughly wash the area immediately with clean water. If any fluid comes in contact with a user's eyes, immediately flush their eyes with water and seek medical attention.

The system batteries are not accessible to users. If you suspect a problem with a system battery, contact your local Terason representative.

For maximum battery life, do the following:

- Use the system in an environment with a temperature range between 10°C and 35°C.
- Store the system in an environment with low humidity and a temperature range between -25°C and 45°C.

Recycling Batteries



Warning: Never dispose of batteries by burning or by flushing into any waste water system, for example, a lavatory. Compromising the structural integrity of a battery can result in leakage or explosion and the potential for personal injury.



Warning: Do not throw batteries into the trash. Collect and recycle used batteries separate from other waste.

Item	Estimated Use Period	Handling Instructions
lithium manganese dioxide batteries and lithium-ion polymer batteries	300 full charge and discharge cycles	See also: Caring for Batteries on page 290

Recycle batteries according to local, state, and regional regulations. Use a battery collection program available in your country to recycle batteries.

To the extent required by local laws and regulations, Terason will collect and recycle batteries for this product at no charge. Contact your local Terason representative for battery shipment instructions.

Disposing of the Packaging Materials

To the extent required by local laws and regulations, Terason will collect and dispose of packaging materials for this product. For more information, contact your local Terason representative.

Disposing of Components and Accessories



Warning: Observe local, state, and regional regulations for the disposal of the ultrasound system components and accessories.




Warning: To eliminate the possibility of exposing patients, operators, or third parties to hazardous or infectious materials, always dispose of the needle from the needle guide according to local, state, and regional regulations.

Component or Accessory	Estimated Use Period	Handling Instructions
7L3 and 12L5 needle guide bracket assemblies	single use	The needle guide for use with the bracket assemblies is a single-use item. Refer to the in-box instructions for disposal procedures.

Energy Conservation

For moderate energy conservation when the system is not in use, exit the ultrasound system software and place the system in standby status.

To	Do This
Exit the ultrasound system software	Click the  at the top right of the menu bar Select File>Exit from the menu bar
Activate or exit standby status ^a	Refer to the Windows help menu for instructions to activate or exit standby status.

- a. Standby status will end the imaging session. Exit the ultrasound system software before you place the system in standby status.

For maximum energy conservation when the system is in storage, power off and unplug the system from the power outlet.



Note: Unplugging the system from the power outlet for more than four weeks at a time can damage the system.

Appendix A Working With Microsoft Windows

If you are new to the Windows 2000 or Windows XP operating systems, here is a brief introduction to the operating system and how to use its features.

To use the Windows operating systems, you must be familiar with:

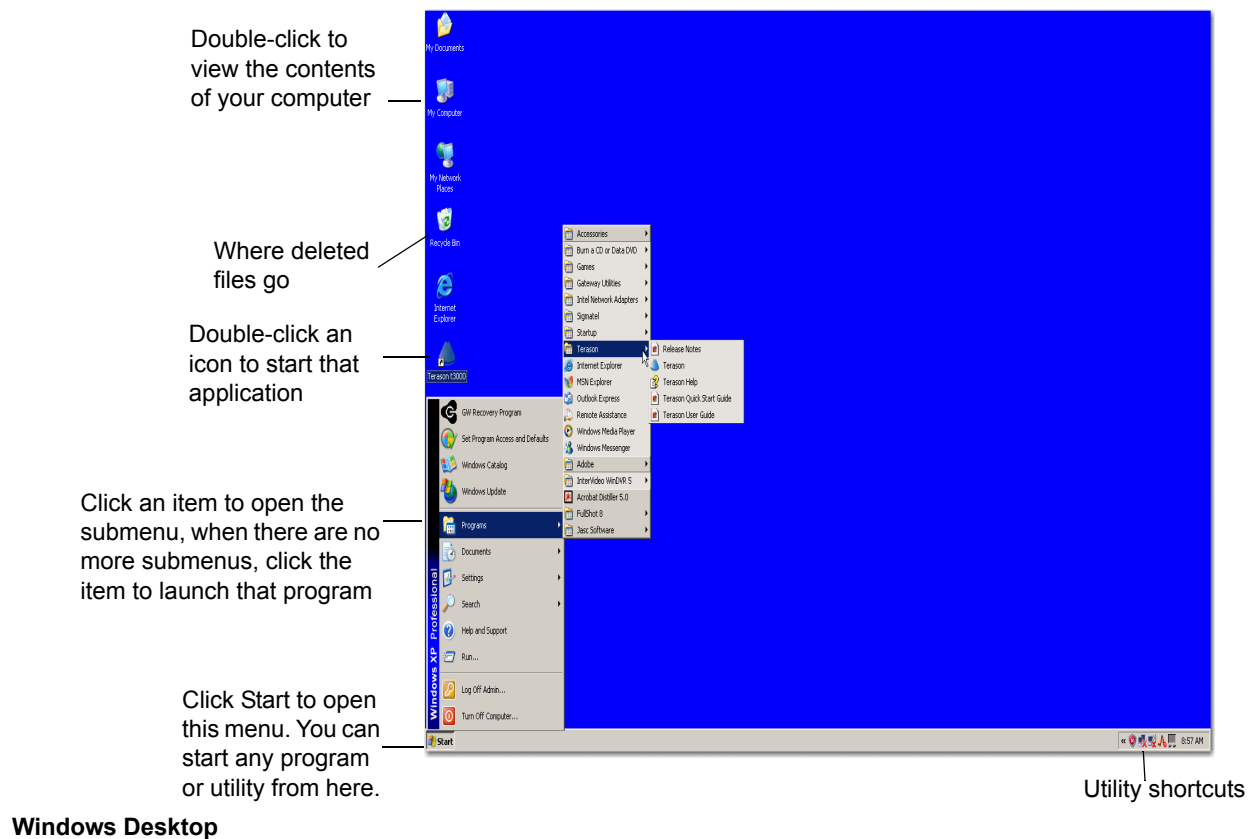
- [The Windows Desktop](#), see page 293
- [Application Windows](#), see page 295
- [Windows Terms](#), see page 296
- [Using the Touchpad or a 2-Button Mouse](#), see page 297
- [Starting/Exiting Programs](#), see page 298
- [Resizing Windows](#), see page 299
- [Moving Windows and Toolbars](#), see page 300

The examples use the Terason software, but the concepts apply to all programs that run on Windows.

If you want more help in using Windows, you can use the Windows online help, or you can purchase a third-party book available at most bookstores.

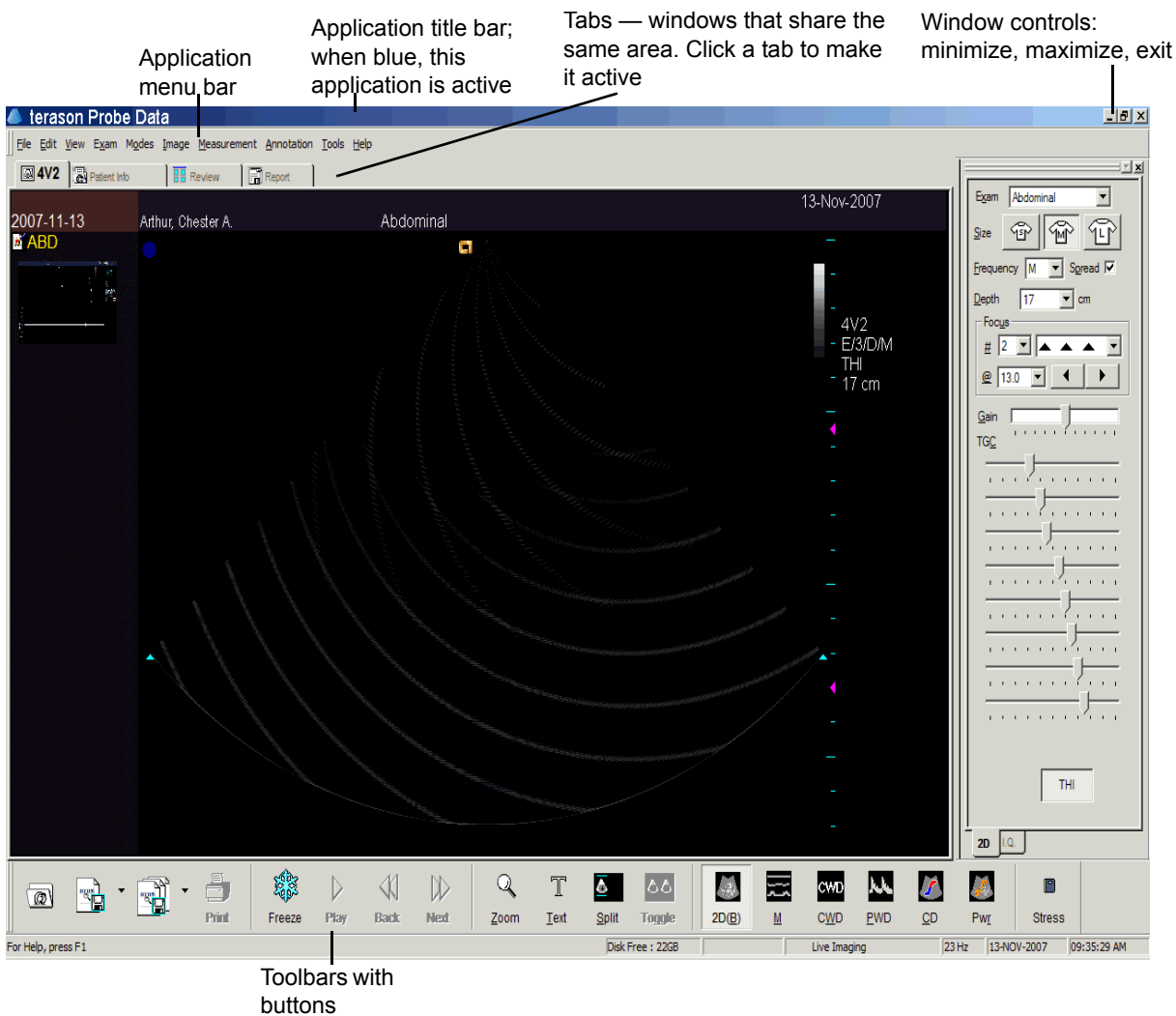
The Windows Desktop

The figure below shows the Windows desktop and defines several key elements:



Application Windows

Most applications have a similar user interface. When you learn a technique for one application, you can use it with other applications. The following figure shows the Terason application window:



Application Window - Terason Ultrasound System

Windows Terms

The following table provides the definitions of several terms used to describe objects within Windows:

Windows Terminology

Term	Definition
Button	A graphic that you can click to execute a function. For example, the Print button prints a file; the PWD button starts Pulsed-Wave Doppler scan mode. (<i>Exception:</i> mouse buttons are physical buttons on a mouse.)
Check box	A check box can be checked or cleared. Each time you click in the box, it toggles to the other setting. When a box is checked, that item is selected or enabled. When a box is clear, that item is not used or disabled. For example, when the Invert check box is checked, the image is shown inverted; when the check box is clear, the image shows normally (not inverted).
Desktop	The entire Windows screen where you put things you want to use. The desktop can hold files, shortcuts to programs, and links to objects, and provides access to all of the programs and data on the computer.
Directory	The icon for a directory is a folder. A folder contains any number of files. Files can be data documents or applications.
Drop-down Menu	Looks like a field followed by a down arrow. When you click the down arrow, a menu opens. Click any of the items, and the software puts your choice in the field. Drop-down menus provide a quick method for selecting options.
Field	An area of a window where you can type characters for input to the software.
Hot Key	A keyboard shortcut that lets you press keys instead of clicking with the mouse to perform an operation. For example, if you press Alt-F, Windows opens the File menu. In a menu or button name, the hot key is underlined (unless the option to view hot keys is turned off).
Icon	A graphic that represents a file, program, network connection, or other item. Icons can show you what type of format a file has, or they can be buttons to open a file or program.
Maximize	Enlarge the window to fill the desktop.
Menu	A list of functions from which you select what you want to do or use. For example, you can select Print from the File menu, or you can open the online help from the Help menu.
Menu bar	The menu bar displays along the top of the application window. It carries the individual menus. Most applications have a File menu (to open, save, print files), Edit menu, and other menus specific to that application's function.
Minimize	Condense the window to the size of a button, and show that button on the task bar at the bottom of the desktop. You can later click that button to return the window to its original size.
Program	Also known as a software application. A program does something using the computer components. It could be a game, a word processor, or an ultrasound scanning system.
Restore	If you minimized a window, you use the Restore function to return it to its original size. You can restore a program by clicking its button on the Task bar, or by selecting Restore from the right-click menu if you click the button.

Windows Terminology (Continued)

Term	Definition
Shortcut	A shortcut lets you quickly access something that could be stored in a different location. For example, the Terason software is stored several directory levels deep on your computer, but the desktop shortcut lets you access it without having to find its specific location. A shortcut icon usually includes a small boxed arrow to indicate it is a shortcut and not the actual object.
Slider	Lets you adjust a setting over a range of possible values, from Low to High. The slider points to the current value, and you can move it up-or-down or left-or-right as needed.
Start button (Start menu)	Button at the bottom left of the desktop; used to find files, open programs, and start any task. Also used to shut down the computer.
Status bar	Message area at the bottom of a window where the program can display application messages or help.
Submenu	Menus can have several levels. If you highlight a menu item and another menu pops out beside it, that is a submenu. Also called a pop-out menu.
Tab	Tabs let multiple items share the same space. When you click a tab, Windows brings a window associated with that tab to the front, and puts all other tabs behind it. The Image Display, Review, and Patient Info tabs share the same space in the Terason window, but you can only see one of them at a time.
Task bar	The bottom of the desktop, where you can access utilities, the Start menu, and minimized programs.
Text box	<i>See Field</i>
Thumbnail	A small picture that represents a larger image. Because thumbnails are small, you can fit more of them on a page. Typically, thumbnails also act as links to the full-sized image.
Toolbar	A collection of buttons.
Tree	A tree is a hierarchical representation of a file system.
Window	A defined area on the screen that contains other items, and can be moved to other locations on the screen independently of other windows.

Using the Touchpad or a 2-Button Mouse

The laptop includes a touchpad that you use to control the movement of the Windows pointer on the screen. The touchpad is also a button. The laptop or desktop computer can also be connected to a mouse to control the Windows pointer.

In general, you gently drag your finger across the touchpad or roll the mouse or trackball around to move the Windows pointer. To select something on the screen, such as a menu or a button, move the Windows pointer on top of the item and press the touchpad with one finger, or click the left mouse button.

The word “click” means that you either press the touchpad until it clicks or press the left button on the mouse.

Pressing the touchpad with one finger is the same as pressing the left button on a mouse. Pressing the touchpad with two fingers is the same as pressing the right button on a mouse.

To select a menu item:

1. Move the Windows pointer to the menu name and press the touchpad with one finger or press the left mouse button. The menu pops up.
2. Slide the Windows pointer down the menu to the item you want.
3. Press the touchpad with one finger or click the left mouse button to select that menu item.

This guide uses the following format when instructing you to choose a menu item:
select View > Image Display Properties > Frame Rate.

This instruction means that you click the **View** menu in the menu bar, slide the Windows pointer down the menu to Image Display Properties, then slide to the right and click Frame Rate.

You can also access any menu by using its shortcut key combination. To see a menu using a shortcut, press the Alt key and the underlined letter in the menu name. For example, to see the **View** menu, hold down the Alt key and press the V key.

This user guide uses the following terms in procedures:

Click	Press the touchpad with one finger or press and release the left button on the mouse
Double-click	Press the touchpad twice with one finger or press the left button twice in quick succession
Right-click	Press the touchpad with two fingers or press the right button on the mouse
Drag	Press the touchpad with one finger (or press the left button on the mouse), hold it down, and move the Windows pointer

Starting/Exiting Programs

Windows provides several methods to start and exit programs. You can use either of these methods to start an application:

- Start button
- Desktop shortcut

You can use either of these methods to exit an application:

- File menu
- Close button

Typically, if you have not saved what you were working on, the application prompts you to save your work when you try to exit.

Starting Using the Start button:

1. Click the Start button at the bottom left corner of the screen. The Start menu opens.
2. Move the Windows pointer onto **All Programs**. A list of software programs installed on the computer pops out to the right.
3. Move the Windows pointer onto the list and onto the one you need. Windows highlights that item, and if it has more choices for that application, displays another list of items.

4. Click the application. Windows starts that application.

Starting From the Desktop:

Most applications place a shortcut on the computer desktop when they are installed. To start the application, double-click its icon on the desktop.


Closing Using the File menu:

When finished using an application, you should close it. To close an application, complete these steps:

1. Click **File** on the menu bar.
2. Click **Exit** on the File menu.





The application closes, or, if you have not saved what you were working on, the application displays a dialog box asking if you want to save your work.

Closing Using the Close Button

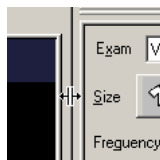
Every application window in Windows has  in the upper right corner. Clicking this button is the same as clicking Exit on the File menu. If you have not saved your work, the application prompts you to do so before it closes.

Resizing Windows

The small buttons in the upper right of an application let you minimize, maximize, and exit the program.

-  Closes the window but leaves the program running (called minimizing the window). A button appears at the bottom of the screen in the taskbar. Click the button in the taskbar to re-open the window.
-  Enlarges the window to fill the entire screen (also called maximizing).
-  Returns the window to the size that it was before you maximized it.
-  Exits the application. Be sure to save any images that you want to keep before you click this button.

When an application displays more than one pane in a window, you can usually resize the panes to enlarge or reduce the area used for adjacent panes. Enlarging the size of one pane usually reduces the size of another pane. To make a pane narrower, place your Windows pointer between the two panes and watch for the Windows pointer to change shape as shown in the figure below, then click and drag the pane border to a new position.



Resizing Parts of the Window

Moving Windows and Toolbars

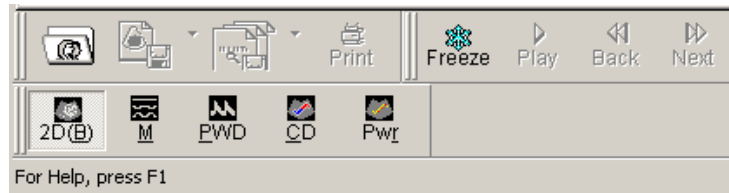
You can change where panes and toolbars appear within the Terason window. For example, you can move the Terason Explorer pane to the far right, and you can move the Tools toolbar to below the Playback toolbar.

Notice that each window and toolbar has a set of double lines along one edge. If you click these lines, you can drag the window or toolbar to any other location. A gray rectangle shows as you move the toolbar.



Moving a Toolbar

Hold the mouse button down and move the Windows pointer to where you want to put the toolbar, and release the mouse button. The software adjusts the spacing in the window to insert the toolbar.



Moved Toolbar

Appendix B Menu and Toolbar Reference

This Appendix briefly describes these parts of the Terason software:

- [Shortcut Keys](#), see page 301
- [Menu Reference](#), see page 302
- [Shortcut Menu Reference](#), see page 309
- [Toolbar Reference](#), see page 313

Shortcut Keys





The Terason software has mapped the keyboard function keys (F1 to F12) and several other keys to specific functions, as listed in the following table.

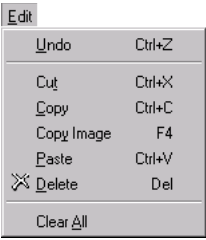
Shortcut Keys

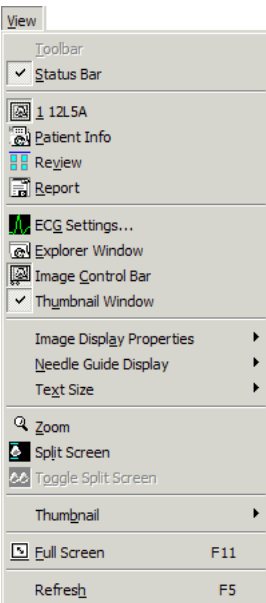
Key	Description	Key	Description
Space	Freeze/Live image (toggles)	Esc	Delete unfinished measurement
Shift	In Duplex and Triplex modes, toggles Update on & off	B	Start scanning in 2D
Ctrl-arrow (L & R)	Select a different Image Control tab	M	Start scanning in M-Mode
F1	Open Terason online help	P	Start scanning in PWD mode
F2	Freeze imaging	C	Start scanning in Color Doppler mode
F3	Live imaging	D	Start scanning in DPD mode
F4	Copy Image	R	Start scanning in Power Doppler mode
F5	Refresh	W	Start scanning in CWD mode
F8	Save Image	H	Start scanning in THI mode
F9	Save Loop	G	Toggle split screen
F11	Full Screen/Exit Full Screen	S	Enter Split screen mode
F12	Print	T	Text
Alt + F4	Exit	Z	Enter or exit Zoom mode
Shift-fn-F11	Print Screen	N	Show Needle Guides
.	(Period) Select region of interest to move; select ultrasound cursor in M-Mode	/	(Slash) Select steering angle
..	(Two periods) Select region of interest to resize in CD mode	Ctrl-Tab	Cycle through Imaging, Patient Info, Review tabs
Shift	Toggle Update On or Off in		

Menu Reference

For each menu item, the table provides a brief description, and the location where more information about that menu item can be found.

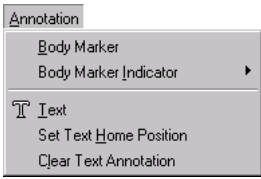
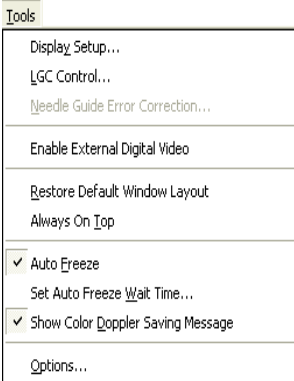
Menu	Menu Item	Description	Where Described in Guide
 File  New Patient...  Save Patient...  Open... Ctrl+O  Close Image  Save Image (DICOM) F8 or Ctrl+F  Save Loop (DICOM) F9 or Ctrl+S  Save Image As  Save Loop As  Export...  Send All DICOM File(s)  Send DICOM Image  Send DICOM Loop  Print DICOM Image  Save Study  Close Study  Print... Ctrl+P  Print Preview  Print Setup...  Exit Alt+F4	New Patient	Clears the current patient info in the Patient Info tab	Adding a New Patient on page 57
	Save Patient	Saves any changes made to the patient info in the Patient Info tab	Adding a New Patient on page 57
	Open	Opens the Windows File Browser window and you can locate a needed saved image or loop	Finding Stored Images and Loops on page 136
	Close Image	Closes the tab showing a saved image file	Finding Files in the Terason Explorer on page 136
	Save Image (ULT)	Saves the displayed frame as a Terason format (ULT) image file	Saving Images and Loops on page 133
	Save Loop (ULT)	Saves an image loop as a Terason format loop file	Saving Images and Loops on page 133
	Save Image As	Saves an image in a specific file format (select from pop-out menu)	Saving Images and Loops on page 133
	Save Loop As	Saves an image loop in a specific file format (from pop-out menu)	Saving Images and Loops on page 133
	Export	Specify a filename, location, and image format when saving an image or loop	Exporting a File on page 135
	Send All DICOM File(s)	Sends saved DICOM files to the server	Sending Files to a DICOM Server on page 228
	Send DICOM Image	Exports an image to a DICOM server	Sending Files to a DICOM Server on page 228
	Send DICOM Loop	Exports an image loop to a DICOM server	Sending Files to a DICOM Server
	Print DICOM Image	Prints to a DICOM printer	Printing Files to a DICOM Printer on page 227
	Save Study	Saves Stress Echo study being reviewed	Saving and Sending Studies on page 208
	Close Study	Closes the Stress Echo study being reviewed	Closing a Stress Echo Study on page 207
	Print	Prints the image(s) in the Image Display window, Image Preview window, or the Review window	Printing Images on page 146
	Print Preview	Views a picture of what the print out will look like when it is printed	Printing from the Print Preview Window on page 148
	Print Setup	Configures default printer options	Printing Images on page 146
	Exit	Closes the Terason Ultrasound System application	Starting and Exiting the Software on page 63

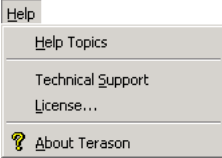
Menu	Menu Item	Description	Where Described in Guide
	Undo	Undoes the most recent text edit (cut, paste, or delete) or entry in the Patient Info window	Using the Patient Info Window on page 57
	Cut	Removes the selected text from its current location and puts it in the clipboard	Using the Patient Info Window on page 57
	Copy	Copies the selected text to a clipboard	Using the Patient Info Window on page 57
	Copy Image	Copies the image in the Image Display window to the computer's clipboard for pasting it into a different application	Storing Images and Loops on page 131
	Paste	At the location of the text cursor, inserts the last text cut or copied	Using the Patient Info Window on page 57
	Delete	Deletes the selected text in a text box or text on the Image Display window,	Deleting Text from an Image on page 85
	Clear All	Deletes text entries and measurements on the Image Display window	Deleting Text from an Image on page 85

Menu	Menu Item	Description	Where Described in Guide
	Status Bar	Shows or hides the Status bar	Hiding Windows on page 75
	Active Probe	Shows the current probe that is attached	Hiding Windows on page 75
	Patient Info	Shows the Patient Info window	Hiding Windows on page 75 Hiding Windows
	Review	Shows the Review window	
	Report	Shows the Report window	Restoring All Measurement Groups to Defaults on page 201
	ECG Control	Opens a control panel for ECG exams	Features of the Stress Echo Scanning Window on page 209
	Explorer Window	Shows or hides the Terason Explorer window	Terason Explorer Window on page 33 Terason Explorer Window
	Image Control Bar	Shows or hides the Image Control Bar	Image Control Bar/Measure Tabs on page 34
	Thumbnail Window	Shows or hides the Thumbnail Window	Hiding Windows on page 75
	Image Display Properties	Shows or hides guides on the Image Display window	Adding Guides to the Image Display on page 77
	Needle Guide Display	Shows or hides needle guide lines (used for biopsies only)	Selecting a Needle Guide on page 104
	Text Size	Sets the size of text in the Image Display window	Changing the Text Size on page 78
	Zoom	Enlarges a selected area of the image in the Image Display window	Enlarging an Area of the Image on page 73
	Split Screen	Splits the Image Display window into two screens	Using Split Screen Mode on page 79
	Toggle Split Screens	Makes the opposite screen the active screen	Using Split Screen Mode on page 79
	Thumbnail	When checked, specifies large thumbnails in the Review window, otherwise small thumbnails are used	Finding Files in the Review Window on page 139
	Full Screen	Enlarges the Image Display window to cover the entire computer's screen, hiding all other windows and toolbars	Displaying the Image in Full Screen on page 75
	Refresh	Updates the thumbnail list	

Menu	Menu Item	Description	Where Described in Guide
	Open Exam	Opens a dialog box where you can select an exam type for the current exam	Opening an Exam on page 215
	Save Exam	Saves any edited settings (changes made to preset values in the Image Control window) to the exam; you cannot save changes to any of the Terason-provided exams	Creating Custom Exams on page 215
	Save Exam As	Saves the current set of Image Control settings to a new Exam type	Creating Custom Exams on page 215
	Delete Exam	Deletes a custom exam type. You can only delete exam types you created; you cannot delete any of the Terason-provided exam types	Deleting Custom Exams on page 216
	[Exam Type]	Opens the selected exam; lists the Terason-provided exams	Opening an Exam on page 215
	# [Exam Name]	Opens the selected custom exam; lists the custom exams for the connected transducer	
	2D	Activates 2D scanning and starts a live image	2D Mode on page 23
	M-Mode	Activates M-Mode scanning and starts a live image	M-Mode (Motion Mode) on page 23
	Pulsed-Wave Doppler	Activates Pulsed-Wave Doppler scanning and starts a live image	Pulsed-Wave Doppler on page 27
	Color Doppler	Activates Color Doppler scanning and starts a live image	Color Doppler on page 25
	Directional Power Doppler	Activates Directional Power Doppler scanning and starts a live image	Directional Power Doppler on page 26
	Power Doppler	Activates Power Doppler scanning and starts a live image	Power Doppler on page 24
	THI	Toggles tissue harmonic imaging on and off	Tissue Harmonic Imaging (THI) on page 98

Menu	Menu Item	Description	Where Described in Guide
	Freeze/Live	Live if the Image Display window is frozen; Freeze if the Image Display window is live: menu chooses the opposite imaging state	Freezing Images on page 70
	Play	Play runs through the frames in a loop	Working with Image Loops on page 70
	Pause	Halts a playing loop at the current frame	Working with Image Loops on page 70
	Back	Moves to the previous frame in a loop	Working with Image Loops on page 70
	Next	Moves to the next frame in a loop	Working with Image Loops on page 70
	Size	Opens a submenu used for 2D, to select Small, Medium, or Large	Adjusting the Size on page 92
	Depth	Opens a submenu used for 2D, to set the depth for the scan	Adjusting the Depth on page 93
	Gain	Opens a submenu used to increase (Up) or decrease (Down) the gain setting by one unit	Adjusting Spectral Gain on page 115
	Invert	Opens a submenu used for 2D, to choose Left/Right or Up/Down inverts	Inverting Images on page 100
	Colorization	Opens a submenu used for 2D to choose a color palette	Adjusting Colorization on page 101
	Smoothing	Opens a submenu used for 2D to choose a Smoothing algorithm	Adjusting Smoothing on page 102
	Persistence	Opens a submenu used for 2D to choose a Persistence level	Adjusting Persistence on page 102
	Map	Opens a submenu used for 2D to choose an image map	Adjusting the Image Map on page 103
	Sweep Speed	Opens a submenu used to set the speed for the Time Series scan	Adjusting the Sweep Speed on page 106
	Time Series Image Height	Opens a submenu used to set the Time Series Image Height.	
	New Measurement	Initiates a measurement of the type selected in the Measure tab	Working With Measurements on page 150
	Clear 2D Measurements	Deletes all measurements in the 2D image display window	Deleting Measurements on page 201
	Clear Time Series Measurements	Deletes all measurements in the Time Series window	Deleting Measurements on page 201
	Send Measurements to Serial Port	Transmits OB and GYN measurements to another computer	Changing the Indicator's Direction on page 87

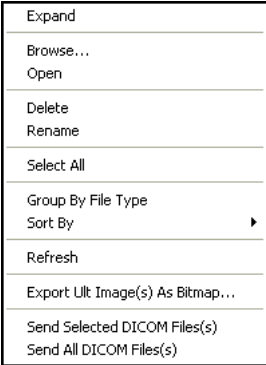
Menu	Menu Item	Description	Where Described in Guide
	Body Marker	Opens Annotation window showing the Body Marker tab where you can select a body marker icon	Adding a Body Marker on page 86
	Body Marker Indicator	Opens a submenu that lets you choose to display the body marker indicator horizontally or vertically	Changing the Indicator's Direction on page 87
	Text	Activates the Text tool and opens the Annotation window showing the Text tab	Adding Text to an Image on page 81
	Set Text Home Position	Sets the home position for text at the location where you click after selecting this menu item	Setting the Text Home Position on page 83
	Clear Text Annotation	Deletes all text on the Image Display window	Deleting Text from an Image on page 85
	Display Setup	Provides tools to adjust the display characteristics of the monitor	Testing the Monitor Display on page 237
	LGC Control	Displays a set of sliders that control gain on lateral segments of the scan display	Adjusting Lateral Gain Compensation (LGC) on page 97
	Needle Gauge Error Correction	Adjusts the guides for biopsy applications	Setting the Error Correction on page 224
	Restore Default Window Layout	Changes the location and visibility (hidden or shown) for all windows and toolbars to the default	Restoring the Default Layout on page 241
	Always on Top	Prohibits other Windows applications from obscuring the Terason window	Keeping the Terason Software on Top on page 242
	Auto Freeze	Stops sending power to the transducer after the transducer is not in use and the wait time expires	Setting a Time-Out Value on page 242
	Set Auto Freeze Wait Time	Sets the wait time for auto freeze	Setting a Time-Out Value on page 242
	Show Color Doppler Saving Warning	Hides or shows the warning if you try to save a color Doppler scan with a high level of color persistence	Adjusting the Color Persistence on page 123
	Options	Sets options for Save functions, Display Modes, Measurements, and Annotations	Specifying Optional Settings on page 243

Menu	Menu Item	Description	Where Described in Guide
	Help Topics	Opens the Terason Online Help window	Terason Online Help on page 12
	Terason Support	Opens a message box with contact information	Contacting Terason on page 21
	License	Opens a dialog box where you can read your licensing information or register (if you have not yet registered an evaluation copy of the software)	Contacting Terason Technical Support on page 320
	About Terason	Opens a message box that displays the Terason copyright information, and the current version of the software	Contacting Terason Technical Support on page 320


Shortcut Menu Reference

When you right-click on an area in the Terason window, a shortcut menu pops up with items specific to the location or item where you clicked. The following table lists the shortcut menus you might see, with a brief description of the available menu items.

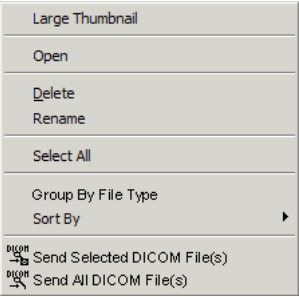
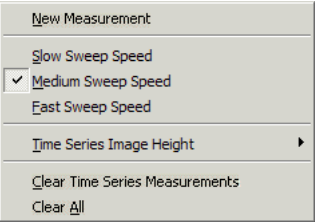
Shortcut Menus

Where Active/Menus	Menu Item	Description	Where Described
Any item in the Terason Explorer Window: 	Expand/ Collapse	Shows as Expand if the folder is closed and shows as Collapse if the folder is open. Shows (Expand) or hides (Collapse) the contents of the folder	Terason Explorer Window on page 33
	Browse	Opens the Windows File dialog box. You can use that dialog box to locate a Patient info file or an image file	Browsing to Find Files on page 140
	Open	Opens the selected item, either a Patient info file or an image file	Preparing Patient Info for an Exam on page 60 Finding Stored Images and Loops on page 136
	Select All	Selects all images in a folder	
	Rename	Changes the file name to an edit box where you can type or edit the file name	Renaming Files on page 143
	Delete	Permanently deletes the selected image file (does not work with Patient Info files)	Deleting Files Using the Terason Explorer, Review, and Thumbnail window on page 144
	Group By File Type	Sort images in folders based on file type	Finding Files in the Review Window on page 139
	Sort by	Sort images in folder based on file name or creation date	Finding Files in the Review Window on page 139
	Refresh	Updates the file listing	Finding Files in the Terason Explorer on page 136
	Export Ult Image(s) As Bitmap	Transfers saved .ult images to a directory as .bmp files	Exporting a File on page 135
	Send DICOM (Selected or All)	Available if DICOM is installed. Sends the selected DICOM file to the DICOM server	Sending Files to a DICOM Server on page 228

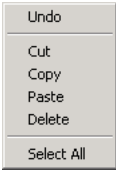
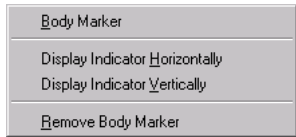

Shortcut Menus (Continued)

Where Active/Menu	Menu Item	Description	Where Described
2D Image Display Window: 	New Measurement	Start a measurement of the type currently selected in the 2D Measure tab	Measuring in the 2D Window on page 151
	Clear All	Deletes measurement and text entries on the Image Display window	Deleting Text from an Image on page 85
	Clear 2D Measurements	Deletes all measurements in the 2D Image Display window	Deleting Measurements on page 201
	Clear All Text Annotations	Deletes all text added to the Image Display window	Deleting Text from an Image on page 85
	Live/Freeze	Item shows as Live if the Image Display window is frozen; shows as Freeze if the Image Display window is live: menu chooses the opposite imaging state	Freezing Images on page 70
	Play	If the Image Display window contains a frozen loop or a saved loop, runs through the frames in the loop	Working with Image Loops on page 70
	Set PWD Gate	Locks the PWD gate position and switches to the PWD scan mode	Setting the PWD Gate Position on page 114
	Text	Activates the Text tool; you can click in the Image Display window and type any needed text	Typing Text on an Image on page 84
	Save Image (ULT)	Saves the displayed frame as an image file in the Terason file format	Saving Images and Loops on page 133
	Save Loop (ULT)	Saves an image loop in the Terason file format	Saving Images and Loops on page 133
	Export	Specifies a filename, location, and image format when saving an image or loop	Exporting a File on page 135

Shortcut Menus (Continued)

Where Active/Menus	Menu Item	Description	Where Described
Review and Thumbnail window: 	Large Thumbnail	Specifies large thumbnails in the Review window	Finding Files in the Review Window on page 139
	Open	Opens the selected image	
	Delete	Deletes the selected thumbnail from the Review window; does not delete the actual file	
	Rename	Allows you rename the selected image	
	Select All	Selects all images shown in the Review window	
	Group By File Type	Arranges the images based on file type	
	Sort By	Sorts the images by file name or creation type (pop-up menu)	
	Refresh	Updates the Review window to show thumbnails for all images in the selected folder	
	Send DICOM	Available if DICOM is installed. Sends the selected DICOM file to the DICOM server	Sending Files to a DICOM Server on page 228
Time Series window 	New Measurement	Initiates a measurement of the type selected in the M Measure or PWD Measure tab	Measuring in the M-Mode Window on page 165 and Measuring in the Spectral Doppler Modes on page 166
	Slow Sweep Speed	Select the Slow sweep speed for an M-Mode or PWD scan	Adjusting the Sweep Speed on page 106
	Medium Sweep Speed	Select the Medium sweep speed for an M-Mode or PWD scan	
	Fast Sweep Speed	Select the Fast sweep speed for an M-Mode or PWD scan	
	Time Series Image Height	Opens a submenu used to set the Time Series Image Height.	
	Clear Time Series Measurements	Deletes all measurements in the 2D and Time Series windows	Deleting Measurements on page 201
	Clear All	Deletes all text and measurements from the 2D and Time Series windows	Deleting Measurements on page 201



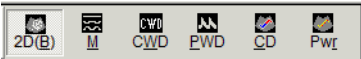












Shortcut Menus (Continued)

Where Active/Menu	Menu Item	Description	Where Described
Patient Info fields: 	Undo	Undoes the most recent text edit (cut, paste, or delete) or entry in the Patient Info window	Using the Patient Info Window on page 57
	Cut	Removes the selected text from its current location and puts it in the clipboard	
	Copy	Copies the selected text to a clipboard	
	Paste	At the location of the text cursor, inserts the last text cut or copied	
	Delete	Deletes the selected text in a text box or text on the Image Display window	Deleting Text from an Image on page 85
	Select All	Highlights all text in the field where you placed the text cursor	N/A
Body Marker: 	Body Marker	Show Annotation window with Body Marker tab visible	Adding a Body Marker on page 86
	Display Indicator Horizontally	Show the pink indicator horizontally	Changing the Indicator's Direction on page 87
	Display Indicator Vertically	Show the pink indicator vertically	
	Remove Body Marker	Removes the body marker icon	Removing the Body Marker on page 88
Text in 2D window: 	New Text	Add a new line for typing text beneath the current line	Editing Text on page 85
	Delete Text	Delete the highlighted text	Deleting Text from an Image on page 85
	Show Arrow	Add an arrow from the text toward the center of the 2D scan (you can then move the arrow head to any location)	Placing Arrows on the Image on page 83












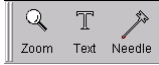



Toolbar Reference

The Terason software provides several toolbars that you can hide or display, or move into individual windows.

Descriptions of Buttons on the Image Mode Toolbar

Toolbar	Button	Mode Description
		Opens and closes the Terason Explorer window
		2D: provides a standard two-dimensional display in real time.
		Motion: displays motion along a line depicted in the 2D image as a function of time.
		Pulsed-Wave Doppler: displays a line in the 2D image that contains the sample size and location of interest. The pulsed Doppler waveform depicts the instantaneous velocity of flow within that sample, as a function of time.
		Continuous Wave Doppler: similar to Pulsed-Wave Doppler, but with less aliasing and less depth-specific information.
		Color Doppler: displays, in real time, a two-dimensional image of blood flow overlaid on the B-Mode image. The hues in the color palette indicate mean flow velocity, and the different colors indicate the direction of blood flow.
		Power Doppler: displays, in real time, a two-dimensional image of blood flow overlaid on the B-Mode image. The hues in the color palette indicate the density of red blood cells. Brighter hues indicate greater density. Directional information is not provided. Power Doppler is not subject to aliasing and is generally more sensitive to low flow than Color Doppler or Directional Power Doppler.
		Launch Sonocubic 3-D imaging software (only displays if Sonocubic software is installed on the computer)
		Play button (visible when viewing a frozen image) lets you play loops of data. You can play up to sixty frames of loop information
		Pause button (visible when playing an image) lets you pause the loops of data in Play mode
		Back button lets you return to the previous frame during Playback Mode
		Next Image button allows you to advance to the next frame during Playback Mode

Descriptions of Buttons on the Image Mode Toolbar (Continued)

Toolbar	Button	Mode Description
 or 		Save button saves the current image to a file; icon may be different if you selected a default format other than Terason ULT; click arrow to select different file format
		Save Loop button saves the maximum allowed number of previous frames as a loop; icon may be different if you selected a default format other than Terason ULT; click arrow to select different file format
		Print button lets you print the current image to a printer
 (toggles between Live and Freeze)		Live button provides a real-time image display
		Freeze button freezes the image during the scan to allow you to print or save to a file
		Split screen toggles split screen (two current scans displayed in the 2D window) on and off
		Toggle button makes the other screen active in split screen mode
		Zoom: magnifies the selected region of your image
		Text: lets you enter text on live or frozen images
		Needle: Show or hide the needle guides for medical procedures; also shows target indicator if that option is selected and the image is Live

Appendix C Solving Problems

You can resolve many Terason 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 315
- [Problems with Scanning](#) on page 315
- [Interference on the Scan](#) on page 318
- [Printing Problems](#) on page 318
- [Display Problems](#) on page 319
- [VCR/TV Problems](#) on page 319
- [CD Writing or Reading Problems](#) on page 319
- [Network Problems](#) on page 320

If you complete the procedures and the problem persists, contact Terason as described in [Contacting Terason Technical Support](#) on page 320.

Installation Problems

When installing the Terason software, you cannot have any other applications open on the laptop, 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.

Problems with Scanning

If the software does not show a scan image, the problem could be:

- The transducer is not plugged in
- The connector for the FireWire or transducer is loose
- The device driver is not installed

To determine how to proceed, look at the Image Status Message at the bottom of the Terason window. This message describes the current status of scanning as defined in [Determining Image Status](#) on page 72. Use the following table to determine how to resolve the problem:

Terason Transducer States

If the Image Status is...	Then...
Frozen Image	Either you have frozen an image, or the transducer has not been used in several minutes and has shut down to conserve power. Press any key on the keyboard or move the mouse, and the laptop sends power to the transducer
Live Imaging	The transducer is functioning. Try adjusting the brightness and contrast controls on the 2D tab of the Image Control window

Plugging in the Transducer

If you have used the transducer before, the driver is already installed, so it is probably a connection problem. Make sure all connections between the transducer and computer are secure.

Reconnecting the Components


If the problem still exists, usually the cause is that one of the component connections has become loose. You must unplug all of the components and plug them in again, following these steps:

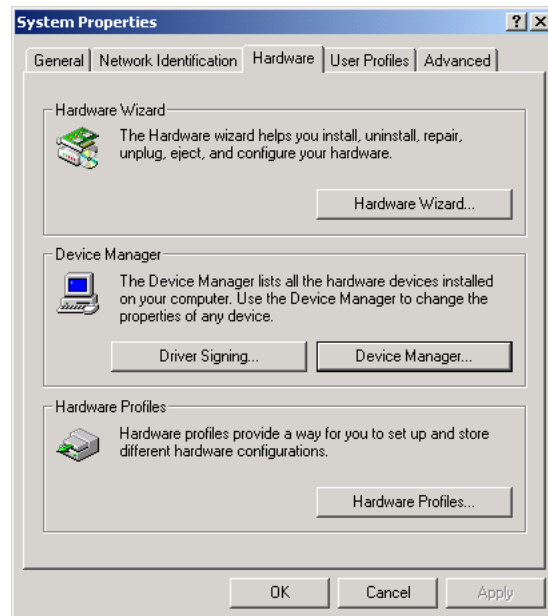
1. **Quit** the Terason software.
2. Shut down the **computer**.
3. Unplug the **transducer**.
4. Start the **computer**.
5. When the hourglass icon is gone, plug in the **transducer**.
6. Wait **15 seconds**.
7. If you see a “Digital Signature not Found” or a “Found New Hardware” message, follow the instructions in [Installing the FireWire Terason Transducer Driver](#) on page 42.
8. If no digital signature message displays, start the **Terason software**.

Determining if the Driver Is Installed

If you still cannot see an image, complete these steps:

1. Quit the Terason software.
2. Select **Start > Settings > Control Panel**. The Control Panel window opens on the desktop.

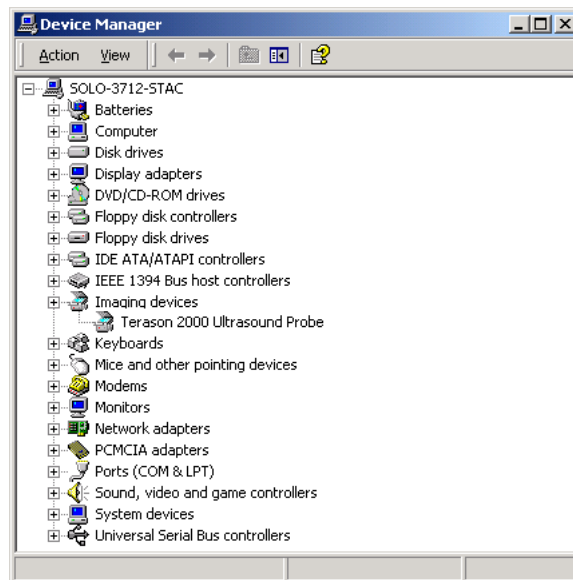
3. Double-click the  icon. The System Properties window opens.
4. Click the Hardware tab.




System Properties: Hardware Tab

5. Click the **Device Manager** button.

A window listing all hardware devices connected to the computer opens.



Device Manager Window

6. Look for an entry named **Imaging devices**, and click the .
7. If you do not see **Terason 3000 Ultrasound Probe**, follow the instructions for [Installing the FireWire Terason Transducer Driver](#) on page 42.

8. If you see the Terason entry, close all windows and start the Terason software. If you still cannot see an image, contact Terason Technical Support.

Interference on the Scan

If the transducer or the Terason electronics envelope is too close to an electronic device, such as your computer, you may see interference patterns in the scan image.

To resolve this problem, move the transducer and electronics away from all power sources, including the laptop. If the cable from the laptop to the electronics is coiled or looped, the laptop can interfere with the scan. Make sure the electronics is as far from the laptop as the cable permits.

Printing Problems

The most common printing problems are:

- The printout is too light or too dark
- The printout is too small



Caution: A printer installed within the patient environment may result in non-conformance to safety standards. Use of non-medical grade peripherals will result in non-compliance of safety and EMI standards. Non-conformance to these standards can result in risks to the patient and operator of this equipment.

Print Quality

The default printer settings should be sufficient to print a good image, although the type of paper you put in the printer also affects image quality:

- Photo quality paper produces the best output, but is the most expensive
- Brochure paper produces good output, and costs less than photo quality paper
- Regular laser printer paper is the least expensive, but produces low-quality output

If the printer is low on ink, you may have to change the printer cartridge. refer to the printer user manual for instructions.

If you must adjust the printer controls, refer to the user guide for the printer for instructions on adjusting (usually to lighten) the output.

The Print Output is Too Small

You can enlarge the image display by pressing F11 (see [Displaying the Image in Full Screen](#) on page 75 for more information). This function key hides all other elements on your desktop and uses the entire area for the image display. Print the image (press the PrtScrn key), then press F11 again to restore the other elements.

Display Problems

If you install a printer using the Video port on the computer, the Windows operating system changes the screen size to 1024 x 768 pixels. The normal resolution is 1280 x 1024 pixels. This is a limitation of the Windows operating system and cannot be changed. If you need greater resolution on the screen, you must connect to the printer using the USB or parallel port on your computer.

If you must connect a separate monitor to the laptop, you can purchase third party cables. You will need a VGA cable. Please note that the ultrasound images can only be optimized for display on a single monitor.

VCR/TV Problems

If you connected a VCR or TV to the computer but the VCR or TV is not working, refer to the owner's manual for the specific VCR or TV. Some VCRs require you to select Line 1, others Line 2, others Composite Video. The type of connection required is determined by the VCR, not by the laptop or the Terason software.



Caution: A VCR or TV installed within the patient environment may result in non-conformance to safety standards. Use of non-medical grade peripherals will result in non-compliance of safety and EMI standards. Non-conformance to these standards can result in risks to the patient and operator of this equipment.

The owner's manual for the VCR should contain instructions for connecting it to various devices, including computers and the TV.

Please note that only video output is sent to the VCR; you cannot record the audio output of Pulsed-Wave Doppler scans.

CD Writing or Reading Problems

If you get errors when writing to a CD, check these items:

- Filenames for CDs are restricted to 64 characters, however, Windows supports filenames with up to 256 characters. For any files that you want to archive or move to a CD, make sure the filenames do not exceed 64 characters.
- Make sure you do not exceed the available space on the CD. For example, if you choose 100 MB to add to a CD, but the CD only has 80 MB available, the CD writer may let you start the copying process, but will generate an error during the write process.
- If you closed the CD when you created it, you cannot add any more files to that CD. When you copy to a CD, you can close the session, but if you want to write to the CD again, you should not close the CD. See [Backing Up Files on a CD](#) on page 142 for guidelines.

If you cannot access files on a CD, you may not be able to recover those files. To avoid possible problems reading files from a CD, follow these guidelines:

- Terason recommends that you use only write-once CDs. If you use rewriteable CDs, they may not work on other computers.
- Do not completely fill the CD. If the CD is close to 100% full, the computer may not be able to read from that CD. When adding files to the CD layout, the Status bar displays an Estimated Free Space value. Make sure to leave at least 10% available space on the CD.
- Check for errors when writing a CD. Make sure to choose Test and Create CD and not Create CD only. If you choose Test and Create CD, the Create CD software lets you know immediately if any errors occurred.
- Always use the Terason software after writing to a CD to open an image on that CD. This step lets you know immediately if there is a problem with the CD.

Network Problems

Terason cannot provide network assistance. Only a system administrator at your site can resolve network issues. The laptop 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:

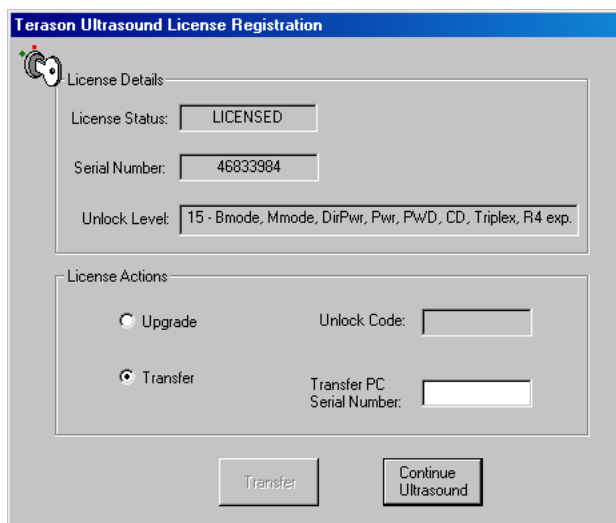
- Serial number on the transducer/electronics envelope
- Operating system (Windows 2000 or Windows XP) and service pack number
- Terason software version number
- If available, sales order number
- Name of the organization that purchased the Terason Ultrasound System

You can find the Terason software version by selecting Help > About Terason to open the About Ultrasound message box.

**About Terason Message Box**

Click **OK** to close the box.

You can find your serial number by selecting Help > License to open the License Registration box.

**License Registration Message Box**

Copy the serial number, then click **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
- Transducer serial number
- Terason software version number
- Operating system (Windows 2000 or Windows XP) and service pack #
- Make of laptop or desktop computer

Appendix D Gestational Tables

This appendix contains gestational tables for the measurements included with the Obstetrical exam type:

- AC Chart, Hadlock, 12-42 weeks
- BPD Chart, Hadlock, 12.1 - 41.6 weeks
- CRL Chart, Hadlock, 5.7 - 18 weeks
- FL Chart, Hadlock, 12.2 - 42 weeks
- GSD, Hansmann - 6.0 - 14.0 weeks
- HC Chart, Hadlock, 12.2-41.9 weeks
- HL Chart, Jeanty, 12.6 - 40.1 weeks

[Calculating Estimated Fetal Weight](#) on page 162 describes the procedure for measuring an obstetrical scan to estimate the fetal weight. This calculation is based on the Hadlock tables in this Appendix, and uses this formula:

$$EFW[g] = 10^{\left(1.326 - (0.00326 * AC[cm] * FL[cm]) + (0.0107 * HC[cm]) + (0.0438 * AC[cm]) + (0.158 * FL[cm])\right)}$$

where:

EFW Estimated Fetal Weight
AC Abdominal Circumference
HC Head Circumference
FL Femur Length

AC Chart, Hadlock, 12-42 weeks

AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)
51	12.1	93	15.5	135	19.0	177	22.6	219	26.4	261	30.2	304	34.4	346	38.5
52	12.2	94	15.5	136	19.0	178	22.7	220	26.4	262	30.3	305	34.5	347	38.6
53	12.2	95	15.6	137	19.1	179	22.8	221	26.5	263	30.4	306	34.6	348	38.7
54	12.3	96	15.7	138	19.2	180	22.9	222	26.6	264	30.5	307	34.7	349	38.8
55	12.4	97	15.8	139	19.3	181	22.9	223	26.7	265	30.6	308	34.7	350	38.9
56	12.5	98	15.9	140	19.4	182	23.0	224	26.8	266	30.7	309	34.8	351	39.0
57	12.5	99	15.9	141	19.5	183	23.1	225	26.9	267	30.8	310	34.9	352	39.1
58	12.6	100	16.0	142	19.6	184	23.2	226	27.0	268	30.9	311	35.0	353	39.2
59	12.7	101	16.1	143	19.6	185	23.3	227	27.1	269	31.0	312	35.1	354	39.3
60	12.8	102	16.2	144	19.7	186	23.4	228	27.2	270	31.1	313	35.2	355	39.4
61	12.9	103	16.3	145	19.8	187	23.5	229	27.3	271	31.2	314	35.3	356	39.5

AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)	AC (mm)	MA (wks)
62	12.9	104	16.4	146	19.9	188	23.6	230	27.4	272	31.3	315	35.4	357	39.6
63	13.0	105	16.4	147	20.0	189	23.7	231	27.5	273	31.4	316	35.5	358	39.7
64	13.1	106	16.5	148	20.1	190	23.7	232	27.5	274	31.5	317	35.6	359	39.8
65	13.2	107	16.6	149	20.2	191	23.8	233	27.6	275	31.6	318	35.7	360	39.9
66	13.3	108	16.7	150	20.2	192	23.9	234	27.7	276	31.7	319	35.8	361	40.0
67	13.3	109	16.8	151	20.3	193	24.0	235	27.8	277	31.8	320	35.9	362	40.1
68	13.4	110	16.9	152	20.4	194	24.1	236	27.9	278	31.9	321	36.0	363	40.2
69	13.5	111	16.9	153	20.5	195	24.2	237	28.0	279	32.0	322	36.1	364	40.3
70	13.6	112	17.0	154	20.6	196	24.3	238	28.1	280	32.0	323	36.2	365	40.4
71	13.7	113	17.1	155	20.7	197	24.4	239	28.2	281	32.1	324	36.3	366	40.5
72	13.7	114	17.2	156	20.8	198	24.5	240	28.3	282	32.2	325	36.4	367	40.6
73	13.8	115	17.3	157	20.8	199	24.6	241	28.4	283	32.3	326	36.5	368	40.7
74	13.9	116	17.4	158	20.9	200	24.6	242	28.5	284	32.4	327	36.6	369	40.8
75	14.0	117	17.4	159	21.0	201	24.7	243	28.6	285	32.5	328	36.7	370	40.9
76	14.1	118	17.5	160	21.1	202	24.8	244	28.7	286	32.6	329	36.8	371	41.0
77	14.2	119	17.6	161	21.2	203	24.9	245	28.7	287	32.7	330	36.9	372	41.1
78	14.2	120	17.7	162	21.3	204	25.0	246	28.8	288	32.8	331	37.0	373	41.2
79	14.3	121	17.8	163	21.4	205	25.1	247	28.9	289	32.9	332	37.1	374	41.3
80	14.4	122	17.9	164	21.5	206	25.2	248	29.0	290	33.0	333	37.2	375	41.4
81	14.5	123	17.9	165	21.5	207	25.3	249	29.1	291	33.1	334	37.3	376	41.5
82	14.6	124	18.0	166	21.6	208	25.4	250	29.2	292	33.2	335	37.4	377	41.6
83	14.6	125	18.1	167	21.7	209	25.5	251	29.3	293	33.3	336	37.5	378	41.7
84	14.7	126	18.2	168	21.8	210	25.5	252	29.4	294	33.4	337	37.6	379	41.8
85	14.8	127	18.3	169	21.9	211	25.6	253	29.5	295	33.5	338	37.7	380	42.0
86	14.9	128	18.4	170	22.0	212	25.8	254	29.6	296	33.6	339	37.8		
87	15.0	129	18.5	171	22.1	213	25.8	255	29.7	297	33.7	340	37.9		
88	15.0	130	18.5	172	22.2	214	25.9	256	29.8	298	33.8	341	38		
89	15.1	131	18.6	173	22.2	215	26.0	257	29.9	300	34.0	342	38.1		
90	15.2	132	18.7	174	22.3	216	26.1	258	30.0	301	34.1	343	38.2		
91	15.3	133	18.8	175	22.4	217	26.2	259	30.1	302	34.2	344	38.3		
92	15.4	134	18.9	176	22.5	218	26.3	260	30.2	303	34.3	345	38.4		

BPD Chart, Hadlock, 12.1 - 41.6 weeks

BPD (mm)	MA (weeks)	BPD (mm)	MA (weeks)	BPD (mm)	MA (weeks)
15	12.1	44	19.3	73	29.3
16	12.3	45	19.6	74	29.7
17	12.5	46	19.9	75	30.1
18	12.8	47	20.2	76	30.5
19	13.0	48	20.5	77	30.9
20	13.2	49	20.8	78	31.3
21	13.4	50	21.1	79	31.7
22	13.6	51	21.5	80	32.1
23	13.8	52	21.8	81	32.5

BPD (mm)	MA (weeks)	BPD (mm)	MA (weeks)	BPD (mm)	MA (weeks)
24	14.1	53	22.1	82	33.0
25	14.3	54	22.4	83	33.4
26	14.5	55	22.8	84	33.8
27	14.8	56	23.1	85	34.2
28	15.0	57	23.4	86	34.7
29	15.2	58	23.8	87	35.1
30	15.5	59	24.1	88	35.6
31	15.7	60	24.5	89	36.0
32	16.0	61	24.8	90	36.5
33	16.3	62	25.2	91	36.9
34	16.5	63	25.5	92	37.4
35	16.8	64	25.9	93	37.8
36	17.0	65	26.3	94	38.3
37	17.3	66	26.6	95	38.7
38	17.6	67	27.0	96	39.2
39	17.9	68	27.4	97	39.7
40	18.1	69	27.7	98	40.2
41	18.4	70	28.1	99	40.6
42	18.7	71	28.5	100	41.1
43	19.0	72	28.9	101	41.6

CRL Chart, Hadlock, 5.7 - 18 weeks

CRL (mm)	Menstrual Age	CRL (mm)	Menstrual Age	CRL (mm)	Menstrual Age
2	5.7	42	11.1	82	14.2
3	5.9	43	11.2	83	14.2
4	6.1	44	11.2	84	14.3
5	6.2	45	11.3	85	14.4
6	6.4	46	11.4	86	14.5
7	6.6	47	11.5	87	14.6
8	6.7	48	11.6	88	14.7
9	6.9	49	11.7	89	14.8
10	7.1	50	11.7	90	14.9
11	7.2	51	11.8	91	15.0
12	7.4	52	11.9	92	15.1
13	7.5	53	12.0	93	15.2
14	7.7	54	12.0	94	15.3
15	7.9	55	12.1	95	15.3
16	8.0	56	12.2	96	15.4
17	8.1	57	12.3	97	15.5
18	8.3	58	12.3	98	15.6
19	8.4	59	12.4	99	15.7
20	8.6	60	12.5	100	15.9
21	8.7	61	12.6	101	16.0

CRL (mm)	Menstrual Age	CRL (mm)	Menstrual Age	CRL (mm)	Menstrual Age
22	8.9	62	12.6	102	16.1
23	9.9	63	12.7	103	16.2
24	9.1	64	12.8	104	16.3
25	9.2	65	12.8	105	16.4
26	9.4	66	12.9	106	16.5
27	9.5	67	13.0	107	16.6
28	9.6	68	13.1	108	16.7
29	9.7	69	13.1	109	16.8
30	9.9	70	13.2	110	16.9
31	10.0	71	13.3	111	17.0
32	10.1	72	13.4	112	17.1
33	10.2	73	13.4	113	17.2
34	10.3	74	13.5	114	17.3
35	10.4	75	13.6	115	17.4
36	10.5	76	13.7	116	17.5
37	10.6	77	13.8	117	17.6
38	10.7	78	13.8	118	17.7
39	10.8	79	13.9	119	17.8
40	10.9	80	14.0	120	17.9
41	11.0	81	14.1	121	18.0

FL Chart, Hadlock, 12.2 - 42 weeks

FL (mm)	MA (weeks)	FL (mm)	MA (weeks)	FL (mm)	MA (weeks)
7	12.2	33	20.3	58	30.3
8	12.4	34	20.7	59	30.8
9	12.7	35	21.0	60	31.2
10	13.0	36	21.4	61	31.7
11	13.3	37	21.8	62	32.1
12	13.5	38	22.2	63	32.6
13	13.8	39	22.5	64	33.1
14	14.1	40	22.9	65	33.5
16	14.4	41	23.3	66	34.0
17	14.7	42	23.7	67	34.5
18	15.3	43	24.1	68	34.9
19	15.6	44	24.5	69	35.4
20	16.0	45	24.9	70	35.9
21	16.3	46	25.3	71	36.4
22	16.6	47	25.7	72	36.9
23	16.9	48	26.1	73	37.4
24	17.2	49	26.5	74	37.9
25	17.6	50	26.9	75	38.4
26	17.9	51	27.3	76	38.9
27	18.2	52	27.7	77	39.4
28	18.6	53	28.2	78	39.9
29	18.9	54	28.6	79	40.4

FL (mm)	MA (weeks)	FL (mm)	MA (weeks)	FL (mm)	MA (weeks)
30	19.3	55	29.0	80	40.9
31	19.6	56	29.5	81	41.4
32	20.0	57	29.9	82	42.0

GSD, Hansmann - 6.0 - 14.0 weeks

Sac (mm)	Menstrual Age (weeks + days)	Sac (mm)	Menstrual Age (weeks + days)	Sac (mm)	Menstrual Age (weeks + days)
10	5 + 6	30	8 + 5	50	11 + 3
11	5 + 7	31	8 + 6	51	11 + 4
12	6 + 1	32	8 + 7	52	11 + 5
13	6 + 2	33	9 + 1	53	11 + 6
14	6 + 3	34	9 + 2	54	11 + 7
15	6 + 4	35	9 + 3	55	12 + 1
16	6 + 5	36	9 + 4	56	12 + 2
17	6 + 6	37	9 + 4	57	12 + 3
18	6 + 7	38	9 + 5	58	12 + 4
19	7 + 1	39	9 + 6	59	12 + 5
20	7 + 2	40	9 + 7	60	12 + 6
21	7 + 3	41	10 + 1	61	12 + 7
22	7 + 4	42	10 + 2	62	13 + 1
23	7 + 5	43	10 + 3	63	13 + 2
24	7 + 6	44	10 + 4	64	13 + 3
25	7 + 7	45	10 + 5	65	13 + 4
26	8 + 1	46	10 + 6	66	13 + 5
27	8 + 2	47	10 + 7	67	13 + 6
28	8 + 3	48	11 + 1	68	13 + 7
29	8 + 4	49	11 + 2		

HC Chart, Hadlock, 12.2-41.9 weeks

HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)
56	12.0	94	14.3	132	16.8	170	19.6	208	22.9	246	26.7	284	31.2	322	36.4
57	12.1	95	14.3	133	16.8	171	19.7	209	23.0	247	26.8	285	31.3	323	36.5
58	12.2	96	14.4	134	16.9	172	19.8	210	23.1	248	26.9	286	31.4	324	36.7
59	12.2	97	14.5	135	17.0	173	19.9	211	23.2	249	27.0	287	31.5	325	36.8
60	12.3	98	14.5	136	17.1	174	19.9	212	23.3	250	27.1	288	31.7	326	37.0
61	12.3	99	14.6	137	17.1	175	20.0	213	23.4	251	27.3	289	31.8	327	37.1
62	12.4	100	14.7	138	17.2	176	20.1	214	23.5	252	27.4	290	31.9	328	37.3
63	12.4	101	14.7	139	17.3	177	20.2	215	23.6	253	27.5	291	32.1	329	37.4
64	12.5	102	14.8	140	17.3	178	20.3	216	23.6	254	27.6	292	32.2	330	37.6
65	12.6	103	14.8	141	17.4	179	20.3	217	23.7	255	27.7	293	32.3	331	37.7
66	12.6	104	14.9	142	17.5	180	20.4	218	23.8	256	27.8	294	32.5	332	37.9
67	12.7	105	15.0	143	17.6	181	20.5	219	23.9	257	27.9	295	32.6	333	38.0

HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)	HC (mm)	MA (wks)
68	12.7	106	15.0	144	17.6	182	20.6	220	24.0	258	28.0	296	32.7	334	38.2
69	12.8	107	15.1	145	17.7	183	20.7	221	24.1	259	28.2	297	32.9	335	38.3
70	12.8	108	15.2	146	17.8	184	20.8	222	24.2	260	28.3	298	33.0	336	38.5
71	12.9	109	15.2	147	17.9	185	20.8	223	24.3	261	28.4	299	33.1	337	38.6
72	13.0	110	15.3	148	17.9	186	20.9	224	24.4	262	28.5	300	33.3	338	38.8
73	13.0	111	15.4	149	18.0	187	21.0	225	24.5	263	28.6	301	33.4	339	39.0
74	13.1	112	15.4	150	18.1	188	21.1	226	24.6	264	28.7	302	33.5	340	39.1
75	13.1	113	15.5	151	18.1	189	21.2	227	24.7	265	28.9	303	33.7	341	39.3
76	13.2	114	15.6	152	18.2	190	21.3	228	24.8	266	29.0	304	33.8	342	39.4
77	13.3	115	15.6	153	18.3	191	21.4	229	24.9	267	29.1	305	33.9	343	39.6
78	13.3	116	15.7	154	18.4	192	21.5	230	25.0	268	29.2	306	34.1	344	39.7
79	13.4	117	15.8	155	18.4	193	21.5	231	25.1	269	29.3	307	34.2	345	39.9
80	13.4	118	15.8	156	18.5	194	21.6	232	25.2	270	29.4	308	34.4	346	40.1
81	13.5	119	15.9	157	18.6	195	21.7	233	25.3	271	29.6	309	34.5	347	40.2
82	13.6	120	16.0	158	18.7	196	21.8	234	25.4	272	29.7	310	34.6	348	40.4
83	13.6	121	16.0	159	18.8	197	21.9	235	25.5	273	29.8	311	34.8	349	40.6
84	13.7	122	16.1	160	18.8	198	22.0	236	25.6	274	29.9	312	34.9	350	40.7
85	13.7	123	16.2	161	18.9	199	22.1	237	25.8	275	30.0	313	35.1	351	40.9
86	13.8	124	16.2	162	19.0	200	22.2	238	25.9	276	30.2	314	35.2	352	41.1
87	13.9	125	16.3	163	19.1	201	22.3	239	26.0	277	30.3	315	35.3	353	41.2
88	13.9	126	16.4	164	19.1	202	22.3	240	26.1	278	30.4	316	35.5	354	41.4
89	14.0	127	16.4	165	19.2	203	22.4	241	26.2	279	30.5	317	35.6	355	41.6
90	14.0	128	16.5	166	19.3	204	22.5	242	26.3	280	30.7	318	35.8	356	41.7
91	14.1	129	16.6	167	19.4	205	22.6	243	26.4	281	30.8	319	35.9	357	41.9
92	14.2	130	16.6	168	19.5	206	22.7	244	26.5	282	30.9	320	36.1		
93	14.2	131	16.7	169	19.5	207	22.8	245	26.6	283	31.0	321	36.2		

HL Chart, Jeanty, 12.6 - 40.1 weeks

HL (mm)	MA (weeks)	HL (mm)	MA (weeks)	HL (mm)	MA (weeks)
10	12.57	30	19.86	50	29.29
11	12.86	31	20.29	51	29.86
12	13.14	32	20.71	52	30.29
13	13.57	33	21.14	53	30.86
14	13.86	34	21.57	54	31.43
15	14.14	35	22.00	55	32.00
16	14.57	36	22.57	56	32.57
17	14.86	37	22.86	57	33.14
18	15.14	38	23.43	58	33.57
19	15.57	39	23.86	59	34.14
20	15.86	40	24.29	60	34.86
21	16.29	41	24.86	61	35.29
22	16.71	42	25.29	62	35.86
23	17.14	43	25.71	63	36.57

HL (mm)	MA (weeks)	HL (mm)	MA (weeks)	HL (mm)	MA (weeks)
24	17.43	44	26.14	64	37.14
25	17.86	45	26.71	65	37.71
26	18.14	46	27.14	66	38.29
27	18.57	47	27.71	67	38.86
28	19.00	48	28.14	68	39.57
29	19.43	49	28.86	69	40.14

Appendix E Electromagnetic Compatibility Tables

This appendix provides reference tables for emissions and immunity requirements.

The Terason Ultrasound System is intended for use in the electromagnetic environment specified in the following tables. The customer or user of the Terason system should ensure that it is used in such an environment.

Compatibility for All Equipment

Guidance and Manufacturer's Declaration—Electromagnetic Emissions—For All Equipment and Systems (Table 201 from EN 60601-1-2:2001)

Emissions Test	Compliance	Electromagnetic Environment - Guidance
RF Emissions CISPR 11	Group 1	The Terason Ultrasound System uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF Emissions CISPR 11	Group 2	The 10V5S transducer emits electromagnetic energy. Nearby electronic equipment may be affected.
RF Emissions CISPR 11	Class B	The Terason Ultrasound System is suitable for use in all establishments, including domestic, and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonics IEC 61000-3-2	Class A	
Flicker IEC 61000-3-3	Complies	

Guidance and Manufacturer's Declaration—Electromagnetic Immunity—For All Equipment and Systems (Table 202 from EN 60601-1-2:2001)

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
ESD IEC 61000-4-2	±6kV Contact ±8kV Air	±6kV Contact ±8kV Air	Floors should be wood, concrete or ceramic tile. If floors are synthetic, the relative humidity should be at least 30%
EFT IEC 61000-4-4	±2kV Mains ±1kV I/Os	±2kV Mains ±1kV I/Os	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1kV Differential ±2kV Common	±1kV Differential ±2kV Common	
Voltage Dips/ Dropout IEC 61000-4-11	>95% Dip for 0.5 Cycle 60% Dip for 5 Cycles 30% Dip for 25 Cycles > 95% Dip for 5 Seconds	>95% Dip for 0.5 Cycle 60% Dip for 5 Cycles 30% Dip for 25 Cycles > 95% Dip for 5 Seconds	Mains power quality should be that of a typical commercial or hospital environment. The unit continues to operate during a 5-second loss of power. However, if the user of the Terason Ultrasound System requires continued operation during a longer power outage, Using an uninterruptible power supply to power the Terason system is recommended.
Power Frequency 50/60 Hz Magnetic Field IEC 61000-4-8	3A/m	3A/m	Power Frequency magnetic fields should be that of a typical commercial or hospital environment.

Compatibility for Non-Life-Supporting Equipment

Guidance and Manufacturer's Declaration—Electromagnetic Immunity—For Equipment and Systems That Are Not Life Supporting (Table 204 from EN 60601-1-2:2001)

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 KHz to 80 MHz	$[V_1] = 3 \text{ Vrms}$	<p>Portable and mobile communications equipment should be separated from the Terason Ultrasound System by no less than the distances calculated/listed below</p> $d = \left[\frac{3.5}{V_1} \right] \sqrt{P}$ $d = \left[\frac{3.5}{E_1} \right] \sqrt{P} \quad 80 \text{ to } 800 \text{ MHz}$ $d = \left[\frac{7}{E_1} \right] \sqrt{P} \quad 800 \text{ MHz to } 2.5 \text{ GHz}$ <p>where P is the max power in watts and d is the recommended separation distance in meters.</p> <p>Field strengths from fixed transmitters, as determined by an electromagnetic site survey, should be less than the compliance levels (V_1 and E_1).</p> <p>Interference may occur in the vicinity of equipment containing a transmitter.</p>
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	$[E_1] = 3 \text{ V/m}$	

Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and the Terason Ultrasound System and Systems that Are Not Life-Supporting

Rated Maximum Output Power of Transmitter Watts (W)	Separation Distance According to Frequency of Transmitter Meters (m)		
	IEC 61000-4-6	IEC 61000-4-3	
	150 kHz to 80 MHz $1.1667\sqrt{P}$	80 MHz to 800 MHz $1.1667\sqrt{P}$	800 MHz to 2.5 GHz $2.3333\sqrt{P}$
0.01	0.12 m	0.17 m	0.24 m
0.1	0.53 m	0.53 m	0.74 m
1	1.17 m	1.67 m	2.34 m
10	5.28 m	5.28 m	7.38 m
100	16.70 m	16.70 m	23.34 m

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rate of the transmitter in watts (W) according to the transmitter manufacturer.



Note: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Appendix F Acoustic Output Reporting for Track 3

Terason follows Track 3 of the FDA's Information for Manufacturers Seeking Marketing Clearance of Diagnostic Ultrasound Systems and Transducers. Track 3 does not require evaluation of acoustic output on an application-specific basis, but the global maximum derated I_{SPTA} must not exceed 720 mW/cm^2 and the global maximum MI must not exceed 1.9. Ophthalmic use is an exception, and has a different requirement: the $TI = \max.(TIS_{as}, TIC)$, and must not exceed 1.0. $I_{SPTA,3}$ must not exceed 50 mW/cm^2 , and MI must not exceed 0.23.

This appendix contains tables that display the Acoustic Output Reporting for Track 3. Tables are shown for the scanning modes for the following transducers:

t3000 Transducers (see [page 334](#))

4V2A
4V2S
5C2A
7L3V
8BP4
8EC4A
8MC3
8TV4
10V5S
12HL7
12L5V

Echo Transducers (see [page 385](#))

4V2A
5C2A
7L3V
8EC4A
12HL7
12L5V
PDOF

Acoustic Output Tables for t3000 Transducers

Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer
(Terason t3000 Ultrasound System in 2D Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non-scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.39	2.02	-	-	-	3.90
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.16					
	W_o	P	(mW)		151.57	-		-	225.65
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	3.90				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	2.42	2.79	-	-	-	1.99
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.02	-	-	-	1.37
			Y (cm)		1.20	-	-	-	1.20
Other Information	PD	t_d	(μsec)	0.62					
	PRF	p_{rr}	(Hz)	150					
	$p_r@P_{II\text{max}}$	p_r at max. I_{pi}	(MPa)	2.90					
	$d_{eq}@P_{II\text{max}}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		4.0	-	-		5.5
	$I_{PA,3} @MI_{\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	229.92					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								X
	Control 4								

Note: 1. Maximum free air surface temperature of the lens is 41.1°C for this operating mode, assuming an ambient air temperature of 23.0 °C
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non-scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.39	1.53	-	Note 1	0.21	3.38
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.16					
	W_o	P	(mW)		118.25	-		5.19	213.18
	min of [$W_{,3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta,\alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	3.90				3.80	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.34	
	f_c	f_{awf}	(MHz)	2.42	2.79	-	-	1.99	2.42
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.02	-	-	1.37	1.63
Y (cm)				1.20	-	-	1.20	1.20	
Other Information	PD	t_d	(μsec)	0.62					
	PRF	p_{rr}	(Hz)	240					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	2.90					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					0.34	
	Focal Length	FL	(cm)		4.00	-	-		7.00
	$I_{PA,3} @ MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	229.92					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3							X	
	Control 4								X

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer
(Terason t3000 Ultrasound System in Color Mode)

Index Label				MI	TIS		TIB	TIC	
					Scan	Non-scan			Non-scan
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.38	2.23	-	-	-	4.26
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.94					
	W_o	P	(mW)		B-M =51.12 CD=113.52	-		-	268.78
	min of [$W_{,3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	2.30				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	1.99	B-M = 3.28 CD = 2.65	-	-	-	1.99
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.02	-	-	-	1.63
			Y (cm)		1.20	-	-	-	1.20
Other Information	PD	t_d	(μsec)	2.37					
	PRF	p_{rr}	(Hz)	250					
	$p_r@P_{I\text{Imax}}$	p_r at max. I_{pi}	(MPa)	2.53					
	$d_{eq}@P_{I\text{Imax}}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		4.00	-	-		7.00
	$I_{PA,3} @M_{I\text{Imax}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	168.44					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								X
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer
(Terason t3000 Ultrasound System in Continuous-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non-scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.09	-	1.00	-	3.59	2.56
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	0.12					
	W_o	P	(mW)		-	104.66		104.66	104.66
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta,\alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	3.00				2.85	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.44	
	f_c	f_{awf}	(MHz)	2.00	-	2.00	-	2.00	2.00
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	0.69	-	0.69	0.69
			Y (cm)		-	1.20	-	1.20	1.20
Other Information	PD	t_d	(μsec)	-					
	PRF	p_{rr}	(Hz)	-					
	$p_{r@PILmax}$	p_r at max. I_{pi}	(MPa)	0.15					
	$d_{eq@PILmax}$	d_{eq} at max I_{pi}	(cm)					0.43	
	Focal Length	FL	(cm)		-	16.00	-		4.00
	$I_{PA,3} @MI_{max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	-					
Operating Control Conditions	Control 1			X				X	X
	Control 2					X			
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non-scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.22	-	-	1.85	4.32	3.96
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.72					
	W_o	P	(mW)		-	-		214.39	241.84
	min of [$W_{,3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				162.72		
	z_1	z_s	(cm)				2.40		
	z_{bp}	z_{bp}	(cm)				2.29		
	z_{sp}	z_b	(cm)	3.50				4.90	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.56	
	f_c	f_{awf}	(MHz)	1.99	-	-	2.39	1.99	2.39
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	-	1.52	1.52	1.52
		Y (cm)		-	-	1.20	1.20	1.20	
Other Information	PD	t_d	(μsec)	3.79					
	PRF	p_{rr}	(Hz)	900					
	$p_r@P_{II\max}$	p_r at max. I_{pi}	(MPa)	2.13					
	$d_{eq}@P_{II\max}$	d_{eq} at max I_{pi}	(cm)					0.53	
	Focal Length	FL	(cm)		-	-	16.5		16.5
	$I_{PA,3} @MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	130.31					
Operating Control Conditions	Control 1			X					
	Control 2						X		X
	Control 3							X	
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.

2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.

3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 4V2S Transducer
(Terason t3000 Ultrasound System in 2D Mode)**

Index Label				MI	TIS		TIB	TIC
					Scan	Non- scan		
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$	
Maximum Index Value				1.10	1.04	-	-	-
Associated Acoustic Parameter	USFDA Track 3	IEC						
	$p_{r,3}$	p_{ra}	(MPa)	1.56				
	W_o	P	(mW)		109.81	-		109.81
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-	
	z_1	z_s	(cm)				-	
	z_{bp}	z_{bp}	(cm)				-	
	z_{sp}	z_b	(cm)	4.90				-
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-
	f_c	f_{awf}	(MHz)	2.00	2.00	-	-	2.00
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.90	-	-	0.90
			Y (cm)		1.40	-	-	1.40
Other Information	PD	t_d	(μsec)	0.94				
	PRF	p_{rr}	(Hz)	54				
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	2.13				
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					-
	Focal Length	FL	(cm)		3.0	-	-	3.0
	$I_{PA,3} @ MI_{\max}$	$I_{pa, \alpha}$ at max. MI	(W/cm ²)	112.28				
Operating Control Conditions	Control 1			X				
	Control 2				X			X
	Control 3							
	Control 4							

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 4V2S Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.10	0.95	-	-	0.13	2.10
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.56					
	W_o	P	(mW)		116.97	-		5.85	155.57
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	4.90				6.40	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.43	
	f_c	f_{awf}	(MHz)	2.00	2.00	-	-	2.00	2.00
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.20	-	-	1.92	1.92
Y (cm)				1.40	-	-	1.40	1.40	
Other Information	PD	t_d	(μsec)	0.94					
	PRF	prr	(Hz)	240					
	pr@PII _{max}	p_r at max. I_{pi}	(MPa)	2.13					
	deq@PII _{max}	d_{eq} at max I_{pi}	(cm)					0.39	
	Focal Length	FL	(cm)		4.0	-	-		7.0
	$I_{PA,3} @MI_{\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	112.28					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3							X	
	Control 4								X

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 4V2S Transducer Transducer
(t3000 Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.92	1.47	-	-	-	2.26
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	1.30					
	W ₀	P	(mW)		114.69	-		-	114.69
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	4.90				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	2.00	2.64	-	-	-	2.64
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.90	-	-	-	0.90
			Y (cm)		1.40	-	-	-	1.40
Other Information	PD	t _d	(μsec)	3.77					
	PRF	prr	(Hz)	7968					
	pr@Pllmax	p _r at max. I _{pi}	(MPa)	1.77					
	deq@Pllmax	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		3.0	-	-		3.0
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	77.35					
Operating Control Conditions	Control 1			X					
	Control 2				X				X
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 4V2S Transducer
(Terason t3000 Ultrasound System in PWD Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.00	-	-	1.06	4.02	2.26
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.41					
	W_o	P	(mW)		-	-		135.51	108.20
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				84.25		
	z_1	z_s	(cm)				2.50		
	z_{bp}	z_{bp}	(cm)				2.50		
	z_{sp}	z_b	(cm)	5.17				4.80	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.39	
	f_c	f_{awf}	(MHz)	2.00	-	-	2.65	2.00	2.64
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	-	1.56	1.56	0.90
			Y (cm)		-	-	1.40	1.40	1.40
Other Information	PD	t_d	(μsec)	3.77					
	PRF	prr	(Hz)	1500					
	$p_r@P_{I\max}$	p_r at max. I_{pi}	(MPa)	1.89					
	$d_{eq}@P_{I\max}$	d_{eq} at max I_{pi}	(cm)					0.37	
	Focal Length	FL	(cm)		-	-	7.0		3.0
	$I_{PA,3} @MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	96.50					
Operating Control Conditions	Control 1			X					
	Control 2						X		
	Control 3							X	
	Control 4								X

Note:

1. Maximum free air surface temperature of the lens is 40.1° C for this operating mode, assuming an ambient air temperature of 23.0° C.
2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 4V2S Transducer
(Terason t3000 Ultrasound System in Continuous-Wave Doppler Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.08	-	-	0.87	4.03	2.44
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.12					
	W _o	P	(mW)		-	-		117.33	117.33
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				91.54		
	Z ₁	Z _s	(cm)				1.80		
	Z _{bp}	Z _{bp}	(cm)				1.80		
	Z _{sp}	Z _b	(cm)	1.80				1.80	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.51	
	f _c	f _{awf}	(MHz)	2.00	-	-	2.00	2.00	2.00
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	-	0.81	0.81	0.81
			Y (cm)		-	-	1.40	1.40	1.40
Other Information	PD	t _d	(μsec)	-					
	PRF	prr	(Hz)	-					
	pr@Pllmax	p _r at max. I _{pi}	(MPa)	0.13					
	deq@Pllmax	d _{eq} at max I _{pi}	(cm)				0.50		
	Focal Length	FL	(cm)		-	-	4.0		4.0
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	-					
Operating Control Conditions	Control 1			X			X	X	X
	Control 2								
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 5C2A Transducer
(Terason t3000 Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.60	0.62	-	-	-	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.88					
	W ₀	P	(mW)		39.55	-		-	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	4.60				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	2.17	3.31	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.00	-	-	-	-
			Y (cm)		1.20	-	-	-	-
Other Information	PD	t _d	(μsec)	1.11					
	PRF	p _{rr}	(Hz)	84					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.21					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		4.0	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	22.88					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 5C2A Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.60	0.35	-	Note 1	0.04	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.88					
	W ₀	P	(mW)		30.18	-		1.23	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	4.60				4.27	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.37	
	f _c	f _{awf}	(MHz)	2.17	3.33	-	-	2.17	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.50	-	-	1.50	-
			Y (cm)		1.20	-	-	1.20	-
Other Information	PD	t _d	(μsec)	1.11					
	PRF	p _{rr}	(Hz)	240					
	p _r @P _{II} max	p _r at max. I _{pi}	(MPa)	1.21					
	d _{eq} @P _{II} max	d _{eq} at max I _{pi}	(cm)					0.35	
	Focal Length	FL	(cm)		6.0	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	22.88					
Operating Control Conditions	Control 1			X				X	
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 5C2A Transducer
(Terason t3000 Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.58	2.17	-	-	-	Note 3
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.90					
	W ₀	P	(mW)		141.92	-		-	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	4.67				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	2.41	3.17	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.00	-	-	-	-
			Y (cm)		1.20	-	-	-	-
Other Information	PD	t _d	(μsec)	3.17					
	PRF	p _{rr}	(Hz)	9084					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.27					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		4.0	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	34.25					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

- Note:**
1. Maximum free air surface temperature of the lens is 42.3° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 5C2A Transducer
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.59	-	1.32	-	3.51	Note 3
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.87					
	W ₀	P	(mW)		-	86.96		99.47	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	4.60				3.57	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.39	
	f _c	f _{awf}	(MHz)	2.17	-	3.17	-	2.00	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	0.80	-	1.20	-
			Y (cm)		-	1.20	-	1.20	-
Other Information	PD	t _d	(μsec)	1.11					
	PRF	p _{rr}	(Hz)	67					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.22					
	deq@PII _{max}	d _{eq} at max I _{pi}	(cm)					0.37	
	Focal Length	FL	(cm)		-	4.0	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	22.06					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								

Note: 1. Maximum free air surface temperature of the lens is 44.5° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 7L3V Transducer
(Terason t3000 Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.43	0.43	-	-	-	0.56
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.77					
	W ₀	P	(mW)		18.66	-		-	18.07
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	2.73				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	3.20	4.87	-	-	-	4.82
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.99	-	-	-	0.72
			Y (cm)		0.70	-	-	-	0.70
Other Information	PD	t _d	(μsec)	0.64					
	PRF	p _{rr}	(Hz)	24					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.05					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		3.5	-	-		2.5
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	25.02					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								X
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 7L3V Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.43	0.24	-	-	0.02	0.35
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	0.77					
	W_o	P	(mW)		12.56	-		0.29	18.54
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	2.73				2.58	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.23	
	f_c	f_{awf}	(MHz)	3.20	4.88	-	-	3.20	3.21
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.26	-	-	0.99	1.95
			Y (cm)		0.70	-	-	0.70	0.70
Other Information	PD	t_d	(μsec)	0.64					
	PRF	prr	(Hz)	240					
	pr@Pllmax	p_r at max. I_{pi}	(MPa)	1.05					
	deq@Pllmax	d_{eq} at max I_{pi}	(cm)					0.22	
	Focal Length	FL	(cm)		4.5	-	-		8.0
	$I_{PA,3} @ MI_{max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	25.02					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3							X	
	Control 4								X

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 7L3V Transducer
(Terason t3000 Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.68	2.48	-	-	-	3.24
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	1.35					
	W ₀	P	(mW)		104.39	-		-	113.72
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	2.47				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	3.98	4.99	-	-	-	3.97
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.87	-	-	-	0.87
			Y (cm)		0.70	-	-	-	0.70
Other Information	PD	t _d	(μsec)	1.96					
	PRF	p _{rr}	(Hz)	18792					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.85					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		1.5	-	-		1.5
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	83.85					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								X
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 7L3V Transducer
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.42	-	2.20	-	3.33	3.13
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	0.73					
	W_o	P	(mW)		-	93.14		83.29	45.75
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	2.60				3.13	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.29	
	f_c	f_{awf}	(MHz)	3.02	-	4.97	-	3.02	3.98
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	1.29	-	1.11	0.15
			Y (cm)		-	0.70	-	0.70	0.70
Other Information	PD	t_d	(μsec)	2.66					
	PRF	p_{rr}	(Hz)	4500					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	0.96					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					0.28	
	Focal Length	FL	(cm)		-	8.0	-		0.8
	$I_{PA,3} @ MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	20.18					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								X

- Note:**
1. Maximum free air surface temperature of the lens is 40.8° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 7L3V Transducer
(Terason t3000 Ultrasound System in Triplex Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.68	-	2.15	-	3.11	3.43
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.35					
	W_o	P	(mW)		-	90.34		77.91	66.78
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	2.47				3.13	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.29	
	f_c	f_{awf}	(MHz)	3.98	-	4.97	-	3.02	3.98
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	1.29	-	1.11	0.39
Y (cm)				-	0.70	-	0.70	0.70	
Other Information	PD	t_d	(μsec)	1.96					
	PRF	prr	(Hz)	4000					
	pr@PII _{max}	p_r at max. I_{pi}	(MPa)	0.96					
	deq@PII _{max}	d_{eq} at max I_{pi}	(cm)					0.28	
	Focal Length	FL	(cm)		-	8.0	-		0.8
	$I_{PA,3} @ MI_{\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	20.18					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3						X		
	Control 4							X	

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8BP4 Transducer *linear array*
(Terason t3000 Ultrasound System in 2D Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.54	0.24	-	-	-	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	p _{ra}	(MPa)	1.22					
	W ₀	P	(mW)		9.71	-		-	-
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	z _{bp}	(cm)				-		
	Z _{sp}	z _b	(cm)	1.30				-	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	5.12	5.10	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.01	-	-	-	-
			Y (cm)		0.50	-	-	-	-
Other Information	PD	t _d	(μsec)	0.36					
	PRF	p _{rr}	(Hz)	30					
	pr@P _{II} max	p _r at max. I _{pi}	(MPa)	1.51					
	deq@P _{II} max	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	67.36					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8BP4 Transducer *linear array*
(Terason t3000 Ultrasound System in M-Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.54	0.13	Note 1	-	0.01	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	1.22					
	W ₀	P	(mW)		4.42	-		0.10	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	1.30				1.30	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.12	
	f _c	f _{awf}	(MHz)	5.12	5.93	-	-	5.12	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.01	-	-	0.63	-
			Y (cm)		0.50	-	-	0.50	-
Other Information	PD	t _d	(μsec)	0.36					
	PRF	p _{rr}	(Hz)	240					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.51					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					0.11	
	Focal Length	FL	(cm)		2.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	67.36					
Operating Control Conditions	Control 1			X				X	
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8BP4 Transducer *linear array*
(Terason t3000 Ultrasound System in Color Flow Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.73	0.90	-	-	-	Note 3
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.63					
	W_o	P	(mW)		38.01	-		-	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.43				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	4.98	5.95	-	-	-	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.22	-	-	-	-
			Y (cm)		0.50	-	-	-	-
Other Information	PD	t_d	(μsec)	1.58					
	PRF	p_{rr}	(Hz)	900					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	2.07					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		1.5	-	-		-
	$I_{PA,3} @MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	119.34					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

- Note:**
1. Maximum free air surface temperature of the lens is 33.8° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8BP4 Transducer *linear array*
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.47	-	1.15	-	1.70	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	1.05					
	W _o	P	(mW)		-	40.39		28.23	-
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	1.17				1.25	
	d _{eq} (z _{sp})	d _{eq} (Z _b)	(cm)					0.24	
	f _c	f _{awf}	(MHz)	4.99	-	5.96	-	4.98	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	1.81	-	0.97	-
			Y (cm)		-	0.50	-	0.50	-
Other Information	PD	t _d	(μsec)	1.77					
	PRF	prr	(Hz)	800					
	pr@Pllmax	p _r at max. I _{pi}	(MPa)	1.30					
	deq@Pllmax	d _{eq} at max I _{pi}	(cm)					0.20	
	Focal Length	FL	(cm)		-	8.0	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	45.75					
Operating Control Conditions	Control 1			X				X	
	Control 2					X			
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8BP4 Transducer *curved linear array*
(Terason t3000 Ultrasound System in 2D Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.41	0.23	-	-	-	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.92					
	W ₀	P	(mW)		10.03	-		-	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	2.30				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	4.99	4.90	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.96	-	-	-	-
			Y (cm)		0.50	-	-	-	-
Other Information	PD	t _d	(μsec)	0.40					
	PRF	p _{rr}	(Hz)	30					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.32					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		3.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	38.93					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8BP4 Transducer *curved linear array*
(Terason t3000 Ultrasound System in M-Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.41	0.13	-	-	0.01	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.92					
	W ₀	P	(mW)		5.35	-		0.14	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	2.30				1.97	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.18	
	f _c	f _{awf}	(MHz)	4.99	4.90	-	-	4.30	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.96	-	-	0.78	-
			Y (cm)		0.50	-	-	0.50	-
Other Information	PD	t _d	(μsec)	0.40					
	PRF	p _{rr}	(Hz)	240					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.32					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					0.17	
	Focal Length	FL	(cm)		3.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	38.93					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3							X	
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8BP4 Transducer *curved linear array*
(Terason t3000 Ultrasound System in Color Flow Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.45	0.98	-	-	-	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.91					
	W ₀	P	(mW)		41.20	-		-	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	2.00				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	4.01	4.98	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.78	-	-	-	-
			Y (cm)		0.50	-	-	-	-
Other Information	PD	t _d	(μsec)	1.94					
	PRF	p _{rr}	(Hz)	900					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.20					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	31.97					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8BP4 Transducer *curved linear array*
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.42	-	0.76	-	1.59	Note 3
	USFDA Track 3	IEC							
	P _{r,3}	p _{ra}	(MPa)	0.84					
	W ₀	P	(mW)		-	31.64		22.49	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	1.90				0.68	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.26	
	f _c	f _{awf}	(MHz)	4.00	-	5.02	-	4.00	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	1.29	-	0.27	-
			Y (cm)		-	0.50	-	0.50	-
Other Information	PD	t _d	(μsec)	1.94					
	PRF	p _{rr}	(Hz)	900					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.09					
	deq@PII _{max}	d _{eq} at max I _{pi}	(cm)					0.22	
	Focal Length	FL	(cm)		-	8.0	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	25.45					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								

Note: 1. Maximum free air surface temperature of the lens is 38.7° C for this operating mode, assuming an ambient air temperature of 23.0° C.
2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8EC4A Transducer
(Terason t3000 Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						A _{apr} ≤ 1cm ²	A _{aprt} >1cm ²		
Associated Acoustic Parameter	Maximum Index Value			0.80	0.59	-	-	-	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	1.78					
	W ₀	P	(mW)		25.00	-		-	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	.525				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	1.40				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	4.99	4.99	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.78	-	-	-	-
			Y (cm)		0.50	-	-	-	-
Other Information	PD	t _d	(μsec)	0.58					
	PRF	p _{rr}	(Hz)	150					
	p _r @P _{II} max	p _r at max. I _{pi}	(MPa)	2.17					
	d _{eq} @P _{II} max	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	124.03					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8EC4A Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						A _{apr} ≤ 1cm ²	A _{aprt} >1cm ²		
Associated Acoustic Parameter	Maximum Index Value			0.80	0.46	-	-	0.04	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	1.78					
	W _o	P	(mW)		18.84	-		0.51	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	1.40				1.90	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.15	
	f _c	f _{awf}	(MHz)	4.99	5.85	-	-	4.99	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.25	-	-	0.78	-
			Y (cm)		0.50	-	-	0.50	-
Other Information	PD	t _d	(μsec)	0.58					
	PRF	p _{rr}	(Hz)	240					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	2.17					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					0.14	
	Focal Length	FL	(cm)		4.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	124.03					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3							X	
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8EC4A Transducer
(Terason t3000 Ultrasound System in Color Flow Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.80	0.83	-	-	-	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.75					
	W_o	P	(mW)		34.75	-		-	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.45				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	4.77	4.98	-	-	-	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.55	-	-	-	-
			Y (cm)		0.50	-	-	-	-
Other Information	PD	t_d	(μsec)	1.64					
	PRF	p_{rr}	(Hz)	300					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	2.22					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		1.5	-	-		-
	$I_{PA,3} @ MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	137.22					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8EC4A Transducer
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.70	-	0.60	-	1.71	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.40					
	W_o	P	(mW)		-	25.11		19.80	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.50				0.60	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.21	
	f_c	f_{awf}	(MHz)	4.00	-	4.98	-	4.00	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	1.29	-	0.27	-
			Y (cm)		-	0.50	-	0.50	-
Other Information	PD	t_d	(μsec)	2.00					
	PRF	p_{rr}	(Hz)	4000					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	1.76					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					0.19	
	Focal Length	FL	(cm)		-	8.0	-		-
	$I_{PA,3} @ MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	62.33					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								

Note: 1. Maximum free air surface temperature of the lens is 38.3° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8MC3 Transducer
(Terason t3000 Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.55	0.69	-	-	-	0.98
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.99					
	W ₀	P	(mW)		42.87	-		-	42.87
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	3.18				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	3.22	3.97	-	-	-	3.97
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.18	-	-	-	1.18
			Y (cm)		0.80	-	-	-	0.80
Other Information	PD	t _d	(μsec)	0.60					
	PRF	p _{rr}	(Hz)	29					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.40					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		3.5	-	-		3.5
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	39.79					
Operating Control Conditions	Control 1			X					
	Control 2				X				X
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8MC3 Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.55	0.36	-	-	0.03	0.53
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	0.99					
	W_o	P	(mW)		22.29	-		0.68	30.94
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	3.18				3.30	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.21	
	f_c	f_{awf}	(MHz)	3.22	3.97	-	-	3.97	3.96
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.18	-	-	1.18	2.13
			Y (cm)		0.80	-	-	0.80	0.80
Other Information	PD	t_d	(μsec)	0.60					
	PRF	prr	(Hz)	240					
	$p_r@P_{I\text{max}}$	p_r at max. I_{pi}	(MPa)	1.40					
	$d_{eq}@P_{I\text{max}}$	d_{eq} at max I_{pi}	(cm)					0.20	
	Focal Length	FL	(cm)		3.5	-	-		8.0
	$I_{PA,3} @MI_{\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	39.79					
Operating Control Conditions	Control 1			X					
	Control 2				X			X	
	Control 3								X
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8MC3 Transducer
(Terason t3000 Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.48	2.05	-	-	-	3.31
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	0.86					
	W_o	P	(mW)		108.33	-		-	94.95
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	3.18				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	3.22	3.97	-	-	-	3.97
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.83	-	-	-	0.50
			Y (cm)		0.80	-	-	-	0.80
Other Information	PD	t_d	(μsec)	2.41					
	PRF	p_{rr}	(Hz)	2500					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	1.22					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.5	-	-		1.5
	$I_{PA,3} @ MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	30.31					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								X
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8MC3 Transducer
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.55	-	1.50	-	2.18	2.51
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	0.99					
	W_o	P	(mW)		-	53.22		39.88	53.23
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	3.18				0.80	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.35	
	f_c	f_{awf}	(MHz)	3.22	-	5.93	-	3.21	3.97
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	0.83	-	0.28	0.28
Y (cm)				-	0.80	-	0.80	0.80	
Other Information	PD	t_d	(μsec)	2.41					
	PRF	p_{rr}	(Hz)	4500					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	1.40					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					0.35	
	Focal Length	FL	(cm)		-	2.5	-		0.8
	$I_{PA,3} @ MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	39.79					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								X

- Note:**
1. Maximum free air surface temperature of the lens is 43.4° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8TV4 Transducer
(Terason t3000 Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.47	0.36	-	-	-	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	0.94					
	W_o	P	(mW)		15.93	-		-	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	2.02				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	4.00	4.76	-	-	-	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.88	-	-	-	-
			Y (cm)		0.55	-	-	-	-
Other Information	PD	t_d	(μsec)	0.48					
	PRF	p_{rr}	(Hz)	119					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	1.22					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		3.5	-	-		-
	$I_{PA,3} @MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	38.25					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8TV4 Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.47	0.19	-	-	0.02	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.94					
	W ₀	P	(mW)		9.63	-		0.24	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	2.02				1.87	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.21	
	f _c	f _{awf}	(MHz)	4.00	4.77	-	-	4.00	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.39	-	-	0.70	-
			Y (cm)		0.55	-	-	0.55	-
Other Information	PD	t _d	(μsec)	0.48					
	PRF	p _{rr}	(Hz)	240					
	p _r @P _{II} max	p _r at max. I _{pi}	(MPa)	1.22					
	d _{eq} @P _{II} max	d _{eq} at max I _{pi}	(cm)					0.20	
	Focal Length	FL	(cm)		6.0	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	38.25					
Operating Control Conditions	Control 1			X				X	
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8TV4 Transducer
(Terason t3000 Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.41	0.53	-	-	-	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	p _{ra}	(MPa)	0.81					
	W ₀	P	(mW)		23.47	-		-	-
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	2.02				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	4.00	4.76	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.70	-	-	-	-
			Y (cm)		0.55	-	-	-	-
Other Information	PD	t _d	(μsec)	1.43					
	PRF	p _{rr}	(Hz)	900					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.06					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	30.21					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8TV4 Transducer
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.47	-	0.45	-	1.19	Note 3
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	0.94					
	W_o	P	(mW)		-	19.73		16.00	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	2.02				1.37	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.21	
	f_c	f_{awf}	(MHz)	4.00	-	4.76	-	4.00	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	0.70	-	0.51	-
			Y (cm)		-	0.55	-	0.55	-
Other Information	PD	t_d	(μsec)	1.90					
	PRF	prr	(Hz)	10000					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	1.22					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					0.20	
	Focal Length	FL	(cm)		-	2.5	-		-
	$I_{PA,3} @ MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	38.25					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								

- Note:**
1. Maximum free air surface temperature of the lens is 38.9° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 10V5S Transducer
(Terason t3000 Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non-scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.18	1.08	-	-	-	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.81					
	W_o	P	(mW)		36.19	-		-	-
	min of [$W_{,3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.90				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	5.70	6.63	-	-	-	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.06	-	-	-	-
			Y (cm)		0.68	-	-	-	-
Other Information	PD	t_d	(μsec)	0.42					
	PRF	p_{rr}	(Hz)	41					
	$p_r@P_{II\text{max}}$	p_r at max. I_{pi}	(MPa)	3.98					
	$d_{eq}@P_{II\text{max}}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		5.0	-	-		-
	$I_{PA,3} @M_{I\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	369.82					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 10V5S Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non-scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.18	1.08	-	-	0.08	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.81					
	W_o	P	(mW)		35.95	-		1.21	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.90				1.90	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.16	
	f_c	f_{awf}	(MHz)	5.70	6.68	-	-	5.70	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.06	-	-	0.80	-
			Y (cm)		0.68	-	-	0.68	-
Other Information	PD	t_d	(μsec)	0.42					
	PRF	p_{rr}	(Hz)	240					
	$p_r@P_{II\text{max}}$	p_r at max. I_{pi}	(MPa)	3.98					
	$d_{eq}@P_{II\text{max}}$	d_{eq} at max I_{pi}	(cm)					0.15	
	Focal Length	FL	(cm)		4.0	-	-		-
	$I_{PA,3} @M_{I\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	369.82					
Operating Control Conditions	Control 1			X				X	
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 10V5S Transducer
(Terason t3000 Ultrasound System in Color Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non-scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.15	1.22	-	-	-	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.58					
	W_o	P	(mW)		42.71	-		-	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.90				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	5.00	5.96	-	-	-	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.94	-	-	-	-
			Y (cm)		0.68	-	-	-	-
Other Information	PD	t_d	(μsec)	0.86					
	PRF	p_{rr}	(Hz)	250					
	$p_r@P_{II\text{max}}$	p_r at max. I_{pi}	(MPa)	3.48					
	$d_{eq}@P_{II\text{max}}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		3.00	-	-		-
	$I_{PA,3} @M_{I\text{I}\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	372.51					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 10V5S Transducer
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non-scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.16	-	1.26	-	1.64	Note 3
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.60					
	W_o	P	(mW)		-	44.33		19.46	-
	min of [$W_{,3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta,\alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.90				0.60	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.21	
	f_c	f_{awf}	(MHz)	5.00	-	5.97	-	5.96	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	1.06	-	0.24	-
			Y (cm)		-	0.68	-	0.68	-
Other Information	PD	t_d	(μsec)	2.00					
	PRF	p_{rr}	(Hz)	600					
	$p_r@P_{II\text{max}}$	p_r at max. I_{pi}	(MPa)	3.54					
	$d_{eq}@P_{II\text{max}}$	d_{eq} at max I_{pi}	(cm)					0.21	
	Focal Length	FL	(cm)		-	8.5	-		-
	$I_{PA,3} @M_{I\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	375.58					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								

Note:

1. Maximum free air surface temperature of the lens is 41.7° C for this operating mode, assuming an ambient air temperature of 23.0° C.
2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12HL7 Transducer
(Terason t3000 Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.40	0.19	-	-	-	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	1.11					
	W ₀	P	(mW)		5.26	-		-	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	0.95				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	7.78	7.73	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.56	-	-	-	-
			Y (cm)		0.35	-	-	-	-
Other Information	PD	t _d	(μsec)	0.24					
	PRF	p _{rr}	(Hz)	26					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.41					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.0	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	60.00					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12HL7 Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.40	0.14	-	Note 1	0.01	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.11					
	W_o	P	(mW)		4.05	-		0.05	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	0.95				0.92	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.10	
	f_c	f_{awf}	(MHz)	7.78	7.70	-	-	7.78	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.10	-	-	0.40	-
			Y (cm)		0.35	-	-	0.35	-
Other Information	PD	t_d	(μsec)	0.24					
	PRF	prr	(Hz)	240					
	$p_r@P_{I\text{max}}$	p_r at max. I_{pi}	(MPa)	1.41					
	$d_{eq}@P_{I\text{max}}$	d_{eq} at max I_{pi}	(cm)					0.10	
	Focal Length	FL	(cm)		4.8	-	-		-
	$I_{PA,3} @MI_{\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	60.00					
Operating Control Conditions	Control 1			X				X	
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12HL7 Transducer
(Terason t3000 Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.55	0.77	-	-	-	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.43					
	W_o	P	(mW)		24.23	-		-	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	0.75				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	6.69	6.69	-	-	-	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.90	-	-	-	-
			Y (cm)		0.35	-	-	-	-
Other Information	PD	t_d	(μsec)	0.86					
	PRF	p_{rr}	(Hz)	2250					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	1.70					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.0	-	-		-
	$I_{PA,3} @MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	89.81					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12HL7 Transducer
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.37	-	0.61	-	1.40	Note 3
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.96					
	W ₀	P	(mW)		-	18.99		10.65	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	0.98				0.85	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.12	
	f _c	f _{awf}	(MHz)	6.70	-	6.68	-	6.03	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	1.10	-	0.38	-
			Y (cm)		-	0.35	-	0.35	-
Other Information	PD	t _d	(μsec)	1.16					
	PRF	p _{rr}	(Hz)	1500					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	1.17					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					0.12	
	Focal Length	FL	(cm)		-	3.5	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	39.74					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								

- Note:**
1. Maximum free air surface temperature of the lens is 34.6° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12L5V Transducer
(Terason t3000 Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.53	0.55	-	-	-	0.71
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.29					
	W_o	P	(mW)		19.35	-		-	19.35
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.62				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	5.98	5.98	-	-	-	5.98
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.72	-	-	-	0.72
Y (cm)				0.50	-	-	-	0.50	
Other Information	PD	t_d	(μsec)	0.27					
	PRF	prr	(Hz)	94					
	$p_r@P_{I\text{max}}$	p_r at max. I_{pi}	(MPa)	1.77					
	$d_{eq}@P_{I\text{max}}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.0	-	-		2.0
	$I_{PA,3} @MI_{\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	113.56					
Operating Control Conditions	Control 1			X	X				X
	Control 2								
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12L5V Transducer
(Terason t3000 Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.53	0.07	-	Note 1	0.06	0.10
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.29					
	W_o	P	(mW)		3.91	-		3.47	3.91
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.62				1.50	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.43	
	f_c	f_{awf}	(MHz)	5.98	5.87	-	-	5.87	5.87
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.62	-	-	1.62	1.62
Y (cm)				0.50	-	-	0.50	0.50	
Other Information	PD	t_d	(μsec)	0.27					
	PRF	prr	(Hz)	240					
	$p_r@P_{I\text{max}}$	p_r at max. I_{pi}	(MPa)	1.77					
	$d_{eq}@P_{I\text{max}}$	d_{eq} at max I_{pi}	(cm)					0.23	
	Focal Length	FL	(cm)		4.5	-	-		4.5
	$I_{PA,3} @MI_{\text{max}}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	113.56					
Operating Control Conditions	Control 1			X					
	Control 2				X			X	X
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12L5V Transducer
(Terason t3000 Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.68	1.91	-	-	-	2.28
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.53					
	W_o	P	(mW)		67.77	-		-	67.77
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.18				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	5.02	5.91	-	-	-	5.91
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.87	-	-	-	0.87
			Y (cm)		0.50	-	-	-	0.50
Other Information	PD	t_d	(μsec)	0.75					
	PRF	p_{rr}	(Hz)	1250					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	1.94					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		1.3	-	-		1.3
	$I_{PA,3} @MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	123.35					
Operating Control Conditions	Control 1			X					
	Control 2				X				X
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12L5V Transducer
(Terason t3000 Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.46	-	2.01	-	2.31	2.38
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.03					
	W_o	P	(mW)		-	63.97		49.66	27.29
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.05				1.43	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.30	
	f_c	f_{awf}	(MHz)	5.01	-	6.65	-	5.01	5.95
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	1.29	-	0.90	0.12
Y (cm)				-	0.50	-	0.50	0.50	
Other Information	PD	t_d	(μsec)	0.79					
	PRF	p_{rr}	(Hz)	14400					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	1.23					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					0.24	
	Focal Length	FL	(cm)		-	6.5	-		0.6
	$I_{PA,3} @ MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	48.77					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								X

- Note:**
1. Maximum free air surface temperature of the lens is 40.1° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Tables for Echo Transducers

Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer
(Terason Echo Ultrasound System in 2D Mode)

Index Label				MI	TIS		TIB	TIC
					Scan	Non- scan		
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$	
Maximum Index Value				1.57	2.46	-	-	-
Associated Acoustic Parameter	USFDA Track 3	IEC						
	$p_{r,3}$	p_{ra}	(MPa)	2.62				
	W_o	P	(mW)		157.32	-		198.30
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-	
	z_1	z_s	(cm)				-	
	z_{bp}	z_{bp}	(cm)				-	
	z_{sp}	z_b	(cm)	3.58				-
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-
	f_c	f_{awf}	(MHz)	2.80	3.29	-	-	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.02	-	-	-
			Y (cm)		1.20	-	-	-
Other Information	PD	t_d	(μsec)	0.54				
	PRF	p_{rr}	(Hz)	41.8				
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	3.49				
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					-
	Focal Length	FL	(cm)		4.0	-	-	4.0
	$I_{PA,3} @ MI_{\max}$	$I_{pa, \alpha}$ at max. MI	(W/cm ²)	278.77				
Operating Control Conditions	Control 1			X				
	Control 2				X			
	Control 3							X
	Control 4							

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer
(Terason Echo Ultrasound System in M-Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						A _{apr} ≤ 1cm ²	A _{aprt} >1cm ²		
Associated Acoustic Parameter	Maximum Index Value			1.57	2.38	-	Note 1	0.41	3.96
	USFDA Track 3	IEC							
	p _{r,3}	p _{ra}	(MPa)	2.62					
	W _o	P	(mW)		152.22	-		19.36	249.44
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	3.58				5.07	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					0.54	
	f _c	f _{awf}	(MHz)	2.80	3.29	-	-	1.97	1.99
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.02	-	-	1.63	1.63
			Y (cm)		1.20	-	-	1.20	1.20
Other Information	PD	t _d	(μsec)	0.54					
	PRF	p _{rr}	(Hz)	240					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	3.49					
	deq@PII _{max}	d _{eq} at max I _{pi}	(cm)					0.51	
	Focal Length	FL	(cm)		4.0	-	-		7.0
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	278.77					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3							X	
	Control 4								X

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer

(Terason Echo Ultrasound System in Color Flow Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1cm^2$	$A_{aprt} > 1cm^2$		
Associated Acoustic Parameter	Maximum Index Value			1.57	2.18	-	-	-	4.23
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.21					
	W_o	P	(mW)		166.69	-		-	266.55
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	5.47				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	1.99	2.65	-	-	-	1.99
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.02	-	-	-	1.63
			Y (cm)		1.20	-	-	-	1.20
Other Information	PD	t_d	(μ sec)	1.90					
	PRF	prr	(Hz)	1500					
	pr@PIImax	p_r at max. I_{pi}	(MPa)	3.10					
	deq@PIImax	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		4.0	-	-		13.0
	$I_{PA,3} @MI_{max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	228.94					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								X
	Control 4								

Note: 1. Maximum free air surface temperature of the lens is $42.3 \times C$ for this operating mode, assuming an ambient air temperature of $23.0 \times C$.

2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.

3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.

4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer
(Terason Echo Ultrasound System in Pulsed-Wave Doppler Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						A _{apr} ≤ 1cm ²	A _{aprt} >1cm ²		
Associated Acoustic Parameter	Maximum Index Value			1.57	-	-	1.87	5.06	4.16
	USFDA Track 3	IEC							
	p _{r,3}	p _{ra}	(MPa)	2.43					
	W _o	P	(mW)		-	-		246.16	245.23
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				164.60		
	Z ₁	Z _s	(cm)				2.33		
	Z _{bp}	Z _{bp}	(cm)				2.29		
	Z _{sp}	Z _b	(cm)	3.75				4.93	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					0.56	
	f _c	f _{awf}	(MHz)	2.40	-	-	2.39	1.99	1.99
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	-	1.52	1.52	1.52
			Y (cm)		-	-	1.20	1.20	1.20
Other Information	PD	t _d	(μsec)	3.18					
	PRF	p _{rr}	(Hz)	700					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	3.03					
	deq@PII _{max}	d _{eq} at max I _{pi}	(cm)					0.53	
	Focal Length	FL	(cm)		-	-	13.0		16.5
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	259.21					
Operating Control Conditions	Control 1			X					
	Control 2						X		
	Control 3							X	
	Control 4								X

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 4V2A Transducer
(Terason Echo Ultrasound System in Continuous-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.09	-	1.00	-	3.62	2.56
	USFDA Track 3	IEC							
	p _{r.3}	p _{ra}	(MPa)	0.12					
	W _o	P	(mW)		-	104.66		104.66	104.66
	min of [W _{.3} (z ₁), I _{TA.3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	z ₁	z _s	(cm)				-		
	z _{bp}	z _{bp}	(cm)				-		
	z _{sp}	z _b	(cm)	2.98				2.80	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					0.44	
	f _c	f _{awf}	(MHz)	2.00	-	2.00	-	2.00	2.00
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	0.69	-	0.69	0.69
			Y (cm)		-	1.20	-	1.20	1.20
Other Information	PD	t _d	(μsec)	-					
	PRF	prr	(Hz)	-					
	pr@PIImax	p _r at max. I _{pi}	(MPa)	0.15					
	deq@PIImax	d _{eq} at max I _{pi}	(cm)					0.43	
	Focal Length	FL	(cm)		-	8.0	-		4.0
	I _{PA.3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	-					
Operating Control Conditions	Control 1			X				X	X
	Control 2					X			
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 5C2A Transducer
(Terason Echo Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.44	1.45	-	-	-	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	2.45					
	W ₀	P	(mW)		81.87	-		-	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	4.60				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	2.89	3.72	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.00	-	-	-	-
			Y (cm)		1.20	-	-	-	-
Other Information	PD	t _d	(μsec)	0.62					
	PRF	p _{rr}	(Hz)	35					
	pr@P _{II} max	p _r at max. I _{pi}	(MPa)	3.82					
	deq@P _{II} max	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		4.00	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	321.01					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 5C2A Transducer
(Terason Echo Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.44	1.42	-	Note 1	0.30	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	2.45					
	W _o	P	(mW)		81.03	-		13.94	-
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	4.60				5.80	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.39	
	f _c	f _{awf}	(MHz)	2.89	3.72	-	-	2.48	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.75	-	-	1.45	-
			Y (cm)		1.20	-	-	1.20	-
Other Information	PD	t _d	(μsec)	0.62					
	PRF	p _{rr}	(Hz)	240					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	3.82					
	d _{eq} @PII _{max}	d _{eq} at max I _{pi}	(cm)					0.37	
	Focal Length	FL	(cm)		4.00	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	321.01					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3							X	
	Control 4								

Note: 1. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
 2. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 5C2A Transducer
(Terason Echo Ultrasound System in Color Flow Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.44	2.15	-	-	-	Note 3
	USFDA Track 3	IEC							
	P _{r,3}	p _{ra}	(MPa)	2.43					
	W ₀	P	(mW)		142.78	-		-	
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	4.50				-	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	2.84	3.16	-	-	-	
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.00	-	-	-	
			Y (cm)		1.20	-	-	-	
Other Information	PD	t _d	(μsec)	1.32					
	PRF	p _{rr}	(Hz)	200					
	pr@P _{II} max	p _r at max. I _{pi}	(MPa)	3.93					
	deq@P _{II} max	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		4.00	-	-	-	
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	350.60					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note:

1. Maximum free air surface temperature of the lens is 42.8 °C for this operating mode, assuming an ambient air temperature of 23.0 °C).
2. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
3. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 5C2A Transducer
(Terason Echo Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.36	-	1.30	Note 1	3.37	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.29					
	W_o	P	(mW)		-	86.20		86.73	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	4.40				1.30	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.47	
	f_c	f_{awf}	(MHz)	2.84	-	3.16	-	2.40	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	0.80	-	0.50	-
			Y (cm)		-	1.20	-	1.20	-
Other Information	PD	t_d	(μsec)	3.62					
	PRF	p_{rr}	(Hz)	400					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	3.51					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					0.43	
	Focal Length	FL	(cm)		-	4.00	-		-
	$I_{PA,3} @ MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	308.05					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								

Note: 1. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
 2. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 7L3V Transducer
(Terason Echo Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						A _{apr} ≤ 1cm ²	A _{aprt} >1cm ²		
Associated Acoustic Parameter	Maximum Index Value			0.56	0.75	-	-	-	0.98
	USFDA Track 3	IEC							
	P _{r,3}	p _{ra}	(MPa)	1.23					
	W _o	P	(mW)		32.43	-		-	31.44
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	z _{bp}	(cm)				-		
	Z _{sp}	z _b	(cm)	3.10				-	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	4.87	4.87	-	-	-	4.82
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.99	-	-	-	0.72
			Y (cm)		0.70	-	-	-	0.70
Other Information	PD	t _d	(μsec)	0.29					
	PRF	prr	(Hz)	32					
	pr@Pllmax	p _r at max. I _{pi}	(MPa)	2.00					
	deq@Pllmax	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		3.5	-	-		2.5
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	106.02					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								X
	Control 4								

Note: 1. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
 2. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 7L3V Transducer
(Terason Echo Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.56	0.41	-	-	0.02	0.58
	USFDA Track 3	IEC							
	p _{r,3}	p _{ra}	(MPa)	1.23					
	W _o	P	(mW)		21.61	-		0.44	27.78
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	z ₁	z _s	(cm)				-		
	z _{bp}	z _{bp}	(cm)				-		
	z _{sp}	z _b	(cm)	3.10				2.58	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					0.23	
	f _c	f _{awf}	(MHz)	4.87	4.88	-	-	3.20	4.86
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.26	-	-	0.99	1.62
			Y (cm)		0.70	-	-	0.70	0.70
Other Information	PD	t _d	(μsec)	0.29					
	PRF	p _{rr}	(Hz)	240					
	pr@P _{II} max	p _r at max. I _{pi}	(MPa)	2.00					
	deq@P _{II} max	d _{eq} at max I _{pi}	(cm)					0.22	
	Focal Length	FL	(cm)		4.5	-	-		5.5
	I _{PA.3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	106.02					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3							X	
	Control 4								X

Note: 1. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
 2. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 7L3V Transducer
(Terason Echo Ultrasound System in Color Flow Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan			
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.98	2.14	-	-	-	3.75
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	1.96					
	W _o	P	(mW)		112.8 7	-		-	87.99
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	2.47				-	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	3.98	3.97	-	-	-	3.98
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.87	-	-	-	0.39
			Y (cm)		0.70	-	-	-	0.70
Other Information	PD	t _d	(μsec)	1.96					
	PRF	p _{rr}	(Hz)	7000					
	p _r @P _{II} max	p _r at max. I _{pi}	(MPa)	2.69					
	d _{eq} @P _{II} max	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		1.50	-	-		0.80
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	169.79					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								X
	Control 4								

Note: 1. Maximum free-air lens surface temperature for this mode is 42.8°C, assuming an ambient air temperature of 23.0°C.
 2. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
 3. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 7L3V Transducer
(Terason Echo Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.61	-	1.84	-	2.38	2.32
	USFDA Track 3	IEC							
	P _{r,3}	p _{ra}	(MPa)	1.21					
	W ₀	P	(mW)		-	77.92		59.56	33.94
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	z _{bp}	(cm)				-		
	Z _{sp}	z _b	(cm)	2.48				3.13	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					0.29	
	f _c	f _{awf}	(MHz)	3.98	-	4.97	-	3.02	4.97
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	1.29	-	1.11	0.15
			Y (cm)		-	0.70	-	0.70	0.70
Other Information	PD	t _d	(μsec)	1.96					
	PRF	p _{rr}	(Hz)	3000					
	pr@P _{II} max	p _r at max. I _{pi}	(MPa)	1.65					
	deq@P _{II} max	d _{eq} at max I _{pi}	(cm)					0.28	
	Focal Length	FL	(cm)		-	8.00	-		0.80
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	71.99					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								X

Note: 1. Maximum free-air lens-surface temperature for this mode is 41.9°C, assuming an ambient air temperature of 23.0°C.
 2. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
 3. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8EC4A Transducer
(Terason Echo Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.47	0.60	-	-	-	Note 2
	USFDA Track 3	IEC							
	p _{r,3}	p _{ra}	(MPa)	3.86					
	W _o	P	(mW)		25.39	-		-	-
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	z ₁	z _s	(cm)				-		
	z _{bp}	z _{bp}	(cm)				-		
	z _{sp}	z _b	(cm)	1.50				-	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	6.93	4.94	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.78	-	-	-	-
			Y (cm)		0.50	-	-	-	-
Other Information	PD	t _d	(μsec)	0.39					
	PRF	p _{rr}	(Hz)	150.0					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	5.19					
	deq@PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	590.94					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
 2. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8EC4A Transducer
(Terason Echo Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.47	0.60	Note 1	-	0.19	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	3.86					
	W_o	P	(mW)		25.54	-		4.10	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.50				1.65	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.28	
	f_c	f_{awf}	(MHz)	6.93	4.92	-	-	5.04	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.96	-	-	1.25	-
			Y (cm)		0.50	-	-	0.50	-
Other Information	PD	t_d	(μsec)	0.39					
	PRF	prr	(Hz)	240.0					
	pr@Pllmax	p_r at max. I_{pi}	(MPa)	5.19					
	deq@Pllmax	d_{eq} at max I_{pi}	(cm)					0.27	
	Focal Length	FL	(cm)		3.5	-	-		-
	$I_{PA,3} @MI_{max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	590.94					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3							X	
	Control 4								

Note: 1. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
 2. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 8EC4A Transducer
(Terason Echo Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.47	0.89	-	-	-	Note 2
	USFDA Track 3	IEC							
	p _{r,3}	p _{ra}	(MPa)	3.57					
	W _o	P	(mW)		37.41	-		-	-
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	z ₁	z _s	(cm)				-		
	z _{bp}	z _{bp}	(cm)				-		
	z _{sp}	z _b	(cm)	1.80				-	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	5.93	4.97	-	-	-	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.78	-	-	-	-
			Y (cm)		0.50	-	-	-	-
Other Information	PD	t _d	(μsec)	0.50					
	PRF	prr	(Hz)	3704					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	5.03					
	deq@PII _{max}	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.5	-	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	501.12					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of *TIS* not yielding the maximum value of *TIS* for that mode.
 2. Information need not be provided regarding *TIC* for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Acoustic Output Reporting Table for Track 3 for the 8EC4A Transducer
(Terason Echo Ultrasound System in Pulsed-Wave Doppler Mode)

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.46	-	0.65	-	1.82	Note 3
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	3.56					
	W_o	P	(mW)		-	27.32		22.53	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.60				0.60	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.24	
	f_c	f_{awf}	(MHz)	5.93	-	4.99	-	4.00	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		-	0.90	-	0.27	-
			Y (cm)		-	0.50	-	0.50	-
Other Information	PD	t_d	(μsec)	1.14					
	PRF	prr	(Hz)	800					
	pr@Pllmax	p_r at max. I_{pi}	(MPa)	4.80					
	deq@Pllmax	d_{eq} at max I_{pi}	(cm)					0.21	
	Focal Length	FL	(cm)		-	4.5	-		-
	$I_{PA,3} @MI_{max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	468.20					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								

Note: 1. Maximum free air surface temperature of the lens is 37.6° C for this operating mode, assuming an ambient air temperature of 23.0° C
2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12HL7 Transducer
(Terason Echo Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.93	0.49	-	-	-	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.58					
	W_o	P	(mW)		13.32	-		-	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	0.90				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	7.62	7.73	-	-	-	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.56	-	-	-	-
			Y (cm)		0.35	-	-	-	-
Other Information	PD	t_d	(μsec)	0.22					
	PRF	prr	(Hz)	38					
	pr@Pllmax	p_r at max. I_{pi}	(MPa)	3.22					
	deq@Pllmax	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.0	-	-		-
	$I_{PA,3} @MI_{max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	243.98					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12HL7 Transducer
(Terason Echo Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.93	0.35	-	Note 1	0.02	Note 2
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	2.58					
	W _o	P	(mW)		10.42	-		0.12	-
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	0.90				0.92	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.10	
	f _c	f _{awf}	(MHz)	7.62	7.70	-	-	7.78	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		1.10	-	-	0.40	-
			Y (cm)		0.35	-	-	0.35	-
Other Information	PD	t _d	(μsec)	0.22					
	PRF	prr	(Hz)	240					
	pr@Pllmax	p _r at max. I _{pi}	(MPa)	3.22					
	deq@Pllmax	d _{eq} at max I _{pi}	(cm)					0.10	
	Focal Length	FL	(cm)		4.8	-	-		-
	I _{PA.3 @MI} _{max}	I _{pa,α} at max. MI	(W/cm ²)	243.98					
Operating Control Conditions	Control 1			X				X	
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12HL7 Transducer
(Terason Echo Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.16	0.77	-	-	-	Note 2
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	3.00					
	W_o	P	(mW)		23.83	-		-	-
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	0.75				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	6.68	6.69	-	-	-	-
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.90	-	-	-	-
			Y (cm)		0.35	-	-	-	-
Other Information	PD	t_d	(μsec)	0.87					
	PRF	prr	(Hz)	1500					
	pr@PII _{max}	p_r at max. I_{pi}	(MPa)	3.57					
	deq@PII _{max}	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.0	-	-		-
	$I_{PA,3} @MI_{max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	384.63					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12HL7 Transducer
(Terason Echo Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.78	-	0.55	-	1.20	Note 3
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	2.01					
	W _o	P	(mW)		-	15.91		12.08	-
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	0.95				1.08	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					0.14	
	f _c	f _{awf}	(MHz)	6.68	-	6.68	-	6.02	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	0.74	-	0.46	-
			Y (cm)		-	0.35	-	0.35	-
Other Information	PD	t _d	(μsec)	3.88					
	PRF	prr	(Hz)	1000					
	pr@PII _{max}	p _r at max. I _{pi}	(MPa)	2.40					
	deq@PII _{max}	d _{eq} at max I _{pi}	(cm)					0.14	
	Focal Length	FL	(cm)		-	4.8	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	130.08					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								

Note: 1. Maximum free air surface temperature of the lens is 36.4° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12L5V Transducer
(Terason Echo Ultrasound System in 2D Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.77	1.19	-	-	-	1.54
	USFDA Track 3	IEC							
	p _{r,3}	p _{ra}	(MPa)	1.89					
	W _o	P	(mW)		41.72	-		-	41.72
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	z ₁	z _s	(cm)				-		
	z _{bp}	z _{bp}	(cm)				-		
	z _{sp}	z _b	(cm)	1.62				-	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					-	
	f _c	f _{awf}	(MHz)	5.98	5.98	-	-	-	5.98
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		0.72	-	-	-	0.72
			Y (cm)		0.50	-	-	-	0.50
Other Information	PD	t _d	(μsec)	0.27					
	PRF	p _{rr}	(Hz)	94					
	p _r @P _{II} max	p _r at max. I _{pi}	(MPa)	2.59					
	d _{eq} @P _{II} max	d _{eq} at max I _{pi}	(cm)					-	
	Focal Length	FL	(cm)		2.0	-	-		2.0
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	244.84					
Operating Control Conditions	Control 1			X	X				X
	Control 2								
	Control 3								
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12L5V Transducer
(Terason Echo Ultrasound System in M-Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.77	0.60	-	Note 1	0.04	0.84
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	1.89					
	W_o	P	(mW)		21.90	-		0.42	37.19
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.62				1.57	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					0.13	
	f_c	f_{awf}	(MHz)	5.98	7.06	-	-	5.98	5.80
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		1.26	-	-	0.72	1.95
Y (cm)				0.50	-	-	0.50	0.50	
Other Information	PD	t_d	(μsec)	0.27					
	PRF	prr	(Hz)	240					
	$p_r@PII_{max}$	p_r at max. I_{pi}	(MPa)	2.59					
	$d_{eq}@PII_{max}$	d_{eq} at max I_{pi}	(cm)					0.13	
	Focal Length	FL	(cm)		3.5	-	-		5.5
	$I_{PA,3} @MI_{max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	244.84					
Operating Control Conditions	Control 1			X				X	
	Control 2				X				
	Control 3								X
	Control 4								

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12L5V Transducer
(Terason Echo Ultrasound System in Color Flow Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			1.05	1.90	-	-	-	2.61
	USFDA Track 3	IEC							
	$p_{r,3}$	p_{ra}	(MPa)	2.70					
	W_o	P	(mW)		67.17	-		-	51.87
	min of [$W_{.3}(z_1)$, $I_{TA,3}(z_1)$]	Min of [$P_{\alpha}(z_s)$, $I_{ta, \alpha}(z_s)$]	(mW)				-		
	z_1	z_s	(cm)				-		
	z_{bp}	z_{bp}	(cm)				-		
	z_{sp}	z_b	(cm)	1.2				-	
	$d_{eq}(z_{sp})$	$d_{eq}(z_b)$	(cm)					-	
	f_c	f_{awf}	(MHz)	6.60	5.91	-	-	-	5.81
	Dim of A_{aprt}	Dim of A_{aprt}	X (cm)		0.87	-	-	-	0.39
			Y (cm)		0.50	-	-	-	0.50
Other Information	PD	t_d	(μsec)	0.57					
	PRF	p_{rr}	(Hz)	1500					
	$p_{r@PII\max}$	p_r at max. I_{pi}	(MPa)	3.49					
	$d_{eq@PII\max}$	d_{eq} at max I_{pi}	(cm)					-	
	Focal Length	FL	(cm)		1.3	-	-		0.6
	$I_{PA,3} @MI_{\max}$	$I_{pa,\alpha}$ at max. MI	(W/cm ²)	476.04					
Operating Control Conditions	Control 1			X					
	Control 2				X				
	Control 3								X
	Control 4								

- Note:**
1. Maximum free air surface temperature of the lens is 38.5° C for this operating mode, assuming an ambient air temperature of 23.0° C.
 2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the 12L5V Transducer
(Terason Echo Ultrasound System in Pulsed-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non- scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.70	-	1.98	-	2.25	2.40
	USFDA Track 3	IEC							
	P _{r,3}	p _{ra}	(MPa)	2.42					
	W ₀	P	(mW)		-	62.64		51.94	38.18
	min of [W ₃ (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	z _{bp}	(cm)				-		
	Z _{sp}	z _b	(cm)	1.25				1.15	
	d _{eq} (z _{sp})	d _{eq} (z _b)	(cm)					0.32	
	f _c	f _{awf}	(MHz)	6.66	-	6.65	-	5.95	5.81
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	1.29	-	0.90	0.39
			Y (cm)		-	0.50	-	0.50	0.50
Other Information	PD	t _d	(μsec)	1.167					
	PRF	prr	(Hz)	2000					
	pr@Pllmax	p _r at max. I _{pi}	(MPa)	2.33					
	deq@Pllmax	d _{eq} at max I _{pi}	(cm)					0.23	
	Focal Length	FL	(cm)		-	6.5	-		0.6
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	189.59					
Operating Control Conditions	Control 1			X					
	Control 2					X			
	Control 3							X	
	Control 4								X

Note: 1. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
 2. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
 3. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

**Acoustic Output Reporting Table for Track 3 for the PDOF Transducer
(Terason Echo Ultrasound System in Continuous-Wave Doppler Mode)**

Index Label				MI	TIS			TIB	TIC
					Scan	Non- scan		Non-scan	
						$A_{apr} \leq 1\text{cm}^2$	$A_{aprt} > 1\text{cm}^2$		
Associated Acoustic Parameter	Maximum Index Value			0.08	-	0.95	-	3.54	Note 3
	USFDA Track 3	IEC							
	P _{r,3}	P _{ra}	(MPa)	0.11					
	W _o	P	(mW)		-	100.00		100.00	-
	min of [W _{.3} (z ₁), I _{TA,3} (z ₁)]	Min of [P _α (z _s), I _{ta, α} (z _s)]	(mW)				-		
	Z ₁	Z _s	(cm)				-		
	Z _{bp}	Z _{bp}	(cm)				-		
	Z _{sp}	Z _b	(cm)	2.30				2.10	
	d _{eq} (Z _{sp})	d _{eq} (Z _b)	(cm)					0.47	
	f _c	f _{awf}	(MHz)	2.00	-	2.00	-	2.00	-
	Dim of A _{aprt}	Dim of A _{aprt}	X (cm)		-	0.69	-	0.69	-
			Y (cm)		-	1.38	-	1.38	-
Other Information	PD	t _d	(μsec)	-					
	PRF	p _{rr}	(Hz)	-					
	pr@Pllmax	p _r at max. I _{pi}	(MPa)	0.13					
	deq@Pllmax	d _{eq} at max I _{pi}	(cm)					0.46	
	Focal Length	FL	(cm)		-	8.0	-		-
	I _{PA,3} @MI _{max}	I _{pa,α} at max. MI	(W/cm ²)	-					
Operating Control Conditions	Control 1			X		X		X	
	Control 2								
	Control 3								
	Control 4								

Note: 1. Maximum free air surface temperature of the lens is 32.4° C for this operating mode, assuming an ambient air temperature of 23.0° C.
2. Information need not be provided for any formulation of TIS not yielding the maximum value of TIS for that mode.
3. Information need not be provided regarding TIC for any transducer assembly not intended for transcranial or neonatal cephalic uses.
4. Information on MI and TI need not be provided if the equipment meets both exemption clauses given in 51.2 aa) and 51.2 dd).

Index

Numerics

10V5S Transducer

Acoustic output, 373, 374, 375, 376

Features, 31

Indications for Use, 264

12HL7 Transducer

Acoustic output, 377, 378, 379, 380, 402, 403, 404, 405

Features, 31

Indications for Use, 264, 265

12L5V Transducer

Acoustic output, 381, 382, 384, 406, 407, 408, 409

Biopsy, 218

Exam types, 213

Features, 31

Indications for Use, 266

2D

Error correction for needle guides, 224

Exam preset values, 214

Exam procedure, 65

Focus Depth, 95

Frequency, 93

I.Q. tab, 100

Introduction, 23

Needle guide display, 220

Pulsed-Wave Doppler, with, 27

Scan line position for PWD, 113, 117

tab, 90

When to use, 89

2D Measure tab, 151

Area, 154

Circumference, 154

Delete, 201

Ellipse, 154

Gynecological measurements, 164

Measurement list, 152

OB Info, 160

Obstetrical measurements, 159

Prev and Next, 201

Stenosis, 157

Trace, 156

Volume, 153

2D suppress, 125

2D tab, 89, 90

Depth, 93

Exams, 67, 215

Focus, 95

Frequency, 93

Gain, 95

Image Format, 97

Sector width, 97

Size, 92

Time Gain Compensation (TGC), 96

T-shirt sizes, 92

4V2A Transducer

Acoustic output, 385, 386, 387, 388, 389

Exams, 213

Features, 30

Indications for Use, 257

4V2A transducer

special controls, 68

4V2S Transducer

Acoustic output, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343

Exam types, 213

Features, 30

Indications for Use, 256

Label, 30

5C2A Transducer, 220

Acoustic output, 344, 345, 346, 347, 390, 391, 392, 393

Biopsy, 218

Exams, 213

Features, 30

Indications for Use, 258

7L3V Transducer

Acoustic output, 348, 349, 350, 351, 352, 394, 395, 396, 397

Biopsy, 218

Exams, 213

Features, 30

Indications for Use, 259

8BP4 Transducer

Acoustic output, 353, 354, 355, 356, 357, 358, 359, 360

Features, 30

Indications for Use, 260

8EC4A Transducer

Acoustic output, 361, 362, 363, 364, 398, 399, 400, 401

Features, 31

Indications for Use, 261

8MC3 Transducer

Acoustic output, 365, 366, 367, 368

Features, 31

Indications for Use, 262

8TV4 Transducer

Acoustic output, 369, 370, 371, 372

Indications for Use, 263

A

ABD file name, 214

Abdominal

Anterior-Posterior Diameter measurement, 161

Circumference measurement (AC), 159, 161

Exam, 213

Ratio calculation, 172

Transverse Diameter measurement, 161

AC measurement label, 161

AC power

Cleaning, 14

Medical grade power cord, 14

Shock hazard, 14

Surges, 14

Accession Number, 59

Accuracy measures, 281

Area, 281

Circumference, 281

Distance, 281

Volume, 282

Acoustic output

Indices, 268

Bone tissue thermal index, 269

Cranial thermal index, 270

Mechanical Index, 269

Soft tissue thermal index, 269

Reporting, 333

10V5S transducer, 373, 374, 375, 376

12HL7 transducer, 377, 378, 379, 380, 402, 403, 404, 405

12L5V transducer, 381, 382, 384, 406, 407, 408, 409

4V2A transducer, 385, 386, 387, 388, 389

4V2S transducer, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343

5C2A transducer, 344, 345, 346, 347, 390, 391, 392, 393

7L3V transducer, 348, 349, 350, 351, 352, 394, 395,

- 396, 397
- 8BP4 transducer, 353, 354, 355, 356, 357, 358, 359, 360
- 8EC4A transducer, 361, 362, 363, 364, 398, 399, 400, 401
- 8MC3 transducer, 365, 366, 367, 368
- 8TV4 transducer, 369, 370, 371, 372
- PDOF transducer, 410
- Acquisition of loops, prospective, 71
- Acquisition of loops, retrospective, 72
- Acrobat Reader, 12
- Adding
 - Body Markers, 86
 - Exam presets, 216
 - Measurements, 150
 - New Patient, 58
 - Text, 85
- Age
 - Gestational sac measurement, 163
 - Patient, 60
- ALARA, 268
- Aliasing, 110, 120
- Amniotic Fluid Index, 162
 - Quadrant 1 measurement, 161
 - Quadrant 2 measurement, 161
 - Quadrant 3 measurement, 161
 - Quadrant 4 measurement, 161
- Annotation menu
 - Body Marker, 86
 - Body Marker Indicator, 87
 - Set Text Home Position, 83
 - Text, 81, 85
- Annotation window, 81
 - Anatomy text, 82
 - Arrow button, 82
 - Body Marker, 86
 - Body marker icons, 86
 - Clear All button, 82
 - New button, 82
 - Patient Position, 82
 - Scan Orientation, 82
- Annotations, 81
 - Body markers, 86
 - Deleting, 85
 - Text, 81, 84
- Antecubital Vein, 170, 171
- Anterior Tibial Artery, 168
- Vein, 171
- Aorta, 168, 169, 172
- Area
 - Measurements, 152, 281
- Arrows
 - Editing location, 84
 - From text, 82, 83
- ART file name, 214
- Arterial exam, 213
 - Flow measurements, 172
 - Ratio measurements, 172
- Artery, 169
- Artery 1/Artery 2 ratio, 172
- Artifacts, JPEG images, 132
- ATA, 168
- AUA, 159
- Audio. See *Volume*.
- AVI
 - File icon, 137
 - Image format, 132
 - Opening, 136
 - Playing, 70
 - Saving loops as, 132
 - Setting as default save format, 244
 - Viewing, 137
- Axillary
 - Artery, 168, 170
 - Vein, 170, 171
- B**
- Back button (Playback toolbar), 71
- Backing up files, 142
- Baseline, 116
 - Adjusting on PWD tab, 116
 - Color, 124
- Basilic Vein, 170, 171
- Battery
 - Laptop power, 63
 - Recycling, 15
 - Usage and disposal of, 15
- Biopsy, 29, 218
 - 2D, 30
 - Civco, 220
 - Cleaning transducer, 225
 - Color Doppler, 30
 - Directional Power Doppler, 30
 - Displaying needle guides, 222
 - Distance to target, 224
 - Equipment, 104, 115, 218
 - Error correction, 224
 - Kits, ordering, 220
 - Modes, 30
 - Needle guide, 104, 222
- Power Doppler, 30
- Preparation, 222
- Protek, 220
- Replacement kit, 220
- Software settings, 219
- Starter kit, 220
- Supported scan modes, 220
- Target indicator, 223
- Transducers, supported, 218
- Verify alignment, 224
- Warning guidelines, 222
- Bi-parietal Diameter measurement, 161
- Bitmap
 - File icon, 137
 - Image format, 132
 - Opening, 136
 - Saving images as, 132
 - Setting as default save format, 244
 - Spatial info image format, 132
 - Viewing, 137
- B-Mode See *2D*
- BMP Image File status message, 73
- Body markers, 86
 - Adding to an image, 86
 - Changing icon, 87
 - Flipping, 87
 - Indicator
 - Moving, 87
 - Removing, 88
 - Rotating, 88
- Bone Tissue Thermal Index (TIB), 269
- BPD measurement label, 161
- Brachial
 - Artery, 168, 170
 - Vein, 171
- Brachytherapy, 29, 218
- Breast exam, 213
- Brightness
 - See also *2D*.
- BRT file name, 214
- Bulb, 169
- Buttons
 - Back, 70
 - Caliper (2D), 152
 - CD, 66, 67
 - Delete, 201
 - Ellipse, 154
 - Freeze, 67, 68, 69, 133
 - Full, 75
 - Gray, 32
 - Image Mode toolbar, 32

- Live, 70
 - M-Mode, 66, 67
 - Needle guide, 222
 - New Patient, 57
 - Next, 70
 - Patient Info window, 57
 - Pause, 70
 - Play, 70
 - Playback toolbar, 70
 - Print, 146
 - Print Preview window, 149
 - PWD, 68, 69
 - Pwr, 66, 67
 - Save Loop, 134
 - Text, 81, 85
 - Trace, 156
 - Zoom, 74
- C**
- C drive, 131
 - CA (Correction Angle), 174
 - Calculations. *See Measurements.*
 - Calendar tool, using, 59
 - Caliper button, 152
 - CAR file name, 214
 - Cardiac
 - exam, 213
 - measurement groups, 184
 - measurements, 184
 - special image controls, 125
 - Care, 18
 - Carotid exam, 213
 - Ratio calculation, 172
 - Cautions, 13
 - CCA (Common Carotid Artery), 169, 172
 - CD (compact disk)
 - Copying files to, 142
 - Problems, 319
 - CD button, 66, 67
 - CD tab
 - Color baseline, 124
 - Color gain, 122
 - Color invert, 121
 - Color persistence, 123
 - Color priority, 123
 - Pulse Repetition Frequency, 120
 - Scan area, 119
 - Wall filter, 122
 - Celiac Trunk, 168
 - Cephalic
 - Index, 162
 - Vein, 170, 171
 - Cerebellum Size measurement, 161
 - CFA measurement label, 168, 170
 - CFV measurement label, 170, 171
 - Changing
 - Text size, 78
 - CIA measurement label, 168
 - Cine loops. *See Loops.*
 - Circumference
 - Accuracy, 281
 - Measurement, 152
 - Obstetric measurements, 159
 - See also Ellipse.*
 - Traced measurement, 156
 - Cis Magnum Size measurement, 161
 - Civco
 - needle guide kits, 220
 - Cleaning, 14, 225, 283
 - Clear 2D Measurements, 201
 - Clear All, 201
 - Clear Time Series Measurements, 201
 - Clinician, for patient info, 56, 59, 61
 - Closing the software, 63
 - Color
 - Baseline, 124
 - Gain, 122
 - Invert, 121
 - Palettes, 101
 - Persistence, 123
 - Priority, 123
 - Reference bar, 78
 - Region of Interest, 120
 - Scale, 101
 - Color Doppler
 - Button, 66, 67
 - Color maps, 249
 - Directional Power Doppler, with, 26
 - Exam preset values, 214
 - Exam procedure, 65
 - Introduction, 25
 - Needle guide display, 220
 - When to use, 89
 - See also CD tab.*
 - Color Doppler Save Warning, 123, 243
 - Color map, 125
 - Colorization
 - Adjusting, 101
 - Selecting from Image menu, 101
 - Common
 - Carotid Artery, 169
 - Femoral Artery, 168, 170
 - Femoral Vein, 170, 171
 - Iliac Artery, 168
 - Iliac Vein, 171
 - Compensation
 - lateral gain
 - Compression issues, 132
 - Connecting Terason transducers, 65
 - Console, 34
 - controls, 35
 - using with 2D mode, 105
 - using with Color and Power Doppler modes, 125
 - using with M-mode, 108
 - using with PWD mode, 118
 - Context menus, 309
 - Copy on Edit menu, 57
 - Copying files, 141
 - Correction angle
 - Pulsed-Wave Doppler, 112
 - Couplants, 17
 - Cranial Thermal Index (TIC), 270
 - CRD file name, 214
 - Cremasteric Artery, 170
 - CRL measurement label, 161
 - Crown Rump Length measurement, 161
 - Cryoablation, 29, 218
 - Cut on Edit menu, 57
- D**
- Date of birth, patient, 59
 - .dcm. *See DICOM.*
 - Defaults, 243
 - File save format, 244
 - Image format, 243
 - Print button, 245
 - See also Preset values.*
 - Defibrillator, 13
 - Delete button, 201
 - Deleting
 - Cardiac measurement groups, 177, 186
 - Exams, 216
 - Files, 143
 - Image files, 144
 - Measurements, 175, 201
 - Text, 85
 - Depth, 93
 - Choosing from 2D tab, 93
 - Ruler, 94
 - Sample volume, adjusting, 114
 - Setting from Image menu, 94
 - Desktop, 293
 - DIA (Diameter), 174
 - DIA file name, 214
 - Dialysis Access exam, 213

- Diastolic measurements, 172
- DICOM
 - Configuration, 47
 - File icon, 136
 - HASP installation, 45
 - Image format, 132, 246
 - Image status message, 73
 - Info tab, 138
 - Palette color format, 246
 - Playing, 70
 - Printer, 227
 - RGB color format, 246
 - RLE Compression, 246
 - Saving images or loops as, 132
 - Sending to server, 228
 - Server, 227
 - Setting as default file format, 244
 - Worklist, 228
 - worklist, 228
- Directional Power Doppler
 - Exam preset values, 214
 - Exam procedure, 65
 - Needle guide display, 220
 - When to use, 89
 - See also *DirPwr tab*.
- DirPwr tab
 - Color baseline, 124
 - Color gain, 122
 - Color invert, 121
 - Color persistence, 123
 - Color priority, 123
 - Pulse Repetition Frequency, 120
 - Scan area, 119
 - Wall filter, 122
- Disk space, 131
- Displays, updating, 127
- Distance
 - Accuracy, 281
 - To target, 224
- Dorsalis Pedis Artery, 168
- DPA measurement label, 168
- Driver, 42
- E**
 - ECA, 169
 - EDD, 159, 160
 - Edit menu
 - Clear All Text Annotation, 85
 - Copy, 57
 - Copy Image, 131
 - Cut, 57
 - Delete, 201
 - Paste, 57
 - Undo, 57
- Editing
 - Exams, 215
 - Filenames, 143
 - Images, 145
 - Loops, 145
 - Patient info, 61
- EFT. See *Estimated fetal weight*.
- Electrical
 - Fast Transients, 14
 - Power surges, 14
 - Shock hazard, 13
- Electromagnetic Interference (EMI), 16
- Electrostatic Discharge (ESD), 17
- Ellipse, 159
 - Button, 154
 - Measurements, 154
- Environmental conditions, 19
- Error correction for needle guides, 224
- Estimated fetal weight, 162
 - Formula, 322
- Exam menu, 215
 - Delete Exam, 217
 - Open Exam, 215
 - Save Exam, 216
 - Save Exam As, 216
- Exams, 212
 - Creating new, 216
 - Custom, 215
 - Deleting, 216
 - File name abbreviations, 214
 - Loading Patient Info, 60
 - Opening, 215
 - Procedure, 65
 - Selecting from menu, 215
 - Selecting on 2D tab, 67
 - Selecting type in 2D tab, 215
 - Size specific versions, 216
 - Workflow, 65
- Exiting the software, 63
- Expected Due Date, 159, 160
- Explosive warning, 15
- Exporting an image or loop, 135
- External
 - Carotid Artery, 169
 - Iliac
 - Artery, 168, 169
 - Vein, 171
- F**
 - F1 key, 301
 - F4 key, 131
 - F8 key, 134
 - F9 key, 134
 - F11 key, 75
 - Femur Length measurement, 161
 - FET file name, 214
 - Fetal
 - Aorta, 169
 - Cardiac exam, 213
 - ICA, 169
 - MCA, 169
 - Renal Artery, 169
 - Weight, 162
 - Fetus
 - Measurements, 159
 - Multiple, 159
 - FHR measurement label, 161
 - Fibula Length measurement, 161
 - File menu
 - Exit, 64
 - Export, 135
 - New Patient, 57
 - Open, 140
 - Print, 146
 - Print DICOM Image, 228
 - Print Setup, 146
 - Save Image (ULT), 134
 - Save Image as, 134
 - Save Loop (ULT), 134
 - Save Patient, 57
 - Send DICOM Image, 228
 - Send DICOM Loop, 228
 - File toolbar, 32
 - Files
 - Backing up, 142
 - Copying, 141
 - Copying to CD, 142
 - Default exam file names, 214
 - Deleting, 143
 - Moving, 142
 - Renaming, 143
 - Saving as a different format, 132
 - Setting default format, 244
 - FL measurement label, 161
 - Flow volume measurement, 174
 - Focal depth. See *Focus*.
 - Focus, 95
 - depth, 95
 - Multiple depths, 95
 - Selecting from 2D tab, 95
 - Folders
 - Image, 136
 - Patient, 60, 136
 - Viewing, 33
 - Font size, 78
 - Frame rate, 288

- Frames
 - Averaging, 102
 - Rate, 78
 - Rate indicator, 32
 - Saving, 71
 - Viewing, 70
- Freeze button, 67, 68, 69, 70, 133
- Frequency, 93
- Frozen Image status message, 73
- Full
 - Button, 75
 - Screen, 75
- Function keys, 301
- FV (Flow Volume), 174
- G**
- Gain, 95
 - Adjusting on 2D tab, 96
 - Adjusting on PWD tab, 115
 - Color. *See Color gain.*
 - lateral compensation
 - Preset, 214
 - TGC curve, 96
- Gain control knob, 36
- Gamma correction for monitor, 237
- Gate, PWD, 114
- Gel couplants, 17
- Gender, 59
- Gestational measurements
 - Sac age, 163
 - Tables, 322
 - See also Obstetrical/Exam.*
- Gestational Sac Diameter
 - Height measurement, 161
 - Length measurement, 161
 - Width measurement, 161
- Greater Saphenous Vein, 170, 171
- Group By File Type, 140
- Groups, cardiac measurement, 184
- GSDH measurement label, 161
- GSDL measurement label, 161
- GSDW measurement label, 161
- GSS measurement label, 161
- GSV, 171
- GSV measurement label, 170
- Guide, printing, 12
- GYN file name, 214
- Gynecological exam, 213
 - Measurements, 164
- H**
- HASP, 45
- Hazards, 13
- HC measurement label, 161
- Head Circumference measurement, 161
- Head circumference measurement, 159
- Heart rate, measuring, 165
- Heat, 17
- Height, 59
- Help
 - Computer, 20
 - Online, 12
- Help menu
 - About Terason, 320
 - Help Topics, 12
 - License, 321
 - Technical Support, 21
- Hepatic
 - Artery, 168
 - Vein, 168
- HL measurement label, 161
- Home cursor. *See Orientation logo.*
- Hospital (Site), 56
- Humerus Length measurement, 161
- I**
- I.Q. tab, 89, 100
 - Colorization, 101
 - Left/Right invert, 100
 - Map, 103
 - Needle guide, 104
 - Persistence, 102
 - Smoothing, 102
 - Up/Down invert, 100
- ICA (Internal Carotid Artery), 169, 172
- ICA/CCA ratios, 172
- Icons
 - Body Markers, 86
 - Quick reference, 313
 - Terason application, 63
 - Terason Explorer, 136
 - See also Buttons.*
- IFU. *See Indications for Use.*
- IJV, 171
- Image
 - Display
 - Patient Info, 60
 - Properties, 77
 - Depth Ruler, 94
 - Persistence, 103
 - Reference bar, 103
 - TGC Display, 97
 - Folder, 33, 134
 - JPEG artifacts, 132
 - Map, 103
- Menu
 - Depth, 94
 - Invert, 101
 - Live, 70
 - Map, 103
 - Palette, 101
 - Persistence, 102
 - Playback buttons, 71
 - Size, 92
 - Smoothing, 102
 - Size, 73
 - Full screen, 75
 - Resizing windows, 74
 - Zoom, 73
- Image Control window, 32, 76
 - 2D Measure tab, 151
 - 2D tab, 89, 90
 - CD tab, 118
 - DirPwr tab, 118
 - I.Q. tab, 89, 100
 - M Measure tab, 165
 - PWD Measure tab, 166, 172
 - PWD tab, 108
 - Pwr tab, 118
 - Tabs, 34
- Image Display window, 32, 33
 - Full screen, 75
 - Live and frozen images, 70
 - Printing from, 146
 - Properties, 78
 - Tab name, 33
- Image menu, 71
 - M-Mode Speed, 106
 - PWD Speed, 110
- Image Preview window, 32
 - Printing from, 146
- Images
 - Backing up, 142
 - Editing, 145
 - Files, 33
 - Freezing, 70
 - Retrieving, 136
 - Storing, 131
- Immersion, 18
- Indications for Use, 254
- Inferior
 - Mesenteric Artery, 168
 - Pudendal Artery, 169
 - Thyroid Artery, 170
 - Vena Cava, 168
 - Vesical Artery, 169
- Info tab, 34, 137
 - DICOM files, 138
- Initializing status message, 73

- Inner Orbital Diameter measurement, 161
 - Innominate
 - Artery, 168, 169
 - Vein, 171
 - Installation instructions, 37
 - Terason software, 37
 - Transducer driver, 42
 - Institution (Site), 56
 - Intended use, 15
 - Intercostal Artery, 168
 - Interference on the image, 318
 - Internal
 - Carotid Artery, 169
 - Iliac Artery, 169
 - Jugular Vein, 171
 - Mammary Artery, 168
 - Invert
 - 2D image, 100
 - Color, 121
 - Pulsed-Wave Doppler, 113
 - Waveform, 113
 - IPA measurement label, 169
 - IVA measurement label, 169
 - IVC measurement label, 168
- J**
- JPEG
 - Compression issues, 132
 - File icon, 137
 - Image File status message, 73
 - Image format, 132
 - Opening, 136
 - Saving images as, 132
 - Setting as default file format, 244
 - Viewing, 137
- K**
- Keyboard function keys, 301
- L**
- Labels, system, 18
 - LAP file name, 214
 - Laptop
 - Battery power, 63
 - Positioning, 13
 - powering on & off, 63
 - Last Menstrual Period, 160
 - Lateral
 - gain compensation
 - Thoracic Artery, 168
 - Ventricular Width measurement, 161
 - Laterality, 167
 - Latex, 17
 - Launching the software, 63
 - Layout of toolbars, 241
 - Left
 - Foot Length measurement, 161
 - Ventricular Outflow Tract, 169
 - Left/Right invert, 100
 - Lesser Saphenous Vein, 170, 171
 - LGC. *See Lateral gain compensation.*
 - License
 - Entering number, 50
 - Extending, 52
 - Number, 321
 - Transferring, 52
 - Upgrading, 54
 - Liquids, 17
 - Live button, 70
 - Live Imaging status message, 73
 - Live/Freeze toolbar, 32
 - LMP, 160
 - Location of exam, 56, 59
 - Location of vessel, 167
 - Loop acquisition, prospective, 71
 - Loop acquisition, retrospective, 72
 - Loops, 142
 - Editing, 145
 - Moving through frames, 70
 - Pausing, 70
 - Playing, 70
 - Retrieving, 136
 - Storing, 131
 - LSV measurement label, 170, 171
 - LVOT measurement label, 169
- M**
- M Measure tab, 165
 - Magnifying the image, 73
 - Main
 - Portal Vein, 168
 - Renal Artery, 168
 - Maintenance, 252, 286
 - Map
 - Choosing from I.Q. tab, 103
 - Selecting from Image menu, 103
 - Map, color, 125
 - Markers. *See Body Markers.*
 - Measure tabs, 34
 - 2D Measure, 151
 - M Measure tab, 165
 - PWD Measure tab, 166
 - Measurement groups
 - cardiac, 184
 - restoring, 201
 - Measurement lists
 - restoring, 179
 - vascular, 175
 - Measurement menu, 201
 - Measurements, 150
 - 2D Measure tab, 151
 - Accuracy, 281
 - Area, 152
 - Cardiac, 165, 184
 - cardiac, 184
 - Circumference, 152
 - Defaults, 250
 - Deleting, 175, 201
 - Depth, 153
 - Diastolic, 172
 - Displaying value on image, 152
 - Ellipse, 154
 - End diastole, 171
 - Fetal Cardiac, 165
 - Flow Volume, 174
 - Formulas, 281
 - groups, cardiac, 184
 - Gynecological, 164
 - Heart Rate, 172
 - PWD mode, 173
 - Length, 153
 - List, 152
 - M Measure tab, 165
 - M-Mode, 165
 - Distance, 165
 - Heart rate, 165
 - Slope, 165
 - Time over Distance, 165
 - Obstetrical, 159
 - Peak systole, 171
 - PS/ED, 172
 - PWD Measure tab, 167
 - Resistance Index, 171, 172
 - Retained, 150
 - Rise Time, 172
 - PWD mode, 173
 - S/D ratio, 171
 - Saving, 150
 - Slope, 165
 - Stenosis Area, 152
 - Systolic, 172
 - Time over Distance, 165
 - Time Series in PWD mode, 166
 - Trace, 155
 - Value, displaying on image, 155
 - Vessels, 167
 - Width, 153
 - measurements
 - vascular, 175

- Mechanical Index (MI), 78, 269
 - Median Antecubital Vein, 171
 - Median Basilic Vein, 170
 - Medical procedures, 10, 29, 218
 - Menu
 - Image, 71
 - Tools
 - Restore Default Window Layout, 241
 - Menus, 32
 - Annotation, 85, 86
 - Edit, 57
 - Exam, 215
 - File, 135
 - Gray, 32
 - Help, 12, 320
 - Image, 92
 - Measurement, 201
 - Shortcuts, 309
 - Tools, 124, 225, 237, 243
 - View, 76, 104, 222
 - MHA measurement label, 169
 - MI. See *Mechanical Index*.
 - Middle
 - Hemorrhoidal Artery, 169
 - Vesical Artery, 169
 - Minus symbol, 33
 - Mitral Valve, 169
 - M-Mode
 - Button, 66, 67
 - Exam preset values, 214
 - Exam procedure, 65
 - Introduction, 23
 - When to use, 89
 - See also *M-Mode tab*.
 - M-Mode tab
 - Scan line position, 106
 - Speed, 106
 - Monitor, adjusting display, 237
 - Motion. See *M-Mode*.
 - Mouse, using, 297
 - MRI, 13
 - MUS file name, 214
 - Musculoskeletal exam, 213
 - MV measurement label, 169
 - MVA measurement label, 169
- N**
- Needle guides, 219
 - Available scan modes, 30
 - Button, 222
 - Choosing, 222
 - Displaying, 104, 222
 - I.Q. tab, 104
 - Kits, 29, 220
 - Selecting from I.Q. tab, 104
 - Target indicator, 223
 - Needle kits 12L5V Transducer
 - Needle kits, 220
 - Network problems, 320
 - New
 - Exam type, 215
 - Patient, 57
 - New Measurement menu item, 151
 - New Patient, 57
 - Button, 57
 - File menu, 57
 - Next button
 - Measure tab, 201
 - Playback toolbar, 71
 - NT measurement label, 161
 - Nuchal
 - Skin Fold Thickness measurement, 161
 - Translucency measurement, 161
- O**
- OB file name, 214
 - Obstetrical
 - Exam, 213
 - Measurements, 159
 - Default setup, 250
 - Estimated fetal weight, 162
 - Gestational sac age, 163
 - Volume, 163
 - Occipital Frontal Diameter measurement, 161
 - Omni Beam, 99
 - Online help, 12
 - Options
 - Measurement defaults, 250
 - Save image format, 244
 - Ordering biopsy kits, 220
 - Orientation logo, 78
 - Outer Orbital Diameter measurement, 161
 - Ovarian Artery, 169
- P**
- Paste on Edit menu, 57
 - Patient
 - Adding new, 58
 - Data file, 136
 - Deleting, 61
 - Files, 33
 - Folder, 136
 - Size, 92
 - Exam types, saved in, 216
 - Patient folder, 33, 134
 - Deleting, 61
 - Patient info
 - Accession Number, 59
 - Age, 60
 - File, 61
 - Gender, 59
 - Height, 59
 - Image Display window, 78
 - in Worklist, 228
 - Location, 59
 - Patient ID, 59
 - Printing, 57
 - Show on image, 60
 - Study ID, 59
 - Terason Explorer, locating in, 60
 - Weight, 59
 - Patient Info window, 32, 33, 56
 - Adding a new patient, 57
 - Buttons, 57
 - Entering data, 58
 - New Patient button, 57
 - Save button, 57
 - Setting up for an exam, 60
 - Updating patient data, 61
 - Patient Position text, 82
 - Pause button, 71
 - Paused AVI Video Clip status message, 73
 - Paused DICOM Loop status message, 73
 - Paused Loop File status message, 73
 - Paused Loop status message, 73
 - PDF files, printing, 12
 - PDOF Transducer
 - Acoustic output, 410
 - PDOF transducer
 - indications for use, 267
 - modes, 280
 - specifications, 30
 - Pelvic exam, 213
 - Pencil cursor, 156
 - Peripherals, 15
 - Peroneal
 - Artery, 168
 - Vein, 171
 - Persistence
 - Color, 123
 - Image Display Properties, 103
 - Selecting from I.Q. tab, 102
 - Selecting from Image menu, 102
 - PFA measurement label, 168, 170
 - PFV measurement label, 171
 - Placenta, 169

- Play button, 71
 - Playback toolbar, 32, 70
 - Playing AVI Video Clip status message, 73
 - Playing DICOM Loop status message, 73
 - Playing Loop File status message, 73
 - Playing Loop status message, 73
 - Plus symbol, 33
 - Polygon, 155
 - Drawing, 156
 - Popliteal
 - Artery, 168, 170
 - Vein, 170, 171
 - Portal Vein, 168
 - Posterior Tibial
 - Artery, 168
 - Vein, 171
 - Power Doppler
 - Button, 66, 67
 - Exam preset values, 214
 - Exam procedure, 65
 - Introduction, 24
 - Needle guide display, 220
 - When to use, 89
 - See also *Pwr tab*.
 - Powering laptop on & off, 63
 - Prerequisites, 12
 - Preset values, 212
 - See also *Exams*.
 - Prev button, 201
 - PRF
 - Value, 78
 - Print button, 146
 - Print Preview window, 148
 - Printer
 - DICOM, 227
 - Problems with, 318
 - Printing
 - Choosing number of images per page, 147
 - DICOM, 227
 - Image Display window, 146
 - Images, 146
 - Patient Info, 57
 - Print Preview window, 148
 - Review window, 147
 - User Guide, 12
 - PRO file name, 214
 - Probe
 - Data, 316
 - Info, 78
 - Verification test, 241
 - See also *Terason transducers*.
 - Problems, resolving, 315
 - Profunda
 - Femoral Artery, 168, 170
 - Femoral Vein, 171
 - Programs, starting and exiting, 298
 - Prospective loop acquisition, 71
 - Prostate exam, 213
 - Protek needle guide kits, 220
 - Protocols, 10
 - PTA measurement label, 168
 - PTV measurement label, 171
 - Pulmonary Artery, 169
 - Pulse Repetition Frequency
 - Color and Power Doppler modes, 120
 - Pulsed-Wave Doppler
 - Aliasing, 110
 - Baseline, 116
 - Button, 68, 69
 - Exam preset values, 214
 - Exam Procedure, 69
 - Introduction, 27
 - Sample volume, 28
 - Steering angle, 112
 - Switching to from another scan mode, 114
 - Time Series measurements, 166
 - Time Series window, 28
 - Vessel of interest, 114
 - When to use, 89
 - See also *PWD tab*.
 - PWD. See *Pulsed-Wave Doppler*.
 - PWD button, 68, 69
 - PWD Measure tab, 167
 - Arterial ratios, 172
 - Correction Angle, 167
 - Flow Volume, 174
 - Heart Rate, 173
 - Laterality, 167
 - Location, 167
 - PS/ED, 171, 172
 - Ratio, 167
 - Rise Time, 173
 - Vessel Info, 167
 - PWD tab, 108
 - Baseline, 116
 - Changing the volume, 116
 - Correction angle, 112
 - Gain, 115
 - Inverting the waveform, 113
 - Scan line position, 113, 117
 - Sound volume, 116
 - Speed, 109
 - Steering angle, 112
 - SV size, 114
 - Velocity display units, 110
 - Wall filter, 111
 - Pwr. See *Power Doppler*.
 - Pwr button, 66, 67
 - Pwr tab
 - Color baseline, 124
 - Color gain, 122
 - Color invert, 121
 - Color persistence, 123
 - Color priority, 123
 - Pulse Repetition Frequency, 120
 - Scan area, 119
 - Wall filter, 122
- ## Q
- Query
 - broad, 232
 - configuring, 230
 - patient-specific, 233
 - Quitting the software, 63
- ## R
- Radial
 - Artery, 168, 169
 - Vein, 171
 - Radius Length measurement, 161
 - Rainbow color map, 249
 - Rate, frame, 288
 - Recycle bin, 144
 - Red-Blue color map, 249
 - Reference bar, 78, 103
 - Refresh the Terason Explorer, 137
 - Region of interest, 119
 - Registration number, 321
 - Removing the software from the computer, 41
 - REN file name, 214
 - Renal exam, 213
 - Renal Vein, 168
 - Reports
 - cardiac, 188
 - vascular, 181
 - Restore Default Window Layout menu item, 241
 - Retrospective loop acquisition, 72
 - Review window, 32, 33
 - Deleting images, 140
 - Playing loops, 70
 - Printing from, 147
 - Thumbnail size, 139
 - Thumbnails, 139
 - RF Interference, 14
 - Right

- Foot Length measurement, 161
- Ventricular Outflow Tract, 169
- Right-click menus, 309
- RLE compression, 246
- RVOT measurement label, 169
- S**
- S/D ratio, 166
- Safety, 252
 - Electrical, 253
 - Standards, 19, 252
 - Ultrasound, 253
- Sample volume, 28
 - Adjusting depth and size, 114
 - Limits, 114
 - Locating in 2D, 114
- Save
 - Image formats, 244
- Save Loop
 - Button, 134
 - Image formats, 244
- Saving
 - Available formats, 132
 - Default directory, 134
 - Default exam file names, 214
 - Images, 133
 - Default format, 243
 - Unique name, 135
 - Loops, 133
 - Default format, 243
 - Unique name, 135
- Scan
 - Area, 119
 - Resizing in Image Display window, 119
 - Line position
 - M-Mode, 106
 - PWD, 113, 117
 - Problems, 315
 - Interference, 318
 - See also *Image*.
- Scan Mode toolbar, 32
- Scan modes. See *Ultrasound scan modes*.
- Sector width, 97
- Sending images to a DICOM Server, 228
- Service, Terason, 320
- SFA measurement label, 168, 170
- SFV, 171
- SFV measurement label, 170
- Shock hazard, 14
- Shortcuts, 309
- SieVision, 29
- Single Image File status message, 73
- Size
 - Adjusting, 92
 - Selecting from menu, 92
 - SV (Sample Volume), 114
- Slope measurement, 165
- SMA, 168
- Smoothing
 - Adjusting, 102
 - Algorithms, 102
 - Selecting from I.Q. tab, 102
 - Selecting from Image menu, 102
- SMV measurement label, 168
- Software version, 320
- Sort By, 140
- Sound volume, 116
- Space key, 301
- Speed
 - M-Mode, 106
 - Pulsed-Wave Doppler, 109
- Spermatic Artery, 170
- Splenic
 - Artery, 168
 - Vein, 168
- Split View toolbar, 32
- SRA measurement label, 169
- Starting up the software, 63
- Status, 72
- Status bar, 32
 - Hiding, 76
 - Showing, 76
- Steering angle, 112
 - PWD mode, 112
- Stenosis
 - Area measurement, 152
 - Calculating area, 157
 - Calculating diameter, 157
 - Measurements, 157
- Stop playback. See *Pause button*.
- Storing files
 - Back ups, 142
- Stress echo studies, 202
 - Closing, 207
 - Features of the Review window, 210
 - Pausing, 208
 - Resuming, 208
 - Saving, 208
 - Sending, 208
- Study ID, 59
- Subclavian
 - Artery, 168, 169
 - Vein, 170, 171
- Superficial Femoral
 - Artery, 168, 170
 - Vein, 170, 171
- Superior
 - Epigastric Artery, 168
 - Mesenteric
 - Artery, 168
 - Vein, 168
 - Rectal Artery, 169
 - Thyroid Artery, 170
- Supplies, biopsy, 220
- Suppress, 2D, 125
- Suspended, 316
- Sweep speed. See *Speed*.
- System
 - Labels, 18
 - Air Pressure, 19
 - CE Mark, 19
 - Environmental, 19
 - Safety Standards, 19
 - See User Guide, 19
 - Temperature, 19
 - Transducer models, 19
 - Type BF Equipment Applied Part, 18
 - Ultrasound Energy, 18
- Systolic
 - Measurements, 172
 - Renal artery, 172
- T**
- Target indicator, 223, 224
 - Displaying, 222
- Targeted ablation, 29, 218
- TD (Time over Distance), measuring, 165
- TDI, 125
- Technical Support, 21
- Terason
 - Contacting, 21
 - Email address, 21
 - FAX number, 21
 - Service, 320
 - Street address, 21
 - Telephone numbers, 21
- Terason Explorer, 32, 76, 136
 - Deleting files, 144
 - Files, 33
 - Finding files, 136
 - Icons, 136
 - Patient Info file, 60
 - Refresh, 137
- Terason software
 - Biopsy support, 219
 - Desktop shortcut, 63

- Entering the license number, 50
- Exam types, 212
- Exiting, 63
- Installing, 37
- Menu reference, 301
- Scan modes, 22
- Starting, 63
- Status, 72
- Uninstalling, 41
- Upgrading, 39
- Version number, 320
- Terason transducers, 19
 - 10V5S, 31
 - 12HL7, 31
 - 12L5V, 31
 - 4V2A, 30
 - 4V2S, 30
 - 5C2A, 30
 - 7L3V, 30
 - 8BP4, 30
 - 8EC4A, 31
 - 8MC3, 31
 - Between uses, 282
 - Cleaning, 225
 - Disinfecting, 282
 - Driver, 42
 - Checking if installed, 316
 - Exam types, 213
 - Immersion, 18
 - Installing the driver, 42
 - Liquids, 17
 - Models, 30
 - Problems with, 315
 - Setting power timeout, 242
 - Switching, 65
 - Verification test, 241
- Terason Ultrasound System
 - AD version, 22
 - Biopsies, 29
 - Care of, 18
 - Covers, 13
 - Indications for Use, 254, 255
 - Installation instructions, 37
 - Main window, 32
 - Maintenance, 286
 - Medical procedures, 29
 - Safety and Maintenance, 252
 - Scan modes, 22, 89
 - ST version, 22
 - Warranty, 285
- TeraVision, 76
 - Changing default, 250
- Terms, 296
- TES file name, 214
- Testes exam, 213
- Testicular
 - Artery, 170
 - Vein, 170
- Text
 - Adding to an image, 81
 - All Caps, 82
 - Arrow button, 82
 - Arrows, 83
 - Button, 85
 - Clear All, 82
 - Customized, 82
 - Deleting, 85
 - Home position, 83
 - Image Display, 84
 - Moving, 84
 - New line, 82
 - Patient Position, 82
 - size, 78
 - Typing, 84
- Text button, 81
- TGC. See *Time Gain Compensation*.
- TGC curve, 96
 - Displaying, 78, 97
- Thermal Index (TIB and TIS), 78, 269
- THI, 98
 - Needle guide display, 220
- Thumbnails, 139
 - Large, 139
 - Small, 139
 - Zoom, 74
- THY file name, 214
- Thyroid exam, 213
- Thyroidal Artery, 170
- TIB, 269
- Tibia Length measurement, 161
- TIC, 270
- TIFF
 - File icon, 137
 - Image format, 132
 - Opening, 136
 - Saving images as, 132
 - Setting as default file format, 244
 - Viewing, 137
- TIFF Image File status message, 73
- Time Gain Compensation, 96
- Time line. See *Time Series window*.
- Time over Distance measurement, 165
- Time Series
 - Measurements
 - M-Mode, 165
 - Pulsed-Wave Doppler, 166
- Window
 - Baseline, 116
 - M-Mode, 106
 - Pulsed-Wave Doppler, 28
 - Velocity Units, 110
- Time-out for transducer, 242
- Tint. See *Colorization*.
- TIS, 269
- Tissue Doppler imaging, 125
- Tissue Harmonic Imaging, 98
- TMV (Time Mean Velocity), 174
- Toolbars, 32
 - DICOM files, 245
 - File, 32
 - Hiding, 75
 - Live/Freeze, 32
 - Playback, 32, 70
 - Reference, 313
 - Resetting default positions, 241
 - Scan Mode, 32
 - Showing, 75
 - Tools, 32
 - View menu, 76
- Tools
 - Menu, 237
 - Always on Top, 242
 - Auto Freeze, 242
 - Gamma Correction/Display Setup, 237
 - Needle Guide Error Correction, 225
 - Options, 243
 - Set Auto Freeze Wait Time, 243
 - Show Color Doppler Save Warning, 124, 243
 - Toolbar, 32
- Touchpad, using, 297
- Trace button, 156
- Tracing, 155
 - Area, 155
 - Polygon, 155
- Track 3 reporting, 333
- Transducer
 - connecting different model, 65
- Tricuspid Valve, 169
- Trimester, 160
- Triplex
 - Image Controls, 126, 127
 - Introduction, 28
 - PRF, 127
 - Region of Interest, 127
 - Wall Filter, 127
- Troubleshooting, 315

- CDs, 319
- Installation problems, 315
- Networks, 320
- Printer problems, 318
- Scanning problems, 315
- VCRs, 319
- T-shirt sizes, 92
- TV measurement label, 169
- U**
- Ulna Length measurement, 161
- Ulnar
 - Artery, 168
 - Vein, 171
- ULT
 - Icon, 137
 - Image format, 132
 - Opening, 136
 - Setting as default save format, 244
- Ultrasound scan modes, 22
 - 2D, 23
 - Color Doppler, 25
 - M-Mode, 23
 - Power Doppler, 24
 - Pulsed-Wave Doppler, 27
 - Triplex, 28, 126
- Umbilical
 - Artery, 169
 - Vein, 169
- Uncalibrated target (biopsy), 223
- Undo on Edit menu, 57
- Uninstalling the Terason software, 41
- Unlock code, 51, 52
- Up/Down invert, 100
- Update button, 127
- Upgrade instructions, 39
- Use, intended, 13, 15
- Uterine Artery, 169
- V**
- V5M, using, 88
- VAS file name, 214
- Vascular
 - Access exam, 213
 - Measurements, 166
 - Puncture, 29
- VCR, Problems with, 319
- Vein, 169
- Velocity display units for PWD, 110
- VEN file name, 214
- Venous exam, 213
- Verification test, 241
- Version number, 320
- Vertebral Artery, 169
- Vessels
 - Laterality, 167
 - Location, 167
 - PWD measurement, 167
- View menu, 76
 - Full Screen, 75
 - Image Control Bar, 76
 - Image Display Properties, 60, 74, 77, 97, 152, 155
 - Large Thumbnail, 139
 - Needle Guide Display, 104, 222
 - Refresh, 140
 - Small Thumbnail, 139
 - Status bar, 76
 - Terason Explorer, 76
 - Toolbars, 32, 76
 - Zoom, 74
- Volume
 - Accuracy, 282
 - Calculating, 153
 - Changing, 116
 - Sample size, 114
 - Sound, 116
- W**
- Wall filter
 - Doppler modes, 122
 - Pulsed-Wave Doppler, 111
 - Value, 78
- Warnings, 15
- Warranty, 285
- Weight, 59
- Windows, 295
 - Hiding, 75
 - Resetting default positions, 241
 - Resizing, 74, 299
 - Showing, 75
- Windows 2000 operating system, 10
- Windows 2000/XP Operating System
 - Deleting files, 144
 - Desktop, 293
 - How to use, 293
 - Starting and exiting programs, 298
 - Terms, 296
- Windows XP operating system, 10
- Worklist
 - broad query, 232
 - configuring, 229
 - configuring broad query, 230
 - patient specific query, 233
- Worklist, DICOM, 228
- Y**
- Yolk Sac Size measurement, 161
- YS measurement label, 161
- Z**
- Zoom, 73
 - Button, 74
 - Removing from image, 74
 - Thumbnail, showing or hiding, 74