

GE Healthcare

EchoPAC* BT12 Software

† BT12 features



Product Description

The EchoPAC Application is a comprehensive clinical software package for viewing, analyzing, and reporting of multi-dimensional echo, vascular and abdominal ultrasound images. The EchoPAC Software provides basic and advanced viewing and quantitative analysis capabilities for 2D and multi-dimensional ultrasound parametric images from the GE Healthcare Vivid family of scanners, as well as DICOM images from other ultrasound systems.

Physical Product

- Installation CD
- User manual
- Installation manual
- Container box
- Option key (password)
- Dongle for licensing (USB)

Extension of the Vivid Scanner Product Line

The EchoPAC extends the accessibility and functionality of GE Healthcare's Vivid product to an offline clinical workstation. Through our TruScan Raw Data Architectures the EchoPAC displays exams with the original data sets from Vivid 7, Vivid 3, Vivid 4, Vivid *i*, Vivid *q*, Vivid S5, Vivid S6 and Vivid E9 scanners. Consequently users are able to analyze and manipulate exams as if the images were still on the ultrasound system. In addition, DICOM images from other ultrasound systems can be easily viewed and analyzed without the need for screen calibration.

Functionality

Advanced Echo Stress

- Review of stress-echo studies acquired with the Vivid 7, Vivid 4, Vivid 3, Vivid *i*, Vivid *q*, Vivid S5, Vivid S6 and Vivid E9, as well as other DICOM ultrasound systems
- User-definable groups
- Quantitative stress analysis of grayscale 2D and tissue velocity information raw data acquired in parallel on Vivid scanner
- Qualitative wall motion scoring
- Quantitative stress analysis provides three different analysis tools based on TVI data stored during stress acquisition:
 - Vpeak measurement: Enables the display of a tissue velocity trace for a selected region of a previously scored segment through the entire heart cycle

- Tissue tracking: Enables visualization of the heart contraction at peak level by color coding the displacement in the myocardium
 - Quantitative analysis: Enables further quantitative analysis based on multiple tissue velocity traces
- Stress echo report templates

Measurements and Analysis

- Personalized measurement protocols allow individual set and order of M&A items
- Measurements can be labeled seamlessly by using protocols or post assignments
- Measurements assignable to protocol capability
- Parameter annotation follow ASE standard
- Seamless data storage and report creation
- User-assignable parameters
- Comprehensive set of cardiac measurements and calculations to help assess dimensions, flow properties and other functional parameters of the heart
- Comprehensive set of shared service measurements and calculations covering vascular, abdominal, obstetrics and other application areas
- Configuration package to set up a customized set and sequence of measurements to use, defining user-defined measurements and changing settings for the factory-defined measurements
- Stress echo support allowing wall motion scoring and automatic stress level labeling of measurements
- Support for measuring DICOM images
- Automatic Doppler trace functionality for use in non-cardiac applications in both live and replay
- Worksheet for review, edit and deletion of performed measurements
- Reporting support allowing a configurable set of measurements to be shown in the exam report
- DICOM SR export of measurement data
- Intima Media Thickness (IMT) measurements (optional)
 - Automated measurement of IMT rather than the conventional way of measuring the IMT manually
 - Results representative of a region rather than a single point of a vessel wall
 - Helps reduce examination time by improving the process of measuring the IMT

- 4D Auto LVQ, 4D LV Mass and 4D Strain (option)
 - Automated measurement of LV volume and EF from volumetric data
 - Automated identification of LV long-axis and standard views
 - Automated initialization of measurement ROI
 - Validation of detected boundaries
 - LV volume waveform for entire cardiac cycle
 - ED and ES automatically selected from volume waveform (max/min)
 - Approval of final results
 - Editing by point and click
 - Fully integrated in M&A system
- Quantitative analysis package
 - Traces for velocity or derived parameters (strain rate, strain, displacement) inside defined regions of interest as function of time
 - Contrast analysis with traces for grayscale intensity or angio power inside defined regions of interest as function of time, including post processing ECG triggering and curve fitting for wash in/wash out analysis
 - Curved anatomical M-mode display allowing an M-mode along an arbitrary curve in a 2D image
- Automated Function Imaging (AFI) (option)
- Parametric imaging tool which gives quantitative data for global and segmental wall motion
 - Allows assessment at a glance by combining three longitudinal views into one comprehensive bulls-eye view
 - Integrated into M&A package with specialized report templates
 - 2D strain-based data moves into clinical practice
 - Intuitive workflow with adaptive ROI, quick tips and combined display of traces from all segments

4D and Multi-dimensional Imaging (option)

- 4D views
 - Auto alignment to help define standard orientation of acquired 4D data
 - Standard views, such as 4ch, 2ch, APLAX, ME LAX,† septum, mitral valve and aortic valve, are defined from the standard orientation
 - Automatic display of volume renderings and 2D cut planes from standard views

- 4D data cropping
 - Flexible tool for standard or dynamic cropping 4D data using up to six different crop planes
 - Each crop plane can be moved without any restrictions
 - The crop plane positions are visible in both the volume rendering and in the 2D cut plane displays
- 2 Click Crop†
 - Intuitive tool for visualization of 4D structures of standard and non-standard views
- Depth render
 - Volume visualization where the color hue changes according to the distance into the image
- Stereo render
 - Volume visualization by stereoscopic display necessitates the use of stereoscopic glasses
- 9 slice/6 slice
 - Simultaneous display of 6 or 9 short-axis slices from the 4D volume data (tissue and color)
- 12 slice
 - Possible to add three long-axis slices showing the three standard views
- FlexiSlice†
 - Simultaneous display of three independent random slices
- Laser lines†
 - Colored lines displaying the origin/location of extracted 2D slices as overlays on the 4D rendered volume

Automated Function Imaging (option)

- Parametric imaging tool which gives information about global and segmental wall motion
- Tri-plane AFI allows assessment at a glance by combining three longitudinal views into one comprehensive bulls-eye view
- AFI with TEE
- Auto 2D EF
- Integration into M&A package with specialized report templates
- New simplified workflow with new quick tips and adaptive ROI for robust and reproducible results for the non-expert – helps improve the speed and confidence in understanding the LV function

Advanced Q-Scan with

Tissue Synchronization Imaging (option)

- 2D strain and strain rate imaging which gives information about synchronicity of myocardial motion
- Delayed myocardial segments produce red overlay whereas segments with early motion are green
- Additional features in combination with multi-dimensional imaging option:
 - Efficient segment specific TSI time measurements
 - Immediate bulls-eye report
 - Automatic calculated TSI synchrony indexes
 - TSI surface mapping
 - LV synchronization report template

IMT (option)

The IMT option provides automatic measurement of Intima Media Thickness of the carotid artery. The algorithm works with TruScan raw data images from GE Vivid family of ultrasound scanners.

2D Strain (option)

2D strain is an advanced research option on EchoPAC allowing global and regional quantitative evaluation of the myocardial function. 2D strain enables calculation of myocardial tissue velocity and deformation parameters based on feature tracking from 2D grayscale and/or 2D tissue Doppler (TVI) images.

The torsion screen displays the global torsion and torsion rate. The torsion is calculated as the difference between the apical and basal rotations and is available when apical short-axis (SAX-AP) and mitral valve short-axis (SAX-MV) views have been processed.

4D LV Volume (option)

4D Left Ventricle (LV) volume and volume ejection fraction analysis tool provides the ability to include results, both alpha-numeric values and screen captures, into the patient exam.

4D RV Volume (option)

4D Right Ventricle (RV) volume and volume ejection fraction analysis tool provides the ability to include results, both alpha-numeric values and screen captures, into the patient exam.

Mitral Valve Assessment† (option)

The semi automated MV Assessment tool provides the ability to include quantitative results for the mitral valve apparatus, into the patient exam.

Image Review

- TruScan architecture allows for instant access/recall to digital raw data for analysis and reporting
- EchoPAC image browser displays from current and stored exams for efficient serial image review
- Thumbnail image display for quick overview
- Image play, freeze and single frame advance are possible in the image review screen
- Flexible image layout with multiple images allows for serial comparison of image data from different exam dates (up to 12 images single frames and cine loops)
- User manual available on-line through “Help” button

Image Post Processing

GE raw data enables “scanner” post-processing functionality:

- Anatomical M-mode
- Compress/reject
- Gain
- Cine speed adjustment
- Freeze/unfreeze
- Frame-by-frame review of cine loops
- Up/down and invert
- Zoom and pan facility
- Tint
- Color map selection
- DDP control
- Color display on/off
- Horizontal sweep adjustment
- Baseline shift
- Physiological traces control (gain and position)
- Tissue priority
- Variance

Workflow/Productivity/Connectivity

- Digital raw data (single frames and cineloop of 2D, 4D M-mode, TVI, Spectral and Color Doppler modalities) enables image review at the original resolution and frame rate from the Vivid 7, Vivid 4, Vivid 3, Vivid i, Vivid q, Vivid S5, Vivid S6 and Vivid E9 ultrasound units
- DICOM media read (CD, DVD, MOD, USB drive)
- ECG, phono and three auxiliary traces recorded with raw data capture

- EchoPAC creates MPEG image files and attaches a MPEG viewer to enable physicians and sonographers to view images on conventional PCs
- Quality Image sets can be copied and saved on to removable media (CD, DVD, USB flash card) by EchoPAC for DICOM media interchange, as well as MPEG, JPEG, VolDICOM and AVI formats
- EchoPAC Share (option) enabling up to four other GE clients (Vivid *i*, Vivid *q*, Vivid S5, Vivid S6, Vivid 7, Vivid E9, EchoPAC) to simultaneously connect to the patient archive of the master EchoPAC acting as “mini server”
- EchoPAC DICOM Share (option) enabling two non-GE scanners to connect via DICOM to the EchoPAC. One additional GE client (as defined above) is also enabled with this option

Patient Record and Image Management

- Shared patient archive with Vivid 7, Vivid 4, Vivid 3, Vivid *i*, Vivid *q*, Vivid S5, Vivid S6 and Vivid E9
- Exceptional workflow with instant access data management
- Fast search and recall of patient studies
- Physicians can search on their name and patient file to view if a report has been completed or not with one click
- Stress, pediatric, vascular and many other exam categories can be searched and viewed with one click
- Functionality to sign a report. User is prompted for username/password. Sign-off is clearly indicated and by whom and date/time in the patient management screens and report screen. The signed report can only be changed by a user with the appropriate authorizations. The “Diagnosing Physician” field is automatically assigned to the user that did the sign-off.
- Patient browser screen for registration of demographic data and quick review of image clipboard contents
- Storage of single-frame, multi-frame and raw data image in raw data DICOM format
- DICOM media store (US, US-MF and secondary capture) to CD, DVD, MOD and USB drive
- DICOM network storage to DICOM server
- Storage of reports and worksheet
- Export of reports as CHM, TEXT and PDF formats
- Export of measurements and findings in Excel format
- Export of 4D datasets to media or shared network volume, in a data format that can be imported and analyzed by TomTec’s workstation “4D LV-Analysis” and “4D RV-Analysis”
- Report-structured text statements assist in quickly creating reports
- Report function includes: Patient information, measurements, calculations, ultrasound images and wall motion scoring
- Pre-defined clinical report templates for cardiac, vascular, general imaging and OB
- Configurable report templates
- Structured findings report tools support efficient text entries with direct editing of findings text, usability improvements, new configuration options and conclusion section
- Pre-defined and configurable structured findings for efficient generation of the echo study findings – the findings will populate the final report
- Pre-defined structured findings for vascular and pediatric applications
- Normal values: Each measurement can be given a normal range and measurements in the report falling outside the normal range will be highlighted
- Printable on ink-jet printer and laser printer
- Report and view images and measurements at the same time
- Direct report program to select or create fully configurable text statements
- Measurements created on the Vivid ultrasound system automatically populate the EchoPAC worksheet
- Measurements created on ultrasound systems other than Vivid are manually entered into the EchoPAC worksheet
- EchoPAC worksheet measurements selected by the physician and sonographer auto populate the EchoPAC report
- Use of USB storage devices as long-term image storage by use of the “Disk Management” function
- Use of USB storage devices, such as USB flash cards and USB hard disks, for archive/raw data export and import
- Activity report for ICAEL accreditation: Report out echo-lab activity for a specified period of time, in CHM, TEXT or PDF format – contains information about which operator, type of exam, etc.

DICOM

- Storage
- Read/write images on DICOM format (US, US-MF and Secondary Capture)
- Verify
- Query/retrieve
- DICOM print
- DICOM SR creation

Ease of Use

Measurements from Vivid 7, Vivid 4, Vivid 3, Vivid *i*, Vivid *q*, Vivid S5, Vivid S6 and Vivid E9 populate the EchoPAC report from the EchoPAC worksheet. Physicians decide which measurements will be displayed on the final report. The sonographer or physicians on the fly can customize templates for echo, vascular and stress reports without system programming experts.

Operating System and Hardware

Table 1 – EchoPAC Software Hardware Recommendations

GE recommends that you match or exceed this hardware configuration. This configuration required for full, specified 4D and volume operation.

Operating System	Microsoft Windows XP Pro (32 bit) SP3 or higher, or Windows 7 (32/64 bit) Professional, Enterprise and Ultimate
CPU	Minimum Pentium IV or Pentium M, 2.0 GHz, RAM DDR-2, minimum 533 MHz, front side bus 800 MHz
Memory	2 GB minimum, 4 GB recommended with Windows 7
Screen Resolution	Minimum 32 bit, 1024 x 768 and maximum 1920 x 1200
Available Disk Space	Program: <ul style="list-style-type: none">• 2 GB (minimum) for program on C drive Patient study storage: Examples of typical study sizes and the resultant number of patient studies per GB are shown below. <ul style="list-style-type: none">• Vivid raw data study (75 MB/study) – 12 patient studies per 1 GB**• Vivid raw data study (100 MB/study) – 10 patient studies per 1 GB**• Vivid raw data study (125 MB/study) – 8 patient studies per 1 GB** <p><i>** Storage space required for patient study storage will vary depending upon procedure type, probe type, Vivid type, and the operator usage patterns employed for the procedure. Overall storage capacity must also account for other content on the hard drive of the target PC. The study sizes shown above are representative sizes only.</i></p>
Disk Drive	DVD
USB	Required to have at least one port available

Table 1 – EchoPAC Software Hardware Recommendations *(continued)*

Graphics Controller	<p>Performance will vary depending on the graphics capabilities of your graphics board. Many laptop/notebooks have integrated graphics chips that are not suited for high-performance 2D and 3D graphics display. To enable dynamic 9 slice, an nVidia graphics board with support for CUDA is required, as well as an nVidia driver with CUDA 2.3 support.</p> <p>The latest nVidia graphics drivers for your graphics board can be found at: http://www.nvidia.com/Download/index.aspx?lang=en-us.</p> <p>For workstations/desktops, we recommend nVidia workstation class graphics boards: nVidia Quadro Fx 1800, 2000, 3800, 4000, 4800, 5000, 5800, 6000 or later.</p> <p>Desktop boards that support CUDA with good performance are:</p> <ul style="list-style-type: none">• GeForce 580/470/480/460/450• GeForce 8-series (8600 or better)• GeForce 9-series (9600 or better)• GeForce 200-series (240 or better) <p>For laptops, we recommend the following graphics chips:</p> <ul style="list-style-type: none">• Quadro Fx 880M, 1800M, 2800M, 3700M, 3800M and 5000M <p>Recommended ATI boards (does not support dynamic 9 slice) are:</p> <ul style="list-style-type: none">• ATI FirePro 3750, 5700, 7700, 7750, 8750 or later. <p>EchoPAC requires a fully DirectX 9 compatible graphics card for display of 3D ultrasound data.</p>
Other Considerations	<p>Installed software:</p> <ul style="list-style-type: none">• Windows Media Player 9.0 or higher• Adobe Acrobat Reader 4.0 or higher (for on-line Help function)• Internet Explorer 7.0 or higher <p>No versions of Sybase database may be installed on the target PC prior to installation of EchoPAC Software.</p> <p>If Oracle database is already installed and used by other applications on the target PC, a conflict may result, causing the EchoPAC Software not to operate properly.</p> <p>The hardware key (“dongle”) must be inserted at all times for proper operation of the EchoPAC Software.</p> <p>The installation of EchoPAC Software must run from the CD. Network installation of the software is not supported.</p> <p>If you have a SCSI device that you want to use for storage, it is required that the Windows user account has Administration rights.</p>

Table 2 – EchoPAC Software

Minimum requirements for the hardware. Not appropriate for full, specified 4D and volume operation.

Operating System	Microsoft Windows XP Pro (32 bit) SP3 or higher, or Windows 7 (32/64 bit) Professional, Enterprise and Ultimate
CPU	Pentium III, 1 GHz
Memory	1 GB, 2 GB recommended with Windows 7
Screen Resolution	Minimum 32 bit, 1024 x 768 and maximum 1920 x 1200
Disk Space	<p>Program:</p> <ul style="list-style-type: none"> • 2 GB (minimum) for program on C drive <p>Patient study storage: Examples of typical study sizes and the resultant number of patient studies per GB are shown below.</p> <ul style="list-style-type: none"> • Vivid raw data study (75 MB/study) • 12 patient studies per 1 GB** • Vivid raw data study (100 MB/study) • 10 patient studies per 1 GB** • Vivid raw data study (125 MB/study) • 8 patient studies per 1 GB** <p><i>** Storage space required for patient study storage will vary depending upon procedure type, probe type, Vivid type, and the operator usage patterns employed for the procedure. Overall storage capacity must also account for other content on the hard drive of the target PC. The study sizes shown above are representative sizes only.</i></p>
Disk Drive	DVD
USB	Required to have at least one port available
Graphics Controller	<p>Performance will vary depending on the graphics capabilities of your graphics board. Many laptop/Notebooks have integrated graphics chips that are not suited for high-performance 2D and 3D graphics display.</p> <p>For workstations/desktops we recommend nVidia workstation class graphics boards: nVidia Quadro Fx 1800, 2000, 3800, 4000, 4800, 5000, 5800, 6000 or later.</p> <p>Desktop boards that support CUDA with good performance are:</p> <ul style="list-style-type: none"> • GeForce 580/470/480/460/450 • GeForce 8-series (8600 or better) • GeForce 9-series (9600 or better) • GeForce 200-series (240 or better) <p>For laptops, we recommend the following graphics chips:</p> <ul style="list-style-type: none"> • Quadro Fx 880M, 1800M, 2800M, 3700M, 3800M and 5000M <p>Recommended ATI boards (does not support dynamic 9 slice) are:</p> <ul style="list-style-type: none"> • ATI FirePro 3750, 5700, 7700, 7750, 8750 or later. <p>EchoPAC requires a fully DirectX 9 compatible graphics card for display of 3D ultrasound data.</p>

Table 2 – EchoPAC Software *(continued)*

Other
Considerations

Installed software:

- Windows Media Player 9.0 or higher
- Adobe Acrobat Reader 4.0 or higher (for on-line Help function)
- Internet Explorer 7.0 or higher

No versions of Sybase database may be installed on the target PC prior to installation of EchoPAC Software.

If Oracle database is already installed and used by other applications on the target PC, a conflict may result, causing the EchoPAC Software not to operate properly.

The hardware key (“dongle”) must be inserted at all times for proper operation of the EchoPAC Software.

The installation of EchoPAC Software must run from the CD. Network installation of the software is not supported.

If you have a SCSI device that you want to use for storage, it is required that the Windows user account has Administration rights.

©2012 General Electric Company – All rights reserved.

General Electric Company reserves the right to make changes in specifications and features shown herein, or discontinue the product described at any time without notice or obligation. Contact your GE representative for the most current information.

*GE, GE Monogram, Vivid and EchoPAC are trademarks of General Electric Company.

GE Medical Systems Ultrasound & Primary Care Diagnostics, LLC, a General Electric Company, doing business as GE Healthcare.

Healthcare Re-imagined

GE is dedicated to helping you transform healthcare delivery by driving critical breakthroughs in biology and technology. Our expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, and biopharmaceutical manufacturing technologies is enabling healthcare professionals around the world to discover new ways to predict, diagnose and treat disease earlier. We call this model of care “Early Health.” The goal: to help clinicians detect disease earlier, access more information and intervene earlier with more targeted treatments, so they can help their patients live their lives to the fullest. Re-think, Re-discover, Re-invent, Re-imagine.

GE Healthcare
3000 North Grandview
Waukesha, WI 53188
U.S.A.

www.gehealthcare.com



imagination at work