Voluson S10
Quick Guide

Extraordinary vision

gehealthcare.com

Voluson S10

Main 2D   Sub 2D   Cine

Factory Folder: Obstetric

Routine | 1.Trim | 2.Trim | 3.Trim
Cardiac | 1.Trim.Card | Penetration | Routine Sepia

VCI A

XBeam CRI 1 | FFC | XL
SRI 2 | CE | HI

Max Angle
Angle 55°

Dyn.Cont.f.

Har.Frq. HIGH
AO: 92%

1 Power on/off

2 Utilities key

3 New patient key

4 Report key

5 Probe/program key

6 Archive/exam review key

7 End exam key

8 F1/help key

9 Multi-function control knobs

10 Acoustic power output

11 PW Mode and gain control/X axis*

12 M-Mode and gain control/Y axis*

13 PD Mode and gain control/Z axis*

14 CF Mode and gain control/
Parallel Shift*

15 2D Mode and gain control

16 Push/turn – HD/Pan zoom
Up/down – Depth control

17 Turn – Sector width
Up/down – Focal position
Push – Focal number

18 Menu exit key

19 Arrow key

20 Annotation/ABC key

21 Clear key

22 Measure/Calc. key

23 3D & 4D keys

24 Auto Optimize

25 Print, store and save keys

26 Freeze/run

27 Trackball and trackball keys

* 3D Control

Getting started

Entering patient information

1. Press the New Patient key (3).*

2. Enter patient ID number and/or patient name. If a number is not entered, the system will assign an ID number. If LMP, GA or EDD is not given, no growth information will be displayed (for growth trending on subsequent exams, the same ID number must be used).

3. Select Start Exam from the top trackball key (27) or from the touch panel.

4. Press End key (7) to end exam.

Selecting probe and presets

1. Press Probe/Program key (5). All connected probes will be displayed on the touch panel.

2. Select the desired probe, application and preset from the touch panel.

* Key numbers can be found on pages 2-3.

Saving/printing images
Icons for Print/Save keys

1. To save or print image, press the appropriate P key (25).

2. P keys are set up in Utilities and can be set for multiple functions (Utilities [2] > System Setup > Connectivity > Button Configuration).

Icons for Print and Save keys

P1 Img	P1 3D	P2 4D
Save image to hard drive	Save 3D volume to hard drive	Save 4D volume to hard drive
P2 Cine	P3 Img	P4
Save cine to hard drive	Send image to PACs	Send image to printer
P5		
Record/ Pause DVR		

Annotation

1. To activate, press ABC key (20). Activation can also be done by pressing space bar if system is so configured in Utilities (2) (Utilities > System Setup > Annotations tab > check box next to 'Use Space key to switch "ABC"on').

2. Select word from touch panel.

3. Free typing is possible at any time after annotation is activated using ABC key or space bar.

4. To set word, press the right or left trackball key (27) (set).

5. To delete last word, select small trackball key or push corresponding rotary knob (9).

6. To delete all annotations, press Clear key (21) on console.

Dual/quad screen format

1. Press the desired view (dual or quad; located above Print keys [25]).

2. To move to next image, select update from right trackball key or select appropriate dual/quad button (may select freeze if desired before updating).

3. To return to single screen, press single screen button above Print keys or press 2D knob (15) on console.

Zoom

1. Two zooms available: Pan Zoom and HD Zoom.

2. To Pan Zoom, turn zoom rotary knob (16).

3. For High Definition Zoom, press the zoom knob. Adjust the ROI to include the area of interest. Size can be adjusted by selecting top trackball key (change).

4. Activate using the right side trackball key.

5. To return to unzoomed state, press zoom key again or press the 2D knob.

Acoustic power output

1. Adjust acoustic power output by using acoustic power/volume rotary key (10).

2. MI (Mechanical Index) and TI (Thermal Index) are displayed in heading bar of image.

Audio volume

1. For pulsed-wave Doppler, volume control will appear on the touch panel and controlled by the left multi-function control knob (9).

2. For system sounds, select Utilities (2) then use the right multi-function control knob.

Scan Assistant

1. Activate Scan Assistant from the patient demographic screen by selecting desired scan list. The structure to be imaged will be displayed on the right side of the screen.

2. Once structure is identified, select the appropriate P key (programmed in Utilities [2] to confirm and move to the next structure. Utilities > Connectivity > Button Configuration > Select desired P button > check box on Overview > "Confirm Scan Assistant").

3. To move through the lists, use the menu arrow key (19) to open the desired group. Use the menu arrow key to select structure to be imaged and set using right or left trackball key.

4. To view list in the worksheet, select the Report key (4) from the console.

5. Choose Scan Assistant from the touch panel.

6. Structures that have been imaged will have a green check. Items with a red 'X' have not been recorded.

7. When exam is ended without all structures being seen, the Scan Assistant List will appear on screen. Choose to end or continue exam from the menu.

Measurements

Generic distance

1. Press the Measure/Calc. key (22).

2. Select Generic on top of touch panel. Alternately, based on system configuration, select Measure/Calc. button twice to access Generic menu.

3. Move caliper to desired location using trackball. To set caliper, select Set on the right or left trackball key (27). Again, using trackball, place next caliper at desired location.

4. To move endpoints, select the top trackball key (27) (Change).

5. To complete measurement, set with right or left trackball key.

6. To activate another caliper, move the trackball.

Ellipse

1. Select ellipse from touch panel.

2. Using trackball, move caliper to the desired location and set with side trackball key.

3. A second caliper will appear with the ellipse active. Place this caliper at desired location and set.

4. Using the trackball, adjust the ellipse to desired size; to move endpoints select top trackball key (change).

5. Select set to complete measurement.

6. To activate another ellipse, move the trackball.

Calculation

1. Press the Measure/Calc. key (22) and confirm touch panel menu is on desired measurement application (e.g. biometry, fetal echo, gynecology, etc.).

2. Select the desired calculation on the touch panel, or choose from the monitor menu using the trackball and arrow.

3. Set the calipers using the right or left trackball key (27).

4. Complete the calculation using the trackball key (Set).

5. For measurements requiring ellipse, please see above under Generic Measurements.

6. To navigate to alternative calculation packages or study group (e.g. from fetal biometry to gynecology), select Measure Application at right side of touch panel and choose appropriate application.

Report/worksheet

1. Press Report key (4).

2. Measurements that have been completed are displayed. To move through the report, use Page toggle switch (9).

3. Comments may be added to the end of the report on the Comment page (select Exam Comments on the touch panel or page down until comment page is reached).

4. Include/remove any portion of the printed report graphs by adding/removing checkmark on left side of the report graphs (Figure 1).

5. Print Preview, located on the touch panel, will allow preview of report before printing.

6. Report can be saved to archive or may be printed with a line printer from either the preview page or main report menu.

Trending fetal growth

1. Patient must have had previous exam performed on the system or must have past exam information entered.

   To enter past information:
   • New Patient key (3) > Past Exam
   • Enter date and desired measurements in appropriate column
   • Save & Exit
   • Select Continue Exam from the right menu or touch panel

2. LMP, GA or EDC must be entered on demographic screen.

3. From the worksheet menu, select Graph.

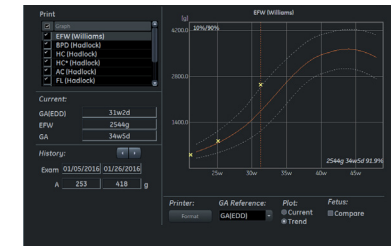4. Using arrow, select 'Trend' beneath the graph.

Figure 1

Imaging

FFC (Focus Frequency Composite) – Utilizes two different transmit frequencies and two different focal zones in the 2D image. This function combines a low frequency to increase the penetration and a higher frequency to keep higher resolution.

CrossXBeam^CRI™ (CRI) – Spatial Compounding. Pulses are transmitted not only perpendicularly (typical) to the acoustic window, but also combined with oblique directions. This results in increased contrast resolution, tissue differentiation and border detection. Multiple levels available.

CE (Coded Excitation) – Improves image resolution and penetration in the far field. This allows for a higher frequency on a technically challenging patient. Not available on all probes.

SRI (Speckle Reduction Imaging) – An adaptive algorithm to reduce the unwanted effects of speckle in the image. Result is increased contrast resolution and reduced speckle noise artifact. Multiple levels available.

Dynamic Contrast – Allows user to modify range of grays available in the image to optimize contrast. The higher the number, the more contrast in the image.

Auto Optimize – Optimizes contrast and gray scale resolution based on a specific region of interest or anatomy within the image.

Gray Maps – Optimizes the gray scale of the anatomy being visualized by varying the appearance of the shades of gray. A color tint may also be added to the gray map. These adjustments are made in the sub menu.

2D image optimization

1. Select appropriate preset from the touch panel.
2. Gain is adjusted using the 2D rotary control (15). Overall gain should be adjusted before adjusting TGC.
3. Depth control is a toggle switch above the dual/quad screen keys (16).
4. Adjust focal zone using toggle next to Depth toggle (17). Place focal zone at or just below area of interest.

5. Adjust frequency as needed from right toggle switch (9). Each probe has 6 frequencies – 3 Harmonic frequencies and 3 fundamental frequencies. Frequency currently being used is displayed on the touch panel above the toggle switch, as well as in the information block on the upper right monitor (higher frequency gives better resolution but has less penetration).
6. To adjust gray map, go to sub menu on the touch panel and select Gray Map. A color tint may also be added from this same sub menu.

Main menu

Sub menu

IF	THEN
Image too grainy	1. Activate Harmonics 2. Activate/adjust SRI levels 3. Activate/adjust CRI 4. Change gray map (sub menu) 5. Decrease Dynamic Contrast
Image too soft	1. Activate Auto Optimize 2. Adjust SRI 3. Deactivate/adjust CRI 4. Change gray map (sub menu) 5. Increase Dynamic Contrast
Image too noisy	1. Decrease overall gain 2. Increase frequency 3. Increase SRI levels 4. Activate Auto Optimize 5. Activate CRI 6. Decrease acoustic power output

IF	THEN
Image too contrasty	1. Adjust SRI 2. Turn off CRI 3. Turn off Auto Optimize 4. Change gray map (sub menu) 5. Decrease Dynamic Contrast
Improve uniformity	1. Adjust focal zone position 2. Adjust TGC 3. Adjust frequency 4. Activate Auto Optimize
Cystic imaging	1. Decrease gain 2. Utilize Auto Optimize 3. Increase CRI 4. Increase frequency 5. Increase Dynamic Contrast
Technically difficult patient	1. Select Penetration Preset 2. Decrease frequency 3. Deactivate harmonics 4. Activate FFC 5. Select lower frequency probe

Doppler and M-Mode

Color Doppler

1. To activate, press the CF knob (14).
2. To adjust gain, turn CF knob.
3. To adjust ROI (region of interest) position, move trackball.
4. To adjust ROI size, select top trackball key (27) to change trackball function. Adjust box size with trackball.
5. To move between position and size, use top trackball key.
6. PRF (pulse repetition frequency) and WMF (wall motion filter) can be adjusted with appropriate toggle keys as indicated on the touch panel (9).

Power Doppler/HD-Flow

1. To activate, press PD knob (13).
2. Gain is adjusted by turning PD knob.
3. Follow Color Doppler instructions above to adjust ROI position and size.
4. PRF (pulse repetition frequency) and WMF (wall motion filter) can be adjusted with appropriate toggle keys as indicated on the touch panel (9).
5. HD-Flow™ can be selected from the touch panel for High Definition Flow.

M-Mode

1. To activate, press the M knob (12).
2. Place line in area of interest. Select 2D/M run from right or left trackball keys.
3. Display can be chosen on the touch panel to be either vertical or horizontal.
4. Gain is adjusted by turning M knob.
5. Adjust speed from the touch panel.

AMM (Anatomical M-Mode)

1. Activate M-Mode.
2. Select AMM from the touch panel.
3. Place line in area of interest. Line can be rotated using the rotary key (9) or with the trackball.
4. To add a second line, activate icon on the touch panel. Move between the first and second lines with the bottom trackball key (27).

PW (Pulsed Wave Doppler)

1. To activate, press PW knob (11).
2. Gain is adjusted by turning the PW knob.
3. Position sample gate using the trackball.
4. Adjust size of the sample gate by selecting top trackball key (change) then moving trackball to desired gate size.
5. Select left trackball for Update mode (high quality spectrum, frozen B-image). Select right trackball for Simultaneous mode (lower quality spectrum, live B-image).
6. Moving trackball will update the B-image when in Update mode.
7. Modify baseline, Doppler angle and PRF as needed using the toggle keys (9).
8. Modify sweep speed from touch panel as needed.

Note: *To deactivate all modes, press the 2D knob (15).*

Archive and image management

To review images in the current study

For single image:

Using menu arrow (19), select desired image from clipboard. Press left trackball key (27) (reload).

For entire study:

1. Select Archive (6) on console.
2. Move through images using arrow and trackball.
3. Select Reload beneath image to reload a single image.

To review stored closed exam

1. Open Archive (6) on console.
2. Using menu arrow or arrow keys from the keyboard, select patient using right or left trackball key (Set).

3. Select desired exam for review.
   a. Select Exam Review on right menu or double click left trackball key for exam review.
   b. Right double click for exam reload.

Exporting images

Media supported: CD-R, CD-RW, DVD+R , DVD+RW, USB device (USB must not contain any 3rd party software [e.g. U3 technology] or require separate power source).

Export entire single exam

1. Insert media.
2. Press Archive on console.
3. Select desired patient and exam using right or left trackball key (Set).
4. Select Export from menu or touch panel.
5. Choose format type.*
6. Name file if you want a name other than the default provided.
7. Choose anonymization if desired.
8. Save.

To export multiple exams

1. Insert media.
2. Press Archive on console.
3. Highlight desired patients.
   a. For sequential patients, press and hold Shift key on keyboard.
      i. Highlight 1st study on list using right or left trackball key (Set).
      ii. Highlight last study on list using right or left trackball key (Set) + Shift key.
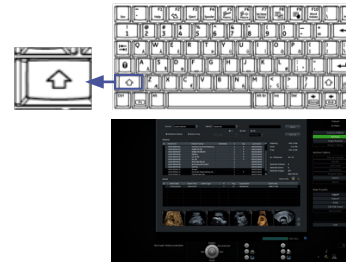
   b. For patients in a random order, press and hold Control key on keyboard and select each one.
      i. Highlight various studies in a random order using right or left trackball key (Set) + Control key.

4. Select Export from menu.
5. Choose format type.*
6. Name file.
7. Choose anonymization if desired.
8. Save.

To save selected images

Current exam:

1. Insert media.
2. Press Archive on console.
3. Using menu arrow, select desired image(s) using right or left trackball key (Set).
4. Select Export from menu or touch panel.
5. Choose format type.*
6. Name file.
7. Choose anonymization if desired.
8. Save.

Closed/stored exam

1. Insert Media.
2. Press Archive key (6) on console.
3. Select desired patient and exam from list.
4. Select Exam Review from right menu or double click left trackball key for exam review.
5. Using menu arrow, select desired image(s) using right or left trackball key (Set).
6. Select Export from menu or touch panel.
7. Choose format type.*
8. Name file.
9. Choose anonymization if desired.
10. Save.

Voluson™ format can reload exam back on system or in 4D View software.

DICOM® Files transfer images to a DICOM network.

Deleting studies from the hard drive

1. Press Archive key (6) on console.
2. Highlight patient to be deleted using right or left trackball key (Set).
3. Select Delete from menu or touch panel.
4. Answer question appropriately:

   Yes = delete all data from the system (images and patient data).

   No = delete images only from the archive.

   Cancel = nothing is deleted.

To delete multiple studies at once

Grouped studies

1. Press and hold Shift key on keyboard.
2. Highlight 1st study on the list using right or left trackball key (Set).
3. Highlight last study on list to be deleted using right or left trackball key (Set).
4. Select Delete from menu or touch panel.

Multiple studies in random order

1. Press and hold Control key on keyboard.
2. Highlight various studies using right or left trackball key (Set).
3. Select Delete from menu or touch panel.

Importing study back to the system

1. Insert media.
2. Press Archive key (6) on console.
3. Select Import from menu or touch panel.
4. Select the appropriate media from pull down choices.
5. Select appropriate folder.
6. Select Open.
7. Select desired patient.
8. Select Import.

---

* Format types:

PC/MAC format files (*.jpg, *.mp4)
Voluson format compressed (*.4dv)
Voluson format uncompressed (*.4dv)
JPEG files (*.jpg)

Bitmap files (*.bmp)
TIFF files (*.tiff)
AVI files (*.avi)
MPEG files (*.mpg)

Volume files/Raw Data (*.vol, *.raw)
DICOM files (*.dcm)
DICOM files with DICOMDIR

3D/4D imaging

Volume acquisition

3D

1. Select volume probe.
2. Press 3D on console (23).
3. Select the desired 3D preset from the touch panel.
4. Using trackball, adjust ROI (region of interest) box position and size with trackball and top trackball key to include area of interest. If performing a surface rendering, the green line should be just above the area of interest. A fluid interface is helpful when performing surface rendering.
5. Position transducer in the center of the structure to be imaged.
6. Start acquisition using right trackball (27) or Freeze key (26). The acquisition is automatic; do not move the transducer during the acquisition.
7. Save volume with appropriate Print key (25).

4D

1. Select Volume Probe.
2. Press 4D on the console (23).
3. Select the desired 4D preset from the touch panel.
4. Using trackball, adjust ROI position and size with the trackball and top trackball key to include area of interest. Place the green line just above the area of interest. A fluid interface is helpful when performing surface rendering.
5. Position transducer in the center of the structure to be imaged.
6. Start acquisition using right trackball key (27).
7. Save volume with appropriate Print key (25).
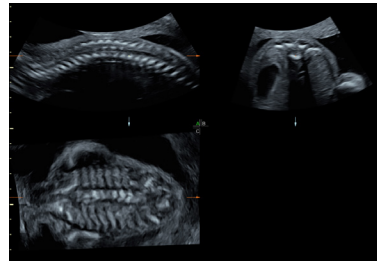
Figure 1 – Multiplanar display

Volume displays

Following acquisition of dataset, multiple displays are possible.

Multiplanar – Display divides the screen into three sections, A Plane (initial acquisition plane), B Plane (90 degrees clockwise to A Plane) and C Plane (orthogonal to A and B Planes). A rendered image is not displayed in Multiplanar display. (Fig. 1)

Single, quad or dual screen display is available. Any plane is available in a single screen by selecting single screen on the console; the active/reference image will be displayed. Quad format displays all three
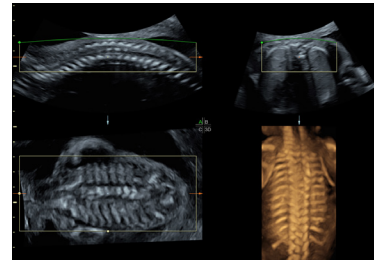

Figure 2 – Demonstrates placement of green rendered line for rendering of fetal spine

orthogonal planes simultaneously. Dual display is available in the menu to display A and B only or A and C only.

Rendering – Composite picture (3D image) of the acquired volume. Only structures within the rendered box will be displayed. Green render line and render box control anatomy displayed. (Fig. 2).

Single, quad or dual screen display is available. The rendered image can be viewed as a single image by selecting single screen from the console.
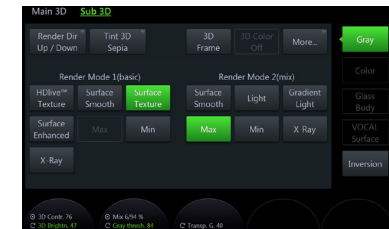

Figure 3 – Render mode options

Quad format displays all three orthogonal planes and the rendered image simultaneously. Dual display will display the A Plane (plane of acquisition) with the rendered image. Selecting Dual button a second time will display the A plane + the B plane + the rendered image. The rendered image is made up render modes (Gray 1 and Gray 2) (Fig. 3). Eight possible modes are available. Surface render modes render the surface closest to the green render line. Transparency render modes (Max, Min, X-ray) render the entire ROI box to create the rendering.

Surface – Renders the surface closest to the green render line (Fig. 4a, 4b and 4c).

Surf. Sm. – Smooth surface.

Surf. Text. – Textured surface.

Grad. L. – Appears as if a light is shining on the structure.
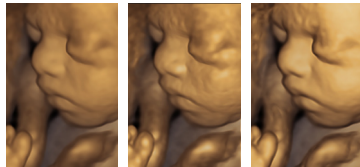
Figure 4a – Surf. Sm.   **Figure 4b –** Surf. Text.   **Figure 4c –** Grad. L.

Transparent modes render below the surface (Fig. 5a, 5b and 5c).

Max – Enhances maximum intensity echoes (e.g. bone).

Min – Enhances minimum intensity echoes (e.g. fluid).

X-ray – Average of all echoes within the render box.
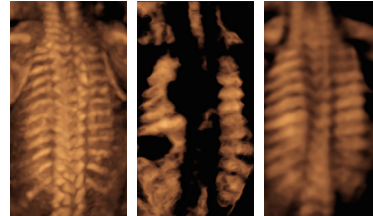
Figure 5a – Max   **Figure 5b –** Min   **Figure 5c –** X-ray

Mix – Two rendered modes can be combined or 'Mixed' to create the desired rendered look (Fig. 6a and 6b).

Figure 6a – Surf. Text./Surf. Sm. mix 50/50   **Figure 6b –** Surf. Text/Grad. L. mix 50/50

Threshold – When used with surface rendering, threshold allows low-level echoes to be suppressed in the images (Fig. 7a, 7b and 7c).
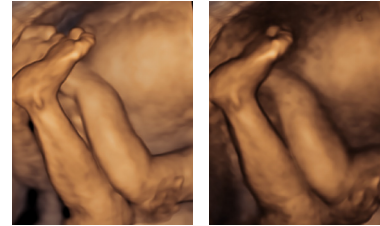

Fig. 7a – Normal threshold   **Fig. 7b –** Threshold too low

Fig. 7c – Threshold too high

Volume manipulation

The volume dataset is not limited to the initial three planes displayed. Each plane can be rotated on the X, Y or Z axis as well as shifting through an individual plane in a parallel fashion (Parallel Shift). By manipulating the volume, any plane necessary within the volume can be displayed (Fig. 8a, 8b and 8c).

X axis (11) – Rotates the active image on the horizontal axis.

Y axis (12) – Rotates the active image on the vertical axis.

Z axis (13) – Rotates the active image in a clockwise or counter-clockwise motion.

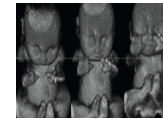*Parallel Shift (14)* – Moves in/out of the dataset without rotating on an axis.
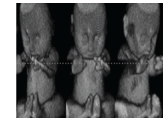

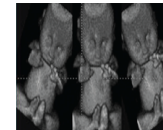**Fig. 8a –** X axis rotation   **Fig. 8b –** Y axis rotation

Fig. 8c – Z axis rotation

For more information, contact your GE Sales Representative at (888) 202-5528 or visit us at www.voluson.gehealthcare.com.

Imagination at work