



medical

### SONOLINE G40™ Ultrasound System

#### Quick Scan Card

#### 3-Scape Real-Time 3D Imaging

The 3-Scape Real-Time 3D Imaging feature is a system option that allows the acquisition of three-dimensional ultrasound images. Ultrasound data based on three-dimensional imaging methods can assist the diagnostic process. 3D imaging anatomical volumes is suited for viewing and post processing e.g.: arbitrary slicing, volume rendering, rotation and magnification of localized areas of interest.

#### Intended Use

The 3D imaging feature can be used to image any structure where a view cannot be achieved by standard 2D-mode ultrasound to improve understanding of complex structures.

3D imaging is intended for the following uses:

- Imaging of volumes to improve diagnostic analysis.
- Rotation of 3D images (volume and slices) to view aspects of a structure that cannot be imaged directly.

#### Setting Up 3-Scape Real Time Imaging

Preparation for volume acquisition begins with scanning in 2D-mode. Image optimization must be completed before acquisition as only TGC, and over all GAIN are available during acquisition.

After activating 3D imaging, you can define a 3D ROI to limit acquisition to the data contained within the ROI.

Present Software 2.0 activation of the 3D imaging feature is in the **OB Exam** type and on the CH5-2.

Obtain Volumes and Images by the following method:

- **Rocked:** An angular scanning motion, during which the transducer face is used as a pivot (does not slide).

mode	
P	100%
U/D Flip	U
L/R Flip	L
Section	Off
Split	Off
SynAps	Off
4B	
3D	

#### Use the ON SCREEN MENU to select 3-Scape

- 3D Activates Imaging and Displays controls

When you activate 3D imaging, the system displays 3D ROI, On Screen Menu box and a time gauge display on the right of the screen. (e.g.: 120°/16sec)

mode	
P	100%
ROI	On
Rocked Scan	
Angle	60 °
Speed	Med

The system updates the scan length/angle and scan duration depicted on the time gauge. The system computes the scan duration based on the selected scan length or angle range, acquisition speed, and the current frame rate. The seconds of the scan duration is the amount of time required by the system to acquire the volume.

- P Allows control of Power
- 3D Region of Interest (ROI) Activates display of the 3-Scape ROI
- Scan Method Fixed for Rocked
- Angle selects the scan angle for volume acquisition.
- Scan Speed/Quality Selects the scan speed for volume acquisition.

#### Acquiring the Volume

1. Rotate the **SELECT** control to highlight **3D** and then depress knob to activate.
2. Optimize the 2D-mode image.
3. To resize the 3D ROI press **SET** key and move trackball to increase or decrease size. Press **SET** key again to lock.
  - a. Position the ROI use trackball.
2. Press the **UPDATE** key to begin acquisition. Rocked scanning is required. Use the transducer face as a pivot.
3. To cancel the acquisition press the **UPDATE** key e.g.: image artifact or patient movement.
4. To complete volume acquisition before the scan duration on the time gauge elapses, press the **FREEZE** key.

The system processes the acquired information into data sets for the 3D volume and then displays the volume.

5. To begin another volume acquisition without saving the displayed volume, press the **2D** control or the **FREEZE** control.

#### Viewing the Volume and Slices

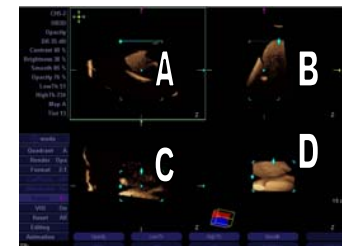
When you complete volume acquisition or retrieve a volume from a previous examination, the system initially displays the volume and slices in the quadrant display format.

Quadrants are designated A, B, C, and D. Quadrant D (the lower-right quadrant) contains the volume. Quadrants A, B, and C contain arbitrary slices of the volume, initially oriented at the center of the volume; each slice is orthogonal to the other two slices. The slices are also referred to as Multi-Planar Reformating (MPR) quadrants. A marker (focal point)

within each slice quadrant indicates the point of intersection of the slices. The system initially displays the markers at the center of each slice. You can select a display format, select a quadrant, display the acquired 2D-mode data, and remove data from the volume to reveal anatomical structures, change the surface appearance of the volume and Animation control. You can use these post-processing functions to help differentiate anatomic structure.

You can also rotate the volume and reposition slices. Use the Update key to cycle through the appropriate icons and rotate volume with the track ball. Note: Major Mode knobs will turn Volume and slices but icon will not change to give you direction.

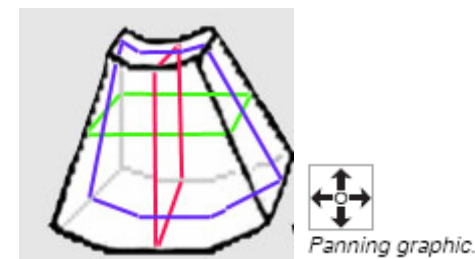
**A=Acquisition**



**B= Elevation**

**C= Coronal**

**D= Volume**



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mode	
Quadrant	A
Render	Opa
Format	2:1
CutPlane	Off
Wireframe	On
Rotate	0°
VOI	On
Reset	All
Editing	
Animation	

Use the on the on-screen menu for viewing, displaying, selecting, and editing the 3D data set(s). *Use the SELECT control to highlight selections and adjust settings on the on-screen menu.*

**Render** Selects a display method for the volume quadrant:

- **Sli** (Slice)—Displays a one-voxel-thick slice in its Three-dimensional context. The displayed slice (within the volume) corresponds to the most recently selected slice (Multi-Planar Reformatting, or MPR) quadrant.
- **Opa** (Opacity)—Smooths image contours, creating a soft, sculptured appearance for highlighting surface features. Uses the mode-specific selections for opacity percentage and thresholds.
- **Sha** (Surface Shading)—Heightens contrast, creating a textured appearance for highlighting internal features. Uses the mode-specific selected shading in addition to the mode-specific selected opacity percentage and thresholds.
- **Mpr**—Increases the rendering speed by displaying the MPRs (arbitrary slices) only.

**Reset** Adjusts the orientation of quadrants:

- **Cen** (Center)—On each slice, repositions the focal point to the center of the quadrant.
- **Sync** (Synchronize)—Aligns slice and volume orientations. When the selected quadrant is a slice, aligns the orientation of the volume quadrant to that of the slice quadrant. When the selected quadrant is the volume quadrant, aligns the orientation of all slice quadrants to that of the volume quadrant.
- **Ori** (Orientation)—Restores the default orientation for all quadrants.
- **All**—Restores the default orientation and display format for all quadrants; also restores the default (or user-defined) settings of other parameters for all quadrants.
- **Flip**—Reverses the render direction.

## Editing Selections

- **Polygon** Defines an irregular area from a drawn outline and then removes all the voxels inside or outside of that area.
- **Trace** Defines an area from a free-form drawn outline and then removes all the voxels inside or outside that area.
- **Undo Last Edit** Removes the most recent edit.

## Animation Selections

**Animation ON/OFF** Automatically rotates the volume according to the selected range, speed, and axis.

**Note:** The system dithers the **Editing** selections and the general selections from the 3D Parameter menu (except **Wireframe**) while the volume is automatically rotating.

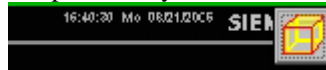
- **Angle** The volume will continuously rotate in one direction around the selected axis (for **Axial**, to the right; for **Lateral**, downward). For other selections, the volume rotates in both directions around the selected axis (for **Axial**, first right, then left; for **Lateral**, first downward, then upward). **30, 60, 90, 120, 180, 240, 300, 360**
- **Speed** Selects rotation speed. **Slow, Med, Fast**
- **Axis** Selects rotation axis: **Axi** (Axial), **Lat** (Lateral)

## Printing and Storing

Print and store images of 3D volumes no different than normal images to Patient Browser or OEM.

**Volume Store requires the Print/Store Key to designated to Store Volumes.**

- Preset Menu-Peripheral.
- Using Print/Store Key Destination (rather than Print Key destination) chose from drop down-Volume Store.
- Keep Print Key Destination ~Disk Stare & B/W Print.



**Recalling a Volume from the Patient Browser:** Use the Arrow and Set key on the Yellow cube in the top corner of the image. There will be a black flash, an empty 2D screen, another pause, and then the Volume display appears. All 3D tools are available. After any Editing here, only screenshots can be recorded. These new images store to same patient record. Use right toggle, "Exit" to return to Review display.

## 3-Scape Imaging Technique Hints

This section includes information on how to obtain optimum 3-Scape images.

### Adequate Gel

Apply a generous amount of coupling agent (gel) along the entire area to be scanned to avoid disrupting the scan sweep. Insufficient gel causes the transducer to drag on the skin during a linear scan.

### Preview Sweep

Before acquiring a 3-Scape image, perform a preview scan of the anatomy in standard 2D-mode. To be sure you acquire a complete structure of interest, include some of the surrounding area in the 2D-mode image.

### Scan Speed

Scan at a constant rate. An irregular movement pattern may result in motion artifacts or distortions of the 3-Scape image.

### Transducer

For a rocked scan, hold the transducer with both hands to ensure a steady, even scan motion.

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