



Philips CX 50 Ultrasound use with Vascular Imager

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Background

The Philips CX50 is a portable general imaging ultrasound system used in cardiovascular research. The system comes with an ECG capability that is used to trigger frame capture of the ultrasound image by the vascular imager software.



The unit has a number of input / output ports (called **Physio receptacles** by Philips) on the left hand side of the unit. These receptacles (figure 1) are for both high-level and low-level ECG, pulse, phono, and auxiliary signals.



Figure 1.

Physio Receptacles

- 1 Low-level ECG input
- 2 Analog output
- 3 Pulse/Phono/Aux 2 input
- 4 External ECG/Aux 1 input

We are interested in receptacles 1 and 2. **Receptacle 1** is where the ECG is connected and **Receptacle 2** is the *analogue output* from the unit. The unit's analogue output (2) can be configured to output either the original ECG trace OR a TTL pulse when the unit detects a QRS complex. In this later case the output voltage is held at zero normally but when an event is detected a pulse of 5V (2msec duration) is output. We use this signal to increment a counter on the National Instruments 6000-USB which ultimately triggers the frame capture of the image at the time of the beat detection. Figure 2. Shows the CX50 with the ECG and the Vascular imager system connected to receptacles 1 and 2 respectively.



Figure 2.

The black cable from Receptacle 2 connects to the National Instruments USB-6000 A/D unit (Figure 3). Ground (black) connects to digital ground and active (clear) connects to PFI 0 (digital counter). The USB from the 6000 connects to the computer running the vascular imaging software.



Figure 3.

Configuration of the CX-50.

As mentioned above the analogue output of the CX50 can be configured to either output the ECG signal or the trigger (TTL) This configuration is made from the CX50 console.

1. Press the **'Physio'** button (Figure 4) at the top of the unit. This will bring up a two page menu list related to configuring the Physio output.

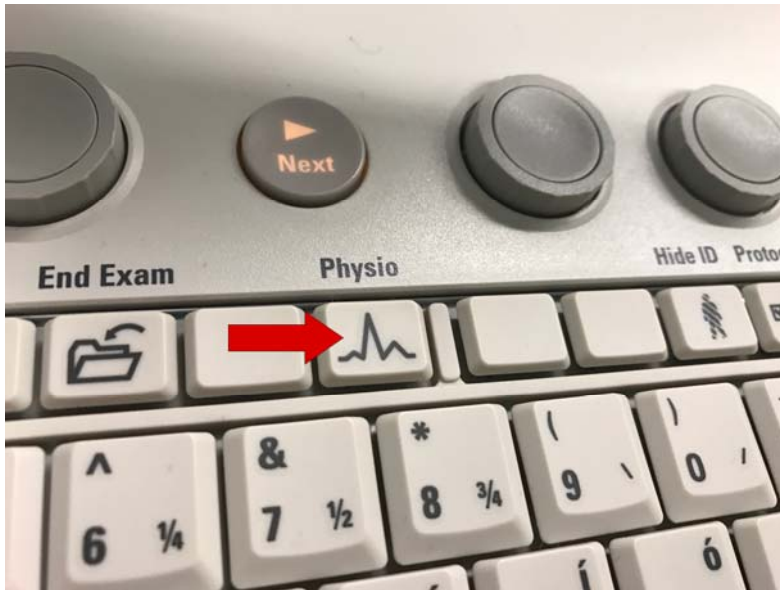


Figure 4.

2. Figure 5 shows page 1 of the Physio configuration menu.



Figure 5.

3. Move to page 2 by pressing Next button (above the Physio button - Figure 4). The screen will display the second page (Figure 6).

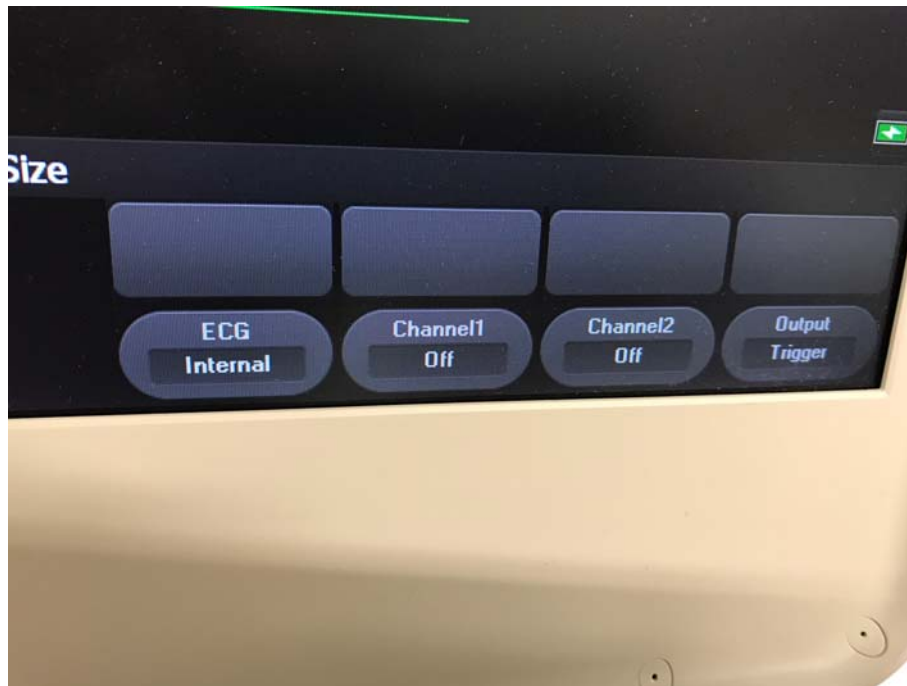


Figure 6

The important configuration option is the 'Output' button in the lower right-hand corner. Pressing this toggles a number of options including 'Trigger' which outputs the TTL pulse. Make sure this option is selected (there is also an 'Internal' option that outputs the untransformed ECG signal but this should not be selected).