Audio Recordings with the Cardio Microphone

Written by staff of ADInstruments.

Introduction

The cardio microphone is a transducer that can be used to record heart and body sounds with a PowerLab system. The cardio microphone does not require an amplifier for typical use. This document describes the basic procedures for using the Cardio Microphone.

Equipment required

Computer system with sound card and speakers
PowerLab with pod connector (such as PowerLab 4/25T, 2/25 or 4/25)
Chart 5.1 or later
Play Sound Extension for Chart 5
Cardio Microphone [MLT201]

Equipment setup

Installing the Play Sound Extension for Chart

The Play Sound Extension is a free software component for Chart that enables a computer with a sound card and speakers to play back Chart data as audio.

1. Download the free Play Sound Extension for your version of Chart from http://www.adinstruments.com/updates.
2. After the file has been downloaded and extracted, double-click the installer icon to install the Play Sound Extension. Please refer to the *Play Sound Extension User's Guide* for more details.

Connecting the equipment

1. Turn on the PowerLab and start Chart.
2. Connect the Cardio Microphone to an available Pod input on the front of the PowerLab. Ensure there are no devices connected to the BNC input you wish to use for the cardio microphone.

Basic settings for audio recording

Use the following settings as a starting point for audio recordings:

Sampling Rate: 1 kHz or higher
View Compression: 10:1

Input Amplifier Settings (see Figure 1):

Range: 20mV, adjust as necessary
Low Pass: 500 Hz
Differential: selected
Mains Filter: selected

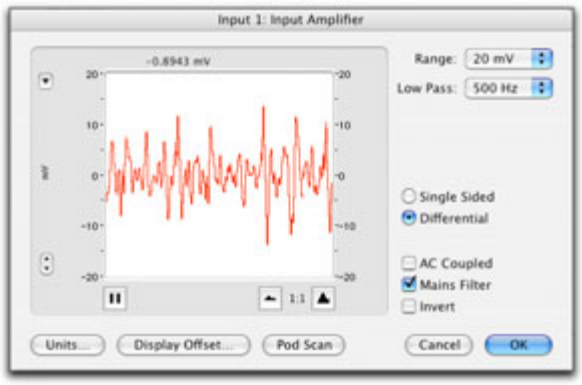

Figure 1. The Input Amplifier dialog showing heart sounds recorded with the Cardio Microphone.

Basics of operation

1. Place the Cardio Microphone on the skin where you wish to record. Make sure the microphone is positioned so that the hole is facing the skin (Figure 2).

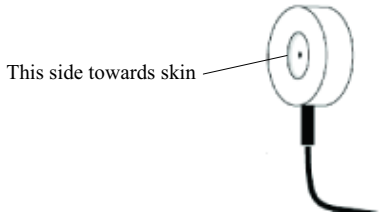

Figure 2. The Cardio Microphone, showing the hole that must face the skin.

2. Click Start to begin recording.

3. When you have finished recording, click Stop.

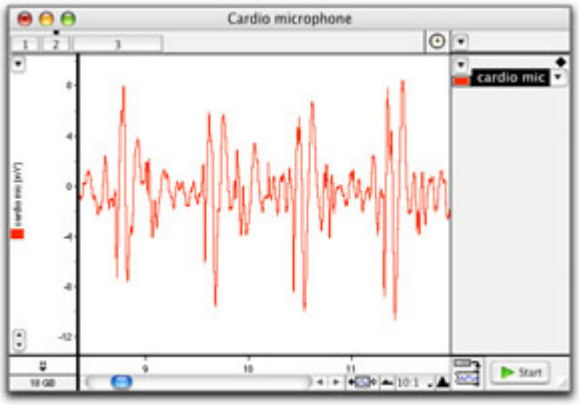

Figure 3. The raw signal (Channel 1)

Using digital filtering to improve signal recognition.

It is not always easy to detect the two heart sounds in the Chart display (for example, the signal from the microphone in Channel 1, Figure 4). A high-pass digital filter often improves the visual appearance, as shown in Channel 2 (Figure 4). The Digital Filter dialog is accessed from the Channel Function pop-up menu (Figure 4).

Some experimentation may be required to obtain the best filter settings but those shown in Figure 5 are often satisfactory.

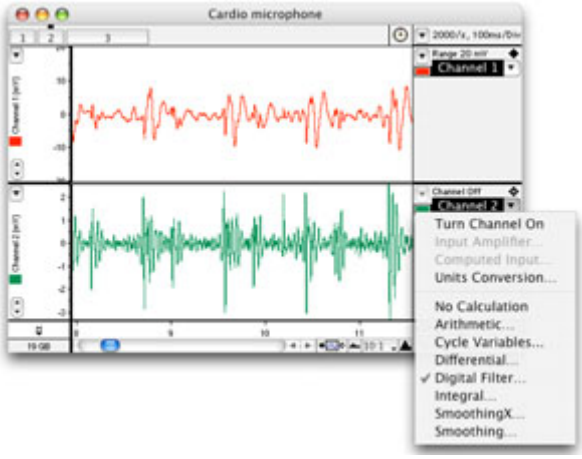

Figure 4. The raw signal (Channel 1) and the same after digital filtering (Channel 2). Note the Channel Function pop-up menu with Digital Filter… selected.

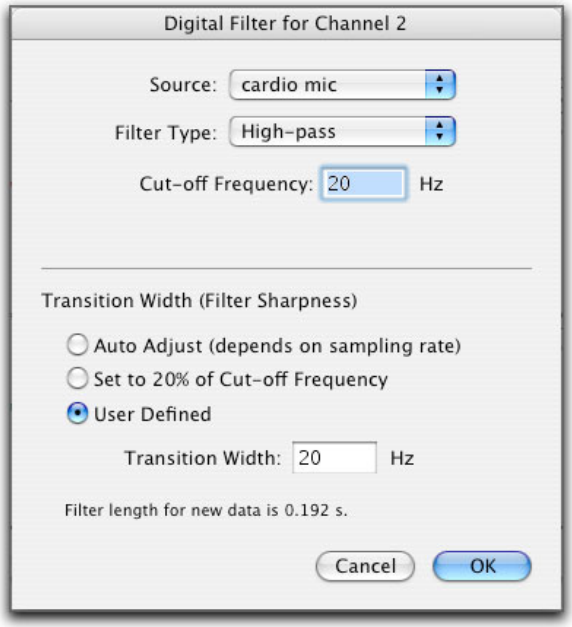

Figure 5. Suggested digital filter settings.

Audio playback in Chart

1. Use the mouse to select a range of data that you want to play back as a sound.

2. From the Commands menu, choose Play Selection as Sound (Mac version) or Play Selection (Windows version) (Figure 6). Please refer to the *Play Sound Extension User's Guide* for more details.

3. The data will be played back over the computer speakers. In a noisy environment such a teaching laboratory, good quality headphones such as the ADInstruments MLA1250 may be required.

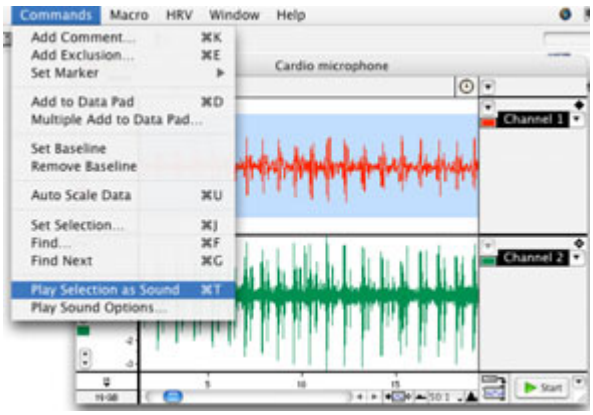

Figure 6. Playing back a data selection as sound in Chart.

Troubleshooting

Signal amplitude is too small

- Adjust the Range to a smaller setting.
- Make sure the Cardio Microphone is placed directly on the skin. Clothing can interfere with the recording quality.
- Try different placements of the Cardio Microphone to get a better recording.

Signal is noisy

- Use medical tape to attach the Cardio Microphone to the skin. Alternatively, if the subject is lying down, place a weight (such as a large Physiology textbook) on top of the microphone. Note that touching the Cardio Microphone during recording will introduce noise.
- Make sure the Cardio Microphone is positioned with the hole facing the skin as shown in Figure 2.
- Make sure the Range is appropriate. In the Input Amplifier dialog, adjust the Range so that the signal is 1/2 to 2/3 the window height.

Unable to playback data as sound

- Make sure you have installed the Play Sound Extension for your version of Chart and it is in the Extensions folder on your computer.
- Make sure you have speakers or headphones attached to your computer.
- Make sure that the computer speaker volume is adjusted properly.
- Adjust the sound output level by choosing Play Sound Options from the Commands menu in Chart.
- Please refer to the *Play Sound Extension User's Guide* for more details on the use of this extension.

Sound recording quality is poor

- Use a lower Range setting to increase signal amplitude.
- Make sure you are recording directly from the skin, and not through clothes.

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