Using The BIOPAC Software

Last Update: 9/27/2012

The Biopac software and hardware package is a powerful tool for collecting and analyzing physiological data. In most cases, you will open Biopac by first opening a template by double clicking the template icon. In the example used in this tutorial, a template which uses an EMG and hand dynamometer sensor is opened and operated.

1. Starting the Program and Collecting Data

Open the file, sample.gtl. The following window will open:

For this example, the topmost graph displays the EMG signal, the middle graph displays the hand dynamometer signal, and the third graph is a calculation channel showing a real-time integration of the EMG signal.

Click on the enlarge button (boxed in red below) to enlarge the working window.
The display will now look as given below:

Underneath the menus is the **Tool Bar**, below which are the **Measurements** boxes (boxed in red above).
After connecting the appropriate sensors to the Biopac unit (make sure the connections have been secured), you can click the **Start** button (boxed in green) on the bottom right of the screen to begin collecting data. You can click the button again, which will now read “**Stop,**” to stop collection.

If you want to start over (make sure you’ve saved your data!), go to **Edit > Select All** and then **Edit > Clear All.** Doing this will also clear the display of the template graphs. However, when you press **Start** again, the graphs will re-appear.

2. **Scaling**

The data in this example will look as follows (open sample.acq to follow along):

The graphs are not scaled such that the data will display in the most optimal view; sometimes, rescaling will be necessary for a more convenient, proper view of the data. To scale, select a graph by clicking anywhere on the graph of interest, and then select the **Autoscale** toolbar icon (circled in red above). Autoscaling all of the graphs will produce the following:
You can choose to input your own scale by clicking on the x- or y-axis scales themselves.

3. Analyzing Data

Now that you’ve collected the data, you can do much of your analysis using the Biopac software. First select the I-bar on the bottom right corner of your screen (circled in green below).
Clicking on the graph will display a line:
The line displayed is effectively your cursor.

Next, look at the **Measurements** area of the screen at the top left corner of your screen (circled in green above).

Looking closely at this area, you can see three different sets of button/boxes:

<table>
<thead>
<tr>
<th></th>
<th>value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.014343 mV</td>
</tr>
<tr>
<td>2</td>
<td>-2.852175 kg</td>
</tr>
<tr>
<td>40</td>
<td>0.000000 Volt</td>
</tr>
</tbody>
</table>

Clicking on one of the buttons labeled ‘1’, ‘2’ and ‘40’ will display the following option:

- SC, Selected Channel
- Ch1, CH1 Input
- Ch2, CH2 Input
- Ch40, EMG - Integrated

Choosing one of these will show data for that channel in the text box just next to it. **Ch1** will show data in the corresponding text box for the top most graph (EMG), **Ch2** will show data for the second graph (Hand Dynomometer) and **Ch40** will allow you to display data for the third graph (Integrated EMG signal). **SC** refers to **Selected Channel** which would display data for
whatever graph is selected. In the full screen image above, the second graph is selected since the label on the left labeled **Ch2 Input** is blue, in contrast to the labels for the other graphs.

In this example, each of the three rows of the **Measurements** area is showing data for the corresponding graph. The text box shows the y-axis value corresponding to where the cursor sits.

Clicking on the bar labeled **Value** will give you other analytical tools, such as **delta T**, which gives you the change in time, **area**, which gives you the area under the curve, and **slope**, in addition to the ones shown: **p-p** (peak to peak), **mean**, **max** and **min**.

On your graph, you can highlight a region and get related information. So, if we highlight a region, as depicted below, the selected information is shown:

Thus we can see the peak-to-peak value, min, max and mean for the selected region.

4. **Saving Data**

To save data for later use on Biopac, select **File > Save As** and then save the file as type **.acq**.

To export to a spreadsheet program such as Excel, select **Edit > Select All**. Then select **Edit > Clipboard > Copy Wave Data**. You can then paste the data into a spreadsheet. Alternatively, you can just save the file as a **txt** file and open it in the spreadsheet program. If you decide to do
this, make sure you click the “Options…” button after switching the file extension to .txt and make sure that the drop-down menu selection for “Column delimiter” reads “tab.” This ensures that the format of the data retains its integrity. If you choose to save as a text file, you also have the option of checking a box labeled “Selected section only,” if you only want the data from a particular section that you’ve highlighted in advance with the cursor.

5. Other features

You can modify your channel selections by going to MP35 > Setup Channels.

In this example, under Analog Input Channels, channel 1 and 2 are selected to be displayed. You can select more channels here, select preset settings under Presets, or customize it under View/Change Parameters which is the icon with the wrench symbol.

The Calculation Channels section provide options for real-time calculations, which in this example, C1 is set to provide an integrated EMG signal, which was chosen from the Presets option. Clicking the View/Change Parameters icon will allow you to choose the analog channel which you would like to manipulate, in addition to other variables.
You can adjust (and determine) your sample rate and acquisition time by going to **MP35 > Setup Acquisition** (shown below).