GREAT LAKES NEUROTECHNOLOGIES

Quick Notes

BioCapture™ : Acquiring ECG data

Electrocardiography (ECG) is a recording used to examine the electrical activity of the heart. BioCapture uses surface electrodes to monitor the rhythm of heart muscles as they contract and expand. There are several practiced ways of acquiring an ECG signal. This quick note will demonstrate a basic 1 channel or 1 lead ECG recording.

What you will need

Need to order supplies?
Contact your local Sales Representative, call 1-855-GLNeuro (855-456-3876) or e-mail sales@glneurotech.com
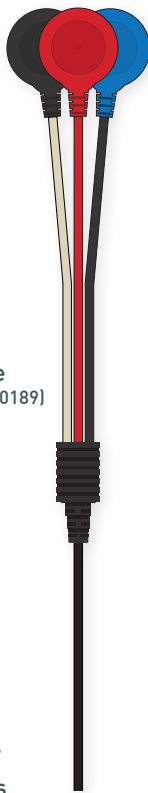
2.4 GHz BioRadio 150
User Unit

<u>3</u> cloth surface electrodes
(P/N 040-0026, pkg of 30)

Alcohol wipes*

2.4 GHz
USB Receiver

<u>3</u> high performance foam snap electrodes
(optional P/N 040-0038, pkg of 60)
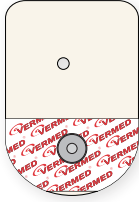
Nuprep skin prep gel*

Shielded lead electrode cable
(optional, P/N 502-0189)

<u>3</u> "button snap" electrode cables
(any color, P/N 116-0045-R, pkg of 5)

*part of Disposable Supply Kit, P/N 602-0036-R

Set up

Using an alcohol wipe and skin prep gel, prepare the surface of the skin where the electrodes will be placed by gently abrading and then wiping clean the area. Make sure the skin is dry before placing the electrodes.
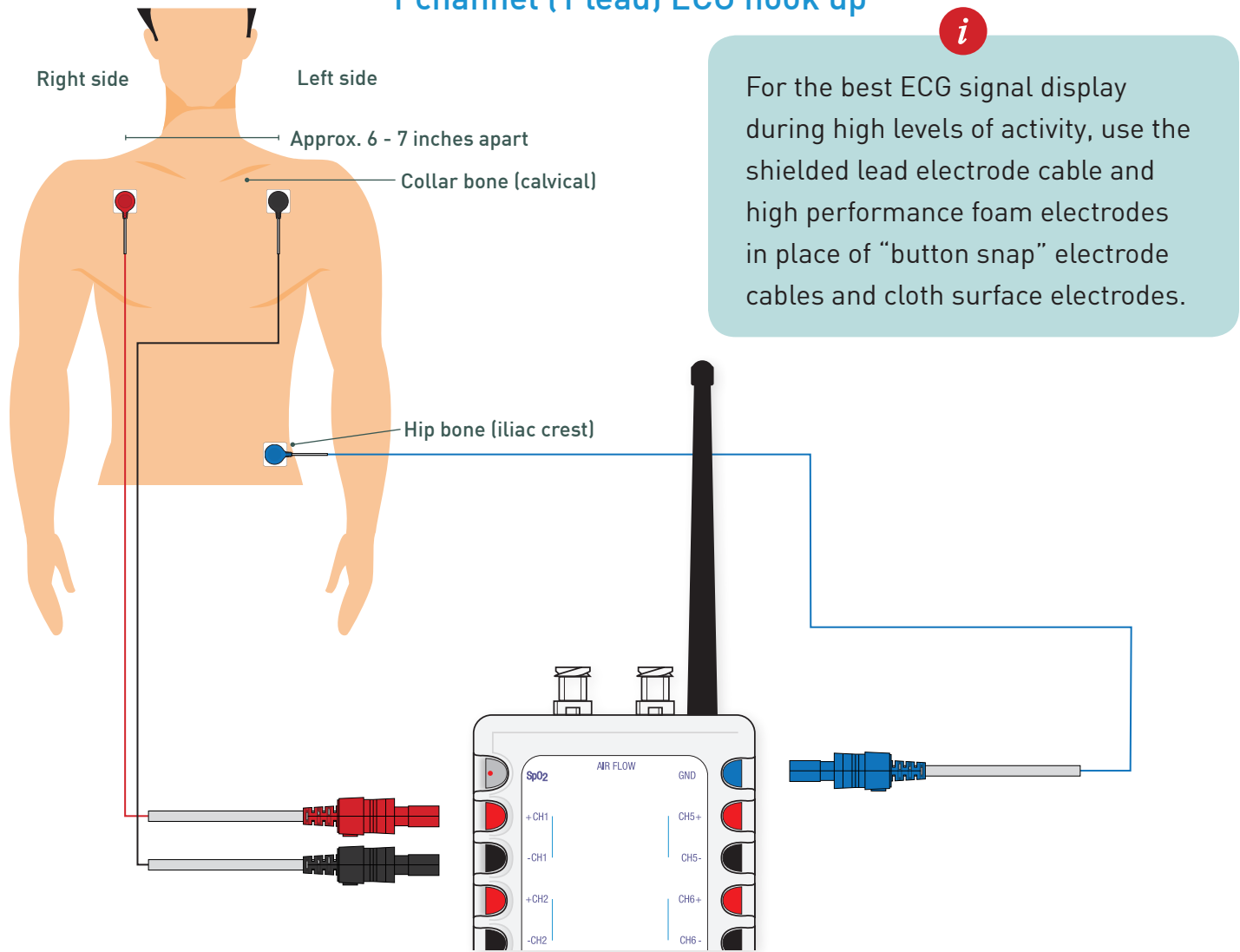
i If sweating occurs, the cloth surface electrode contact will diminish and you may have to repeat this process in order to ensure sufficient skin/electrode contact.

With you or a participant standing up and relaxed, place two cloth surface electrodes, approximately six to seven inches apart, just below the collar bone (clavicle). See figure on the next page for details.

Place a third cloth surface electrode left or right hip bone (iliac crest). This will be the ground electrode.

Connect any color "button snap" electrode cable to each cloth surface electrode.

1 channel (1 lead) ECG hook up

Right side

Left side

Approx. 6 - 7 inches apart

Collar bone (calvical)

Hip bone (iliac crest)

For the best ECG signal display during high levels of activity, use the shielded lead electrode cable and high performance foam electrodes in place of "button snap" electrode cables and cloth surface electrodes.

SpO2   AIR FLOW   GND

+CH1   CH5+

-CH1   CH5-

+CH2   CH6+

-CH2   CH6-

Connecting electrode cables to BioRadio 150 User Unit

Connect the electrode cables to the +CH1 and -CH1 inputs on the BioRadio 150 User Unit.

⚠ For an accurate ECG signal display, plug the **left electrode** into the **-CH1 input**, and the **right electrode** into the **+CH1 input**.

Connect the hip bone ('Ground') electrode cable to the GND input of the User Unit.

🖐 To prevent interference from encroaching ECG signal data, twist or bundle together any dangling cables, or tape any dangling cables to the skin with medical tape.

Configuring your BioCapture system

With your BioRadio 150 turned on and your USB Receiver connected and ready for use, launch BioCapture and click Device Config, from the tool bar to, configure your BioCapture system for one channel of ECG.


Device Config
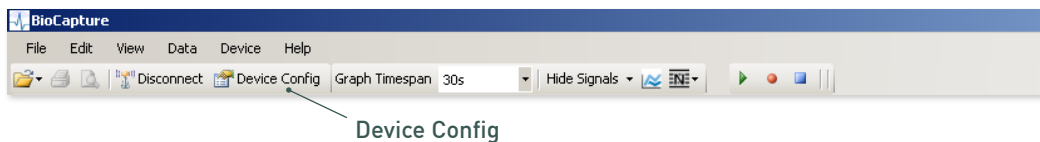
From the Standard View, enable Channel 1 ('CH1'), type in ECG for a custom name and select the ECG option under the Configuration drop down box.

Ensure that all other inputs are disabled. For the this demonstration, Sampling Rate and Resolution can remain unchanged.

i For further reading on Sampling Rate and Resolution, please refer to the BioCapture User's Guide.

Press Program Device to program your BioCapture system.


Program Device
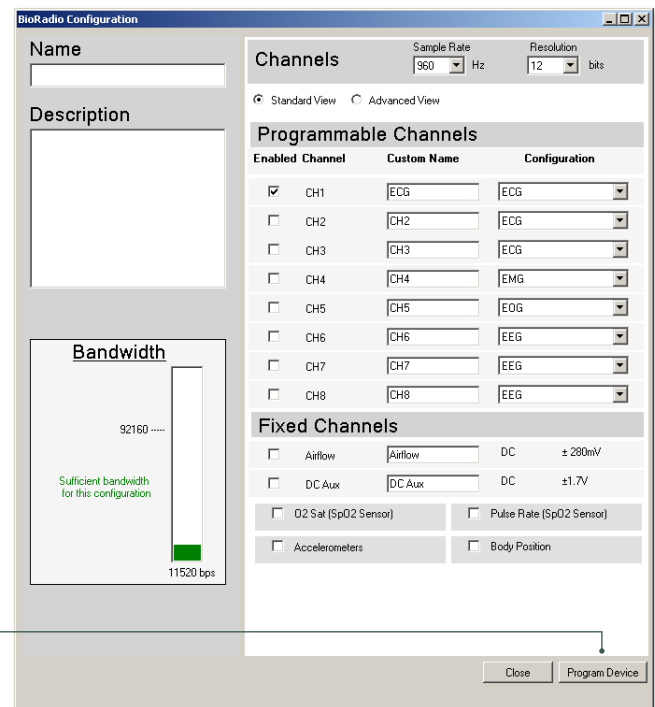
Acquiring ECG data

Your BioCapture system should now be ready to collect one channel of ECG. Please note that the ECG configuration option presets the following display properties: y-axis max/min, custom filters, gain and offset.

With arms at rest and relaxed, press Start Acquisition from the tool bar to begin acquiring data. A small data trace will appear.

Start Acquisition
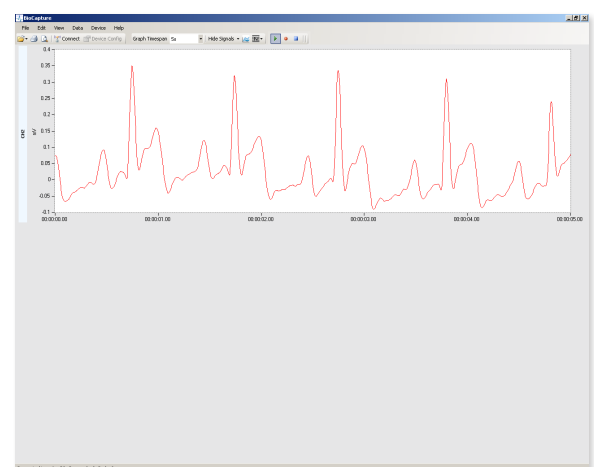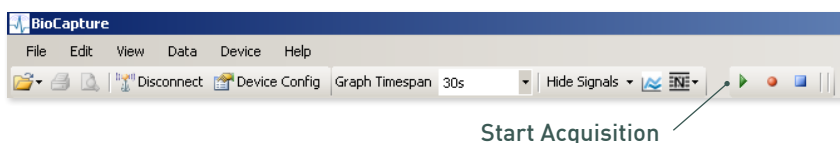
▲ Standard 1 channel ECG signal display

> **i** You may need to access the Y-Axis Set Max/Min option for a more prominent ECG signal display. The ECG hardware configuration option sets a display range of ± 12 mV. You can auto-scale all signals by pressing Ctrl + A or by selecting View > Auto-Scale Signals.
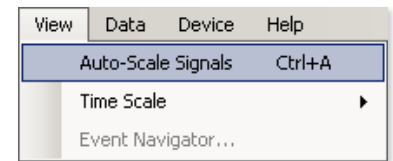
▲ Auto-Scale Signals

ECG, heart rate and exercise

Unlike most physiological signals, ECG consists of a particular and recurring set of electrical activities. These activities, displayed in millivolts, consist of a P wave, a QRS complex, and a T wave. A heartbeat is a cardiac cycle that creates these waves and complexes.

> **i** Performing any kind of aerobic exercise will cause the heart muscles to work more quickly. During and after light exercise the ECG signal display should show more heart beats – sets of P waves, QRS complexes and T waves - per minute.
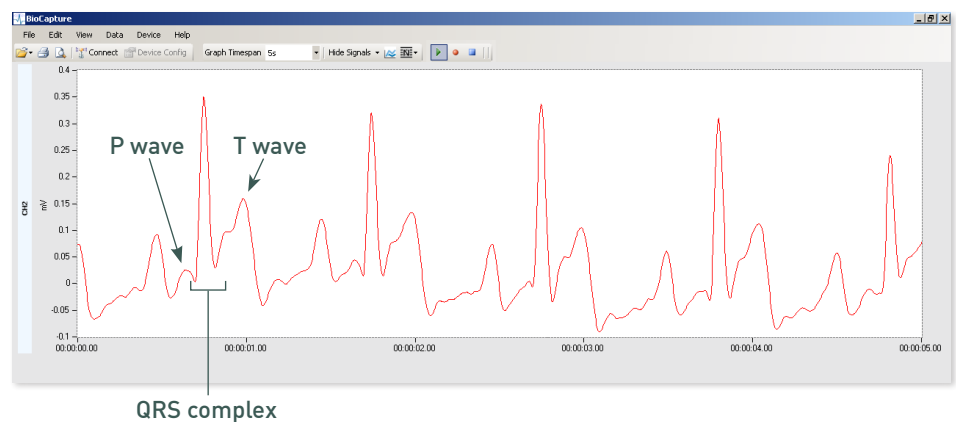
The heartbeat's electrical cycle represents heart muscles—artia and ventricles—that contract and expand, creating periodic changes of each muscles' electrical state in the process.

The heart rate is the inverse of the time in between any P wave, QRS complex, or T wave. For example, if the time measured between two QRS complexes is 0.8 seconds, then the number of beats per second is the inverse, 1.25 beats per second. In order to obtain the heart rate, you would simply multiply by 60 seconds per minute. This would yield 75 beats per minute.
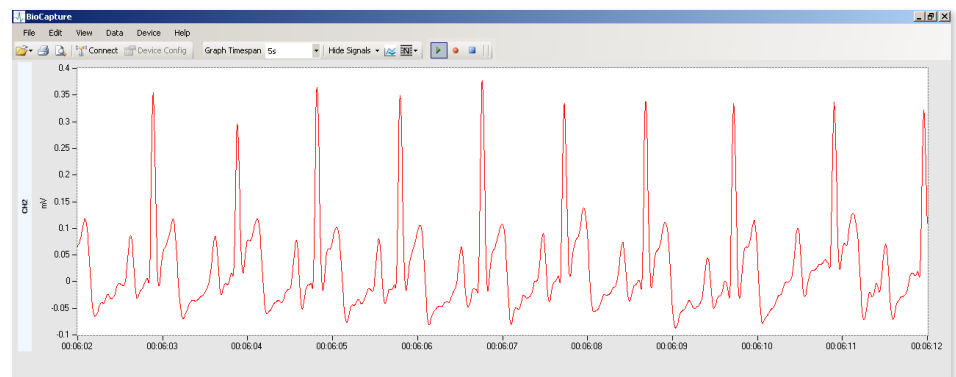
Ready. Set. Go!

You are now familiar with an essential ECG recording.For further reading on ECG, please refer to the BioCapture User's Guide and/or the following references:

- Guyton and Hall. <u>Textbook of Medical Physiology</u>, 9th Edition, Saunders, Philadelphia, 1996.

- Rhoades, R and Pflanzer, R. <u>Human Physiology</u>, Third Edition. Saunders College Publishing, Fort Worth, 1996.
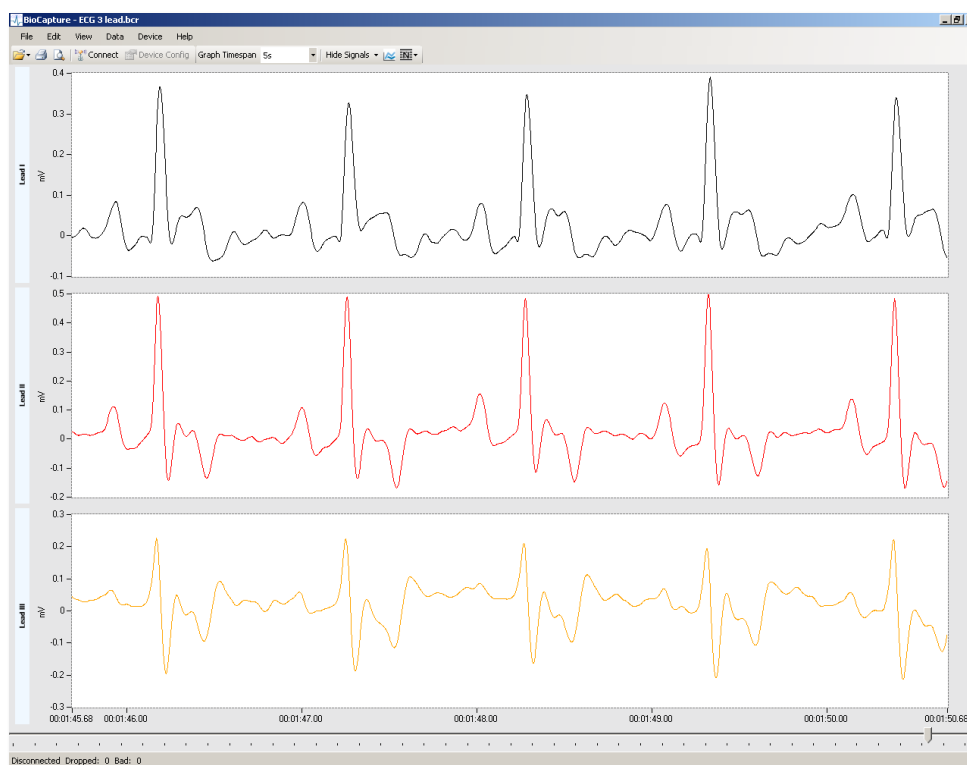
▲ More complex ECG recordings can show specific electrical activity of certain heart muscles and special conductive tissues

HAVE QUESTIONS? NEED TECHNICAL SUPPORT? WE'RE HERE TO HELP.

Telephone: (216) 361-5410 or Toll-free 1-855-GLNeuro (1-855-456-3876)

9:00 a.m. - 5:00 p.m. EST, Monday – Friday

E-mail: support@GLNeuroTech.com

Web: http://www.GLNeuroTech.com/support