



Quick Notes

BioCapture™ : Acquiring EMG data

Electromyography (EMG) is a recording used to examine the electrical activity of the muscles. More specifically, BioCapture uses surface electrodes for surface electromyography (sEMG) to monitor the general picture of superficial muscles that are close to the skin. This quick note will demonstrate a basic 1 channel EMG recording.

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

What you will need

BioRadio User Unit

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

Alcohol wipes*

Nuprep skin prep gel*

Free weight (optional)
(i.e., a heavy book or bag or dumbbell)

3 high performance foam snap electrodes
(optional P/N 040-0038, pkg of 60)

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

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

USB Bluetooth adapter
(optional)

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

Set up

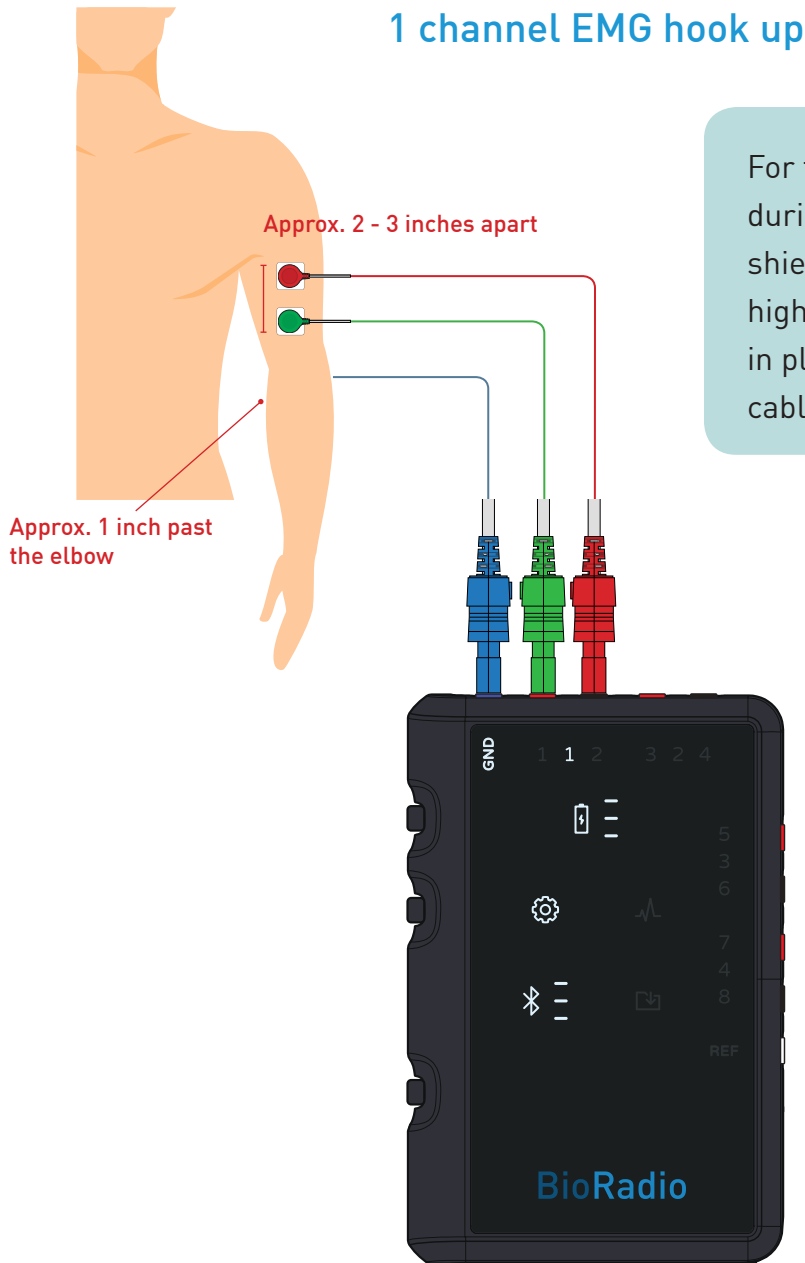
Using an alcohol wipe and skin prep gel, prepare the surface of the skin where the electrodes will be placed by gently abrading and then wiping clean the area. Make sure the skin is dry before placing the electrodes.

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 arms relaxed, place two cloth surface electrodes approximately two to three inches apart on the left or right biceps muscle. See figure on the next page for details.

Place a third cloth surface electrode right below the elbow of the same arm, ensuring the electrode is over a bony surface. This will be the ground electrode.

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



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For the best EMG 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.

Connecting electrode cables to BioRadio User Unit

Connect the biceps muscle electrode cables to the black and red inputs of Ch1, on the BioRadio. It does not matter which input an electrode cable connects to.

Connect the elbow (‘Ground’) electrode cable to the GND input of the User Unit.

To prevent motion artifact from encroaching EMG 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 BioCapture launched and your BioRadio turned on, connected and ready for use, press Device Config, from the tool bar to configure the BioRadio for one channel of EMG.

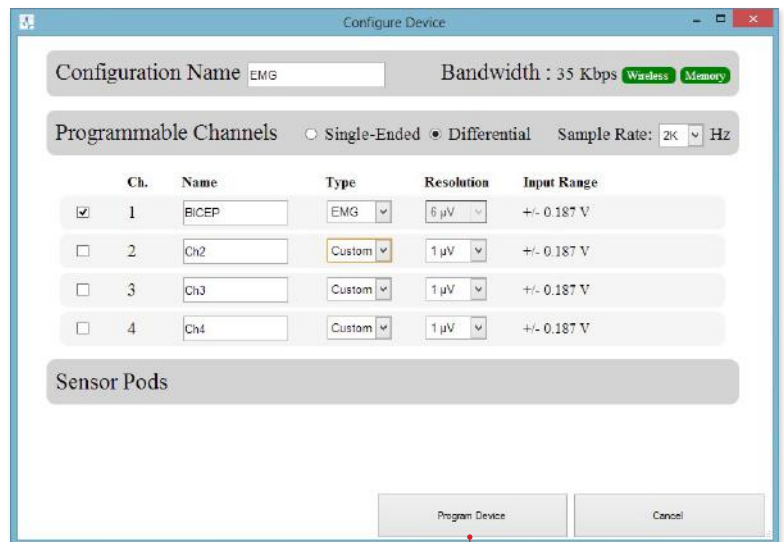


Device Config

From the Configure Device window, select Differential, enable Channel 1 ('Ch1'), type in EMG for a custom name and the select EMG option under the Type drop down box.

Ensure that all other inputs are disabled. For this demonstration, a 2 kHz sampling rate is recommended.

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



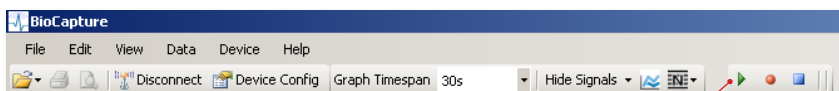
Program Device

Press Program Device to program your BioRadio.

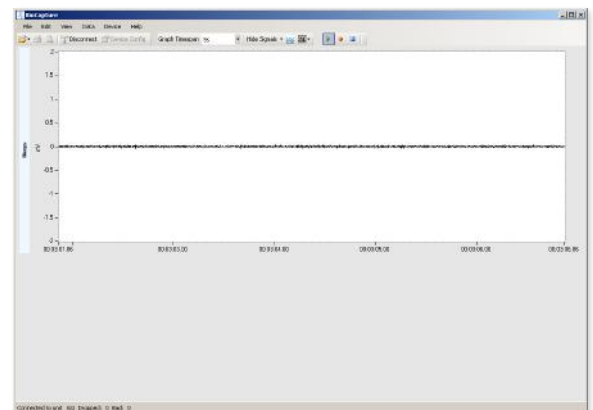
Acquiring EMG data

Your BioCapture system should now be ready to collect one channel of EMG data. Please note that the EMG 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.

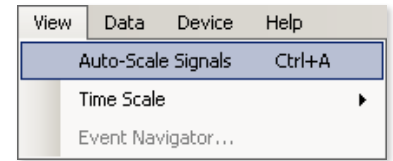


Start Acquisition



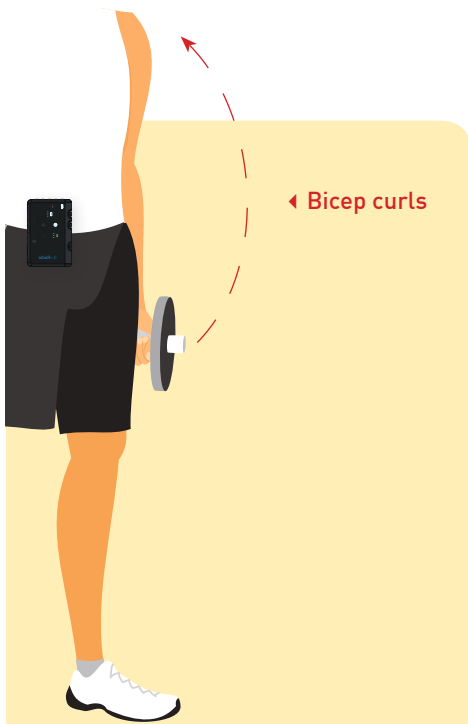
▲ This is the muscle activity at rest, also known as rest potential.

i You may need to access the Y-Axis Set Max/Min option for a more prominent EMG signal display. The EMG hardware configuration option sets a display range of ± 25 mV. You can auto-scale all signals by pressing Ctrl + A or by selecting View > Auto-Scale Signals.



Auto-Scale Signals

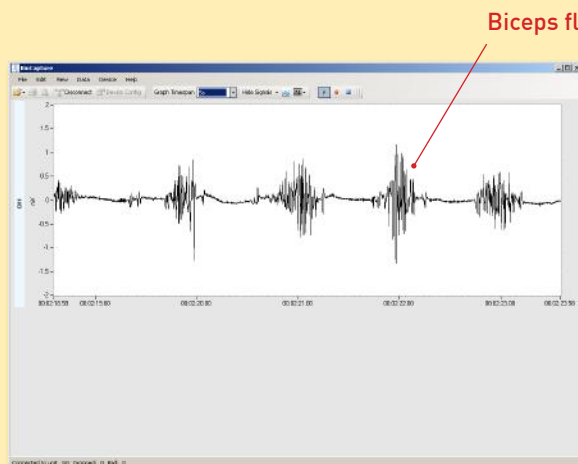
Biceps exercises



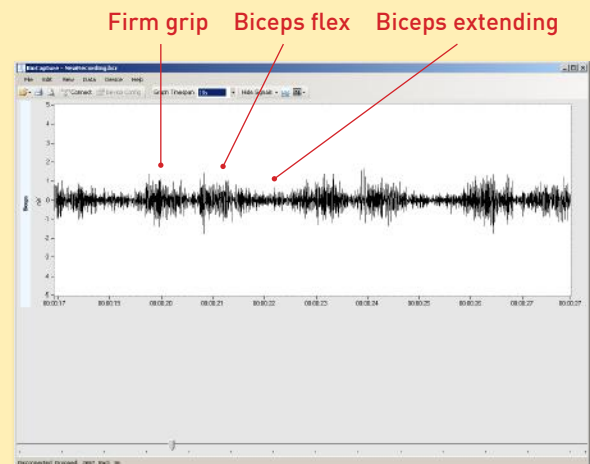
Simply squeezing, flexing or contracting your biceps muscles will produce a short series of bursts. Each burst is an action potential—a rise and fall event of the muscle cell’s membrane potential. In between flexes or as soon as you stop, the biceps muscles cells’ membrane potential will return to their rest potential, creating a small, electrically silent signal trace.

Performing biceps curls—arm at your side, bend your elbow and raise your hand to your shoulder—with a heavy book, bag or a dumbbell genuinely demonstrates EMG activity of the biceps muscles.

As a hand firmly grips the weight, the biceps’ muscle cells become “electrically excited” and their membrane potential begins to spike or fire, creating an action potential. As the weight is curled and brought back down, the biceps flex and extend, and the EMG signal data amplitude grows and attenuates. This coincides with the boisterous firing of the biceps numerous muscle cells.



The harder the biceps flexes, the greater the action potential, hence, the greater the EMG signal data’s amplitude.

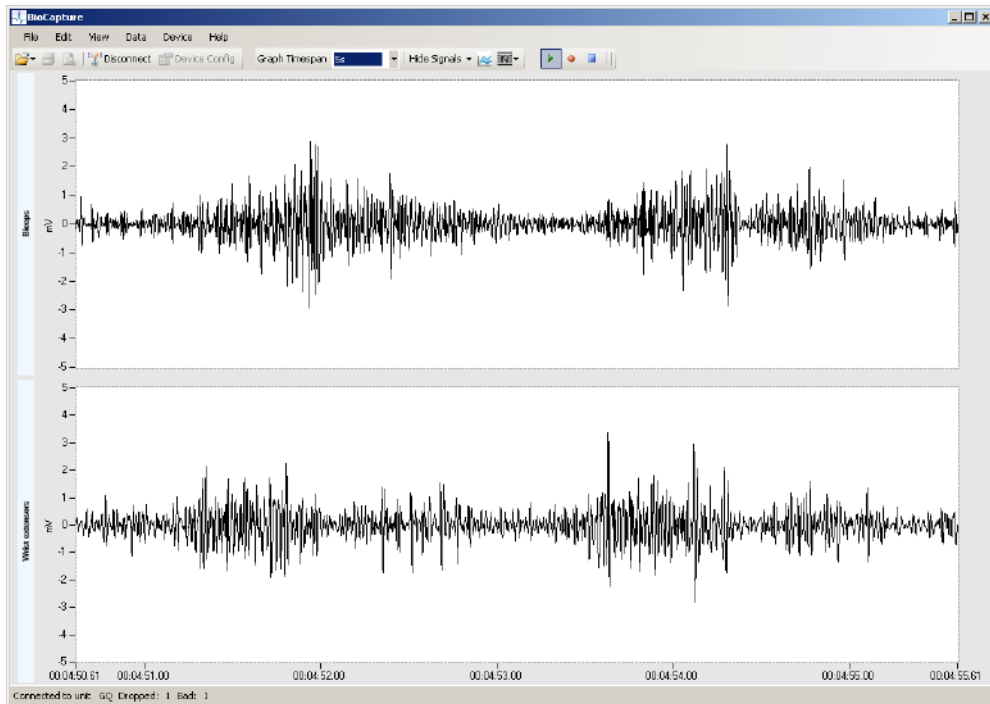


A biceps curl’s dynamic range of motion requires the biceps muscles to complement other muscle groups.

Ready. Set. Go!

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

- Guyton and Hall. Textbook of Medical Physiology, 9th Edition, Saunders, Philadelphia, 1996.
- Kandel ER, Schwartz JH, Jessel, TM. Essentials of Neuroscience and Behavior. Appleton and Lange, Norwalk, Connecticut, 1998



By monitoring multiple muscle groups, dynamic exercises, like biceps curls, demonstrate activity of both biceps and wrist extensor muscles.

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>

BioCapture is intended for scientific and research purposes only. IRB approval must be obtained before using this device in human testing. BioCapture is a trademark and BioRadio is a registered trademark of Great Lakes NeuroTechnologies Inc., Cleveland, OH. Acknowledgments: This work utilizes technologies supported by Small Business Innovation Research grants from the National Institutes of Health (NINDS, NHLBI, NIMH) and the Department of Defense.



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