Enobio/Starstim - Biosemi comparison

Neuroelectrics White Paper WP201304

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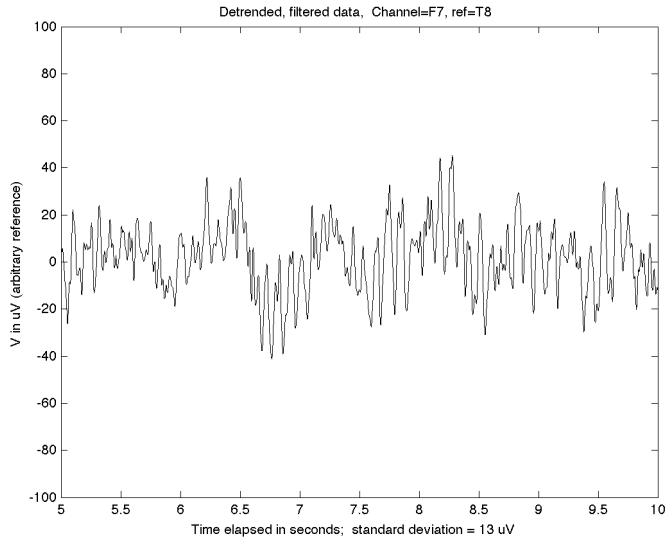
In this paper we provide some comparison of our systems with more traditional laboratory equipment. Biosemi's well-known expertise in laboratory-oriented biopotential measurement equipment makes their laboratory multichannel devices a reliable reference in this field. The purpose of this white paper is thus to demonstrate the equivalent functionality of Enobio/StarStim devices from Neuroelectrics taking *Biosemi ActiveTwo* system as a reference.

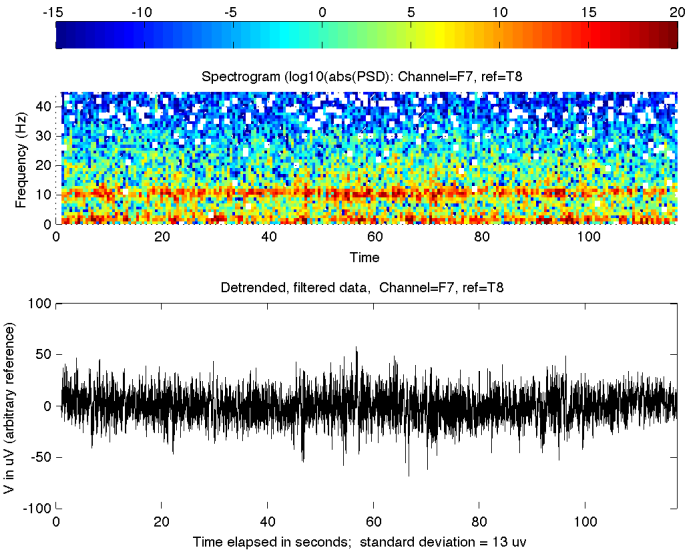
The following figures show the spectrograms, Power Spectral Density functions and raw (detrended) data of EEG signals recorded concurrently using Enobio/Starstim and Biosemi. Three types of Neuroelectrics' electrodes were used for the signals recorded with Enobio/Starstim: wet (NE *GELTRODE*), dry (NE *DRYTRODE*) and Pi (NE *PISTIM*) electrodes.

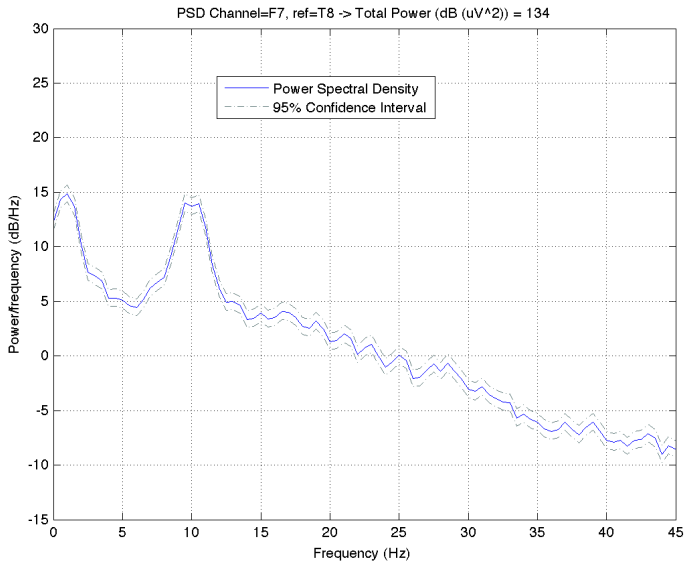
In order to be able to compare both devices, the corresponding electrodes were placed in adjacent (but not the same) locations. Signals were filtered from 1 to 45 Hz. CMS/DRL (ground) electrodes were placed in the left and right mastoids for Enobio/Starstim and Bisoemi, respectively. Enobio/Starstim and Biosemi signals have then been referenced to P8 and T8, respectively. In the figures below, signals show a clear peak at 10 Hz corresponding to the alpha wave peak of the subject, who remained with eyes closed during the whole protocol.

Comparisons show the equivalent signal quality of both systems. In particular, the use of dry, wet or Pi electrodes with NE devices can lead to similar results in laboratory conditions. Note that the electrode locations of the systems being compared are adjacent, but not the same, as are the references. For this reason, signals should be expected to be similar, but not exactly the same.

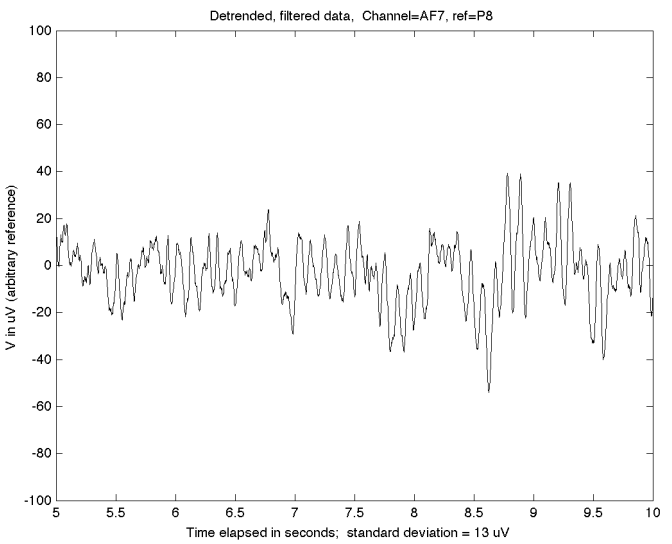
AF7 (Enobio), dry electrode (NE *DRYTRODE*)

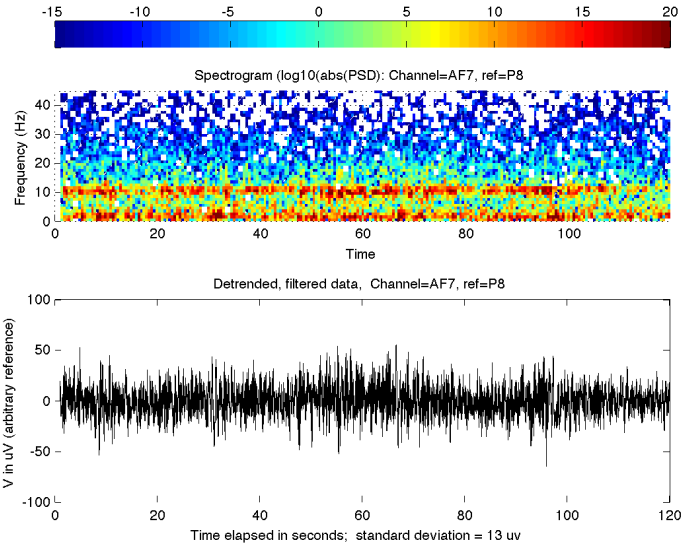


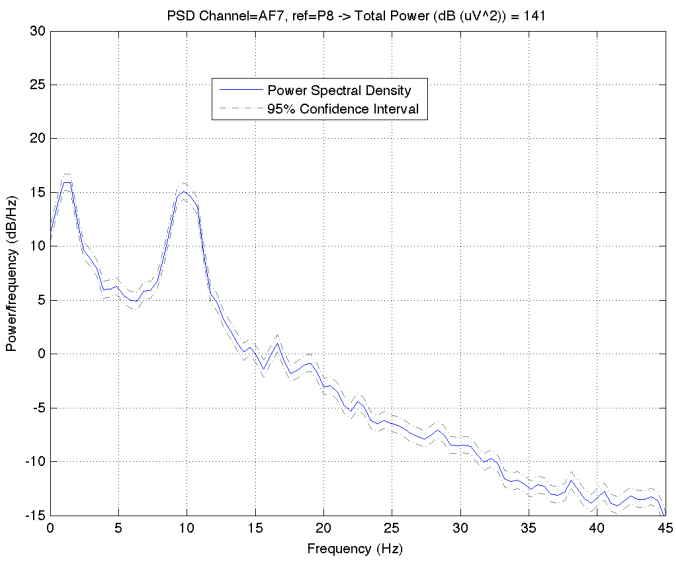




F7 (Biosemi)







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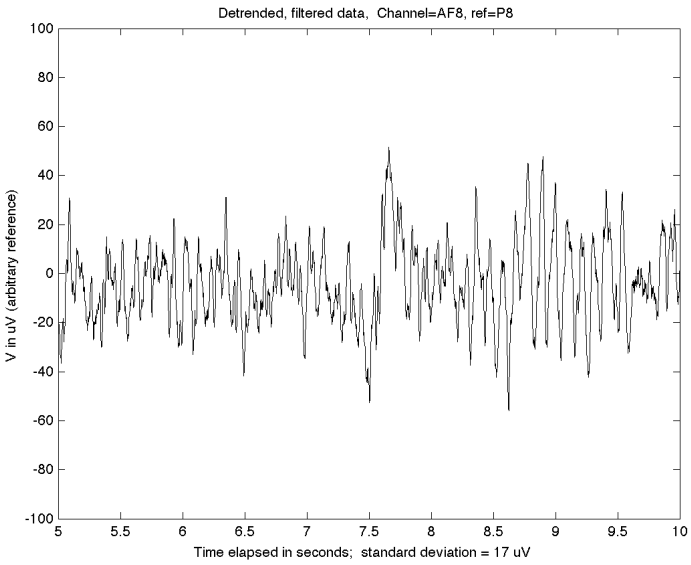

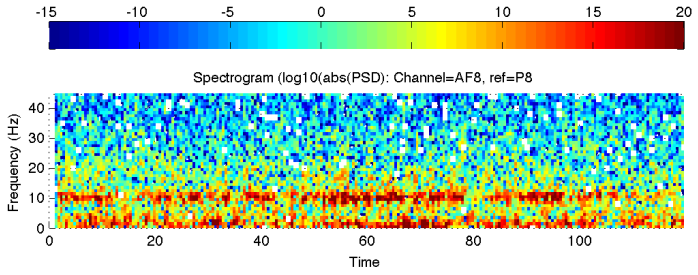

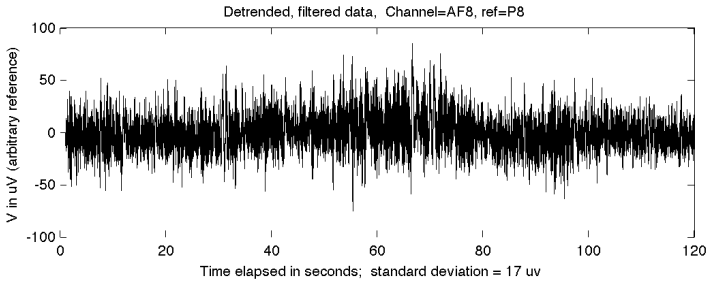

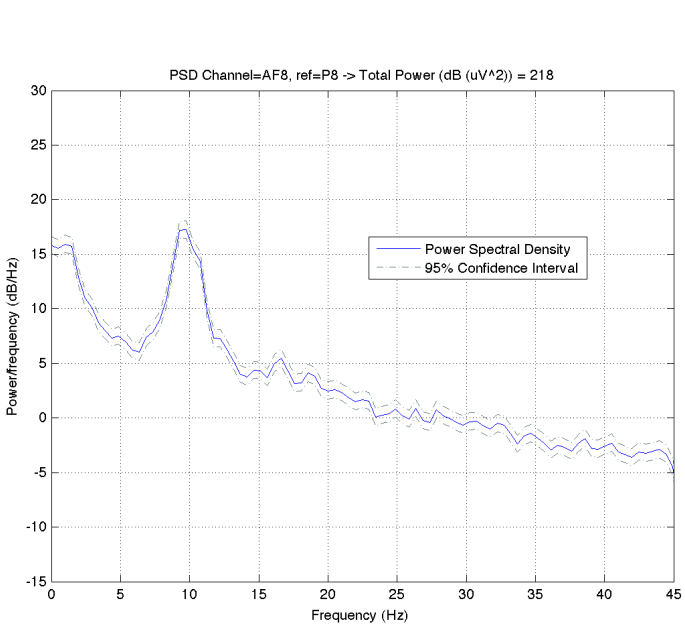

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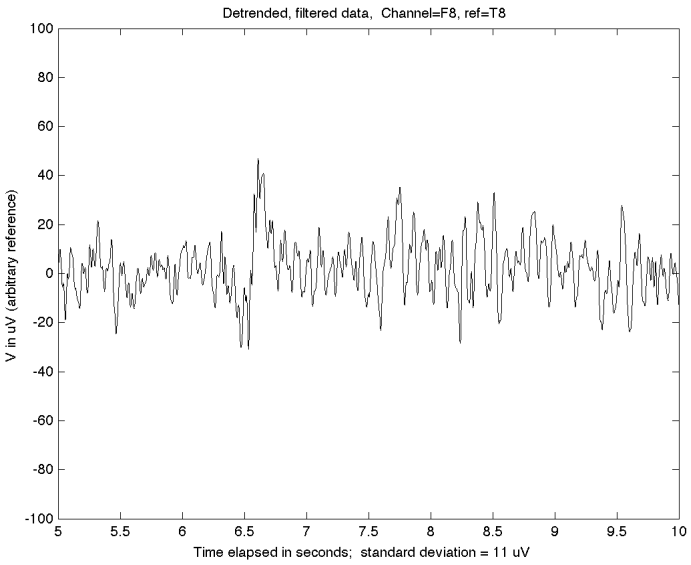
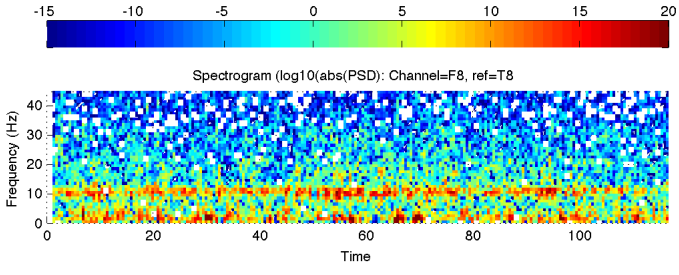
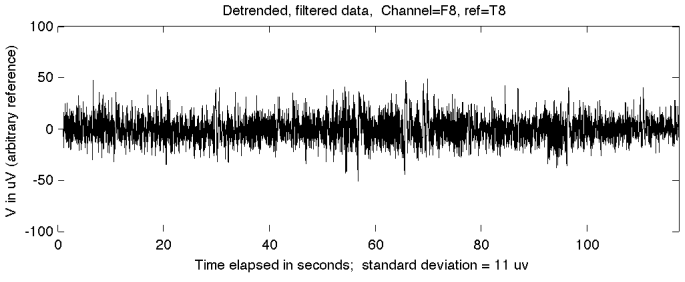
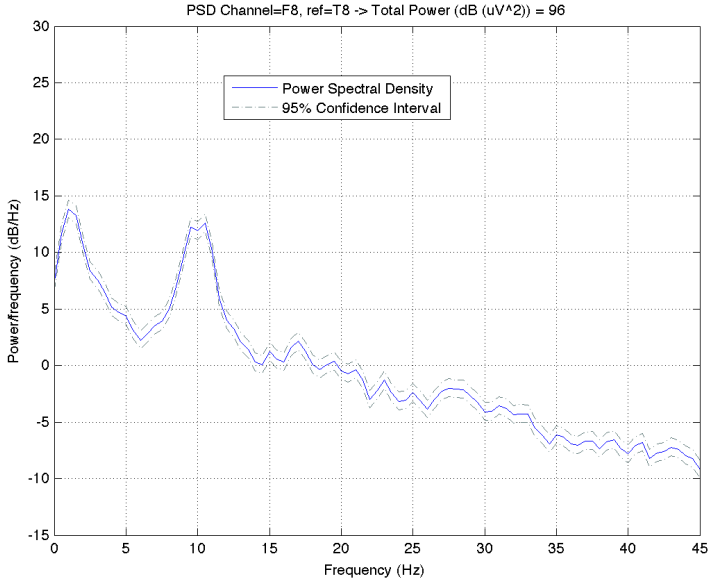
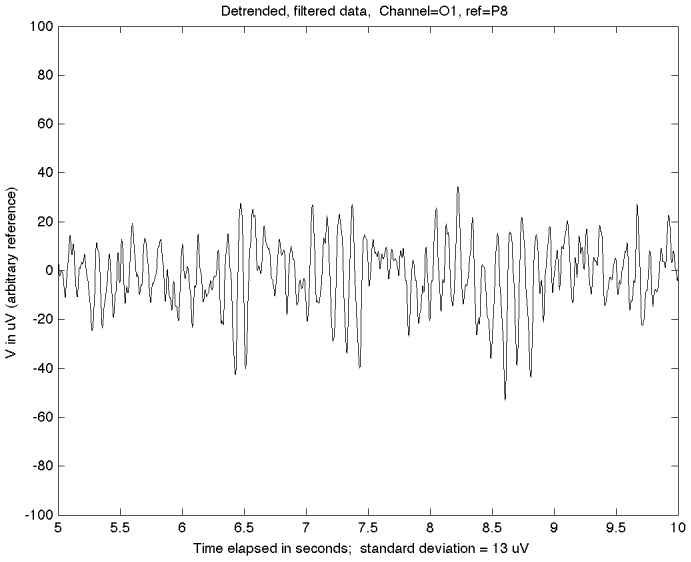


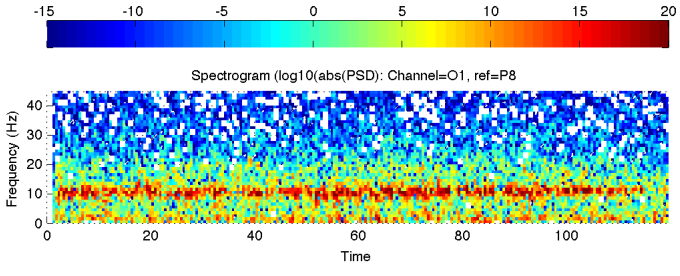


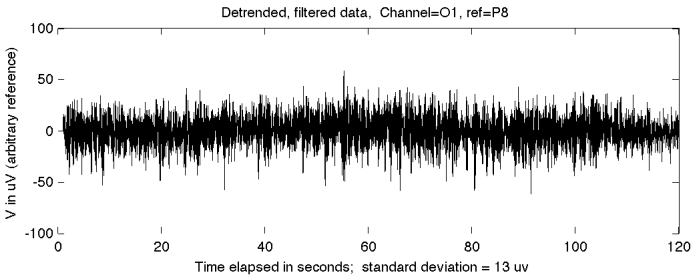


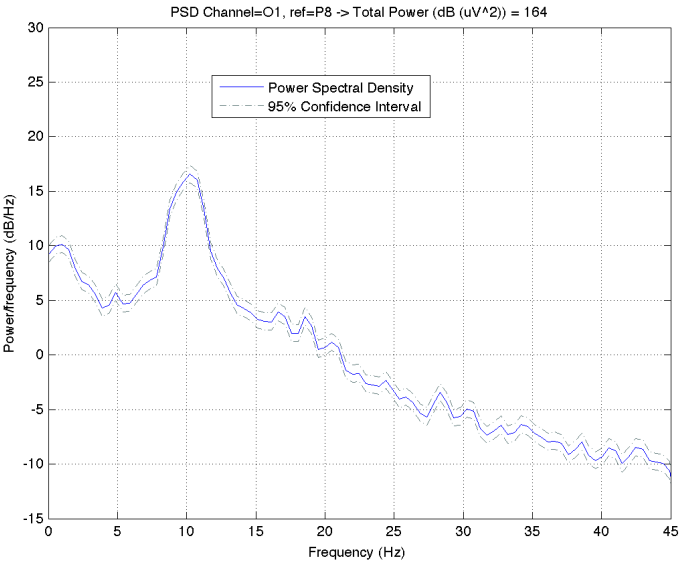


O1 (Enobio), Pi electrode (NE *PISTIM*)

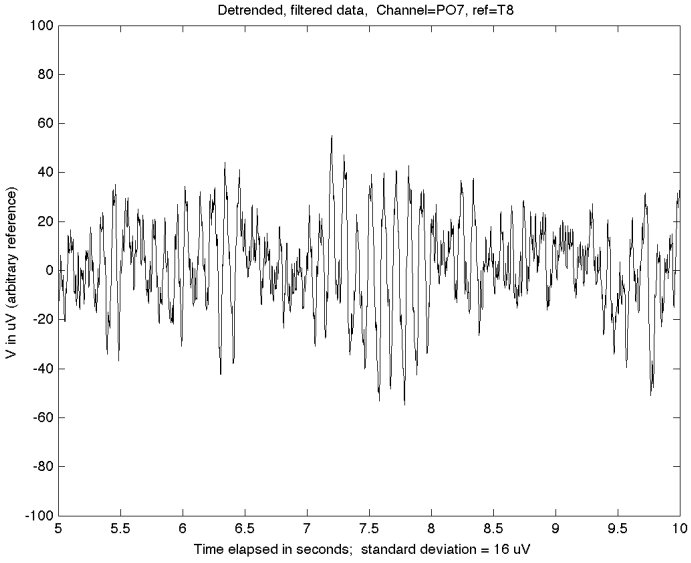


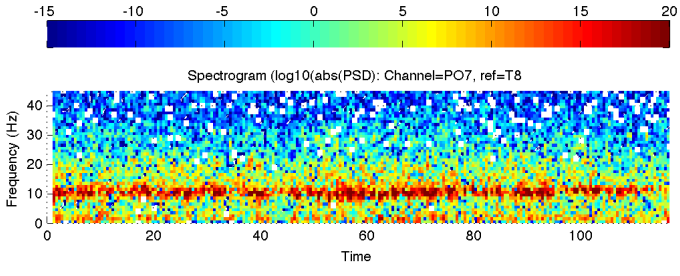


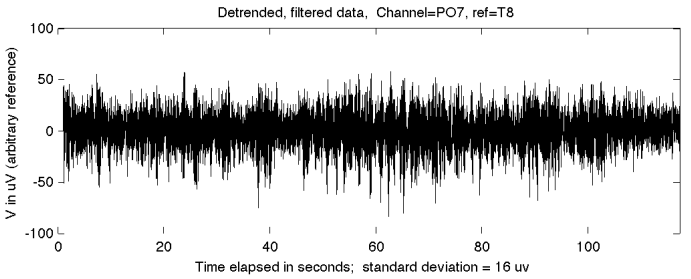


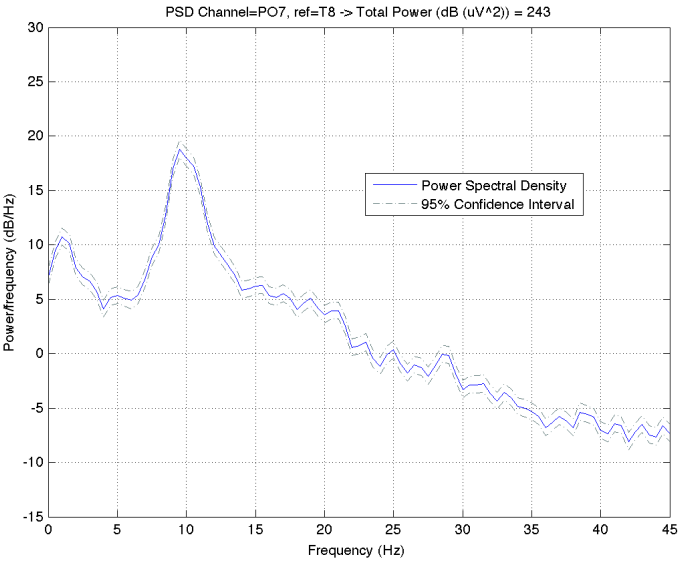
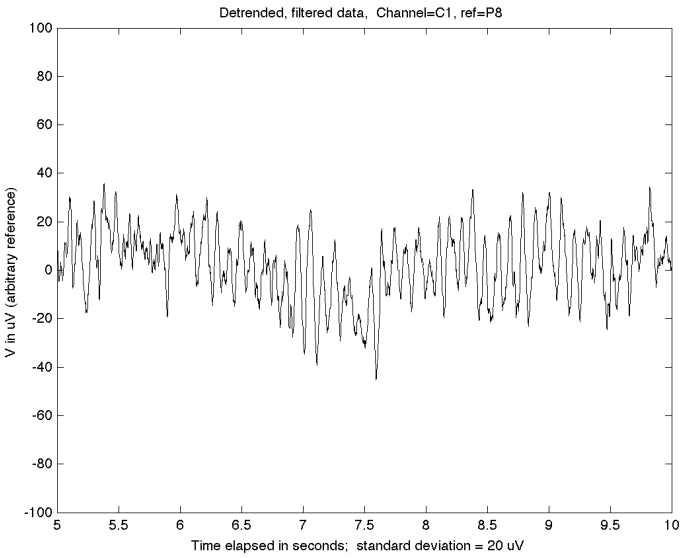
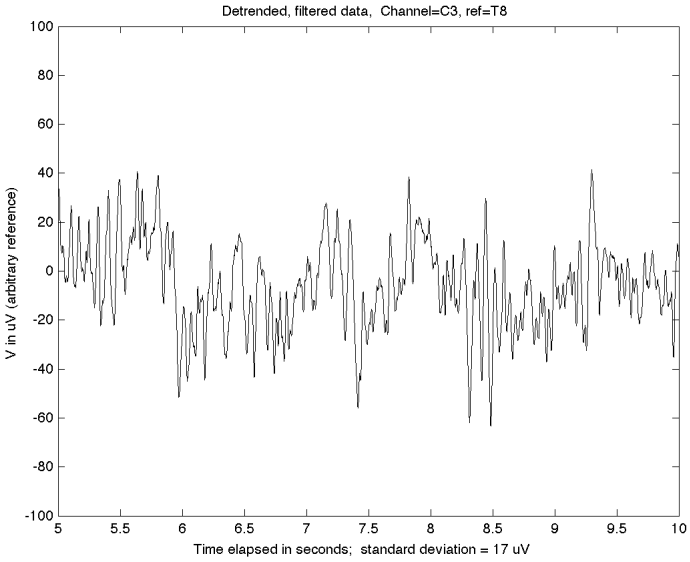
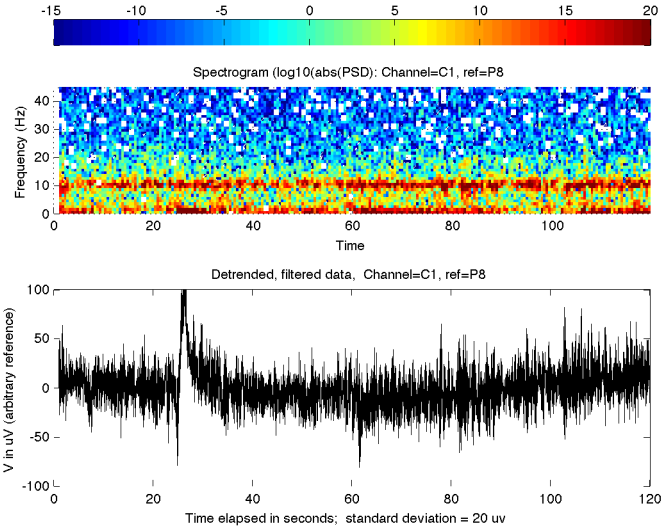
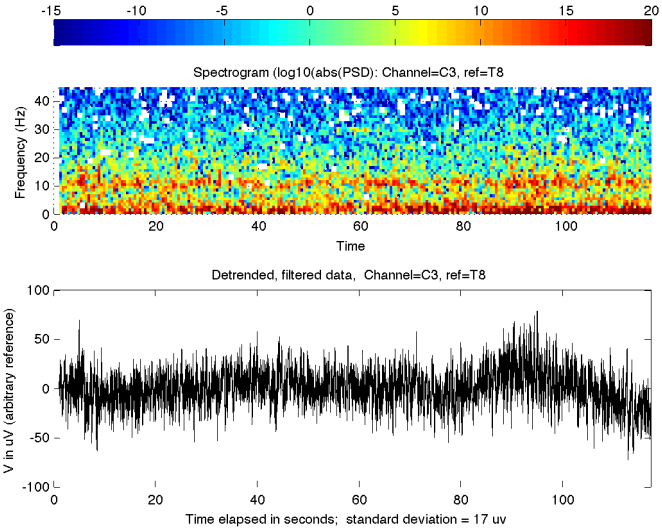
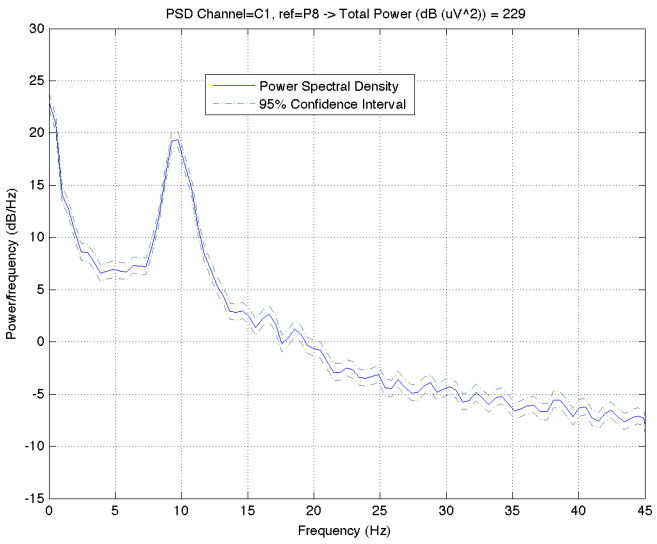
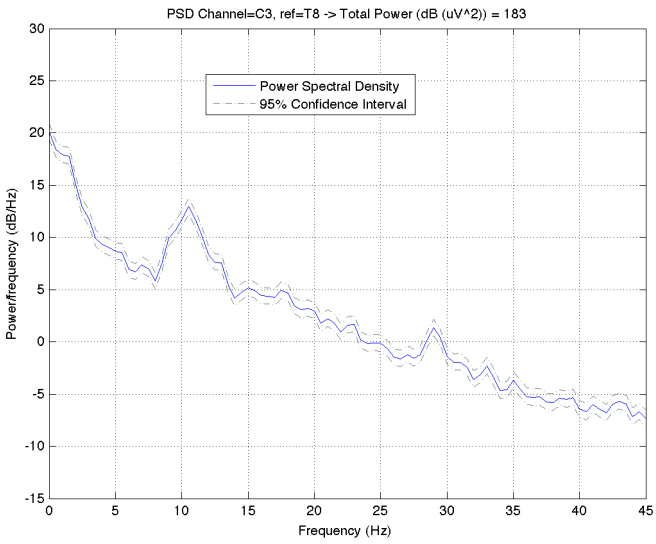


PO7 (Biosemi)









C1 (Starstim), wet electrode (NE *GELTRODE*) **C3 (Biosemi)**