

EPOCH Wireless In Vivo Recording

Recording EEG at 200 Hz

- Epoch2 2-channel Receiver Hz is specified when ordering: 1/1 = Ch1 100 Hz + Ch2 100 Hz
1/2 = Ch1 100 Hz + Ch2 200 Hz
2/2 = Ch1 200 Hz + Ch2 200 Hz.

Typically, a 100 Hz channel would be used for EEG and a 200 Hz channel would be used for ECG or EMG, but a 200 Hz channel can also be used for EEG and then filtered with a 100 Hz low pass filter to remove the noise.

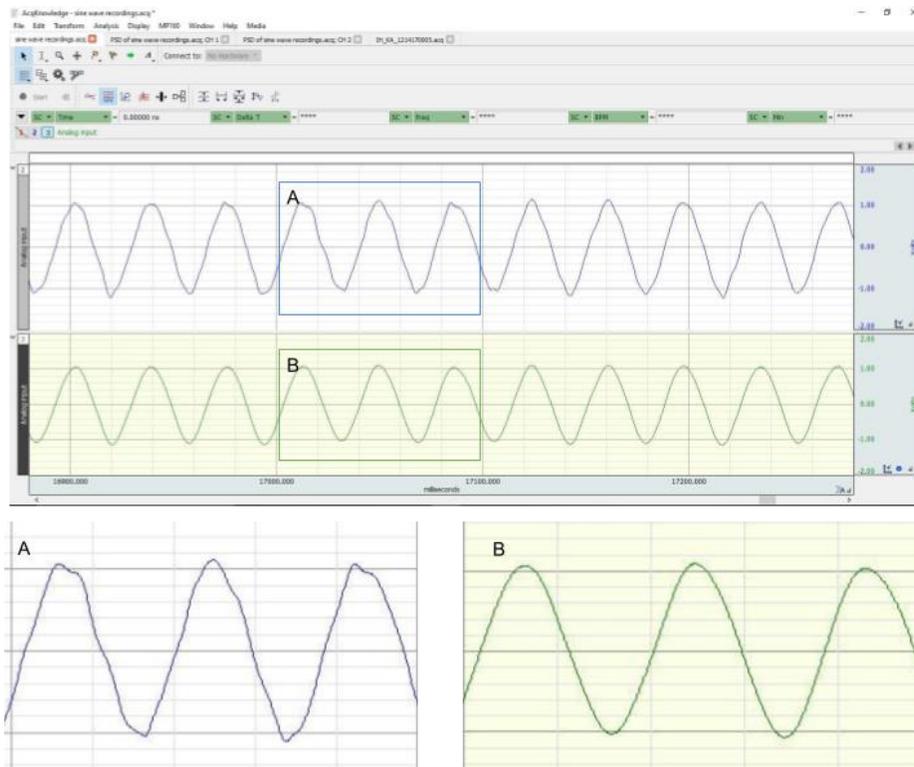
(Note that Epoch6 6-channel Receiver and Epoch-Pup 4-channel Pup Receiver are both 60 Hz on all channels, and the older Epoch "Classic" Receiver was just 100 Hz.)

- Q:** What is the difference between recording EEG, ECG and EMG at 100 Hz or 200 Hz?
- A:** EEG recordings are typically analyzed for bandwidths lower than 100 Hz. ECG and EMG analysis in rodents are higher frequency signals with a wider bandwidth to 200 Hz. With the wider bandwidth, comes a trade off in higher frequency system noise entering the EEG signal that is not driven by brain activity that would normally be driven by higher-bandwidth biopotentials.
- Q:** Is it possible to record EEG on the 200 Hz channel(s) of the Epoch2 100/200 or 200/200 receiver (P/Ns 10229 thru 10232)? Or is purchasing a separate Epoch2 100/100 receiver (P/Ns 10206 and 10207) required?
- A:** Yes, you can record EEG on the 200 Hz channel of those Epoch2 receivers. While the Epoch2 100/100 receiver will produce the cleanest EEG signal on both channels, **applying a simple real-time or post-process 100 Hz low-pass filter will remove the high-frequency content** that happens when you record EEG with 200 Hz bandwidth.

In the following two examples, EEG was recorded on the Epoch2 100/200 mouse receiver.

Example #1

In this example, the 2-channel Epoch sensor was activated with the Epoch Activator and placed on the Epoch2 100/200 mouse receiver. The Epoch Activator inputs a 27 Hz sine wave on channel 2 which is the 200 Hz receiver output (blue trace). Zooming in on the box in A we note that there is higher frequency system noise entering the 27 Hz sine wave due to the wider bandwidth receiver output which makes the sine wave look a little jagged. By filtering this signal with a 100 Hz low-pass filter we can recover the signal back to its original 27 Hz sine wave (green trace). Zooming in on the box in B we see the smooth, rounded edges of the original sine wave.



Example #2



In this example, the 2-channel Epoch sensor was activated with the Epoch Activator, implanted on an adult mouse, and placed on the Epoch2 100/200 mouse receiver. The animal was subsequently given an intrahippocampal injection of kainic acid to induce seizure activity. The EEG electrode was placed over the injection site (blue trace) at -1.8 AP, -1.6 ML in the stereotaxic coordinates of the adult mouse. Shown in blue is the channel recorded on the 200 Hz receiver output. Zooming in on the box in A we see non-neural, higher-frequency noise. By filtering this signal with a 100 Hz low-pass filter we can remove the higher frequency system noise in the recorded signal (green trace). Zooming in on the box in B we see an electrographically-cleaner signal.

Filtering

BIOPAC's *AcqKnowledge* software can apply 100 Hz low-pass filtering in real time or post processing.

Real time Calculation

Choose Hardware > Set Up Data Acquisition > Channels.
 Click the Calculation tab.
 Enable Acquire and Plot (and optionally, Values).
 Click the Preset pull-down menu and select Filter.
 Click the Setup button in the Input Channels dialog to generate the Filter dialog.
 Enter Fixed 100 Hz.
 Click OK.

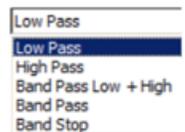
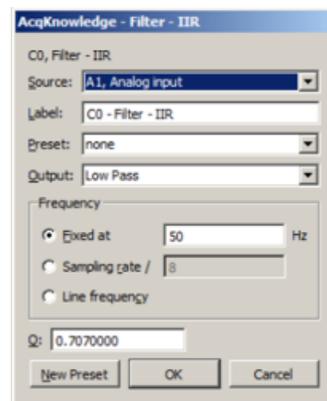
Post processing Transformation

Copy channel and the apply to filtering to the copied channel:

Choose *AcqKnowledge* Transform menu > IIR > Low Pass

Enable **Fixed**, and enter **100**

Click **OK**.



Filter Setup & Output Options

