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News

Future meetings and events

Physiology 2011

University of Oxford,
Oxford, UK
July 11th – 14th 2011

Ion Channels: Structure, Function & Therapeutics

Shanghai Jiaotong University School of Medicine,
Shanghai, China
July 24th – 27th 2011

Polish Neuroscience Society

University of Lodz,
Lodz, Poland
September 21st – 24th 2011

Latest versions of Spike2 and Signal

Updates for Spike2 and Signal are available from the [CED downloads](#) page, or by clicking on the links in the table below. Demonstration versions of the latest software are also available.

Spike2 downloads	Released	Signal downloads	Released
Spike2 version 7.07	06/11	Signal version 5.02	05/11
Spike2 version 6.16	03/11	Signal version 4.08	10/10
Spike2 demo		Signal demo	

Scripts Spotlight

In this new section of the newsletter we plan to focus on scripts written by our script-writing service. We hope that you will find them useful –once you know that they exist!

Hum Remove

Electrophysiological recordings are often polluted by mains-related electrical interference despite one's best efforts to shield the preparation, remove earth loops and so on... *Hum Remove.s2s* is a Spike2 script that you can use offline to strip out much of this residual mains interference, making your data much more presentable and easier to analyse.

It works on the principle of reference noise subtraction. Put simply, it generates an estimate of the mains –related noise on each channel using a waveform average triggered on the peaks of the mains cycle. It then generates a clean signal by subtracting this average from each successive period of the mains cycle (20 ms in Europe, 16.66 ms in the USA).

To use this script, your waveform sample rates should be at least 10x mains frequency and preferably 100x or more. You also need an *Event* channel marking the onset of each



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mains cycle. We are working on a piece of hardware to do this for you. However, until that comes along, you can sample an extra waveform channel to record the hum by connecting it to a length of unshielded wire. The script can use this signal to derive a mains cycle marker.

In the absence of other options, the script can derive a pretty good hum marker from one of your hum –polluted data channels. Thus, you can use this approach to clean up existing data files. Of course, the noise subtraction method has its limitations. It depends on the mains frequency and the level of interference pickup remaining stable for the duration of the recording, or, at least changing only slowly and smoothly. However, a recent study suggests that the method compares favourably, with hum removal using other methods such as notch or adaptive filters. (Jiruska *et al.* 2009). Why not give it a try?

Click [here](#) to download the hum remove script and user guide. If you have any questions please contact geoff@ced.co.uk

Reference

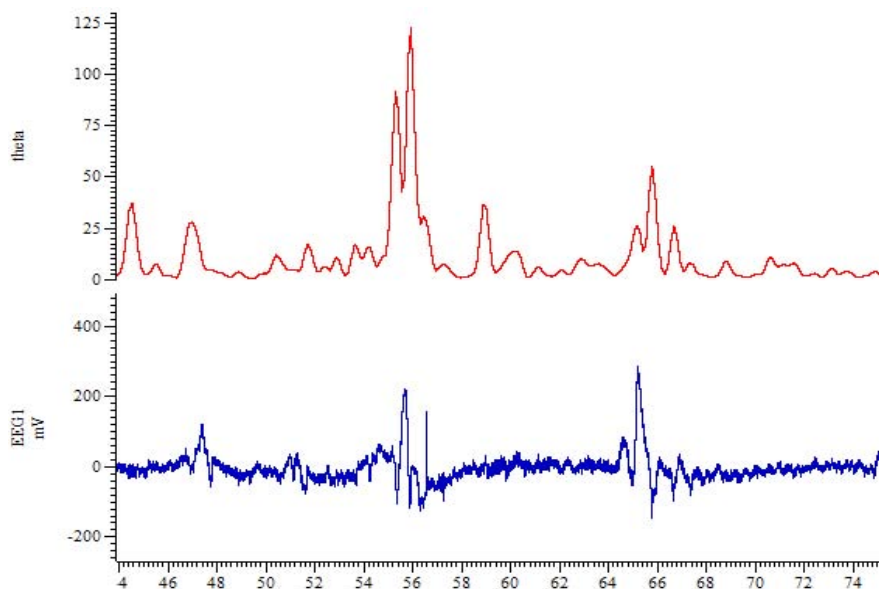
Jiruska P et al (2009) Reference noise method of removing powerline noise from recorded signals *J. Neurosci Methods* 184:110-114



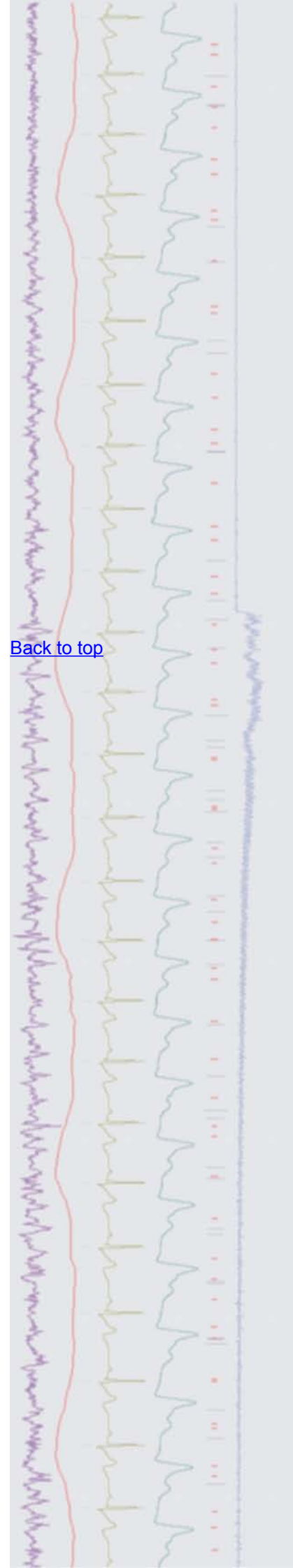
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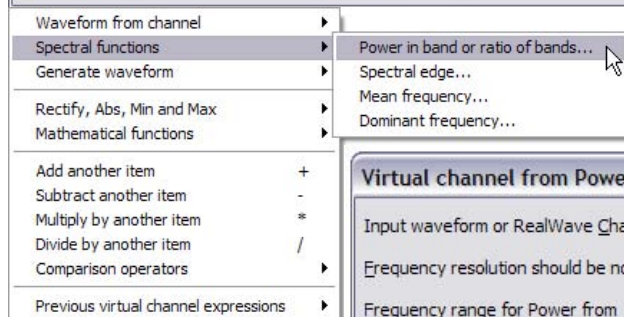
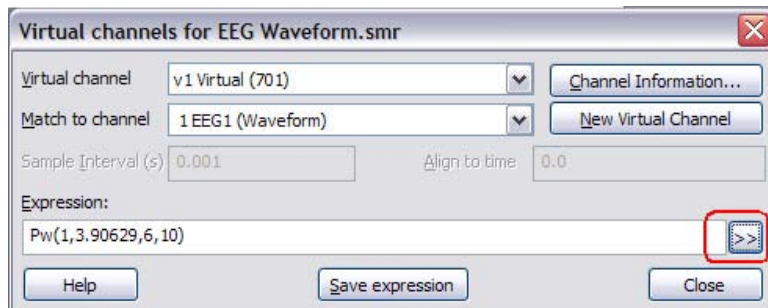
- Q. I am recording and analyzing EEG activity. Is there any way to show how the power in frequency bands changes during a recording? For example I would like to display the hippocampal theta activity (typically between 6-10Hz).
- A. Virtual channels have now been extended to include spectral functions which can be used to show how a particular feature of the power spectrum of an input channel changes over time. The available functions include:
- Power in frequency bands
 - Spectral edge
 - Mean frequency
 - Dominant frequency

All of the above functions can be applied from the Spectral functions option in the expressions menu of the Virtual channel expression dialog. The example below calculates the spectral power in the theta band of an EEG input channel.



Virtual channel showing power in a 6-10Hz frequency band





Virtual channel settings for power in band

Full details of using Virtual channels to calculate spectral functions can be found in the Virtual channel: Spectral functions section of the Spike2 on-line help.

Scripts: Spike2



- Q. I would like to create an on-line PSTH that displays spikes per sweep rather than spikes per second.
- A. The script, `ModOnResult.s2s` is an example script that generates a copy of an on-line result view with modified results. This example generates a PSTH and modifies the copied view to display the bin values as spikes per sweep. The script could easily be modified to use any type of result views and apply different modifications as required.

Signal

- Q. I have just started using Signal for a voltage clamp experiment. Can the y-axis scaling be set to change automatically in response to changes in the amplifier settings? I am using a WPC-100 amplifier.
- A. Signal can automatically adjust the scaling of sampled data in response to telegraph outputs supplied by the amplifier. These telegraph outputs are sampled using one of the 1401 ADC ports and the gain and offset information supplied is then applied to the data file. Standard telegraph support is available from the Telegraph button in the Port setup tab of the sampling configuration.

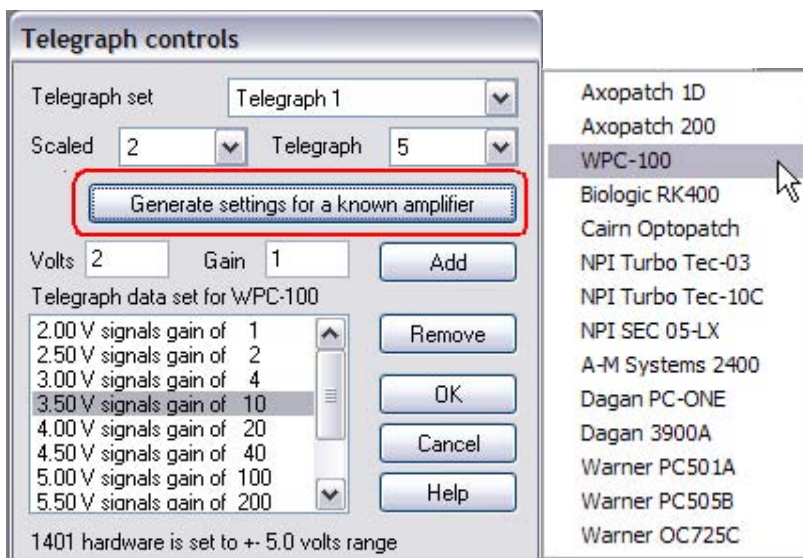
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Right-click the script icon and save to disk.

If you have any problems opening the embedded scripts in this newsletter please let us know.

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Telegraph controls dialog

Up to four ADC channels can be scaled by telegraph outputs in the Telegraph controls dialog. The `Scaled` field sets the ADC port to control and the `Telegraph` field sets the ADC port to read the scaling information from. The `Generate settings for a known amplifier` option provides a list of common amplifiers which, when selected, will generate telegraph data sets for that amplifier. If your amplifier is not supported at this time, you can manually enter the signal voltages and corresponding gains supplied by your amplifier using the `Volt` and `Gain` controls in the dialog.

Scripts: Signal



- Q. I would like to record single channel data in voltage clamp using gap-free sampling. However I may need to alter the gain during the recording but the telegraph system is disabled in gap-free mode. Is there any way to automatically scale the data in this situation?
- A. The telegraph system normally reads the specified ADC input at the end of a sweep and adjusts the gain automatically for the next recorded sweep. In gap-free mode there is no 'end of sweep' as such so this cannot be done in the standard way.

The attached script, `GFTelegraph.sgs`, allows `Signal` to read telegraph data when instructed to do so by the user. It provides a toolbar from which sampling is controlled and, when the gain on the amplifier is changed by the user during recording, pressing the `New Gain` button will stop the sweep, read the voltage value on the ADC input connected to the amplifier telegraph output. This is then used to adjust the scaling on the current channel accordingly and immediately start recording another sweep. As data in the sweep up to the time of the gain change is lost, it is recommended that you change the gain near the beginning of a sweep to minimise lost data.

This script is written specifically for use with an Axon Axopatch 200 amplifier but can easily be modified with appropriate gain settings for other amplifiers. Due to the voltage range of the Axopatch 200 telegraph outputs exceeding 5V, it is recommended to use a 1401 with the voltage range set to +/-10V in order to access the full range of the amplifier. The script needs to know the voltage range of your 1401, so the variable `vr%` (set at the top of the script) must match the 1401 voltage range (either 5 or 10).

If you are using a Power1401 mkII or a micro1401-3 the ADC and DAC voltage range can be changed using the `Try1401` test software. If you require modification of other models please [contact CED](#).

Did you know...?

You can break out of a long drawing operation using the `Ctrl+Break` keyboard shortcut.

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Recent questions

- Q. Our lab currently uses a Power1401 mk II for single electrode recording, but we are hoping to employ multi-electrode recordings of up to 64 channels in the future. I see that top-boxes can be fitted to the Power1401 to give a maximum of 48 channels, but is there any way to expand beyond this?
- A. Multiple 1401 units can be synchronised together to give many channels of recording at high sample rates. In this example, two Power1401 mk II units with an ADC-16 top-box each (giving 32 channels per 1401) could be synchronised together to give 64 channels capable of sampling at 30kHz per channel.

User group

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Try the [CED Forums](#) bulletin board for software and hardware support

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