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News

European Training Days: Thursday 12th and Friday 13th April

These training days will take place in Cambridge, UK. From comprehensive walkthroughs of Spike2 and Signal for the absolute beginner to time saving analysis tips and tricks for the more experienced, our training days are suitable for both existing and prospective users.

Attendance is limited so please [register](#) early to reserve your place on the appropriate course.

Future meetings and events

[Australian Neuroscience Society 2012](#)

Jupiters Hotel,
Gold Coast, QLD, Australia
January 29th – February 1st 2012

[Biophysical Society 56](#)

San Diego Convention Center,
San Diego, CA, USA
February 25th – 29th 2012

[CED European Training Days](#)

St John's Innovation Centre,
Cambridge, UK
April 12th – 13th 2012

[Experimental Biology 2012](#)

San Diego Convention Center,
San Diego, CA, USA
April 21st – 25th 2012

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 7.08 | 12/11 | Signal version 5.05 | 01/12 |
| Spike2 version 6.16 | 03/11 | Signal version 4.09 | 08/11 |
| Spike2 demo | 10/11 | Signal demo | 10/11 |

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Scripts Spotlight

Heart rate and Blood pressure analysis

Many researchers record a blood pressure trace and wish to plot or tabulate changes in heart rate and systolic, diastolic or mean blood pressure (bp) during the course of the recording. For this reason, we have attached a video tutorial below showing how to do this interactively using the *Active Cursors* and *Measure to Channel* features of Spike2.

The script *HR_BP.s2s* provides an alternative method to achieve the same goals. Users of Spike2 v6 or v7 will find this script inside the *scripts* folder. You can familiarise yourself with this script by using it to analyse the snippet of human bp trace in *Blood Pressure Waveform.smr* in the Spike2 *data* folder. You can configure the script to plot any combination of pulse, systolic, diastolic and mean blood pressure (or diastolic + 1/3 pulse pressure if you prefer). These traces can be plotted separately or overdrawn on a common y-axis or overdrawn with the original bp trace. You can plot heart rate as mean frequency over a user-defined time range or as instantaneous frequency. The results can be tabulated and copied to a spreadsheet for further analysis.

You can also use the script *online* to plot changes in blood pressure and heart rate parameters as they happen and to display a table of these parameters that updates every second.

You can customise the script for use with your experimental animal of choice via the *Set up* dialog where you enter the minimum expected heart rate (*bpm*) and a threshold amplitude for detecting systoles in that species. Provided that this amplitude is set lower than pulse pressure but higher than secondary oscillations in the bp trace such as dicrotic notches, then the script should deliver consistent, reliable results.

As usual, a detailed user guide is included in the comments at the top of the script. If you have any feedback or suggestions for improvements please contact <mailto:geoff@ced.co.uk>

The logo for Spike2, featuring the word "Spike2" in a stylized, cursive font with a red-to-yellow gradient and a drop shadow effect.

- Q. I am recording blood pressure and would like an on-line heart rate display during sampling.
- A. Spike2 can perform on-line and off-line detection of waveform features and mark these in a new channel in the data file using the built-in active cursor and measurement functions.

With a Spike2 data file open and ready for sampling, select *Measurements* and then *Data channel* from the *Analysis* menu to open the dialog below.

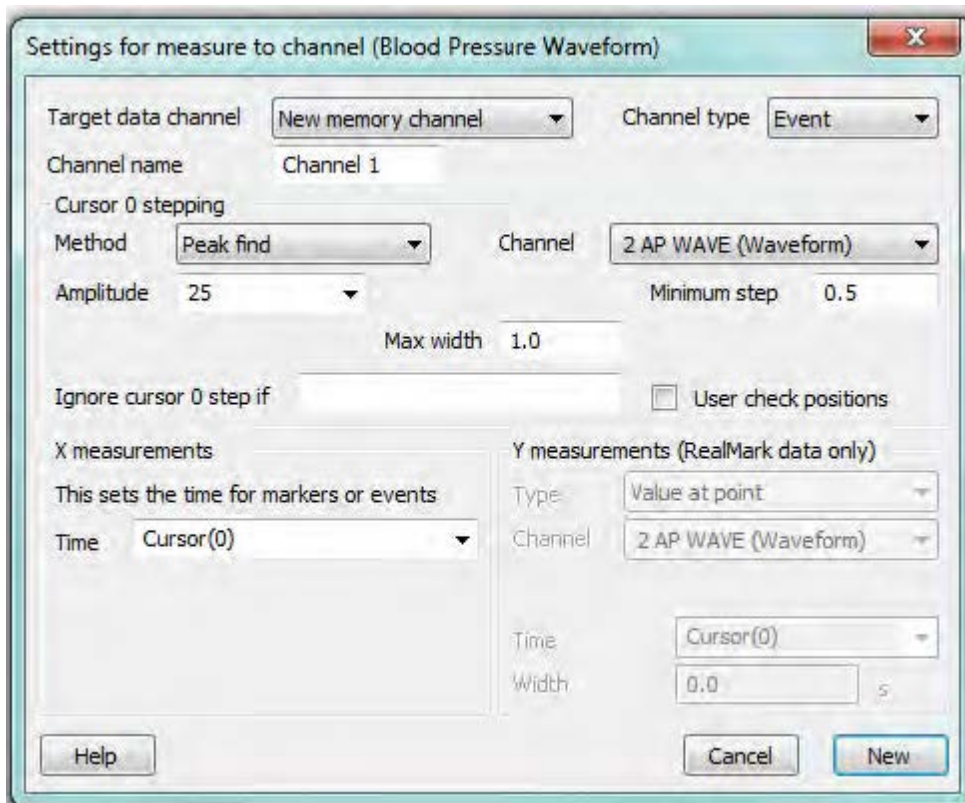
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[Show me how!](#)

Click on the link above to view a video tutorial showing the Channel draw modes

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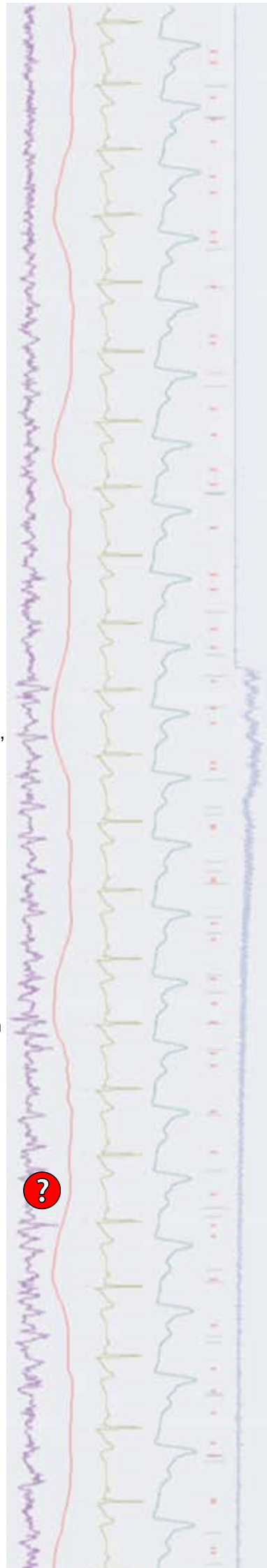
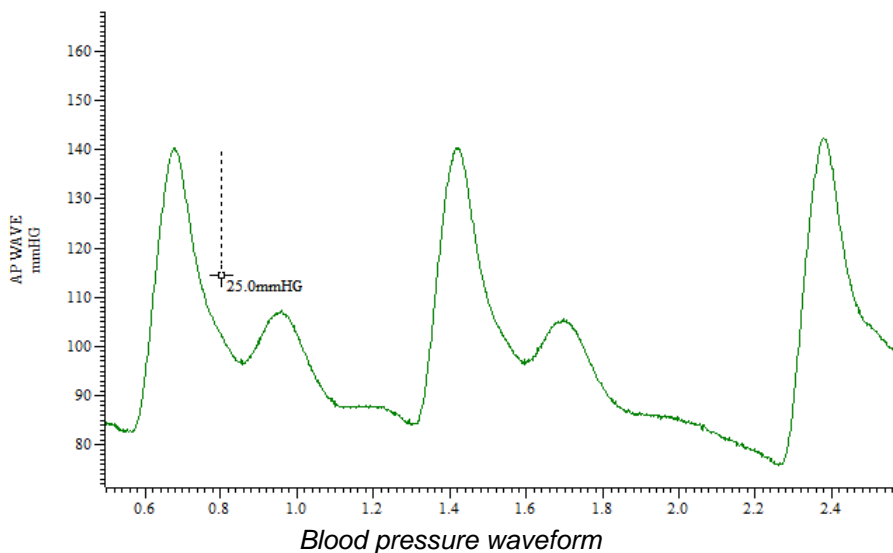




Measure to channel dialog

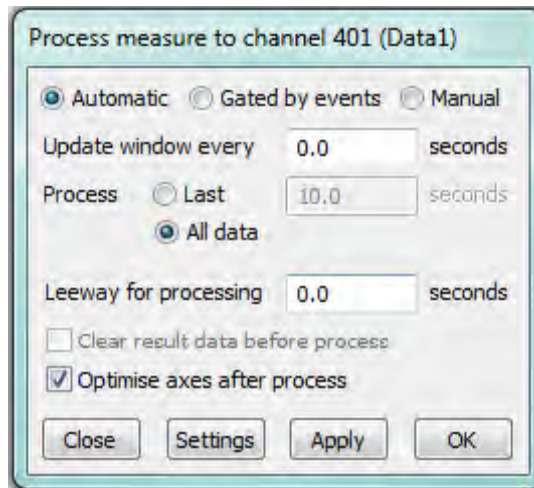
Select the new channel to create from the Target data channel field. This can be a new memory channel or one of the unused disk channels in the data file. The Channel type field holds a list of channel types that can be created; Event, Marker or RealMark. If you select RealMark, the target channel has one real value (e.g. Amplitude) attached to each marker; this value is set by the Y measurements section of the dialog. As we only want to mark peaks in this case, with no associated Y data value, we can select an Event channel to mark the peak times.

The fields in the Cursor 0 stepping dialog are used to set the search method for measurements. Set the method to Peak find, and set the amplitude to find the peaks in the blood pressure trace. Spike2 detects peaks by monitoring the waveform level to ensure that the signal falls by at least the amplitude set here. For a BP channel calibrated in mmHg, such as in the Blood Pressure Waveform.smr data file included in the data folder of your Spike2 directory, 25 (mmHg) would be a suitable estimate for our example. To avoid mistakenly marking any dichotic notch present in the BP data, we can also set a minimum step for the cursor.



The *X measurements* section sets the time of each event or marker that is added into the new data channel. This would normally be an expression related to cursor positions, in this case, the time of each peak as found by *Cursor(0)*. The *Y measurements* section is only available when the type of the target channel is *RealMark*. The value measured here sets the *RealMark* data value to plot.

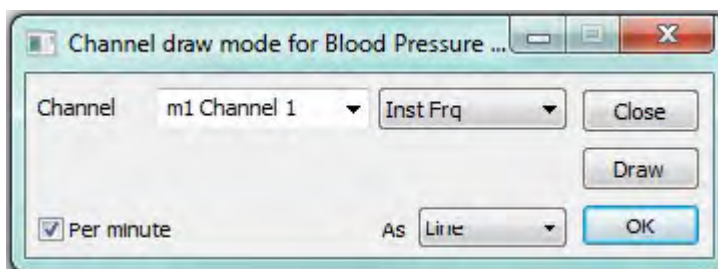
Pressing *New* then opens the on-line processing dialog. From the process dialog we can select the update mode for the measurements.



On-line process dialog

For this example, we can use *Automatic* mode and set *Update window every* to 0 which will update the measurements as quickly as possible. The *Leeway for processing* field sets a time period to wait for incoming data features or for other active cursors to find their positions before processing continues, but is not required in this example. Clicking *OK* will then set the online process mode for the measurement channel. Now when you start sampling you should see on-line marking of the BP peaks as events in the new memory channel. If you find that no peaks are being marked, adjust the *Peak find amplitude* settings in the *Measure to channel* dialog. The process settings for the measurements can be changed at any time by right-clicking on the channel and selecting *Process settings* from the menu.

Finally, select *Channel Draw* mode from the *View* menu and choose *Instantaneous Frequency*. Check the *Per minute* box to display as beats per minute.



Channel draw mode dialog

Scripts: Spike2

- Q. I am running a force feedback experiment recording the force exerted by the subject as channel 1 in the data file. What I would like is an option to display the current force level as a 'meter' or moving bar graph.

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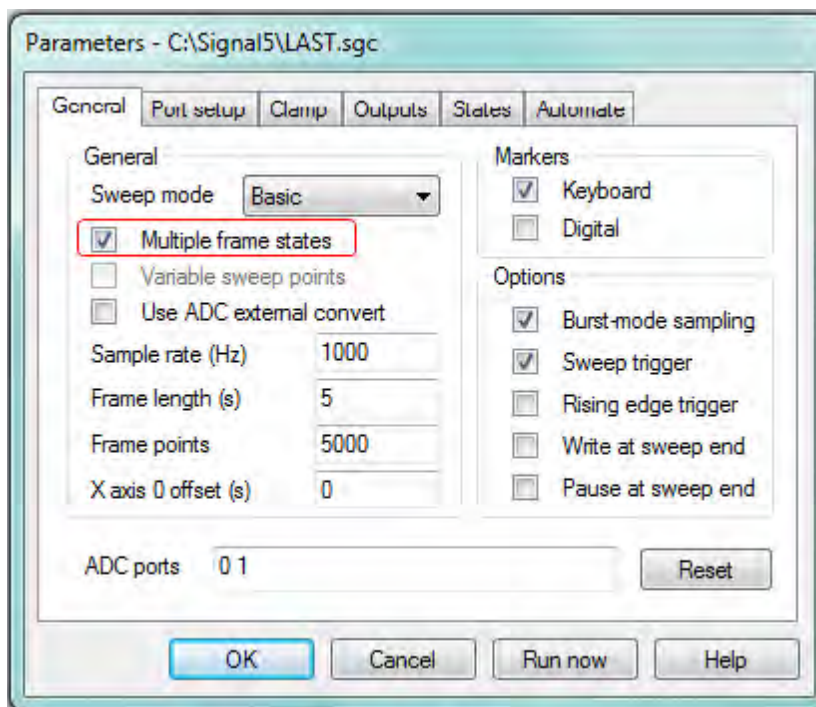


- A. The script, [ForceDisplay.s2s](#), is an example of using an Idle routine to get and display the current channel value in a separate window while sampling. It generates a bar display graph that changes in response to the incoming waveform data on channel 1.

Signal

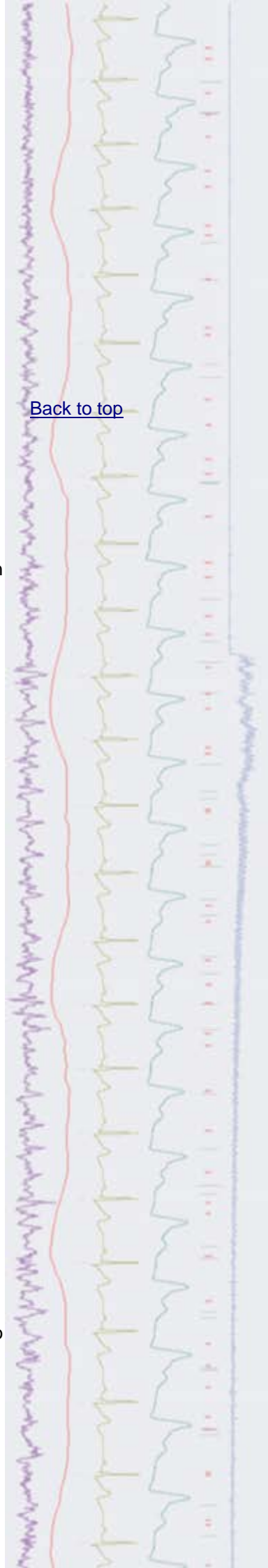
- Q. I am trying to run a series of experiments to measure response times to auditory tones in Signal. I am using Basic sweep mode and have used the arbitrary waveform option in the Pulse outputs dialog to add a series of tone waveforms for output during my frame but have found that I get a "Not enough available memory in the 1401" message when I try to sample with this long frame.
- A. Signal frame data is buffered in the 1401 memory before being written to disk so very long data frames or frames with a very large number of data points can exceed the available memory. To avoid this limitation when setting up a number of stimulus outputs Signal can use what is called Multiple frame states mode. This can be used to setup multiple sets of output pulses and switch between them during sampling using Dynamic outputs state variation. For example, you could create three states, each containing a tone waveform of a different frequency, which can then be applied in a random or preset order during sampling.

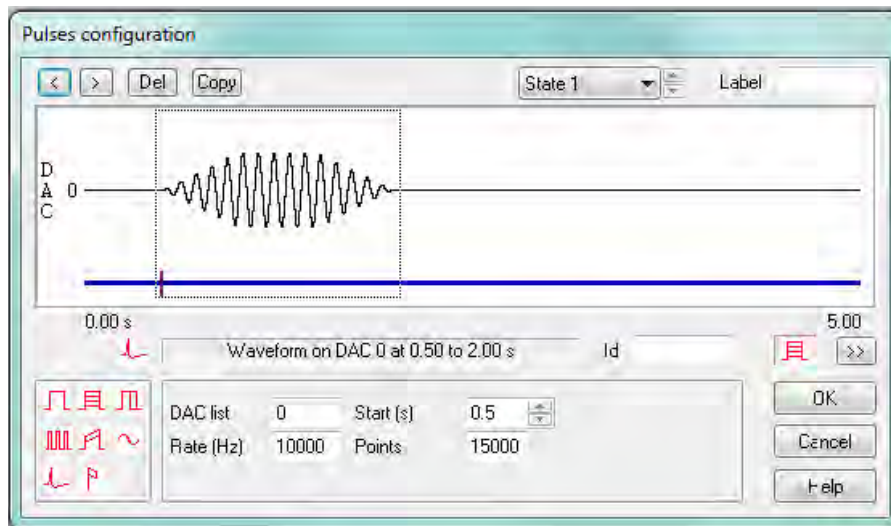
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Multiple frame states selected

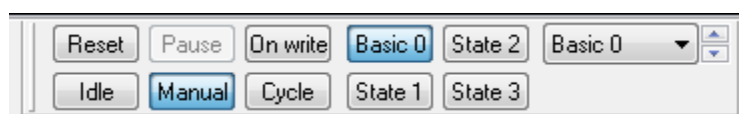
The first step is to check the Multiple frame states checkbox in the General tab of the Sampling configuration dialog. With this selected a new States tab is made available from where you can set the Number of extra states you want to include to hold different stimulus outputs. You can then add pulses and arbitrary waveform outputs to the different states using the Pulses configuration dialog.





Adding arbitrary waveforms to State 1 in Dynamic outputs mode

State 0, or Basic 0, is always available as a default 'idle' state during sampling. The ordering for dynamic outputs is set using the drop-down list in the States tab of the sampling configuration. States can be set to run in a numeric or random order where the user simply specifies the number of repeats. They can also be set to follow a protocol where the user decides the order and number of repeats for the outputs. A protocol consists of a list of up to ten steps, where each step specifies a state number, a repeat count and the next step to use. Multiple protocols can be defined and run in sequence and there are a number of options to specify protocol behaviour when starting and stopping sampling.



States toolbar

During sampling, the States toolbar shows the current condition and gives manual control of state selection using the toolbar buttons or the drop-down list.

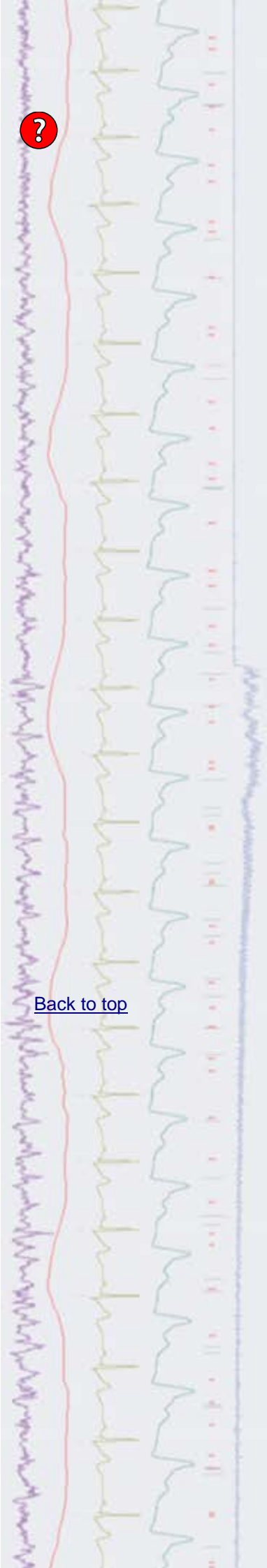
Scripts: Signal

- Q. Can I create short 'tone' waveforms in Signal that can then be used as outputs by adding them directly to the Pulses configuration dialog?
- A. The script, [CreateTones.sgs](#), is a simple example which uses the Virtual Channel functions in Signal to create tone waveforms in a new Memory View based on user-defined settings for rise time, plateau and fall time. These waveforms can then be copied to the clipboard and pasted into an arbitrary waveform section in the Pulses configuration dialog.

Did you know...?

You can set user-defined labels for vertical cursors in Spike2 and Signal from the Cursor menu Label mode > Set Label option or by right-clicking on the cursor and selecting Cursor *n* > Set Label from the context menu, where *n* is the cursor number.

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Recent Questions

- Q. Can I set my Micro-3 to use +/-10V inputs? Ideally I would like to be able to switch between +/-5 and +/-10V input depending on the experimental setup i'm using.
- A. Modern 1401 interfaces, such as the Micro-3 and Power1401 mkII, can be set to use +/-5V or +/-10V inputs and outputs via the Try1401 diagnostic software installed in the Signal and Spike folders. With a 1401 connected and switched on open the Try1401 application and select 1401 options from the File menu pulldown. This opens a dialog where you can select the input/output range to set for the 1401.

User group

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