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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.

CED Pulse box aids removal of mains noise

The new CED Mains pulse box device plugs into the mains supply and generates a TTL signal based on the detected mains frequency, giving a reliable timing signal which can be recorded as an Event channel and used as an accurate reference by Spike2. This device is designed to be used in conjunction with the HumRemove.s2s script, which is available in your Spike installation folder. This script works on the principle of reference noise subtraction; it generates an estimate of the mains-related noise on each channel using a waveform average triggered by the mains cycle. It then generates a clean signal by subtracting this average from each successive period of the mains cycle.

Future meetings and events

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The Biomedical Basis of Elite Performance
The Queen Elizabeth II Conference Centre,
London, UK
March 19th – 21st 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

Physiology 2012
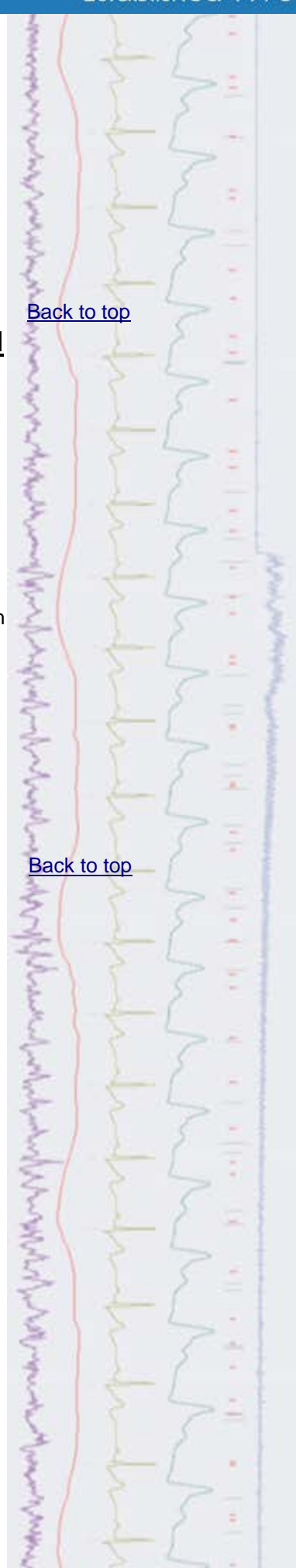Edinburgh International Conference Centre,
Edinburgh, UK
July 2nd – 5th 2012

8th FENS Forum of Neuroscience 2012
International Convention Center (CCIB),
Barcelona, Spain
July 14th – 18th 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 7.09a	02/12	Signal version 5.05a	02/12
Spike2 version 6.16	03/11	Signal version 4.09	08/11
Spike2 demo	10/11	Signal demo	10/11

Scripts Spotlight

Calculating variable values for the output sequencer

The output sequencer in both Spike2 and Signal can be used to run complex experiment control and stimulus sequencing protocols during data capture using the digital and DAC outputs of the 1401. The script language has built-in commands that can be used to control the output sequencer interactively and allow real-time updating of stimulus parameters and output values during a recording. Output sequencer variables are represented using 32-bit integer values which means that the script writer needs to convert unit values, i.e. a one volt amplitude on a DAC output or a known bit pattern for the digital outputs, into values that can be understood by the output sequencer.

Happily for the beleaguered script writer we include scripts called `Varvalue.s2s` and `Varvalue.sgs` in the respective scripts folders of the Spike2 and Signal installation directories. These can be used to calculate the sequencer values that need to be passed from the script to the output sequencer in order to achieve a desired effect, for example, to set a particular output voltage on a DAC or a combination of bits on the digital outputs.
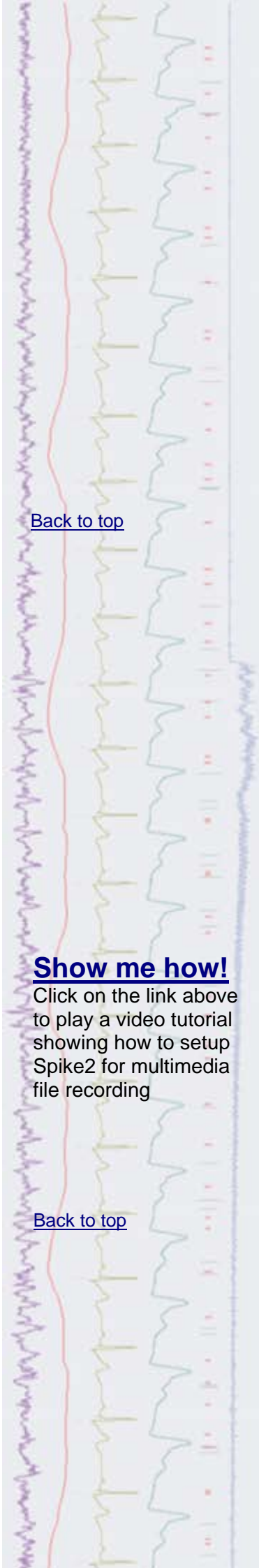
Show me how!
Click on the link above to play a video tutorial showing how to setup Spike2 for multimedia file recording

Q.   I would like to record a video of behavioural activity alongside my sampled data.

A.   The s2video application, which is installed in the Spike folder during installation, allows you to record multimedia files automatically whenever you sample a Spike2 data file. You can run up to 4 copies of this application at a time; each instance of s2video will record one video and/or audio track. The quality of the recording, in terms of video resolution, frame rate and audio sample rate depends on the hardware you are using and the software that you have installed.

Settings for multimedia recording

To run Spike2 data and multimedia capture simultaneously, you will need a suitably powerful computer. A recommended system will likely have two or more processor cores, 2 or more GB of memory, a 500GB hard drive and be running Windows 7, although Spike2 will also run on Windows XP and Vista.

The s2video data capture and replay software is based on DirectShow (which is part of Microsoft DirectX). It is likely that you already have a version of DirectX installed. As of March 2012 the latest DirectX version is 9.0c, which is available for download from the Microsoft website; we strongly recommend that you use the latest version. To record video you will need a web cam or video camera that is supported by DirectShow. The drivers required to run these devices will normally be supplied with them on a CD or your system may automatically recognise the camera when you connect it and locate the drivers for you. Although most companies include DirectShow drivers for their video cameras, some do not. If you are intending to use a high-end (i.e. expensive) device, it is a good idea to check with the manufacturer before purchase. You can record audio from the camera (if your camera supports this) or from a sound card.
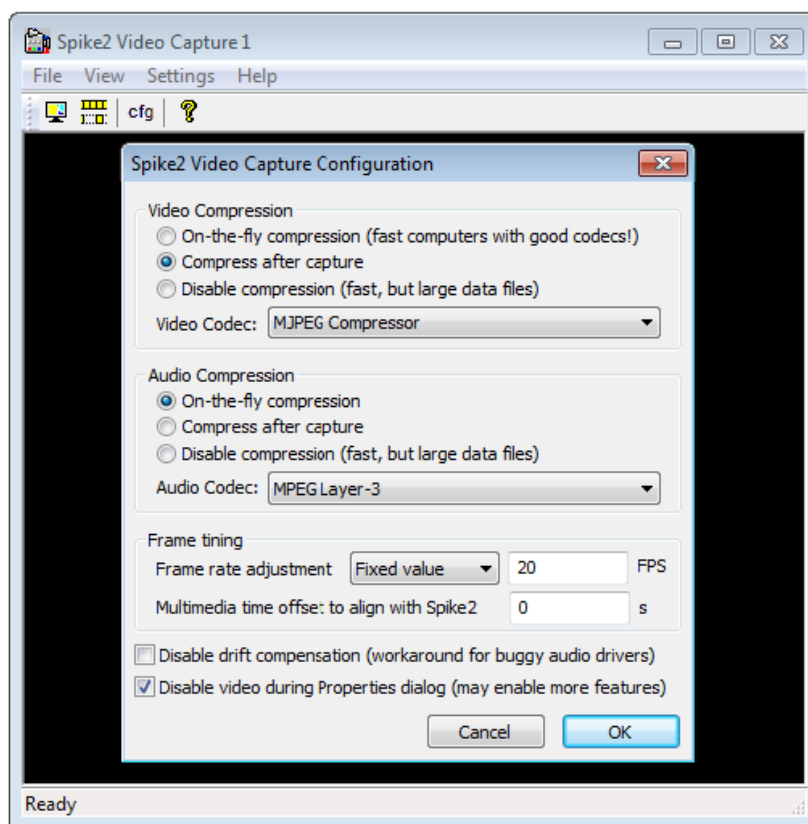
S2video application and Configuration menu

The first time you run the s2video application you must select the devices to use for Video/Audio capture from the `Settings` menu, `Video Device` and `Audio Device` items. Once you have selected a video device, you can preview the image in the video display area of the window, and additional 'property' menu items appear to control the selected video and audio devices. The properties available depend on the selected devices. They may include controls for brightness, saturation and colour balance for the camera as well as volume and equaliser controls for the audio device. The next step is to set the frame rate in the `Video capture` dialog; the lower the frame rate, the smaller the resulting multimedia file. Rates of 10 or even 5 frames per second will be sufficient for many applications.
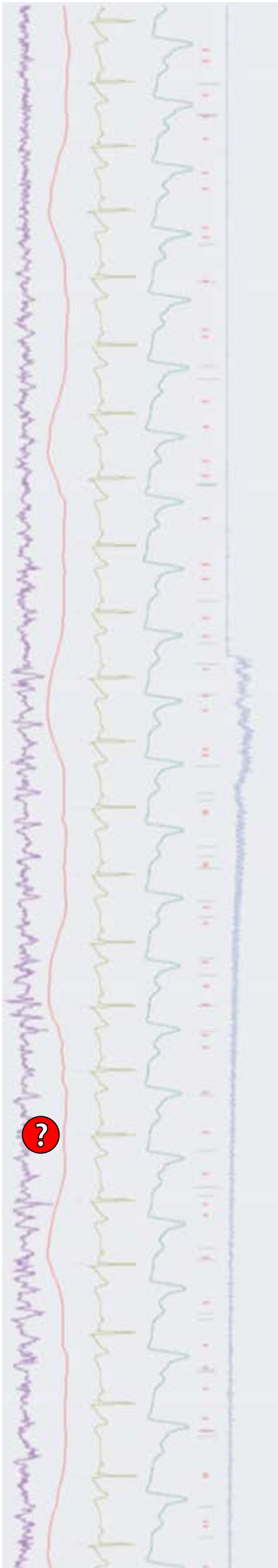
The `Configuration` menu controls the type of data compression to apply to your video and audio data. As a raw video stream can produce several MB of data per second, compression is recommended to give the smallest file size possible. On-the-fly compression is only really useful with a very powerful computer or specialised hardware, unless you are running at low frame rates. Compress after capture means that the data is recorded raw to a temporary file, and when sampling is stopped and the user saves the data file, the temporary file is compressed and saved alongside the data. Compression is performed as a background task, so that Spike2 can sample another file immediately. This is the recommended option for most users. If you decide to Disable compression (be aware of very large files!), there is a compression utility, avicomp.exe, included in your Spike folder which can be use to compress files after capture.

Compression is achieved through the use of specialist software called codecs. These are made up of two components, a coder and a decoder. The coder changes the input signal in some way, and the decoder reverses the process. In this case, we are interested in codecs that compress the input signal to save it to disk, and then decompress the signal when we wish to load it from disk. When installed, DirectX adds a standard set of codecs to your system. It is likely that the installation of your video camera or web cam added further codecs to the system. The audio and video codec fields in the configuration dialog let you select codecs on your system that support audio and video. The s2video on-line help gives a comparison of using s2video with some of the codecs that you are likely to find installed.

The Frame timing section of the Configuration dialog (added in Spike2 7.09) gives additional settings for Frame rate adjustment that can be used improve the synchronisation of the video with the Spike2 data file by using the frame rate generated by Windows, dividing the number of frames in the video file by the sampling time or synchronising to a known clock input.

Recording and reviewing data

The s2video application registers itself as a 'listener' program to a running copy of Spike2 and responds to Spike2 starting/stopping sampling and saving data to disk by performing the same actions on the multimedia file, which is saved alongside the Spike2 data file, and with the same file name.

If an open data file has an associated multimedia file it can be viewed using the Spike2 `View` menu `Multimedia Files` command. The Multimedia view window that opens is then linked to the data file: When you scroll the time window to view data, the multimedia file window(s) will scroll to the same point. If you rerun the time view, the video/audio file will also rerun. The multimedia window also includes its own controls to play/stop and step through frames and an option to track the position of Cursor 0 in the data file. You can also copy the current frame image to the clipboard as a bitmap. Script writers can access further information, such as frame times and image data, using the `Mmxxx()` family of script commands.

Scripts: Spike2

Q.   I would like to be able to have the frame times of my multimedia files dislayed in my data file as an event channel, for example.

A.   The script, MarkMMFrames.s2s, can be used offline to add the times of frames from an associated multimedia file into a new TextMark channel in the data file. This script makes use of the new `MMFrames()` command added in version 7.09.
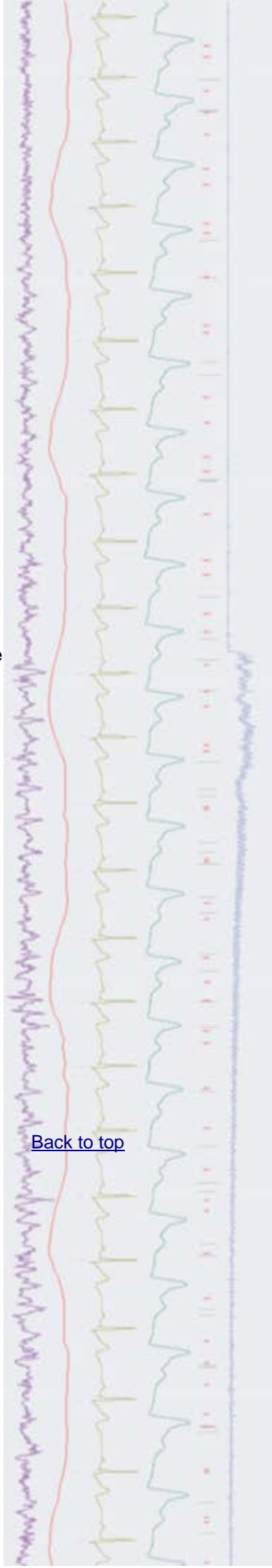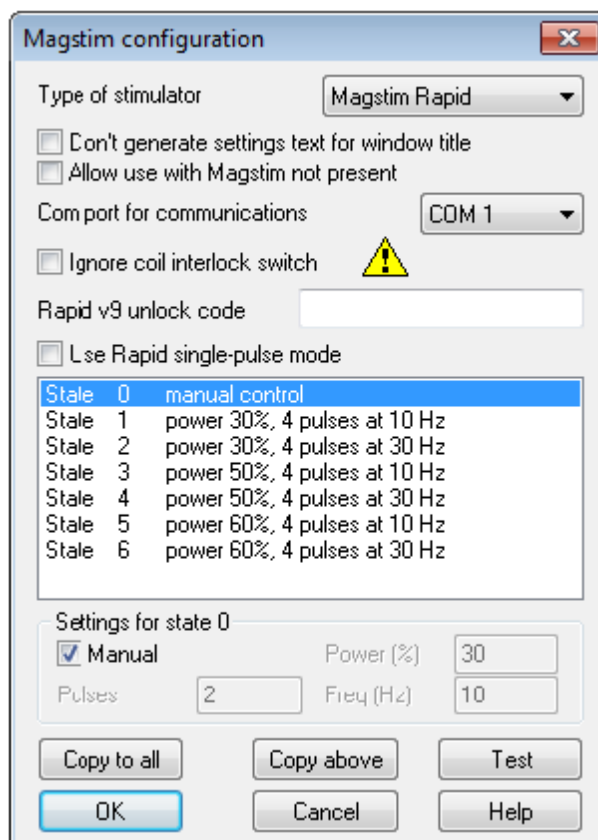
Signal

Q.   How do I connect to and control a Magstim using Signal?

A.   Direct control of supported Magstim devices is achieved using the auxiliary states mode in Signal. The option to include support for Magstim devices is given during the Signal installation.

When the Multiple states checkbox is enabled in the General tab of the sampling configuration and Dynamic outputs mode is selected, the Magstim button in the States tab allows configuration of Magstim 200, BiStim or Rapid devices. Depending on the type of stimulator selected, each enabled state includes settings for Power %, no. of pulses and frequency of stimulation (Hz). During sampling, these settings are applied to the Magstim for the current state. Signal can switch between states in numeric or random order during an experiment, or run multiple user-defined protocols for state sequencing.


Configuration dialog for a Magstim Rapid

Signal control of Magstim devices requires a connection of the PC's serial port and a 1401 Digital Output to the Magstim. Newer Magstim 200 and BiStim units, and all Rapids provide a high-density 26-way combined serial-line and trigger port for external control and triggering. Older 200 and BiStim units have an arrangement which consists of a 9-way serial-line and separate 15-way trigger connector. We can supply suitable cables for both types of connection, contact sales@ced.co.uk for further details.

Given a suitable cable, a common arrangement to control a Magstim using Signal would be as follows:

1. Connect the serial port of your PC to the serial line input on the Magstim using the appropriate serial line cable. Connect the trigger BNC plug to the 1401 digital output port 0 socket on the front of all Micro1401 and Power1401 units.
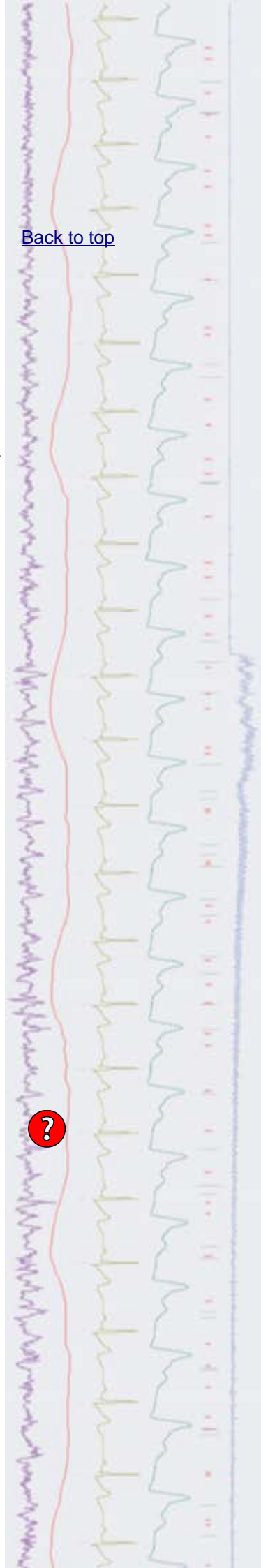
2. In the Outputs tab of the sampling configuration, make sure that digital output bit 0 is enabled. Then, using the pulses configuration dialog, set the initial level of digital output bit 0 to zero and drag a high-going pulse from the palette onto the output 'track' at the time you want the Magstim to fire. You should setup a trigger pulse in each state that you want to use and each trigger output pulse should be at least 10 microseconds long.

While sampling is in progress, Signal will setup the Magstim using the current state data as defined in the Magstim configuration dialog and trigger the device according to the timing pulse from Digital Output 0.

Scripts: Signal

Q. Can I get a list of the sampling configuration settings as a text file?

A. The script, `PrintSigConfig.sgs`, copies the settings from the various 'tabs' in the current sampling configuration to the Log file as text.

Did you know...?

You can print details of a Spike2 sampling configuration as text from the Channels tab of the sampling configuration dialog. `Copy As Text` places the text on the clipboard. `Log` copies the text to the Log window.

Recent Questions

Q. I have just started using Spike2 and find it very useful that the sampling configuration settings are remembered from one trial to the next. However, if my students have been using the setup and changed some of the settings, I have to remember to reset these before my next experiment. Is it possible to setup a default configuration that I can load each time I want to sample?

A. You can create a default configuration that is loaded automatically each time Spike2 is run by saving your configuration (using the `File` menu `Save Configuration as...` command) as `default.s2c` in your Spike directory. Each time Spike2 is run, it looks for the `default.s2c` file and loads this if it is available. If default.s2c does not exist, Spike2 loads the last configuration used (`last.s2c`) instead. The `last.s2c` file is overwritten with the current sampling configuration settings each time you sample so you should not rely on it to store important sampling configurations. You can also save configuration files with any name you like!
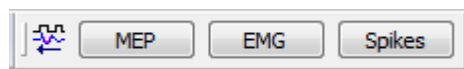
Sample bar with three configurations

If you have a number of different saved configurations you can use the `Sample bar` option from the `Sample` menu to display a toolbar holding a number of configuration files. You can then start sampling using any of these configurations with a single mouse click. To add configuration files to the `Sample bar`, use the `Sample bar list..` option in the `Sample` menu.

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

If you have any comments about the newsletter format and content, or wish to unsubscribe from the mailing list for this newsletter, please notify sales@ced.co.uk.