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TecellaLab User Guide

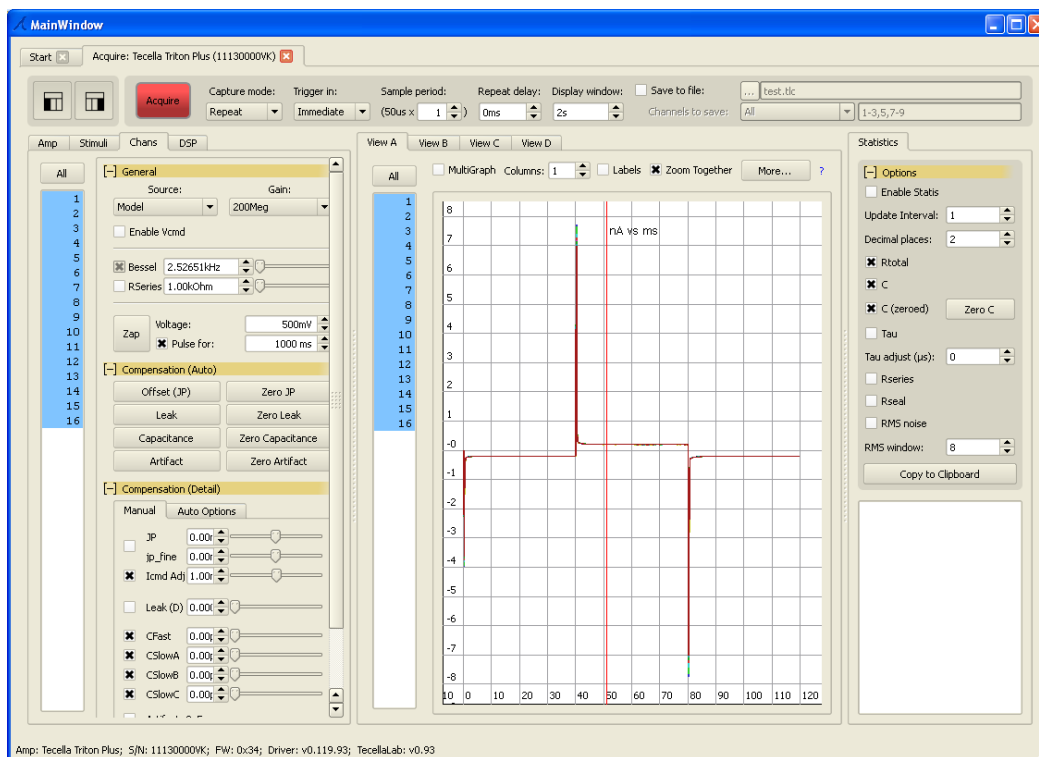
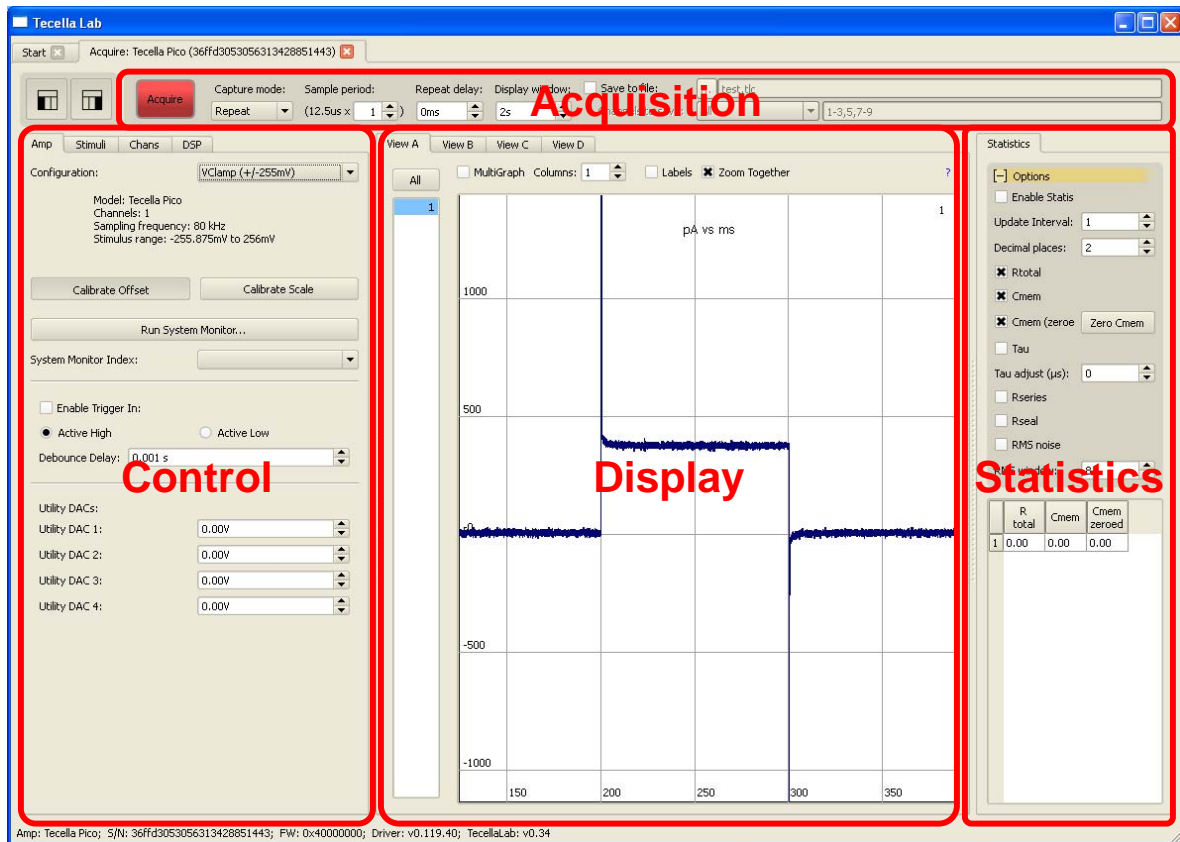


Table of Contents

1.	Main Window	3
2.	Control section	4
	2-1. Amplifier tab	5
	2-2. Stimuli tab	6
	2-2-1. Create New stimulus	7
	2-2-2. Create New stimulus or edit existing stimulus	8
	2-3. Channels tab	9
	2-4. DSP tab	11
3.	Acquisition section	12
4.	Display section	13
5.	Statistics section	14

1. Main Window

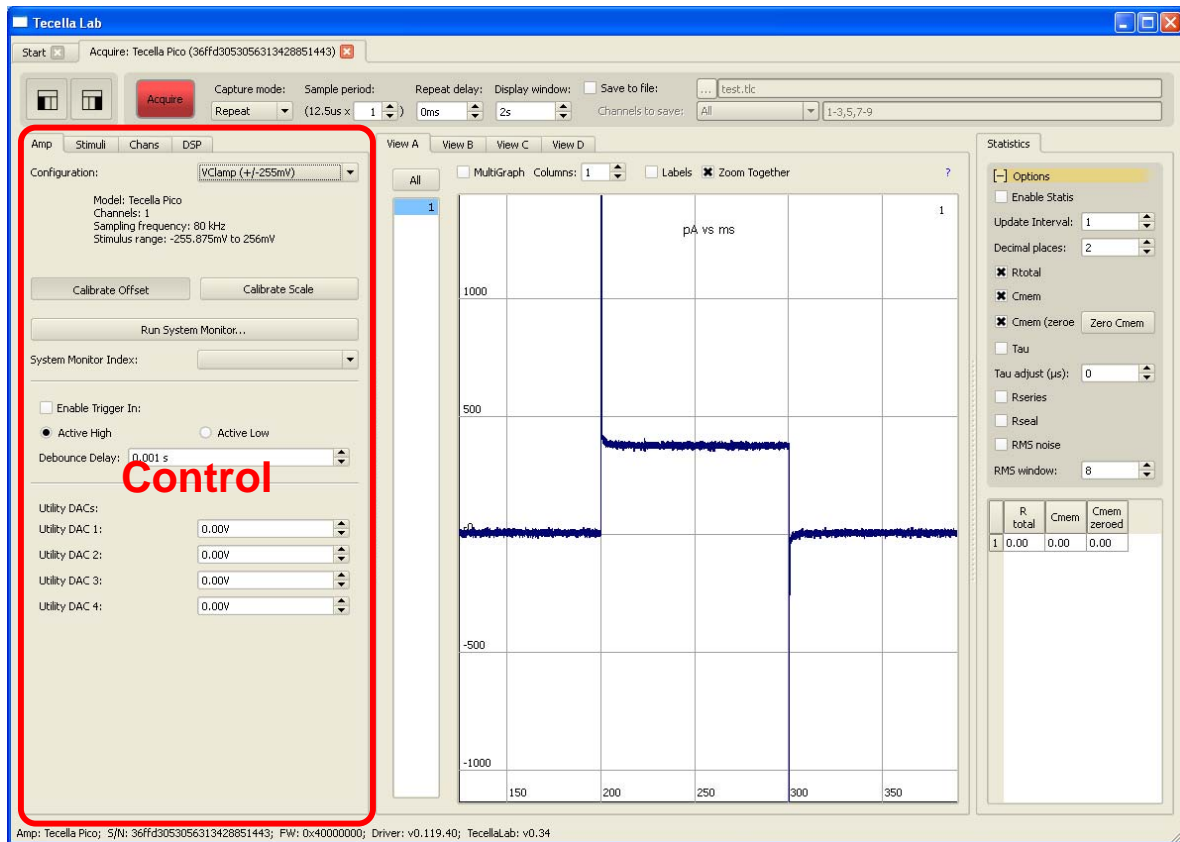


TecellaLab's Main Window is comprised of 4 sections:

- Acquisition
- Control
- Display
- Statistics

Each of these sections are explained in further detail in the following pages.

2. Control



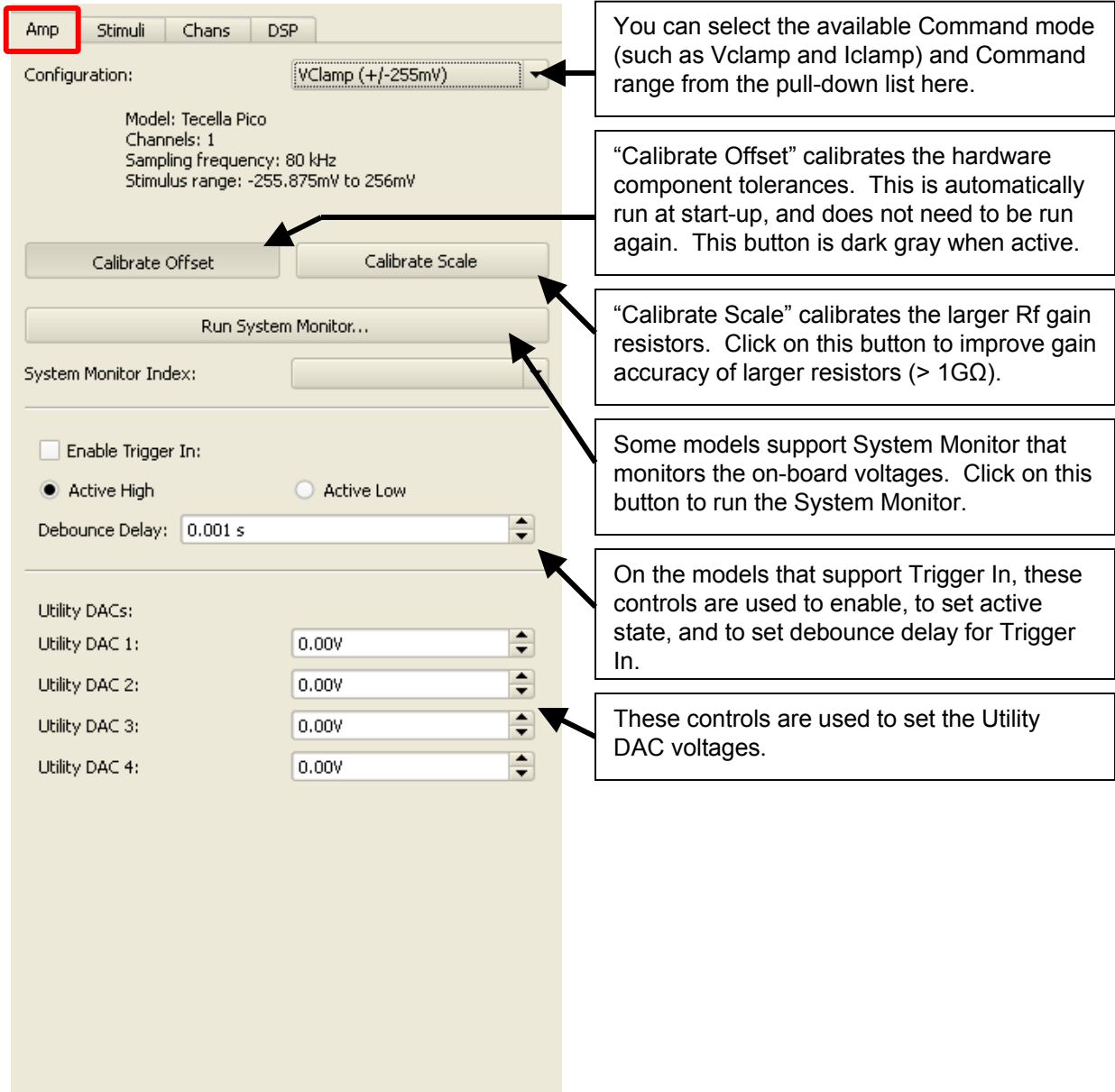
The Control section contains all the functions for controlling the amplifier and stimuli, as well as the DSP functions. The Control section is comprised of the following 4 tabs.

- Amplifier
- Stimuli
- Channels
- DSP

Each of these tabs are explained in further detail in the following pages.

2-1. Amplifier tab

The Amplifier tab contains the controls for your amplifier's hardware. You should not need to change settings on this tab often.



The screenshot shows the 'Amp' tab in the TecellaLab software. The 'Configuration' section displays 'VClamp (+/-255mV)' in a pull-down menu. Below this, the 'Calibrate Offset' button is highlighted with a red box. The 'Calibrate Scale' button is also visible. The 'Run System Monitor...' button is located below the calibration buttons. The 'System Monitor Index' field is empty. The 'Enable Trigger In' section has a checkbox and two radio buttons for 'Active High' and 'Active Low'. The 'Debounce Delay' is set to '0.001 s'. The 'Utility DACs' section shows four DACs, each with a voltage setpoint of '0.00V'.

Amp Stimuli Chans DSP

Configuration: VClamp (+/-255mV)

Model: Tecella Pico
Channels: 1
Sampling frequency: 80 kHz
Stimulus range: -255.875mV to 256mV

Calibrate Offset Calibrate Scale

Run System Monitor...

System Monitor Index:

☐ Enable Trigger In:
☒ Active High ☐ Active Low
Debounce Delay: 0.001 s

Utility DACs:
Utility DAC 1: 0.00V
Utility DAC 2: 0.00V
Utility DAC 3: 0.00V
Utility DAC 4: 0.00V

You can select the available Command mode (such as Vclamp and Iclamp) and Command range from the pull-down list here.

"Calibrate Offset" calibrates the hardware component tolerances. This is automatically run at start-up, and does not need to be run again. This button is dark gray when active.

"Calibrate Scale" calibrates the larger Rf gain resistors. Click on this button to improve gain accuracy of larger resistors (> 1GΩ).

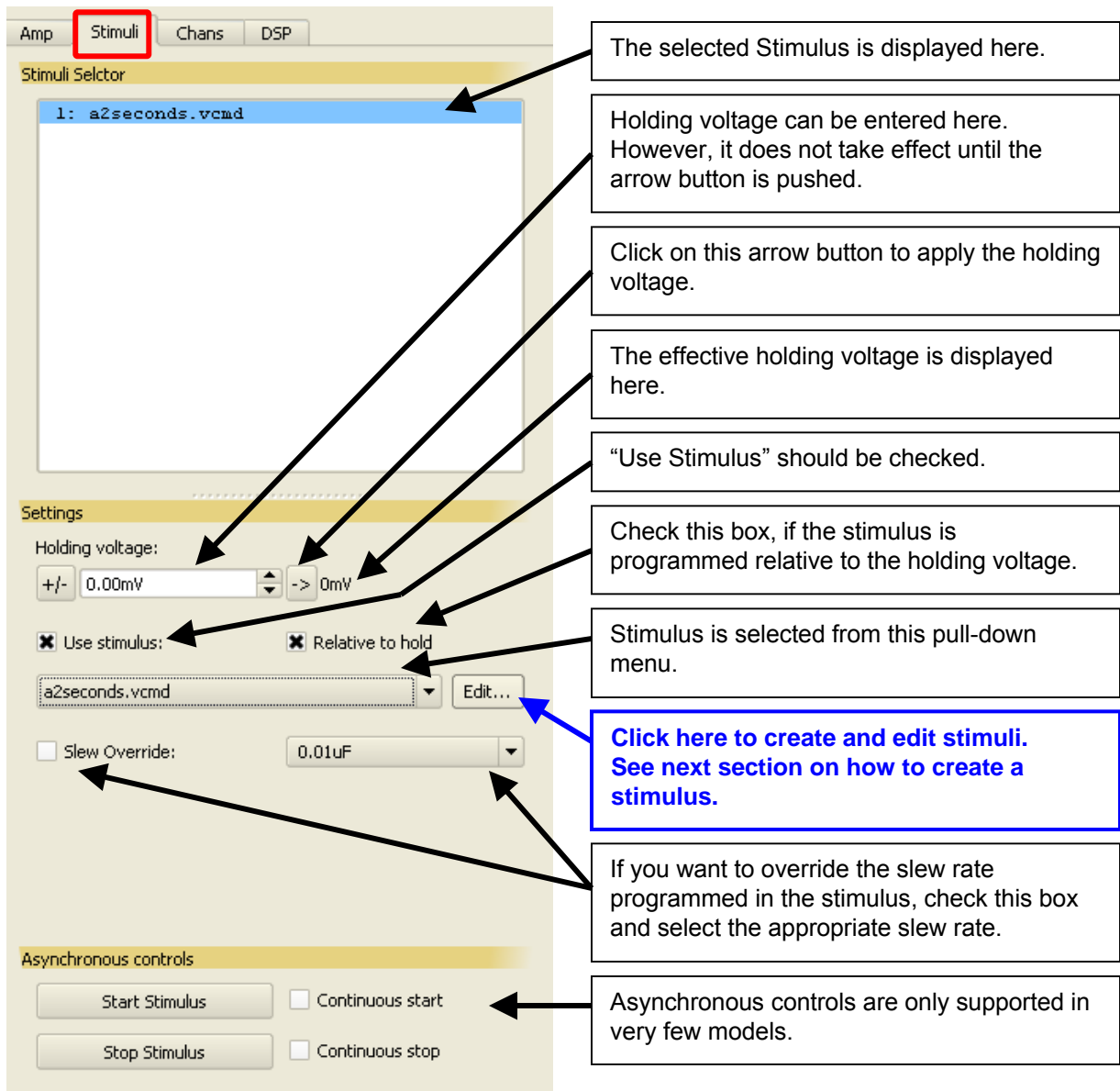
Some models support System Monitor that monitors the on-board voltages. Click on this button to run the System Monitor.

On the models that support Trigger In, these controls are used to enable, to set active state, and to set debounce delay for Trigger In.

These controls are used to set the Utility DAC voltages.

2-2. Stimuli tab

The Stimuli tab contains the controls for creating, editing, selecting, and managing your stimuli.

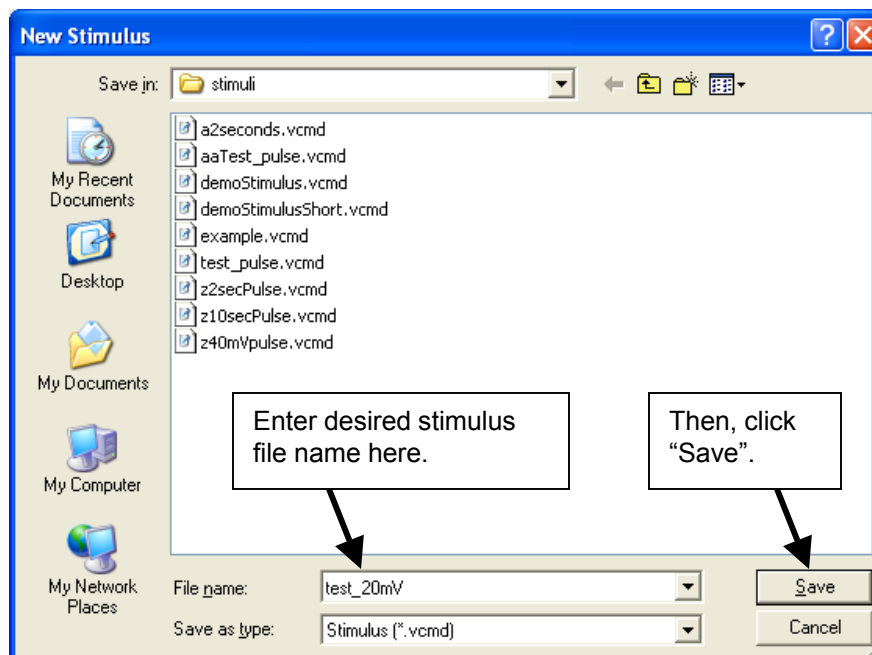
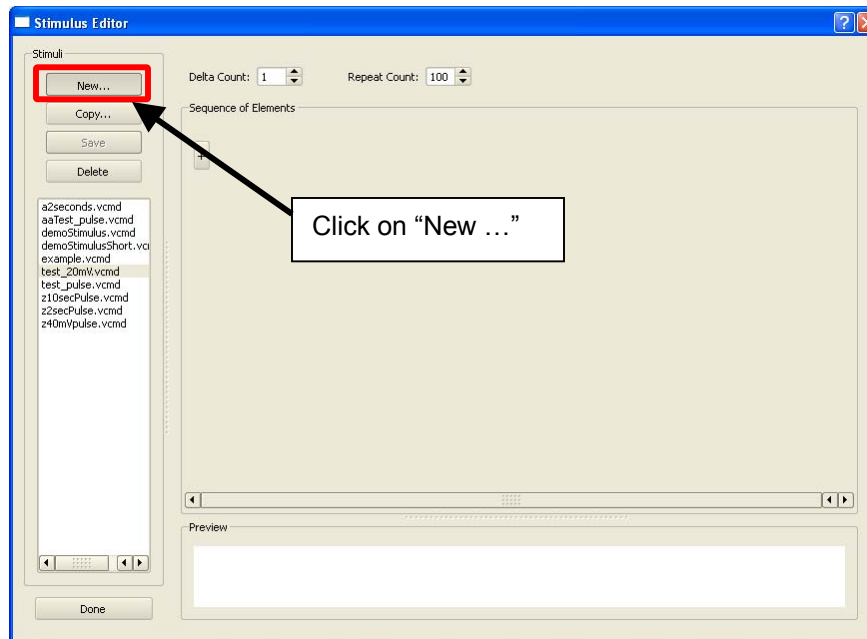


The screenshot shows the Stimuli tab interface with the following components and callouts:

- Stimuli Selector:** A list box containing the selected stimulus `1: a2seconds.vcmd`. Callout: "The selected Stimulus is displayed here."
- Holding voltage:** A control with a +/- sign, a text field showing `0.00mV`, and a button labeled `-> 0mV`. Callout: "Holding voltage can be entered here. However, it does not take effect until the arrow button is pushed."
- Use stimulus:** A checked checkbox. Callout: "Click on this arrow button to apply the holding voltage."
- Relative to hold:** A checked checkbox. Callout: "The effective holding voltage is displayed here."
- Stimulus selection:** A pull-down menu showing `a2seconds.vcmd` and an `Edit...` button. Callout: "Use Stimulus" should be checked.
- Slew Override:** An unchecked checkbox and a pull-down menu showing `0.01uF`. Callout: "Check this box, if the stimulus is programmed relative to the holding voltage."
- Stimulus creation:** A blue-bordered box with the text: "Click here to create and edit stimuli. See next section on how to create a stimulus." (An arrow points to the `Edit...` button).
- Asynchronous controls:** A section containing `Start Stimulus` and `Stop Stimulus` buttons, each with a `Continuous` checkbox. Callout: "Stimulus is selected from this pull-down menu."
- Continuous start/stop:** Callout: "If you want to override the slew rate programmed in the stimulus, check this box and select the appropriate slew rate."
- Asynchronous controls support:** Callout: "Asynchronous controls are only supported in very few models."

2-2-1. Create a New stimulus

When you click the “Edit ...” button from the previous page, you will see the following Stimulus Editor window.



2-2-2. Create a New stimulus or Edit an existing stimulus

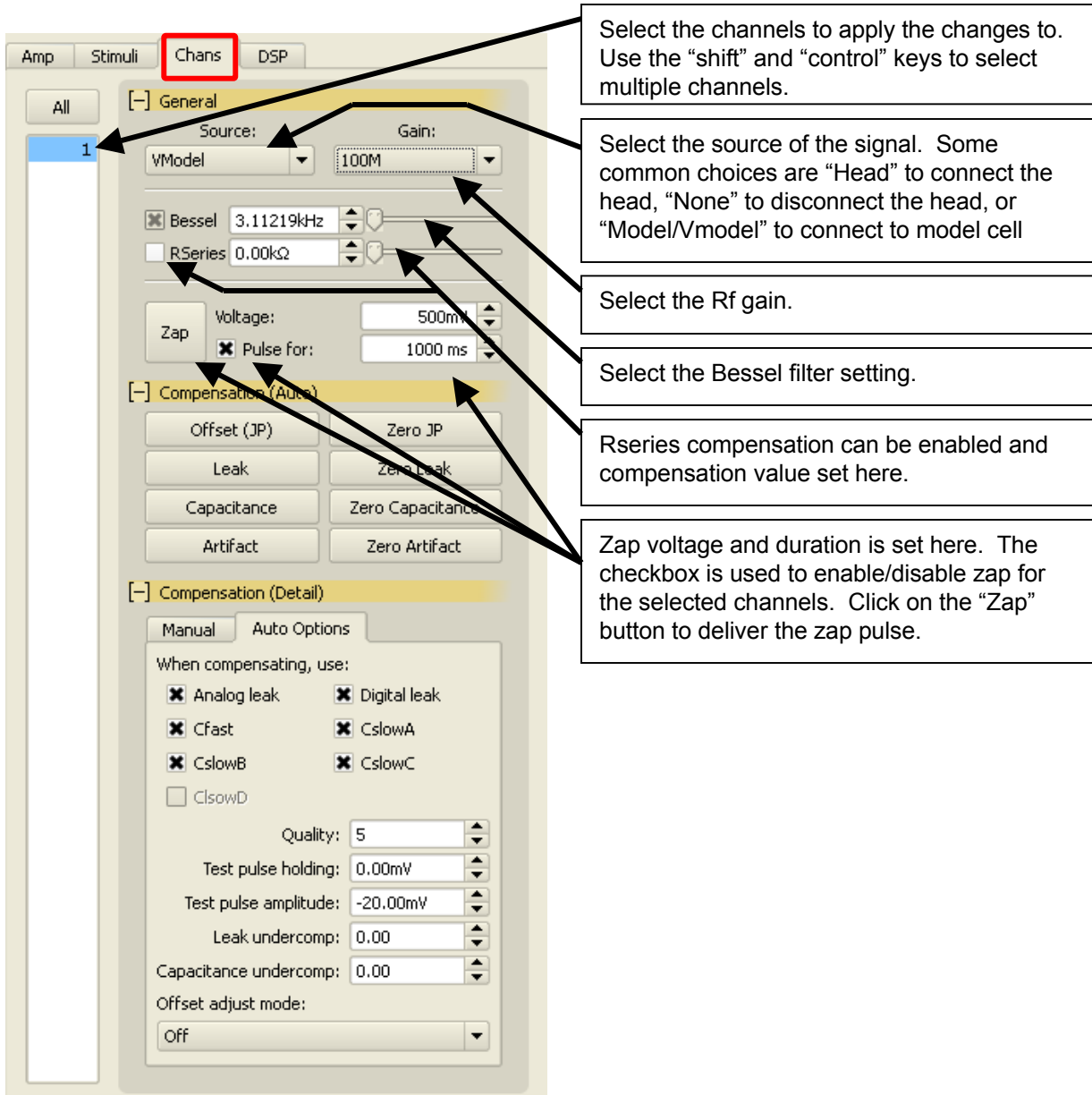
The image shows the **Stimulus Editor** window with several annotations pointing to specific features:

- Delta Count:** Set Delta count here. Usually leave this as 1.
- Repeat Count:** Enter Repeat count here.
- Delete Segment:** Click to delete segment.
- Add Segment:** Click to add segment.
- Segment Type:** Select segment type here.
- Digital Out Control:** Digital Out control.
- Slew Control:** Slew control for segment.
- Voltage:** Voltage for segment.
- Duration:** Duration for segment.
- Preview:** Preview the stimulus here.
- Save/Done:** Click "Save", then "Done" when finished.

The interface includes a **Stimuli** list on the left, a **Sequence of Elements** table with columns for Digital Outs, Slew Rate, Amplitude (mV), and Duration (ms), and a **Preview** graph at the bottom.

2-3. Channels tab (part 1 of 2)

The Channels tab contains the controls for controlling modes and compensations for each channel.



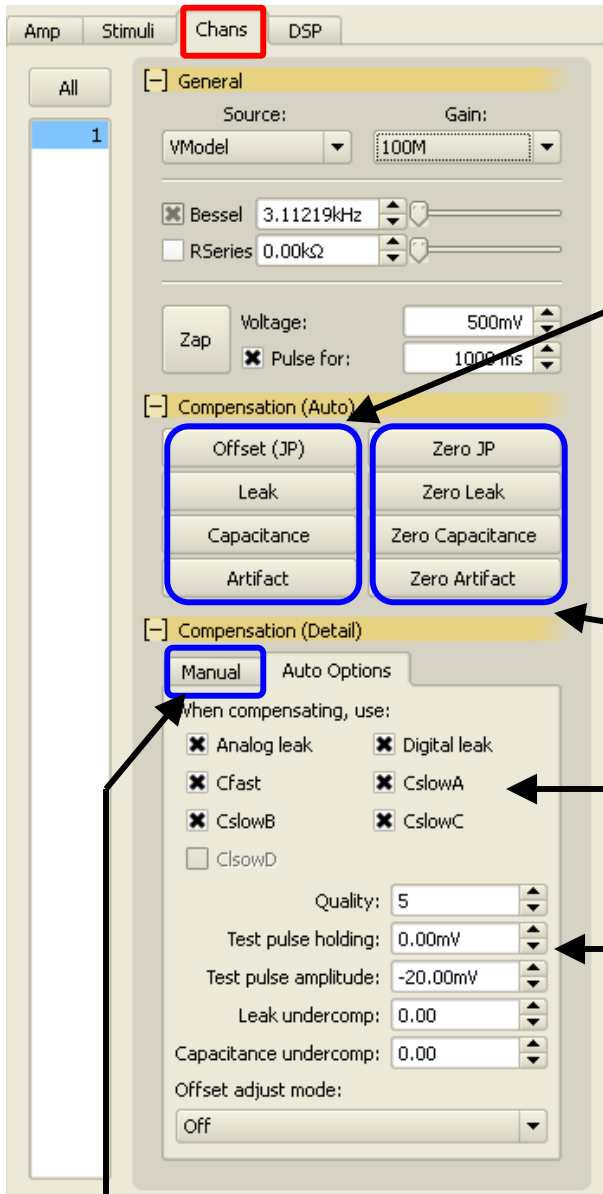
The screenshot shows the 'Channels' tab in the TecellaLab software. The interface includes a list of channels on the left, with channel '1' selected. The main panel is divided into several sections: 'General', 'Compensation (Auto)', and 'Compensation (Detail)'. Callouts provide detailed explanations for various controls:

- Select the channels to apply the changes to.** Use the "shift" and "control" keys to select multiple channels. (Points to the channel list on the left)
- Select the source of the signal.** Some common choices are "Head" to connect the head, "None" to disconnect the head, or "Model/Vmodel" to connect to model cell. (Points to the 'Source' dropdown menu)
- Select the Rf gain.** (Points to the 'Gain' dropdown menu)
- Select the Bessel filter setting.** (Points to the 'Bessel' checkbox and frequency value)
- Rseries compensation can be enabled and compensation value set here.** (Points to the 'RSeries' checkbox and value)
- Zap voltage and duration is set here.** The checkbox is used to enable/disable zap for the selected channels. Click on the "Zap" button to deliver the zap pulse. (Points to the 'Zap' button, 'Voltage' field, and 'Pulse for' field)

The 'Compensation (Auto)' section includes buttons for 'Offset (JP)', 'Zero JP', 'Leak', 'Zero Leak', 'Capacitance', 'Zero Capacitance', and 'Artifact', 'Zero Artifact'. The 'Compensation (Detail)' section has tabs for 'Manual' and 'Auto Options', with various checkboxes for compensation types (Analog leak, Digital leak, Cfast, CslowA, CslowB, CslowC, CslowD) and numerical input fields for Quality, Test pulse holding, Test pulse amplitude, Leak undercomp, and Capacitance undercomp. The 'Offset adjust mode' is set to 'Off'.

2-3. Channels tab (part 2 of 2)

The Channels tab contains the controls for controlling modes and compensations for each channel.



After setting the Compensation Detail below, click on these buttons to perform Auto Compensation.

“Offset (JP)” to compensate offset at the head.
 “Leak” to compensate leak from seal.
 “Capacitance” to compensate total capacitance.
 “Artifact” to digitally remove all artifacts.

These buttons are used to set the zero point for each of the compensations. Usually, these buttons do not need to be pressed.

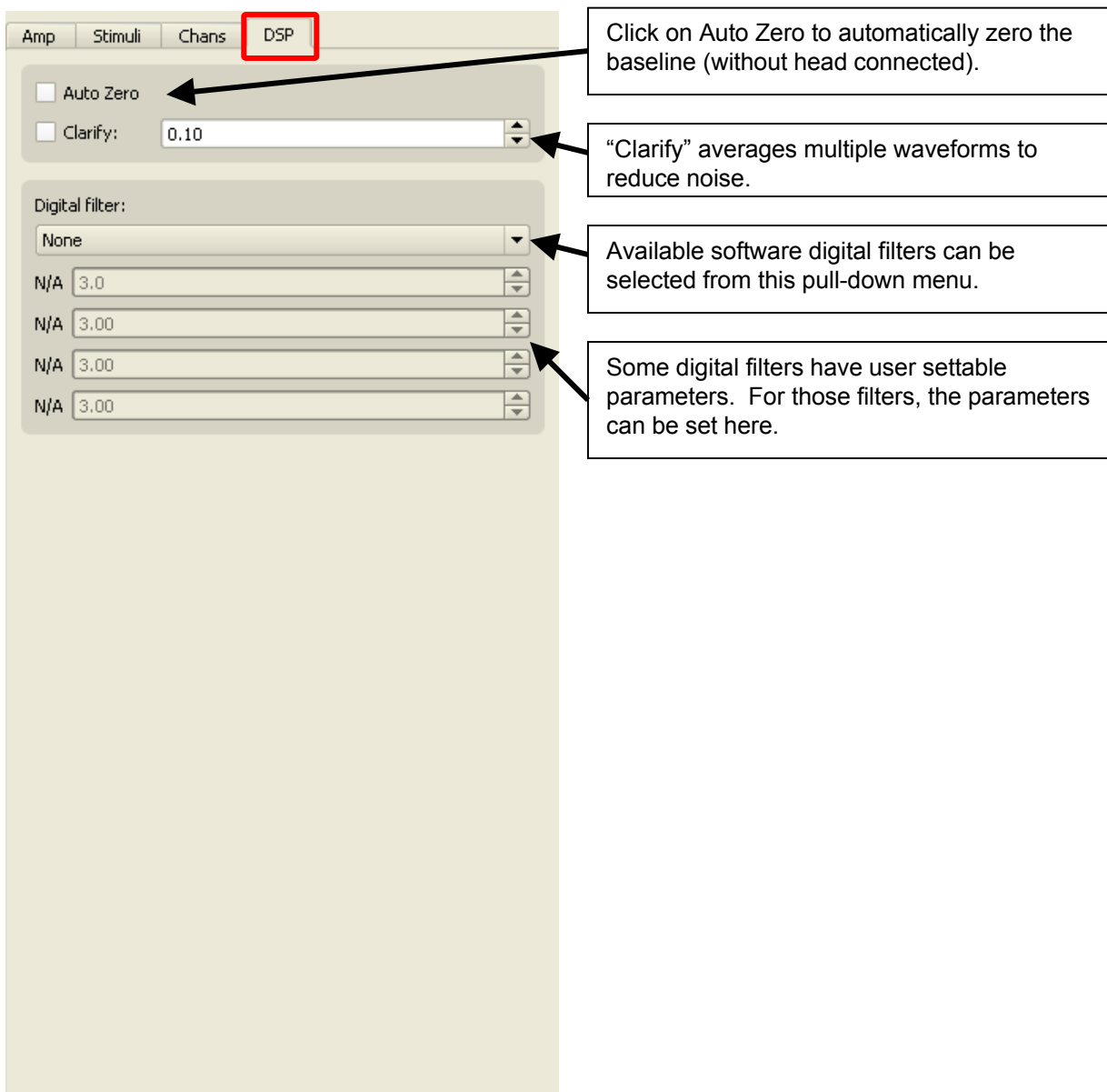
Select the parameters to include in Auto Compensation.

Set the test pulse to be used for Auto Compensation.

All of the compensation can be performed manually by clicking on this tab.

2-4. DSP tab

The DSP tab contains the controls for TecellaLab's soft-DSP features.



The screenshot shows the DSP tab interface with the following callouts:

- Auto Zero:** Click on Auto Zero to automatically zero the baseline (without head connected).
- Clarify:** "Clarify" averages multiple waveforms to reduce noise.
- Digital filter:** Available software digital filters can be selected from this pull-down menu.
- Filter Parameters:** Some digital filters have user settable parameters. For those filters, the parameters can be set here.

3. Acquisition section

Set the acquisition mode here. Choices are "Repeat", "Continuous", and "Single".

For REPEAT mode, set the time between repeats here.

Save to file. And specify file to save to.

Click on this button to start and stop acquisition.

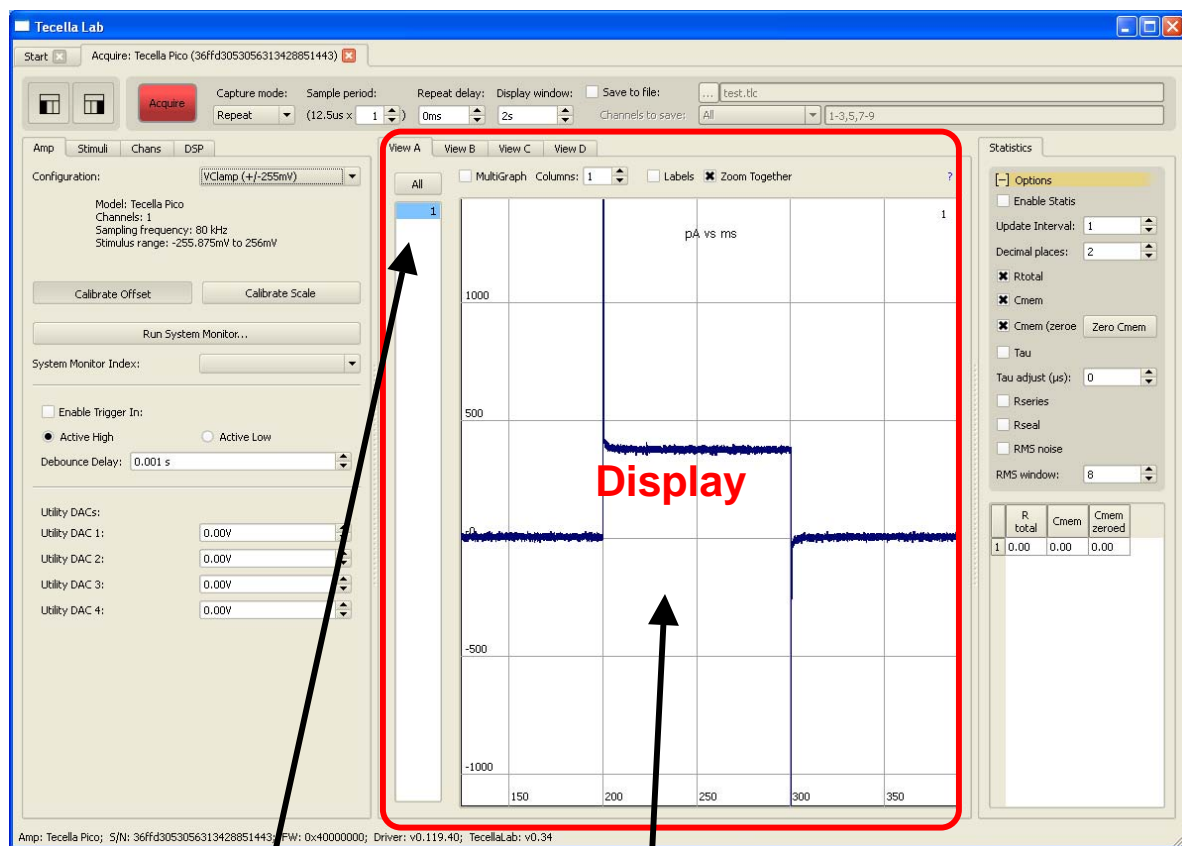
Sampling rate can be reduced here.

For CONTINUOUS mode, set the window size here.

Specify the channels to save data for.

The screenshot shows the Tecella Lab software interface. A red box highlights the acquisition control bar at the top, which includes the 'Acquire' button, 'Capture mode' (set to 'Repeat'), 'Sample period' (12.5us), 'Repeat delay' (0ms), 'Display window' (2s), 'Save to file' checkbox, and 'Channels to save' (All). Annotations with arrows point to these specific controls from text boxes above. The main window displays a graph of current (pA) vs time (ms) showing a step response. The left panel shows configuration details for the Tecella Pico device, and the right panel shows statistics and options.

4. Display section



Select the channels to display.
Use the “shift” and “control” keys
to select multiple channels.

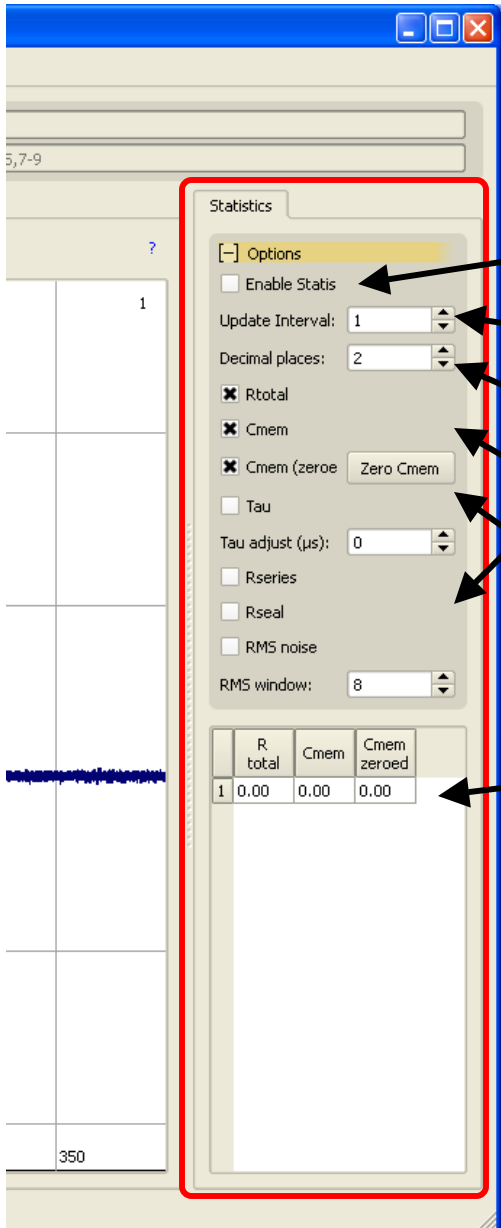
The display window has easy “pan”, “zoom”,
and “fit” features.

To pan, hold down left mouse button and
move the mouse.

To zoom, hold down the right mouse button
and move the mouse.

To fit the entire waveform, double-click on the
left mouse button.

5. Statistics section



The screenshot shows the 'Statistics' panel in the TecellaLab software. The panel is titled 'Statistics' and contains a section for 'Options'. The 'Enable Status' checkbox is checked. The 'Update Interval' is set to 1, and 'Decimal places' is set to 2. Under 'Select the statistics to display', the checkboxes for 'Rtotal', 'Cmem', and 'Cmem (zeroe)' are checked, while 'Tau', 'Rseries', 'Rseal', and 'RMS noise' are unchecked. The 'Tau adjust (μs)' is set to 0, and the 'RMS window' is set to 8. At the bottom, there is a table displaying statistics for the selected channels.

Check to enable statistics.

Update Interval must be non-zero.

Decimal places to display.

Select the statistics to display.

Click here to zero Cmembrane statistic. Typically performed after seal is achieved and prior to going whole cell.

Statistics are displayed here for the selected channels.

	R total	Cmem	Cmem zeroed
1	0.00	0.00	0.00