

The Audio Toolbox

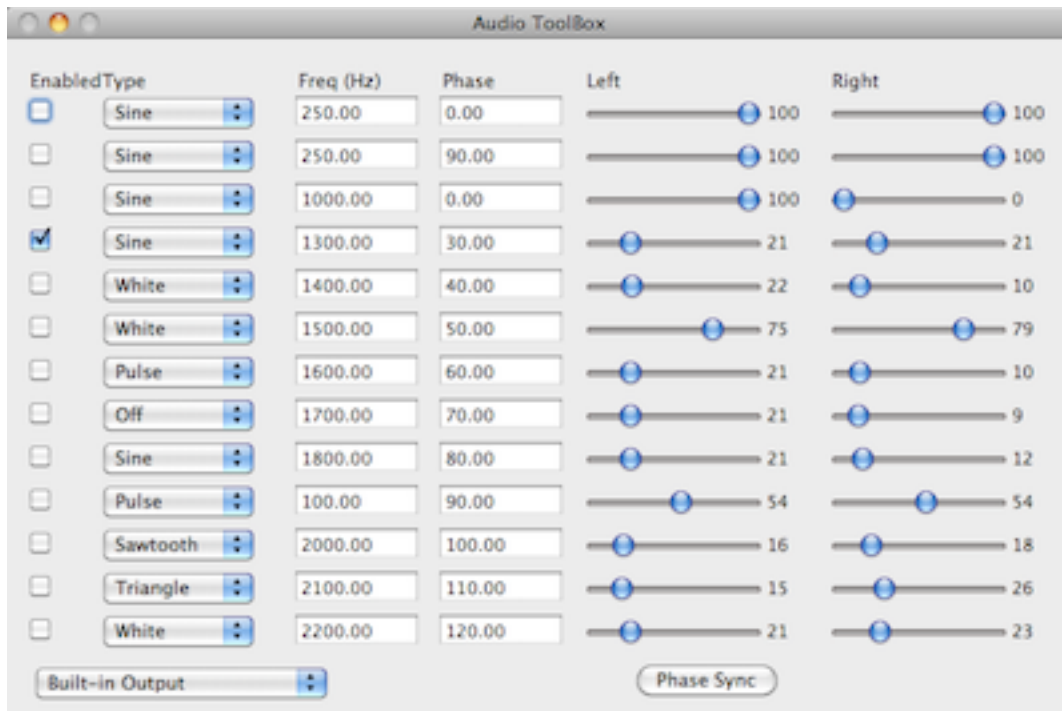
The Audio Toolbox is an audio function generator for the Macintosh. Using no additional hardware, you can produce sine, square, triangle, and sawtooth waveforms of any frequency up to 22 kHz, as well as generate noise. There is also a sweep generator. In addition, oscilloscope, spectrum, and waterfall displays are available.

You can generate up to 13 different waveforms. Each waveform can be routed to either the left or right channel, or to both. The amplitude of each waveform may be adjusted, as well as the volume on each channel, which is a mix of any waveforms routed to that channel.

Please be sure to read this document before using the program, you will probably find the answers to any questions you may have. If you still have a question, feel free to contact us at info@blackcatsystems.com

Function Generator

When the program starts up, you'll a windows, similar to the following, it's the function generator window:



Let's take a look at the various controls and features:

For each waveform, there are six controls:

Enabled If this is checked, the waveform is enabled for generation.

Type This popup menu selects the type of waveform to be generated

Freq This is a text box into which you type the desired waveform frequency, in hertz (Hz).

Left When checked, this waveform is routed to the left channel.

Right When checked, this waveform is routed to the right channel.

Amplitude This is a text box into which you type the desired amplitude of the waveform, ranging from 0 (off) to 100 (maximum).

As you add more waveform to a channel, the overall gain of that channel is automatically adjusted, to prevent clipping.

Please note that due to the limited bandwidth of the computer's audio output, square and sawtooth waveforms will show significant overshoot. This is a function of the Mac's hardware, and cannot be overcome by software.

You can also select which sound output device to use, assuming your computer has more than one, using the popup menu at the bottom of the window.

The Phase Sync button will re-adjust the internal phase counter for each of the waveform generators. You should click this button after changing any of the generator parameters, if you are interested in having the correct phase relationships.

You can Save your current settings, and restore them later, by using the Save and Open selections under the File menu.

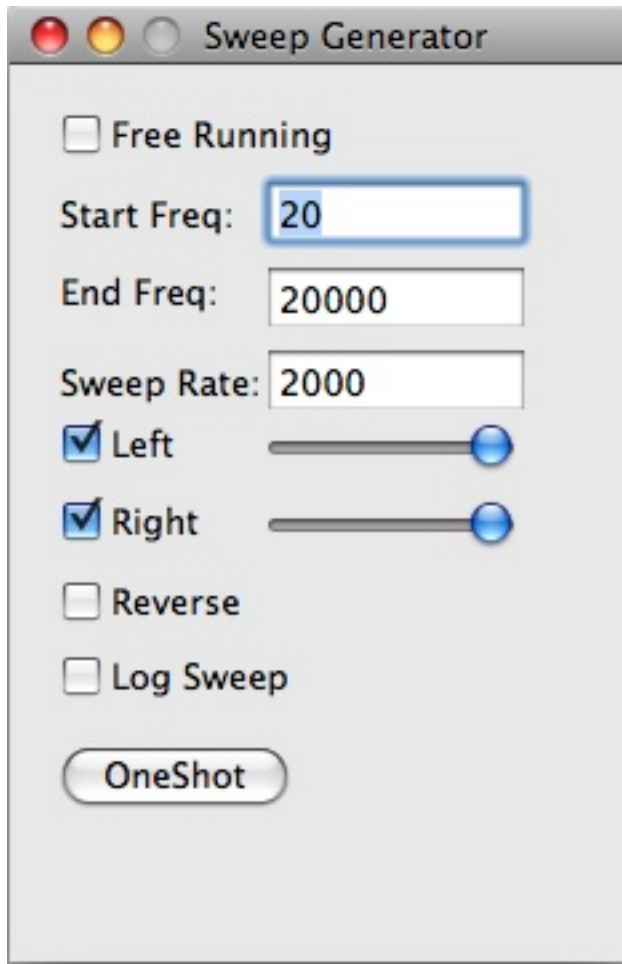
Recording sound to files

You can save the audio generated to an WAVE recording file. To start recording, select **Record to File** from the **File** menu. To stop recording, select **Stop Recording** from the **File** menu.

From the time you start recording until you stop, a sound file will be generated containing all the sound produced, even dead air. The file is always 44.1 kHz, 16 bits, stereo.

Sweep Generator

The second window available is the sweep generator:



The **Enabled**, **Left**, and **Right** controls and the **Amplitude** work just as with the function generator window.

The **Start** and **End** values are the two frequencies between which the generator will sweep. The **Rate** is the sweep rate, in Hz per second.

By selecting **Reverse**, the sweep generator will sweep the frequency back to the low frequency, rather than just jumping there, after it reaches the high frequency.

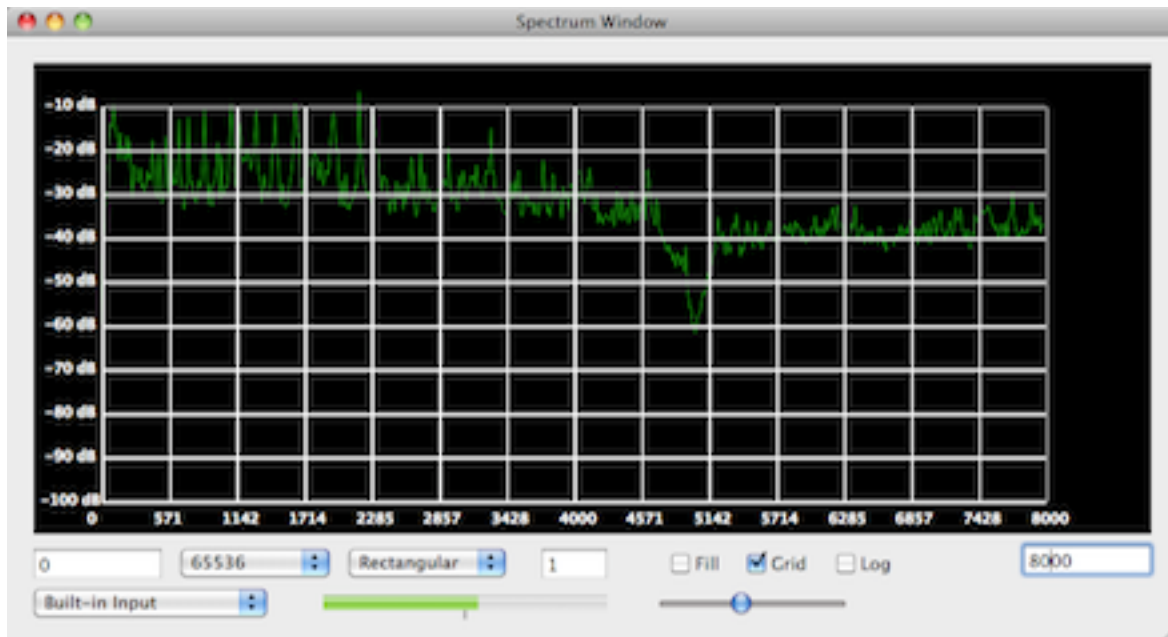
You can also click on the **One Shot** button, and you will get just one sweep,

rather than continuous sweeping.

It's probably best to play around with the various settings, to get a feel for how they interact. It's possible to create some interesting sound effects using the sweep generator. For example, going from 1000 Hz to 2000 Hz at 8000 Hz/sec produces a sound similar to a police siren.

Spectrum Window

The third window is the spectrum window. This window lets you see the spectrum of an audio signal.



The two text boxes allow you to specify the minimum and maximum frequencies to be displayed, between 0 and 22000 Hz.

A popup menu is available to select the input source. The number of FFT bins is selected by a popup menu as well.

The Fill checkbox causes the display to be a filled graph, rather than a simple line.

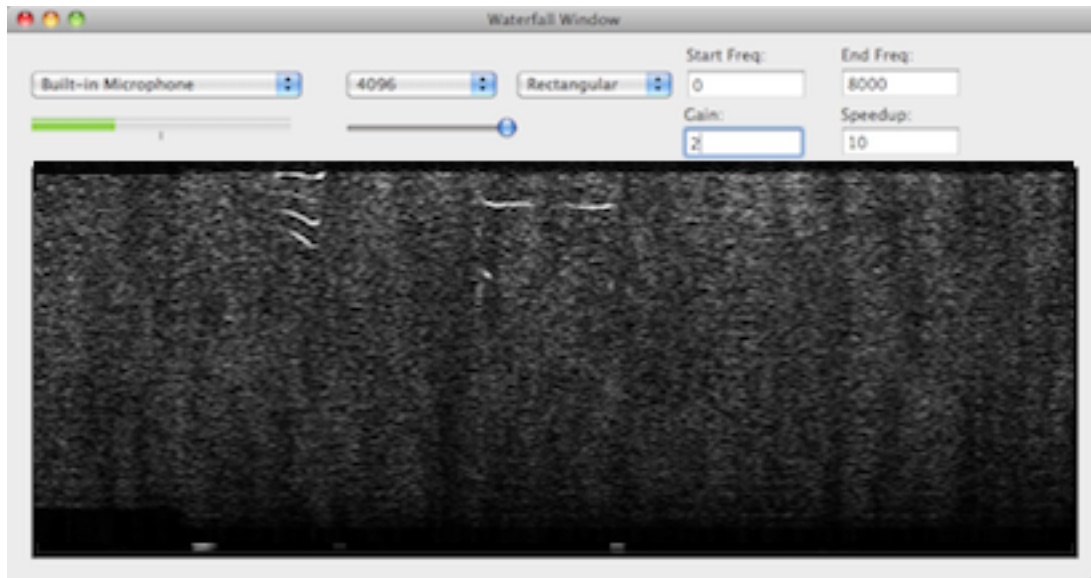
The Grid checkbox displays a vertical signal amplitude grid.

The Log checkbox scales the frequency in a logarithmic form. In this case, the two text boxes for the minimum and maximum frequency are not used, and the full 1 to 20000 Hz range is displayed.

A slider is available to set the input gain, with a volume bar to the left.

Waterfall Window

The fourth window is the waterfall window.



You can select the input source, as well as the FFT size and FFT window type, from popup windows.

A slider adjusts the input gain.

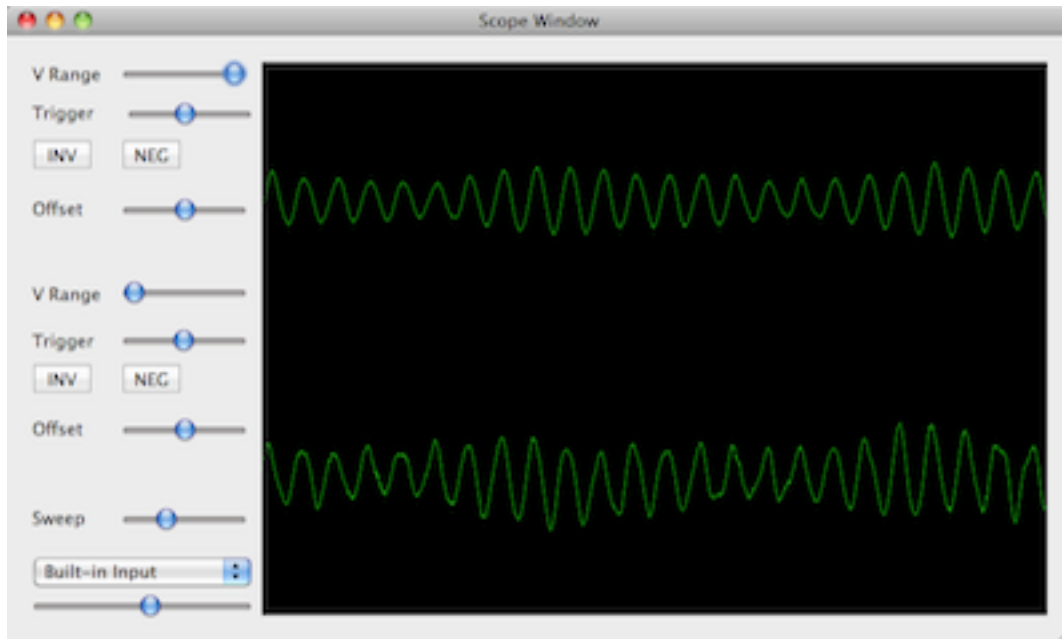
The starting and ending frequencies for the waterfall are entered into two text boxes.

The gain value is used to make the waterfall brighter or darker, and can be used to compensate for the audio volume.

Finally, the speedup value can be used to increase the rate that the waterfall updates. For values larger than 1, additional spectrums are computed on “between” each group of new sound data. A speedup value of 10, for example, will make the waterfall run 10 times faster.

Oscilloscope Window

The fifth window is the oscilloscope window.



For each input, the Vertical Range can be adjusted with a slider, as well as the Trigger point (Each input has it's own trigger). The trigger polarity can be set with the NEG button, and the signal can be inverted with the INV button.

The Offset input allows the trace vertical position to be adjusted.

Finally, the sweep rate can also be set.

A popup menu is available to select the input source, and a slider to adjust the input gain.