

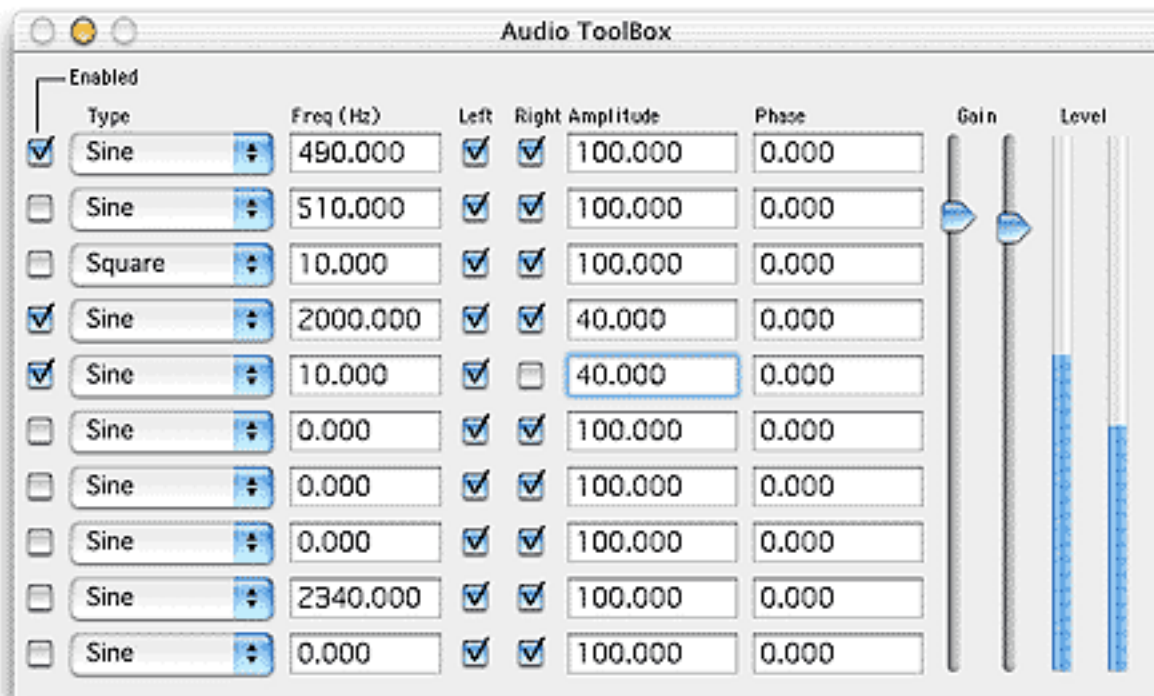
Mac Audio Toolbox is an audio function generator for the Macintosh. Using no additional hardware, you can produce sine, square, triangle, and sawtooth waveforms of any frequency up to 22 kHz, as well as generate noise. In addition, there is a sweep generator. In addition, the Mac OS X version features oscilloscope and spectrum displays. The purchase price is only \$19.99.

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 support@blackcatsystems.com

Function Generator

When the program starts up, you'll see two windows. One window is 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. Typing control-command-0 through 9, A, B, C will turn a generator on or off when this window is selected.

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).

In addition, there are two sliders, one each for the left and right channels. They adjust the output volume for each channel. There is also a bar graph volume display for each channel. Note that the volume display is only affected by the various waveforms fed to that channel, not by the volume slider for that channel, since that volume adjustment is applied after the Mac's D/A output.

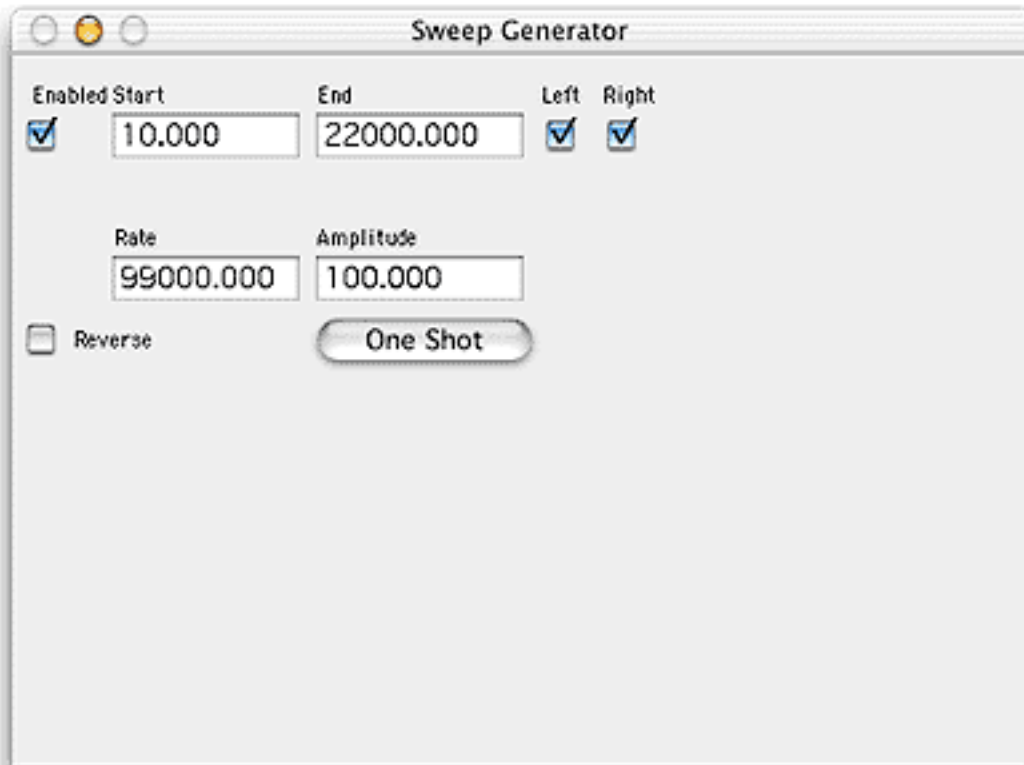
As you add more waveform to a channel, the overall gain of that channel is automatically adjusted, to prevent clipping.

Please note that due to the limited bandwidth of the Mac'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 Save your current settings, and restore them later, by using the Save and Open selections under the File menu.

Sweep Generator

The second window 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.

Recording sound to files

You can save the audio generated to an AIFF recording file. To start recording, select **Record to File** (or cmd-R) from the **File** menu. To stop recording, select **End Recording** (or cmd-R) 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, and has a name that is a timestamp of when the recording began. You can always change the name of the file in the Finder after you're done recording, if you'd like.

Preferences and some Mac OS X Notes

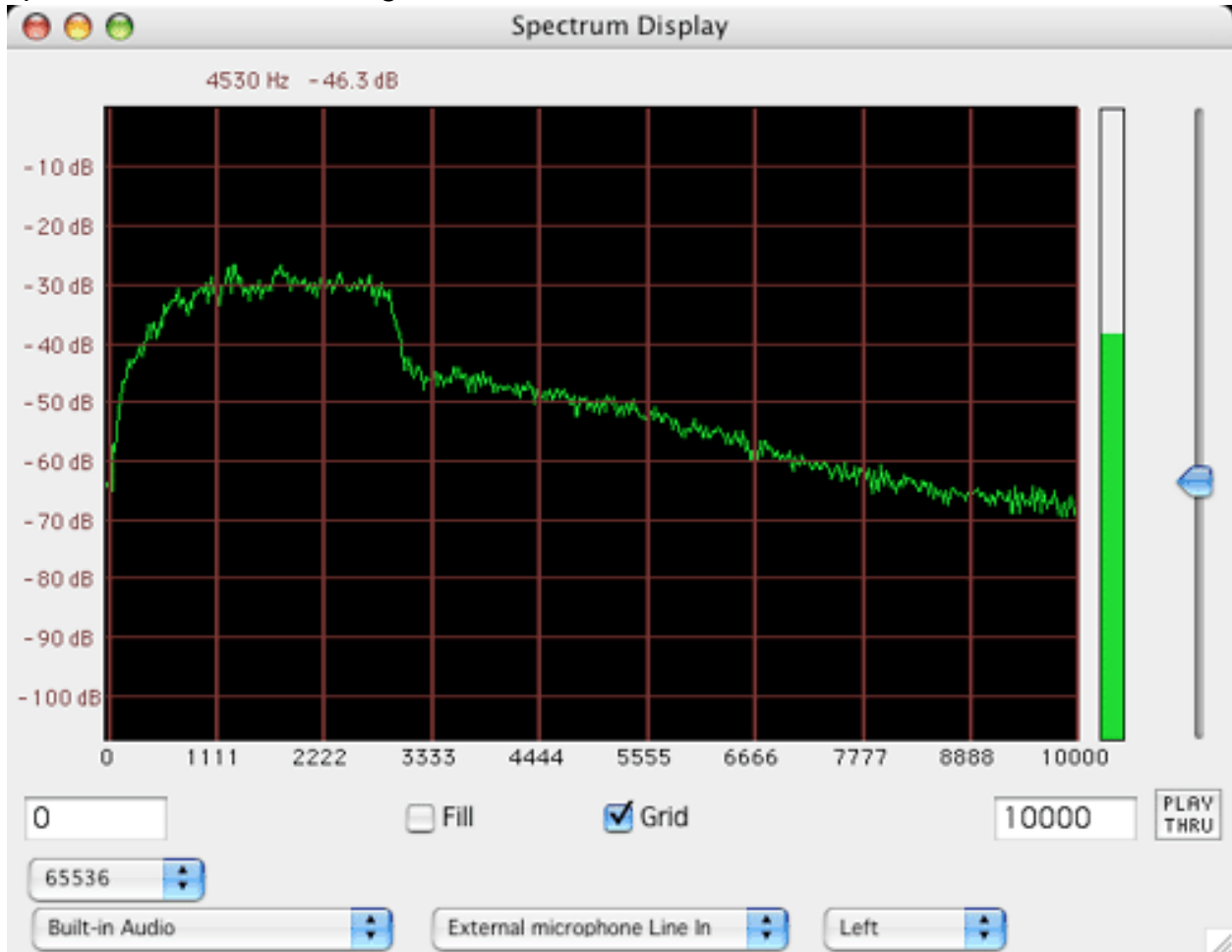
Update Rate: Specifies how often a new block of sound is produced. On MacOS 8 and 9, we find that 500 milliseconds works well. On OSX, due to the way multitasking is handled, you most likely will need a lower (faster value), especially if you have lots of generators enabled. 100 milliseconds works well on a 400 MHz G4, for example.

Creator ID: Specifies the creator ID of recording files. This is useful if you want to be able to double click a recording file and have it opened by a specific application. If so, just put the creator ID of that application here.

If you hear a clicking sound, then your system is too slow for the number of generators you have enabled, or you have the update rate incorrectly set. On OSX systems, you generally have to lower this number (making the updates occur more often), due to the way multitasking is implemented on OSX. You may want to quit other applications if this happens, as well, to free up CPU time.

Spectrum Window

The third window is the spectrum window. Note that this window is only available when running under Mac OS X and that your system needs a sound input device. USB devices are supported. 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.

Popup menus are available to select the input device and source, and which channel should be used, or a mix of left and right. The number of FFT bins is selected by a popup menu as well. The display gain can also be selected, or left set to Auto.

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.

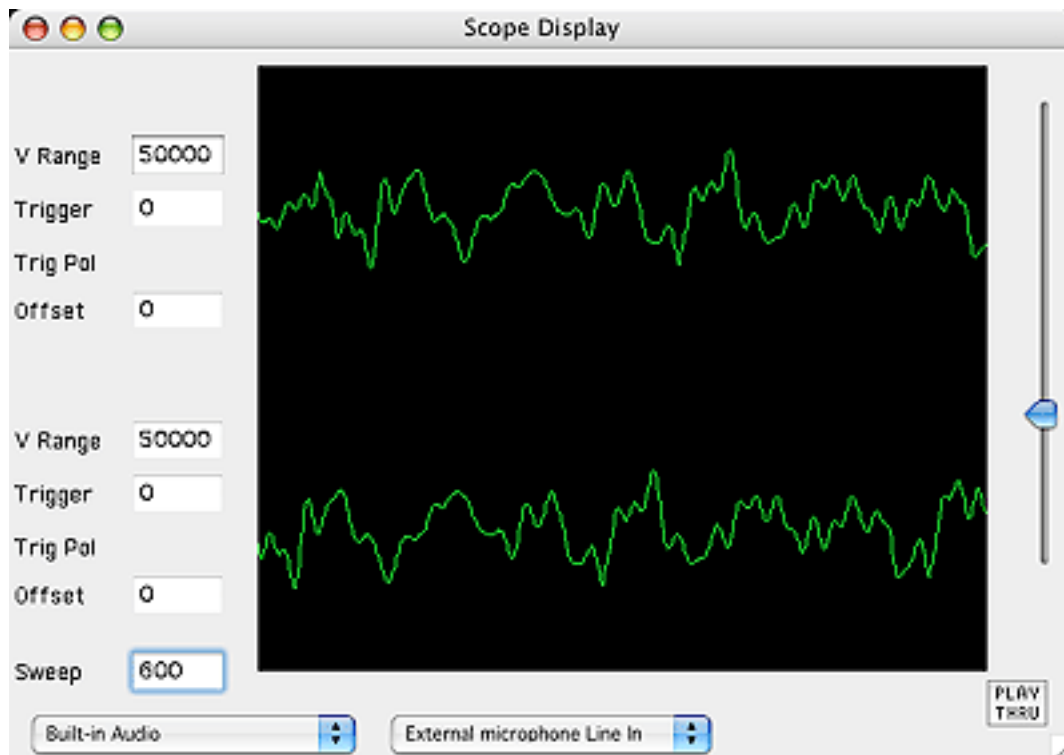
A slider is available to set the input gain, with a volume bar to the left.

Finally, there's a button to enable play-thru. Please note that not all input devices support this, at this time the iMic does not, for example.

Moving the cursor over the display will show the frequency for that horizontal location, as well as the signal amplitude for that frequency.

Oscilloscope Window

The fourth window is the oscilloscope window. This is only available when running under Mac OS X. This window is new, and may not yet be fully functional.



For each input, the Range can be selected, as well as the Trigger point and Polarity. The Offset input allows the trace vertical position to be adjusted.

Finally, the sweep rate can also be set.

Popup menus are available to select the input device and source, as with the spectrum display window. Likewise, an input gain slider is present on the far right side, and there is a button to enable PLAY THRU (which only works on some Mac models).

AppleScript Support

The various settings for the function generator window can be set by AppleScript commands.

The left and right audio levels can be set with the LeftGain and RightGain commands, with values from 0 to 255. For example:

```
LeftGain "255"  
RightGain "0"
```

The other commands allow changing the setting for each of the 13 channels. First, the Channel command should be used to specify which channel will be controlled with latter commands:

```
Channel "5"
```

Then commands can be used to set the frequency, waveform type, phase, amplitude, whether or not to output to the left and right channels, and whether or not the channel is enabled:

```
Frequency "3324"  
Type "SINE"  
Phase "90"  
Amplitude "50"  
Left "0"  
Right "1"  
Enabled "1"
```

Possible settings for Type are:

```
SINE  
SQUARE  
SAWTOOTH  
TRIANGLE  
WHITE  
PINK  
PULSE
```

Some examples follow:

```
tell application "Audio ToolBox OSX"  
    run  
end tell
```

```
tell application "Audio ToolBox OSX"  
    LeftGain "255"  
    RightGain "255"  
end tell
```

```
tell application "Audio ToolBox OSX"  
    Channel "2"  
    Type "sine"  
    Frequency "2400"  
    Amplitude "100"  
    Phase "180"  
    Left "1"  
    Right "1"  
    Enabled "1"  
end tell
```

Buying Mac Audio ToolBox

The price of Mac Audio ToolBox is only \$19.99, allowing the use on a single computer. If you wish to run Mac Audio ToolBox on multiple computers, you must obtain a license for each system, or the appropriate site license.

Online purchase using the Kagi or SWREG secure site is the quickest and easiest way to register your copy. You'll typically get your registration code back from us within minutes of purchase. Visit <http://www.blackcatsystems.com/register/audiobox.html> to buy online.

Site licenses are also available, allowing copies to be run on multiple computers at a single location (for example, a school or university, or office). Please contact Black Cat Systems for pricing and details about site licensing.

By buying your copy of Mac Audio ToolBox you'll help support our efforts to develop new versions with additional information. When you register, you'll be entitled to use all new releases and updates to Mac Audio ToolBox released over the next year, free of charge.

When you buy and receive your registration code, select **Enter Registration...** from the **File** menu, and enter the code. If you buy and don't get your registration code within a few days, please send us an email at info@blackcatsystems.com.

Thanks again for giving Mac Audio ToolBox a try.

Black Cat Systems
4708 Trail Court
Westminster, MD 21158

email: info@blackcatsystems.com

Web: <http://www.blackcatsystems.com/software/audiotoolbox.html>

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Macintosh Model: _____ System Version: _____

Enclosed, please find my check / money order / cash in the amount of \$_____

Mail this form, along with payment, to:

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Westminster, MD 21158
USA**

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You will be sent to our order page at Kagi or SWREG. They handle our credit card payment processing.

Please make sure you include your email address when you register online. That way we can send the registration code to you. If you do not send us a valid email address, we have no way to send you the code.

Revision History

October 30, 2005 - 1.8.0:

Added logarithmic frequency scaling to the Spectrum Display.

Bugfix - Pink noise would sometimes have a popping sound if the amplitude was too high.

Bugfix - clearing the freq or phase fields would cause that channel to no longer produce sound.

March 9, 2005 - 1.7.0:

Added Applescript support.

Can now copy and paste between fields.

Fixed a bug with the pink noise generator.

August 4, 2004 - 1.6.0:

Can now type control-cmd-0 through 9,A,B,C to turn sound generators on and off.

February 1, 2004 - 1.5.0:

Improvements to Spectrum Display

Added White and Pink noise outputs.

Added frequency/amplitude display for current cursor location.

January 5, 2004 - 1.4.0:

Improvements to Spectrum Display

Added Oscilloscope Display. (Mac OS X only)

June 13, 2003 - 1.3.1:

Bug fixes for OSX.

October 11, 2002 - 1.2.0:

Spectrum display window added (Mac OS X only).

May 12, 2002 - 1.1.0:

Can now record produced audio to AIFF files.

April 26, 2002 - 1.0.1:

Now up to 13 tones can be played at a time
Fixed a bug that prevented decimal points from being entered

April 10, 2002 - 1.0.0:
Release for Mac OSX and MacOS 8/9
Added single shot feature to sweep generator

November 4, 2000 - 0.3.0:
Added sweep generator
Changed name to Audio Toolbox

October 14, 2000 - 0.2.0:
Added ability to save/restore settings
Tab now moves between the various fields, as well as the arrow
keys.
Fixed a bug where the sound could start clicking when the volume
was adjusted (maybe!)

October 9, 2000 - 0.1.0:
Initial Release

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