SimSynth Parameter Reference

This is the SimSynth parameter reference only. For an introduction and overview of SimSynth, see the INTRO.WRI file. If you do not know how to use a synthesizer, and would like to learn, see the HOWTO.WRI file.

OSC - Oscillator Group

1, 2, 3, LFO

These buttons select which oscillator is to be controlled by the sliders and buttons in the OSC group. There are three oscillators and an LFO, (Low Frequency Oscillator). Some of the controls in the OSC group are disabled for LFO.

Tri, Saw, Pulse, Noise, File

Specifies a wave shape for the selected oscillator. **Tri** is the triangular wave shape. **Saw** is the sawtooth wave, **Pulse** is the pulse wave, (or square wave), **Noise** is white noise, and **File** allows the choosing of an .OSC file, or a Windows .WAV file for use as an oscillator.

If a .WAV or an .OSC file is selected as an oscillator, a file-open dialog box appears so that a file name can be specified. The "Choose" button, which is normally disabled, becomes enabled. Pressing the "Choose" button brings back the file-open dialog box and allows the selection to be changed at any time.

An .OSC file is unique to SimSynth, and can be created using the built in harmonic synthesizer. There is a section which discusses the harmonic synthesizer at the end of this document.

A .WAV used as an oscillator plays in a loop. At this time, SimSynth is mono internally. A stereo .WAV can be selected, but the channels are mixed, and it is processed mono.

Note: When a preset is saved, in which an .OSC or a .WAV is used, only the name of the .OSC or .WAV file is saved with the preset. This is important to know if you plan to move a preset from one computer to another. When loading a preset, SimSynth first attempts to load the .OSC or .WAV file using the exact same pathname that was originally specified in the preset. If the file can not be found, SimSynth searches for it in the same directory from which the preset was loaded.

Pw

Pulse width. This setting further modifies the shape of the selected wave, and gives it a

different tone.

Pulse width has no affect on noise, .WAV or .OSC wave shapes.

Advanced Note: This setting is accurately named only for the square wave. For sawtooth waves, it is used to reverse the direction of the slope. For triangle waves, a setting of 50% is a triangle, but moving towards 99% evolves the triangle into a pure sine-wave. Moving towards 1% evolves the triangle into something which is more exactly not a sine-wave.

Frq
This is the frequency for the oscillator. In most cases it raises the pitch of the oscillator, relative to the Base Frq. (from the GEN group) in the positive range, and lowers it in the negative. The value is musical, and is in 1/100ths of a semi-tone. If you're not a musician, know that the frequency is non-linear, it doubles at +1200 and quadruples at +2400.

Noise is affected by the Frq setting, (as well as the base frequency).

The LFO frequency is increased as it is adjusted upward in the positive range. *It is also increased when adjusted downward in the negative range.* For LFOs, the negative range produces high speed oscillation. This can be used for special effects. The LFO frequency is not relative to the Base Frq.

The frequency of a .WAV oscillator is not relative to the Base Frq.

Amp
Specifies the amplitude for the selected oscillator *relative to the other oscillators.* If only one oscillator is active, (not muted), this slider does nothing.

Lfo
Specifies the amount that the selected oscillators frequency tracks the LFO. The value is a percentage, (doubles at 100).

Env
Specifies the amount that the selected oscillators frequency tracks the oscillator envelope, (envelope 2). The value is a percentage, (doubles at 100).

Mute
Turns off the selected oscillator.

+1
When selected, the specified frequency is generated, as well as an additional wave at double the frequency.

+2
When selected, the specified frequency is generated, as well as an additional wave at three times the frequency, (second harmonic for a sine wave).

Detune
Adds another frequency to the oscillator, slightly out of tune, (sharp). This "warms" the sound of the oscillator.

Detune has an affect on noise. Without detune, SimSynth generates noise by interpolating

between random values at the specified frequency. With detune, SimSynth holds the random value for the full duration of the cycle. This causes a harsher noise, (with more high frequencies), when detune is selected. It is especially important to be aware of the detune setting when using noise for the LFO.

WARNING: Detune can cause an effect known as "phase cancellation" which may reduce the amplitude of the oscillator.

SVF - State Variable Filter Group

Pre
Pre-amp. Boosts the amplitude of the oscillators before they pass through the filters. Useful when lots of filtering results in a sound which is too quiet.

Advanced Note: There is some attempt to emulate the sound of overdriving true analog circuits.

Off, Normal, Post
Off causes the filter to be bypassed. **Normal** provides normal filtering.

The **Post** option causes the sound to pass through a second low pass filter, after the first. This filter is only low pass, and has a fixed frequency. It is useful for cleaning up noise that leaked through the main SVF filter, or was caused by the main SVF filter, (because of emphasis). Also, the main SVF filter may be dedicated to some type of high pass effect, yet it may still be useful to filter out some of the very high frequencies.

Cut
The cutoff frequency for the filter. The filter is not "tuned", and this value is simply a zero to 255.

Emph
The Emphasis, (or resonance, or "Q"), level for the filter. This setting emphasizes the frequencies near the specified cut off point. Slight amounts of emphasis can be used to better simulate certain types of sound. However, large amounts result in a very artificial, electronic sound, (which is highly characteristic of real analog synthesizers).

Advanced Note: You can turn the emphasis to full and create a sine wave. It will have a rough sound though, and probably isn't neccessary. With SimSynth you can set the "pulse width" of a triangle to full, and produce a digitally perfect sine wave that is easier to control.

Env
Specifies the amount that the filter frequency tracks the filter envelope, (envelope 2). This is an absolute value, where +127 is full. It is added to the cutoff frequency and the LFO, and it is easy to "top off" or "bottom out" unless you pay attention to all three settings.

LFO
Specifies the amount that the filter frequency tracks the LFO. This is an absolute value, where +127 is full. It is added to the cutoff frequency and the Env, and it is easy to "top off" or "bottom out" unless you pay attention to all three settings.

L, H
This slider, which is labeled "L" on one end, and "H" on the other, is used to set the balance between low-pass and high-pass output from the filter. An SVF generates low-pass, high-pass, band-pass, and notch output, all at the same time.

Note: In order to achieve notch output, put this slider at dead zero. (This plays low-pass and high-pass, but the band pass is absent, leaving a "notch" right at the cutoff frequency).

L/H, B
This slider, which is labeled "L/H" on one end, and "B" on the other, is used to set the balance between low-pass/high-pass mix, (which is set using the L/H slider described above), and the band-pass output.

Advanced Note: You can tighten the band pass, (or loosen the notch pass), by increasing the emphasis.

Beginners Note: The low-pass filter is far and away the most useful. For most sounds you should simply set both of these sliders to the left.

ENV - Envelope Group

1:Amp, 2:Osc, 3:Filter
These buttons select which envelope settings are controlled by the sliders and buttons in the ENV group. There are three envelopes. The first is used to control the overall amplitude of the sound. The second controls the oscillator frequencies, (by the amount, if any, specified with the Env slider in the OSC group). The third controls the filter cutoff frequency, (by the amount, if any, specified with the Env slider in the SVF group).

IMPORTANT: The overall duration of the sound is controlled by envelope 1, the amp envelope. This is logical, since no sound could be heard beyond the end of this envelope. However, special effects from the EFX group, such as echo, are not controlled by the Amp envelope. If a sound requires a little silent time at the end, for the echo effect to finish up, you will probably need to create a period of silence by taking advantage of the fact that an envelope setting of +001 is as inaudible as a setting of +000. Set the final stage of the envelope to decay from +001 to +000, and set its duration to the desired length of silence.

Like Amp
If this box is checked, the selected envelope tracks the amp envelope, (envelope 1). This is useful because it is so common to use only one envelope, (especially for the amplitude and the filters).

Stage 1, Stage 2, Stage 3, Stage 4, Stage 5
Each of these stages contain a box with two sliders. The first slider is labeled "T" for time, and the second is labeled "L" for level. "T" is the amount of time, (in milliseconds), that the envelope should spend reaching the level specified by the "L" setting.

FOR EXAMPLE: If the amp envelope were setup as follows: [100,255] [500,001] [125,000] [000,000] [000,000], the volume of the sound would spend 100 milliseconds rising to full volume. Then, 500 milliseconds falling to a volume of 1, then 125 milliseconds falling to a volume of zero. Since the rest of the stages are all set to a volume of zero, this would be the full duration of the generated sound, (725 milliseconds).

EFX - Special effects Group

All of the effects are stereo.

Off
Causes the effects to be bypassed.

Wide
Creates a stereo effect by adding a very subtle delay to the left channel of the sound.

Delay
Adds a delay to the left channel of the sound. This is a longer, more audible delay than the one "width" causes.

Chorus
Adds stereo chorus effect.

Pan
Causes the sound to pan from the left channel to the right.

Flange
Adds a flange effect.

Echo
Adds an echo effect.

GEN - Sound Generation Group

Make
Causes SimSynth to construct a sound, based on all of the parameters.

Load
Load a preset. SimSynth presets have the extent .SYN.

Save
Save a preset. SimSynth presets have the extent .SYN.

Base Frq.
The base frequency for the sound, in musical terms (note and octave).

x2
Doubles the length of the sample. This causes the sound to be twice as deep and slow.

Boost Amp
Boosts the amplitude by turning the volume "too loud". SimSynth attempts to simulate the type of results you get when you over-drive real audio equipment.

Opt Amp
If this box is checked, after the sound is generated, SimSynth amplifies the sound to be as loud as possible without introducing any distortion. This is good for the *signal to noise ratio.* It is rarely useful to use this setting with Boost Amp, because Boost amp produces a sound that is already full amplitude.

?
Provides access to the SimSynth menu.

Output configuration

11025, 22050, 44100
Selects output sample rate in hertz. SimSynth always generates a sound at 44100 hz. If a lower output rate is selected, SimSynth "shrinks" the wave to accommodate.

Stereo
Selects two channel output.

16 bit
Selects 16 bit output. SimSynth always generates a sound as a 16 bit sound. If this switch is off, 8 bit sound is implcitly selected, and SimSynth divides the resolution of each sample by 256 to accommodate.

Save
Save the output sound, usually as a Windows .WAV file. This option is not available if you are using the demo version of SimSynth.

IMPORTANT: Sounds are saved with the current output settings.

ALSO IMPORTANT: If you save a file with an extent other than .WAV, the result will be a "raw" PCM file. This can be useful if you are a programmer who plans to play the file from DOS using your own drivers.

Play
Plays the current sound. Specifically, the last sound generated by pressing the MAKE button in the GEN group. If a setting is changed, it's affect is not heard when the PLAY button is pressed, unless the MAKE button is pressed to regenerate the output.

Making a custom oscillator

You can create digital oscillators for use with SimSynth. These are saved as .OSC files, which

can be selected as the wave shape for an oscillator.

Gain access to the harmonic synthesizer through the SimSynth menu **(?)** option, "Make a custom oscillator". This is a dialog box with a simple array of 16 sliders, a MAKE button, a PLAY button, a LOAD button, and a SAVE button.

Note: Harmonic synthesis is more obscure than subtractive synthesis. If you are not familiar with the concept, just experiment with the sliders. It will be immediately obvious what affect they are having.

Sliders
Each adjust the level of a corresponding harmonic. The levels are relative, (i.e. setting only the first slider to 1, and the second to 2, gives the same result as setting the first slider to 35, and the second slider to 70. If only one slider is above zero, its setting does not matter).

MAKE
Generates a small sample of the oscillator which can be listened to by pressing the PLAY button.

PLAY
Plays the sample of the oscillator which was generated using the MAKE button.

Load
Allows selection of a custom oscillator for editing. Oscillator files use the extent .OSC.

Save
Allows saving of a custom oscillator for use with a preset. Oscillator files are saved with the extent .OSC.