

# SuperSaw Synth user manual

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## 1 About SuperSaw

SuperSaw synth was designed specially for recreation of various leads of melodic and uplifting trance, as well as hard house and dance. It's capable of synthetic sounds as well as airy leads and soft dreamy pads. However, it is not supposed to be used as a general-purpose synth.

### Features

- 2 independent supersaw oscillators
- 4 different algorithms to generate supersaw
- 6 hand-tunable oscillators
- Automagic supersaw oscillator resembling original Roland synth
- Amp envelope
- Low-pass filter envelope
- FDN Reverb, Chorus, Stereo delay
- Up to 50 presets

The synth does NOT feature anything you could possibly place later in the effect chain. No tunable filter, equalizer or arpeggiator. If you want to use any of the effects, choose your favourite solution. If you don't, CPU usage will be lower.

## 2 Controls

### Oscillator section

There are two supersaw oscillators. SAW1 is a fully-programmable set of oscillators, while SAW2 is autotune Roland emulation with only two controls.

Saw Mix knob fades between the two oscillators. SAW1 is on the left, while SAW2 on the right.

Air control fades between two supersaw smoothening algorithms. On the left there is anti-aliasign polyBLEP function, while on the right is key-following high pass filter.



### Saw 1



Supersaw consists of seven saw oscillators. First one is fixed at currently playing note, while the other six can be detuned by hand in range of  $\pm 20$  cents (0.2 semitone) each. Keep in mind that tuning curve is nonlinear and the point at the half of range gives exactly  $\pm 5$  cents. There is precise floating point indicator of frequency ratio for microtonal tuning.

## Saw 2



This supersaw resembles the autotuning feature of Roland hardware synth. The amount of detune for each of six oscillators is calculated automatically and controlled by Detune knob. Max detune of oscillators 6 and 7 is again  $\pm 20$  cents to match first supersaw. Additionally, Fine knob allows you to detune entire second supersaw by additional  $\pm 20$  cents.

## Envelopes

### Amp

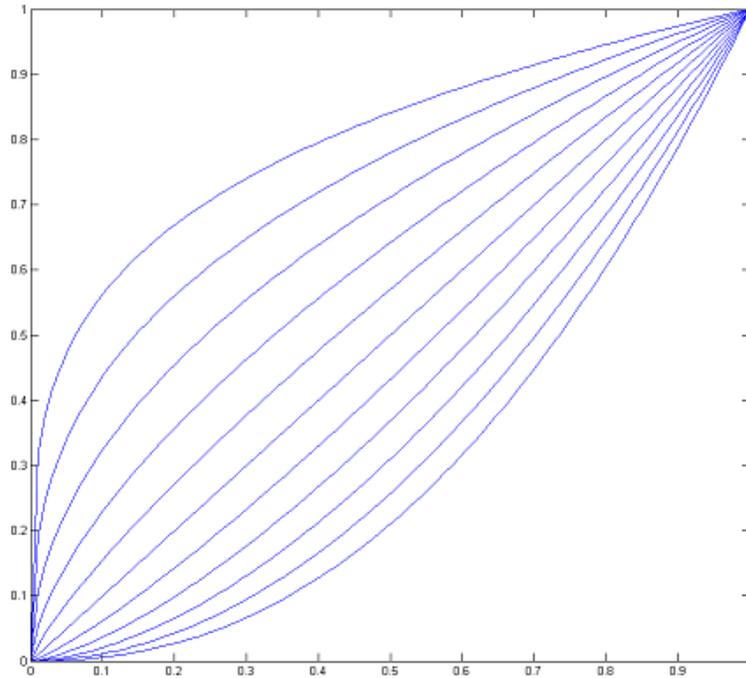


The basic ASDR knobs allow you to set attack, sustain, decay and release time of a note playing Shape - controls the exponent of envelope curve. The effect of shape applied to envelope attack is shown below. Envelope resonance - allows to add oscillations to envelope, resulting in more interesting sound.

### Filter



The ASDR, shape and envelope resonance act in same way like amplifier controls. Cutoff determines the frequency of low-pass filter. Amount is the positive value added to cutoff by envelope, up to Nyquist frequency at max setting. Filter resonance controls same parameter of digital filter, allowing to create hiss or screaming sound.



## Effects

### Reverb



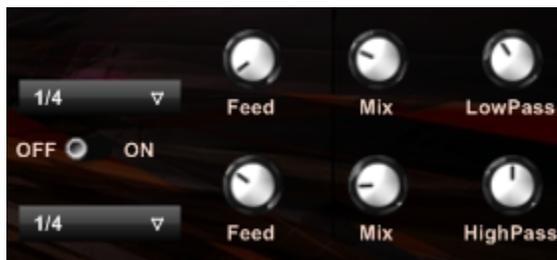
Reverb effect is based on simple implementation of feedback-delay network. Pre-delay determines the time after which first echo occurs. Time (in seconds) is the period after which echoes decay to zero. Dry/wet setting allows to mix between original and processed signal. K factor, named after Ronny K, is a custom solution that determines a cutoff frequency of high-pass filter in feedback loop, allowing to create airy, hissing sound in the background, still in tune with basic oscillators.

## Chorus



Chorus is an effect allowing to add polyphony and richness to sound, simulating multiple voices playing. Pre-delay and Dry/Wet function in the same way as in Reverb. Rate determines the modulation tempo of voices, higher setting results in more distorted sound. Depth determines the range (spanning) of voices and how much is the original sound affected.

## Delay



Stereo delay module adds echoes to sound, with period related to track frequency. Each channel can have different feedback ratio and mix. Also, low- and highpass filters allow to control frequency range of echoes.

## 3 Algorithms

There are two different algorithms used to produce supersaw. The classic one, produced by turning "Air" knob to the right, is key-following high-pass filter used in original Roland synth. As the name of the knob suggests, it produces the very uplifting sound everybody's after. The other, used when "Air" knob is turned left, is the PolyBLEP anty-aliasing algorithm. It produces more balanced sound and is suitable for pads or ambience.

To sum things up, to get the sound of original Roland synthesizer, turn both "Air" and "Saw Mix" knobs max to the right.

## 4 References

- How to create a supersaw - Adam Szabo
- Computationally Efficient Music Synthesis – Methods and Sound Design - Jussi Pekonen
- Phaseshaping Oscillator Algorithms for Musical Sound Synthesis - Jari Kleimola<sup>1</sup>, Victor Lazzarini, Joseph Timoney, Vesa Välimäki

Send your feedback, opinions, presets or just contact me at [djwarmonger@myspace.com](mailto:djwarmonger@myspace.com).

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## 5 Credits

- Thanks to Adam Szabo for his awesome reverse engineering of Roland synth.
- Thanks to Trogz for sound flow help and advice.
- Thanks to Lopeytunes for knob graphics.
- Thanks to Cyto for reverb and subnormal help.
- Thanks to all the Synthmaker forum contributors for their modules used to build this synth and anybody else I forgot to mention.