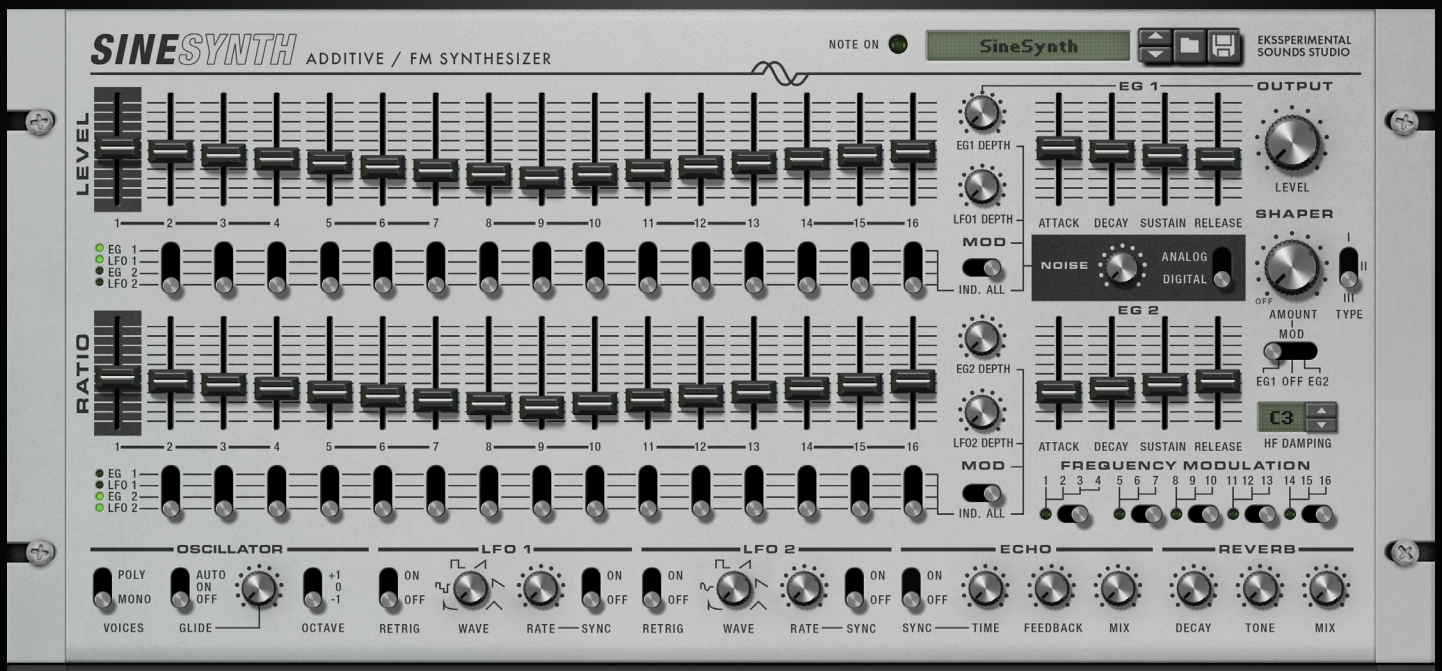
Re
Rack Extension

SINESYNTH

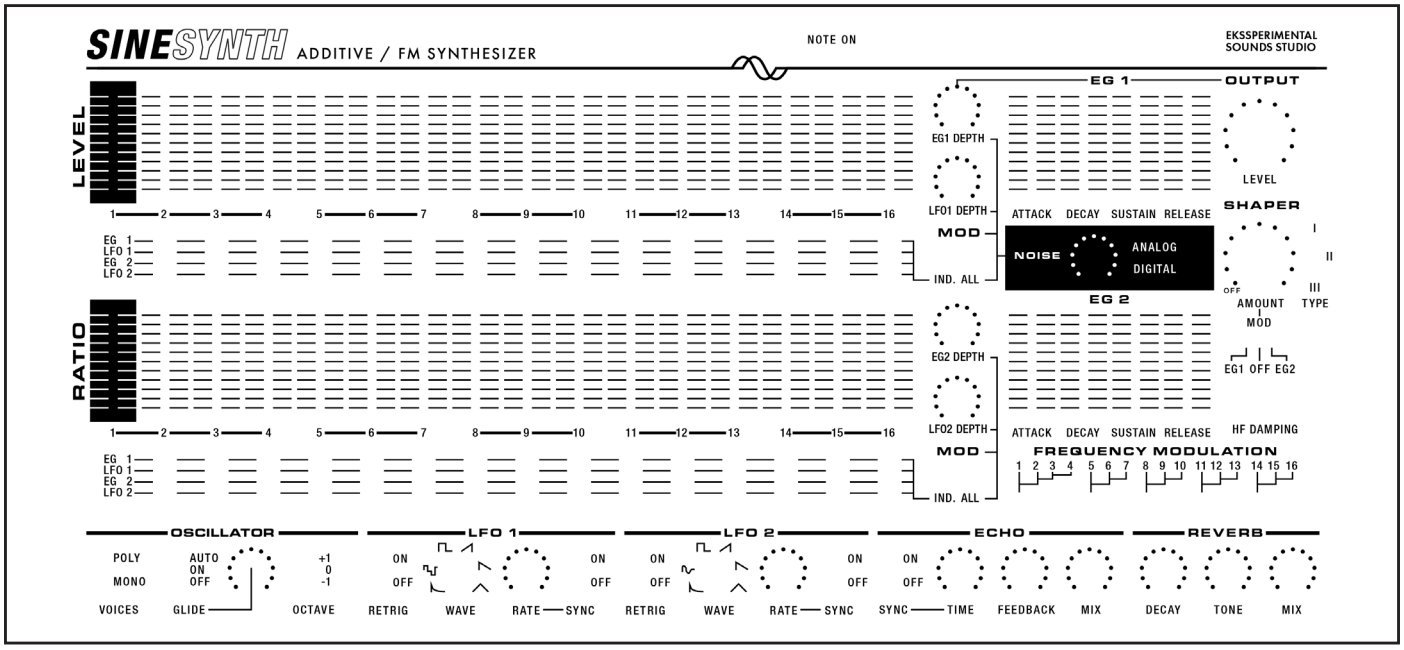
ADDITIVE/FM SYNTHESIZER



1.0.0 USER GUIDE

EKSSPERIMENTAL SOUNDS STUDIO

Front Panel

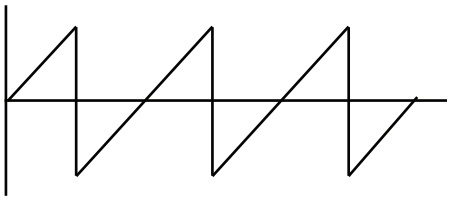


Levels and ratios?

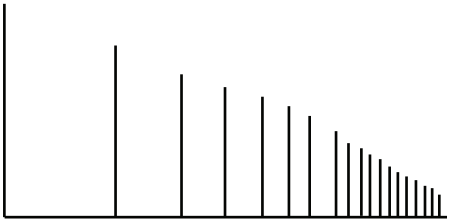
A brief introduction

SineSynth is an additive synthesizer with Frequncy Modulation capabilities that is based around sinewaves.

Any sound can be generated by combining sinewaves of different amplitude and frequency - you can say that sinewaves are the building blocks of any sound!
For example a sawtooth wave is constructed of a series of frequencies illustrated roughly here:



Sawtooth wave in an oscilloscope



Sawtooth wave in spectrum analyzer

The peaks in the spectrum analyzer represents the frequencies present in the sawtooth waveform. Each peak is on it's own a pure sinewave. So by combining several sinewaves of different frequency and amplitude it is possible to recreate other waveforms, even a square wave! Well, technically it would require an near infinite number of sinewaves to get perfectly sharp edges, but one can come pretty close with as little as 16 sinewaves. And, when adding a waveshaper to the signal it can get sharp edges quickly!

SineSynth has 16 sine oscillators and these are refered to in this manual as a "*Partials*" because each one will be a part of the waveshape that they form together.

By modulating the level and pitch of the partials you can create a near infinite number of different sounds!

LEVEL FADERS

1-16

Use these faders to set the level for each partial.

RATIO FADERS

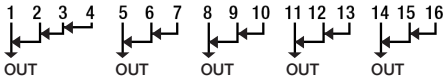
1-16

Use these faders to set the ratio (pitch) for each partial.
Keep in mind that if you modulate partial 1 ratio via CV the pitch of all other partials will be effected since they are ratios in relation to the first partial.

FREQUENCY MODULATION

16 operators in 5 groups

The partials in SineSynth can modulate each other by activating the **FREQUENCY MODUALTION** switches. The routing shown on the panel explains how they interact:



Partials 1, 5, 8, 11 and 14 are carriers whilst the others are modulators. The first group contains 4 Operators while the other 4 groups contains 3 each.
The carriers will be modulated be the next partial, which in turn is modulated by the next after that. The amount of modulation is set with the Level fader of each Partial.

SHAPER

Use the **TYPE** switch set what type of shaping to apply. "**I**" is Soft Ring Modulation, "**II**" is Hard Ring Modulation and "**III**" is waveshaping by applying a Tahn shape drive to the signal.

NOISE

Analog & Digital

Add white **NOISE** to the oscillator signal. When set to digital the signal also goes through a bit reduction filter for lo-fi fidelity. The noise level is controlled by **EG1**.

OUTPUT

Level

Set the over all volume with the **LEVEL** knob. The output level is shaped by Envelope Generator 1.
There is a hard clipping limiter on the output, to avoid extreme audio peaks.

MOD sources – EGs and LFOs

Envelope Generators & Low Frequency Oscillators

EGs and **LFO**s are used to modulate the levels and ratios of the partials.
EG1 & LFO1 are by default linked to levels while EG2 and LFO2 are linked to ratios. These can be unlinked by using the **MOD** switch.

When EG1 and LFO1 **MOD** is set to "**ALL**" all partial levels are modulated by *both* EG1 and LFO1. When set to **IND.** the partial levels are modulated by the source set below each partials level fader. Notice that the source selector is not operational when EG1 and LFO1 MOD is set to ALL.
When EG2 and LFO2 **MOD** is set to **ALL** all partial ratios are modulated by *both* EG2 and LFO2. When set to **IND.** the partial ratios are modulated by the source set below each partials ratio fader. Notice that the source selector is not operational when EG2 and LFO2 MOD is set to ALL.

When **MOD** is set to **IND.** the first partial (**1**) level and ratio is fixed at the fader position and connot be modulated by EGs or LFOs. This is handy since the first partial will be a stable reference point for balancing and tuning the other partials to.

The active modulation sources are indicated by the four LEDs below partial 1 level and ratio.

The LFOs can be set to **RETRIG** with each note and **SYNC** to the song tempo with the two corresponding switches.
LFO1 has a sharp random wave shape whilst **LFO2** has a softer drifting random wave shape.

EG2 and LFO2 has a deeper modulation effect, about 10x as strong as EG1 and LFO1.

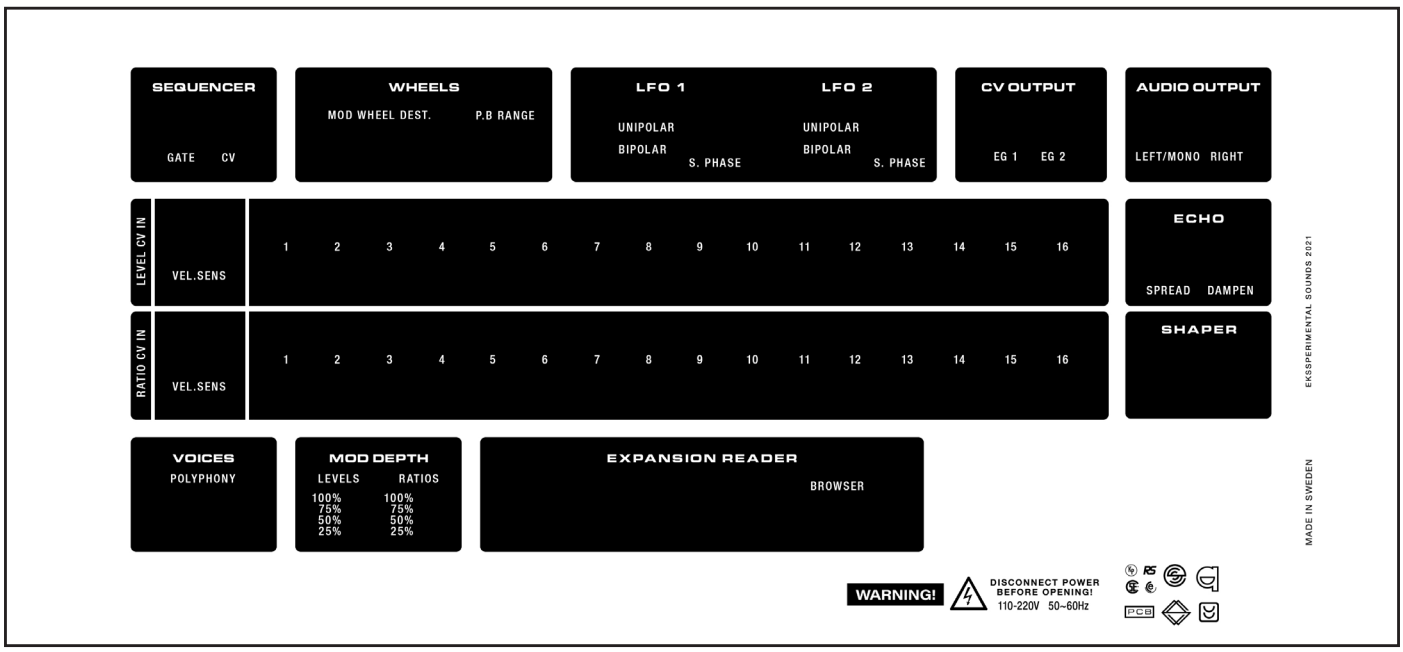
EFFECTS

Echo & Reverb

The **ECHO TIME** can be set to **SYNC** to the song tempo using the switch. **FEEDBACK** will controll how many repetitions are made and **MIX** will set the balance of echo and dry signal.

Reverb **DECAY** controlls the length of the reverberation. For imitating large spaces use longer decay time. The **TONE** controll will dull or brighten the decay signal. The **MIX** will set the balance of reverb and dry signal.

Back Panel



CV
Control Voltage jacks

Use control voltage to modulate the labeled parameters. Use the small trim knobs next to the jack for adjusting the level of modulation.
The EG CV output has a slighlty smoothen signal.

Wheels
Modulation & Pitch wheel behaviour

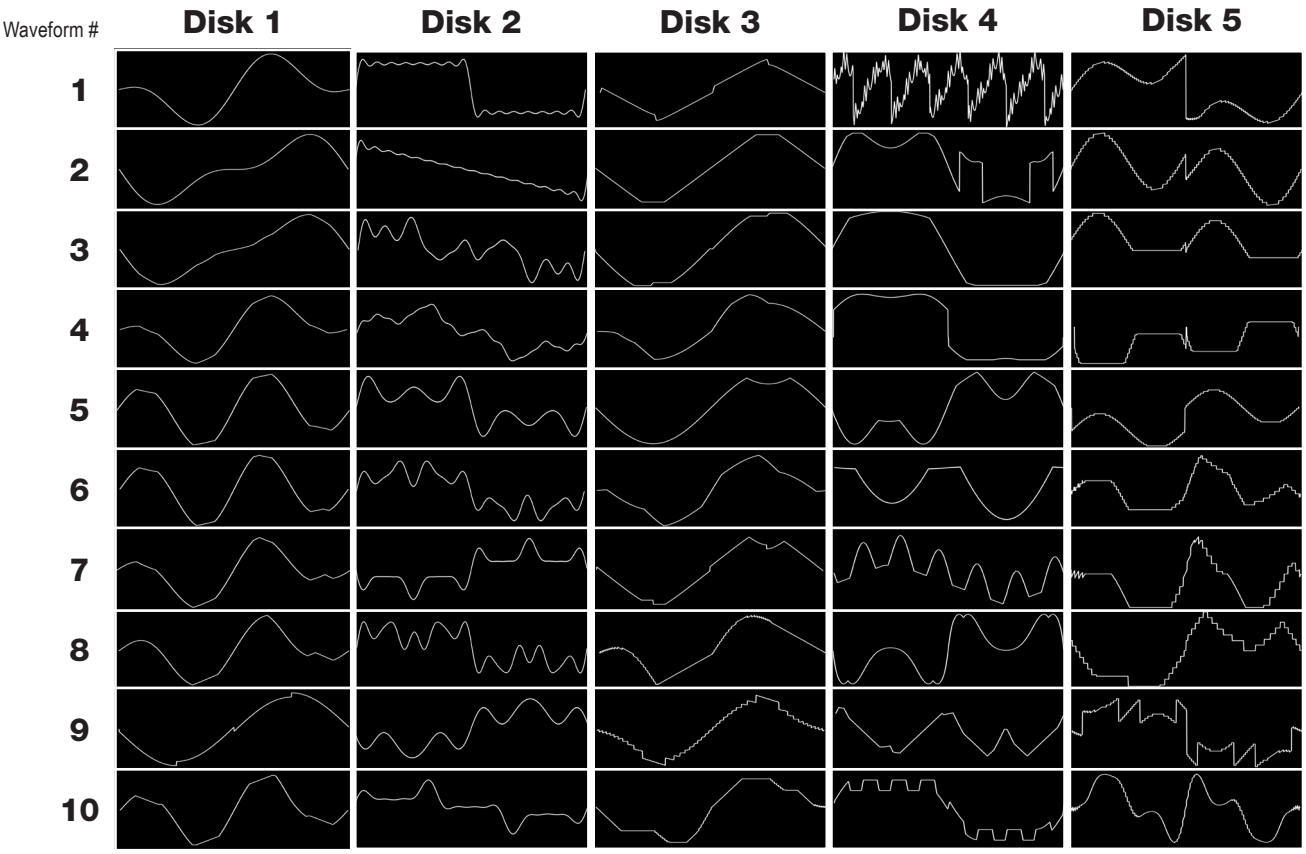
Set the destination for Mod wheel modulation and the range of the pitch bend wheel with these buttons.
If set to LFO depth the mod wheel will scale the amount set by knobs on the front panel.

Trimmers
Vel. Sens, Mod Depth, Polarity, Phase, Echo

Use these trimmers to dial in the prefered levels and behaviour of corresponding functions.

Expansion Reader
3,5in Floppy reader

SineSynth comes with 5 included floppy disks containing 10 waveforms each. When a disk is loaded you can use the **BROWSER** up/down arrows to select between the 10 waveforms on the disk to replace the defaul sinewave with. The current disk name and waveform index are displayed in the browser window.
Below is a chart of the included waveforms:



Thank you for supporting Ekssperimental Sounds Studio!

Ekssperimental Sounds Studio is a one man project driven by the passion for experimental electronic sounds, new and old synthesizers and music gear. As a Reason user since 2001 it truly is a dream come true to finally be able to create my own synthesizers and effects for the Reason rack.
Thanks to all of you who buy my products I can continue to learn and develope more fun and inspiring devices for our beloved rack.

I hope you will enjoy SineSynth!

Cheers,
Erik Söderberg 2021