Theoretical Backgrounds of Audio & Graphics

Subtractive Synthesis

Till Bovermann | Dr.-Ing.
Audio & Interactive Media Technologies

Filmuniversität Babelsberg
KONRAD WOLF

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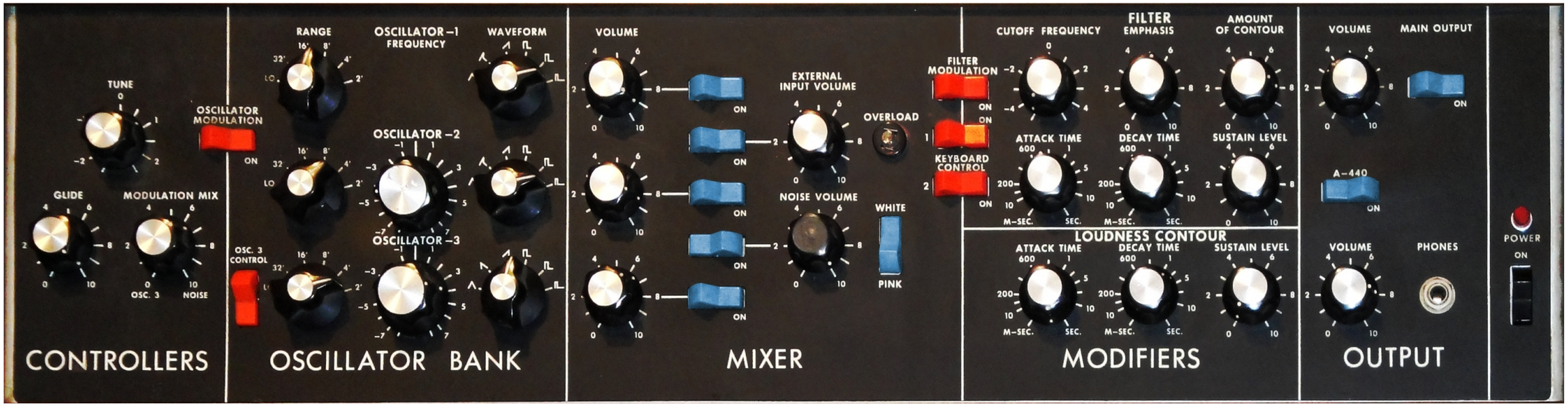
Top LOTs

1. Subtractive Synthesis
    1. overview
    2. tone generator
    3. controlled amplifier
        1. LFO
        2. Envelopes
    4. Filter

Subtractive Synthesis

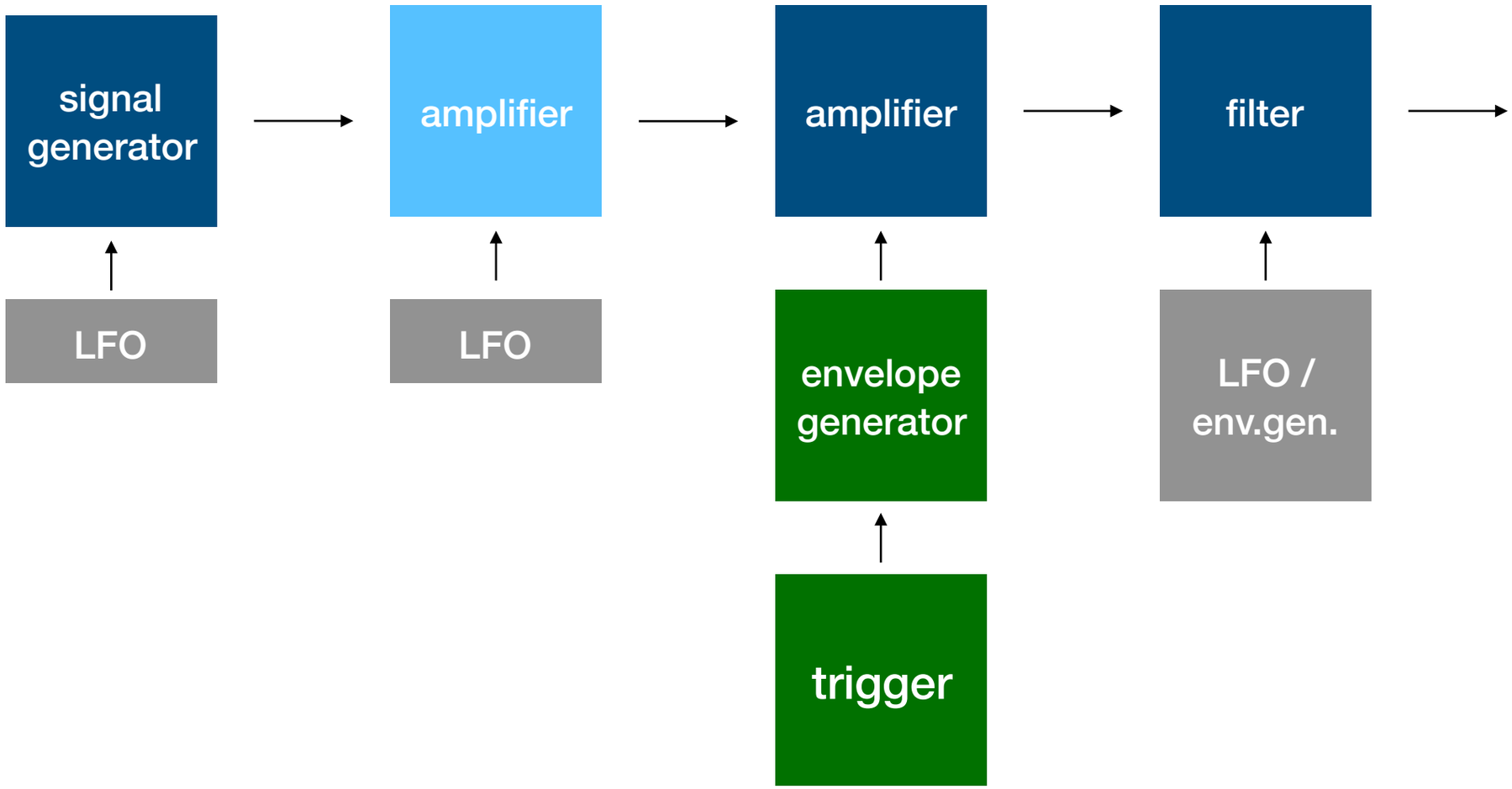
Overview



minimoog faceplate

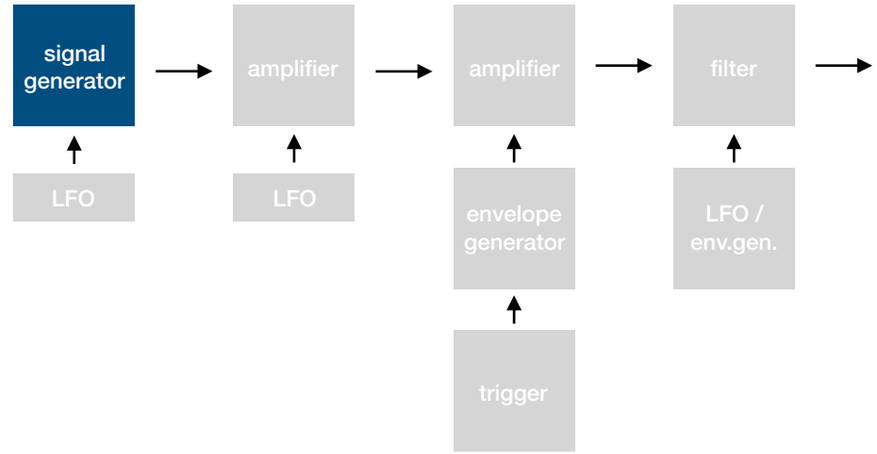
[https://commons.wikimedia.org/wi

Overview


signal generator
amplifier
amplifier
filter
LFO
LFO
envelope generator
LFO / env.gen.
trigger

Signal generator

VCO — Voltage Controlled Oscillator



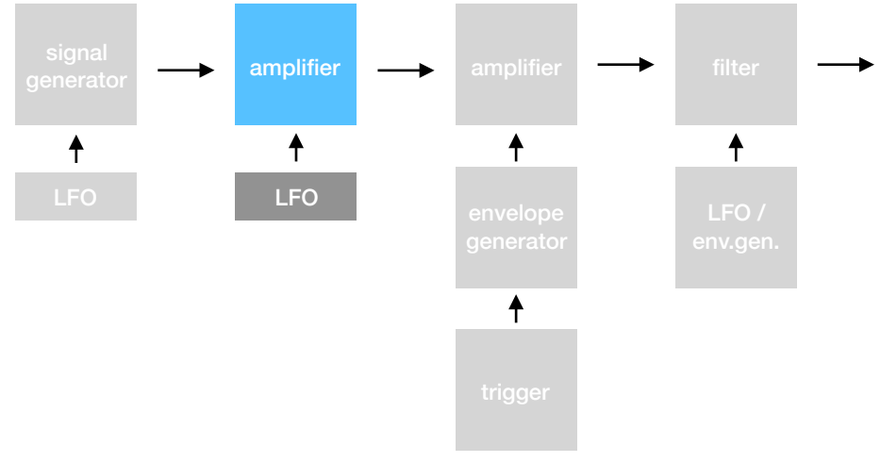
complex waveform generator

- sawtooth
- pulse
- triangle
- impulse
- noise

at different harmonics

Subtractive Synthesis

Amplifier / LFO

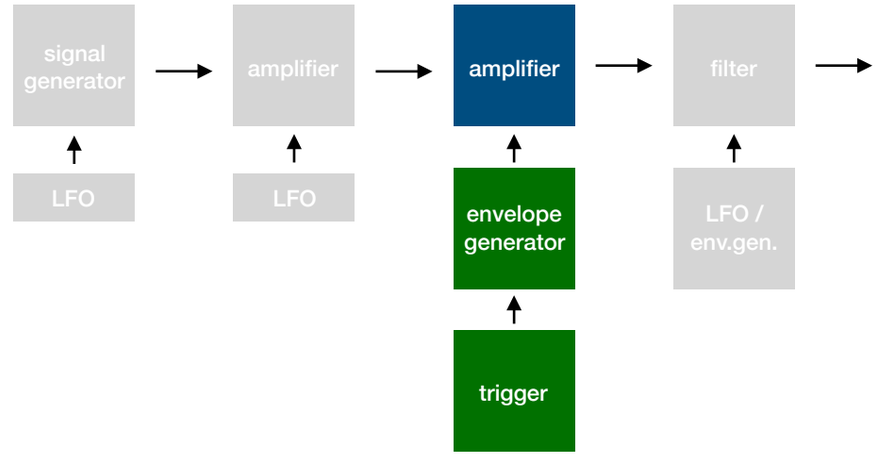


Amplifier as Modulation

- LFO — low-frequency modulator
- $y[t] = x[t] * \mathrm{lfo}[t]$
- LFO ranges typically between 0 and $20\mathrm{Hz}$

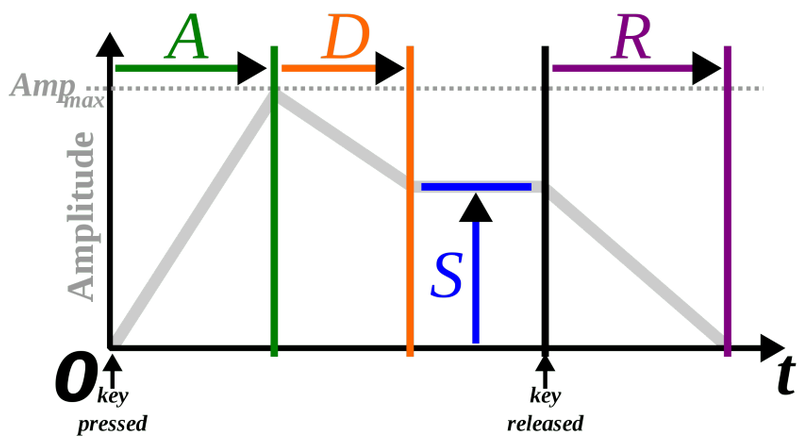
Amplifier / Envelope

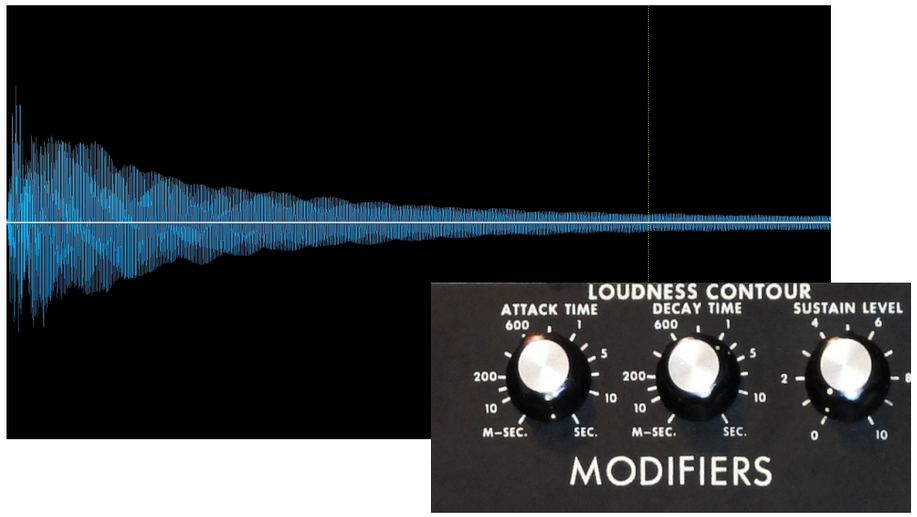
VCA — Voltage Controlled Amplifier



amplitude control mimicking natural sounds

- ASR — attack, sustain, release
- ADSR — attack, decay, sustain, release
- complex forms

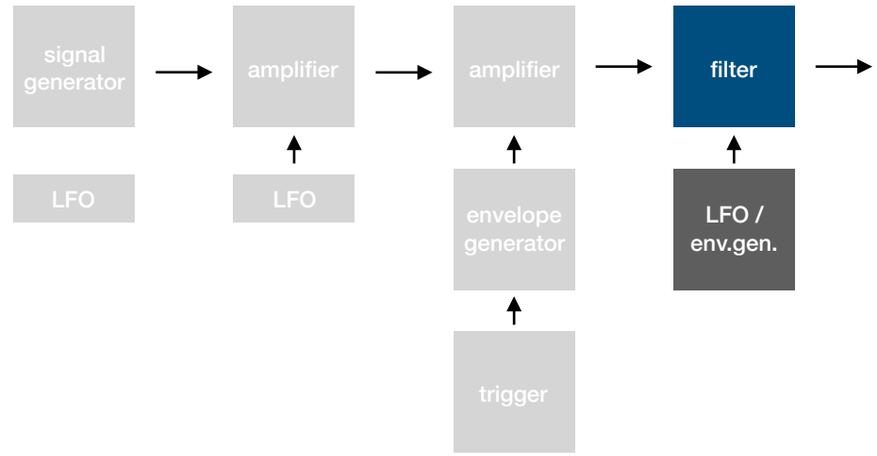




[https://en.wikipedia.org/wiki/Envelope_(music)#/media/File:ADSR_parameter.svg]
[https://freesound.org/people/PACWAY/sounds/442978/]

Filter

VCF — Voltage Controlled Filter



filtering (= removing) frequency content

- low-pass == high-cut
- high-pass == low-cut
- band-pass
- (band-reject)

[https://en.wikipedia.org/wiki/Envelope_(music)#/media/File:ADSR_parameter.svg]
[https://freesound.org/people/PACWAY/sounds/442978/]

References & Further Reading

- Gordon Reid in Sound On Sound on (analogue) subtractive synthesis
  - **introduction** — https://www.soundonsound.com/techniques/whats-sound
  - **LFO/VCO** — https://www.soundonsound.com/techniques/modifiers-controllers
  - **Analogue Filter (1)** — https://www.soundonsound.com/techniques/filters-phase-relationships
  - **Analogue Filter (2)** — https://www.soundonsound.com/techniques/further-filters