



WELCOME TO INTERAKTIV MUSIKK

Spring 2022
WEEK 3

Interactive Music

SYLLABUS

INSTRUCTORS: Çağrı Erdem, Qichao Lan

TIME: Tuesday 09:15–10:00 and Friday 12:15–14:00

LOCATION: ZEB, Seminarrom 2

WEEKLY SCHEDULE

WEEK 1 Introduction: Microphones, tools, effects, and noise

WEEK 2 Analogue Synthesis 1: Main concepts and parameters

WEEK 3 Analogue Synthesis 2: Sound sources and processors

WEEK 4 Collaborative performance and Live Coding

WEEK 5 Digital Synthesis 1: Introduction to Pure Data

WEEK 6 Digital Synthesis 2: Basics, oscillators, and filtering

WEEK 7 Digital Synthesis 3: Audio effects

WEEK 8 Digital Controllers 1: MIDI

WEEK 9 Digital Controllers 2: Sensors and mapping

WEEK 10 Ensemble 1: Composition and improvisation

WEEK 11 Ensemble 2: Final concert preparation



COURSE DESCRIPTION: This course provides students with knowledge and skills in designing, building, and performing with various musical instruments and interactive music systems. Students learn the basics of sound synthesis, gain hands-on experience on hardware synthesizers, digital controllers, and audio programming, explore new methods for musical expression and produce artistic works for electroacoustic music ensembles.

Analog Synthesis part 2

a) Main elements

- Pitch
- Timbre
- Volume

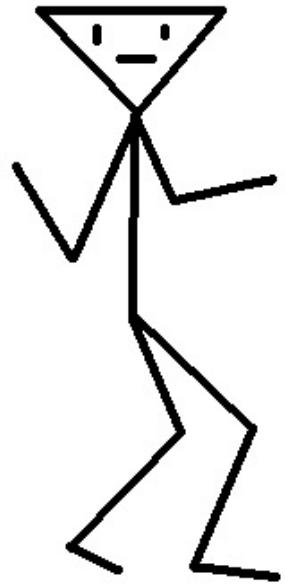
WEEK 3

Sound waves



WEEK 3

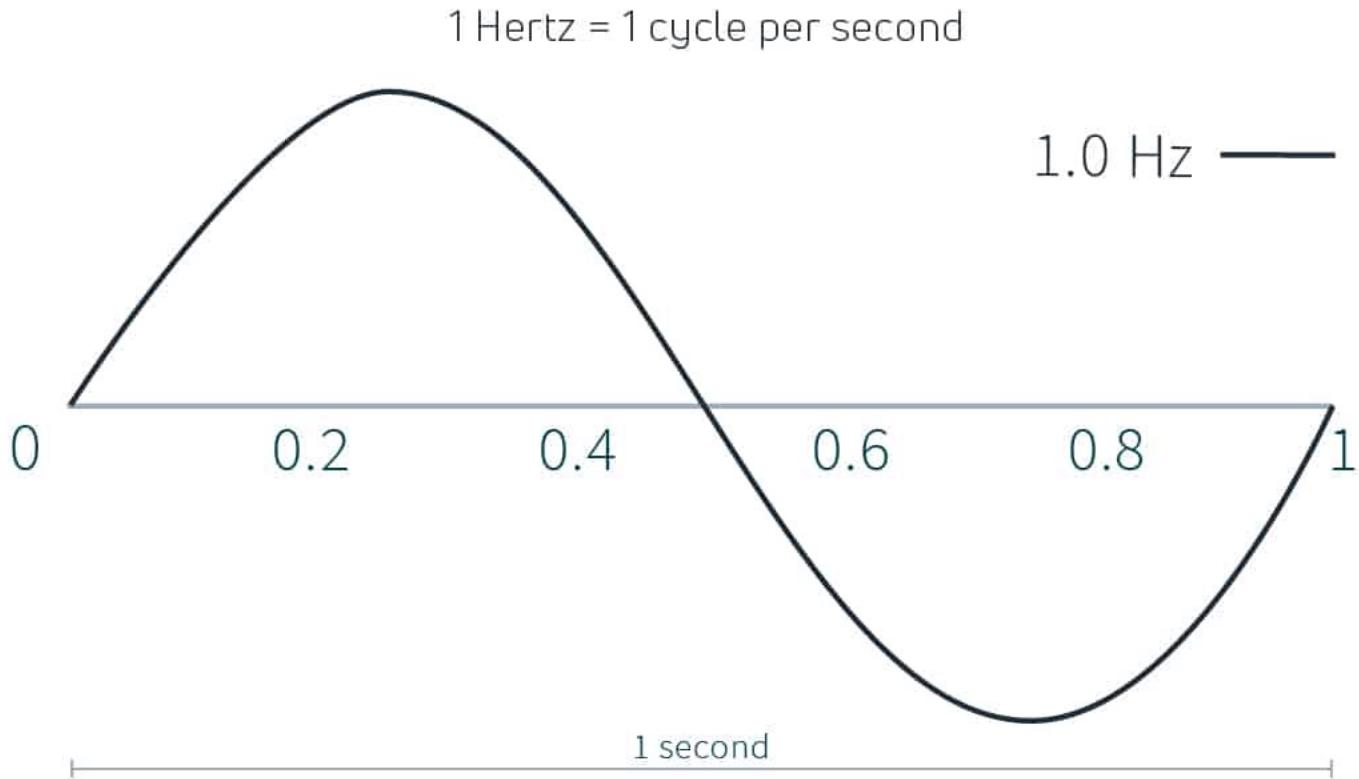
Frequency



glickr.com

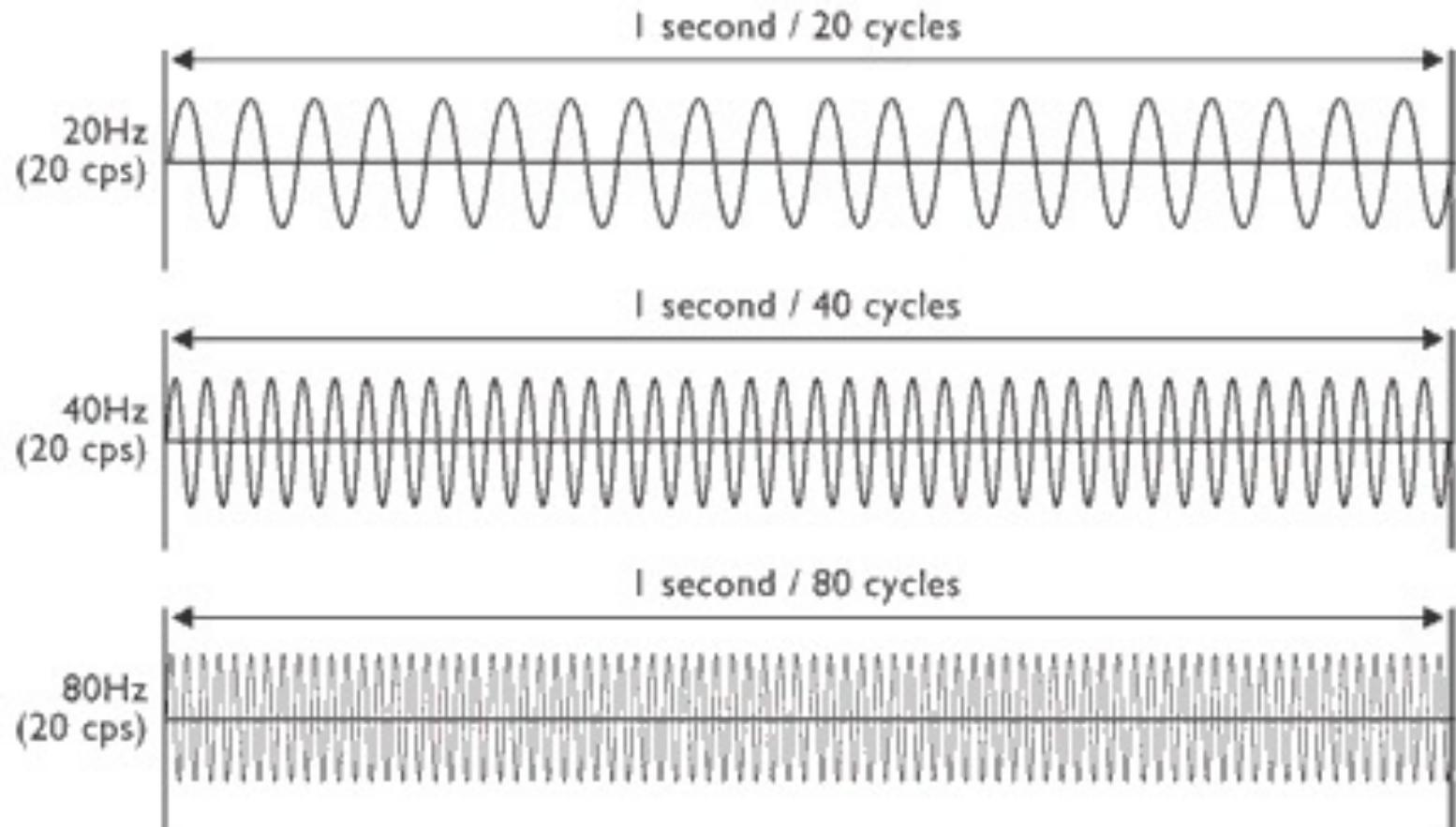
WEEK 3

Frequency

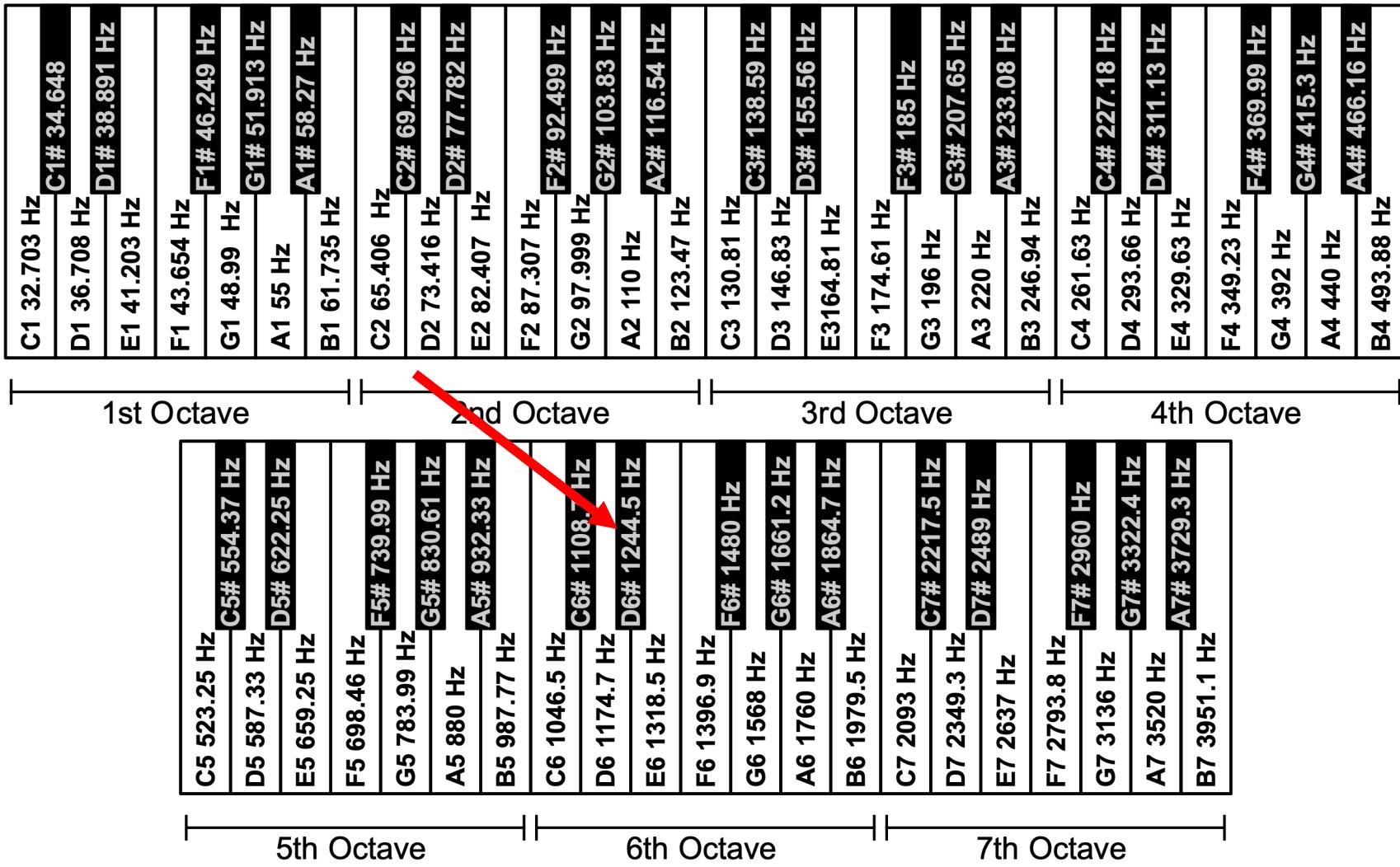


WEEK 3

Frequency



WEEK 3
Pitch

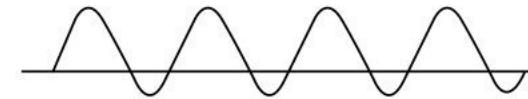


WEEK 3

Timbre



Tuning fork



Flute



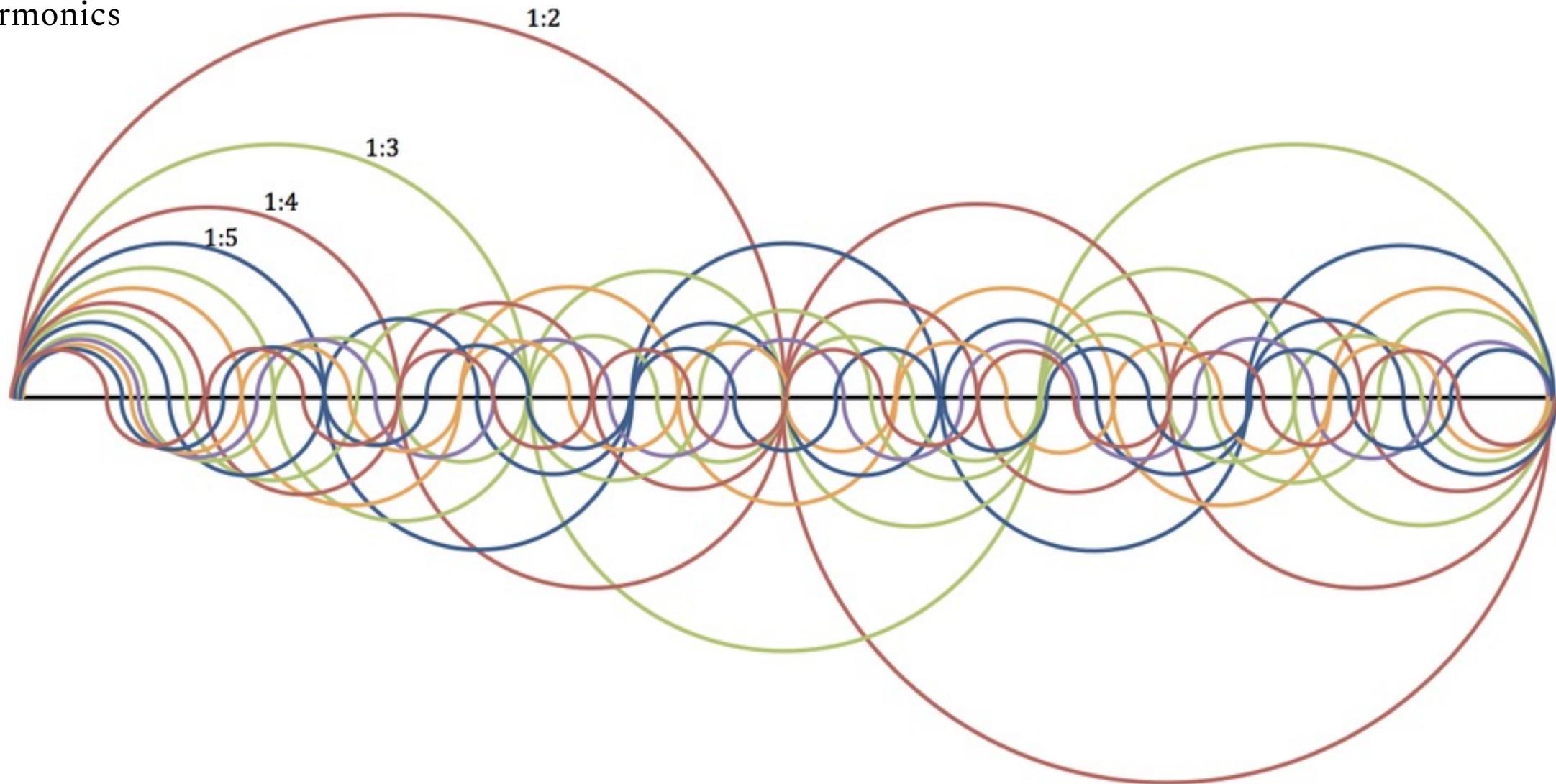
Voice



Guitar



WEEK 3
Harmonics



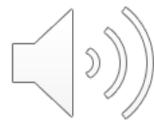
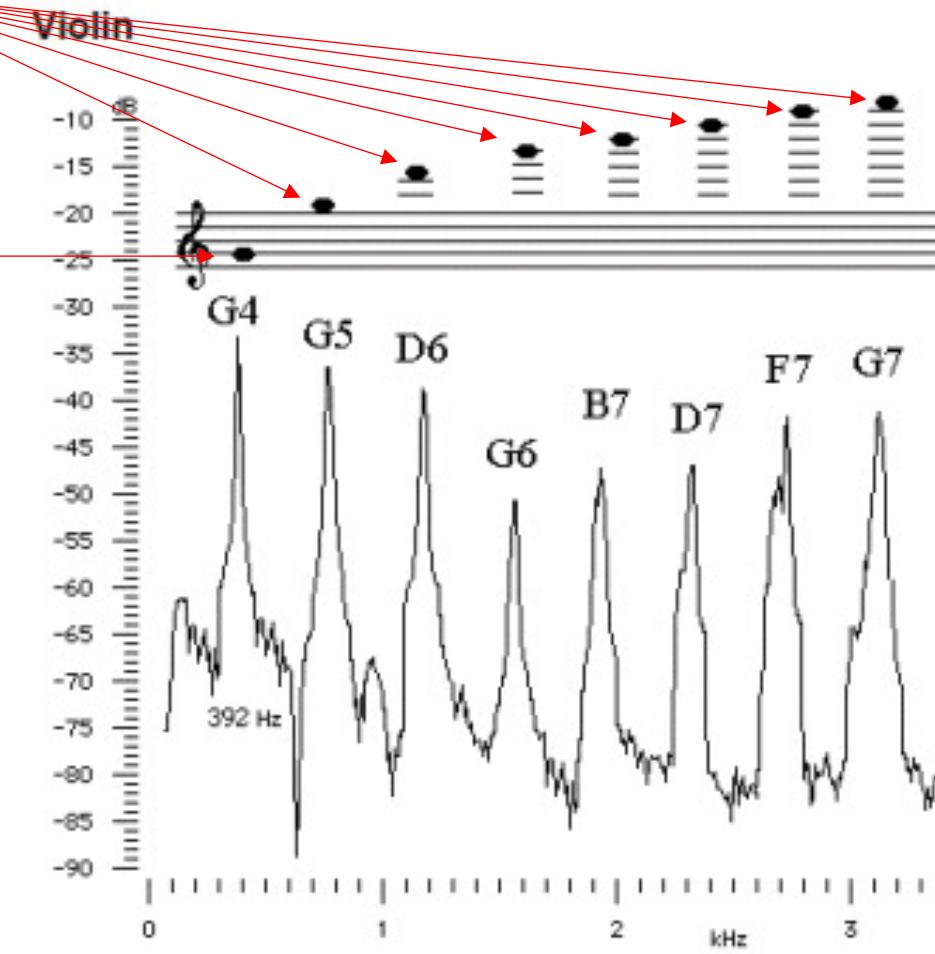
WEEK 3
Harmonics



WEEK 3

Harmonics

Fundamental

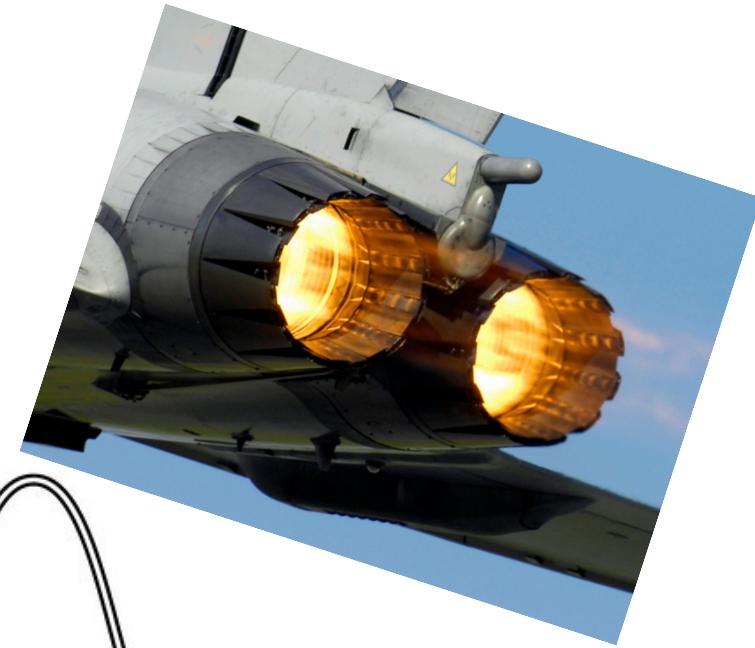
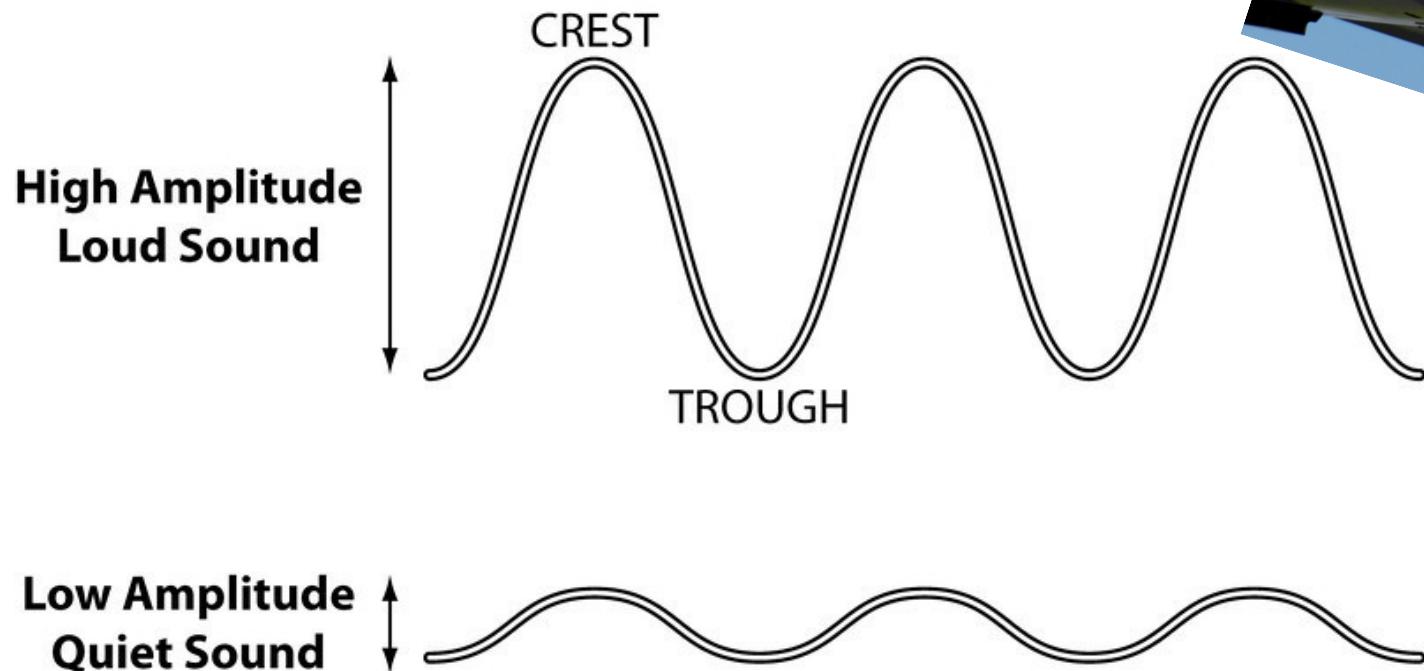


356045__mtg_violin-g4.wav

WEEK 3
Volume

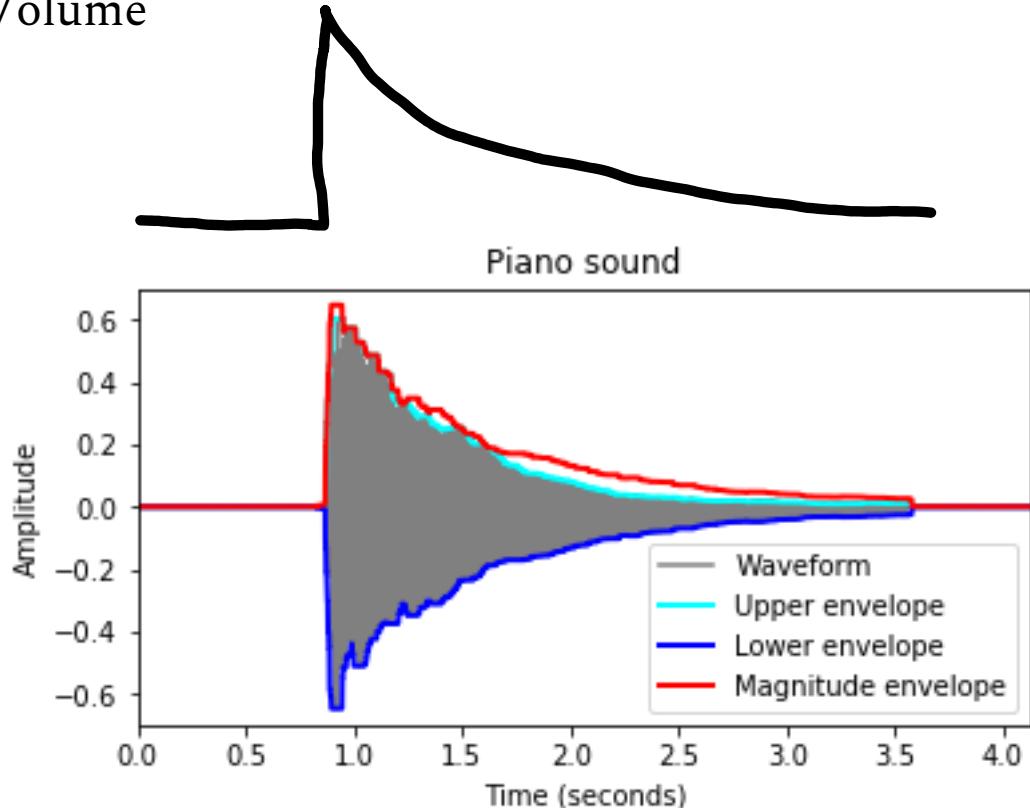


Amplitude of Sound Waves

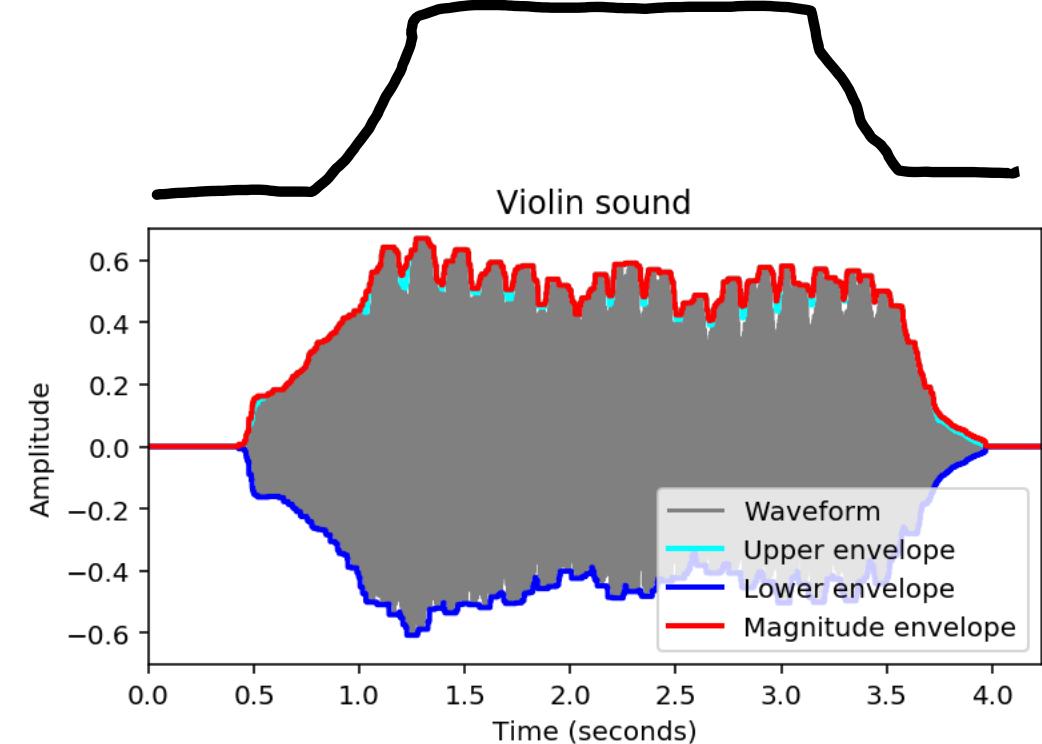


WEEK 3

Volume



piano_env.wav



violin_env.wav

WEEK 3
Envelope



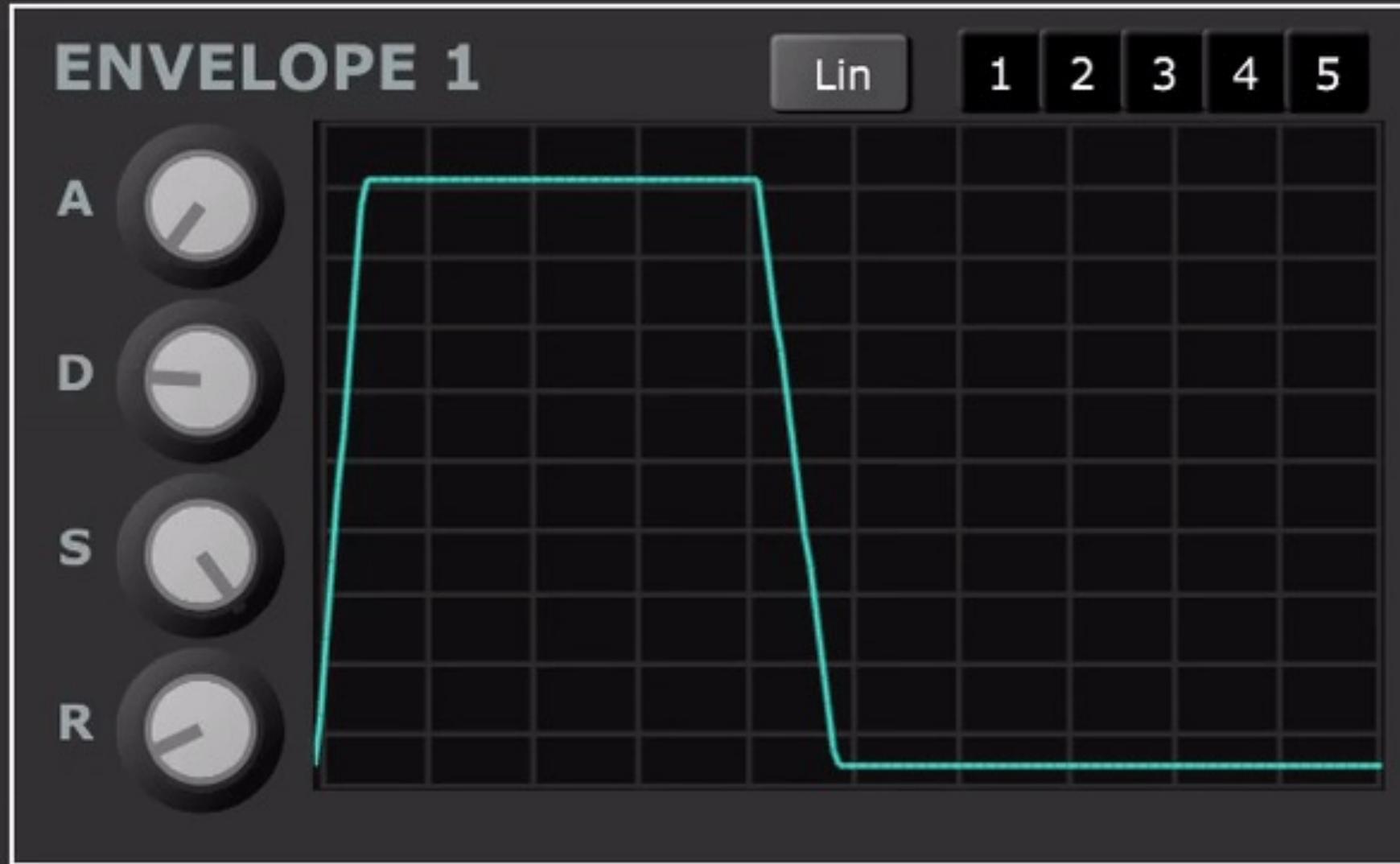
WEEK 3
Envelope

Attack

Decay

Sustain

Release



WEEK 3

Analog Synthesis part 2

a) Building blocks

WEEK 3

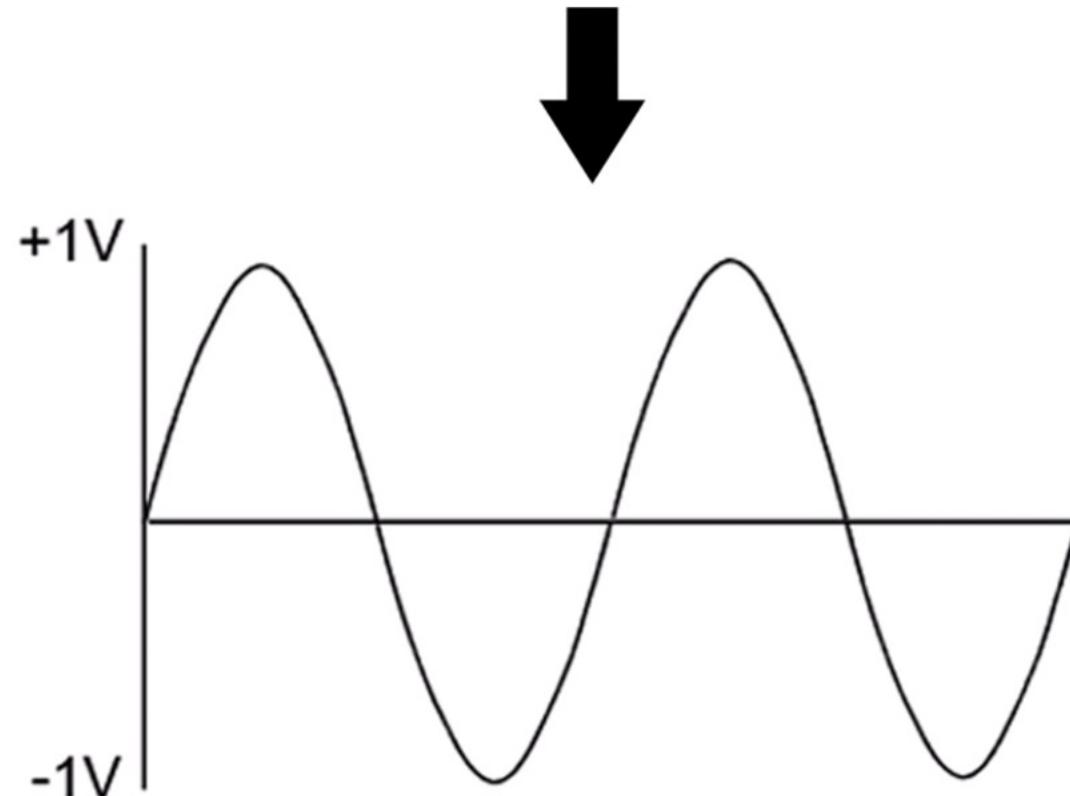
Oscillator

oscillate (v.)

1726, intransitive, "to vibrate, move backward and forward," as a pendulum does, a back-formation from **oscillation**, or else from Latin *oscillatus*, past participle of *oscillare* "to swing." Transitive sense of "cause to swing backward and forward" is by 1766. From 1917 in electronics, "cause oscillation in an electric current." Related: *Oscillated; oscillating*.

WEEK 3
Oscillator

Sine wave oscillator

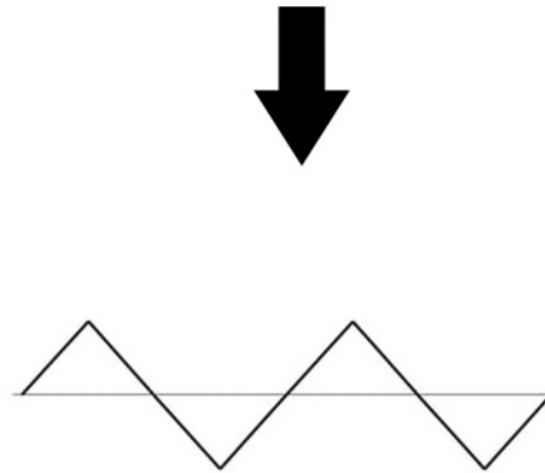
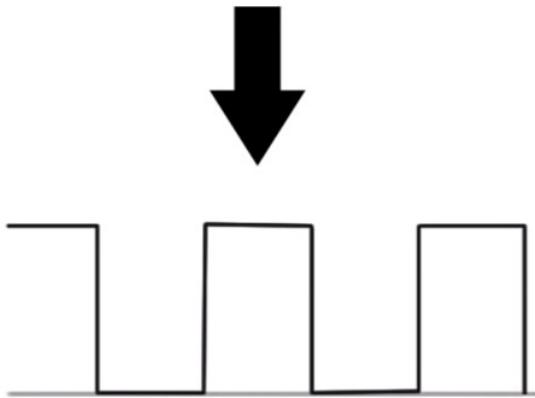


WEEK 3

Oscillator

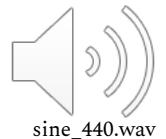
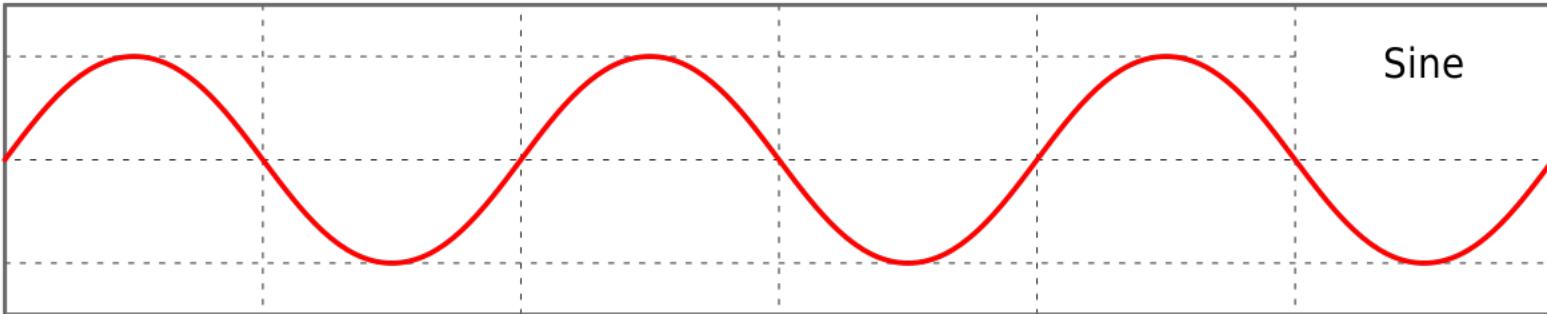
Square wave oscillator

Triangle wave oscillator

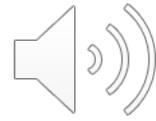
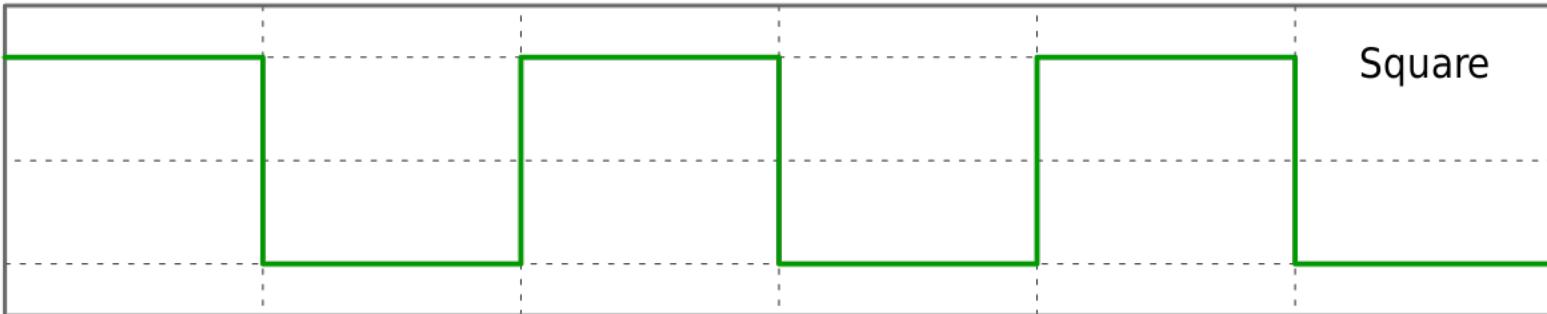


WEEK 3

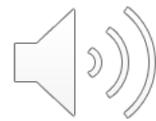
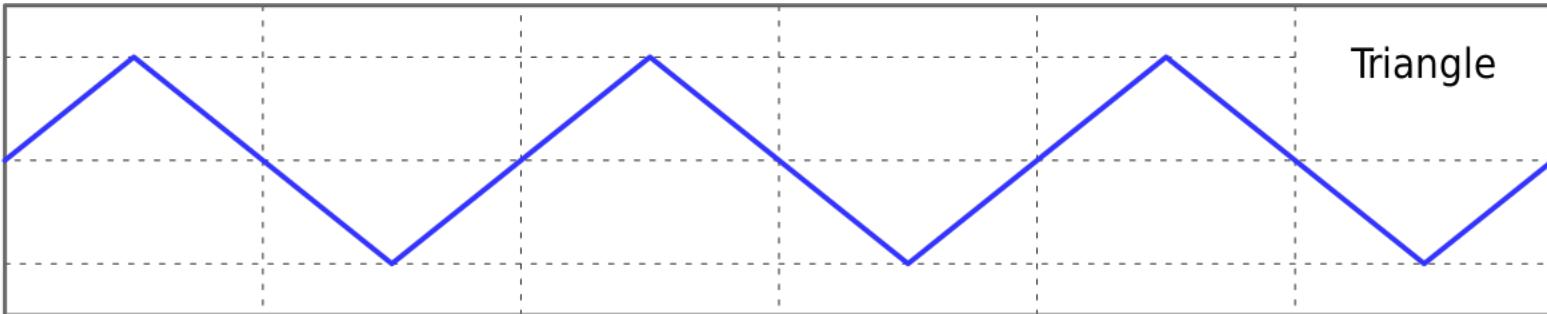
Waveforms



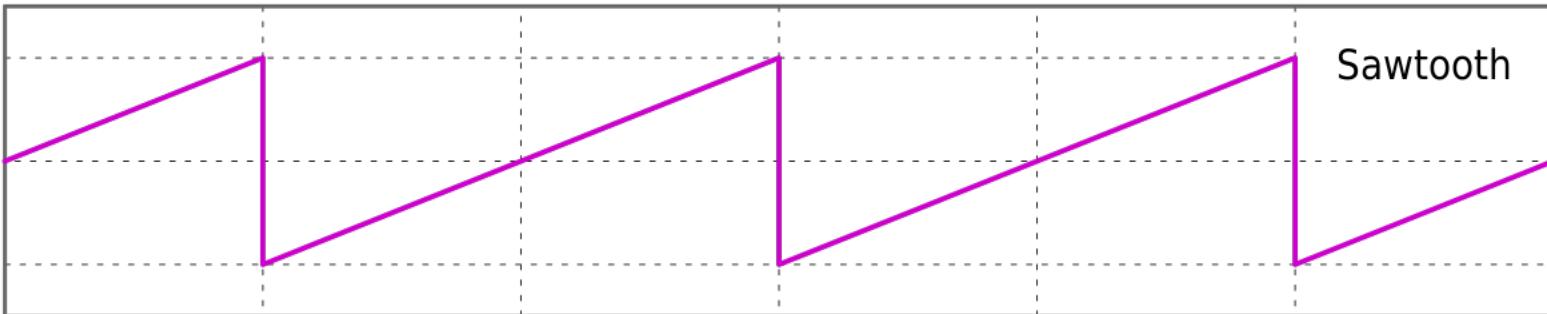
sine_440.wav



square_440.wav



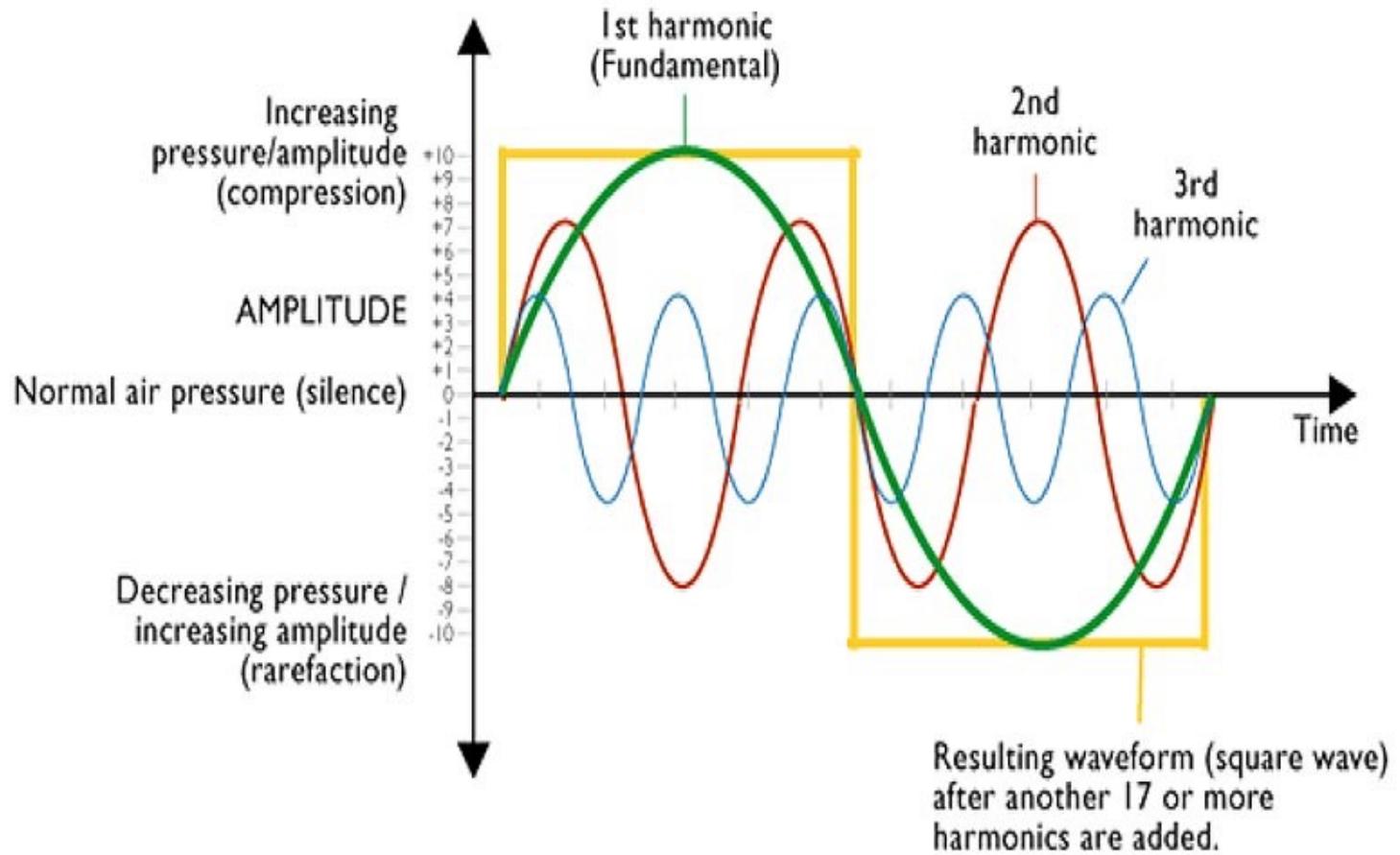
triangle_440.wav



saw_440.wav

WEEK 3

Waveforms

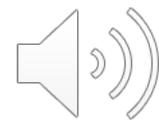
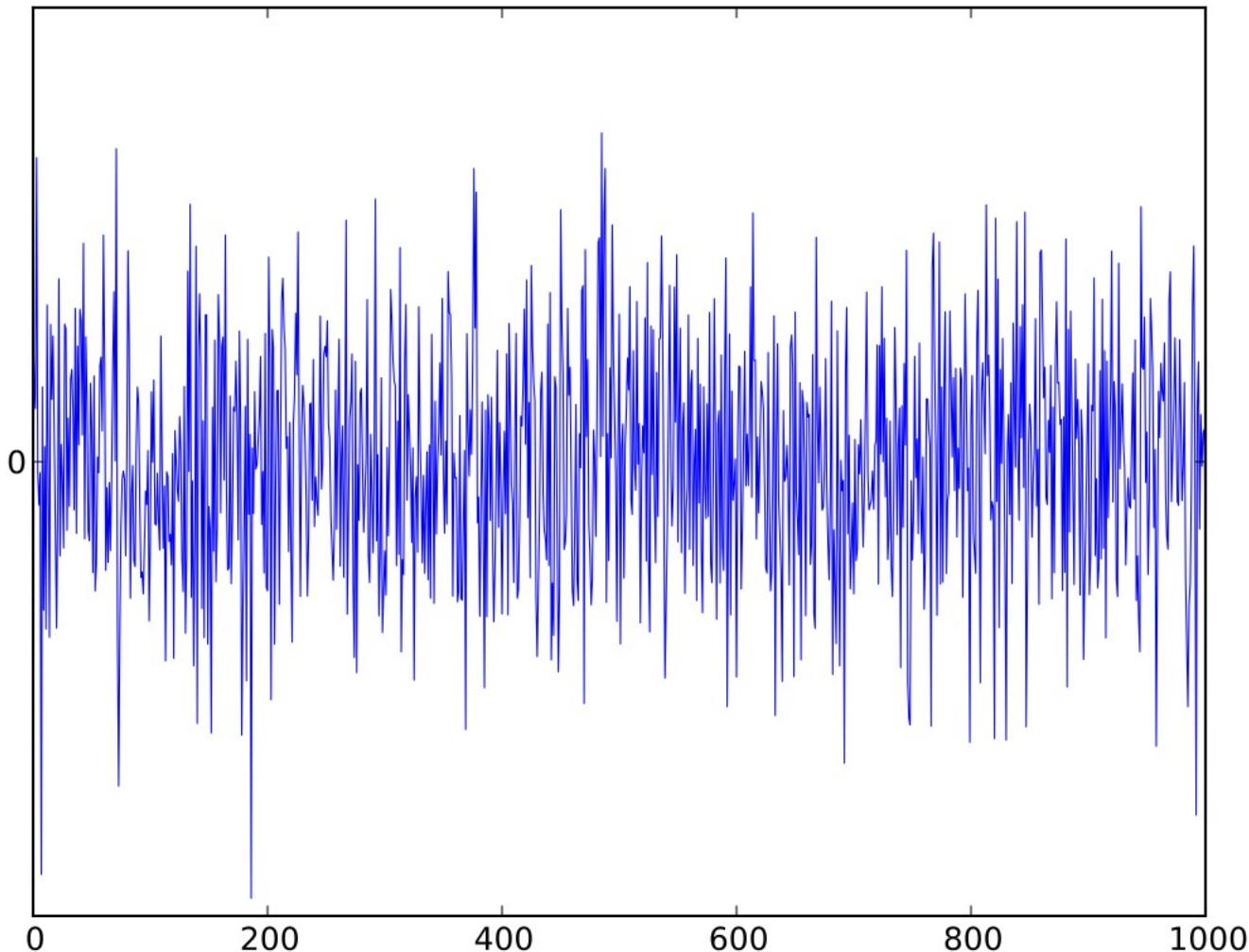


WEEK 3

Waveforms



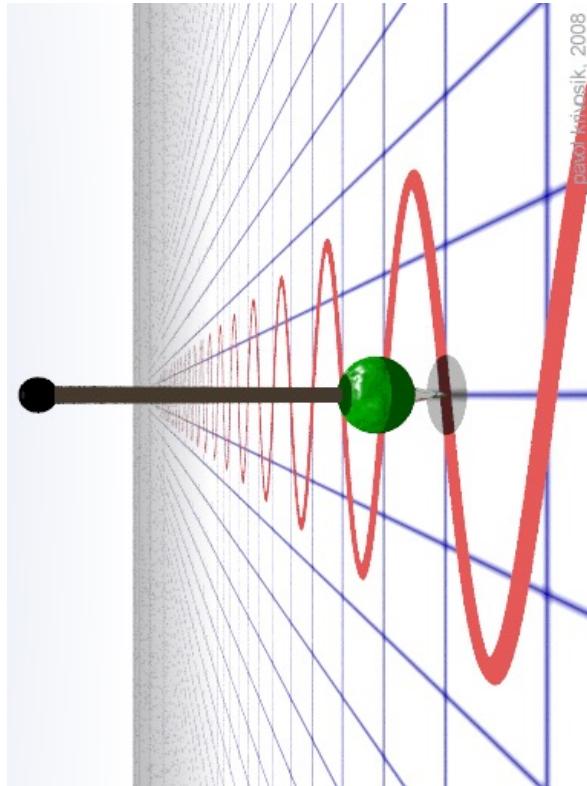
white-noise_wideSpec.wav



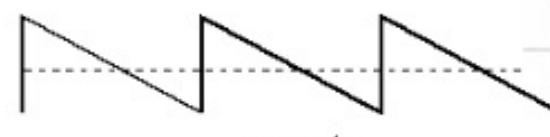
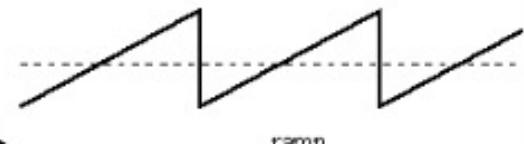
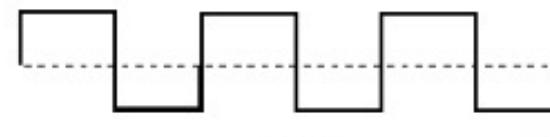
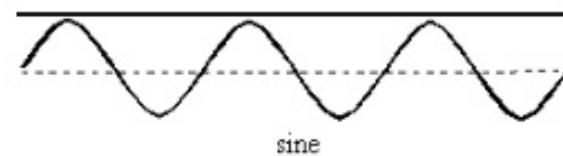
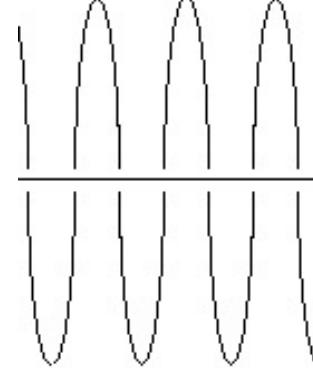
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WEEK 3

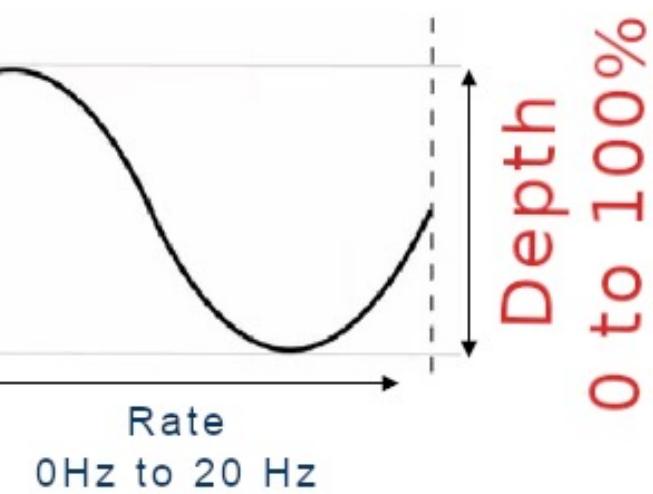
LFO



Frequency



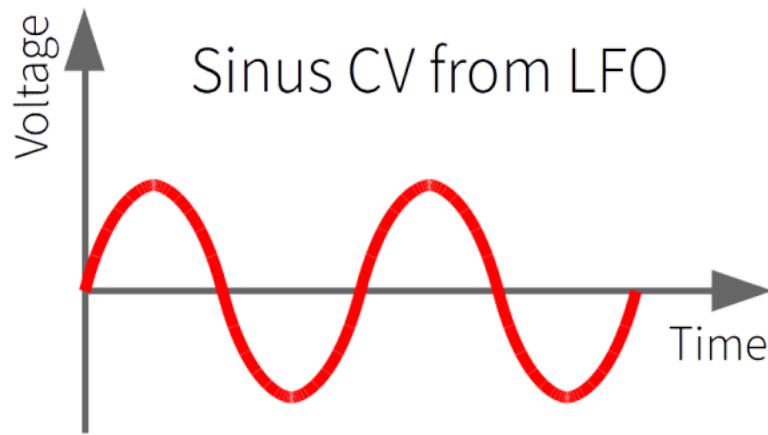
Low Frequency Oscillator



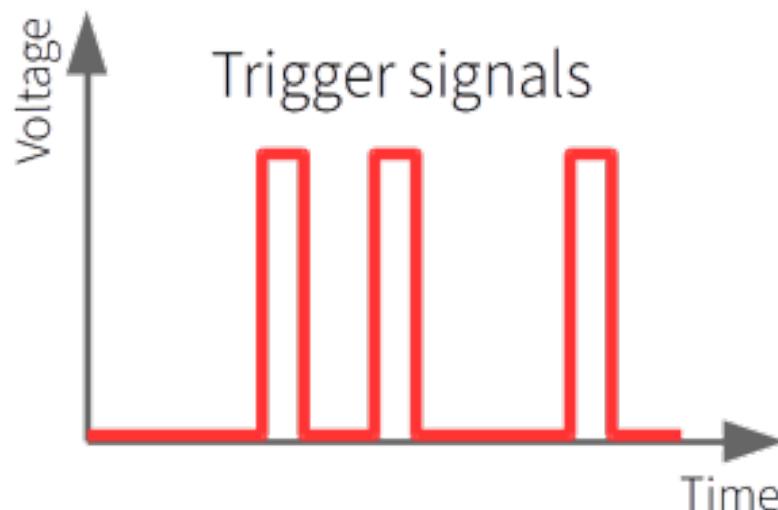
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WEEK 3

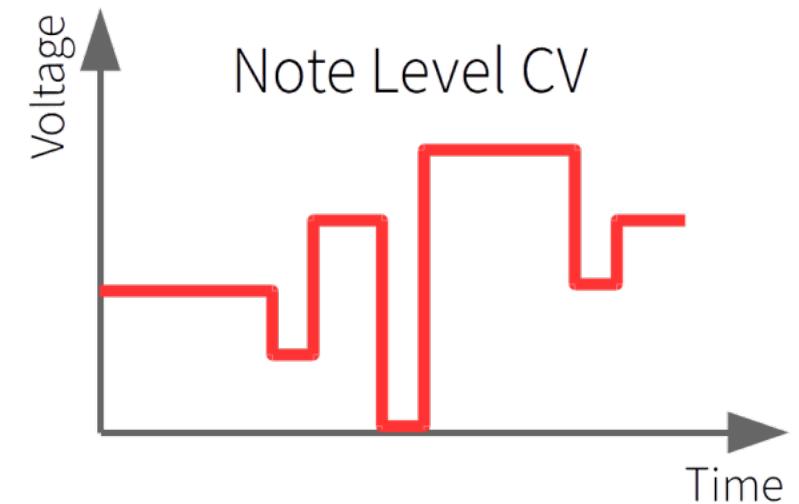
Control Voltage (CV)



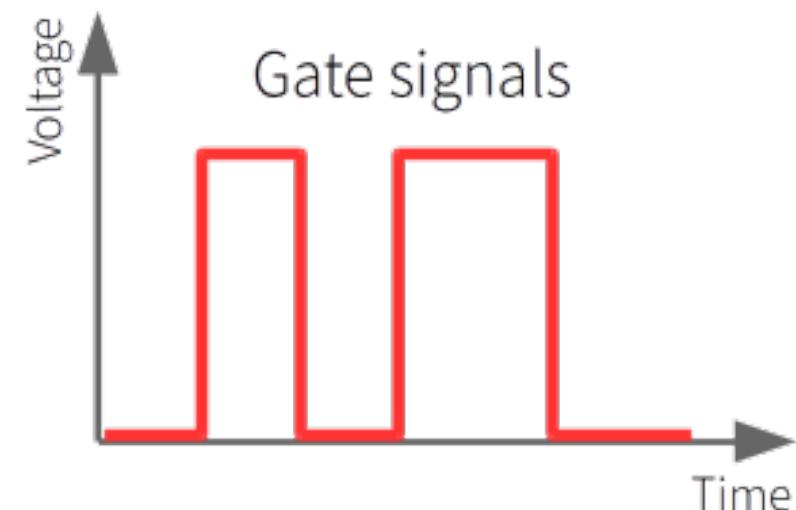
Sinus CV from LFO



Trigger signals



Note Level CV



Gate signals

WEEK 3

Control Voltage (CV)



https://youtu.be/ceRuri3p_CE

WEEK 3

Control Drevices



The main control devices in classical synthesis are:

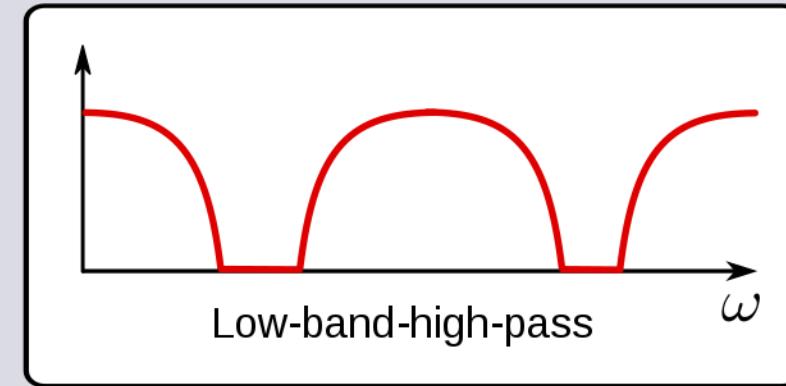
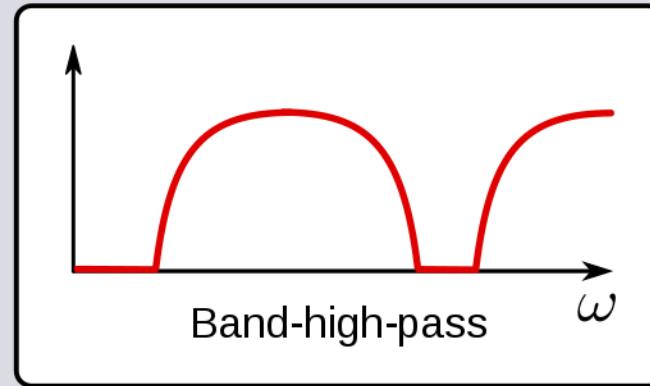
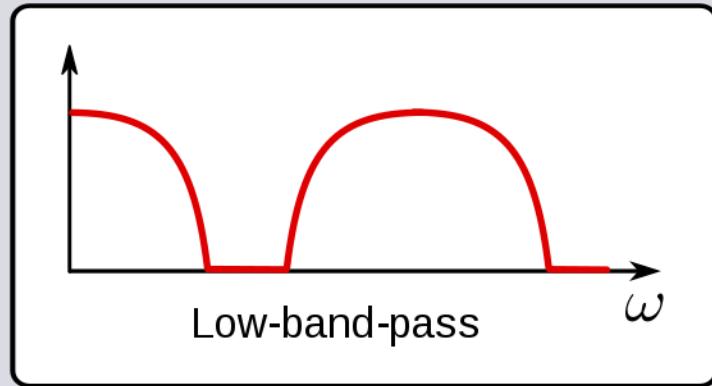
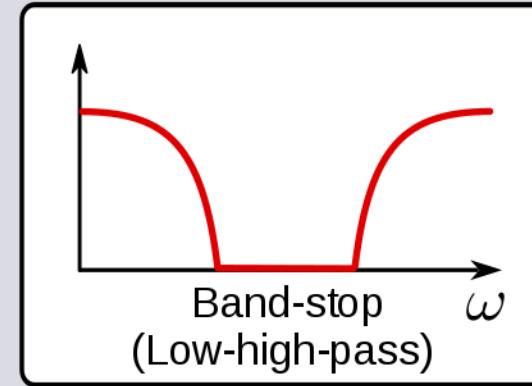
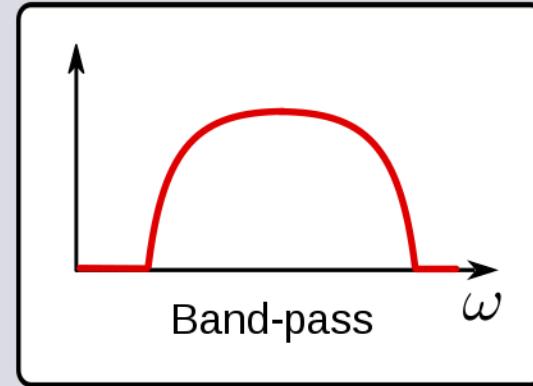
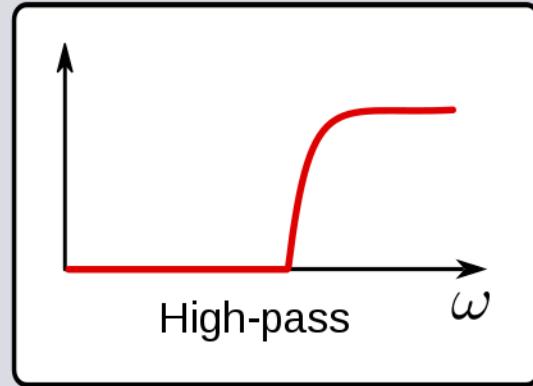
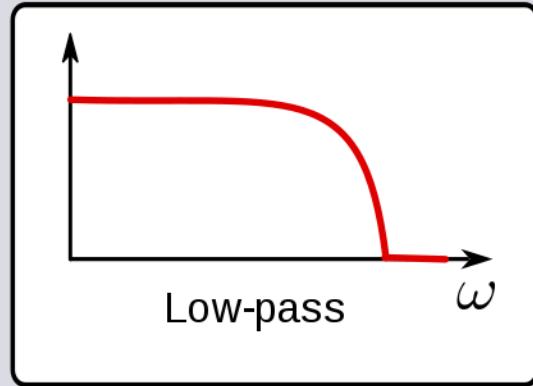
1. Envelope Generator is usually used to control the dynamics of a note, activated by a gate signal
2. Low Frequency Oscillator (LFO) generates waves of lower frequencies than a standard sound oscillator and is used to control or modulate
3. Sequencer (SEQ) is used to create sequences of control voltages and their rhythmic characteristics;
4. The MIDI converter to the control voltage interface (MIDI – CV / GATE) is used to translate the digital control signal received from the MIDI controller, computer or groove box into control voltage signals and trigger/gate signals. It can also broadcast synchronization signals, equipment reset, start-stop and others signals.

WEEK 3
Filter



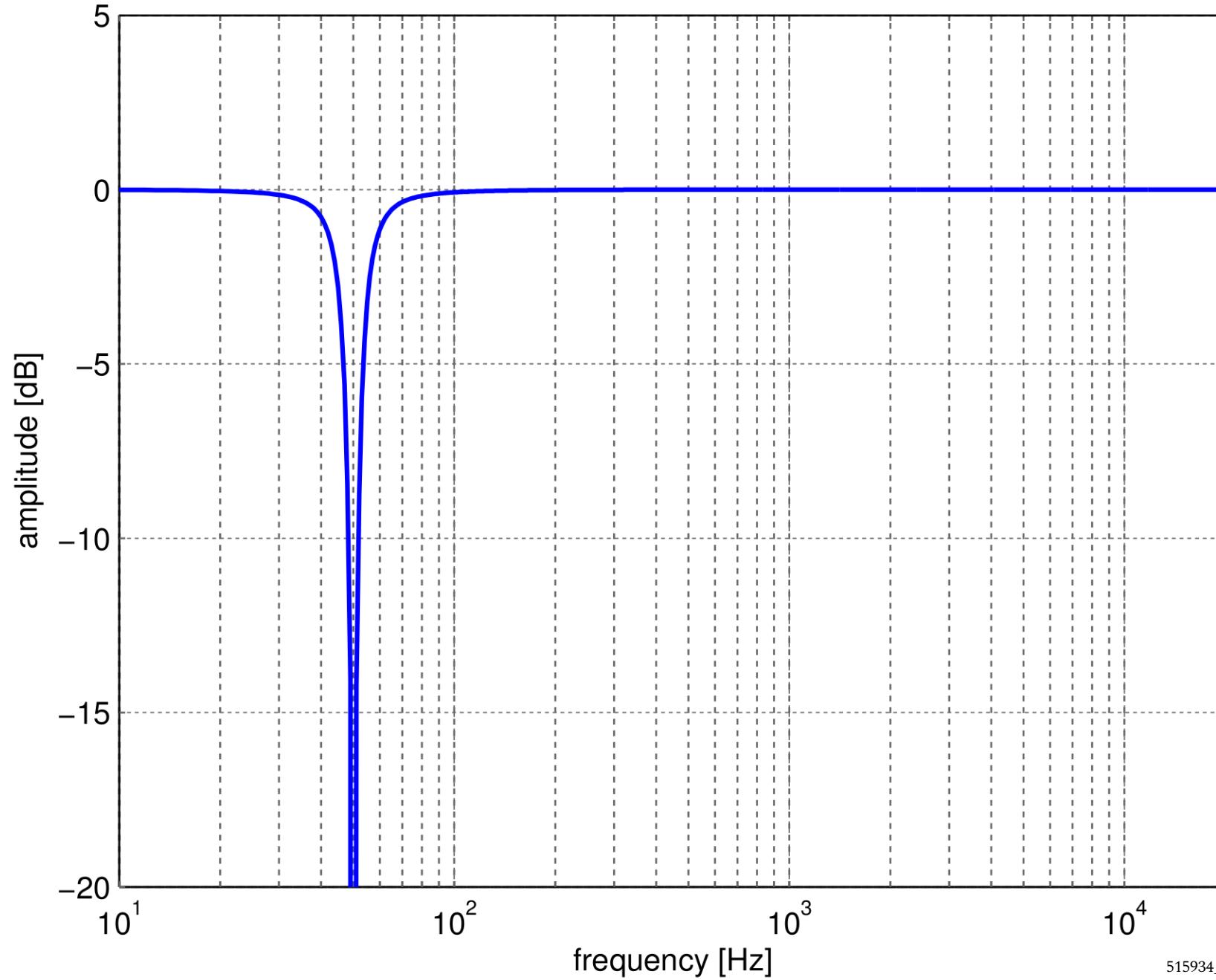
WEEK 3

Filter



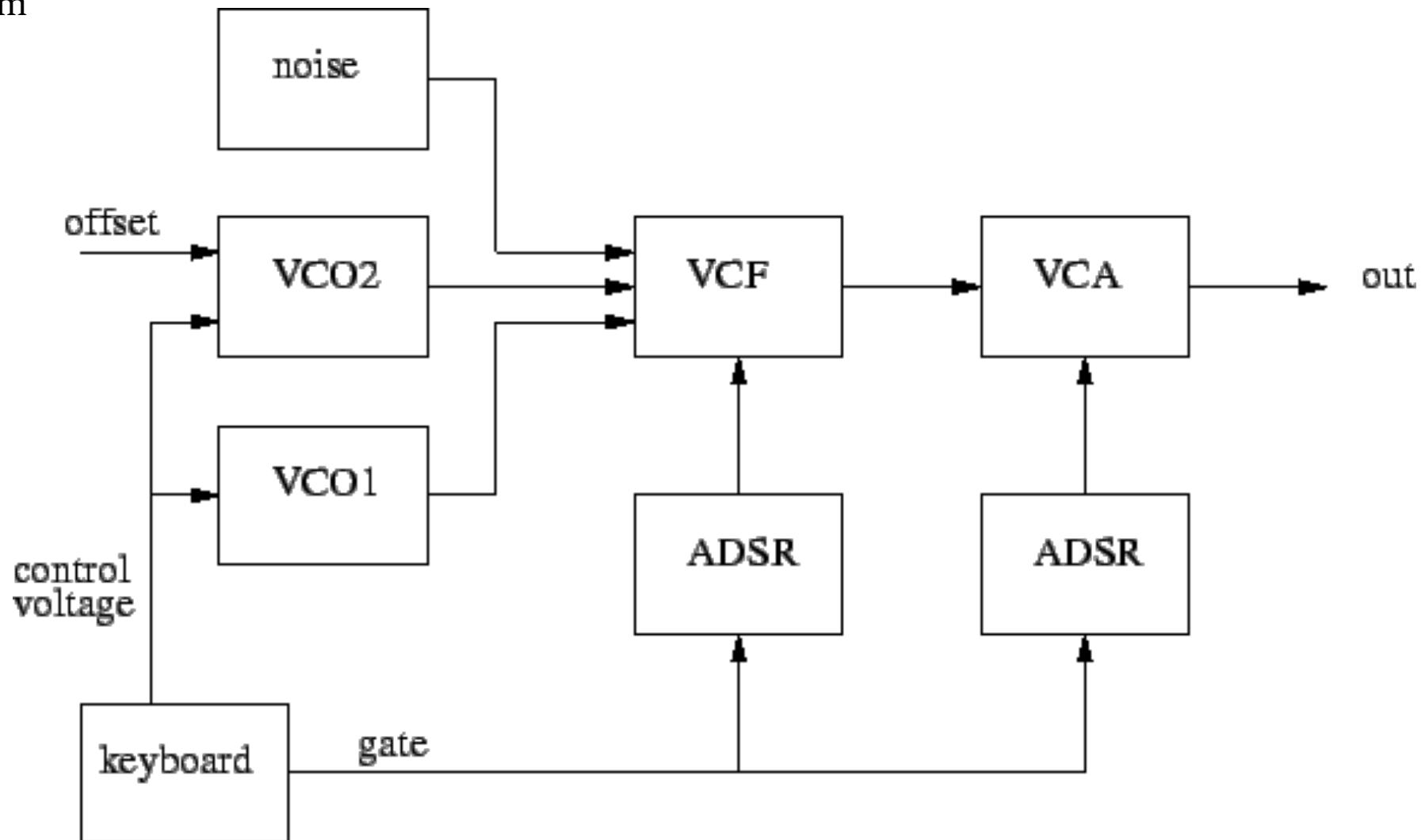
WEEK 3

Filter



WEEK 3

A block diagram



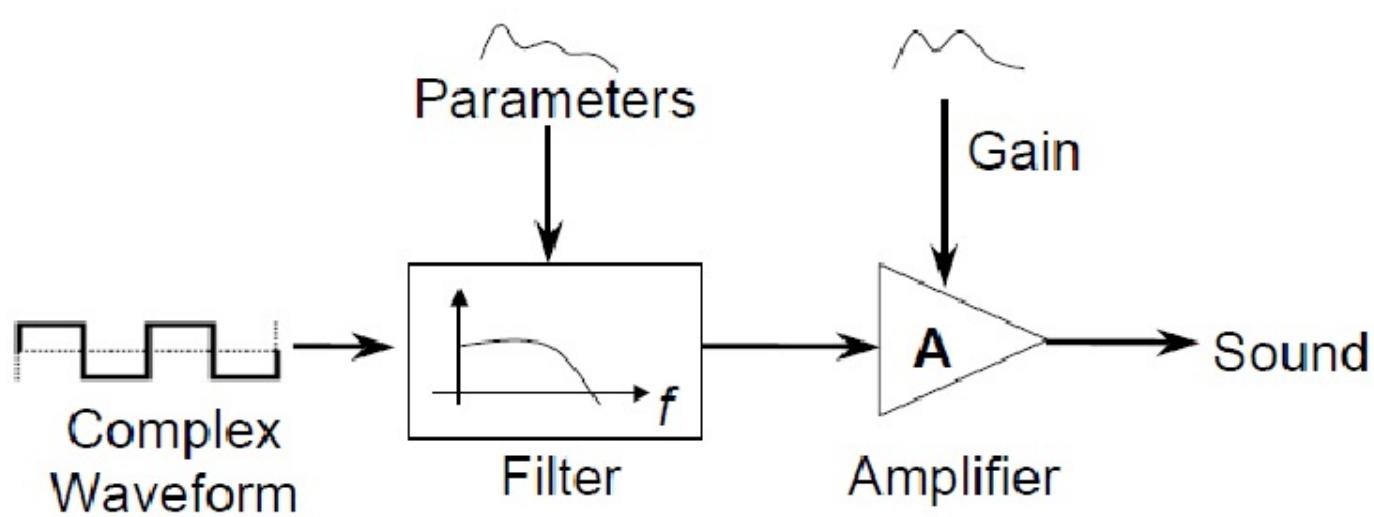
WEEK 3

Analog Synthesis part 2

c) Techniques

WEEK 3

Subtractive Synthesis



WEEK 3

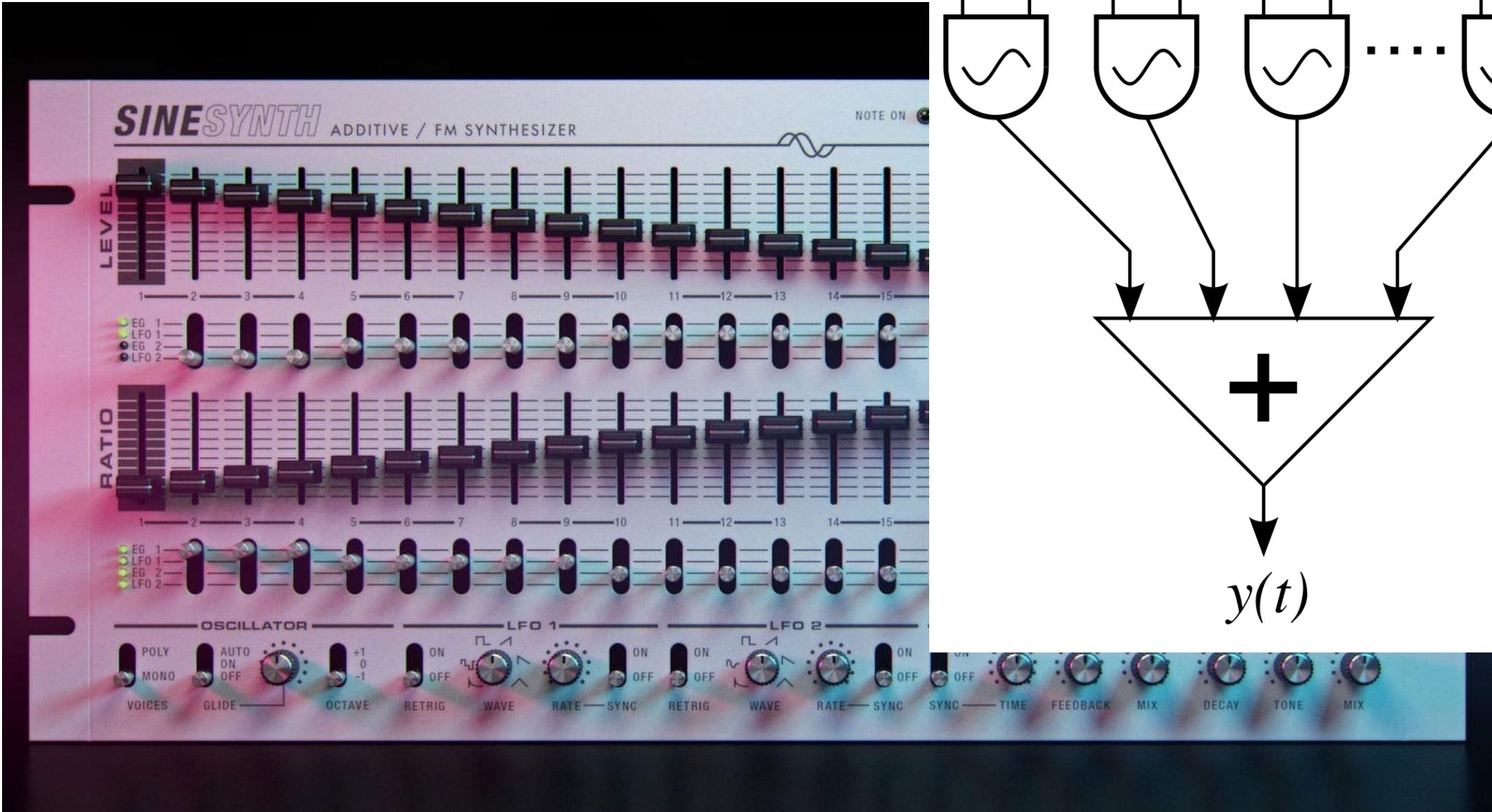
Subtractive Synthesis



<https://youtu.be/grItRCJ5wUM?t=6>

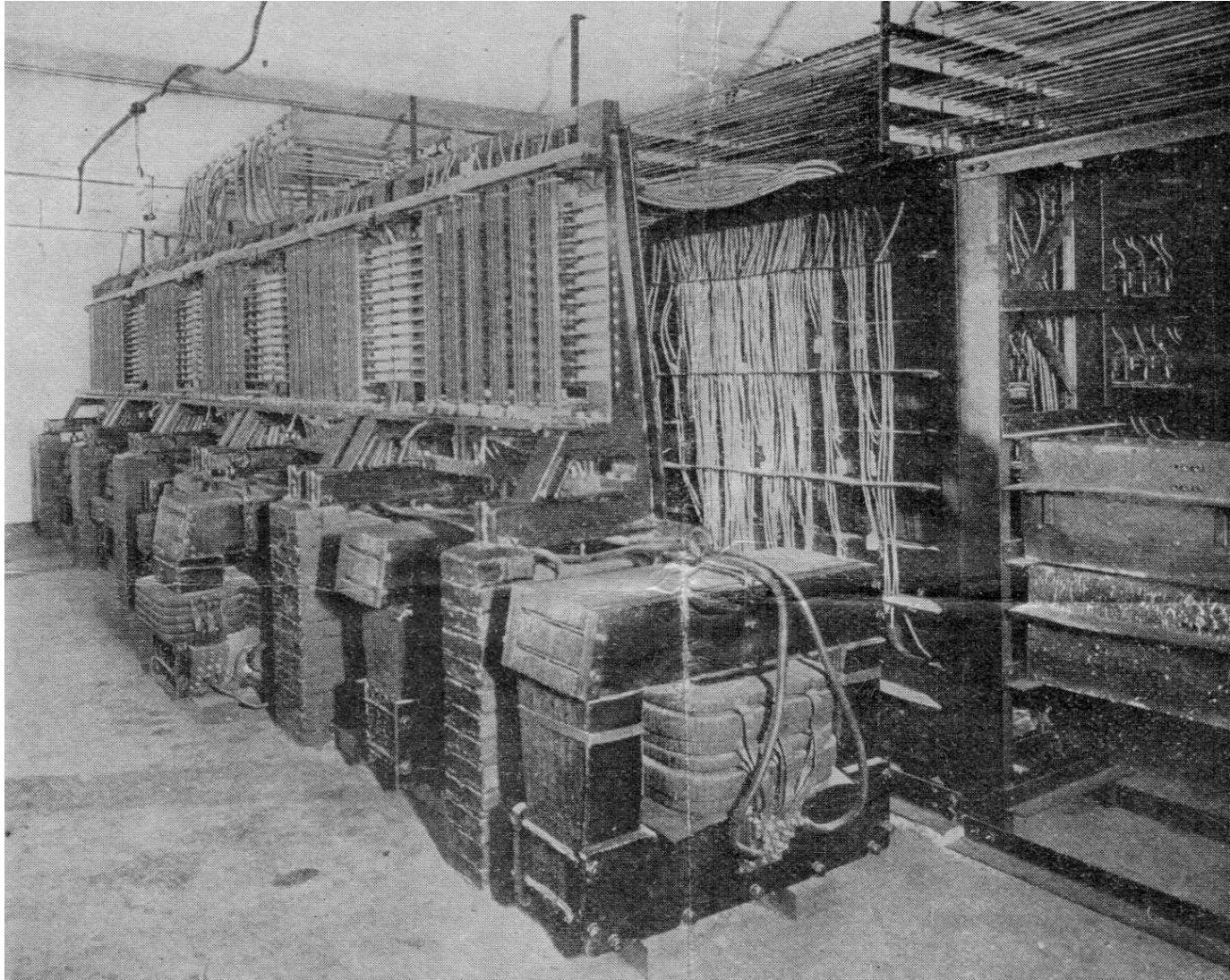
WEEK 3

Additive Synthesis



WEEK 3

Additive Synthesis



WEEK 3

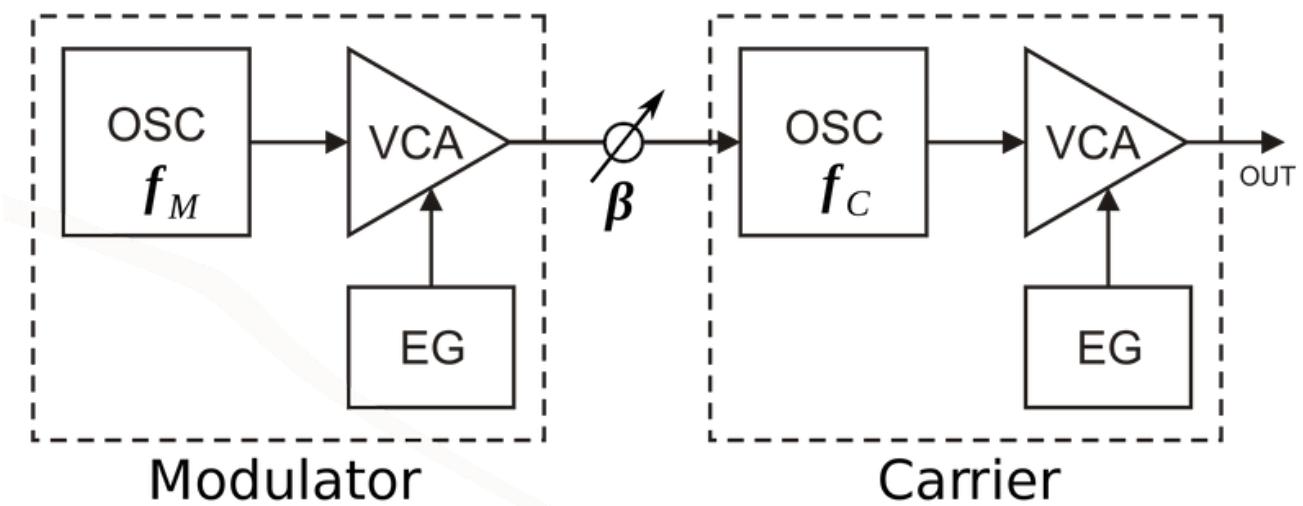
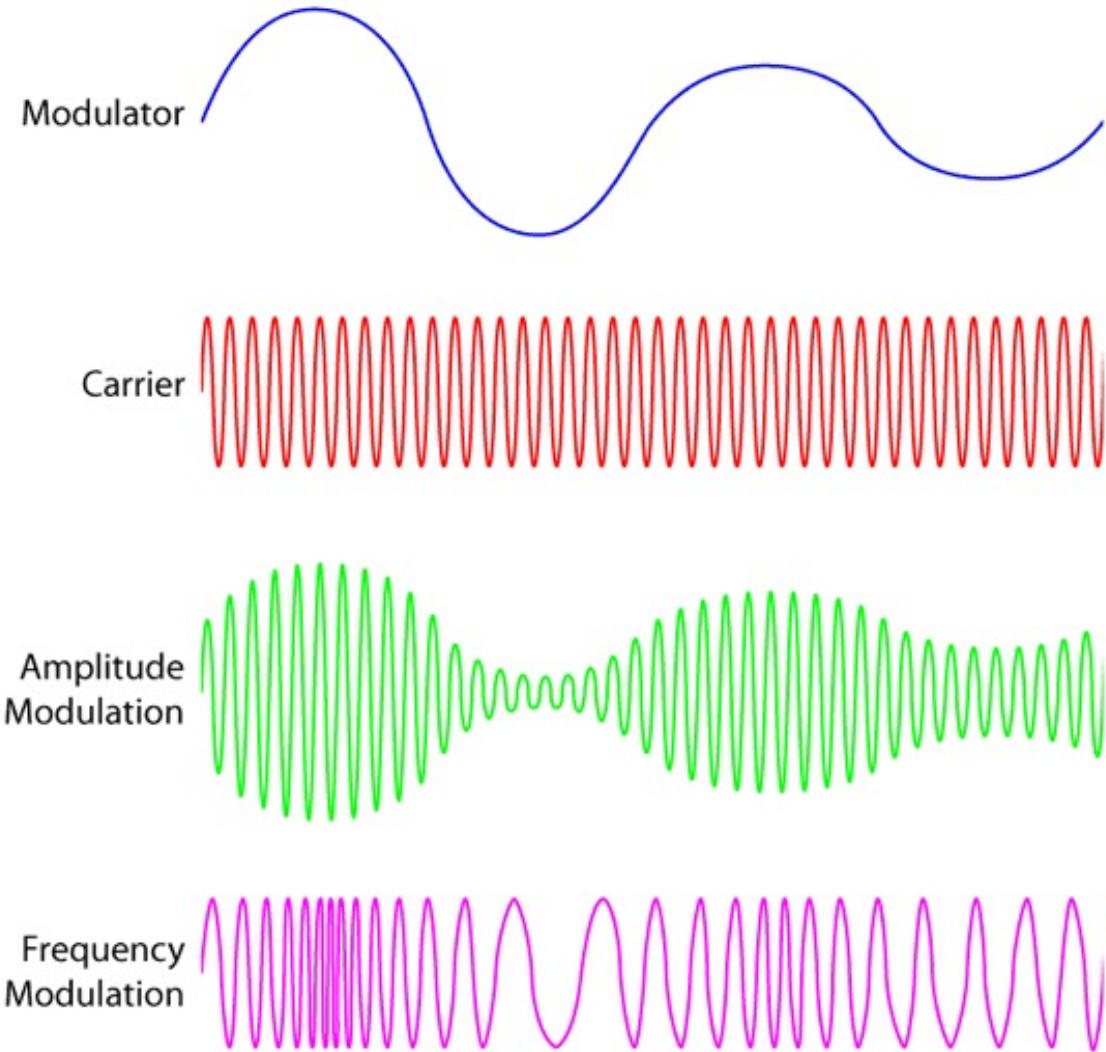
Additive Synthesis



<https://youtu.be/FZ-sVujDIS8?t=76>

WEEK 3

FM Synthesis



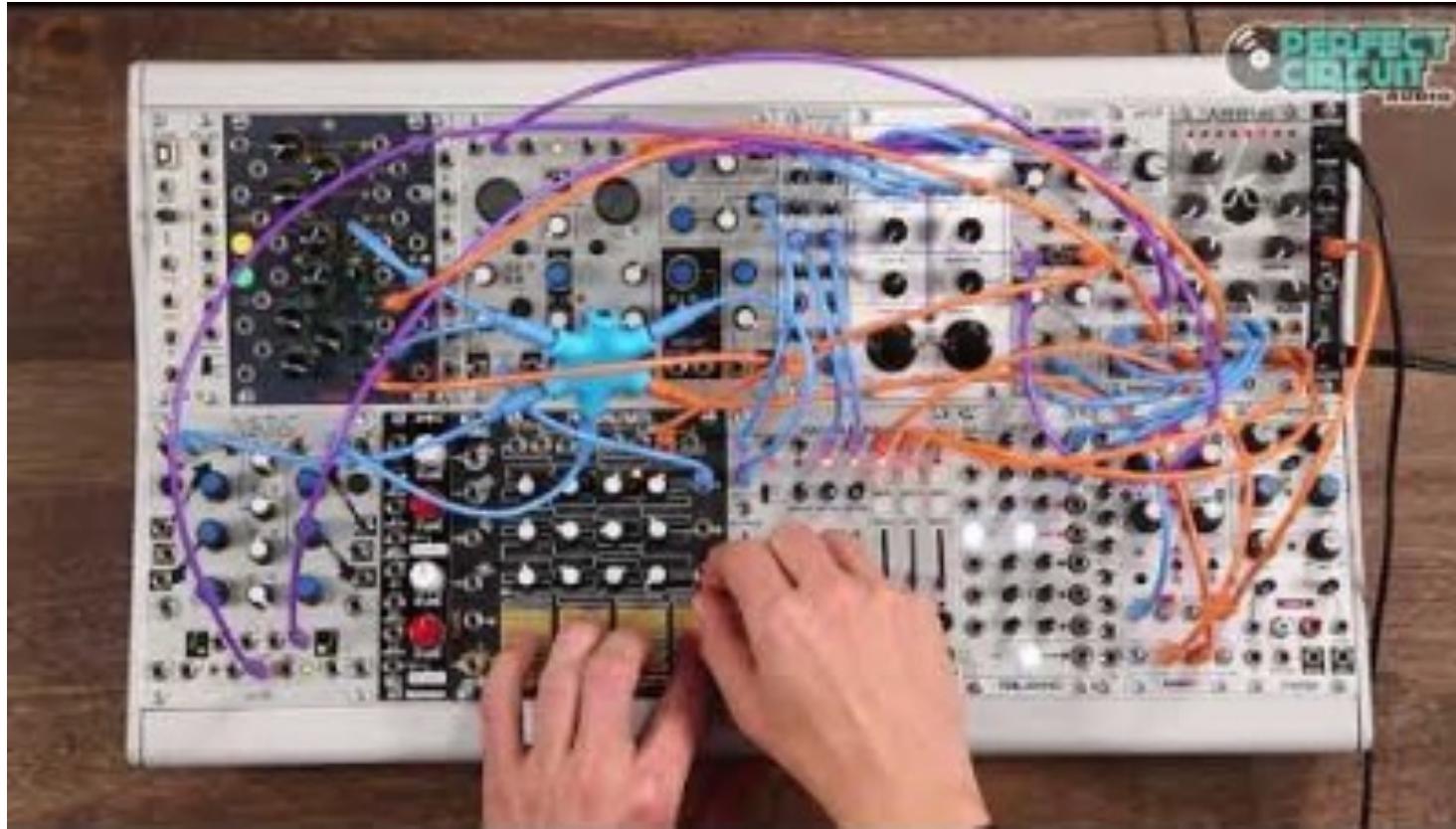
WEEK 3
FM Synthesis



<https://youtu.be/BwxSuhqsrEE>

WEEK 3

West Coast Synthesis



<https://youtu.be/iYD6FafAlRI>

WEEK 3
Discussion



no thanks
i'm just
going to
turn on the
arpeggiator
and hope
for the best



That's all, folks ☺