

## Reverse Avalanche Oscillators: Sound implications



### subject:

Sound implications of an electronic phenomenon: the reverse avalanche oscillation of some specific bipolar transistors in the state of negistor (NDR).

### features:

Our aim is to bring people closer to circuit design in a simple but effective way.

With this experience we would like to inspire participants to get their hands on the most common electronic components used in the production of analog sounds.

A volatile concept such as sound can be transformed into something concrete with easily available and cheap materials.

How?

The principle behind the oscillators we want to present is the Quantum Avalanche Effect.

This phenomenon occurs thanks to the reverse polarization of a transistor which, when subjected to a strong electric field, causes the electrons to accelerate. The direct current is increased and reduced periodically, also thanks to diodes and capacitors.

The diodes allow the current to pass to certain threshold values and the capacitors generate a sawtooth wave through the load voltage at a certain speed based on their values.

In this way we can obtain different frequency values and different pitch heights with different diodes and capacitors. The waveform of a single unfiltered oscillator is a harmonic sawtooth.

The voltage input value is regulated by a potentiometer (or an LDR) for each oscillator. This technique creates an audible variation in tone that affects all oscillators.

By reprocessing breadboard connections, the individual oscillators can be patched in different configurations:

- add or subtract the output signals with another output signal (after the emitter)
- sum the output signal with the input signal of another oscillator (before the collector) and then regulate the input voltage with a potentiometer.

With this scheme it is possible to create complex waveforms and chaotic systems that can randomly vary the different parameters. This is also achieved in a full analog environment.

### developments:

The transistors in state of quantum avalanche (negistor) connected in a continuous oscillation cycle generate other unpredictable and communicative subtractive waves (due to the charge / discharge / recharge cycle between emitter and collector). In theory it is possible to have machines that do not need external manipulations to generate cycles of realistic random harmonies: a cellular automata.

### who we are:

JolinLab was born in the summer of 2018 as an electronic music promotion laboratory. Although our main activity is research, we also build hand-crafted analog and digital tools with educational aim

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