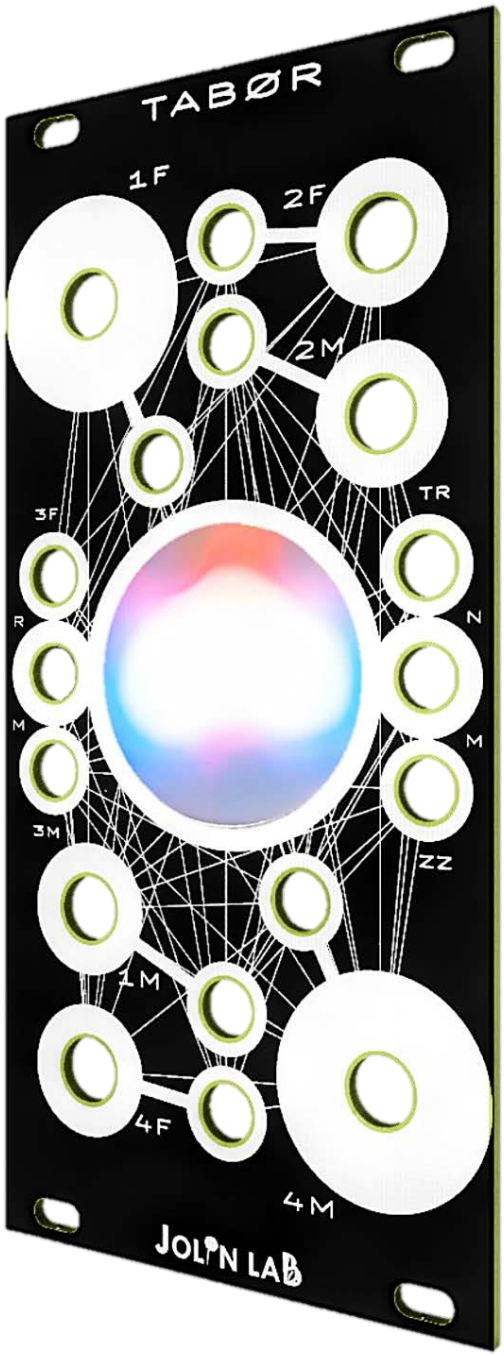
JOLI'N LAB

TABØR

Avalanche Rhythmic Sound-source



TABØR is a rhythmic analogue sound source and envelope generator based on the unpredictability of four avalanche transistors in a continuous oscillation state.

These unpredictable core oscillators are related to each other and their charge and discharge cycle creates complex rhythmic textures that can be controlled and triggered with external CV inputs to add more contamination.

The principle behind the oscillators is the *reverse avalanche effect*. The capacitor is charged via a current limiting resistor. When the voltage is low, the current that flows between the emitter and collector is roughly the reverse current of a diode, almost negligible. When the voltage across the capacitor reaches a certain threshold, the transistor enters the avalanche breakdown mode. In its avalanche breakdown region, the transistor exhibits negative resistance (i.e. the higher the current, the lower the resistance) so the capacitor discharges rapidly through the LED and the voltage across drops until the avalanche mode can no longer be sustained. At this point, the transistor enters its normal operation mode and becomes non-conductive again. Thus, the cycle continues. The rapid discharging through the LED manifests itself as short blinks[1].

With this circuit we can obtain rhythmic textures - intended as rise pulses - and different tone heights by mixing the colors of the LEDs and the values of the capacitors.

The waveform of a single oscillator, unfiltered, is basically a sawtooth. The result of the FM modulation of the whole sound engine is chaotic.

[1] Kerry D. Wong, BJT In Reverse Avalanche Mode. More info and acknowledgement: http://www.kerrywong.com/2014/03/19/bjt-in-reverse-avalanche-mode

features:

Four avalanche oscillators with two controls each:

F	Regulates the distance between the spikes of the single sawtooth waves - their rise pulses frequency
M	The amount of cross-modulation of each core oscillator within the others

Each oscillator can be identified thanks to its color and it can acts differently depending on the state of the others:

OSC1	green light. The most percussive and predominant, the fundamental modulator
OSC2	yellow light. Obedient to OSC1 rhythmically and its direct subsidiary - *a carrier*
OSC3	red light. Strictly related to OSC2 but can set-aside 1 as a modulator[2]
OSC4	orange lights. It can act as a shutter to filter or interrupt the whole communication

**these variables can all be controlled individually with vactrol CV inputs*

Visually you can see the "beating" oscillators in the hollow circle in the middle of the module.

To start oscillate and communicate the avalanche engine needs around 16v to 22v and any value below that point will stop hierarchically its operation:

RM	this input act as an attenuator to the oscillators, limiting their power supply[3]

The result of the whole sound engine is given in three different outputs:

TR	blue lights: a squarified always positive 0-7v trigger / cv source[4]
NM	the dry mixed audio signal straight out of the oscillators
ZZ	an auxiliary fuzzed envelope output from the internal diode-based distortion circuit

technical specs:

Current draw ⇒ 65ma +12V, 7ma -12V, 0ma +5V
Dimensions ⇒ width 12HP, depth 45mm

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[2] Due to its autonomy from the fundamental OSC1 and to keep the communication balanced, OSC3 it's missing the F and M control potentiometers. Its values can be changed only with external CV inputs.
[3] A dummy cable will shut down the oscillators due to the inverted-vactrol configuration of this input. The RM input can be used as an internal voltage-controlled-attenuator, a VCA.
[4] This output is not always active, it fires triggers when the avalanche engine reaches a certain threshold: blue LEDs blinking.