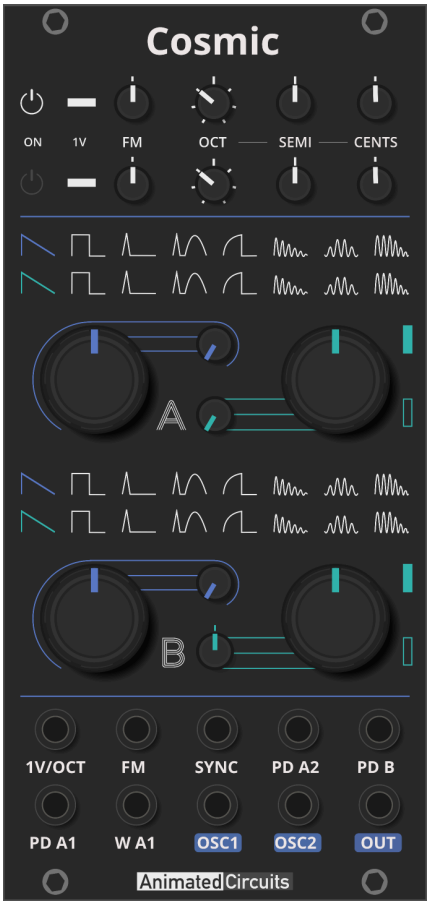
Cosmic

Dual oscillator plugin for VCV Rack

Animated Circuits

This plugin is composed of a dual oscillator module which is inspired by the CZ synthesizers of the 80s whose digital oscillators implemented a unique form of waveform synthesis (called « Phase distortion »).



The phase distortion (« PD ») technique consists of reading a sine wave at different speeds during its period, hence distorting the original wave. Depending on the way the reading speed is changed, different « target waves » are obtained (such as saw, square or pulse like waveforms). By increasing the amount of speed changes, the wave goes from sine (when the amount is 0) to the target wave (saw, square, etc.). The change in timbre resembles the effect of a low pass filter applied to the target wave. With some target waveforms, the effect resembles that of the resonant filter.

This technique is purely digital and so the « color » is somewhat different from the « analog subtractive » method.

We hope that you'll enjoy the Cosmic oscillator !

Cosmic is composed of 2 independent oscillators, A and B, which have almost the same settings.

Pitch control section

Oscillator A settings

Oscillator B settings

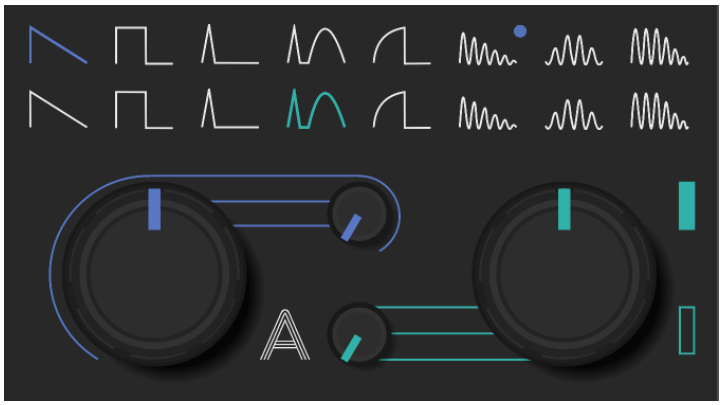
This where you set the general settings of the 2 oscillators. The first row is for oscillator A, the second one for oscillator B.

- **On / Off** : turns on or off the oscillator.
- **1V** : turns on or off pitch tracking of the **1V/OCT** CV input signal.
- **FM** : sets the depth of the frequency linear modulation by the **FM** CV input signal.
- **OCT** : changes the pitch of the oscillator in octave steps. The range is 7 octaves.
- **SEMI** : changes the pitch of the oscillator in semi-tones steps. The range is -12 to 12.
- **CENTS** changes the pitch of the oscillator in cents steps. The range is -50 to 50;

Note : In some combinations, the settings of the knobs and the input modulations lead to a realtime frequency above 18kHz. In those cases, the frequency stays at 18kHz.
Also, if the realtime frequency is very low (typically < 20Hz) you're not going to hear anything (or a slow rumble).

Waveforms and PD sections

There is a section for each oscillator, the upper one for oscillator A and the lower one is for oscillator B. Each section is identical for the 2 oscillators except for a few settings.



Waveform section

Phase distortion section

Waveform section

The set of target waves are inspired by the CZ synthesizers waves.

The 5 first target waves allow for low pass filtering effects of the corresponding wave when changing the phase distortion amount.
The 3 last target waves allow for resonant filtering effets when changing the phase distortion amount.

Manual selection of the waveforms

For each oscillator, 2 waves are played in series, one after the other. The 1st wave controls are blue colored. The 2nd wave controls are green colored.

You select the target waves by clicking on the corresponding glyph.
- The blue row sets the 1st target wave.
- The green row sets the 2nd target wave. When the upper right vertical green button is turned off, the 2nd wave is the same as the 1st wave.

CV selection of oscillator A 1st waveform

The 1st target wave of oscillator A can be selected by a unipolar input signal at the **W A1** CV input. Input values from 0 to 10 are scaled to 0 to 7 to select one of the 8 target waves. When a signal is plugged, a blue light appears near the corresponding « realtime » waveform glyph.

You can achieved a kind of « wave sequencing » by using the **W A1** CV input but beware that there is no crossfading between waves and so some *roughness* may be heard (but it can be what you want !).

PD section

The big knobs (« PD knobs ») set the static amounts of the phase distortion for each wave. Fully CCW, the delivered wave is a sine wave. Fully CW, the delivered wave is the target wave. In between, a kind of « low pass filtered target wave » is delivered.

The little knobs set the depths of the CV modulations of the phase distortion applied to the waves. The CV sources are :
- **PD A1** input : for the 1st wave of oscillator A.
- **PD A2** input : for the 2nd wave of oscillator A.
- **PD B** input : for the 1st and 2nd waves of oscillator B. Note that the CV depth knob for the 2nd wave of oscillator B is bipolar allowing you to invert the modulation signal.

Having control over the phase distortion of each wave is not standard but allows for more variations of the resulting wave.

Standard operation of the PD of the 2nd wave

By turning off the lower vertical green knob on the right of the big green PD knob, you disable the green knobs to have the « standard » way of operating a phase distortion oscillator : the 2nd wave is phase distorted using the same settings as the 1st wave (ie : the 2 blue knobs and use of the **PD A1** [**PD B**] input signal).
In this case, operating the green knobs has no effect and the visuals are meaningless.

Inputs and Outputs section

There are 7 CV inputs :
- **1V/OCT** and **FM** : see « Pitch control section »
- **SYNC** : « hard reset » of the phase of the oscillators
- **PD A1**, **PD A2**, **PB** : see « PD section »
- **W A1** : see « Waveform section »

There are 3 audio outputs :
- **OUT** is the mix of the 2 oscillators.
- **OUT1** outputs only oscillator A (identical to **OUT** if Oscillator B is disabled).
- **OUT2** outputs only oscillator B (if Oscillator B is disabled, no signal is output).

These separated outputs can be used to further mix the oscillators outside of the module, but they can also be plugged in any of Cosmic input to create auto modulation…

Version log

v_0.6.1 (09/11/2018)
Bigger buttons for waveform selection
LED to show the CV selected A1 waveform
Bug fix : B2 PD attenuverter was unipolar. It is now bipolar.

v_0.6.0 (07/20/2018)
Initial version, compatible with VCV Rack 0.6.x

Other Animated Circuits plugins

Sine Oscillators, Noises, Panimated, Welcome

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