

# Wobble

fuzzySynths

## Introduction

This Eurorack module generates 3 channels of varying control voltages. These can be configured as LFOs or single shot, triggered envelopes with a movable start point. The waveshape can be mixed between from sine, triangle & square, saw & ramp, random and direct pot control. An incoming gate input is used as a trigger to restart the waveshape in both LFO and envelope modes.

## Pots

There are 3 pots, each associated with a channel.

On it's own, the pot controls the rate of that channel.

Wave shape is selected by holding the channel button and tweaking any of the 3 pots, giving quick access to a range of waveshapes.

*Pot 1* changes between envelope / sine / square.



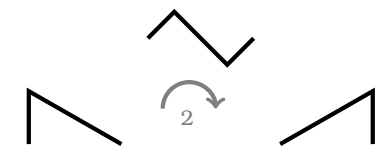
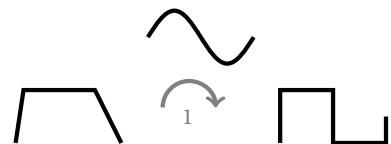
*Pot 2* changes between ramp down / triangle / ramp up.



*Pot 3* gives random then triplets with the pot to the left, while turning to the right gives direct CV control from the pot - turning a VCA into a mixer, for instance. The pot range between selects sequences, output as MIDI and CV.



The module interpolates between adjacent waveshapes, giving unexpected patterns.



## Buttons

A short press, or incoming (rising edge) gate triggers restarting the wave shape.

A medium press toggles between triggered (single-shot) and LFO mode.

A long press enters channel edit mode.

Pressing a button while turning a pot changes the waveshape for that channel.

The buttons are illuminated with dual colour LEDs. Green shows the waveform level, so the LEDs give a good indication of the CV output. Red indicates a trigger input, and orange shows the cycle restarting in LFO mode.

## Channel edit mode

Hold the button down until LEDs go red.

The pots now take on their secondary role for that channel.

Settings are stored and recalled between power cycles.

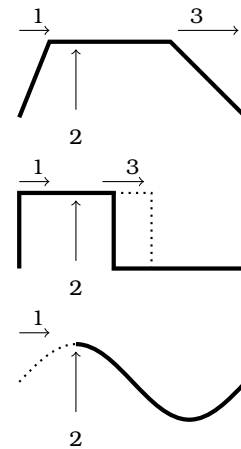
Hold the button again to get out of channel edit mode.

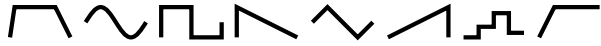
*Pot 1 - attack / phase* sets the phase / attack in EG mode

*Pot 2 - sustain / max* sets the maximum voltage reached

*Pot 3 - release / duty* sets the duty cycle (pulse wave) / release in EG mode

Figure 1: Secondary pot functions





### *Typical uses*

To get an ADSR envelope, hold the channel button and turn the top pot to the left. Let go and the pot will control the sustain. Hold the button for edit mode when pots 1 and 3 control attack and sustain rates respectively.

Set random noise by holding the channel button and turning the 3rd pot to the left. Let go, and turn the pot for that channel to a suitable speed.

If you want it only to change when triggered, hold the channel button for a second, until it alone turns red, which shows it is now in triggered mode. a gate signal on the input, or quick press on the button, will now trigger the waveform.

To set the range of CV an LFO is giving out, hold the button for that channel to go into edit mode, all the LEDs go red, now use pot 2 to set the maximum voltage (1v to 10v max).

### *Storage*

The module periodically saves any changes, so next time it is turned on it should remember previous settings.

Channel settings such as attack, release, amplitude are stored for each channel.

Maximum amplitude settings are *not* stored.

### *Other features*

The fourth (back panel) output by default gives a mix of all 3 outputs, which makes an interesting and varied controllable CV source. It can be configured to do anything, such as an envelope, a random noise source, sequence player, or an LFO.

## *Hacking*

All parameters are programmable in software. An Arduino Nano is used as it is very easy to hack, and has it's own USB port for easy updating.

Here are some of the parameters that can be tweaked in the software.

*DAC MIN* lowest allowable maximum voltage, set at 1v so that the module is never silent - change if needed

*DAC MAX* maximum voltage, up to 10v after the amplifier section, 4.096v from direct DAC outs if run from USB

*MIN PERIOD*, *MAX PERIOD* in milliseconds, as long as you like, will stall falling over above 10Hz or so

*MAX SEQ LENGTH* more than 16 note sequences if needed

A DEEPER MODE WILL ALLOW RECORDING of direct CV values, making a convenient sequencer. Press all 3 buttons to enter sequence record mode - red and green LEDs alternate quickly. Hold one button to set to record.

In record mode, sending either a MIDI or gate trigger will record the pot value and store it in sequence. Stop the sequencer by pressing the button again, allowing sequences of varying length.

*Rate knob* changes tempo

*Channel button* hold & turn pot to change waveshape

*pot 1* envelope - sine - square

*pot 2* ramp down - triangle - ramp up

*pot 3* random - echoes - direct CV

*Short press* triggers the waveform to restart

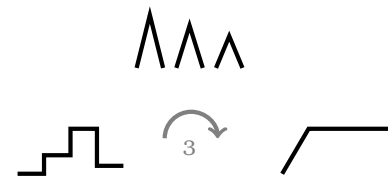
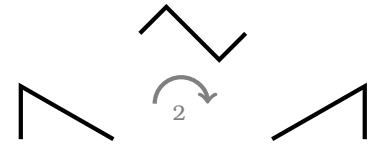
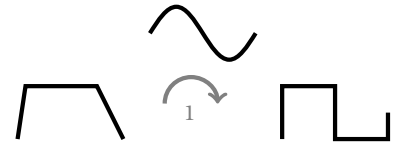
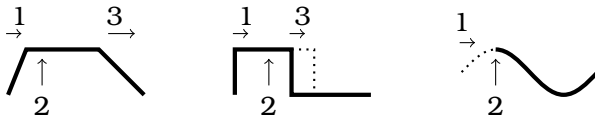
*Medium press* toggles triggered (red) and LFO mode (green)

*Long hold* toggles channel edit mode (all red, active flashing)

*pot 1* controls attack / phase

*pot 2* controls sustain / maximum amplitude

*pot 3* controls release / duty cycle



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