# Hampshire Electronics

## Low Pass VCF in Eurorack Format

## Instructions and Details

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# Overview

The Hampshire Electronics Low Pass VCF is a 100% analogue voltage-controlled filter in the popular Eurorack format.

The VCF features a low pass (12db) resonant filter based on the classic MS-20 state-variable filter design. The filter has two CV inputs and a tracking input for 1v per octave pitch signals.

The LP filter self-oscillates at high resonance settings and, due to its high performing matching transistor pairs, can also be used as a sine-wave voltage-controlled oscillator (VCO).

The key details of the VCF are:

- 12HP Wide Eurorack module with thin profile (20mm deep from faceplate)
- Controls designed and laid-out with performance in mind
- 100% analogue circuitry
- Tough yet light composite faceplate
- Provides a resonant 12db LP filter based on the classic MS-20 design
- Uses two highly log-conformant LS-358 matched transistor pairs for accurate key tracking
- The filter self-oscillates, enabling usage as a sine-wave VCO
- Two filter cut-off CV inputs with attenuator pots
- Tracking CV input with 1v/Oct tracking
- Diode protected power input
- 10ma @ +12v
- 10ma @ -12v

# Installation

## Power Availability

The Low Pass VCF module draws the following current from your power supply:

10ma @ +12v

10ma @ -12v

You should first ensure that your power system has enough power capacity to drive the module before considering installation. If you are in doubt, please consult with your power supply manufacturer.

## Connecting the Power

Refer to the writing on the back of the module next to the 16-pin power connector to ensure that you connect the power supply correctly. The +12v, -12v and ground (GND) pins will be clearly marked.

The power inputs are diode protected but damage may occur if the unit is connected incorrectly.

## Fitment

Use the screws provided to firmly fit the module into your case. You should make sure that the module does not move when you insert and remove patch cables.

# Using the Low Pass VCF Module

The low-pass filter is a 12dB resonant filter with controllable cut-off frequency and peak (resonance).

## Inputs and Outputs

To use the LP filter an input source between -5v and +5v should be inserted into the **in** jack socket. The **out** jack socket can then be used for the filtered output.

## FREQUENCY knob

The **FREQUENCY** knob adjusts the frequency at which the filter operates. Turning the knob to the left will reduce the cut-off frequency and let fewer frequencies of the input sound pass to the output. Turning the knob to the right increases the cut-off frequency and lets more frequencies pass from the input to the output.

Sweeping the **FREQUENCY** knob from fully clockwise to fully counter clockwise will show the full filter range, from un-filtered to fully-filtered.

## CV1, CV2 and 1v/Oct input jacks

The **CV1, CV2** and **1v/Oct** jack inputs can be used to control the cut-off frequency via a voltage source. All of these inputs accept -5v to +5v input range. A positive voltage will increase the cut-off frequency whereas a negative voltage will reduce the cut-off frequency.

The difference between the inputs is that the **CV1** and **CV2** inputs can be attenuated via the **CV 1** and **CV 2** knobs. When the knob is fully clockwise then the full voltage at the CV input is used to vary the cut-off frequency. Turning the knobs counter clockwise reduces the amount of voltage, thus reducing the effect on the cut-off frequency.

The **1v/Oct** input is not attenuated and operates at a 1v/oct scale. This input has excellent tracking due to the matched transistor pair used and can therefore be used to give good key tracking of the filter by inserting a 1v/oct pitch signal.

## RESONANCE knob

The **RESONANCE** knob adjusts the peak, or resonance, of the filter. This is the amount of filtered signal is passed back into the input. When the **RESONANCE** knob is fully counter clockwise then the filter has no resonance and the signal at the **out** jack socket will be the pure filtered input.

Turning the **RESONANCE** knob to the right increases the resonance. This creates the unique resonant filter sounds so ubiquitous with analogue synthesizers.

At high resonance levels the filter becomes self-resonant. This means that the filter will self-oscillate with no signal at its input, generating a sine wave. The filter can therefore be used as a simple sine wave oscillator with a 1v/Oct signal at the **1v/Oct** input and the **FREQUENCY** knob used to control the oscillation frequency.