

THE GRENDEL FORMANT FILTER

Inspired by the human voice, the Grendel Formant Filter is an effect processor that creates vocal-like vowel tones from external audio using subtractive synthesis. It contains four voltage-controlled analog bandpass filters (BPFs) of original Grendel design. The filters are configured in parallel, all receiving the same input signal and with their outputs mixed together internally. A dedicated CV processor is included to modulate the characteristics of the BPFs in special patterns. Each BPF covers a separate range of frequencies, creating a stack of animated filters that simulate the resonance of the oral cavity as vowel tones are spoken.

CHOOSING SOURCE MATERIAL

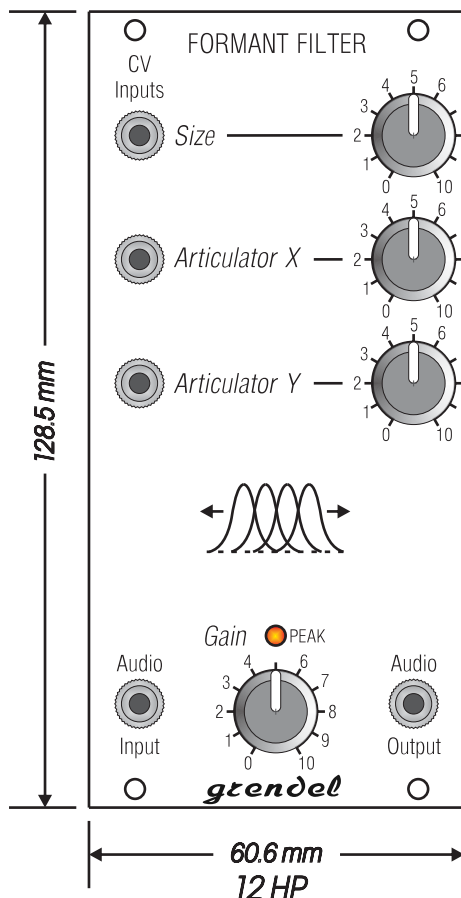
Choosing a frequency-rich signal source such as a sawtooth waveform or pink noise will give the strongest effect. The human vocal cords produce a unique waveform (the 'glottal pulse') which can be approximated by an asymmetric triangle wave with its leading edge faster than the trailing edge. Using an oscillator which has variable symmetry may achieve more natural-sounding results. Note that a pure sine wave input is not useful because it lacks the overtone content which the Formant Filter needs to produce its effect. For the most vocal-like tones, your source oscillator should have a fundamental frequency in the range of 50 – 1000 Hz. Complex signals such as percussion loops, string pads, or even another vocal will be worth experimenting with as well. Pre-distorting your source audio with fuzz or overdrive will add harmonics and give a stronger effect in some cases.

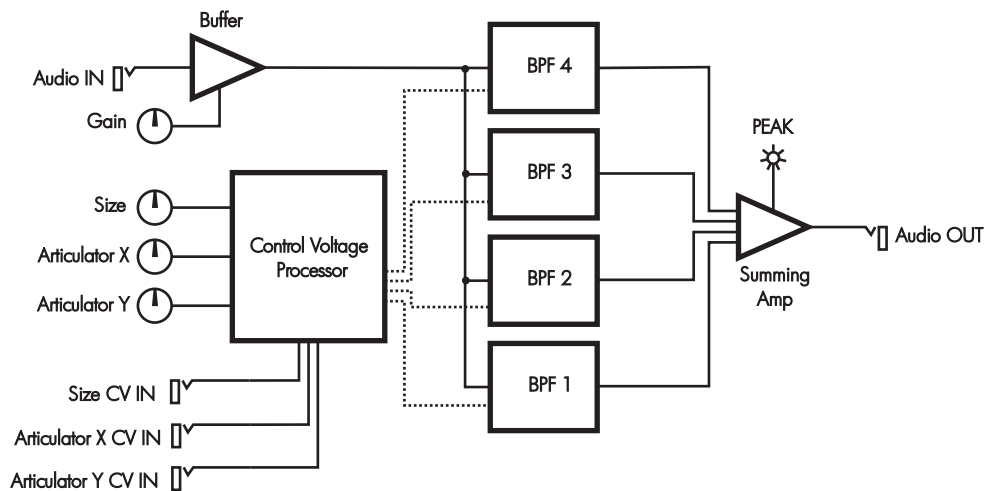
CONNECTING AUDIO

To hear the effect, patch the output of your signal source to the Formant Filter's audio input, and connect the Formant Filter's audio output to your audio monitoring chain via a mixer. This patch is good for droning sounds, and also recommended when you are playing a keyboard instrument as the audio source. Or, you can patch a VCA after the filter to create the classic subtractive synthesis signal chain – VCO > VCF > VCA with CV/Gate control.

PEAK INDICATOR

A peak indicator light is located above the Gain knob. This LED illuminates to indicate that the Formant Filter is being overdriven. Of course, it is fine to enjoy the overdriven sound without risk of damaging the unit. But to maintain a cleaner signal, back the Gain knob down slightly if the peak LED lights.





VOLTAGE CONTROL (CV INPUTS)

The Grendel Formant Filter has three control voltage (CV) inputs. These accept signals of either polarity, up to +/-10V. Each CV input is summed internally with its associated bias knob, located directly to the right of the jack. The CV inputs have exponential response but 1V/octave precision is not supported.

Suggested signal sources for the CV inputs are LFO, envelope generator, MIDI-CV converter, analog joystick controller, envelope follower, LP-filtered noise, S&H, etc. Applying modulation of 100Hz or higher frequency may cause unexpected jumps in volume.

Even if the CV inputs are not used, you can control all of the Formant Filter parameters manually by tweaking the knobs.

SIZE

The SIZE parameter moves all four BPFs in parallel, maintaining their relative pitch relationships. This affects the overall size of the 'mouth', from oversized to midget. Keep the Size knob between the 3 and 7 marks for the most natural effect.

ARTICULATOR X, Y

Experiment with each articulator alone and in combination to hear the range of phonetic sounds the Formant Filter is capable of.

Articulator X and Y work together to select vowel tones from a two-dimensional map known as the [IPA Vowel Chart](#). All vowel sounds of the English language are available. For optimum control, these inputs can be connected to an analog joystick or two channels of a MIDI-CV converter. The ideal voltage range for controlling Articulator X and Y is +/- 2.5 volts, or 0..+5 volts.

INSTALLATION

The package includes 4 each of mounting screws (M2.5x6) and nuts (M2.5x5), and a 40cm ribbon-type power cable.

Install the power cable by observing the orientation of the red stripe on the cable. The Formant Filter's power connector is on the rear side. Match the red stripe on the ribbon with the RED STRIPE legend on the power connector and press the connection tight. Plug in the other end of the cable to the power bus board in your Eurorack enclosure. The ribbon's red stripe must face toward Pin 1 on the bus board power connector.

SPECIFICATIONS

Format.....	12 HP Eurorack
Size.....	60.6mm(W)x128.5mm(H)
Depth required behind panel.....	30 mm
Power source.....	+/-12VDC or +/-15VDC
	65mA each rail
Reverse polarity protection.....	YES
Input impedance.....	10kohm, AC coupled
Output impedance.....	1kohm
Nominal CV input	+/-2.5V or 0..+5V
Audio input range.....	+/-10V
Dynamic Range.....	80 dB
Noise Floor (all controls at 0).....	-67 dBu
Weight (not incl cables).....	99 g (3.5 oz)
Technology.....	analog surface mount