

ATLAS

QUAD CORE MULTIMODE FILTER

User Manual

LIMITED WARRANTY

Vostok Instruments warrants this product to be free of defects in material or construction for three years from the date of purchase (invoice required).

During that period, any malfunctioning unit will be repaired, serviced, and calibrated on a return-to-factory basis, with the customer paying the transit cost to Vostok Instruments.

Malfunctions resulting from wrong power supply voltages, backward or reverse power connections, abusive treatment, removing knobs, or any other obvious user-inflict faults are not covered by this warranty, and regular rates will apply.

Vostok Instruments implies and accepts no responsibility for harm to persons or apparatus caused through the operation of this product.

The device intended for repair or replacement under warranty should be shipped in the original packaging only. Vostok Instruments can not take any responsibility for damages caused during transport. So before sending us anything, contact us at vostokinstruments@gmail.com.

INSTALLATION

Atlas needs a power supply capable of providing 170mA on each of the +12V and -12V rails, and 16HP of free space in your case. We strongly recommend you to check the current consumption of your system on the ModularGrid website and your power supply capabilities before plugging in the module.

To install it, turn your case off and connect the supplied power cable to both the module and your Bus Board, minding the polarity so that the RED Stripe on the cable is oriented to the -12V line on both the module and the Bus Board. Please refer to your case manufacturers' specifications for the location of the negative supply.

Always turn your case off before plugging and unplugging any Eurorack module.

INTRODUCTION

When we talk about the sound signature of synths, filters are probably one of the first topics appearing.

Over the years, the designers have been studying and tweaking different filter topologies to give a unique sound to their synths. As it alters the spectral content of the waveform, a filter is an essential key to creating that concrete sound we have in mind but printing its own character on it.

On Atlas, we dive into the sound of the 80s Japanese classics with four gain-cell-based multimode filters that keep the silky and creamy sound of those legendary machines along with some technical improvements like a better noise floor, an accurate resonance compensation, and a daisy-chain input implementation that makes some patching techniques like parallel filtering a lot easier.

The filter cores have been carefully designed and tweaked to be pristine without losing character. With three filter modes available per channel, 4p-LP, 2p-HP, and 4p-BP, Atlas can cover almost any filtering technique, from superb filter sweeps to multi-slope resonant patches.

Thanks to its precise resonance circuit, each core creates a clean sine wave when self-oscillating. Excite the inputs with fast trigger or gate signals, and you will get TR-like drum sounds, from deep kickdrums to nice toms and congas.

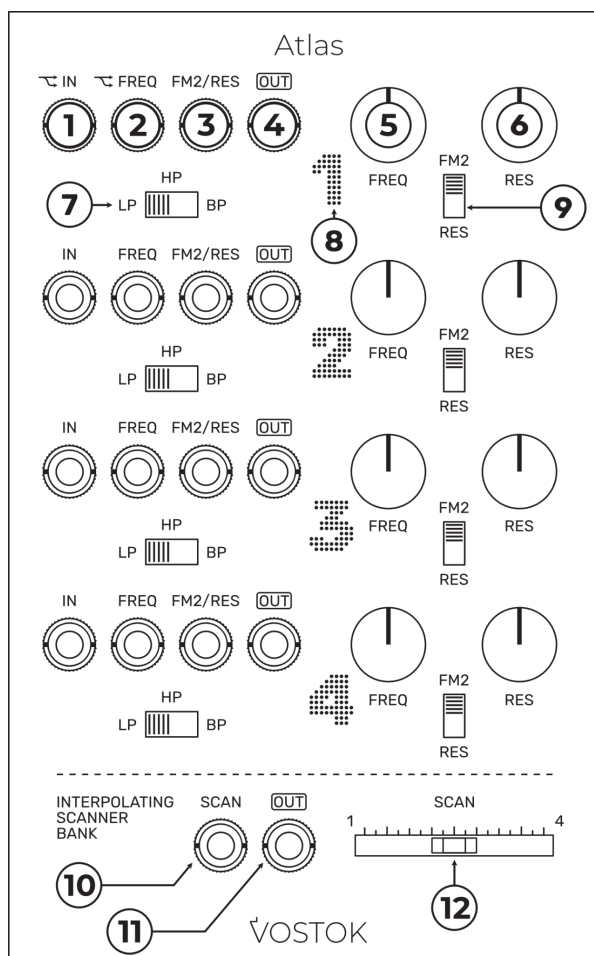
In addition, the module counts with a CV-controlled Interpolating Scanner circuit that morphs softly between each filter output, creating new shapes and timbres as it fades between the channels.

TECHNICAL SPECIFICATIONS

- **Size:** 16HP
- **Current draw:** +/-12V: 170mA, +5V: 0mA
- **Depth:** 30mm (including power cable)
- **Input Impedance:** 100k Ω
- **Output Impedance:** 1k Ω
- **CV Inputs Range:** 10Vp-p

OVERVIEW

1. **Filter Input:** Daisy-chained to the next channel.
2. **FREQ CV Input:** CV control over the filter cutoff frequency. Daisy-chained to the next channel. Range: 10Vp-p.
3. **FM2 / RES CV Input:** CV control over frequency or resonance. Selectable via FM2 / Res switch. Range 10Vp-p.
4. **Filter Signal Output.**
5. **FREQ Pot:** manual control for each channel cutoff frequency.
6. **RES Pot:** manual control for each channel resonance.
7. **Mode Switch:** select between the three available filter modes.



8. **Signal Input LED indicator.**
9. **FM2 / RES:** sets the parameter controlled by the FM2 / RES CV Input.
10. **SCAN CV Input:** CV control over the filter scanning. Range 10Vp-p.
11. **SCAN Signal Output.**
12. **SCAN Fader:** morphs through the filter outputs from left (1) to right (4).

A BRIEF WORD ON FILTERS

To have a better understanding of how each of the Atlas channels is going to alter our signal, we should take a brief look at a couple of basic concepts common to every filter: Cutoff Frequency and Slope.

Cutoff Frequency

A filter is an electronic device that alters the spectral content of our audio signal by boosting or attenuating a delimited range of frequencies. Its behavior is determined by design, being several types available: from classic lowpass to shelving or multi-peak filters. Although they can be very different in terms of sound, every filter shares a functional core: the cutoff frequency.

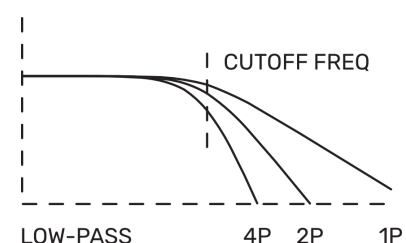
In a filter, the cutoff frequency marks the boundary from where we will apply that gain or attenuation. This cutoff frequency can be fixed, like in a graphic equalizer, or dynamic, like in our case, being the manipulation of its spectral position critical to our musical purposes.

Filter Slope / Poles

Whether we are boosting or attenuating, it takes a bit of time for the filter to reach the target amplitude. That amplitude response concerning time follows a concrete slope measured in dB/oct that we usually call poles.

Let's take an ideal low-pass filter with a 6dB/oct slope as an example. If its cutoff frequency is 50Hz, it will attenuate all the content above those 50Hz in order of 6dB per octave, which means that if we take our initial gain at 50Hz as 0dB, we will have a gain of -6dB at 100Hz, -12dB at 200Hz, -18dB at 400Hz and so on.

The example above is an ideal abstraction. In real devices the slope response is non-linear, and the circuit starts to attenuate a bit before its cutoff, with the amplitude of the cutoff frequency typically located at half of the gain of the filter slope (i.e., -3dB for a 6dB/oct filter).



This concrete slope of 6dB/oct is what we call a Pole. Chain several 1-pole filters in series creates more aggressive slopes as a result, being two poles = 12dB/oct, three poles = 18dB/oct, four poles = 24dB/oct, and so on. These different filter configurations impact the sound and define a big part of the filter's character.

GETTING STARTED

Atlas is laid out in four multi-mode filter channels and an Interpolating Scanner Bank.

To quickly check the vast range of timbres Atlas can offer, patch a Sawtooth or Square wave oscillator to the first Input, an LFO to FREQ Input 1, and the SCAN Output to your mixer or output module to monitor it. Set different positions for the FREQ and RES Pots on each channel, and play with the SCAN Fader.

Interesting? Let's take a deeper look inside then.

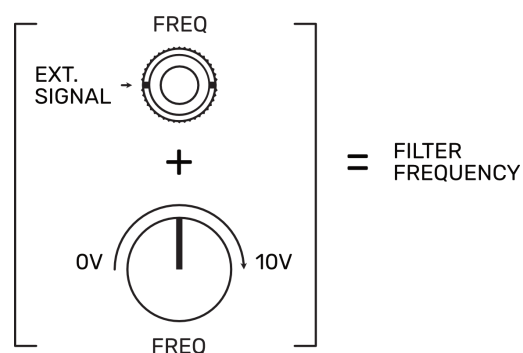
Channels 1-4 are identical in functionality, with symmetrical features between them. As those features represent the functional core of Atlas, let's take a look at them first.

FILTERS: FUNCTIONAL MAP

Frequency Controls

On Atlas filters, frequency is controlled by a positive voltage. The relation between voltage and frequency is directly proportional, which means that as higher the voltage higher the frequency. The cutoff controls of our filters (FREQ Pots) are modulating the frequency by applying different values of positive voltage. In modular synths, the frequency can also be controlled by external signals like, for example, VCOs, which implies the presence of negative voltage.

On the CV Inputs of our filters (FREQ Inputs), every voltage applied is summed to the voltage value set by the cutoff controls. If we send a negative voltage to the input, it will be subtracted from that voltage value, and the filter will close. If the negative voltage applied is higher than the current value, the filter will remain closed till the voltage at its CV Input goes above zero to start opening again.



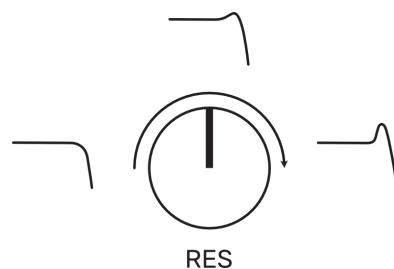
Resonance Controls

Each filter channel counts with a dedicated Resonance circuit that can be manually and CV-controlled.

The circuit boosts the filter cutoff frequency by feeding a portion of its output back to its input. This feedback loop creates a resonant peak that adds brightness, color, and character to our signal.

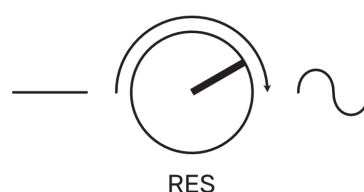
In some designs, an increment of the resonance levels causes a directly proportional attenuation of the passband region. This gain loss is caused by the inverted phase of the feedback loop concerning the input, which partially cancels it.

Atlas filter cores include an accurate resonance compensation circuit that counters those cancellations and keeps the integrity of our signal intact, resulting in a big and creamy sound even at high resonance levels.



With the RES Pot over the 2 o'clock position, the filter core turns into self-oscillation, which creates a clean sine waveform. In this state, the filter channels turn into four independent CV-controlled Sine wave oscillators with tracking over three octaves approx. Be aware that the cores are not temperature-compensated. So, the tracking won't be as accurate as on a proper VCO module.

We can easily make some TR-like drum sounds by patching a fast trigger or gate signal into the filter signal input and playing with the RES Pot to adjust the decay time of our sound.



Secondary CV Input Modes: FM2 - RES

Each Atlas channel counts with a secondary CV Input that can act as a second FREQ Input (FM2) or a resonance CV Input (RES). Its behavior is selected with the FM2/RES switch.

In FM2 Mode, the FM2/RES Input works as an exact copy of the FREQ Input. The plugged signal sums its value to the value of both FREQ Input and Pot.

In RES Mode, the FM2/RES Input works as a resonance CV Input. As happens with FREQ, it sums its value to the current value of the RES Pot.

In both modes, the voltage range of the FM2/RES Input is 10Vp-p.

Daisy-Chain Operation

By default, Atlas sends the signal present at each Signal and FREQ Input to the next one. To break the chain, patch a cable on the desired input. This implementation makes some techniques like parallel filtering easier.

FILTER MODES

On Atlas, each filter counts with three selectable modes to sculpt our sound in different ways: Low-Pass, High-Pass, and Band-Pass. These modes have been carefully tuned to sound musical in their whole range, encouraging you to experiment with different combinations and settings to transform your sound in an always playful way.

Low-Pass Mode

As the heart of subtractive synthesis, the Low-Pass filter is by far the most popular filter type of all time.

It attenuates the content above its cutoff frequency, reducing the brightness of the sound. Is often used along waveforms with a very rich harmonic content like sawtooth or square waves, subtracting harmonics from the high part of the spectrum to sculpt more interesting sounds.

In LP mode, Atlas filter channels work as a four pole, 24dB/oct low-pass filter.

High-Pass Mode

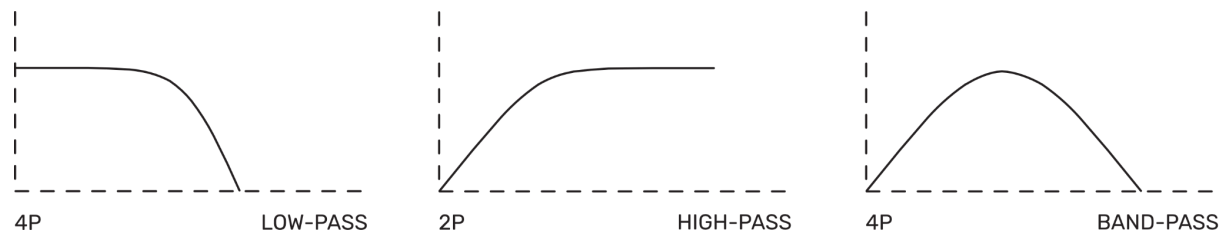
Behaving as the opposite of the low-pass filter, the High-Pass filter attenuates the content below its cutoff frequency, reducing the low-end energy. It is helpful to create sounds with its main content located at the high part of the spectrum (i.e., Hi-Hats, Cymbals) or to add clarity to patches built around a stack-up of different sound layers or textures.

In HP mode, Atlas channels work as a two-pole, 12dB/oct high-pass filter.

Band-Pass Mode

Composed of high-pass and low-pass filters in series, the Band-Pass filter attenuates the content below and above its cutoff frequency, creating a more defined and isolated region of action in the spectrum. At high resonance levels, the band-pass filter generates a ringing, formant-like effect, being the base of one of the most famous synthesis systems of all time: Vocoder.

In BP mode, Atlas channels work as a four-pole, 24dB/oct band-pass filter.



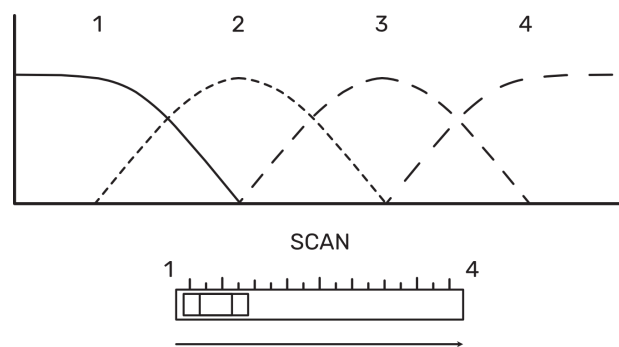
INTERPOLATING SCANNER BANK

Introduced by Jurgen Haible in 1994 and later improved by Donald Tillman in 1999, the Interpolating Scanning circuit is a hybrid between a signal selector and a crossfader.

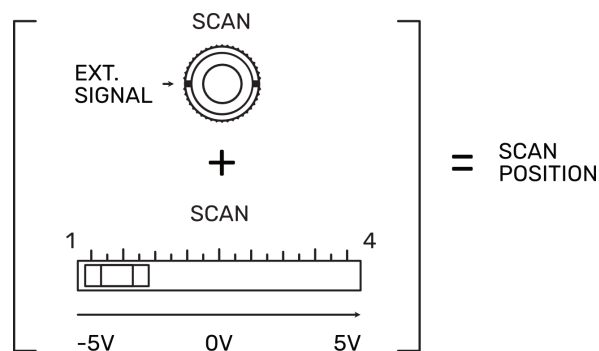
The circuit selects between the filter outputs, fading from one to the next as the voltage control rises. The Atlas version of this classic circuit counts with a custom, fine-tuned slope response that prioritizes a smooth transition between the outputs, allowing some interesting middle points between the channels and improving its behavior when controlled by external CV signals.

The Scanner Bank counts with a manual slider control (SCAN), its related CV Input, and a signal output. By moving the SCAN slider from left to right, we can morph between the different filter channels in ascendant order, having the first channel (1) at the left position and the last channel (4) at the right.

The figure below shows the SCAN circuit behavior. Be aware that the slopes in the figure are not related to the filter's frequency but to its volume. The Scanner bank works as an array of four serial macro-controlled VCAs, which allows fading between any signal and filter mode configuration of the four channels.



As happens with the FREQ and RES parameters, the SCAN Input sums the value of its incoming signal to the voltage value set by the SCAN slider.



The Interpolating Scanner Bank is an entirely independent circuit, so its output works simultaneously with the rest of the filter outputs without affecting them.