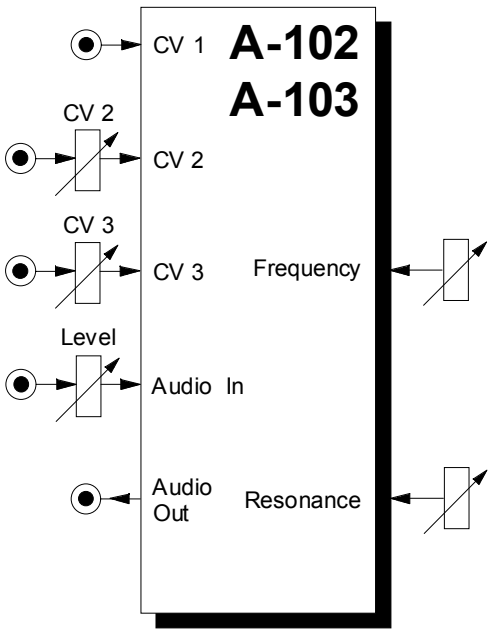


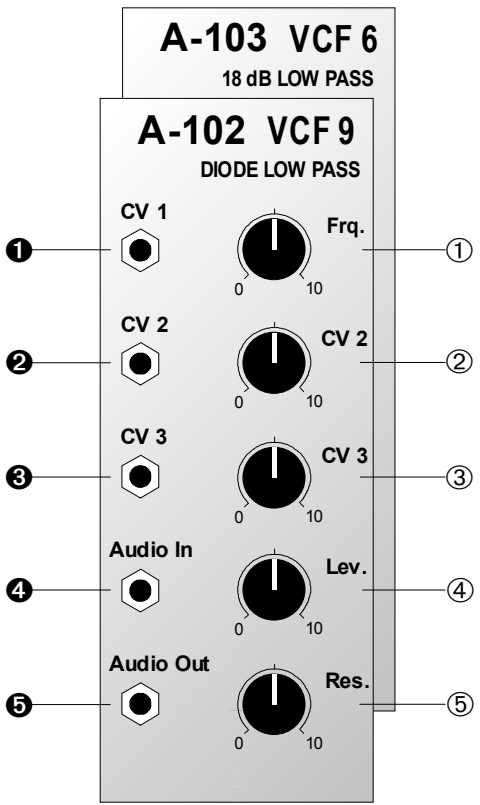
1. Introduction

Modules **A-102** and **A-103** are **voltage controlled low-pass filters** that filter out the higher parts of the sound spectrum and let lower frequencies pass through. Both filters very similar to the A-120 low-pass filter but sound very different. In contrast to the 24dB low-pass A-120 - that is based on the famous Moog transistor ladder - A-102 and A-103 use **different ladder types**. The **A-103** is an **18dB low-pass** that works with a **modified transistor ladder** identical to the circuit used in the Roland **TB-303** (base and collector of each transistor are connected). In the **A-102** the transistors in the ladder are replaced by **diodes** causing the typical **diode filter sound** with a very specific frequency and resonance behaviour.

The **cut-off frequency** determines the point at which filtering takes effect. You can control this manually, or by voltage control for both filters (**filter modulation**, for instance by an LFO). Three CV inputs are available, and the sum of the voltages from these affects the filter cut-off.

Resonance (or emphasis) is adjustable all the way up to self-oscillation - in which case the filter behaves like a sine wave oscillator.

2. Overview



Controls:

① **Freq.**: Cut-off frequency control

② **CV 2**: Attenuator for CV at input ❷

③ **CV 3**: Attenuator for CV at input ❸

④ **Lev.**: Attenuator for audio input ❹

⑤ **Res.**: Control for setting the filter's resonance (emphasis)

In / Outputs:

❶ **CV 1**: Control Voltage input

❷ **CV 2**: ditto, level controlled by ②

❸ **CV 3**: ditto, level controlled by ③

❹ **Audio In**: Audio input to the filter

❺ **Audio Out**: Audio output from the filter

3. Controls

① Frq.

With this control you adjust the **Cut-Off Frequency f_c**, above which the filter attenuates all frequencies. At 10, the filter is fully open. The more you turn down this control, the more the high frequencies are filtered. The sound becomes mellower and less bright (see Fig. 1) until at 0 the filter is completely shut, and there will be no output signal at all.

② CV 2 • ③ CV 3

For voltage control or modulation of the cut-off frequency, use these CV inputs ❷ and/or ❸ (see Fig. 1). Use attenuators ② and/or ③ to adjust the **control voltage level**.

④ Lev.

Use this attenuator to control the amount of signal entering the filter input ❹.

☞ If the filter's output distorts, turn this control down, unless you deliberately want the sound as a special effect.

⑤ Res.

With this control you adjust the filter's **resonance** (*emphasis, Q*) - the parameter which emphasises the frequencies around the cut-off point f_C. Close to its maximum setting, the filter becomes so resonant that it goes into self-oscillation, and starts behaving like a **sine wave**. You can take advantage of this effect, and use the VCF as an additional oscillator.

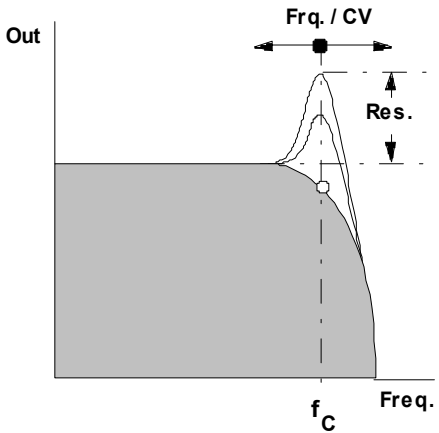


Fig. 1: Frequency response of the A-103

☞ For the **A-102** the filter parameters **frequency** and **resonance** are **not** completely **independent** from each other. This a special feature of this circuit and not a mistake !

4. In / Outputs

❶ CV 1

Socket CV 1 is the filter's standard **voltage control input**, and works on the 1V / octave rule, like the VCOs. If you patch a modulation source (eg LFO, ADSR) to this input, the cut-off frequency of the filter will be modulated by its voltage: ie., the sound color changes according to the voltage put out by the modulator. If you use the VCF as a sine wave oscillator, connect the pitch CV into this socket. Do the same if you want the filter's cut-off frequency to track exactly with the pitch of a note (**filter tracking**).

❷ CV 2 • ❸ CV 3

Sockets CV 2 and CV 3 are also **voltage control inputs for the filter.** Unlike CV 1, you can control the level of voltage - the intensity of modulation effect on the filter - with attenuators ② and ③.

❹ Audio In

This is the filter's **audio input** socket**.** Patch in the output from any sound source (eg. VCO A-110/A-111, Sampler/Wavetable Oscillator A-112, Subharmonic Generator A-113, Ring Modulator A-114, Audio Divider A-115, Waveform Processor/Waveshaper A-116/ A-136, Noise Generator A-117/118, external audio signal e.g. via A-119, VC Divider A-163, mixed signal of different audio sources using A-138 and so on).

❺ Audio Out

Filter output ❺ sends out the filtered signal.

5. User examples

As the A-102 and A-103 are very similar to the A-120 please refer to the user examples of the A-120. The filter's cut-off frequency can be modulated in various ways. The basic modulations types are:

- **VCF - LFO (A-145, A-146, A-147)**
  Cyclical changes of the **sound spectrum**
- **VCF - ADSR** (**A-140, A-141, A-142)**
  Modulation by an envelope results in triggered gradual change of the **sound spectrum**
- **VCF - Keyboard CV**
  This modulation produces pitch-related filter opening: the higher the pitch, the more the filter opens, and the brighter the sound becomes.

But even other voltage sources may be used to control the frequency of the A-102/103: e.g. Theremin A-178, Light-controlled CV A-179, Joy Stick A-174, MIDI-to-CV interfaces A-190 or A-191, Random Voltage A-118, S&H A-148, Sequencer A-155, Quantizer A-156, Foot Controller A-177, Ribbon Controller A-198 and many more. Please refer to the user's guides of these modules for details and additional examples.