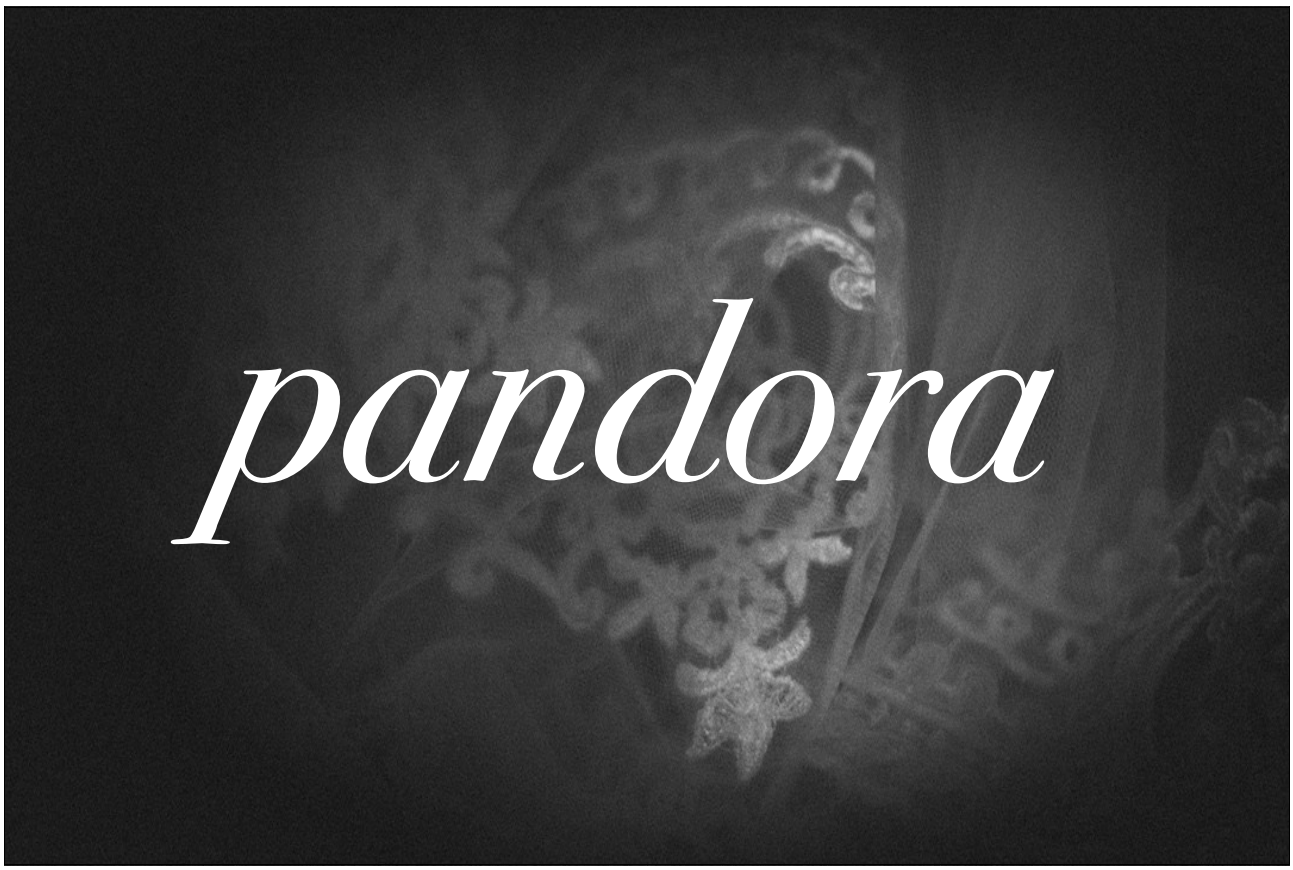
Expert Sleepers



User Manual

Revision 1.0

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Introduction

Congratulations on your purchase of an Expert Sleepers “Pandora”. Please read this user manual before operating your new module.

Pandora is a bandpass filter/distortion processor, based on an unusual combination of power MOSFET transistors and vactrols. Voltage control is provided over the two sides of the filter, the gain, and the filter feedback. A wet/dry mixer is provided, also under voltage control.

A range switch is provided to drop the filter response several octaves, at which point the module becomes capable of synthesising percussion sounds when fed trigger pulses.

The module is 100% analogue.

Installation

House the module in a Eurorack case of your choosing. The power connector is 16-pin Doepfer standard[1]. If using the power cable supplied with the module, the red edge of the cable is closest to the bottom edge of the PCB, and carries -12V. ("-12V" is marked on the PCB itself next to this end of the connector.) Be sure to connect the other end of the power cable correctly, again so -12V corresponds to the red stripe on the cable.

Power requirements

Pandora draws up to 69mA on the +12V rail, and 58mA on the -12V rail.

It does not use the 5V rail.

1 http://www.doepfer.de/a100_man/a100t_e.htm

Inputs and outputs

Pandora's input and output jack sockets are illuminated, lighting red for positive voltage and blue for negative voltage. (Audio appears purple, since it is a rapid alternation of positive and negative.)

From top to bottom, Pandora's sockets are:

- Filter 'Alpha' CV input
- Filter 'Beta' CV input
- Gain CV input
- Feedback CV input
- Mix CV input
- Audio input
- Audio output

For the gain, feedback, and mix CV inputs, a voltage range of 0-5V corresponds to the full range of the knob. The Alpha and Beta inputs, a CV of 0-12V corresponds to the knob range. In all cases, the knob and CV are simply added, and negative CVs are accepted (a negative CV having the same effect as turning the knob counter-clockwise).

Controls

There are five knobs, which correspond exactly to the five CV inputs: Alpha, Beta, Gain, Feedback, and Mix.

There is also a switch, which sets the filter frequency response range to either 'High' (recommended for audio processing) or 'Low' (recommended for drum synthesis – more on that below). Low is about four and a half octaves below High.

Signal flow

At the heart of the module is an amplifier circuit based on a complementary pair of power MOSFET transistors[2]. This is capable of tremendous amounts of gain (about 200x), and so is preceded by a gain control block, controlled by the Gain knob and CV input. Small amounts of gain results in approximately linear operation, whereas large amounts of gain lead to massive saturation in the MOSFET pair, giving all sorts of pleasant crunchy sounds.

Additionally, the amplifier is wrapped in components to form a “twin-t” filter, a bandpass filter topology that is commonly used in analogue drum synthesizers. The resistive elements of this filter are two vactrols, controlled directly by the 'Alpha' and 'Beta' knobs and CV inputs.

The filter has a feedback path, controlled by the 'Feed' knob and CV input. It will readily self-

2 If you've heard about CMOS pairs in the context of filters before it was probably related to the EDP Wasp filter. That circuit famously 'abuses' a CMOS inverter as a gain element; Pandora on the other hand uses discrete transistors, but the idea is the same. The filter topologies are however entirely different.

oscillate.

Finally, there is a dry/wet mixer, controlled by the 'Mix' knob and CV input. With the Mix knob at 0 the output is purely the unaffected input signal; with the Mix at 10 the output is only the filter output.

Filter control

The Alpha and Beta controls both affect the centre frequency of the filter (which, as already mentioned, has a bandpass response), but in very different ways. When exploring the module, we suggest you start with Alpha at 10 and Beta at 0. Also, try Gain at 3 (for minimal distortion), Feedback at 0 and Mix at 10 (so you're only hearing the filter output). For audio processing, set the switch to High.

From these settings, reducing Alpha will sound similar to lowering the cutoff of a low-pass filter, though this is not in fact what is happening.

Starting again from Alpha 10, Beta 0, raising Beta will sound similar to raising the cutoff of a high-pass filter.

Note that in both cases, turning the knob clockwise corresponds to raising the centre frequency of the filter. It is however such a broad peak (with no feedback applied) that you tend only to notice the far edges of the filter response taking effect.

Alpha and Beta also have complex interplay with the filter gain and bandwidth. Your best bet is probably to use your ears and find something that sounds good!

Use as a drum synth

Setting the switch to Low changes the filter centre frequency range to one more appropriate for drum synthesis, though you are of course free to use it in this position for audio processing as well. All the other controls continue to work exactly as before.

Suggested starting points in this use case are: Alpha 10, Beta 5.5, Gain 5, Feed 3, Mix 10. Hit the module input with a short trigger pulse (around 10ms). This should give you an analogue kick drum sort of sound.

Changing Alpha or Beta will change the resonant frequency (pitch) of the drum. Changing Gain (and/or attenuating the trigger pulse) will affect how much of the trigger makes its way to the output as an initial 'click'. Changing Feedback will affect how long the filter 'rings' for i.e. the release time of the sound.

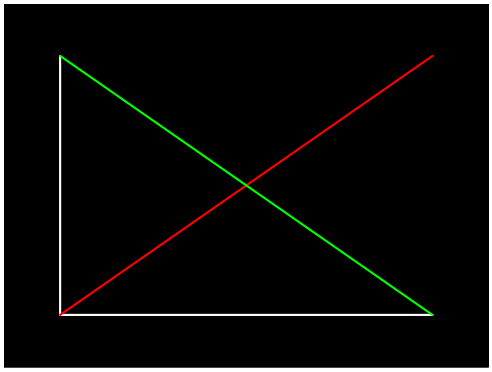
Experiment with CV control over the various aspects of the filter. In particular, it is worth noting that the classic '808' kick drum is achieved by doubling the pitch of the waveform for the first cycle, which you can achieve by giving Beta a separate trigger pulse of just the right length and amplitude.

Another suggestion is to apply an envelope to the Feedback input – triggered with the actual drum trigger, or separately.

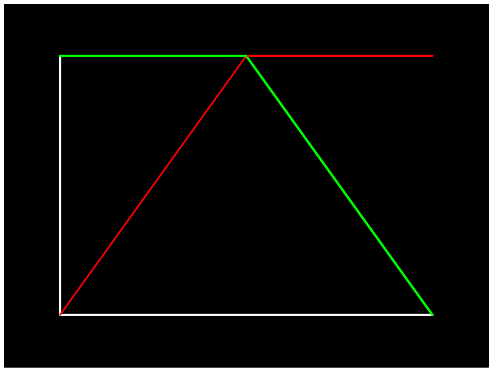
Jumpers

There are two jumpers on the upper PCB, labelled JP1 and JP2. These control the nature of the dry/wet mix, as follows:

- Without the jumpers fitted, the mix is a linear crossfade of the dry and wet signals – at the halfway point, the output is 50% wet and 50% dry.
- With the jumpers fitted, the halfway point is 100% wet and 100% dry. Below halfway, dry stays at 100% and wet fades off as the knob moves towards '0'. Above halfway, wet stays at 100% and dry fades off as the knob moves towards '10'.
  A suggestion of when this is useful: say you have the filter wound up to fairly extreme high pass with lots of saturation. This mix option lets you bring in the filter sound to add more 'hair' to the raw sound, without losing all the lows and mids.



No jumpers



With jumpers fitted

Normally you would either fit both or neither jumpers, but you are of course free to do what you feel gives the best results.

From the factory, the jumpers are in the 'fitted' position.

Where to get help

Email, forum, and social media links can be found at the bottom of every page on our website[3].

Acknowledgments

Black and white photography by Israel Denadai[4].

3 https://www.expert-sleepers.co.uk
4 http://israeldenadai.com.br/bw