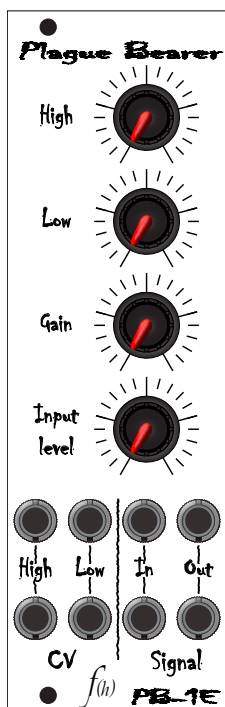


flight of harmony

Plague Bearer

Eurorack and Fractional-rack Modules
~rev2.3~





Components

1	Assembled Plague Bearer filter module
1	DC power cable – 18" 24ga. 5-pin MTA 0.1" Connector

Specifications

(see text for detailed description.)

Supply Voltage (min -> max)	$\pm 9V \rightarrow \pm 15V$
Supply Current (max draw @ $\pm 12V$)	+12V: 6.5mA -12V: 4.0mA
Input Voltage (@ $\pm 12V$)	$0V_{pp} \rightarrow 10V_{pp}$
Output Voltage	$\pm 5V$
Input & Output (I/O) coupling	Capacitive (AC)
Output Impedance	2.2 μF in series with 1k Ω
Control Voltage (CV) inputs	0V -> V+
CV input coupling	Direct (DC)
CV input impedance	100k Ω

Philosophy

The Plague Bearer is called a filter, but that is just a description of the circuit topology, what it can actually do goes way beyond that. It has been described as a filter, a mangler, a crusher, and – my favorite – as an "FSU module".

I think calling it a filter may be a bit misleading, but I have no idea what else to call it. It is a filter, but it does more (all at the same time, really) excessive phase shifting, waveforming, ringing, formant generation, and so on. I guess it could be called a waveform modifier or enhancer, but those don't sound good either. I called it the Plague Bearer for a reason.

If you are looking for technical synthophile specs you are out of luck here. All f(h) devices are designed in accordance with how they sound, not to achieve mathematical perfection.

The most common question I receive is, "what is the filter slope?" Honestly, I never measured that. I specifically avoided the conventional approach while I was designing this circuit, so it's very problematic to try to describe this filter in the normal terms. The slope is directly tied to the gain of the circuit, making it variable, and the Q is affected by all three filter controls. The setup is actually a combined High- and Low-pass. The corner frequencies are adjusted by the controls and can be overlapped completely, which gives a comb-filtering effect.

The rest is for you to discover.

Specification Details

The Plague Bearer filter module rev2.3 is designed to be as versatile as possible. Details:

Supply: This design has been tested from $\pm 9V$ up to $\pm 15V$ and works well in this range, although performance specifics will vary with supply voltage. All measurements, unless stated otherwise, assume $V_{supply} = \pm 12V$.

Output: $V_{out_{pp}} = \pm 5V$. The modules are intended for use in modular synthesizers, so the output is set to the standard level.

Input: This can physically handle pretty much any reasonable (e.g., $< 15V_{pp}$) signal you might throw at it. This is why there is an input attenuator. Lower signal levels will give a much wider range of signal coloration/alteration, while overdriving the input of the filter will give a very harsh distortion and destroy most of the filtering subtleties.

If you find that the filter seems too "touchy", and overdrives too easily for you, try attenuating the signal before the module.

Controls

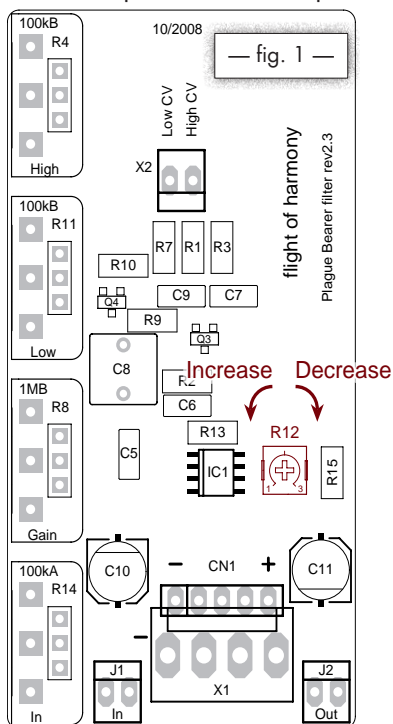
High: Okay, a confession: The controls are technically labelled incorrectly. *High* actually controls the cutoff frequency (f_c) of the lowpass portion (how much of the high end is let through), while *Low* controls the f_c of the highpass section (how much of the low end is let through).

Having said that, clockwise rotation of the High control increases the high end of the signal. This also increases the resonance of the filter. Applying an increasing CV to the High CV input will act the same as clockwise rotation.

Low: This one is rather weird. Clockwise rotation of the Low control will increase the amount of the low end passed through the filter (i.e., it lowers the highpass f_c), and dramatically boosts the resonance. Applying an increasing voltage to the Low CV input also acts as clockwise rotation, which is the weird part: Increasing the Low CV lowers the highpass f_c , allowing more low end through.

Gain: Controls the gain of the filter. Clockwise to increase, yadda yadda yadda...² The part to keep in mind is that increasing the gain increases the resonance, and the PB was designed to go absolutely nertz from this. The filter will easily oscillate and scream at you. The gain also directly controls the amount of internally-generated noise fed through while the input is at or near minimum.

Input: This is the input attenuation control as mentioned above.



Connections

Figure 1 is an outline drawing of the board and its components. Most should be self-explanatory and are silkscreened on the PCB itself, except for the I/O connections – the input connector is on the left side, next to the input level pot, and the output is on the right. the pins on the CV connector are marked on the PCB, not so for the I/O connectors (again).

Input: J1 – LEFT pin is signal/tip, RIGHT pin is ground/sleeve

Output: J2 – RIGHT pin is signal/tip, LEFT pin is ground/sleeve

Power Cable

PB-1E: 9" Ribbon cable with standard 16-pin connector on one end, and a green 5-pin AMP connector on the

2. Equivalent to "blah, blah, blah..."

other. Connect green connector to board, black connector to power bus.

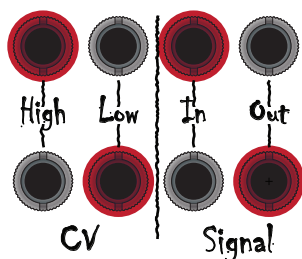
PB-1F: 18" 4-wire cable with identical red AMP connectors at either end. Just plug it in.

Output level Adjustment: Trimpot R12 adjusts the output amplitude from 0 \rightarrow $\pm 5V_{pp}$. Turn trimpot counterclockwise to INCREASE, clockwise to DECREASE.

Jacks

There are eight jacks per filter, two for each input and output. The pairs of jacks are wired directly together (called "multiples"), to allow you to pass the signal on to some other module ("daisy-chain") as well, making the unit transparent in regard to the number of connections used up.

The jacks are very closely placed, yet it is possible to use all of them at once if you are using narrow-bodied plugs. When not using the secondary connections, it is recommended that you stagger the placement of your plugs as in figure 2.



— fig. 2 —

Making Noise

The PB filter can also act as a noise generator³, and quite a variable one at that. To do so, just turn the input all the way down (CCW), turn the gain up a bit, and then adjust the High and Low controls to get the desired tone of noise. You can get some interesting percussion sounds by applying an impulse or saw wave to the High CV input, or some nice wind/whooshing sounds with a slow sweep. Daisy-chaining (series-connecting) a couple filters makes some nicely creepy ambient effects.

3. Caveat: *The noise feature is very quiet!* I'm talking millivolts here. It works, trust me, that is the first and last function I test before shipping. If you can't hear any noise, crank up your output amplifier. If you still can't hear it, use a preamp as well. It is worth it!

Self-Oscillation

While it is possible to get the Plague Bearer to self-oscillate, this ability varies greatly. It is dependent upon the manufacturing process of IC1, and cannot be guaranteed. It is not a feature, just an added bonus that may be present.

That being said, the following procedure is the simplest approach to this:

1. Turn the input all the way down.
2. Turn the gain all the way up.
3. Set the high control around the middle.
4. Now slowly start turning up the low control.

You may have to play around for a bit, it's another one of those "sweet spots", but it will start to make a moaning/howling sound. It can quickly overload and start screaming if you turn up the low too far, so go slowly. The high, low, and gain all interact, so there's a lot of possible combinations.

Once you've gotten the hang of making it oscillate, try using the CV inputs to control the oscillating frequency. Don't even ask me about V/oct., that's not the point of this thing.

Stuff

There is a lot of discussion about the Plague Bearer on the Muffwiggler forums, come check it out! People have posted some excellent demos on there. I haunt the forums as well.

<http://www.muffwiggler.com/forum/index.php>

A big thank you to those who have sent in suggestions and comments, keep them coming!

Send samples to: samples@flightofharmony.com

Comments, suggestions, complaints to: flight@flightofharmony.com

Drawings and designs ©2008 flight of harmony / Red Hand Studios

<http://www.flightofharmony.com>

revised 3/09

Can you hear them?

$f_{(h)}$