Mutant Hihats

dual analogue hihats user manual v1.09 HEXINVERTER.NET

Thank you for your interest in the Mutant Hihats module (MHH)! The Hihats are a 13HP eurorack format synthesizer module available both as a ready-assembled product and a printed circuit/panel set you can build yourself if you have the skills.

THE HIHATS

The MHH is a powerful dual hihat drum generator. There is an open hihat and a closed hihat circuit which share a noise source, but function independently. There is an internal electro hihat noise generator (inspired by the TR-808), however, you can plug in virtually any sound source to the EXT (external) input and synthesize percussive sounds from it. There are a great amount of sounds possible by experimenting with different signal sources!

FEATURES

- analogue hihat circuitry capable of synthesizing vintage and otherwise sounding open and closed hihat sounds
- external audio input lets you synthesise hihats from virtually any sound source (Jupiter Storm, vcNOIZ, etc.)
- lo-fidelity original VCAs upgraded to OTA-based modern VCAs
- VCA drive control for each hihat allows you to dial in anything from soft metallic hihats to extremely overdriven, crunchy hihats
- exclusive switch lets you select how the two hihats (open/closed) interact with eachother when triggered at the same time
- cutoff frequency control for internal resonant bandpass filter
- resonant filter can be switched on/off
- modular level mutual accent input (0-5V CV)
- trigger input accepts almost anything as a trigger signal
- non-invasive analogue optocouplers used for voltage control, thus, completely vintage sounds can still be had if that's what you're after!
- completely redesigned, hi-fi signal chain spares no expense by replacing cheap transistor amplifiers with low noise opamp and OTA equivalents
- you can dial in super hot, modular level output levels (up to 20Vp-p!)

The Mutant Philosophy

There are already some really excellent clones of vintage gear out there in the modular world. The Mutant Drums were not made to try and fill that role. Although each Mutant began as a favourable classic drum topology, we wanted to create something modern and different, while still maintaining an analogue nature. Features like CV inputs and signal routing not found on classic analogue drum machines were incorporated to make the circuit a powerful creative tool in your modular synthesizer, rather than just transplanting a vintage drum circuit into your machine.

TECHNICAL SPECIFICATIONS

Width: 13HP | **Depth:** 30mm
Current draw: +75mA, -45mA @ 12V

USING THE HIHATS

DRIVE CONTROLS

Each hihat's VCA has its own DRIVE control. The hihat can be clean and crisp sounding when turned low but can be seriously overdriven when turned up. While this control does tend to affect the volume, don't think of it as a volume control!

CUTOFF CONTROL

The resonant bandpass filter's CUTOFF can be varied with this control.

> ***WHY IS THERE NO CV OF CUTOFF?***
> We thought of adding CUTOFF CV, but, there were so many other things we wanted to do so it didn't fit into the design. There is a reason why a VCF is its own module – they take up a lot of circuit space! Also, read the note below:
>
> ***A NOTE ABOUT THE CUTOFF CONTROL***
> You'll probably notice that the volume and resonance suddenly spikes near the end of the control. This is because the control isn't exactly controlling CUTOFF only. Because of needing to fit so many features into the circuit, the filter is very basic and varying its frequency affects other filter parameters. So, it wasn't a good candidate for voltage control, but, a manual control knob suits it perfectly!

FILTER SWITCH

The bandpass filter (which the CUTOFF knob controls) can be bypassed with this switch.

TRIG INPUTS

Each hihat has its own trigger input. Each input has an approximately 1V trigger threshold and activates the hihat when that threshold is met. Almost any signal can be used as a trigger as long as it goes all the way back down to 0V and up again with each repetition.

ACC INPUT

This is the **global** ACCENT input. Applying a 0-5V signal here will vary the ACCENT amount of **both hihats** from least (0V) to most (5V). ACCENT varies the volume of the hihats.

> **When nothing is plugged into the ACC INPUT, the ACCENT defaults to either minimum or maximum ACCENT based on the jumper setting on the back of the module. To change whether the input is pulled up (MAXIMUM) or down (MINIMUM) by default, turn off the power to your modular and remove the module from your case so you can move the jumper on the back of the PCB to the desired setting.**

EXT INPUT

Plug in a sound source from elsewhere in your modular system. This will override the internal electro hihat sound generator. This opens up an entirely new realm of sonic possibilities.

EXT CONTROL

This controls the volume of the sound source you are using. **NOTE that if nothing is plugged into the EXT input, the EXT knob controls the volume of the INTERNAL sound generator (and thus the volume of both hihats at once)!**

DECAY CONTROL

The DECAY of the **OPEN** hihat can be varied with the DECAY control (the CLOSED hihat's decay is fixed). The DECAY length can be varied from brief "clicks" to almost sustained sound via the knob or CV at the DECAY CV input.

EXCLUSIVE SWITCH

This switch changes the way the two hihat generators interact with each other when they are triggered at the same time. Interesting dynamic effects can be achieved without any ACCENT modulation by using these features!

The TR-808's closed hihat created a musically pleasing effect by turning off the tail of the open hihat's decay envelope so that the open hihat's length was reduced when the closed hihat sounded. This mimicked the way a real drum kit works. This classic mode is called **FADE** on the MHH. To enable more control, we added a new **EXCLUSIVE** mode in which the closed hihat immediately turns off the open hihat instead of just shortening its tail, creating a super dramatic effect. If you don't want either, you can disable all interaction between the two hihats by turning the switch to **OFF**.

OUTPUTS

Each hihat generator has its own modular level sound output. These outputs can produce very high output levels (up to 20V peak-to-peak).