

# Rabbit Hole User Manual

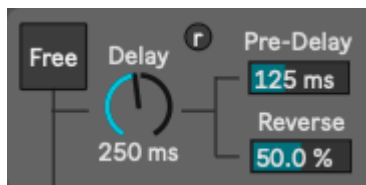


## Introduction

Rabbit Hole is a chaotic modulation delay. Modulation delay is the fundamental algorithm behind effects like vibrato, flanger, chorus, vibe, and doubler. When a sound is delayed while the delay size (the buffer length) is modulated, we can hear spectral effects that go from a subtle phasing of the partials to an actual detuning. “Chaotic” refers to the LFO being generated from a random sequence.

Being unexpected and partly unpredictable is the core identity of Rabbit Hole, as it is possible to use it to add brand-new layers of sound to the original input, resulting in the continuous creation of glitchy, thick, and pulsating sonic textures. The inspiration behind it comes from glitch, IDM, and electroacoustic music.

The following paragraph will describe the device section by section, which is hopefully enough as a starting point to operate on it.



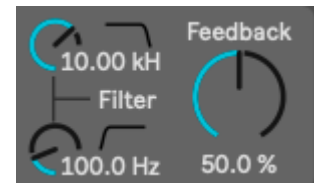
## Delay Section

Placed in the upper-left corner, this section is where the Rabbit Hole engine starts. It includes the following controls:

- **Free/Sync:** it changes the delays, the pre-delay, the rate, and the loop units from milliseconds and seconds to musical durations.
- **Delay:** it sets the delay size in ms or musical durations, depending on the status of the Sync switch. Rabbit Hole has several delay lines in parallel and series configuration, modulated by a set of chaotic LFOs. Without modulation, they are all set to this value.
- **Reset (r):** it empties all the delay lines, acting as a panic button. For a more efficient sound reset, it is recommended to turn the feedback to 0% during the process.
- **Pre-Delay:** a non-feedback delay buffer using ms or musical durations, depending on the status of the Sync switch. It sets a fixed “slapback” or “phased” effect.
- **Reverse:** controls the amount of reversed signal in cross-fade with the forward one. It comes from a parallel buffer of the same size as the delay. It resets itself every time the main delay value changes. When reset, it takes the full delay size time before the buffer is filled again and ready to output sound. The signal goes through an envelope function to prevent clicks. This creates a default fade-in.

### Filter and Feedback Section

Placed at the upper-right corner, this is where the Rabbit Hole sound can be additionally sculpted and refined. Feedback creates a regeneration of the delayed sound, and the two filters reduce the spectral bandwidth. It includes the following controls:



- **Hi-Cut:** A frequency cutoff of a 1st order low-pass filter nested into the delays feedback chain. Lower values make the feedback sound darker.
- **Lo-Cut:** A frequency cutoff of a 1st order hi-pass filter nested into the delays feedback chain. Lower values make the feedback sound brighter.
- **Feedback:** controls all the feedback and the cross-feedback (feedback between different delay lines) amount.



## Modulation Section

Placed in the lower-left corner, this is where we can modify the sound to its fullest, giving the desired shape to our modulation to generate more layers of sound. It includes the following controls:

- **Rate:** it is the rate of the main LFO, from which all the others are driven. It uses Hz or musical durations, depending on the status of the Sync switch. The blinking light marks the general speed.
- **Depth:** it regulates the depth of all the LFOs. The LFOs generate values between 0 and 1. When Smooth is off, it creates sudden glitchy jumps, and it is plotted with an exponential mapping.
- **Seed:** it initializes the pseudo-random number generator, generating different sequences of numbers. Seed and sequence values grow together. The seed value always represents the sequence at the current time frame. You can check its progress on the visualizer by selecting the Noise tab.
- **Loop:** it sets the length of the random sequence in seconds or musical durations (depending on the status of the Sync switch) starting from the seed number. If non-zero, it retriggers the noise function when it reaches the set value, creating a loop. When it equals 0, there is no loop.
- **Retrig:** it restarts the sequence at the given seed.
- **Smooth:** it removes the glitchy jumps.

## Output Section

Placed in the lower-right corner, here we can make the last adjustments to refine our sound. It includes the following controls:



- **Swap:** it swaps the left and right processing branches — yes, they do different things
- **Mono:** it sums the left and right input signals and the left and right processed output signals. The dry signal is unaffected by it.
- **Gain:** final gain stage. It doesn't affect the dry signal.
- **Dry/Wet:** last control in the chain, crossfades between the original and the processed sound.

- **Visualizer tab:** it affects what we see on the visualizer at the right side of Rabbit Hole.

- **LFO:** a plot of the 6 LFOs in blue — the yellow line represents their overall motion. When Smooth is off, it plots the LFOs with an exponential mapping.



- **Noise:** a greyscale vector plot of the pseudo-random sequence. Left and Right are meters reporting the current values as they come out from the LFO, representing the zero level with a black color and the highest peaks (only when Depth is 100%) with a white one. The main LFO here downsamples the sequence at a frequency determined by the Rate parameter. When Rate is very fast, Left and Right will flash at a higher speed.



## In-Depth

Rabbit Hole delay lines are several, and they are specifically designed to create quirky sounds. Moreover, they have several saturators that add distortion depending on how loud the input and the feedback are. Its LFOs are phase-locked and bound to a primary noise — a pseudo-random function. The sequence is downsampled by the main LFO to produce values that are suitable for modulation usage. The LFOs have slightly different phases and rates, contributing to the richness of the sound. Before modulating the delay lines, they are distorted by a set of dividers that continuously scale their amplitude, resulting in a series of springy jumps. The Smooth switch can be used to turn this effect off.

Rabbit Hole can add vitality to drum beats with its unpredictable behavior, which can be managed by limiting its action with the Loop function. Starting with the Sync button turned on, users can set desired Delay Size, Rate, and Depth values, and finally, set the Loop duration to a larger value. Factory presets that have the Sync active can provide a good starting point for this method. Regulating the filters and feedback will help users achieve a more refined result.

When used with sounds other than a drum beat, you might want to turn the Smooth on and the Sync off (to not depend on the Tempo and work with absolute values). Long delays with slow, high-depth modulations can create eerie glissandi, while short delays with high feedback values can produce howling effects. Depth can be used to constrain the tonal range of modulations, which also varies depending on the main Delay size, Feedback brings sustain, and the filters smoothen the result. Pre-Delay adjusts the "slapback effect" between dry and wet, and Gain affects the output gain of the wet signal, which can lose energy when filtered.