

Tesseract Echo User Manual



WHAT IS IT?

Tesseract Echo merges the **vintage imperfection** of **magnetic tape echo** with the **digital precision** of a modern **multi-tap delay**. At its core lies a shared memory line where the signal cascades from one tap to the next, allowing you to build everything from precise rhythmic patterns to ambient soundscapes.

Designed for deep sound exploration, its main features include:

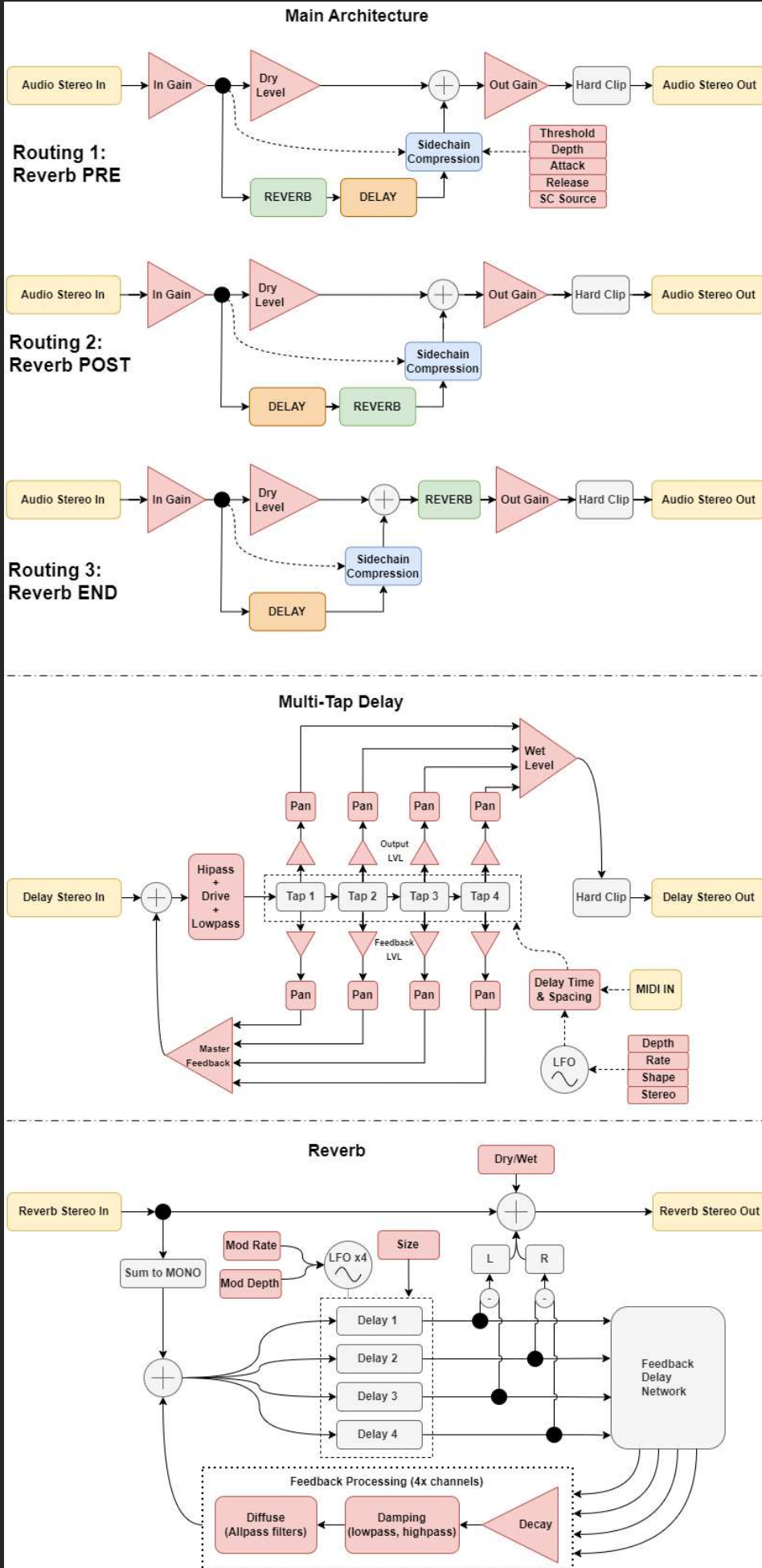
- **4 Cascaded Delay Heads:** Independent On/Off, Level, and Panning controls for both Output and Regeneration paths.
- **Analog-Modeled Feedback Loop:** Dedicated Highpass/Lowpass filters and a Drive circuit sit directly inside the feedback loop to shape the repeats.
- **Stereo Modulation:** Delay time modulation with an adjustable L/R offset transforms standard tape flutter into a massive, wide-spread stereo chorus.
- **Sidechain Ducking:** A built-in compressor shapes the echoes' volume relative to the dry signal or an external input.

HOW TO USE IT?

- **Delay Taps:** The 8 central pads (Delay Outputs & Regeneration) are your mixing desk. Click them to toggle the active state of each head. Click and drag the same pads vertically to adjust their Level, or horizontally to adjust their Pan.
- **Smart Tooltips:** Hover over any parameter to read its function in the footer section. You can also click the footer to type a custom description that will be saved alongside your preset.

SIGNAL FLOW DIAGRAM

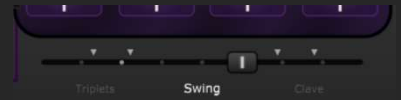
Every red object is a controllable parameter. Signal lines are all stereo (unless explicitly said).



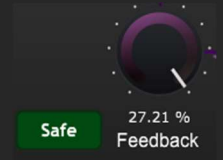
MAIN PARAMETERS

Delay Section

- **Delay Time:** The delay can be set either manually or by selecting BPM **Sync**. Its value is related to **Tap 4** Delay Time.
- **Spacing:** The Spacing parameter alters the **time relationship** between the taps, allowing you to dial in different rhythmic delay grooves. The triangles drawn on the slider show their timing relationships relative to the **Even** Spacing.



- **Feedback:** The delay can easily **self-oscillate**. This means the signal is passed from one tap to the next, stacking up to generate highly distorted and very loud noises (which can be a great creative tool!). When **Safe** mode is **enabled**, the feedback is automatically limited below the self-oscillating ceiling (dynamically). When it is **disabled**, a visual drawing inside the Feedback knob indicates the safe (green) and self-oscillating (red) zones.



NOTE: Feedback automation in the DAW is blocked when Safe mode is active.

- **Kill:** If you ever lose control of the feedback, press the Kill button to instantly clear the delay memory and silence the feedback loop.
- **Drive & Filters:** this circuit (Highpass > Soft-Clip > Lowpass) shapes the tone of the delay. This stage is applied inside the feedback loop and it shapes the combined 'input + feedback' signal.



Dynamics & Routing

- **Sidechain Compression:** Found inside the Advanced Section, this component automatically ducks the Wet volume using a compressor triggered by the internal Dry signal or by an external sidechain source (DAW). The compressor input may vary depending on the current Routing settings.
- **Routing (Pre/Post/End):** Route the Reverb before (**PRE**) or after (**POST**) the delay into the compressor, or place it after the compressor (**END**) acting on the final mix bus.
- **Limiter:** To guarantee protection from digital clipping, the output signal is limited at two stages: post-fader of the delay, and at the very end of the processing chain.



Modulation & Stereo Width

- **LFO:** inside the Advanced Section you will find a stereo LFO that modulates the delay time.
- **Stereo Width:** Create width by adjusting the Pan on individual taps, or by increasing the **LFO Stereo** parameter. This offsets the modulation phase between L/R channels (maximum width is achieved at 180° for sine/triangle shapes, and 360° for random).



USER INTERACTION

Knobs & Sliders:

- **Alt+Click:** Instantly resets any knob or slider to its default value.
- **Quick Value Entry:** Inside the Text Box you can type decimal values omitting the dot: e.g. typing values like '005' will set '0.05' automatically.



Matrix Pads (Tap Buttons):

- **Value Display:** Clicking on the light bulb button reveals all parameters' exact values in the relative Text Box.
- **Click:** Toggles the Output or Feedback Regeneration of each head.
- **Double Click:** Type precise values for the head's values (e.g. type "100 -25" to set "Vol: 100, Pan: -25").
- **Drag Up/Down:** Adjusts the Volume. (Lock panning by holding Ctrl/Cmd).
- **Drag Left/Right:** Adjusts the Panning. (Lock Volume by holding Shift).
- **Alt + Click:** Resets the Volume and Panning to default, without changing its active on/off state.

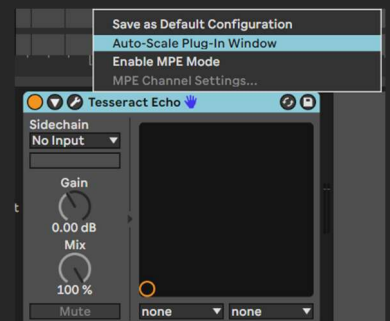
Delay Time Shortcuts:

- **Smart Delay Time (ms):** Click the Delay Time text box to use quick math and tempo sync commands:
- Type MIDI note names like **C2**, **C#2**, or **Eb3** to instantly tune the delay time of Tap 4 to that exact pitch.
- Type ***2** to double the current time, or **/2** to halve it. (You can use decimal values too).
- Type **120bpm** to automatically calculate the delay time in milliseconds for that tempo.
- **Pro Tip:** You can combine commands! For example, type **120bpm * 1.001** to sync to your host tempo but push it very slightly out of phase, creating a non-perfect, organic analog feel.
 - *NOTE: When SYNC is active, the Delay Time value is fixed.*
- **Preset Lock:** Click the small Lock icon next to the Delay Time to maintain your current tempo while browsing different presets and/or randomizing the preset.



GUI Scaling in Ableton Live:

By default, Ableton Live may apply auto-scaling to VST3 plugins, resulting in a slightly **blurred interface**. To unlock the native **high-definition graphics**, right-click the device in your track, uncheck "Auto-Scale Plugin Window" and reload the plugin.



Tesseract Echo as a MIDI Instrument

Tesseract Echo offers three distinct operation modes to manage the delay time, accessible via the dedicated **Mode** button on the interface.



- **Default:** The standard operation mode. The delay time is entirely controlled by the GUI knob and tempo-sync shortcuts.
- **MIDI:** The delay time automatically tracks incoming MIDI notes, tuning the delay to match the played pitch (Karplus-Strong synthesis). **Tap 4** will play the **fundamental** root note. Taps 3, 2, 1 play higher octaves. *(Requires both audio routing as a trigger and MIDI routing for tuning).*
- **MIDI Instr. (Instrument):** Identical to MIDI mode, but every incoming MIDI Note-On message also generates an internal audio impulse (a 'trigger'). This effectively turns the plugin into a mono-legato standalone synth. *(Requires only MIDI routing, place Tesseract Echo at the beginning of a MIDI track chain).*

Karplus-Strong Sound Design Tips: When using the plugin as a pitched resonator, standard delay parameters take on these new musical meanings:

- **Delay Taps = Oscillators:** For a pure fundamental pitch, enable only **Tap 4** (Out Vol & Fb Vol at 100%). Add overtones by introducing other taps.
- **Spacing = (De)tune:** Leave Spacing at 'Even' for perfect concert pitch, or automate it to shape the pitch and timbre related to the taps cross-interactions.
- **Feedback = Release:** The Feedback dictates the sustain of your "string". Turn it to the edge of the self-oscillation zone (double click on the Feedback knob) for the longest notes. Safe mode is highly recommended.
- **Filters & Drive = Tone Shaping:** Lowering the Low-Pass frequency simulates natural string damping, transforming metallic buzzes into warm plucked strings or bass guitars. Pushing the Drive introduces harmonics and compression, which can alter the overall decay.
- **Modulation = Vibrato:** Apply the LFO (Advanced Section) to the delay time to introduce vibrato. Note that continuous delay time shifts will dampen the feedback energy, naturally shortening the note's release. The LFO Rate can reach audio frequencies (up to 3.5 kHz) for extreme robotic and metallic timbres, *though pushing it too hard may introduce aliasing.*
- **Glide = Portamento:** You can play mono-legato notes and set the portamento time.
- **PRE Routing = Ambient Bowing:** Routing the Reverb before the delay (PRE) washes the initial impulse, turning the resonator into a lush pad. The reverb acts as the "body" of your synth, making every parameter crucial: **Size** defines the physical room dimensions, **Diffuse** controls the texture of the reflections (from grainy and sparse to a smooth, dense wash), **Damping** colors the tone, and **Modulation** (Rate/Depth) adds a lush chorus effect. Pay close attention to Decay and Mix, as feeding too much reverberated energy into a high-feedback delay can drastically lengthen the sustain or overload the sound!

This plugin is completely Free.

Consider supporting my work with a small donation here: [<https://ko-fi.com/treblemusic>]