

Tape Echo 2

three-head tape delay with spring reverb

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Tape Echo 2 User Manual

Version 1.0.0

Tape Echo 2 is a three-head tape-delay and spring-reverb effect. It models the mechanical timing, record and playback coloration, regeneration, tape wear, splice dropout, input/output amplifiers, and independent echo and spring returns of a classic hardware echo workflow.

Signal flow

The stereo input is summed to the modeled record and spring paths. Input drives both paths. Record Input interrupts the tape-record feed while the spring remains live, which makes dub-style echo tails and reverb-only operation possible. The selected playback heads feed both the echo output and the regeneration loop. Bass and Treble affect only the echo return. Echo and spring then receive their own level and pan settings. Mix crossfades the direct path against the combined echo and spring returns before Output applies the final stereo trim.

The VU and peak lamp monitor the record path after Input and include regeneration. They remain active when Record Input is off and go dark when Power is off.

Control names in this manual are the legends printed on the panel. Seven host automation parameters carry a different name from the legend that drives them, because those names were fixed by the 0.1 series and are kept so old projects keep loading; each one is noted in parentheses where the control is described.

Controls

Echo section

- **Head Select** (automation name: Mode) chooses one of 12 head/spring routings:

1. Head 1
2. Head 2
3. Head 3
4. Heads 2 + 3
5. Head 1 + Reverb
6. Head 2 + Reverb
7. Head 3 + Reverb
8. Heads 1 + 2 + Reverb
9. Heads 2 + 3 + Reverb
10. Heads 1 + 3 + Reverb
11. Heads 1 + 2 + 3 + Reverb
12. Reverb Only

- **Repeat Rate** controls tape speed. Head 1 spans approximately 177 ms at the slow end to 69 ms at the fast end. The corresponding Head 2 range is 337 to 131 ms and Head 3 is 489 to 189 ms.
- **Intensity** controls regeneration. High values can self-oscillate and become substantially louder than the input.
- **Echo Level** (automation name: Echo Volume) sets echo-return level.
- **Reverb Level** (automation name: Reverb Volume) sets spring-return level in modes 5 through 12.
- **Bass** and **Treble** shape the echo return without changing the dry or spring paths.

Record and transport section

- **Input** (automation name: Input Volume) sets record/spring send gain and drives the modeled input amplifier and tape nonlinearity.
- **Record Input** (automation name: Input Send) toggles new material into the tape loop. Switching it off lets existing repeats decay while the dry and spring paths continue.
- **Tape Age** selects **New**, **Used**, or **Old** tape. New retains a very quiet tape/electronics bed; older states progressively add bandwidth loss, noise, transport variation, level wear, and a more audible tape splice.
- **Wow & Flutter** extends the intrinsic transport movement from subtle mechanical motion to a creative wobble range.
- **Power** is the host-designated bypass and uses a click-free transition.

Tempo and mix section

- **Tempo Sync** derives delay from the host tempo. The rhythmic value belongs to the leading active head in the selected mode. Head 1 spans roughly 70 to 178 ms, and a note longer than the tape can physically carry is held at that maximum rather than transposed, exactly as the hardware behaves. Longer divisions therefore converge on the same endpoint timing at a given tempo, and slow tempos reach the limit sooner. Use a shorter division, or a multi-head mode, when you need the repeat to track the bar at low tempos.
- While Tempo Sync is enabled, the **Repeat Rate** knob becomes the note selector (automation name: Echo Rate Note). It keeps its panel legend and steps through eleven detents instead of sweeping continuously. Each detent selects a rhythmic value for the leading active head, so the available values change with Head Select. The three head displays show the exact $\mathfrak{d}$ (dotted), $\mathfrak{t}$ (triplet), $+/-$, and out-of-range blinking indications used by the reference unit. Changing Head Select keeps the knob at the same detent and updates its note assignment. The older Sync Division parameter remains hidden so projects and automation saved by the 0.1 series continue to load correctly.
- **Mix** crossfades the direct signal against the combined echo and spring returns. At 0% the output is dry-only, 50% preserves both paths at unity, and 100% is fully wet for send/return use.
- **Echo Pan** and **Reverb Pan** place the two wet returns independently.
- **Output** (automation name: Output Volume) provides -20 dB to $+20$ dB after the complete mix; its midpoint is unity gain.

Factory presets

Preset	Purpose
Default	Neutral Head 1 starting point
Slapback Vocal	Short, full-level vocal slap
Rockabilly Guitar	Bright single-head rockabilly echo
Classic Tape Echo	Medium Head 2 echo
Dub Throw	Long feedback throw with a dark return
Synced 1/8 Dub	Host-synced Head 2 dub echo
Multi-Head Bounce	Heads 2 + 3 with spring and right-panned echo
Orbital Echo	Host-synced Heads 1 + 2 with split wet panning
Full Wash	Old-tape three-head and spring wash
Ambient Trails	Old-tape Head 3 and spring ambience
Worn Tape	Old-tape pitch and tone character
Runaway Drone	High-feedback Heads 1 + 3 texture
Spring Only	Head Select 12 (Reverb Only) spring-reverb return

Factory programs never change host bypass or restore meter outputs. The two synced programs use host tempo; all other programs use the stored free-time rate.

Host and format notes

Tape Echo 2 is available as VST3, CLAP, LV2, and Audio Unit on supported platforms. It accepts mono or stereo program material and produces stereo output. Tempo Sync requires a host that supplies a valid tempo; 120 BPM is used as a safe fallback when tempo information is unavailable.

By default, macOS builds are ad-hoc signed and are not notarized. The first time a downloaded build is loaded, Gatekeeper may report that it cannot verify the developer. Approve the plugin once under System Settings > Privacy & Security (“Open Anyway”), or remove the quarantine attribute from the installed bundle in Terminal, for example: `xattr -dr com.apple.quarantine ~/Library/Audio/Plug-Ins/Components/tape_echo.component`. Rescan or restart the host afterward; Logic Pro users should re-run the Audio Unit scan.

When `MACOS_SIGNING_ENABLED=true` and the required Apple signing and notarization secrets are configured, the release workflow instead produces Developer ID signed and notarized AU, VST3, and CLAP bundles. The LV2 bundle is Developer ID signed but is not submitted for notarization.

Parameter IDs from the 0.1 series are preserved. Mix was appended after all previously shipped IDs. The hidden Dry Level parameter retains its original meaning for old project state and automation. Tape Age snaps stored continuous values to the nearest New/Used/Old state.

Gain and safety

Self-oscillation is an intentional part of the model and can exceed 0 dBFS. Lower Intensity or Echo Level before changing modes on loud material, and use Output for final gain staging. Power clears the modeled loop so stale regeneration does not return when the effect is enabled again.

License and support

Tape Echo 2 is released under GPL-3.0-or-later. Third-party component notices are included with release archives. Support and source information are available at <https://dusk-audio.github.io/>.